Downtown Airspace Development Capacity Study (DADCS)

FINAL REPORT – August 2019

PREPARED FOR
City of San José, California and
Norman Y. Mineta San José
International Airport

PRESENTED BY
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1 Introduction

In 2007, new airspace protection mapping was undertaken by the City of San José which placed height limitations on allowable development surrounding Mineta San José International Airport (SJC) in order to minimize impacts to airline service. The airspace protection mapping consisted of a combination of the lowest critical One-Engine Inoperative (OEI) and United States Terminal Instrument Procedures (TERPS) airspace protection surfaces. However, due to the changing environment in aviation operations as well as the need and desire for future building development in the City of San Jose, a new study was undertaken to assess the existing conditions and future needs of the Airport and the development community. In February 2018, a comprehensive study referred to as the Downtown Airspace Development Capacity Study (Project DADCS) was initiated over and spanned a thirteen-month period. The City of San José along with the consultant project team of Landrum & Brown (L&B), Jones Lang LaSalle (JLL) and Flight Engineering, LLC., assessed the impacts of increased airspace protection heights for SJC and the tradeoffs between increasing allowable building development heights and the impacts to aviation departure operations from Runways 12L and 12R at SJC.

The study consisted of a comprehensive evaluation of the following metrics which will be described in extensive detail in this report:

- Existing conditions assessment for SJC aircraft operations
- Existing real estate and land use environment in the Downtown Core and Diridon Station
- Creation and evaluation of various airspace protection surface scenarios
- Aircraft performance and range capability assessment of existing and future destinations served from SJC
- Evaluation of aviation and real estate impacts associated with each of the airspace protection scenarios.

This final report is a compilation of the various technical memorandums and studies that were assessed by the project team during the thirteen-month period.

On March 12, 2019 the City of San José City Council approved a new policy on airspace surface protection heights in the Downtown Core and Diridon Station areas. The new airspace protection surfaces provide additional development height opportunities within the Downtown Core and Diridon Station which will be described in detail in this report.

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2 Existing Conditions Assessment

2.1 Introduction

A focus of the Downtown Airspace and Development Capacity Study (Project DADCS) is understanding the impacts to airline/aircraft departures in Southeast Flow (Runway 12L/12R) due to the existing obstacle environment south of the Airport. This memorandum provides a summary of an assessment of airport runway configurations, historical weather trends and airline operations/fleet mix at San José International Airport (SJC). Understanding the aircraft fleet mix, times of day when these aircraft operate and the destinations served from SJC is an integral component in evaluating potential impacts to domestic, international and transoceanic operations as it applies to proposed high-rise developments south of the Airport and the potential for modifications to airspace protection surrounding the Airport.

The second part of this memorandum compiles an assessment of the existing air service operations at SJC, regional competition with San Francisco International Airport (SFO) and Oakland International Airport (OAK), and economic influence of the air service area. The following topics are described in detail:

- Bay Area Airport Service Area
- Economic Base of Air Travel
- Benefits of SJC, SFO and OAK
- Bay Area Airports Air Service
- Bay Area Market Share
- Airline Operations
- Costs of Doing Business
- Advantages and Disadvantages of the Bay Area Airports
- Regional Competition

2.2 SJC Airport Operations

2.2.1 Airport Runway Operating Configurations

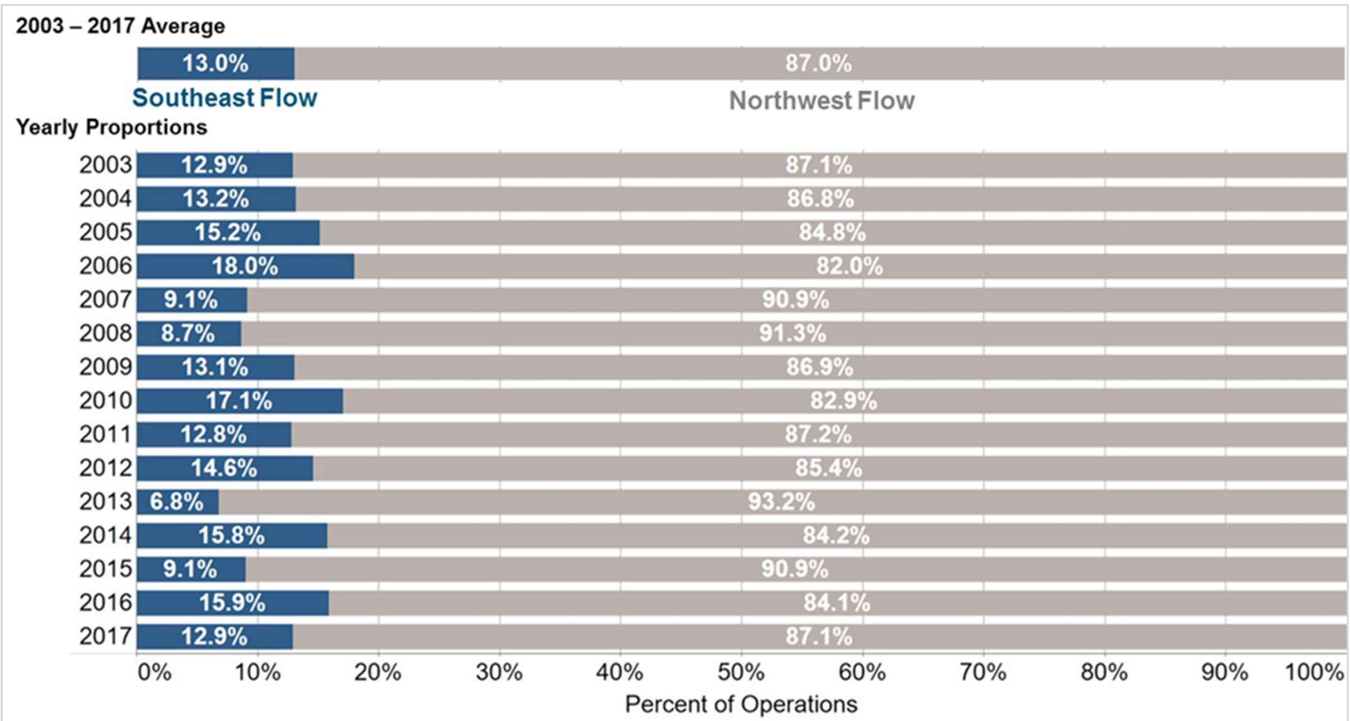
The primary operating configuration at SJC is the Northwest Flow (landing and departing on Runways 30L and 30R). Arrivals on final approach descend over Downtown San José. Departures initially take off over Santa Clara, away from Downtown San José. During Southeast Flow conditions, aircraft land and depart on Runways 12L and 12R, with departures over Downtown San José as depicted in **Figure 2-1**.

Figure 2-1 Runway 12L Departure View of Downtown San José Hi-Rise Buildings

Source: Kimley Horn

As presented in **Figure 2-2**, operations data collected from the SJC Airport Noise and Operations Monitoring System (ANOMS) from 2003-2017 show that the Airport operates in the Northwest Flow approximately 87% of the time annually while operations in the Southeast Flow (arriving and departing Runways 12L and 12R) occur 13% of the time annually.

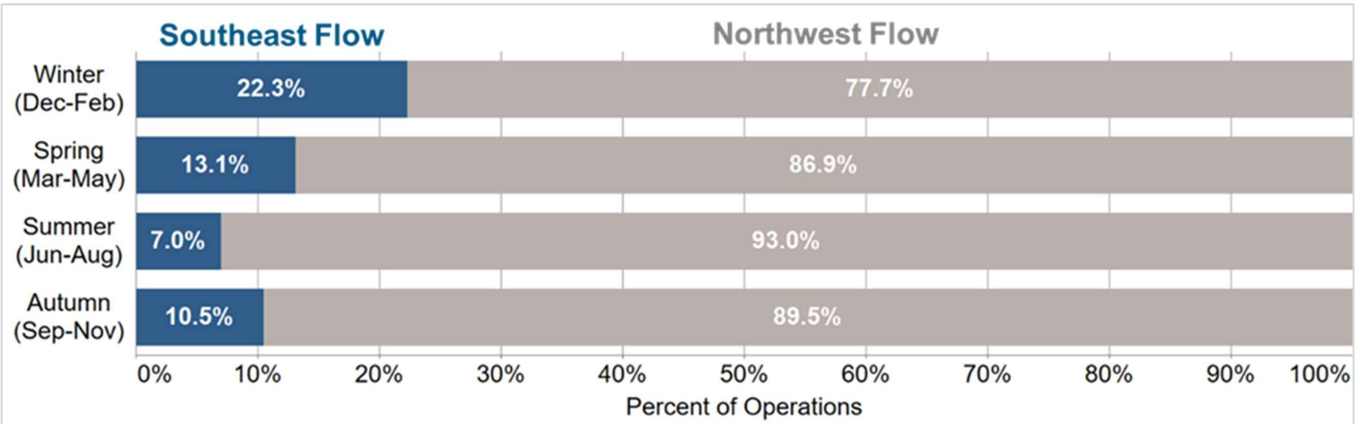
Figure 2-2 2003 – 2017 Historical Airport Runway Configurations at SJC



Source: Data: ANOMS (2003 – 2017), Figure: Landrum & Brown

Figure 2-3 provides a summary of the historical runway configurations by season. It is important to note that operations in the Southeast Flow primarily occur in the winter months between December and February.

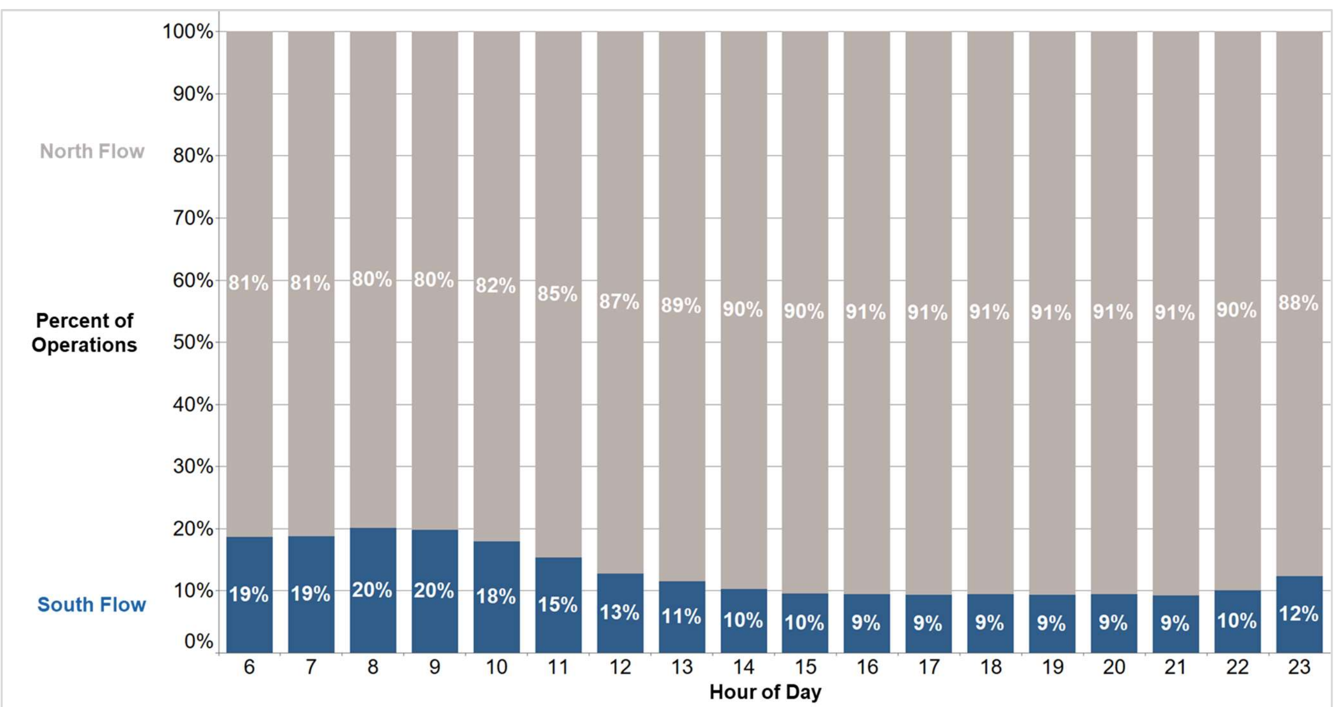
Figure 2-3 2003 – 2017 Seasonal Historical Airport Runway Configurations at SJC



Source: Data: ANOMS (2003 – 2017), Figure: Landrum & Brown

With respect to time of day, the morning hours average approximately 80% of the time in the Northwest Flow. As depicted in **Figure 2-4**, that average increases to approximately 91% in the afternoon hours.

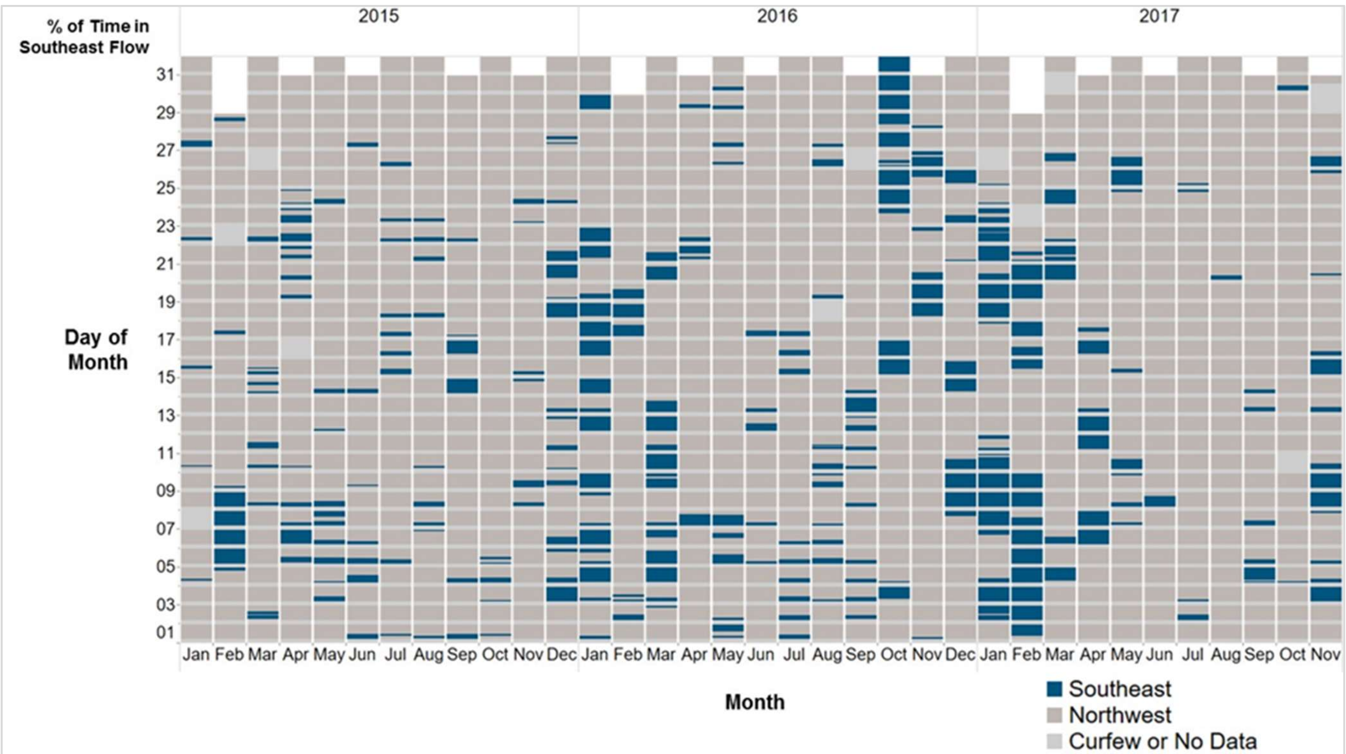
Figure 2-4 Southeast Flow by Hour of Day



Source: Data: ANOMS (2003 – 2017), Figure: Landrum & Brown

The Southeast Flow is usually associated with inclement weather that typically occurs in the winter months. That trend is reflected in **Figure 2-5**, which shows greater use of the Southeast Flow from October through April (although these monthly trends vary by year). Conversely, the Southeast Flow is not as frequently used in/near the summer months (May through September).

Figure 2-5 Flow by Calendar Hour



Source: Data: FAA ASPM (2015 – 2017), Figure: Landrum & Brown

As depicted in **Table 2-1**, there are typically 100 days each year when the Southeast Flow is in use, and during the winter months, the Southeast Flow may operate for several consecutive days.

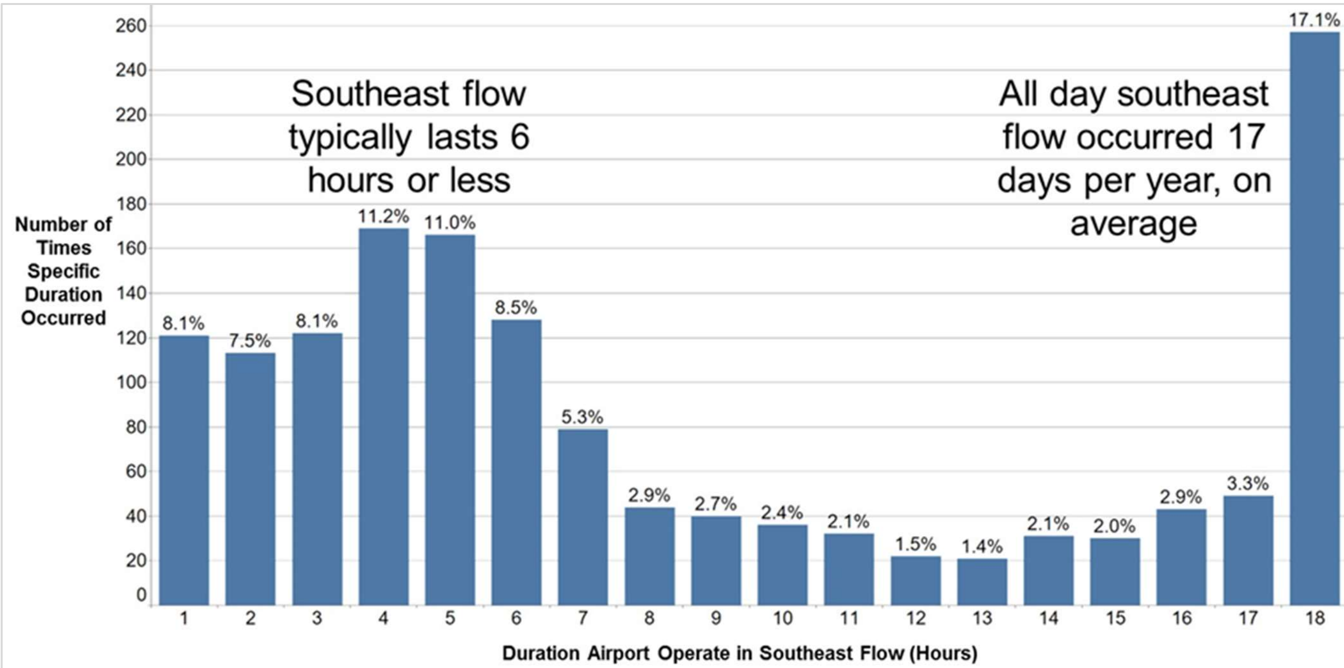
Table 2-1 Southeast Flow by Number of Days Annually

Year	Number of Days When Southwest Flow Occurred
2003 *	37
2004	101
2005	112
2006	129
2007	89
2008	72
2009	100
2010	127
2011	110
2012	110
2013	66
2014	119
2015	98
2016	119
2017 **	87

* 2003 only includes data for August – December
** 2017 only includes data for January – November
Source: Data: FAA ASPM (2003 – 2017), Table: Landrum & Brown

Although the Southeast Flow occurs during an average of 100 days per year, that flow typically occurs for six hours or less during each instance. As depicted in **Figure 2-6**, all-day Southeast Flow occurs an average of 17 days per year.

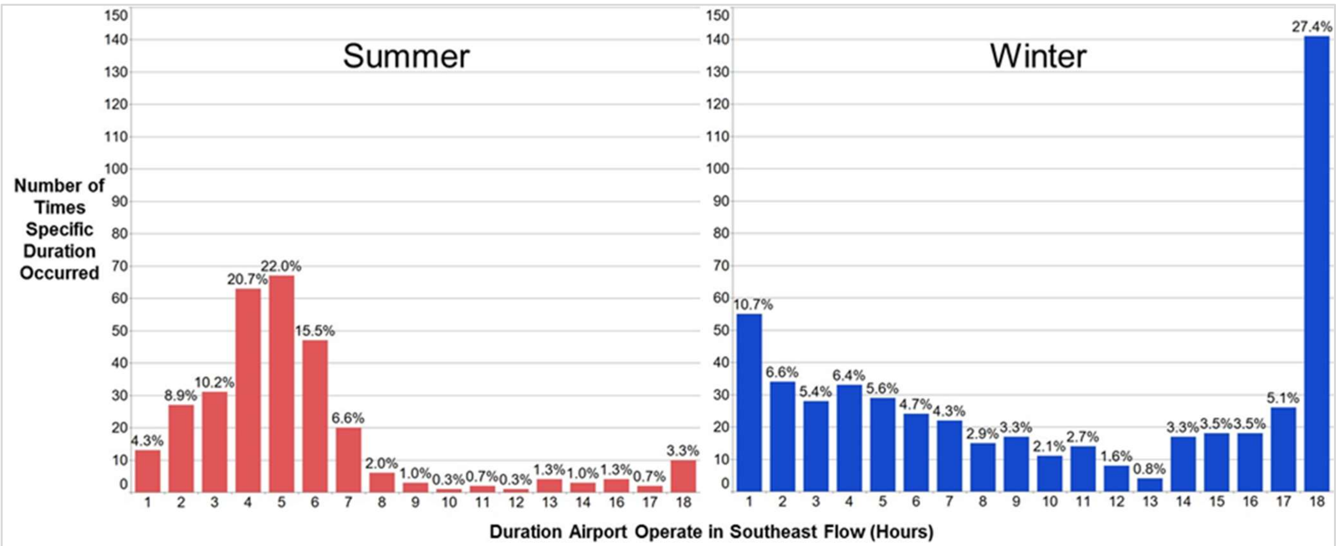
Figure 2-6 Average Duration of Southeast Flow



Source: Data: FAA ASPM (2003 – 2017), Figure: Landrum & Brown

Consistent with other observations, there are typically shorter durations while operating in the Southeast Flow during the summer months and longer durations during the winter months. These trends are reflected in **Figure 2-7**. All-day Southeast Flow rarely occurs in the summer months but occurs more frequently in the winter months.

Figure 2-7 Seasonal Duration of Southeast Flow



Source: Data: FAA ASPM (2003 – 2017, June – August, December – February), Figure: Landrum & Brown

2.2.2 Historical Temperature Analysis

The FAA Aviation System Performance Metrics (ASPM) database provides hourly temperature data. This data was analyzed to identify average temperature trends with respect to hour, month, and flow configuration. For all hours (i.e., both the Northwest and Southeast Flows), the average temperature was 62 degrees Fahrenheit. Average temperatures by month varied from an average of 50 degrees in December to an average of 69 degrees in July, August, and September. Average temperatures by hour varied from an average of 54 degrees Fahrenheit in the 0500 and 0600 hours to an average of 71 degrees Fahrenheit in the 1400, 1500, and 1600 hours.

When the data was filtered to consider only temperatures during the Southeast Flow, the average temperature decreased to 59 degrees Fahrenheit. The meteorological patterns that typically cause the Southeast Flow often occur during the cooler winter months, and they also result in weather that is more temperate (i.e., narrower temperature ranges). Average temperatures by month varied from an average of 54 degrees Fahrenheit in January to an average of 66 degrees Fahrenheit in September. Similarly, the range narrowed of average temperatures by hour, from an average of 55 degrees in the 0400, 0500, and 0600 hours to an average of 63 degrees Fahrenheit in the 1200, 1300, 1400, 1500, and 1600 hours. **Table 2-2** provides a summary of the aforementioned temperatures assessment from 2015 to 2017.

Table 2-2 Historical Temperature Analysis

Temperature (F)	Both Flows	Southeast Flow Only
Average (avg)	62	59
Lowest, avg month	50	54
Highest, avg month	69	66
Lowest, avg hour	54	55
Highest, avg hour	71	63

Source: Data: FAA ASPM (2015 – 2017), Table: Landrum & Brown

2.2.3 Aviation Fleet Mix and Markets Served

Table 2-3 provides a summary of the domestic and international airlines at the Airport as of July 2018

Table 2-3 Airlines Currently Service SJC (As of July 2018)

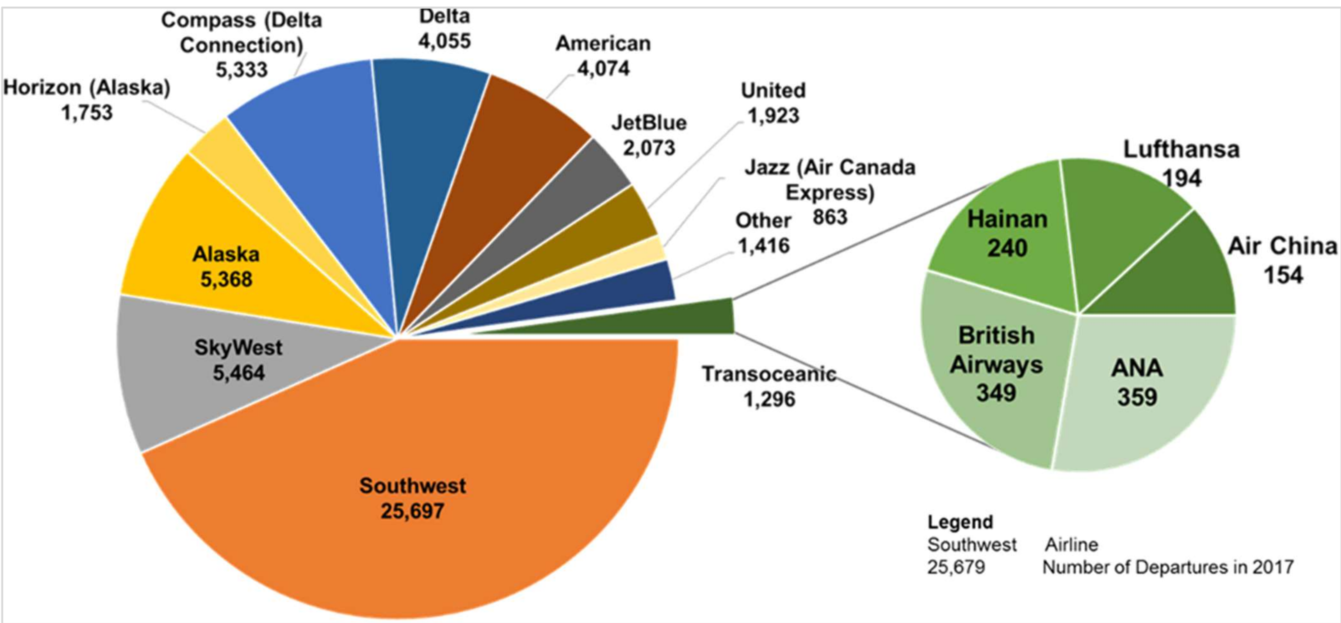
Airlines Currently Serving SJC	
Domestic Airlines	**International Airlines**
Alaska	Aeromexico
American	Air Canada
Delta	Air China
Frontier	ANA
Hawaiian	British Airways
JetBlue	Hainan
Southwest	Lufthansa
United	Volaris

Source: www.flysjc.com/airlines

To understand the fleet mix and markets at SJC, FAA ASPM data (2003 – 2017) was studied. Additionally, runway use data (2003 – 2017) was analyzed from the ANOMS.

As depicted in **Figure 2-8**, Southwest operated the largest number of flights in 2017. Other carriers with substantial operations included Alaska, American, and Delta. In addition, the competitive landscape at SJC changed between 2013 and 2017 as Delta (including Delta Connection) and JetBlue both increased their presence at the airport. It should be noted that SkyWest operated flights for Alaska, Delta, and United. SJC's transoceanic operations are comprised of five carriers: Air China, ANA, British Airways, Hainan, and Lufthansa.

Figure 2-8 Airline Market Share – Passenger Flights

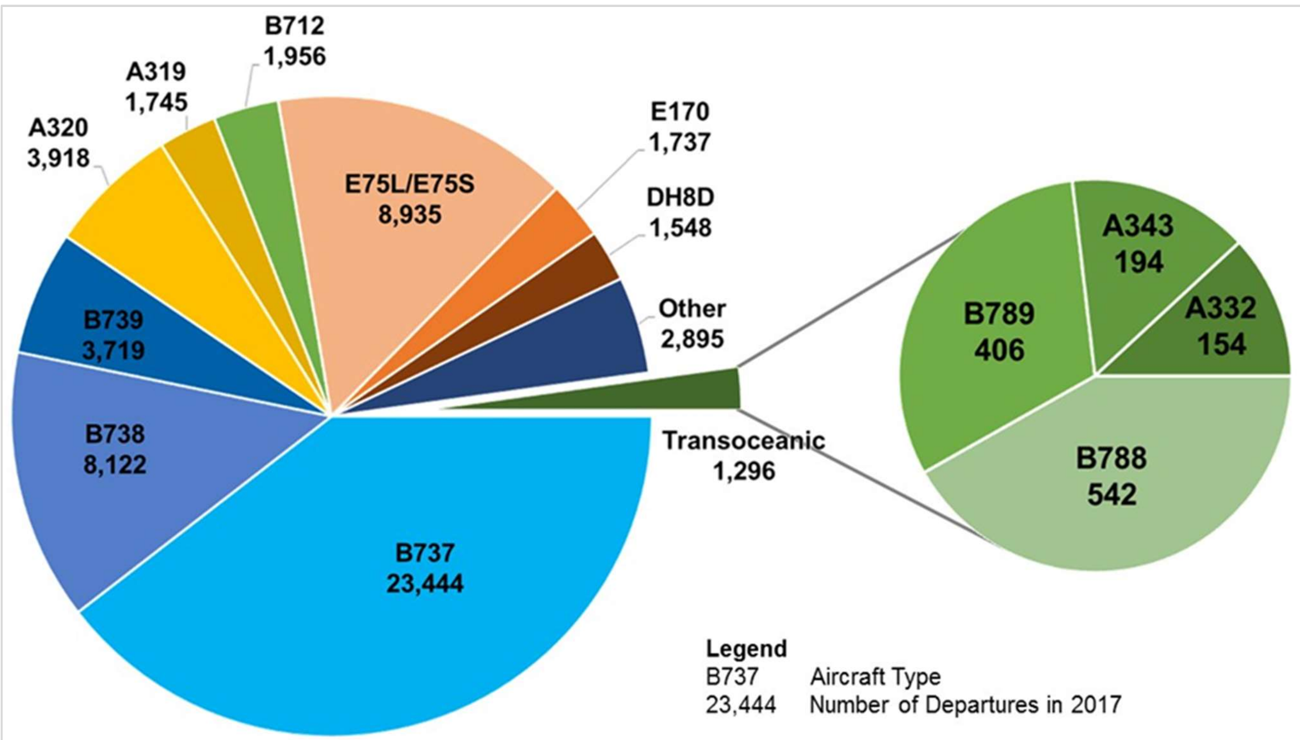


Source: Data: ANOMS (2017), Figure: Landrum & Brown

As depicted in **Figure 2-9**, the same ANOMS data was used to analyze aircraft types that operated at SJC in 2017. Consistent with Southwest's large presence, the Boeing 737-700 was the most commonly operated aircraft at the airport. Other popular types included the Boeing 737-800 and -900, the Airbus A319 and A320, and the Embraer 175. Some changes have occurred in the fleet mix at SJC including the retirement of the Boeing 737-300 by Southwest, and the removal of the Bombardier CRJ-200 by SkyWest. Other aircraft types have increased operations, such as the Embraer 175 and the Boeing 717-200 (operated by Delta). Transoceanic operations were comprised of four aircraft types:

- Airbus A330-200: Air China to PVG
- Airbus A340-300: Lufthansa to FRA
- Boeing 787-8: ANA to NRT, Hainan to PEK
- Boeing 787-9: British Airways to LHR, Hainan to PEK

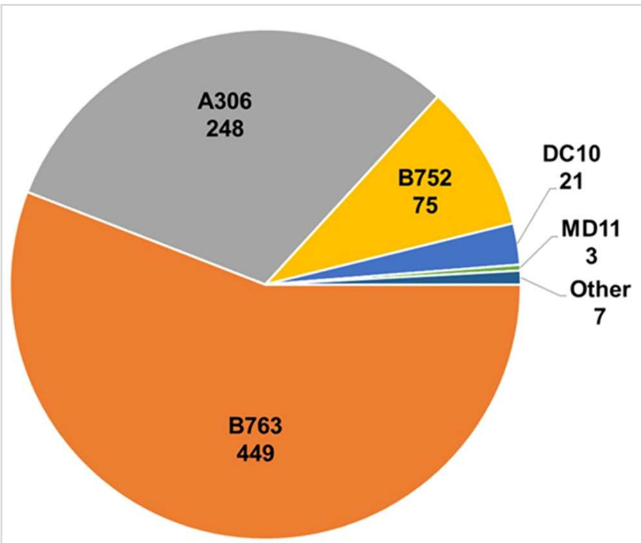
Figure 2-9 Aircraft Profile – Passenger



Source: Data: ANOMS (2017), Figure: Landrum & Brown

Cargo operations at SJC are comprised of a distinctly different fleet mix when compared with the passenger fleet mix. As depicted in **Figure 2-10**, the most commonly used cargo aircraft is the Boeing 767-300, which is operated by both FedEx and UPS. The Airbus A300-600 also has a substantial presence at SJC (used by FedEx and UPS).

Figure 2-10 Aircraft Profile – Cargo



Source: Data: ANOMS (2017), Figure: Landrum & Brown

The following analyses illustrate flight operations by stage length (the length of a flight as measured in statute miles). As depicted in **Table 2-4,** stage lengths are organized as follows:

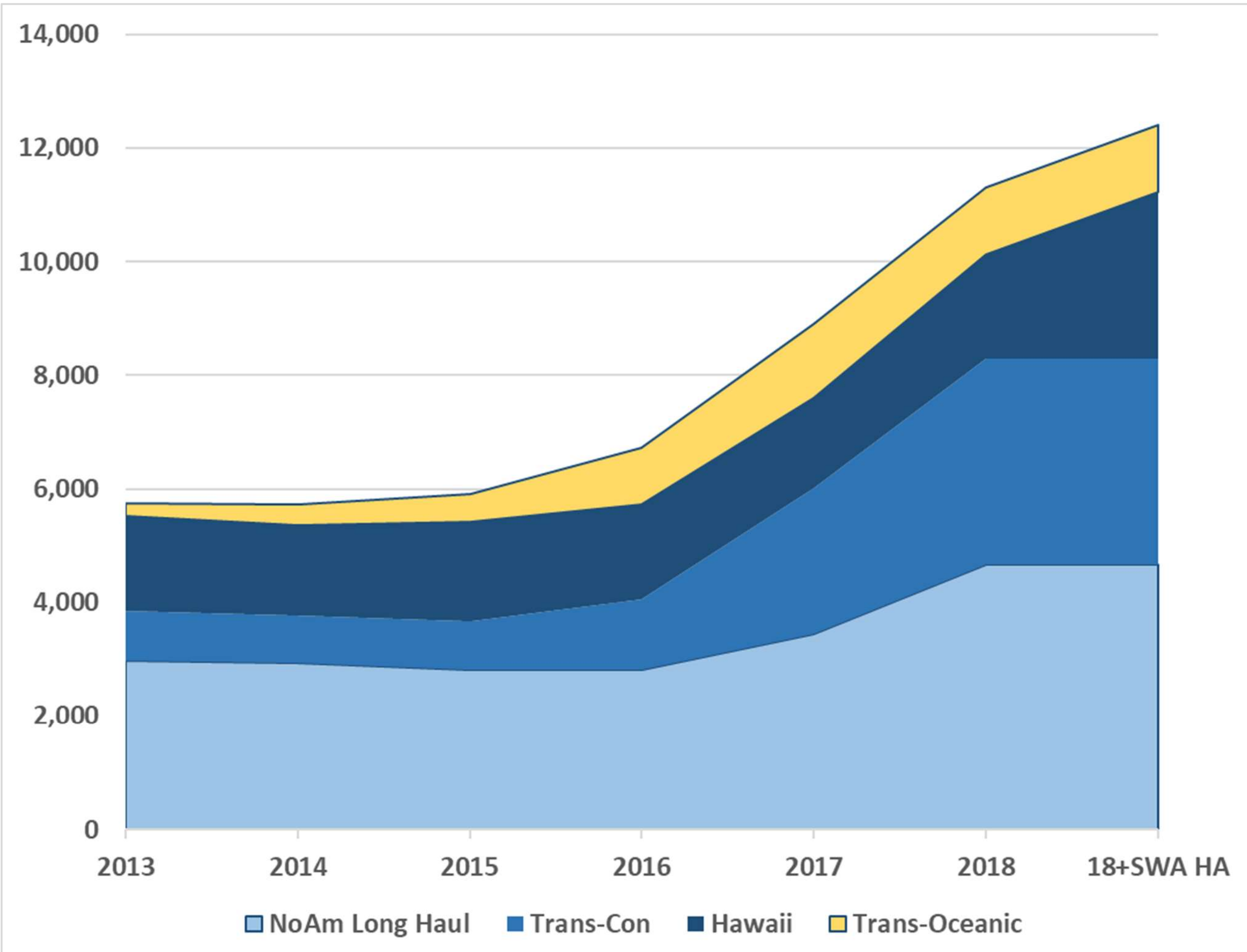
Table 2-4 Stage Length Categories

Distance (Miles)	Category	Examples
0 – 749	Short Haul	LAX, SEA, SAN, PHX
750 – 1,499	Mid-Range	AUS, DFW, SAT, SJD
1,500 – 1,999	North America Long Haul	HOU, MSP, MEX, STL
2,000 – 3,000	Trans-Con	BOS, BWI, JFK, MCO
2,000 – 3,000	Hawaii	HNL, OGG, LIH, KOA
3,000 +	Trans-Oceanic	LHR, PEK, FRA, NRT

Source: DIIO and Innovata Global Flight Schedules Calendar 2018

Since 2013, there has been a significant increase in the number of longer-haul flights (mid-continent, transcontinental, and transoceanic). This increase, which is particularly noticeable starting in 2016, is depicted in **Figure 2-11**.

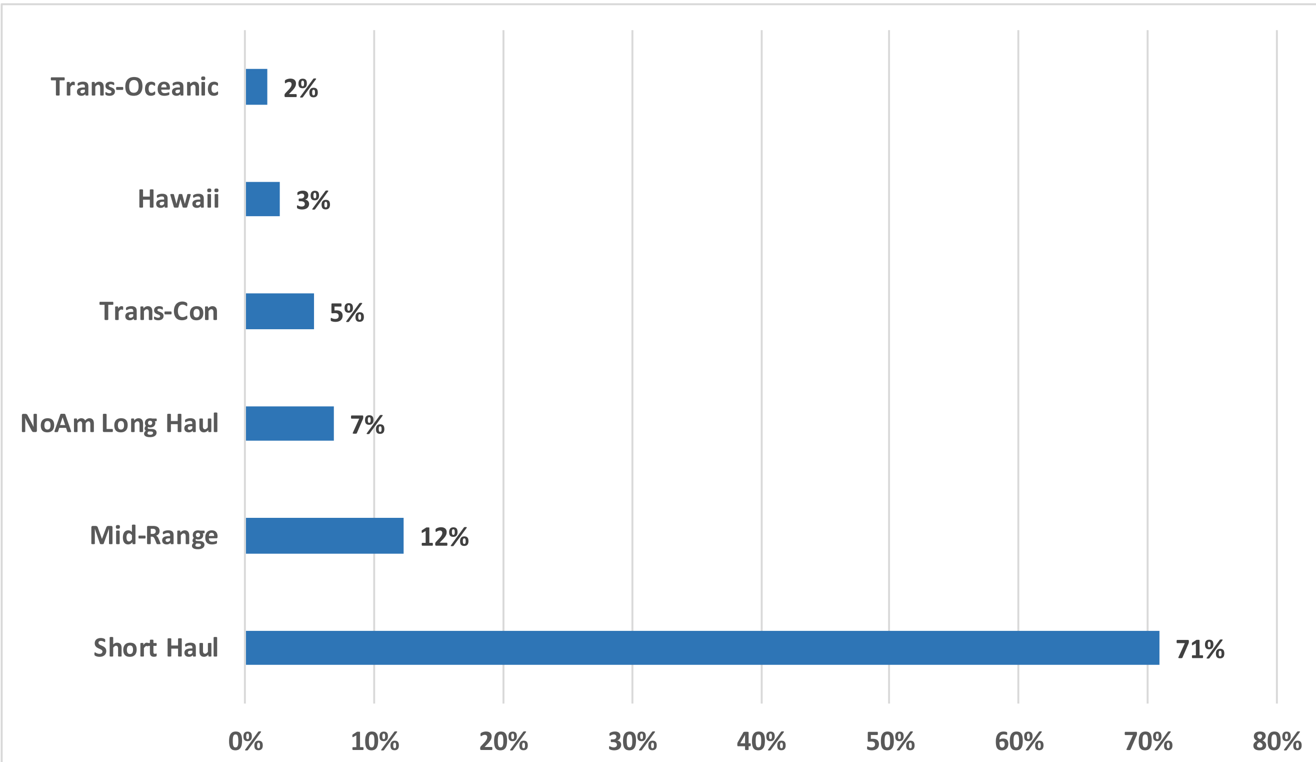
Figure 2-11 Long Haul Departure Trend



Source: DIIO and Innovata Global Flight Schedules, Departures of 1,500+ Miles

As depicted in **Figure 2-12**, an analysis of the passenger and cargo flights at SJC reveal that over 71% of the flights are classified as “shorter haul” and mid-range flights account for 12% of total operations. The remaining 10% of commercial operations include transcontinental, Hawaii and transoceanic flights.

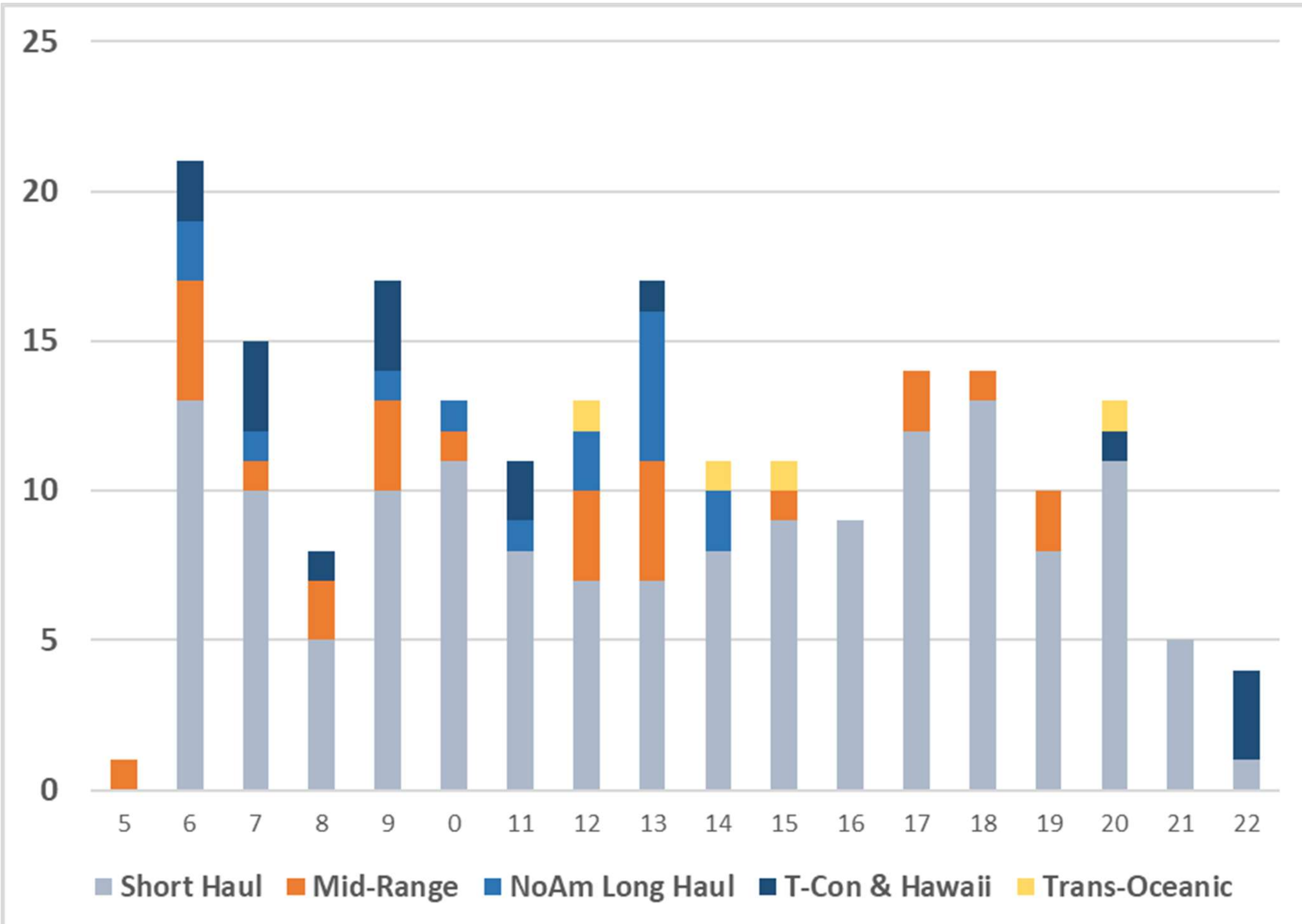
Figure 2-12 Departures by Stage Length (2018)



Source: DIIO and Innovata Global Flight Schedules Calendar 2018

As depicted in **Figure 2-13**, the largest portion of shorter-haul flights operate in the morning and early evening hours; however, traffic is fairly consistent throughout the day. Transoceanic flights to Asia typically operate in the late morning to mid-day hours while transoceanic flights to Europe operate in the afternoon and evening hours. Hawaii flights typically depart in the morning while mid-continent flights operate throughout the day.

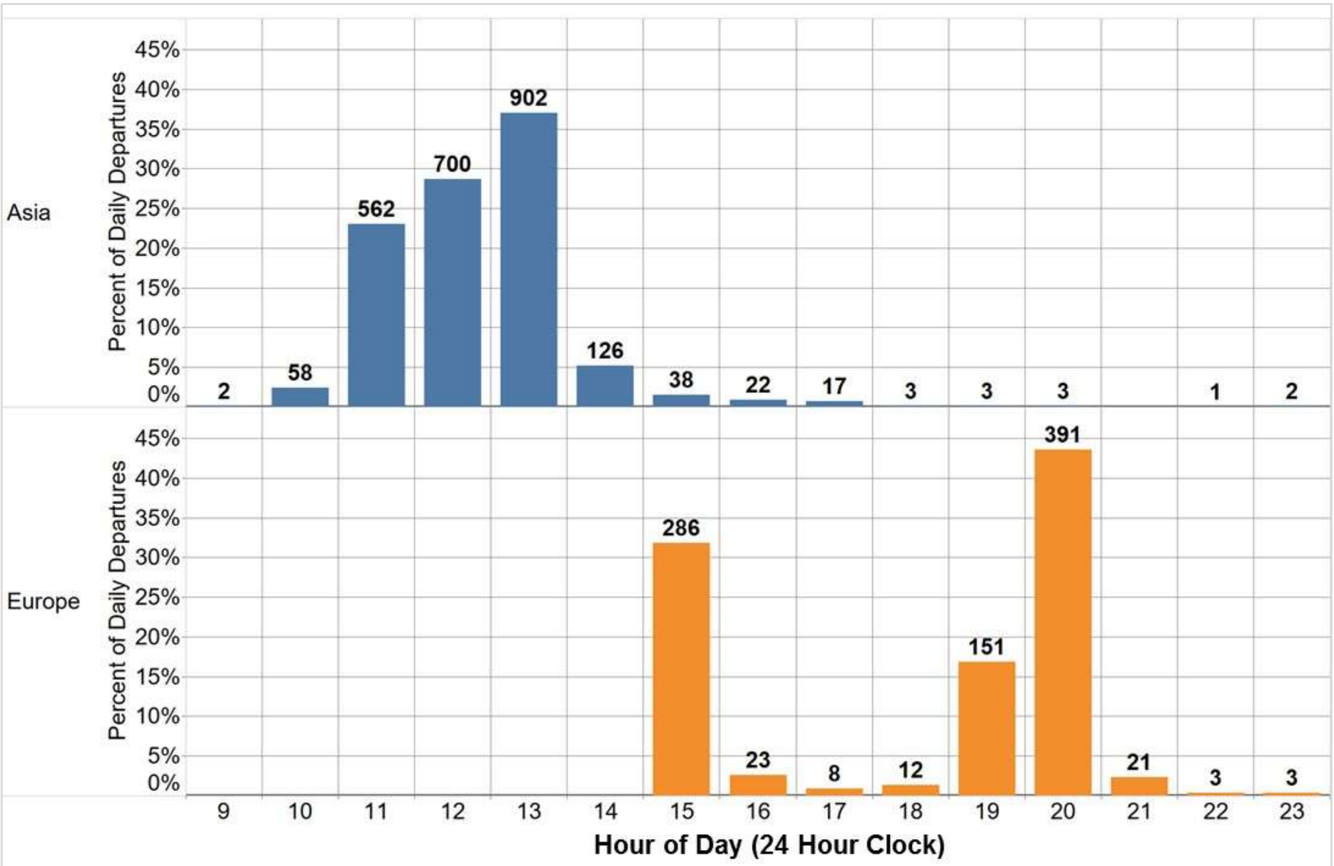
Figure 2-13 Hourly Departures by Stage Length (2013-2017)



Source: DIIO and Innovata Global Flight Schedules Calendar 2018

A more detailed analysis of transoceanic flights is depicted in **Figure 2-14**. Most Asia departures are concentrated in the 1100 to 1300 hours while Europe departures operate in the latter part of the day, starting in the 1500 hour with noticeable increases in the 1900 and 2000 hours.

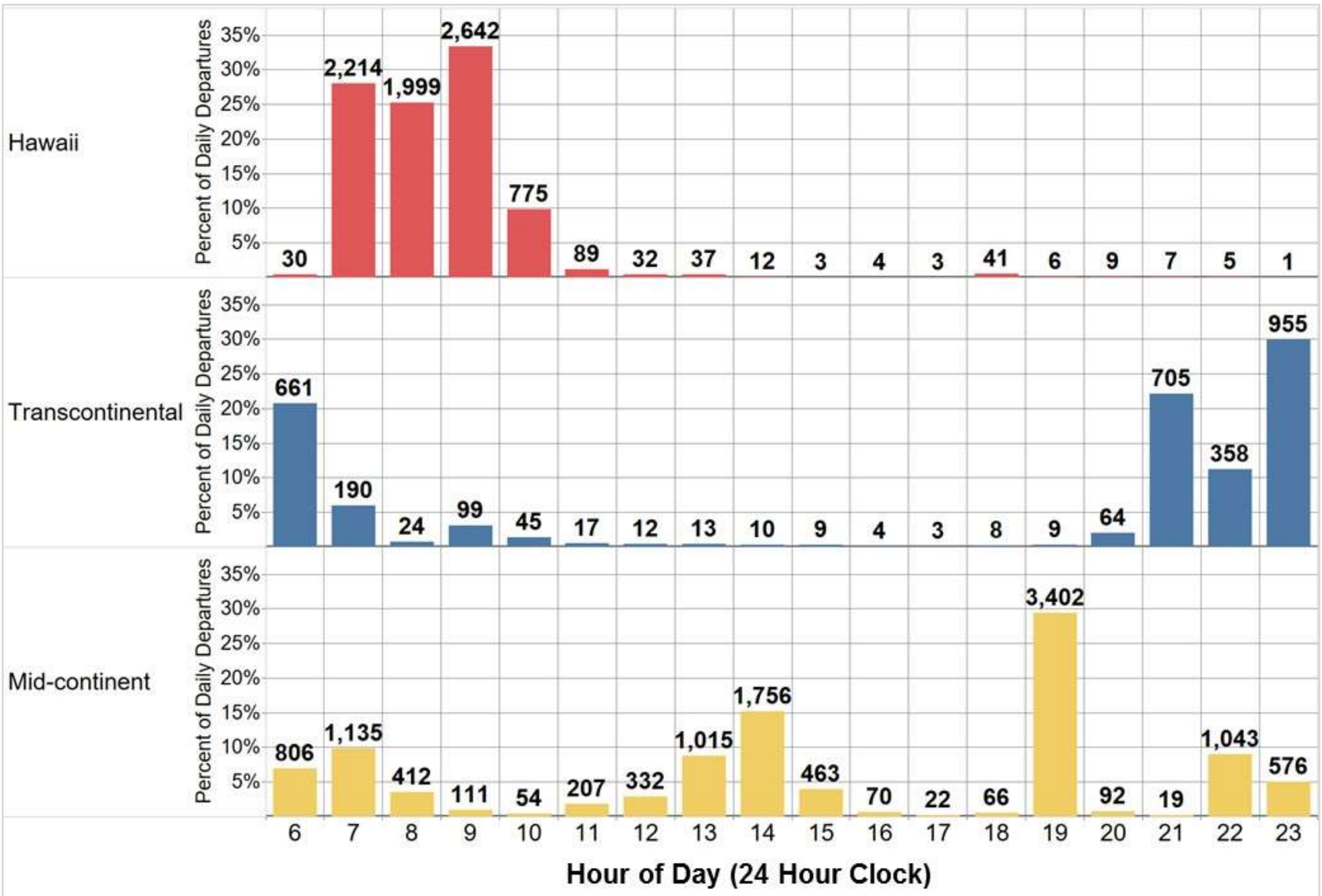
Figure 2-14 Departure Pattern by Stage Length



Source: Data: ANOMS (2013 – 2017), Figure: Landrum & Brown

Domestic departures also exhibit patterns based on the time of day. As depicted in **Figure 2-15**, Hawaii departures mostly depart between 0700 and 1000 hours, transcontinental departures mostly operate in the early morning or late evening (red-eye), and mid-continent departures operate with several peaks throughout the day. All flights are subject to the City of San José's airport curfew ordinance, which starts at 2330 and ends at 0630.

Figure 2-15 Departure Pattern by Stage Length



Source: Data: ANOMS (2013 – 2017), Figure: Landrum & Brown

2.3 Bay Area Airport Service Area

The area served by SJC, including the City of San José and Santa Clara County, is a part of the San José-San Francisco-Oakland Combined Statistical Area (referred to herein as the Bay Area CSA). A CSA is the collection of two or more Metropolitan Statistical Areas. These metro or micro areas consist of one or more counties that have a high degree of social and economic integration. The Bay Area CSA, as defined by the U.S. Department of Commerce, Bureau of the Census, includes the 12 counties of Alameda, Contra Costa, Marin, Napa, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma.

There are three international commercial passenger service airports located in the Bay Area CSA: SJC, SFO and OAK. SJC is located less than three miles from Downtown San José and conveniently located within Silicon Valley. SFO is located 13 miles south of downtown San Francisco. OAK is located across the Bay from SFO. SJC and OAK are medium-hub airports and provide primarily short-and medium-haul domestic service. SFO is a large-hub airport, international gateway, and dominates long-haul domestic service. Because of the proximity of SJC, OAK, and SFO, it is essential to understand local socioeconomic trends in the broader regional context. Economic growth and activity stimulate a significant portion of passenger demand at all three airports. **Figure 2-16** graphically depicts the Bay Area CSA and the international commercial service airports within.

Figure 2-16 Bay Area CSA

Source: Landrum & Brown

2.4 Economic Base of Air Travel

Potential travelers make air travel decisions based primarily on the following three factors: (1) availability of air service, (2) price, and (3) distance of an airport from point of local trip origin/destination. Air travelers will typically select the closest airport if all other selection factors are equal. Conversely, a better set of air service options at more competitive prices will cause travelers to select airports which are not necessarily the closest to where their trip begins or ends. Catchment area “leakage” occurs when passengers use an airport other than the most convenient airport (usually closest) to their trip origin.

This is the case at SJC where a significant portion of the passengers who begin or end their journeys in Silicon Valley. Alternate airports such as SFO and OAK are available for air service needs if unmet at SJC. SJC appeals to high-yield business traffic, being the closest airport to many companies in Silicon Valley. SJC can leverage this convenient location to attract many high-yield business travelers in the technology industry. However, if air service is not available, passengers may choose to utilize SFO and OAK for their travels. Likewise, if high-yield business travelers originate in or are destined for San Francisco, then SFO or OAK may be the easiest airport for those passengers. Additionally, SFO offers a high frequency of flights to key business markets, and OAK offers many low-cost alternatives.

It is attractive to high yield business travelers to have non-stop and long-haul flight opportunities. There are intrinsic links between the growth of aviation activity and economic growth. Growth in population, employment, personal income, and tourism typically lead to increased demand for air travel for both business and leisure purposes. An individual’s demand for air travel is often referred to as “underlying demand” in that it cannot be realized without the presence of airline service at a price that results in the decision to fly rather than use other modes of transportation or not traveling. Because the Bay Area is densely populated and highly compensated, the demand for air travel is higher than the national average.

Future aviation activity at SJC and the Bay Area airports depend on a combination of trends in the airline industry, national and international economic conditions, and the socioeconomic conditions in the Bay Area. As the Bay Area is an influential global business location, as well as a vacation destination in the United States, changes in the broader U.S. economy and in the world economy have the potential to affect the number of passengers at SJC. An overview of the economic factors that generate underlying demand for air travel at SJC and within the Bay Area is provided below. Historical and forecast socioeconomic variables were obtained from Woods & Poole Economics, Inc., of Washington D.C. All economic variables are presented in constant dollars to eliminate any distortion in the data resulting from inflation.

2.4.1 Population

When the population base of an air service region increases, so does the passenger demand. The Bay Area CSA was ranked as the fifth most populated combined statistical area in the United States, and second most populated in California. The Bay Area CSA has shown steady population growth since 1990, at an average rate of 1.0% annually through 2017. In 2017, the Bay Area CSA had an estimated population of more than 8.8 million. The Bay Area CSA is expected to experience steady population growth over the planning horizon at a rate of 0.8% annually, on par with national expected growth, and slightly below expected growth in the State of California. Growth in employment is an important indicator of the overall health of the local economy. Population changes and employment changes tend to be closely correlated as people migrate in and out of areas largely depending on their ability to find work in the local economy.

Table 2-5 Population Trends

Population (In Thousands)			
Year	**Bay Area CSA**	**California**	**United States**
1990	6,814	29,960	249,623
1995	7,168	31,697	266,278
2000	7,680	33,988	282,162
2005	7,781	35,828	295,517
2010	8,174	37,333	309,348
2015	8,686	38,994	320,899
2016	8,752	39,250	323,132
2017	8,827	39,619	325,888
2020	9,076	40,835	335,058
2025	9,503	42,930	350,937
2030	9,937	45,067	367,239
2035	10,349	47,125	382,998
2040	10,731	49,063	397,912
2045	11,090	50,911	412,256
2050	11,437	52,717	426,439
AAGR			
1990-2017	1.0%	1.0%	1.0%
2000-2017	0.8%	0.9%	0.9%
2017-2050	0.8%	0.9%	0.8%

Source: Woods & Poole 2018; Landrum & Brown

2.4.2 Personal Income

Income statistics are broad indicators of the relative earning power and wealth of the region and inferences can be made related to a resident's ability to purchase air travel. PCPI (per capita personal income) corresponds to the average income per inhabitant (total personal income divided by total population). As personal income increases, air travel becomes more affordable and can be used more frequently.

The Bay Area CSA PCPI is much higher than the United States and State of California. Between 1990 and 2017, PCPI for the Bay Area CSA area had increased at an average annual rate of 2.4%, significantly higher than the State of California and the United States. The Bay Area CSA is expected to increase 0.8% annually from 2017 2050 in line with the State of California expected growth, and slightly below the United States.

Table 2 7 displays the historical and forecast PCPI trends. It is expected that air carriers will continue to increase markets and air service operations to the Bay Area, as the local and national economies continues to flourish.

2.4.3 Tourism

SJC is a gateway to some of California's leading tourist destinations, including Big Sur, Carmel, Monterey, Pebble Beach, Santa Cruz, and Yosemite National Park. Many cultural, entertainment, and site seeing opportunities are also available in the Bay Area. Visitors to the region likely make their air travel decisions similar to the local catchment area passengers, basing airport choice on availability of air service, price, and distance from their origin/destination.

Due to the positive population forecast in both the Bay Area and United States, it is expected demand will continue to be strong for the Bay Area Airports. Passengers will continue to make choices based on availability of air service, price, and distance from their origin/destination.

SJC serves a catchment population close to 4 million residents and thousands of Silicon Valley companies with global operations. Residents and visitors within this area can utilize SJC versus driving an hour or more to and from SFO or OAK Airports.

2.4.4 Employment

Growth in employment is an important indicator of the overall health of the local economy. Population changes and employment changes tend to be closely correlated as people migrate in and out of areas largely depending on their ability to find work in the local economy.

The San José area is home to some of the biggest tech giants in the world including Apple, Adobe, Cisco, Facebook, Google, Intel, Netflix, Hewlett Packard, and eBay. There are 105 companies within 18 miles of SJC worth $39.3 billion in capital expenditures, with $628 billion in global sales. As time savings is often correlated with money, businesses travelers often prefer non-stop routes, convenient flight schedules, and long-haul flight opportunities to capitalize on work productivity and personal life balance. SJC can leverage its convenient location to attract many high-yield business travelers in the technology industry. However, if long-haul/trans-oceanic direct routes are unavailable or discontinued, SJC catchment area passengers may decide to travel to SFO or OAK for these preferred routes, even though they may drive past SJC to get there.

Employment in the Bay Area CSA grew at the same rate as the State of California from 1990 through 2017, at an average annual growth rate (AAGR) of 1.3% (see **Table 2-6**). Bay Area CSA employment is forecast to increase at an AAGR of 1.1% from 2017 through 2050, which is on par with expected growth for the United States, and slightly slower than the State of California.

Table 2-6 Employment Trends

Employment (In Thousands of Jobs)			
Year	Bay Area CSA	California	United States
1990	4,192	16,835	138,332
1995	4,296	16,940	147,917
2000	4,962	19,228	165,372
2005	4,772	20,147	172,557
2010	4,721	19,654	173,035

2015	5,598	22,701	190,423
2016	5,759	23,265	193,668
2017	5,921	24,019	198,990
2020	6,195	25,239	208,570
2025	6,651	27,180	223,254
2030	7,110	29,118	237,848
2035	7,536	30,915	251,572
2040	7,920	32,541	264,330
2045	8,275	34,066	276,751
2050	8,617	35,554	289,232
AAGR			
1990-2017	1.3%	1.3%	1.4%
2000-2017	1.0%	1.3%	1.1%
2017-2050	1.1%	1.2%	1.1%

Source: Woods & Poole 2018; Landrum & Brown

2.5 Benefits of SJC, SFO and OAK

2.5.1 Benefits of SJC

Based on a 2013-14 Economic Impact Study at SJC: 57% of SJC passengers were visitors (41% for business vs. 59% leisure), while the remaining 43% of passengers were residents (38% for business vs. 62% leisure). If traveling within Silicon Valley or the San José region, flying to SJC is most convenient. SJC is assessible by various rail and transit networks and has an easily navigated airport layout. SJC has also had historically less flight delays than SFO and OAK.

SJC has been actively adding new air service. In San José, city officials spent years courting a direct flight to Asia, something Silicon Valley businesses had been highly desired. They worked with business leaders to assure airlines that there was pent up demand for new routes. All Nippon Airways launched a direct flight to Japan in 2013 on the new 787 Dreamliner. A wave of other flights quickly followed, including other trans-pacific flights and other trans-oceanic flights to Europe (Frankfurt and London), opening flight connections across both the Pacific and Atlantic Oceans.

In five years, SJC went from 29 domestic and 2 international destinations in 2012 to 42 domestic and 11 international destinations including long-haul markets to Asia (Tokyo, Beijing, and Shanghai), European markets (Frankfurt and London), and Transborder (Los Cabos, Guadalajara, Zacatecas, Morelia, Mexico City. Leon, Los Cabos, and Vancouver) in 2018. Passengers are expected to increase over 15% from 2017 to 2018. During this period, many new markets have been added at the Airport. In 2018, Delta and Alaska Airlines added transcontinental service to New York, John F Kennedy Airport, in addition to JetBlue. Low-cost Frontier Airlines, which started flying out of SJC last fall with new service to Denver and Las Vegas, has targeted the airport for expansion this year, including service to the east including Cincinnati, Austin, San Antonio, Atlanta, and Tulsa. Southwest has been actively adding flights in 2018, with the addition of 80 more flights per week since 2017, including new non-stop service to eight cities and more frequencies on existing routes, and its first-ever international service from the airport (Cabo San Lucas, Mexico). Southwest has also had an aggressive expansion to Hawaii from SJC, developing a significant market share in leisure markets to Honolulu, Kahului, Kona, and Lihue.

2.5.2 Benefits of SFO and OAK

Residents and visitors traveling to/from downtown San Francisco and Oakland have closer proximity to SFO/OAK than SJC. It is sensible to assume that passengers traveling from counties north of San Francisco and Oakland, including Sonoma, Napa, and Solano would utilize SFO or OAK instead of passing the airport and heading south to SJC.

SFO is an international gateway airport and is the only airport in the Bay Area CSA and Northern California with substantial international service (48 international destinations) and connecting traffic, as well as domestic non-stop service to 83 destinations. SFO has the most international service compared to the other Bay Area airports. Due to United’s hub at SFO, there is much more high-yield business traffic with many flight frequencies. United has increased its capacity at SFO in recent years versus capacity reductions at its other hub airports such as Newark and Chicago.

In July 2018, OAK had non-stop direct service to 54 domestic and 14 international destinations. OAK added a significant amount of international traffic over the past few years including transatlantic service to Barcelona, Copenhagen, London-Gatwick, Azores, Paris, Oslo, Stockholm and Rome, as well as transborder flights to Mexico including Mexico City, Guanajuato, Guadalajara, Morelia, Los Cabos, and Puerto Vallarta. OAK also has significant Southwest Airlines domestic connectivity to 34 markets in 2018, including recent additional daily service added to five highly sought destinations from the East Bay: Newark, San Antonio, Orlando, Minneapolis, and Indianapolis.

2.6 Bay Area Airports Air Service

2.6.1 SJC Air Service

In 2017, SJC served approximately 12.5 million passengers, of which 11.6 million were domestic and 900 thousand were international. During this time, 93% of total activity was origin & destination (O&D) passengers with the remaining 7% as connecting passengers. As of July 2018, it is the second busiest airport in the bay area.

In July 2018, SJC provided service to 42 domestic destinations (see **Figure 2-17**) with 182 average daily domestic departures, with an average distance of 702 nm. It also provided service to 11 international destinations including long-haul markets to Asia (Tokyo, Beijing, and Shanghai), European markets (Frankfurt and London), and Transborder (Los Cabos, Guadalajara, Zacatecas, Morelia, Mexico City, Leon, and Vancouver) (see **Figure 2-18**) with 12 average daily international departures (includes Asia, Mexico, and Europe), which had an average distance of 2,241 nm.

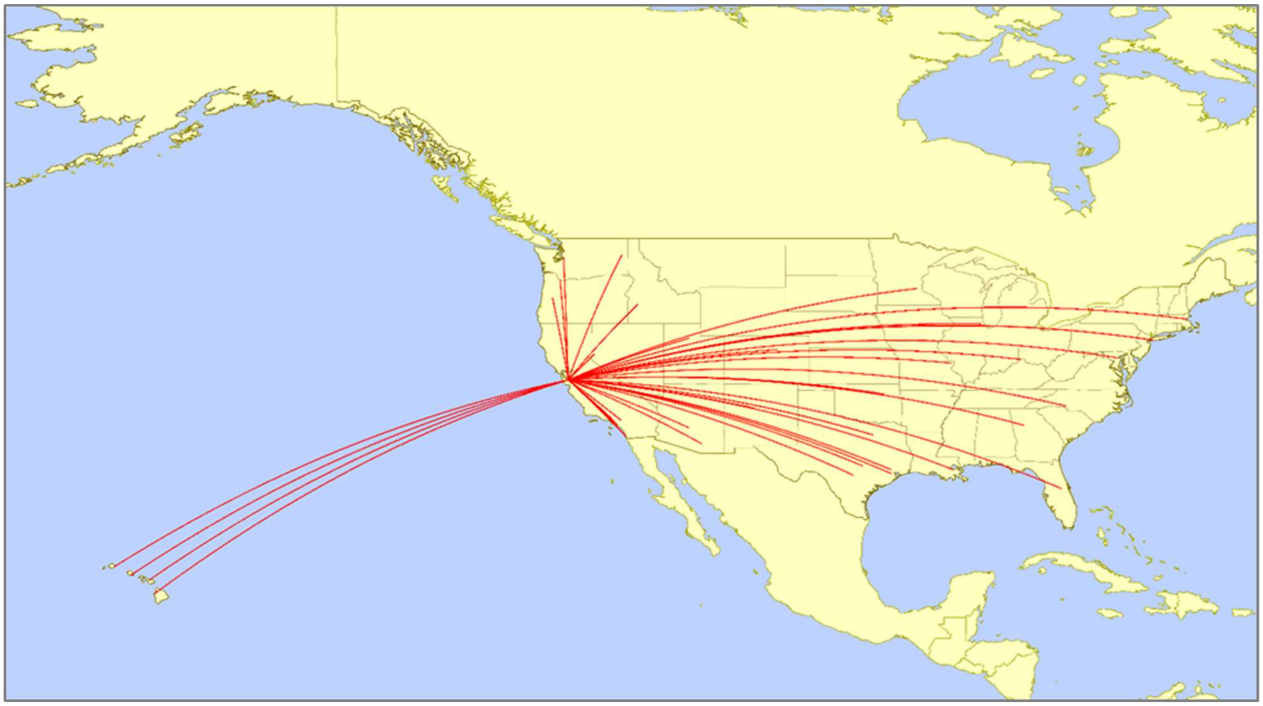
2.6.2 SFO Air Service

In 2017, SFO served approximately 55.8 million passengers, of which 42.4 million were domestic and 13.4 million were international. During this time, 75% of total activity was O&D passengers. In July 2018, SFO provided service to 83 domestic destinations (see **Figure 2-19**) with 527 average daily domestic departures, with an average distance of 1.060 nm. It also provided service to 48 international destinations (see **Figure 2-20**) with 107 average daily international departures (as an international gateway), which had an average distance of 3.643 nm.

2.6.3 OAK Air Service

In 2017, OAK served approximately 13.0 million passengers, of which 12.3 million were domestic and 700 thousand were international (almost double from the previous year, 400 thousand). During this time, 89% of total activity was O&D passengers. In July 2018, OAK provided service to 54 domestic destinations (see **Figure 2-21**) with 171 average daily domestic departures, with an average distance of 687 nm. It also provided service to 14 international destinations (see **Figure 2-22**) with 9 average daily international departures (focused on Mexico and Europe), which had an average distance of 3,020 nm. OAK has an easily navigated layout with less airline competition than SFO yet offers competitive travel costs.

Figure 2-17 SJC Domestic Routes (July 2018)

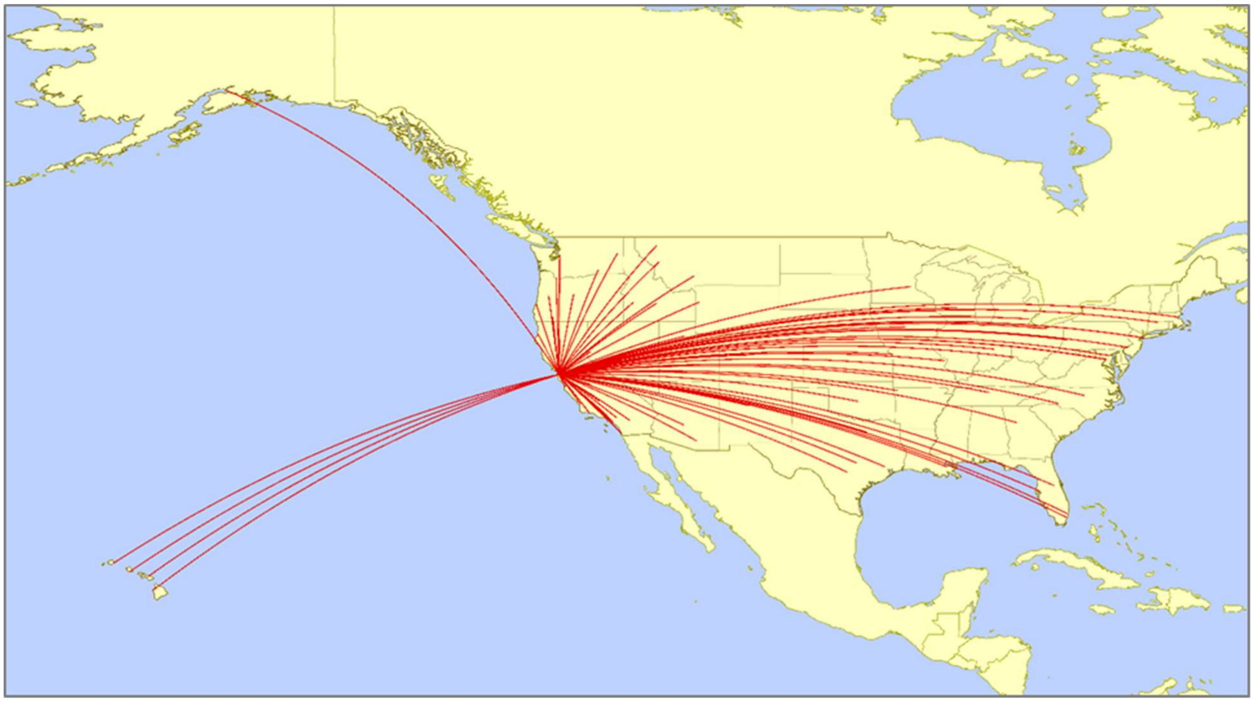


Source: Official Airline Guide; Landrum & Brown

Figure 2-18 SJC International Routes (July 2018)

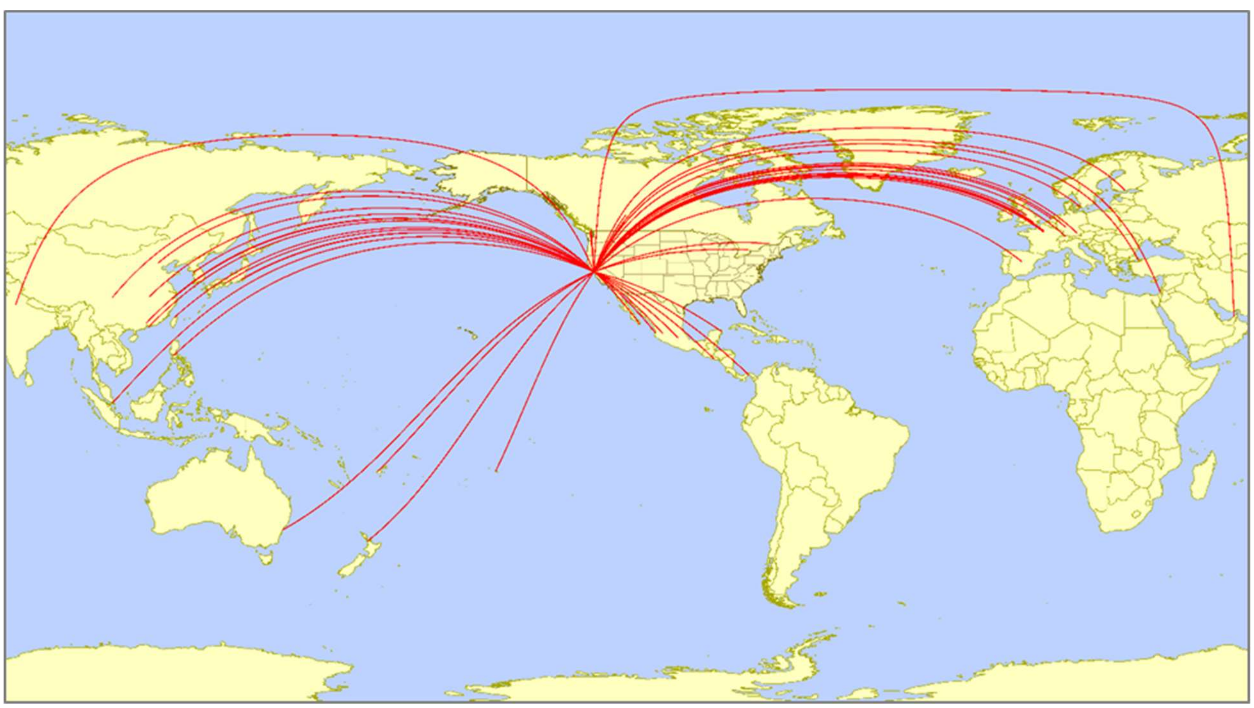
Source: Official Airline Guide; Landrum & Brown

Figure 2-19 SFO Domestic Routes (July 2018)



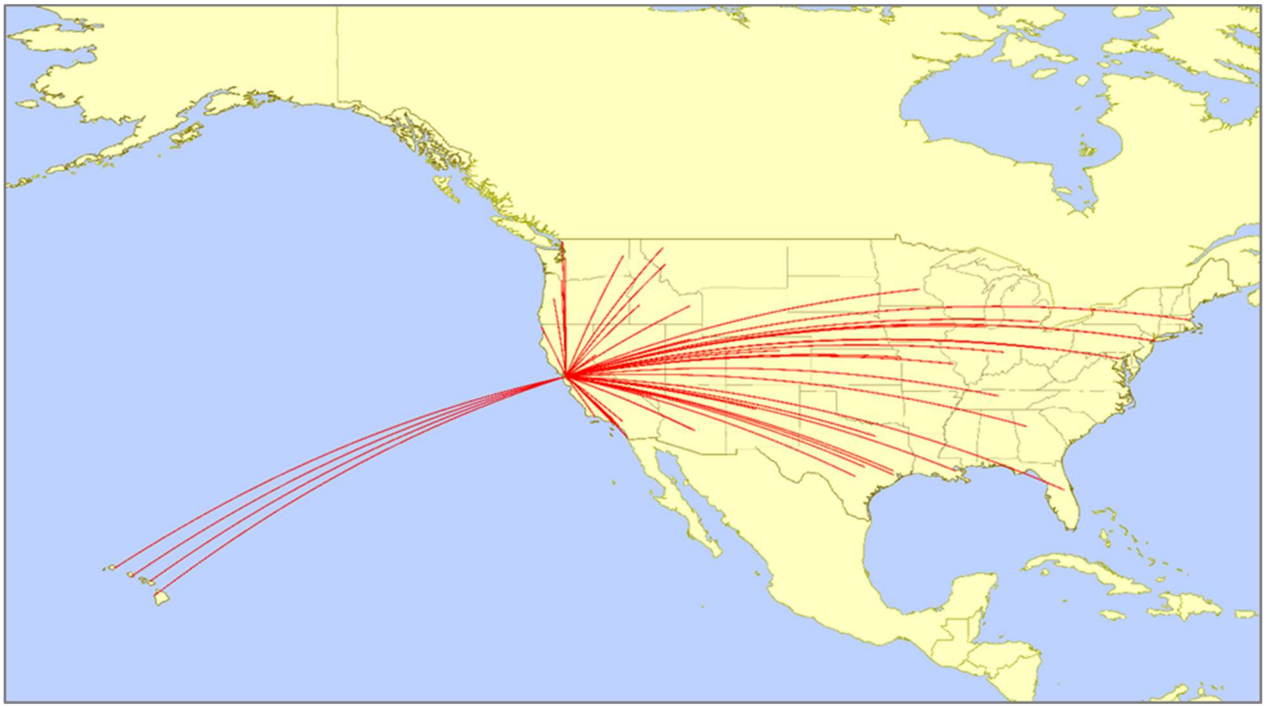
Source: Official Airline Guide; Landrum & Brown

Figure 2-20 SFO International Routes (July 2018)



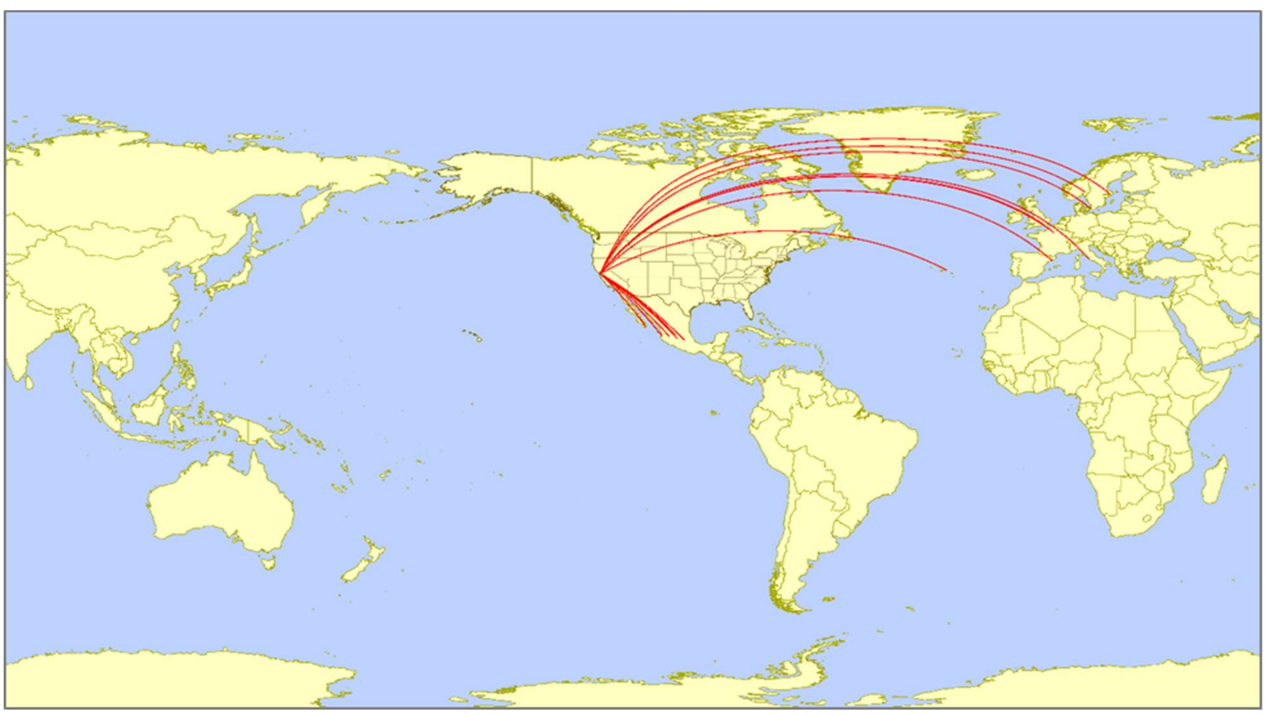
Source: Official Airline Guide; Landrum & Brown

Figure 2-21 OAK Domestic Routes (July 2018)



Source: Official Airline Guide; Landrum & Brown

Figure 2-22 OAK International Routes (July 2018)

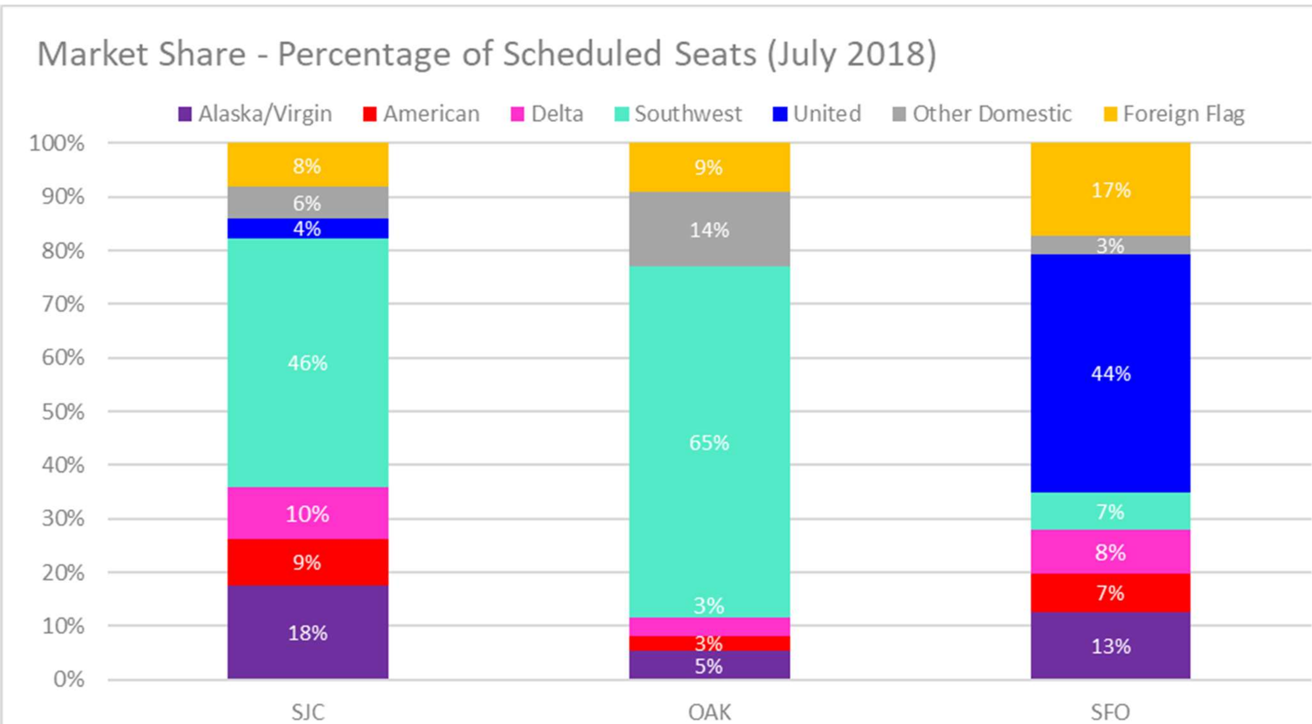


Source: Official Airline Guide; Landrum & Brown

2.7 Bay Area Market Share

Figure 2-23 displays the percentage of scheduled seats by carrier at each Bay Area airport. In July 2018, Southwest Airlines was the primary carrier at SJC (46% of total seats) with a steadily increasing Alaska Airlines market share (18%) and increasing foreign flag carrier presence (8%). United Airlines utilizes SFO as one of its hub airports and is the primary carrier at the airport (44% of total seats). This activity generates network connectivity and high yield business traffic. Alaska Airlines (13% of total seats) operates a mini-hub at SFO and foreign flag carriers have a large presence (17%) due to being an international gateway. OAK is a focus city for Southwest Airlines (65% of total seats in July 2018). OAK also had an increasing amount of foreign flag of seats (9%).

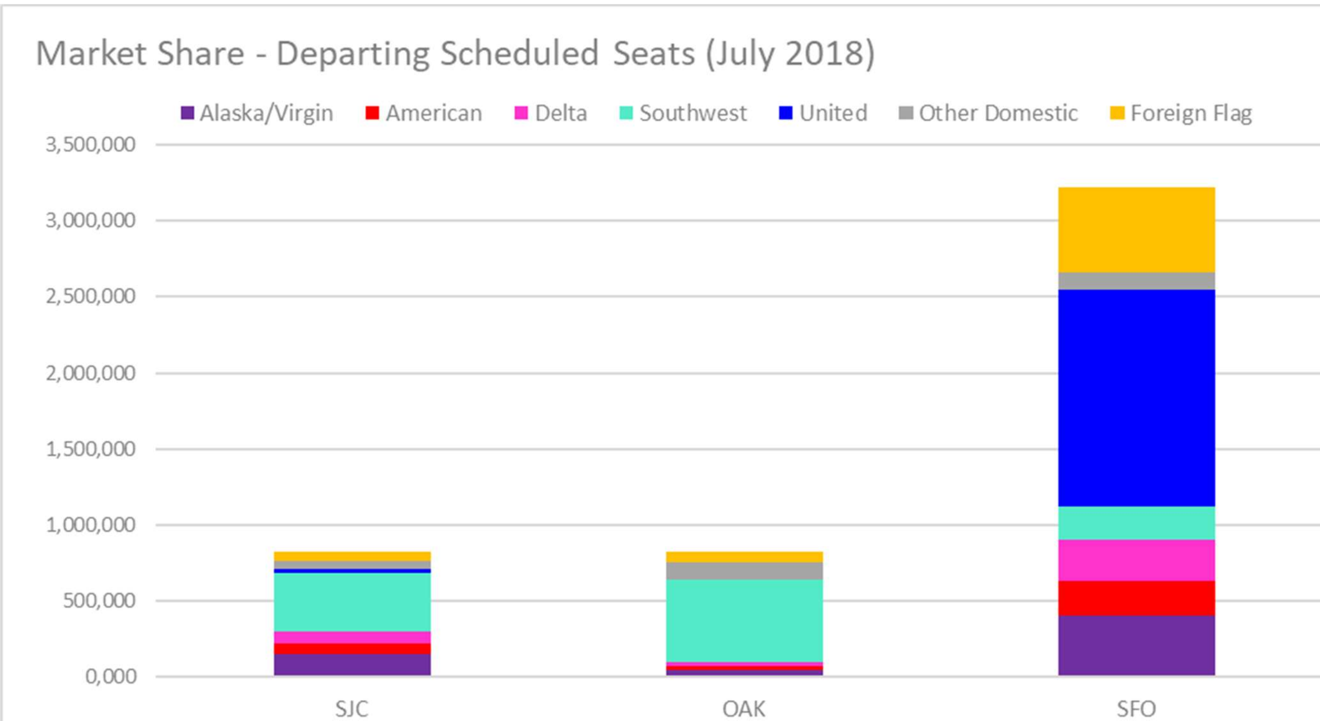
Figure 2-23 Bay Area – Percentage of Scheduled Seats (July 2018)



Source: Official Airline Guide; Landrum & Brown)

Figure 2-24 displays total departing scheduled seats by carrier at each Bay Area airport. In July 2018, the primary carrier at SJC, Southwest, scheduled approximately 383,200 departing seats, followed by 145,500 departing seats scheduled by Alaska. SJC foreign flag scheduled departing seats in July 2018 were 68,000. United Airlines, the primary carrier at SFO had approximately 1,427,400 scheduled departing seats in July 2018, followed by Alaska, the second largest carrier, with approximately 407,300 scheduled departing seats. During the same period, foreign flag scheduled departing seats at SFO were approximately 560,700. Southwest, the primary carrier at OAK, had scheduled approximately 540,200 departing seats in July 2018. During the same period, foreign flag scheduled departing seats at OAK were 75,100.

Figure 2-24 Bay Area – Departing Scheduled Seats (July 2018)



Source: Official Airline Guide; Landrum & Brown

2.8 Airline Operations

The Bay Area airports generally operate as a system with all airports predominantly operating in the west flow. However, each airport may individually transition to the southeast flow when winds dictate such a change. These southeast winds most often occur during the winter season, but they can appear at other times of year.

In addition to runway configurations, flight procedures at each airport are designed in such a manner to ensure vertical and lateral separation between traffic flows. These types of restrictions optimize use of the available airspace while allowing each airport to maximize throughput.

In irregular operations, the airports depend on each other to accommodate flight diversions. Among the Bay Area airports, SFO is most prone to weather-related delays, a result of its closely-spaced parallel runways. In these instances, arriving aircraft are often guided into hold patterns. Excessive delays in a hold pattern may necessitate a diversion to another airport for refueling, and these diverted flights often use SJC and OAK as their alternate airports.

In another example of this close relationship among Bay Area airports, it was recently reported that Alaska Airlines is experimenting with a new operational adjustment where SFO-bound flights could purposefully be re-routed to OAK or SJC to avoid lengthy delays. Instead of a delayed departure from another airport (bound for SFO), the flight could depart on-time but destined for OAK or SJC instead. Upon arrival in OAK or SJC, passengers would be transferred to SFO via pre-arranged ground transportation. Meanwhile, with the aircraft positioned at either OAK or SJC, the subsequent departure would also depart from either OAK or SJC and departing passengers would be transported from SFO to either one of the other airports. This strategy demonstrates how airlines can leverage the proximity of each airport to manage operations and mitigate delays.

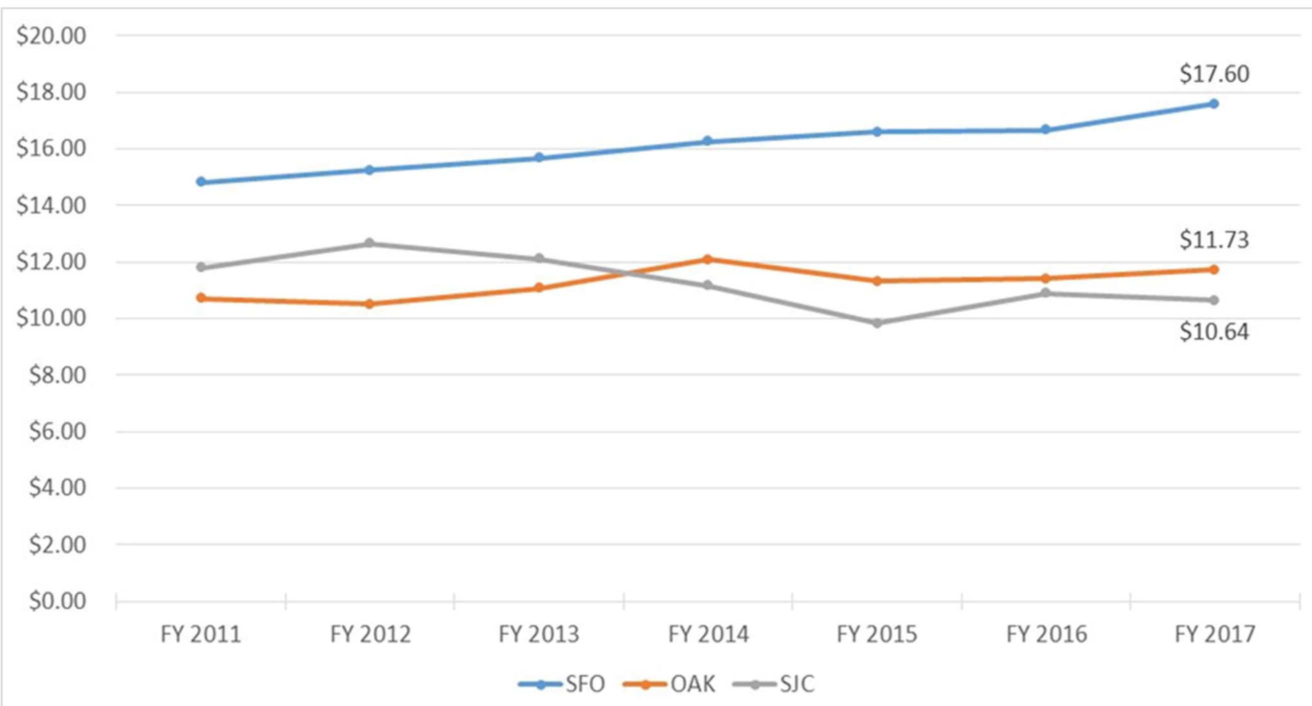
2.9 Cost of Doing Business

To evaluate the cost of doing business at each Bay Area airport, it was necessary to study the cost per enplanement (CPE) for each airport. CPE is an industry standard in determining average costs for an airline to operate at a particular airport. Per the Certification Activity Tracking System (CATS) website of the Federal Aviation Administration (FAA), the following costs were summed and included in calculating CPE:

- Passenger airline landing fees
- Terminal arrival fees, rents, and utilities
- Terminal area apron charges/tiedowns
- Federal Inspection Fees
- Other passenger aeronautical fees

These costs, coupled with enplanement data, were used in determining CPE. Among the Bay Area airports, SFO has always had the highest CPE while OAK and SJC have had lower and fairly comparable CPEs. In the 2017 fiscal year, SJC had the lowest CPE of $10.64 (of all Bay Area airports). Meanwhile, SFO had the highest CPE of $17.60. **Figure 2-25** displays historical passenger airline CPE from FY 2011-2017 at the Bay Area airports.

Figure 2-25 CPE Comparison



Source: Compliance Activity Tracking System (CATS), Federal Aviation Administration, cats.airports.faa.gov; Landrum & Brown

2.10 Advantage and Disadvantages of the Bay Area Airports

Each airport has unique characteristics that may be classified as advantages or disadvantages for passengers and airlines. These characteristics are diverse and include a variety of features such as airline competition, facilities, destinations served, congestion, and weather patterns.

2.10.1 SJC

Advantages

- Lower operating costs: As discussed in the CPE comparison, SJC has the lowest costs among all Bay Area airports.
- Fewer airlines – less competition to many markets: Airlines at SJC often face less competition when compared to operating at busier airports such as SFO.
- Appeals to high-yield business traffic in Silicon Valley: SJC is the closest airport to many companies in Silicon Valley. The airport can leverage this convenient location to attract many high-yield business travelers in the technology industry.
- Few delays: Unlike SFO, SJC has a simple runway layout and favorable weather conditions that do not affect flight operations, thus resulting in few delays.
- Positive passenger experience with less traffic and simple airport layout: Compared to SFO, SJC offers a simple airport layout, less congestion, and easy curbside access.

Disadvantages

- Does not attract San Francisco travelers: Given SJC's location, which is 45 miles south of San Francisco, it is difficult for the airport to attract travelers who are originating in or destined for San Francisco. The airport's primary catchment area is the South Bay.
- Fewer destinations and flight frequencies as that of SFO: SJC has fewer flights and destinations when compared to SFO, especially with respect to international and transcontinental flights. Although SJC may be more conveniently located for some travelers, those travelers may choose SFO for long haul flights.
- Curfew restrictions: SJC observes a noise-based curfew program between the hours of 23:30 and 06:30. This curfew could affect international or transcontinental flights that would otherwise operate in the late night or early morning hours. In contrast, SFO has several international and transcontinental flights that operate around 01:00 and 06:00, respectively.

2.10.2 SFO

Advantages

- Prestige of operating at the region's primary airport: SFO has the distinction of serving the region's largest market, San Francisco. Therefore, many airlines prioritize service to this airport over the region's smaller airports.
- Appeals to high-yield business traffic with proximity to SF and many flight frequencies: Many high-yield business travelers originate in or are destined for San Francisco, and SFO is the easiest gateway airport for those passengers. Additionally, the airport offers a high frequency of flights to key business markets.
- Robust facilities that accommodate all aircraft types and many passengers: SFO has a variety of facilities that can accommodate all types of aircraft and large volumes of passengers. In this regard, the airport is more capable than its Bay Area counterparts are.

- Connections to many destinations: SFO has flights to the most destinations of any Bay Area airport.
- CBP operating hours: CBP is staffed for most hours of the day at SFO, which enables international flights to operate at many hours. In contrast, SJC and OAK only have CBP staffing at specific hours, which may limit the addition of new international flights.

Disadvantages

- Higher operating costs: As discussed, SFO has the highest CPE of all Bay Area airports (by a wide margin).
- Competition from dominant United hub and smaller Alaska hub (previously Virgin America): New airlines that start service and existing airlines that want to add service at SFO face stiff competition from United's dominant hub and Alaska's smaller yet still significant hub. These two carriers provide significant challenges for other airlines.
- Prone to weather-related delays: Unlike SJC and OAK, SFO is susceptible to significant weather-related delays because of its closely spaced parallel runways and frequent low ceilings. These delays result in significant operational challenges that compromise airline schedule integrity.

2.10.3 OAK

Advantages

- Lower operating costs: OAK's operating cost is significantly lower than that of SFO and comparable (albeit slightly higher) than that of SJC.
- Fewer airlines – less competition to many markets: With fewer airlines and flights compared to SFO, airlines at OAK generally face less competition on a given route. However, airlines often encounter competition from Southwest, which is the dominant carrier at OAK.
- Appeals to San Francisco travelers: Although OAK is located in the East Bay, it still attracts many travelers who are originating in or destined for San Francisco. Additionally, BART provides convenient public transportation to downtown San Francisco from OAK.
- Few delays: With one air carrier runway and a modest flight schedule, OAK rarely experiences delays.
- Positive passenger experience with less traffic and simple airport layout: OAK has a simple airport layout that is comprised of just two terminals and easy curbside access for passengers.

Disadvantages

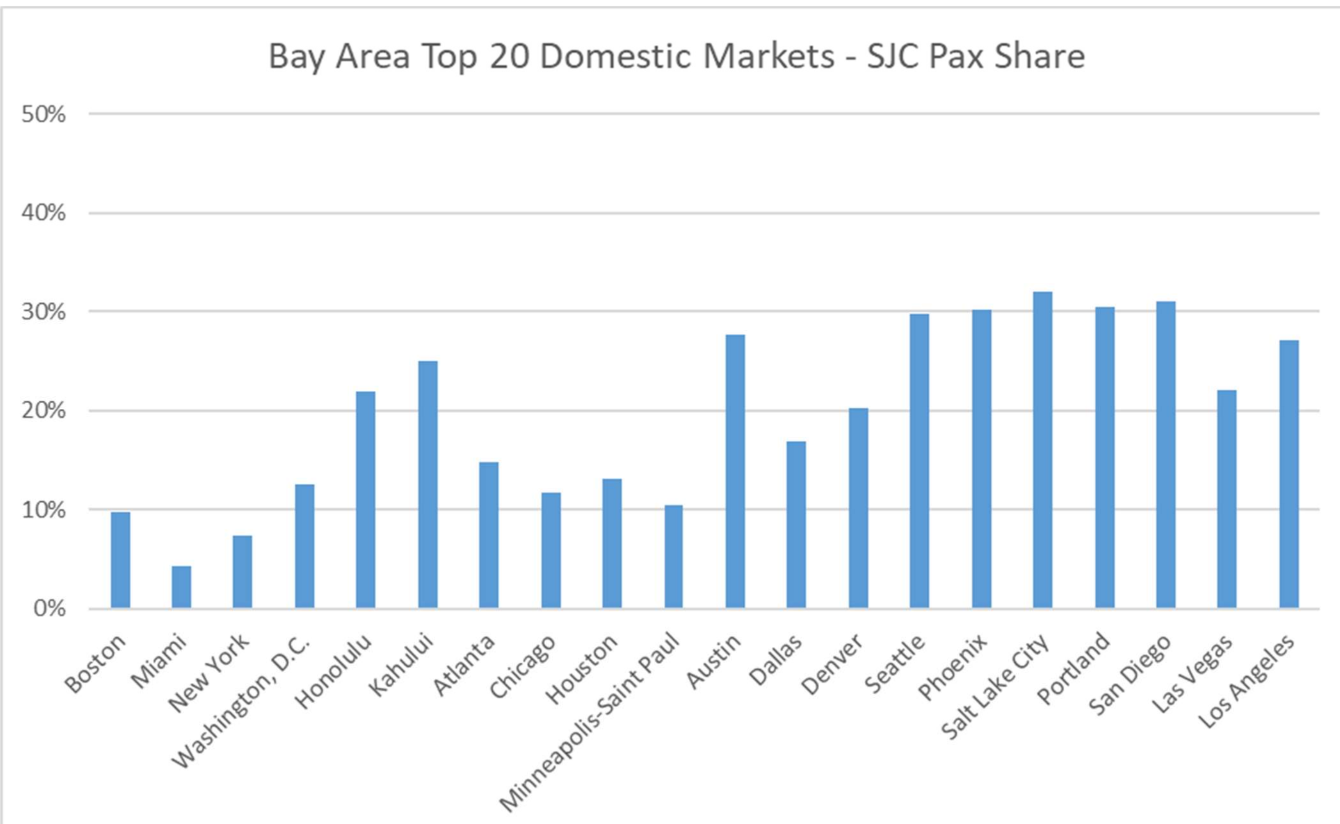
- Competition from dominant Southwest hub and sizable operations from other low-cost carriers: Carriers at OAK often face competition from Southwest's dominant hub. Depending on routes and services, Southwest can be a formidable opponent when establishing new routes for existing carriers or adding new carriers. There is also a significant presence of ultra-low-cost carriers with Allegiant and Spirit.
- Facilities: Unlike Terminal 2, Terminal 1 does not provide a competitive level of service.
- Fewer destinations and flight frequencies as that of SFO: When compared with SFO, OAK has fewer destinations and flights.

2.11 Regional Competition

To study SJC's role among the Bay Area airports, it is important to evaluate the airport's passenger share among the Bay Area's busiest markets. The airport primarily serves shorter routes and accommodates an average of 27% of the Bay Area passengers on these routes. Example destinations include Los Angeles, Las Vegas, and San Diego. However, SJC's passenger share falls to an average of just 13% on longer domestic routes such as Chicago, New York, and Boston. While the airport does not have as much passenger share in domestic long-haul markets, it does have a significant market share in leisure markets to Hawaii (Honolulu and Kahului). In the Bay Area's top 20 international markets, SJC averages just 10% of the passenger share with the notable exception of Guadalajara, which has substantial service from SJC.

Figure 2-26 displays SJC's passenger share in the top 20 Bay Area domestic O&D markets.

Figure 2-26 Top Bay Area Domestic O&D Markets



Notes: Miami: FLL, MIA; New York: EWR, JFK, LGA; Washington, D.C.: BWI, DCA, IAD; Chicago: MDW, ORD; Houston: HOU, IAH; Dallas: DAL, DFW; Los Angeles: BUR, LAX, LGB, ONT, SNA. Destinations sorted in descending order by distance from the Bay Area. "Shorter" Haul defined as destinations less than 1,500 miles from the Bay Area.
Sources: U.S. DOT, Air Passenger Origin-Destination Survey, 2017 data

Figure 2-27 displays SJC's passenger share in the top 20 Bay Area international O&D markets.

Figure 2-27 Top Bay Area O&D International Markets

Notes: London: LGW, LHR; Tokyo: HND, NRT. Destinations sorted in descending order by distance from the Bay Area.
Sources: U.S. DOT, Air Passenger Origin-Destination Survey, 2017 data

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3 Preliminary Real Estate and Land Assessment

3.1 Purpose

3.1.1 Purpose

The purpose of this first report is a preliminary assessment of market dynamics that will impact real estate development in San José and resulting potential value to the City as a result of adjusting the airspace protection surfaces for SJC. This interim report is a summary of JLL's market findings and concludes with a list of assumptions and inputs that JLL will use in its later financial modeling and tax revenue assessment.

This interim report also addresses assumptions made with regard to land uses in the City of San José. It reviews Envision San José 2040 in depth to identify those land use designations that will impact new development and redevelopment over the long-term.

Finally, this report presents a set of assumptions that JLL will continue to explore and which will be key to assessing the value and tax impacts of the airspace protection surface scenarios. These assumptions have not yet been assessed, but are being presented to the City and the Steering Committee for prior feedback ahead of completing the analysis.

3.2 Development Typologies

3.2.1 Build-to-Suit and Speculative Development

Prior to understanding any real estate market's potential for supporting new land development in the near- or long-term, it is important to understand the concepts of "speculative" versus "build-to-suit" development.
A speculative development project is one where a developer finances, builds, and owns a multi-tenant property with only some or no tenants committed to signing leases prior to securing financing and/or groundbreaking.
In robust markets where there is 1) economic growth, 2) low/decreasing vacancy rates and 3) high/increasing rental rates, speculative development may result. That is, if market trends indicate growing demand, developers and their financing partners may be willing to take on leasing risk (that is, financing and constructing a property while still missing tenants) in exchange for delivering a property more quickly and ahead of their competitors. This approach places these developers in a more advantageous position to capture market demand, ahead of their competitors who may not develop their properties as quickly. Developers may still pre-lease a project to some extent as a condition of securing financing and/or to reduce the overall risk of a project, but with strong enough market support, the project may commence without much of the available space committed. As a result, landowners may ground lease land to developers seeking to build new projects with some or no pre-leasing.

A build-to-suit development project is one where a user seeks to occupy a newly constructed building and hires one or more third parties to design, finance, build, operate, and/or maintain the building on their behalf. The user may finance and own the asset themselves or work with the third party who will own the asset and to whom the user will pay rent. In less robust real estate markets where there are high/increasing vacancy rates and low/decreasing rental rates, speculative development may be too risky. However, there still may be demand from potential users seeking new construction for their sole use. These users may seek out developers who will manage a build-to-suit project on their behalf. Landowners may find themselves selling land directly to users, or their developers, seeking opportunities to build new facilities for their use. Industries which are growing in a region may signal potential build-to-suit opportunities as companies seek to relocate or to grow, even if the real estate market itself is relatively lukewarm.

For example, Company A wishes to build a new office building for a call center. Company A can use its own capital to fund the construction of the new project and hire third-party expertise to design, build, operate, and/or maintain the building. As Company A funded the project with its own equity and/or debt, ultimately Company A would be the owner of the building. Alternatively, Company A hires a developer that not only performs the aforementioned tasks but also secures financing using a combination of the developer's own equity, third-party equity, and third-party debt financing. In this case, Company A does not own the building because it did not use its own capital. The developer and/or its partners own the property, and Company A pays the ownership group rent as a tenant in the building. In both cases, Company A has engaged in a build-to-suit project and has received a building for its use that meets its specifications, and in which Company A is the only (or the primary) tenant.

Therefore, while there may not be market support for speculative development, there may still be opportunities to strategically target specific users for one-off development opportunities.

The analysis herein, and following analysis, will address the potential for build-to-suit and speculative development in areas impacted by the airspace protection surfaces analysis. Note that this discussion does not apply to residential or hospitality development, both of which are speculative (though some condominiums developments will pre-sell some units ahead of financing and construction).

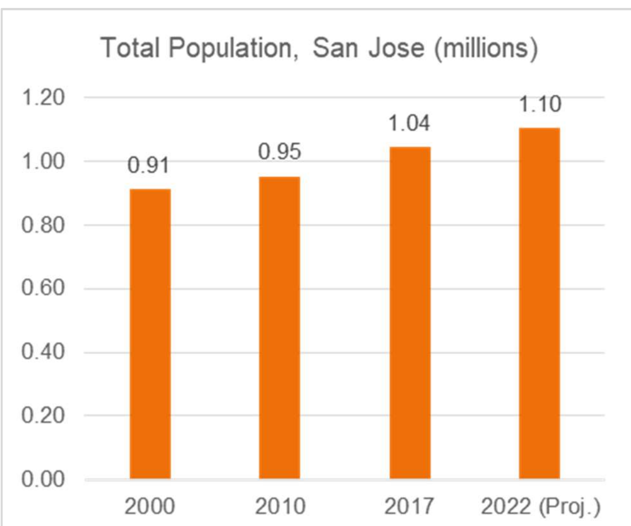
3.3 Real Estate Assessment

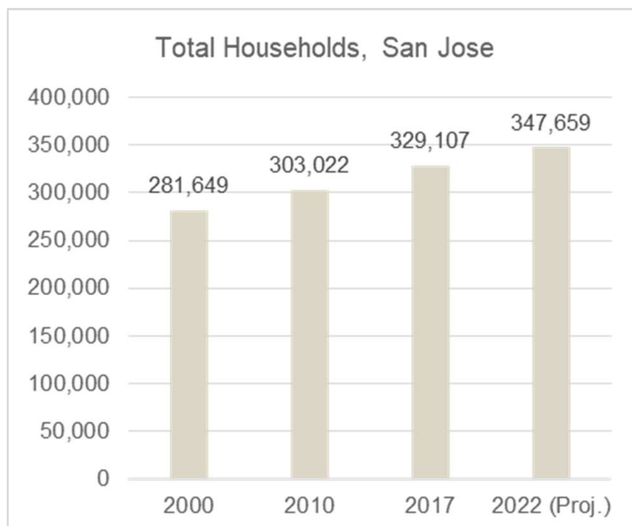
3.3.1 Overview of Demographic Trends

San José's population has grown steadily since 2000, averaging approximately 0.8% each year through 2017. Using a cohort-survival model for population projections, San José's population is projected to continue growing through at least 2022. Similarly, growth in households has also increased steadily since 2000. Household growth has slightly outpaced population growth, averaging 0.9% each year through 2017. As both metrics continue to increase, so will demand for new multifamily development in the city.

Household income is also changing. Current median household income is $88,028 in San José, compared to $56,124 for all U.S. households. Median household income is projected to be $100,012 in five years, compared to $62,316 for all U.S. households. Current average household income is $119,589 in San José, compared to $80,675 for all U.S. households. Average household income is projected to be $136,141 in five years, compared to $91,585 for all U.S. households. Indeed, by 2022, the number of high-income households will continue to grow, while the number of lower-income household will begin to compress. While this will present broader issues for the affordability of the city, these higher income households will support new multifamily development at more expensive price points.

Figure 3-1 Total Population and Total Households in San José





Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2017 and 2022. Esri converted Census 2000 data into 2010 geography

Figure 3-2 Households by Income, 2017 and 2022 Projected

Source: U.S. Census Bureau, Census 2010 Summary File 1. Esri forecasts for 2017 and 2022. Esri converted Census 2000 data into 2010 geography

3.3.2 Overview of Economic Trends

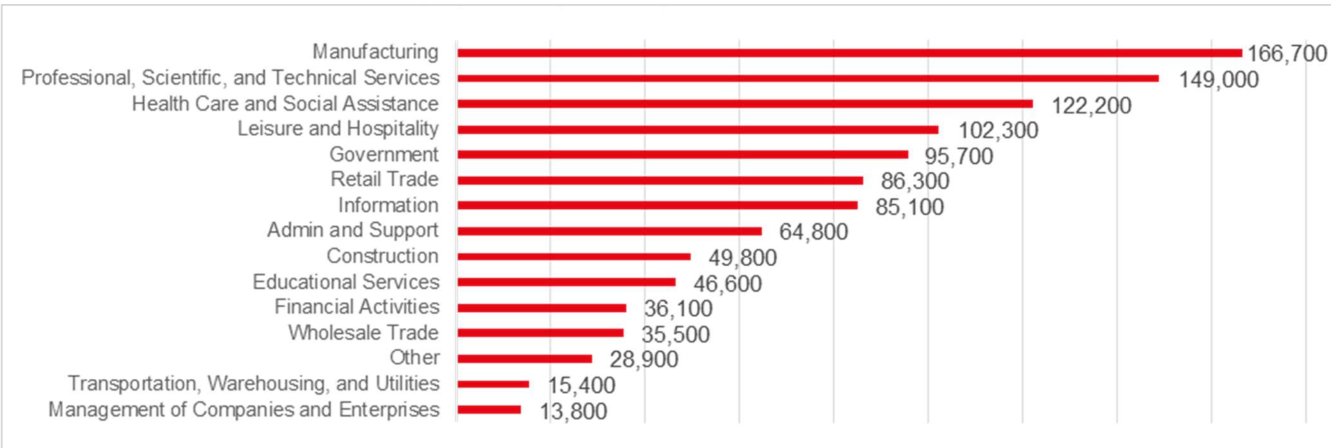
The San José Metropolitan Region has experienced considerable decline in the unemployment rate coming out of the Great Recession. This overall trend points to an ever-strengthening real estate market, as growth in employment will drive demand for both multifamily and office projects, and indirectly for new hospitality projects as well.

Figure 3-3 Unemployment Rate, San José Metro

Source: U.S. Bureau of Labor Statistics

Though growth in the technology sector and supportive industries has characterized San José's economic makeup in recent years, out of the nearly 1.1 million employees in the San José Metro, those working in manufacturing still comprise the greater share at 166,700 (or 15.2%). This is followed by professional, scientific, and technical services, which comprises 149,000 employees (or 13.6%).

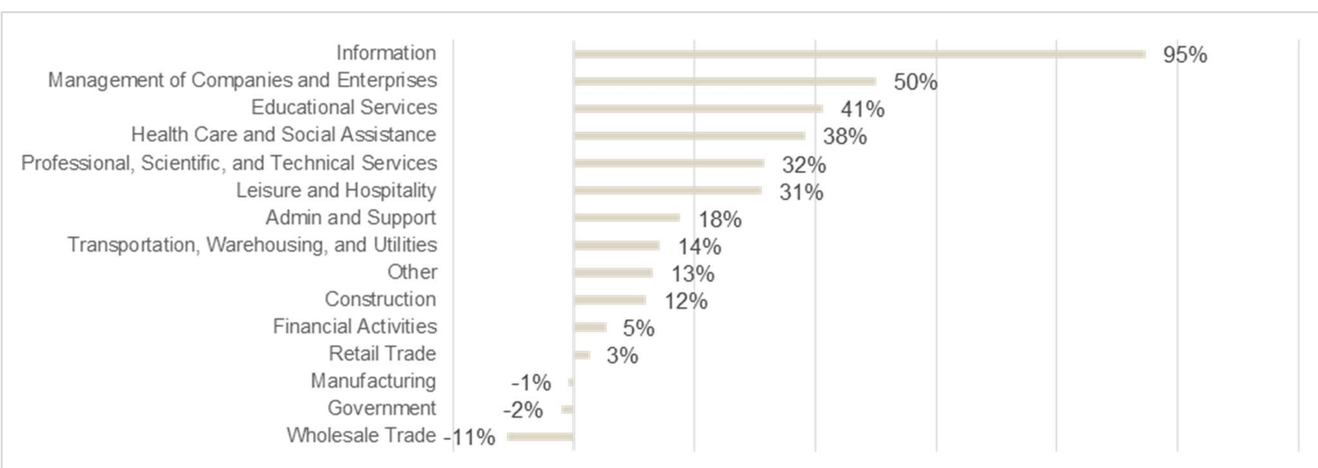
Figure 3-4 Employment by Industry, San José Metro, 2017



Source: U.S. Bureau of Labor Statistics

The Metro has experienced significant growth in nearly every sector, including most office-using sectors such as information, educational services, professional, scientific, and technical services, and administrative and support services. As this growth continues, so will demand for both new office product and new multifamily development as the region continues to attract workers. This growth in office-using industry sectors will be a cornerstone of JLL's analysis of the potential for new office development in San José, as this growth will account for both built-to-suit development and speculative development in the near- and long-term.

Figure 3-5 Change in Employment by Industry, San José Metro, 2008-2017



Source: U.S. Bureau of Labor Statistics

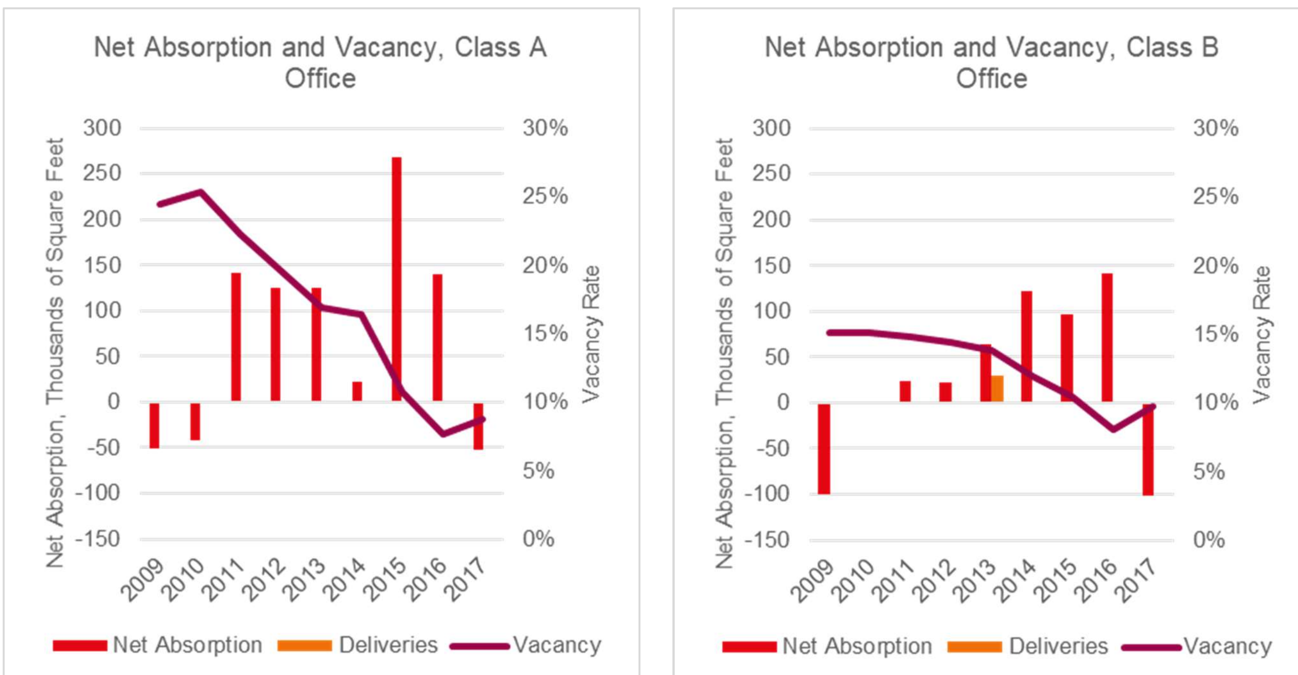
3.3.3 Office

At the moment, downtown development is heavily focused on retail and multifamily, mixed-use properties. While absorption has remained steadily positive, both Class A and B office have experienced some departures in 2017, although vacancy has continued to decline. Available space will continue to compete with new construction, and new speculative office product may face competition from these available spaces at least through 2019.

Rental rates for Class A and Class B have also been climbing since 2012, and as Class A rents continue to grow, so will the likelihood that these rental rates will support new construction. Vacancy rates for all office properties are expected to continue declining as tenants are priced out of prime submarkets, such as Mountain View, Palo Alto, and Sunnyvale and seek alternatives in markets such as San José.

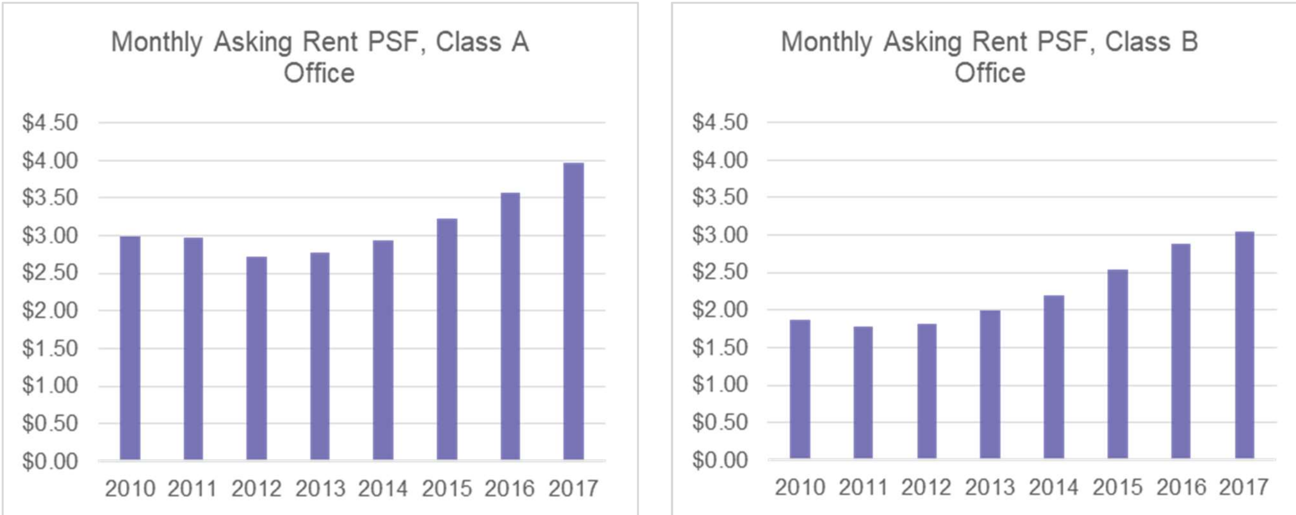
This assessment will assist JLL evaluate the likelihood of speculative office development in the near- and long-term. Along with the analysis of general employment growth, these metrics will help establish a likely pace of long-term office development in areas impacted by the airspace protection surfaces analysis.

Figure 3-6 Net Absorption and Vacancy



Source: CoStar, JLL

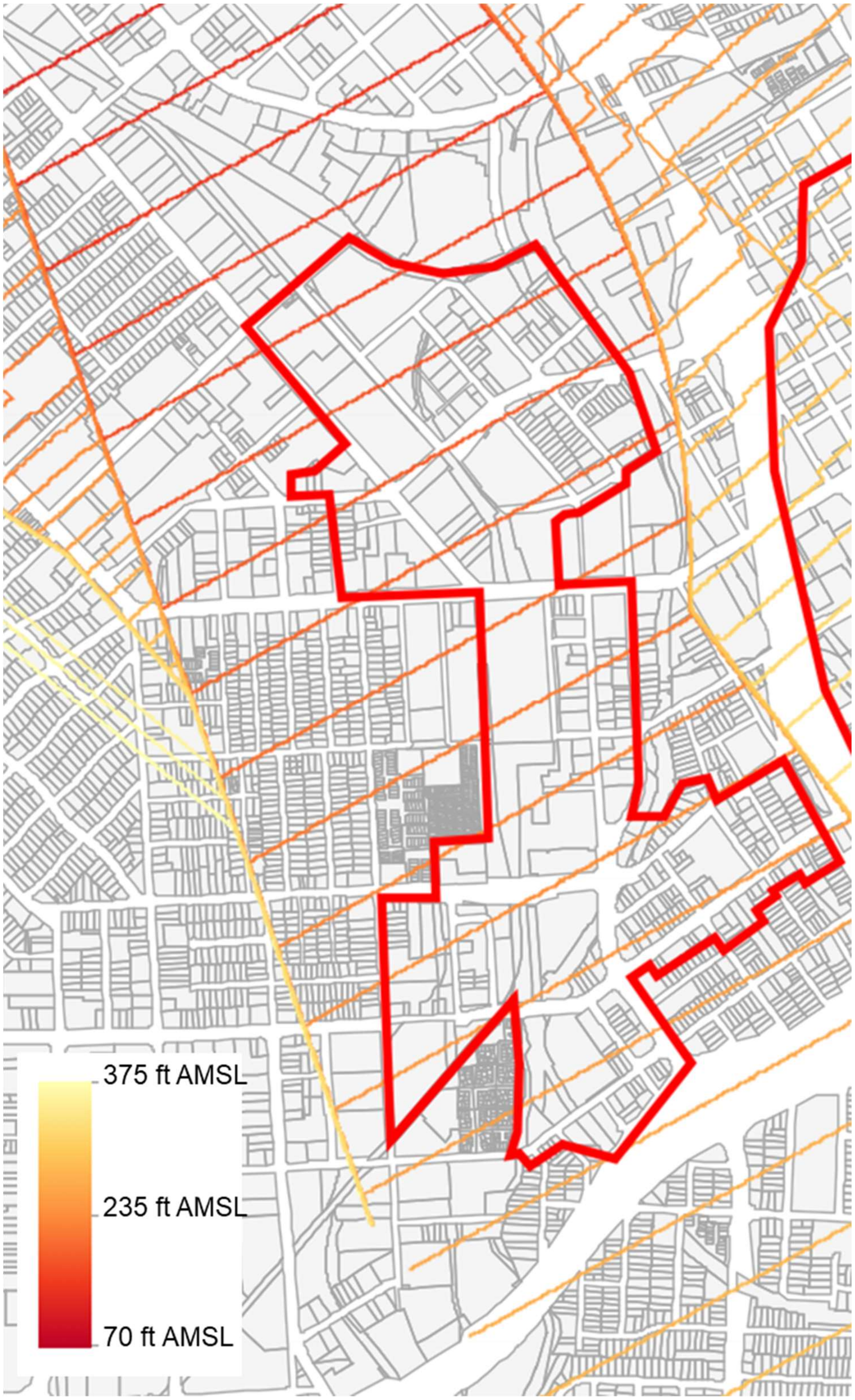
Figure 3-7 Monthly Asking Rent PSF



Source: JLL

The analysis will also factor in development within the Diridon Station Area, which includes future plans by Google to deliver a satellite campus made up of an office and residential development projects. On one parcel that Google recently acquired from Trammell Crow in April, it has preliminary plans to deliver new offices for its use, along with a residential tower and retail. In **Figure 3-8**, the proposed Diridon Station Area is outlined in red (with a portion of the downtown development area displayed as well).

Figure 3-8 Existing West OEI Corridor Heights of Diridon Station Area



Source: Landrum & Brown

3.3.4 Residential

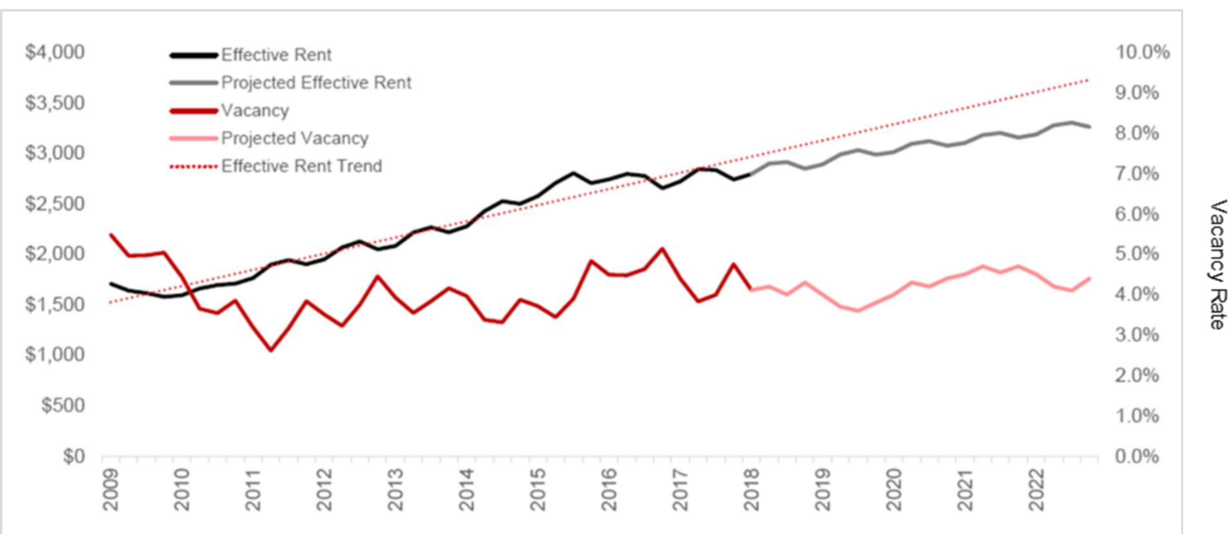
Multifamily

San José's multifamily market is expanding. In Q4 2017, market fundamentals recovered pushing vacancy down below 5% and rents ticked up 2% in that time period. The multifamily market has also benefitted from stable household income and population growth, strict land use controls prohibiting new development, and a lack of affordable home ownership. These inherent characteristics will continue to keep demand ahead of supply for multifamily housing.

Access to employment centers and quality of life has driven tenant demand in all of the urban centers of the Bay Area. In the beginning of this cycle, technology workers enjoyed the benefit of company transportation that allowed employees to live in San Francisco, but work in the employment centers of Silicon Valley. As population and drive times grew, many employees have swapped the urban center of San Francisco for the urban center of San José to ease drive times. This trend has activated San José, welcoming many new residents, developments, and recreational amenities.

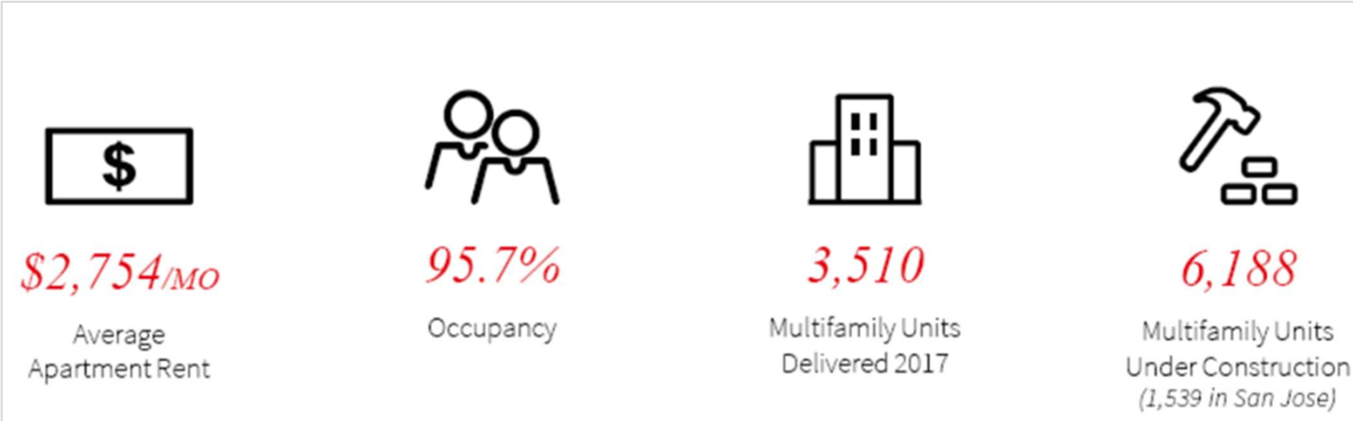
As the Bay Area's economy continues to grow, demand will continue to increase for well-located housing along transportation lines and corridors. Rental rates will continue an upward trend due to the insufficient supply added annually. With the region's above average job growth and lack of housing, investors will continue to benefit from multifamily investments.

Figure 3-9 Multifamily Market Performance: San José



Source: JLL

Figure 3-10 Multifamily Market Snapshot: Santa Clara County (Q1 2018)



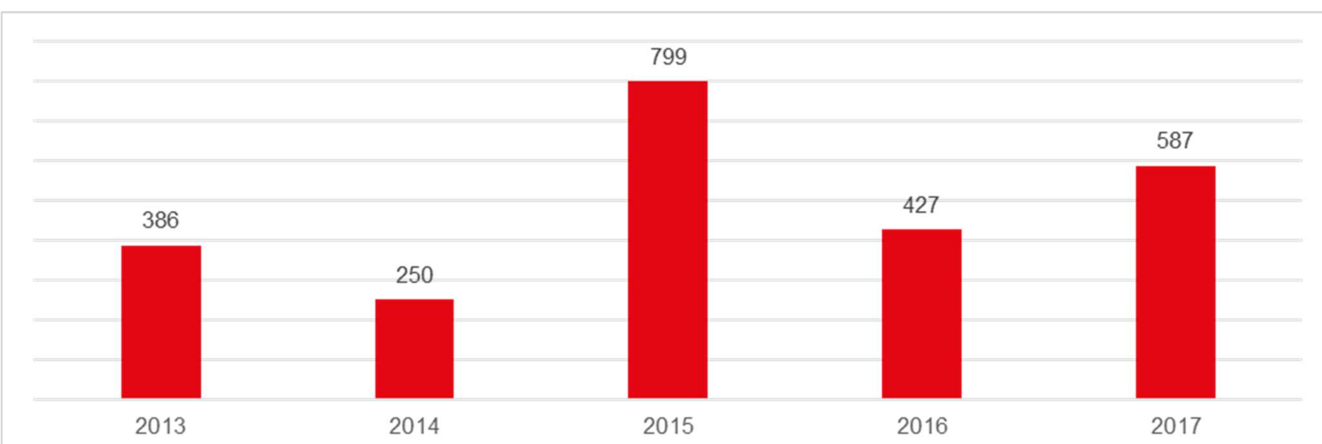
Source: JLL

Multifamily Rental

Within Downtown San José and adjacent neighborhoods, since 2013, there have been nearly 2,500 multifamily units delivered through Q2 2018, and there are over 3,500 units scheduled to be delivered through 2019. Most of these new properties are in areas that will be impacted by changes to the airspace protection surfaces. Including projections for 2018 and 2019, Downtown San José and adjacent neighborhoods will have experienced an average of 900 net new multifamily units delivered each year.

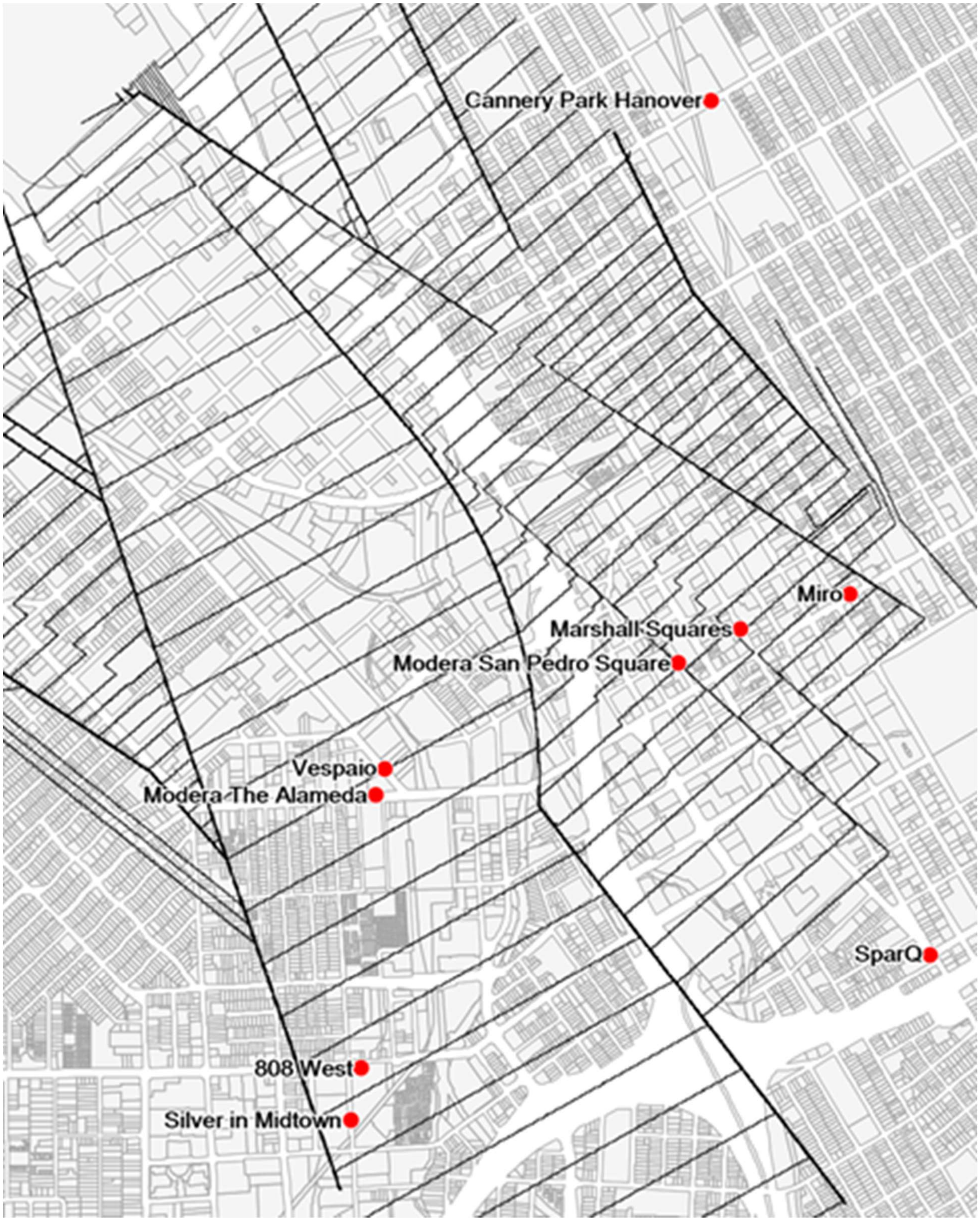
While these new deliveries will have some impact on vacancy and rent, the previous 2,500 units have not had a significant impact on vacancy and rents have continued to climb. Therefore, these trends are not expected to slow anytime soon, particularly with projections of the City's general economic growth continuing.

Figure 3-11 Multifamily Rental Units Delivered, Downtown Area and Adjacent Neighborhoods



Source: Axiometrics, JLL

Figure 3-12 New Rental Properties in Relation to Existing OEI Airspace Protection



Source: JLL

Table 3-1 New Multifamily Rental Properties in San José

Multifamily Rental Properties	Units	Delivery Date (Exp)
808 West	315	4/1/2018
Modera The Alameda	168	5/1/2018
Cannery Park Hanover	403	1/1/2019
Silver in Midtown	800	1/1/2019
Marshall Squares	190	2/1/2019
Modera San Pedro Square	201	4/1/2018
SparQ	105	5/1/2019
Vespaio	164	8/1/2019
Miro	630	8/1/2019
Total	**2,976**	

Source: JLL

3.3.5 Hospitality

While there are a number of hotels in the area of the existing airspace protection surfaces, only five have seen recent investment since 2010. Of these, only one–an AC Hotel by Marriott–is new construction. The remaining properties are renovations of existing hotels and/or adaptive reuse of historical properties.

By and large, these properties are upscale and upper upscale "chain scales." A chain scale is an of the level of service, quality, and cost a consumer may expect from a particular brand. Chain scales are largely determined by Average Daily Rate (ADR), but other factors such as amenities and services can impact which chain scale a particular brand falls in. Chain scales are globally determined by STR, a clearinghouse of hotel market performance data. In all there are six chain scales: in order of highest ranked to lowest ranked, these chain scales are Luxury, Upper Upscale, Upscale, Upper Midscale, Midscale, and Economy.

That newer hotel investment in the market area are exclusively upscale and upper upscale is an indication both of the potential demand that is present as well as the expected ADR that will likely support new investment. However, that only one property has been built as new construction – rather than renovating or converting and existing building – indicates that the hospitality market as a whole in this area may not support significant new construction, likely due to insufficient demand to support the cost of new construction.

Given growth in the economy as a whole, and further investments by major companies that move to the area, hospitality demand may grow and justify new construction. More exploration will be conducted in further analysis.

Figure 3-13 Existing Upper Scale Chain Hotel Locations Within Existing OEI Protection

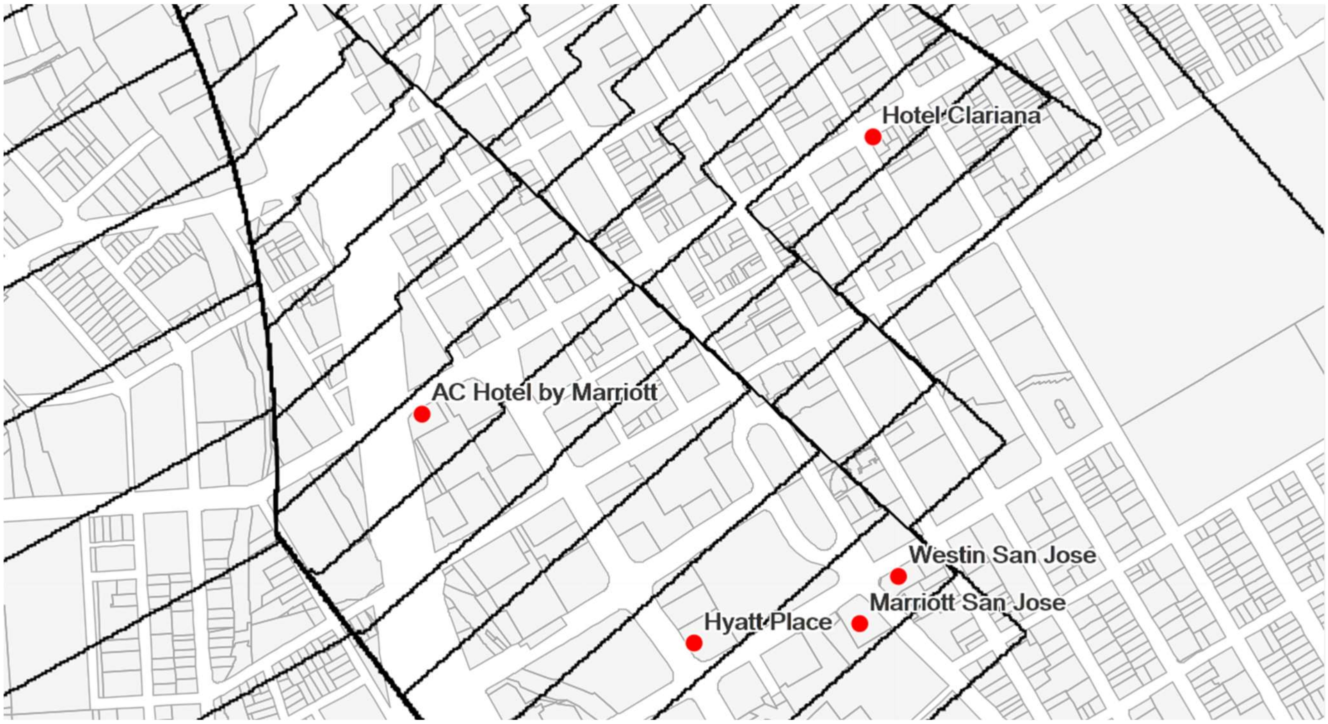


Table 3-2 Existing Upper Scale Chain Hotel Locations Within Existing OEI Protection

Property	Year Built / Renovated	Rooms	Chain Scale
Hyatt Place	1974 / 2012	236	Upscale
Marriott San José	2003 / 2014	510	Upper Upscale
Westin San José	1926 / 2015	171	Upper Upscale
AC Hotel by Marriott	2016	162	Upscale
Hotel Clariana	1912 / 2017	44	Independent (AAA three stars)

Source: JLL

3.3.6 Preliminary Assumptions

Based on the prior analysis, JLL will use the following preliminary assumptions to further the study. Many assumptions are more conservative than what is currently observed in the market to ensure that the analysis does not overstate the long-term value of real estate development to the City. Assumptions not addressed here are listed in the "Additional Assumptions" section at the end of this document. Further analysis may impact these assumptions as the study continues.

Table 3-3 Preliminary Assumptions

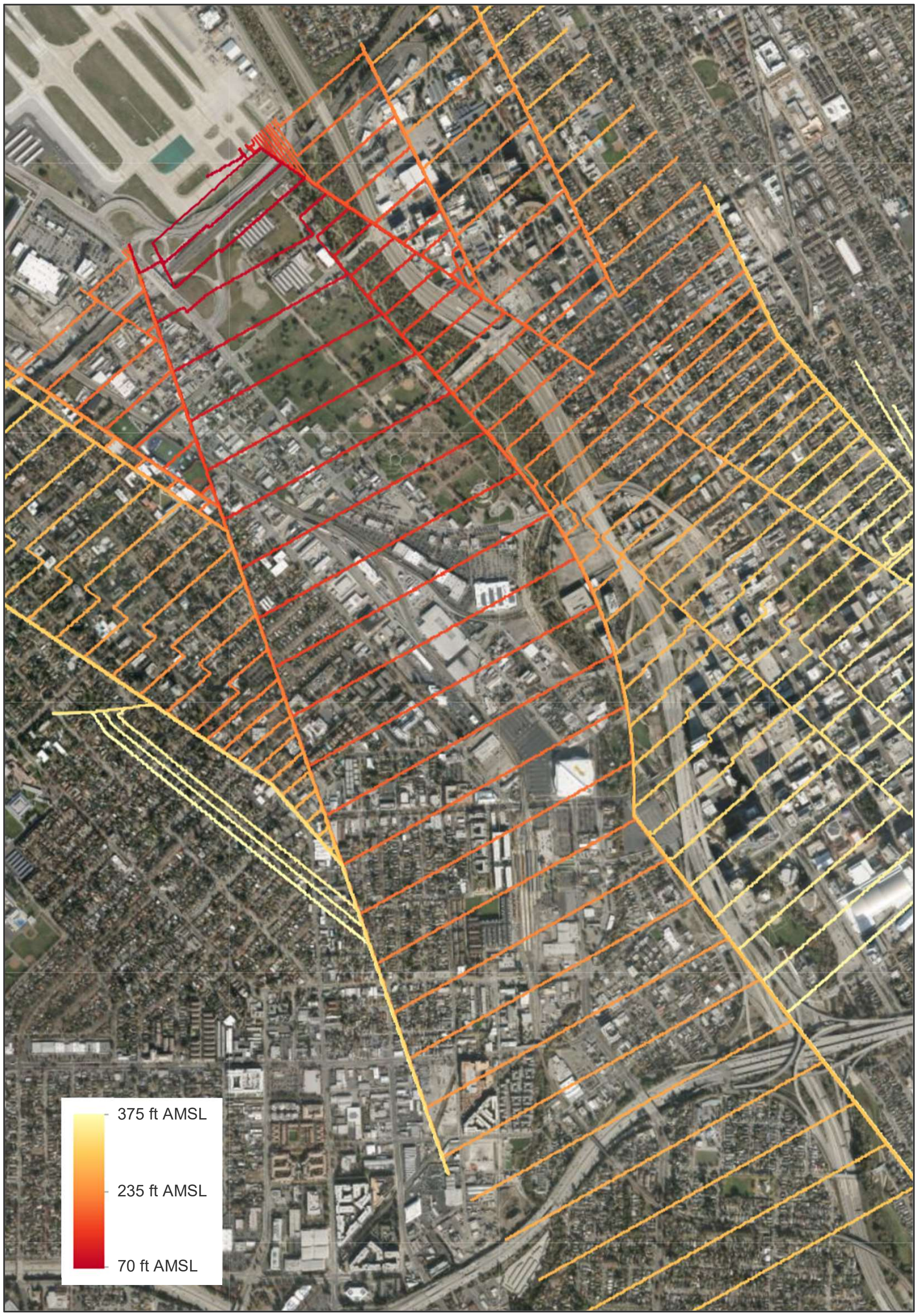
Assumption*	Value
Office	
Construction Cost	
General Assumptions (changes to general assumptions will result from further analysis and will therefore impact assumptions below)	90,000-136,000 GSF, Class A, mid-rise, site-ready, utilities present, 1 FAR, Class A TI, structured parking, zoning MS-100%, 5 stories, 2.5/1,000sf structured parking
Core/shell/systems	$310-$360/gsf
Tenant Improvements Allowance	$50-$75/gsf
Structured Parking	$35,000/space - $45,000/space
Cost Escalation Rate	3.0% annually
Average Annual Absorption	50,000 square feet
Stabilized/Structural Vacancy Rate	10.0%
Rental Rate (2018)	$4.15/sf full services gross per month
Rental Rate Escalation Rate	2.0% annually
Residential	
Construction Cost	TBD
General Assumptions (changes to general assumptions will result from further analysis and will therefore impact assumptions below)	200-unit, common area, self-service amenities, structured parking, A-class finishes/ceiling heights/appliances, excludes land, assumes clean build ready site with close amenities, average unit size 850sf, tower mid/high rise
All-In Cost	$525/gsf
Cost Escalation Rate	3.0%
Average Pace of New Construction Delivery	750 units each year
Stabilized/Structural Vacancy Rate	5.0%
Average Rental Rate (2018)	$2,800 per unit per month
Rental Rate Escalation Rate	2.0%
Hospitality	
Construction Cost	
General Assumptions (changes to general assumptions will result from further analysis and will therefore impact assumptions below)	149 keys, 3-4 star branded, excludes land, includes FF&E/taxes/fees, construction interest @7% with 65% leverage, includes structured parking, mid-high-rise dependent upon lot and FAR
All-In Cost	$680,000/key
Cost Escalation Rate	3.0%

3.4 Land Use Assessment

3.4.1 Overview of Existing TERPS and OEI Surface Elevations

Existing airspace protection surfaces that may potentially impact high density development in the City are at their highest at 375 feet above mean sea level (AMSL), and become lower closer to the runway, with minimum elevations as low as 70 feet AMSL. In addition, ground height in areas impacted by the existing airspace protection surfaces are as high as 108 feet above sea level near I-280 and as high as 62 feet near to SJC (the airport itself is 62 feet above sea level). If, for example, an airspace protection surface has a minimum elevation of 375 feet but the ground height is 100 feet, maximum buildable height will be 275 feet.

Figure 3-14 Existing TERPS and OEI Protection Surface Elevations for SJC

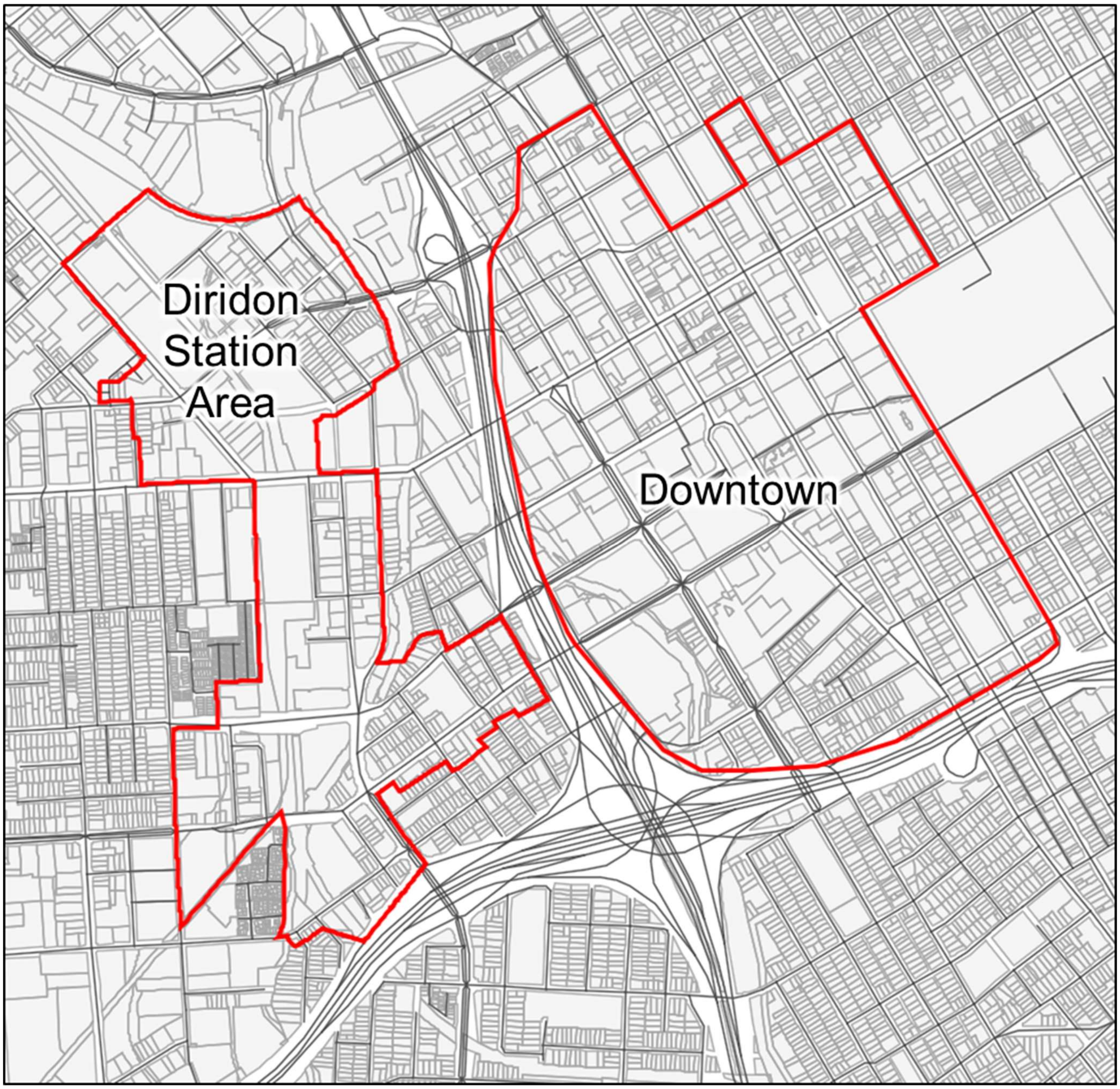


Source: Landrum & Brown, Santa Clara County

3.4.2 Development Areas

Landrum & Brown, working with the Airport, City, and Steering Committee, has identified areas which may be potentially impacted. These areas encompass Downtown and the Diridon Station Area (which, as noted, includes Google's planned future satellite campus and associated development). The goals of JLL's analysis is to therefore refine these areas, as well as identify additional areas outside Downtown and the Diridon Station Area that may be impacted.

Figure 3-15 Downtown Core and Diridon Station Area Study Limits



Source: Landrum & Brown

3.4.3 Building Height Estimation Approach

For the purposes of this assessment, it is necessary to convert height metrics presented in feet to potential building height in stories. While the City of San José Zoning Ordinance offers guidelines and limitations on building height in both feet and stories, the General Land Use Plan offers guidance on total number of stories and floor-area-ratio ("FAR"). As Envision San José 2040 will guide land use for the foreseeable future–per interviews with City staff, decisions regarding applications for zoning approval and/or variances will reference the general plan–its guidance on height and density will be used to assess the impact of various airspace protection surface scenarios on development in the city.

In a survey of high-rise buildings in San José, the median building height per floor is 14 feet. This includes all occupiable, mechanical, and lobby floors. There is some range in average height per floor, ranging from 10 feet per floor for San José Marriott, Centerra, One South Market, and Axis, to 19 feet per floor for Samsung America HQ. While there is a general trend where taller structures have less average height per floor compare to lower structure, there is also considerable variation that does not lend itself to a reliable "bracketing" of average floor height depending on the total height of the building.

(One high-rise structure in San José was not included in this analysis: The Bank of Italy Building, as it was built in 1912, is considerably older than the other properties, and subject to significantly different architectural and structural mores).

Therefore, in this preliminary analysis, an average floor height of 14 feet is presumed. A 25-story building, for example, would be analyzed as 350 tall.

Table 3-4 Building Height Estimation

Name	Height (ft AGL)	Floors	Avg. Feet Per Floor
160 West Santa Clara	220	17	13
60 South Market	213	15	14
Adobe Systems Almaden Tower	260	18	14
Adobe Systems East Tower	236	16	15
Adobe Systems West Tower	259	18	14
Axis	228	22	10
Bank of America Building	199	13	15
Centerra	217	21	10
City Heights at Pellier Park	170	16	11
Comerica Bank Building	167	13	13
Fairmont Hotel	253	22	12
Fairmont Plaza	261	17	15
Heritage Bank Building	214	15	14
Horizon Center	179	14	13
One South Market	238	23	10
Opus Center San José	231	16	14
Samsung America HQ	191	10	19
San José City Hall	285	18	16
San José Hilton	246	18	14
San José Marriott	268	27	10
Sobrato Office Tower	280	19	15
Ten Almaden	230	16	14
The 88	286	22	13
Three Sixty Residences	270	24	11
Tower 55	217	15	14
Median			**14**

Source: JLL

3.4.4 Envision San José 2040 Land Use Designations

While the airspace protection surfaces overlay a large area of San José, not all areas will be impacted. Certain areas will not allow for a level of density that may be impacted by this analysis. In order to identify areas that may be impacted by the airspace protection surfaces, JLL reviewed the "land use designations" outlined in Envision San José 2040. The purpose of the land use designations is to realize the broader goals and objectives of Envision San José 2040, and provide a wide range of land use type, density, and height guidelines depending on location, existing development and adjacent uses, future growth plans, proximity to existing and planned transit, and other factors.

As noted, not all land use designations allow for a level of density or height that would result in new development that is potentially impacted by the airspace protection surfaces. Generally speaking, only those land use designations that allow for dense, high-rise development in excess of 10 stories are applicable. These land use designations are summarized in **Table 3-5**.

In some cases, land use designations do not limit height directly, but limit dwelling units-per-acre ("DU/AC") or floor-area-ratio ("FAR"). These metrics dictate density, not height, though they may result in varying height in practice.[1] Therefore any land use designation that allows for up to 8 FAR or more is also included, as this implies a potential 8-story building if the building footprint and parcel size are approximate (DU/AC is too variable a metric for gauging height; therefore, it was not factored in).

There are two exceptions to the above, noted in **Table 3-6**. In addition, some land use designations may allow for high-density development but are not present within the airspace protection surfaces. These are also excluded.

1 DU/AC limits the number of residential units given land area. For example, a limit of 500 DU/AC on a 2-acre site (87,120 square feet) would allow for 1,000 total units. At an average of 750 gross square feet per unit, the total building area would be 750,000 square feet. Assuming the building can cover 80% of the land, or 69,696 square feet (1.6 acres), this would require a building that is at least 11 stories tall (or 750,000 total building square feet divided by 69,696 land square feet). FAR defines a limit for total square feet of building given a certain land area. For example, a limit of 10 FAR allows for 10 square feet of building area for every 1 square foot of land area, effectively a maximum 10-story building. Using the above example, the land can accommodate 871,200 square feet of total building area. The project above, at 750,000 square feet, would equal 8.6 FAR (or 871,200 square feet divided by 750,000 square feet). Therefore, this building would be within the allowable density established by the FAR limit.

Table 3-5 Applicable Land Use Designation

Name	Purpose	Target Density
Downtown	High-intensity office, retail, service, residential, and entertainment	Up to 800 DU/AC Up to 30.0 FAR 3-30 stories
Commercial Downtown	As above, without residential	Up to 15.0 FAR 3-30 stories
Urban Village	High-density commercial, residential, institutional, or other	Up to 200 DU/AC Up to 10.0 FAR
Urban Village Commercial	As above, without residential	Up to 8.0 FAR
Transit Employment Center	Office, R&D, industrial, limited residential	Up to 14.0 FAR 4-25 stories
Combined Industrial/Commercial	Office, industrial, other	Up to 12.0 FAR 1-24 stories
Transit Residential	Residential	50-250 DU/AC 2.0-12.0 FAR 5-25 stories

Source: City of San José

Table 3-6 Excluded Regardless of Potential Density

Name	Purpose	Target Density	Reason for Exclusion
Mixed Use Commercial	Mix of commercial and residential uses	0.25-4.5 FAR 1-6 stories	These areas are not subject to airspace protection surfaces low enough to impact 6-story buildings
Industrial Park	R&D, mfg., assembly, testing. and office	Up to 11.0 FAR 2-15 stories	It is unlikely that these land uses will achieve this level of density

Source: City of San José

3.4.5 Potentially Impacted Development Areas

Based on the review of Envision San José 2040 land use designations, areas of San José that may be impacted by changes to the airspace protection surfaces for SJC are below. These areas are highlighted by land use designation and overlaid by the existing TERPS and OEI airspace protection surfaces in black. Most are within the previously established development areas (in red), and based on this analysis, specific parcels within these development areas will be scrutinized in more detail. In addition, there are a number of parcels outside of these development areas that may also be impacted, and which JLL will explore further.

Many of these areas are largely developed already, though there is some amount of available land. Over the long-term, the airspace protection surface changes may impact redevelopment opportunities for existing properties. In subsequent documentation, specific development parcels will be identified within these areas.

Figure 3-16 Potentially Impacted Development Areas

Note: Highlighted development areas that are not within the airspace protection surfaces overlay will not be impacted nor are considered in this analysis.

Source: JLL

3.4.6 Preliminary Assumptions

Based on the analysis of potentially impacted land uses, JLL will assess potential development parcels that fall into the following land use designations as discussed previously. Further analysis may result in land use designations being removed or added in the future.

Table 3-7 Land Use Designation Categories

Name	Purpose	Target Density
Downtown	High-intensity office, retail, service, residential, and entertainment	Up to 800 DU/AC Up to 30.0 FAR 3-30 stories
Commercial Downtown	As above, without residential	Up to 15.0 FAR 3-30 stories
Urban Village	High-density commercial, residential, institutional, or other	Up to 200 DU/AC Up to 10.0 FAR
Urban Village Commercial	As above, without residential	Up to 8.0 FAR
Transit Employment Center	Office, R&D, industrial, limited residential	Up to 14.0 FAR 4-25 stories
Combined Industrial/ Commercial	Office, industrial, other	Up to 12.0 FAR 1-24 stories
Transit Residential	Residential	50-250 DU/AC 2.0-12.0 FAR 5-25 stories

Source: JLL

3.5 Additional Assumptions

As noted in the Scope and Purpose, included below are a set of assumptions that JLL will continue to explore and which will be key to assessing the value and tax impacts of the airspace protection surface scenarios.
These assumptions have not yet been assessed, but are being presented to the City and the Steering Committee for prior feedback ahead of completing the analysis.

Table 3-8 Additional Evaluation Assumptions

Additional Assumptions
Office
Pace of New Build-to-Suit Delivery Based on Economic Growth
Pace of New Speculative Delivery Based on Real Estate Fundamentals
Operating Cost
Development and Construction Draw Schedule
Construction Financing Assumptions
Permanent Financing Assumptions
Developer Return Threshold
Capitalization Strategy (sale or refinance)
Cap Rate (for sale calculation)
Debt Service Coverage Ratio (for refinance calculation)
Other Major Developments Impacting Supply and Demand
Residential
Operating Cost
Development and Construction Draw Schedule
Construction Financing Assumptions
Permanent Financing Assumptions
Developer Return Threshold
Capitalization Strategy (sale or refinance)
Cap Rate (for sale calculation)
Debt Service Coverage Ratio (for refinance calculation)
Other Major Developments Impacting Supply and Demand
Hospitality
Room-Night Demand
Supply Pipeline
Likely Segmentation of New Development
Average Daily Rate

Additional Assumptions
Occupancy
Revenue per Available Room ("RevPAR")
Development and Construction Draw Schedule
Construction Financing Assumptions
Permanent Financing Assumptions
Developer Return Threshold
Capitalization Strategy (sale or refinance)
Cap Rate (for sale calculation)
Debt Service Coverage Ratio (for refinance calculation)
Other Major Developments Impacting Supply and Demand

Source: JLL

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4 Airspace Scenarios and Aircraft Performance Assessment

4.1 Introduction

In 2007, the Airspace Obstruction Study with the associated composite mapping assessment was conducted for Norman Y. Mineta San José International Airport (SJC or Airport). In this analysis, airspace protection surfaces were evaluated to determine the lowest controlling obstacles that surround the Airport within a 3-mile radius, and to map out a proposed set of maximum allowable heights for development surrounding SJC based on the most restrictive airline one-engine inoperative (OEI) procedure surfaces and Federal Aviation Administration (FAA) "TERPS" surfaces (arrival and departure instrument procedures).

A decade has passed since the previous assessment was conducted, and changes in the Airport operating environment have occurred, including the following:

- The FAA implemented satellite-based navigation along with existing ground-based navigation. Specifically, the implementation of RNP procedures since 2007 as these are technically the newest satellite-based procedures that have been developed.
- New aircraft came into San José which among them included the Boeing 787-8/9 and Airbus 321-NEO and Airbus has introduced the A350 into worldwide service.
- This study focused was very specific to SJC, the area south of the airport, the aircraft and markets served
- The Airport recently completed new obstacle data survey in late 2016.

Table 4-1 depicts the existing commercial airlines that currently operate at SJC. **Table 4-2** provides a summary of the existing markets that are currently served from SJC.

Table 4-1 Existing Passenger Commercial Airlines at SJC

Existing Commercial Airlines	
Aeromexico	Frontier Airlines
Air Canada	Hainan Airlines
Alaska	Hawaiian Airlines
American Airlines	JetBlue
ANA	Lufthansa
British Airways	Southwest
California Pacific	United
Delta	Volaris

Source: www.flysjc.com/airlines

Table 4-2 Existing Markets Served at SJC

City	Country	City	Country
Albuquerque	United States	London-Heathrow	Europe
Atlanta	United States	Long Beach	United States
Austin	United States	Los Angeles	United States
Baltimore/Washington	United States	Minneapolis-St. Paul	United States
Beijing	China	Morelia	Mexico
Boise	United States	Nashville	United States
Boston	United States	New Orleans (Seasonal)	United States
Burbank	United States	New York-JFK	United States
Cabo San Lucas	United States	Newark (New York Area)	United States
Chicago-Midway	United States	Ontario	United States
Chicago-O'Hare	United States	Orange County	United States
Dallas/Fort Worth	United States	Orlando	United States
Dallas-Love Field	United States	Phoenix	United States
Denver	United States	Portland	United States
Detroit	United States	Raleigh/Durham	United States
El Paso	United States	Reno	United States
Everett (Seattle Area)	United States	Salt Lake City	United States
Guadalajara	Mexico	San Diego	United States
Honolulu	United States (Hawaii)	Seattle	United States
Houston-Hobby	United States	Spokane	United States
Houston-Intercontinental	United States	St. Louis	United States
Kahului (Maui)	United States (Hawaii)	Tokyo-Narita	China
Kona (Hawaii)	United States (Hawaii)	Tucson	United States
Las Vegas	United States	Vancouver	Canada
Leon	Mexico	Zacatecas	Mexico
Lihue (Kauai)	United States (Hawaii)		

Source: www.flysjc.com/destinations

The new study, initiated in early 2018, is intended to update and reassess the current airspace protection surfaces for SJC and to identify potential changes to maximum allowable development heights, particularly in Downtown Core of San José and the Diridon Station Area immediately to the west of the Downtown Core. At the conclusion of the study, a newly updated composite airspace protection map for SJC will be developed for use by the City of San José.

Below are commonly used acronyms in this report:

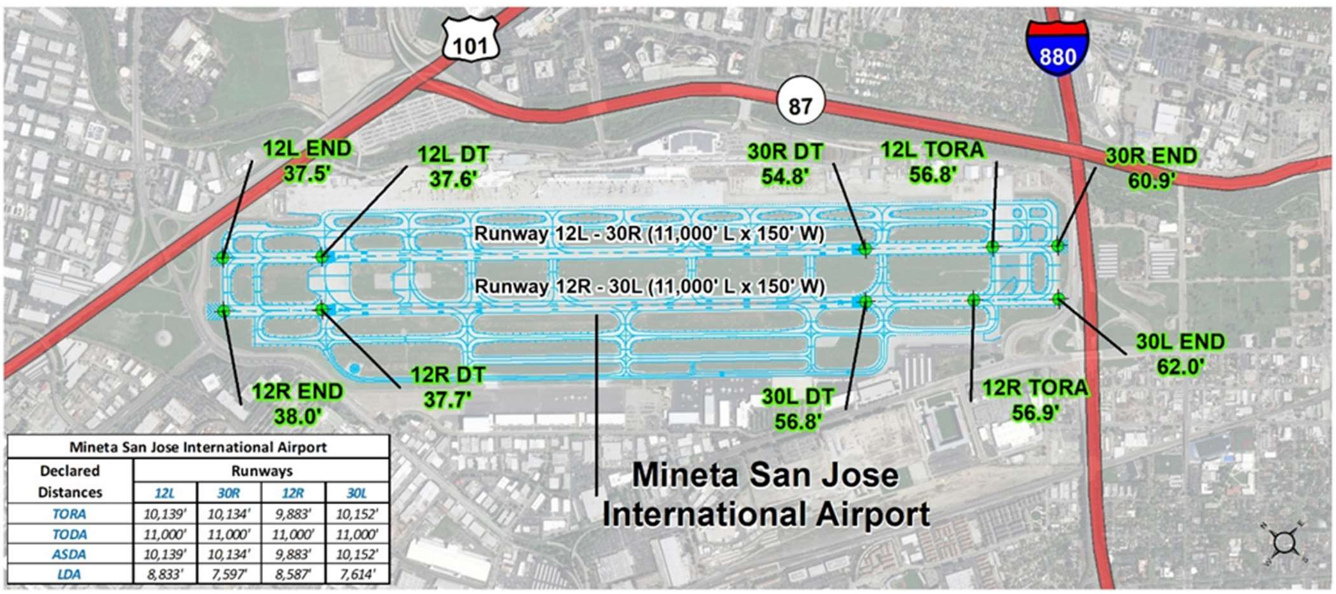
- AGL: Above Ground Level (feet).
- CG: Climb Gradient
- FAA: Federal Aviation Administration
- ICAO: International Civil Aviation Organization
- MSL: Mean Sea Level (feet)
- OEI: One-Engine Inoperative
- OCS: Obstacle Clearance Surface
- PAX: Passenger
- Project DADCS: Downtown San José Airspace and Development Capacity Study
- Project Consultants': Landrum & Brown Inc. and Flight Engineering LLC.
- TERPS: United States Terminal Instrument Procedures
- SJC: Norman Y. Mineta San José International Airport

4.2 Airport and Project Study Area Overview

4.2.1 Airport Layout Overview

Figure 4-1 depicts the existing airport layout for SJC. The Airport is currently served by two closely-spaced parallel runways. Runways 12L-30R and 12R-30L are both 11,000 feet long and 150 feet wide. Runway 12R-30L is classified as a precision instrument runway (PIR) with CAT I and II instrument landing system capabilities. Runway 12L-30R is classified as a non-precision instrument (NPI) runway and does not accommodate instrument landing system operations. A temporarily closed runway, 11-29, was previously used for general aviation operations on the west side of the Airport but is currently operated as Taxiway W1. A separate independent study is evaluating the permanent disposition of this runway. Current declared distances for the two existing runways is depicted in the inset table on Figure 4-1. Please note that all elevations are measured in feet (ex. 37.5').

Figure 4-1 Mineta San José International Airport (SJC) Layout



Mineta San Jose International Airport				
Declared Distances	Runways			
	12L	30R	12R	30L
TORA	10,139'	10,134'	9,883'	10,152'
TODA	11,000'	11,000'	11,000'	11,000'
ASDA	10,139'	10,134'	9,883'	10,152'
LDA	8,833'	7,597'	8,587'	7,614'

Source: Landrum & Brown

4.2.2 Project Study Area Overview

Figure 4-2 depicts the two study areas for Project DADCS, consisting of the Downtown Core and Diridon Station Area. The Downtown Core is located east of Highway 87 and begins approximately 7,200 feet from the approach ends of Runways 30L and 30R and extends to a distance of approximately 13,100 feet from Runways 30L and 30R. The Downtown Core is where high-rise development is most prevalent.

The Diridon Station Area is located west of Highway 87 and begins approximately 5,300 feet from the approach end of Runways 30L and 30R and extends to a distance of approximately 11,200 feet from the runway ends. The Diridon Station Area is currently devoid of high-rise development but is considered to be part of a future expanded downtown given the multiple existing and proposed rail and transit systems serving Diridon Station.

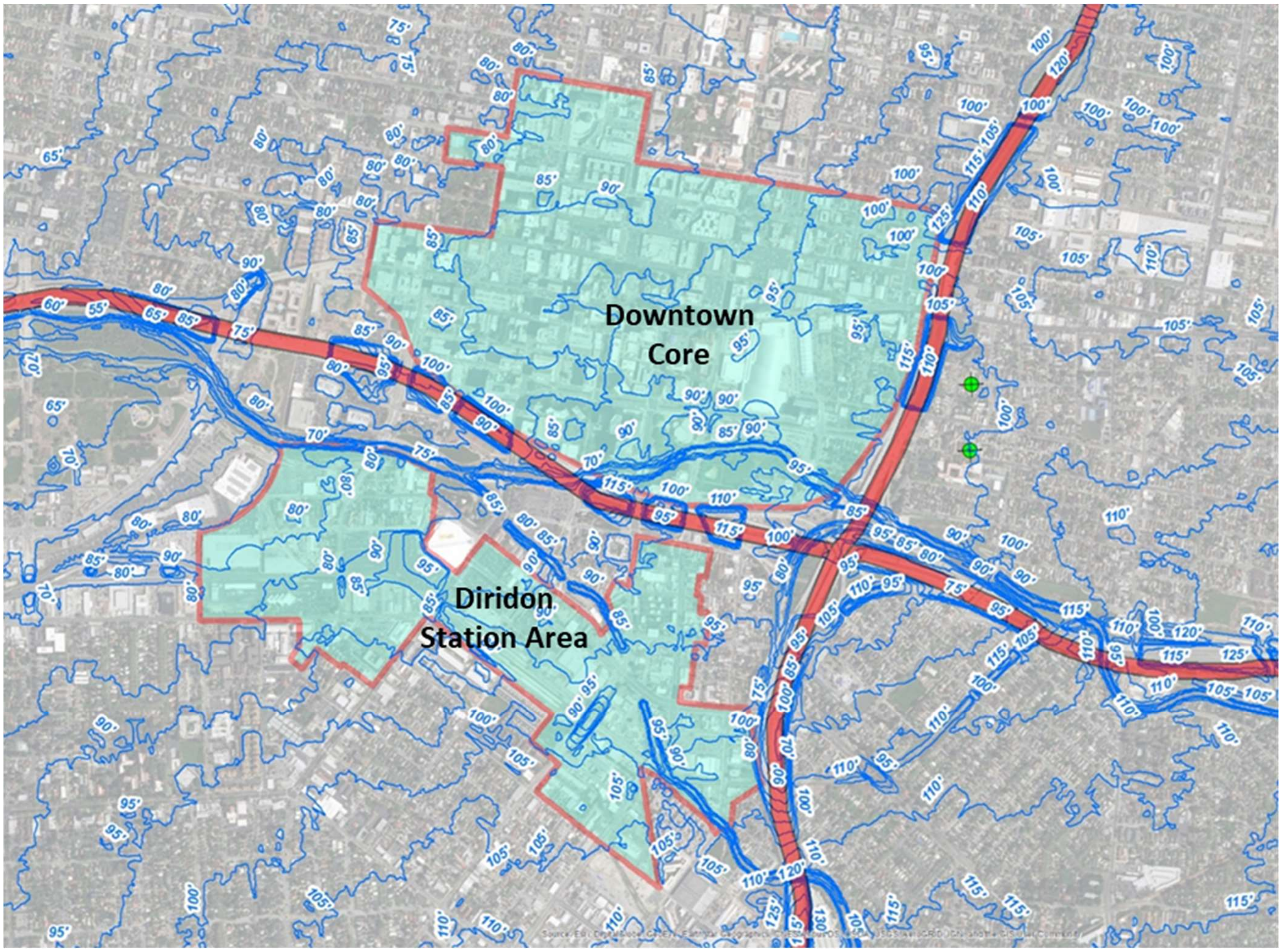
The 2007 Airspace Obstruction Study found that most airlines operating at SJC use OEI procedures that go straight out over the Downtown Core when departing to the south. A few airlines, however, including those with larger aircraft going to more distant destinations, use OEI procedures that curve away from the Downtown Core in order to avoid the existing high-rise buildings and instead overfly the Diridon Station Area where existing development heights are much lower. Protecting for this westerly curving maneuver by larger/heavier aircraft in an OEI situation results in maximum allowable development heights that are much more restrictive than in the Downtown Core.

Figure 4-2 Existing Airport Layout and Study Evaluation Area

Source: Landrum & Brown

As depicted in **Figure 4-3,** ground elevations in the Downtown Core and Diridon Station Area generally range from 80 feet MSL to 105 feet MSL in a northerly to southerly direction. As development heights are typically expressed in AGL, setting a maximum allowable building height for airspace protection purposes at any given location is derived by subtracting the ground MSL elevation from the airspace surface MSL elevation.

Figure 4-3 Downtown Core and Diridon Station Area Ground Contour Elevations



Source: Graphic prepared by Landrum & Brown. USGS 1/3 arc-second Contour Downloadable Data Collection, 2014; Ground contour data obtained from USGC "The National Map" Staged Products Directory: https://prd-tnm.s3.amazonaws.com/index.html?prefix=StagedProducts/Contours/Shape/

4.3 Airspace Protection Framework

A Project Steering Committee was formed to guide this process. Steering Committee members represent diverse organizations that have interest in the successful growth of the Airport and the Downtown Core/Diridon Station Area. Participating organizations are listed below:

- The Airport Commission and Downtown Resident
- San José Downtown Association
- Santa Clara Building Trades Council (SCBTC)
- Santa Clara County Residents for Responsible Development
- San Francisco Bay Area Planning and Urban Research Association (SPUR)
- Silicon Valley Leadership Group (SVLG)
- The Silicon Valley Organization (SVO)

Additionally, City staff from the Mayor's office, the Downtown Councilmember's office, the Office of Economic Development and the Department of Planning, Building and Code Enforcement were engaged in the study. The Project Steering Committee provided guidance and direction on the study, and allowed for stakeholders to have an open forum to provide feedback and input. A series of Committee meetings was conducted to present and discuss analytical assumptions, methodology/approach, and findings on the various aspects of this project. In addition to the Project Steering Committee, three broader stakeholder meetings were held, offering stakeholders the ability to ask questions and receive updates as the study progressed. The Project Steering Committee utilized a decision-making framework to evaluate various airspace protection scenarios, aircraft types, and airport destinations.

4.3.1 Potential Scenarios Evaluated

The Project Steering Committee explored a variety of potential airspace protection scenarios. A total of ten scenarios and the existing conditions were proposed:

- **Existing airspace protection**
  - Used as the base case and comparison to potentially heights gained in other scenarios
- **West OEI Corridor with increased surface slopes**
  - This scenario was removed and replaced with further refinement of the defined development in Scenario 10.
- **East OEI Corridor with a TERPS only scenario over Diridon Station Area**
  - Evaluate the feasibility of an East OEI corridor which would essentially be a mirror image of the West OEI Corridor and require long-haul departures to turn left to avoid Downtown Core
  - Increased development height over Diridon Station Area with the elimination of the existing West OEI Corridor
- **No OEI protection/TERPS Only**
  - Removal of existing straight-out and West OEI Corridor surface protection for Runways 12L/12R
  - TERPS Only scenario would essentially provide increased development heights over Downtown Core and Diridon Station Area
- **West OEI Corridor surface protection without Straight-out OEI**
  - Maintain existing West OEI Corridor while removing straight-out OEI protection for Runways 12L/12R
  - Additional heights gained of Downtown Core while heights over Diridon Station Area would remain the same

- **West OEI Corridor with greater than 15 degree turn**
  - Evaluate the feasibility of airlines' ability to make a right turn greater than 15 degrees to avoid Diridon Station Area, allowing additional heights for development
  - Downtown Core heights would remain the same
- **Straight-out OEI protection without West OEI Corridor**
  - Maintain existing straight-out OEI surface protection for Runway 12L/12R departures
  - West OEI corridor would be removed, allowing for additional development height within Diridon Station Area.
- **TERPS only with increased TERPS departure climb gradients**
  - Similar to Scenario 4, with the exception that the current lowest published climb gradient procedures (261 feet/NM and 290 feet/NM) would be eliminated.
  - A 470 foot/NM published TERPS departure climb gradient would be protect for thereby increasing developable heights over the Downtown Core and Diridon Station Area.
- **No OEI/TERPS Only, increased FAA height limits**
  - Assumes that the lowest TERPS departure surface climb gradient protection (261 feet/NM and 290 feet/NM) would be eliminated for Runway 12L/12R and non-precision instrument circling approach surface heights would be increased
  - Assumes no changes to vertically guided precision instrument approach procedures for Runway 30L/30R operations
- **Modified West OEI Corridor at defined development heights**
  - Assumes that the surface slope of the West OEI Corridor could be adjusted to allow for additional development heights in Diridon Station Area
  - Incremental surface slopes adjustments would be conducted to determine the impact on aircraft performance
- **Extend the approach ends of Runways 12L and/or 12R to the north**
  - Theoretically solution to extend the arrival end of Runways 12L and/or 12R to the north (across Highway 101) in order to provide a longer runway for departures
  - TERPS departure airspace surface protection for Runways 12L and/or 12R would shift further away from the Downtown Core and Diridon Station Area thereby resulting in additional development height opportunities

The scenarios were analyzed to determine the overall impacts to aviation operations and the development capacity, including an evaluation of the timing and feasibility of implementation.

4.3.2 Decision Making Criteria

The Project Steering Committee developed a list of decision-making criteria to evaluate the potential feasibility of the various airspace protection scenarios that were previously described. An airspace scenario evaluation matrix was created in order to provide a basis of comparison for each of the airspace scenarios above. The evaluation criteria included the following metrics:

- Potential gain in building heights (Downtown Core)
- Potential gain in building heights (Diridon Station Area)
- Potential loss of air service
- Timeframe for action
- Degree of difficulty
- Airlines affected
- Decision making bodies

Table 4-3 presents the evaluation of the scenarios using a comparative matrix criterion.

Upon review of the various alternative airspace protection scenarios, the Project Steering Committee selected four potential scenarios against existing Scenario 1 (the current protection scenario) for further evaluation. The scenarios selected were the following:

- Scenario 1: Existing airspace protection
- Scenario 4: No OEI protection/TERPS Only
- Scenario 7: Straight-out OEI protection without West OEI Corridor
- Scenario 9: No OEI protection, increased FAA height limits
- Scenario 10: Modified West OEI Corridor at defined development heights

4.3.3 Selected Aircraft for Performance Evaluation

Once an agreement was reached regarding the airspace protection scenarios that were to be evaluated further, a decision on the various aircraft types to be considered as part of an aircraft performance assessment was made. A list of commonly flown aircraft and proposed future aircraft that will likely operate out of SJC is listed below:

Narrow-Body Aircraft

- Airbus A320-200 – Currently the aircraft with the longest transcontinental flight distance operating at SJC (Boston non-stop) and second most heavily used aircraft for transcontinental operations.
- Boeing 737-800 – Most heavily used aircraft at SJC for transcontinental operations.

Wide-Body Aircraft

- Boeing 777-300ER – A heavily used, long-range aircraft for international routes. When an international route is successful and air carriers want to increase seats, the Boeing 777 is a typical aircraft used. The Boeing 777-200 was previously used at SJC for Tokyo service.
- Boeing 787-9 – Currently operating at SJC and serving Asia and Europe

Based on the initial aircraft performance evaluation results, additional assessments were conducted for the following aircraft types to provide additional information for decision-making:

Narrow-Body Aircraft

- Airbus A321 NEO – Highest seating capacity long-haul narrow-body aircraft. Currently serves New York and Hawaii.

Wide-Body Aircraft

- Airbus A330-200 – Currently operating at SJC and serving Asia
- Airbus A350-900 – Likely replacement for the A340 service to Frankfurt and by a potential new entrant carrier.

Table 4-3 Project DADCS Airspace Scenario Summary Matrix

DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY (PROJECT DADCS) AIRSPACE SCENARIO SUMMARY MATRIX								
	Existing conditions AGL building heights	**200'-290' AGL**	**80'-160' AGL**					
Scenario	***Scenario Description***	***Potential gain in building heights (Downtown Core)***	***Potential gain in building heights (Diridon Station Area)***	***Potential loss of air service***	***Timeframe for action***	***Degree of Difficulty***	***Airlines affected***	***Decision making bodies***
#1	Existing airspace protection	-	-	None	N/A	N/A	None	City
#2	West OEI Corridor with increased surface slopes	-	60'-100'	Moderate to Significant	Under a year	Moderate	Alaska, Aero Mexico, Air China, American, British, Hainan, Hawaiian	City
#3	East OEI Corridor with a TERPS only scenario over Diridon Station Area	Reduce 10'-30'	90'-130'	Significant	Under a year	Moderate	Alaska, Aero Mexico, Air China, American, British, Hainan, Hawaiian	City
#4	No OEI/TERPS Only	1'-36'	69'-165'	Significant	Under a year	Moderate	All airlines	City
#5	West OEI Corridor surface protection without Straight-out OEI	10'-30'	-	Moderate	Under a year	Moderate	Air Canada, ANA, Lufthansa, Volaris, FedEx, UPS, Delta, jetBlue, Southwest, United	City
#6	West OEI Corridor with greater than 15 degree turn	-	130' (south only)	Significant	Under a year	Moderate	Alaska, Aero Mexico, Air China, American, British, Hainan, Hawaiian	City
#7	Straight-out OEI protection without West OEI Corridor	-	90'-130'	Significant	Under a year	Moderate	Alaska, Aero Mexico, Air China, American, British, Hainan, Hawaiian	City
#8	TERPS only with increased TERPS departure climb gradients	30'-60'	110'-130'	Significant	One to two years	Moderate to High	General aviation and all airlines	City and FAA
#9	No OEI,TERPS Only with increased FAA height limits	1'-179'	76' - 322'	Severe	One to three years	High	All airlines and other aircraft operators	City and FAA
#10	Modified West OEI Corridor at defined development heights	-	Ranging from 14'-121'	TBD	One to three years	TBD	TBD	Likely City and FAA
#11	Extend the approach ends of Runways 12L and/or 12R to the north	30'-60'	110'-130'	None	Over three years	High	TBD	City, FAA, Caltrans, Santa Clara, resource agencies

Source: Project Steering Committee

4.4 Existing OEI Surface Protection for Runways 12L/12R

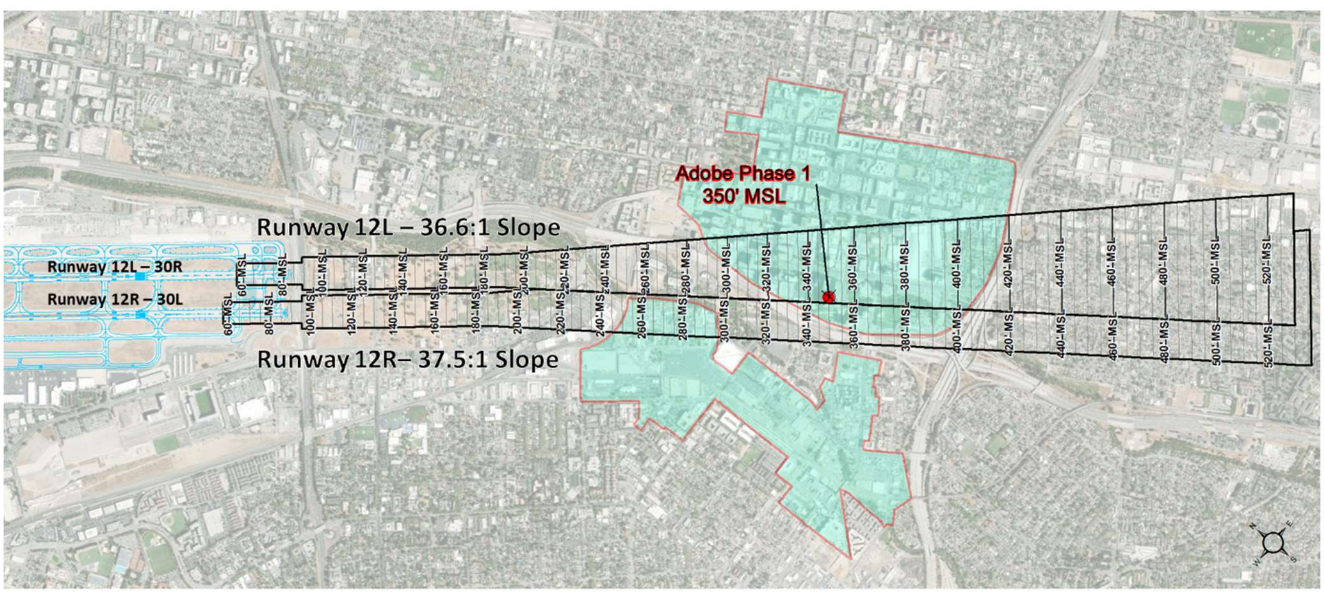
The primary focus of the aircraft performance evaluation was to assess the impacts of increased obstacle heights on OEI departure operations on Runways 12L and 12L at SJC (departures to the southeast over the identified study areas). Scenarios 1, 4, 7 and 10 result in no changes in instrument approach and departure procedures as the TERPS criteria established by the FAA for the safe landing and take-off operations with all engines operating are unchanged. Scenario 9 potentially increases ceiling and visibility minimums for several non-precision approaches but does not eliminate those procedures.

Historical weather analysis indicates that the SJC operates in Southeast Flow approximately 13% annually. In Southeast Flow, aircraft are departing towards the taller buildings in the Downtown Core as well as Diridon Station Area. As previously mentioned, in 2007 the City of San José adopted composite airspace height restriction mapping which included several protected OEI corridors including the ICAO Annex 6, FAA AC120-91 and West OEI Corridors. The FAA has considered protection of OEI procedures to be an economic decision to be made by the airlines, not an FAA safety consideration. It is currently up to local jurisdictions to address the tradeoffs of air service capability versus high-rise development.

4.4.1 Existing Airline OEI Surfaces for Runways 12L/12R

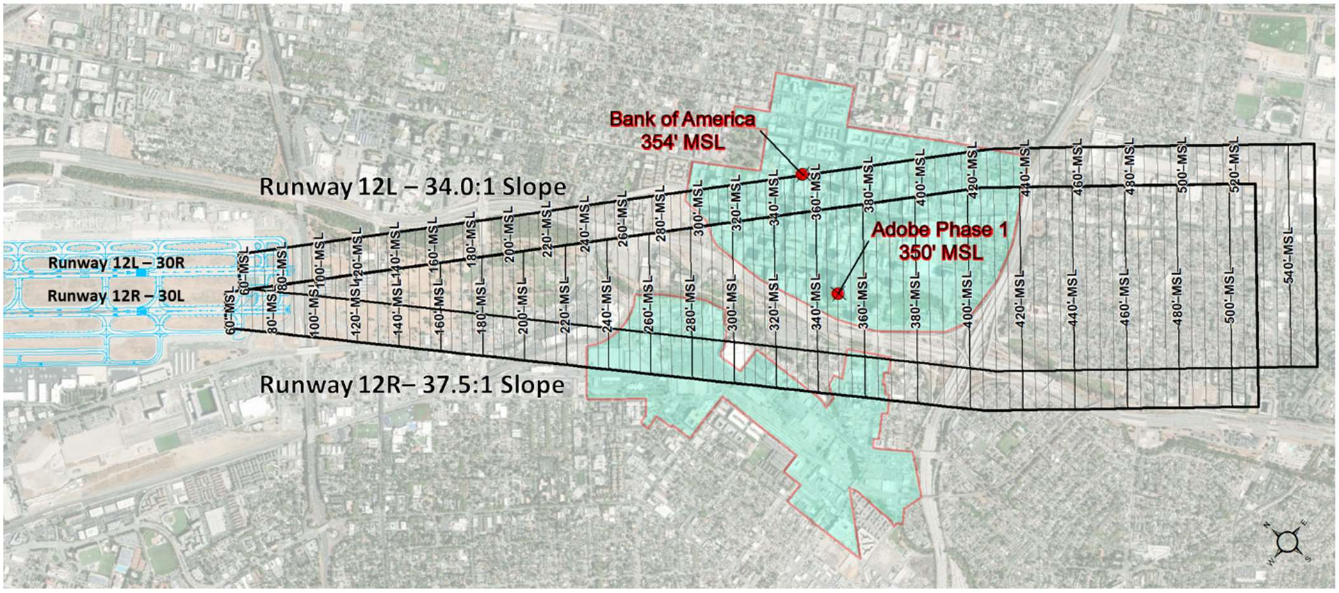
Figure 4-4 through Figure 4-6 depict the existing OEI corridors for Runway 12L/12R departures. The existing “controlling obstacles” which define the slopes of each corridor are also identified. As part of this study, the project consultants evaluated existing OEI surface slopes against updated obstacle survey datasets, specifically the 2016 SJC airspace obstacle survey data, which confirmed that there were no new controlling obstacles that impact existing OEI surface slopes.

Figure 4-4 Runways 12L/12R FAA AC120-91 OEI Surface Existing Heights



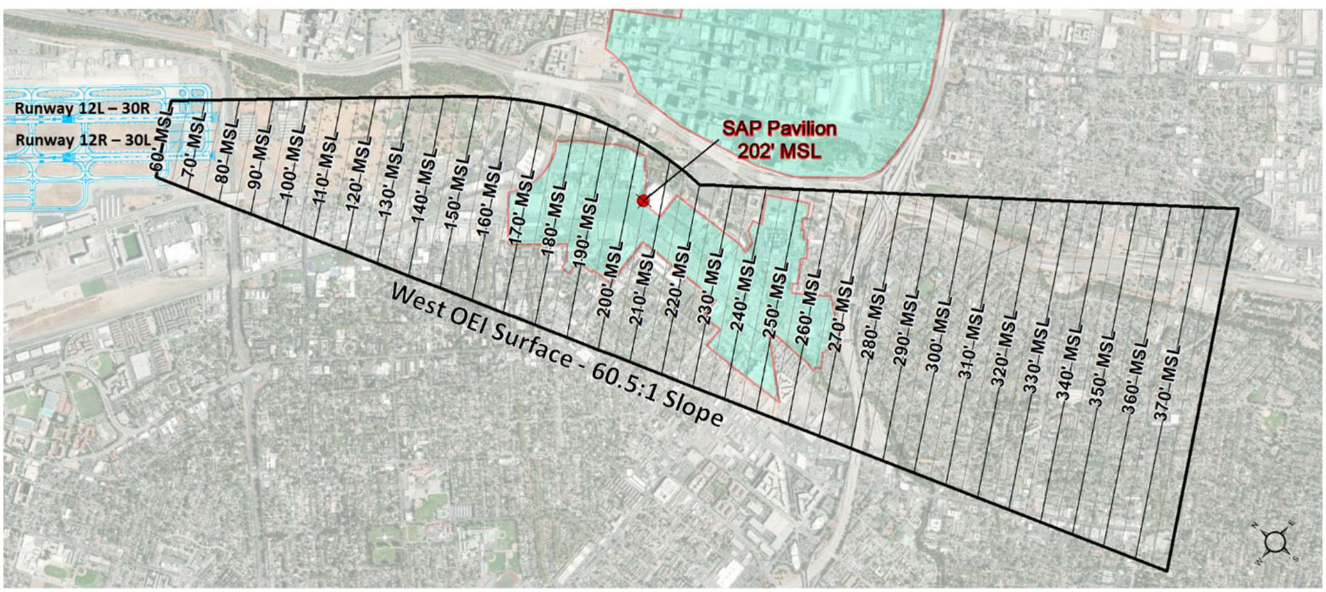
Source: Landrum & Brown

Figure 4-5 Runways 12L/12R ICAO Annex 6 OEI Surface Existing Heights



Source: Landrum & Brown

Figure 4-6 Runways 12L/12R West OEI Corridor Existing Heights



Source: Landrum & Brown

4.4.2 Existing Airline OEI Procedures for Runways 12L/12R

Table 4-4 summarizes the current OEI procedures utilized by Airlines at SJC.

Table 4-4 Airlines OEI Procedures for Runways 12L/12R

Current Airline	OEI Procedure (12L & 12R)
Alaska	West Corridor (AC 120-91 with course correction)
Aero Mexico	East Corridor for 12L, West Corridor for 12R (ICAO with course correction)
Air China	West Corridor (ICAO with course correction)
American	West Corridor (AC 120-91 with course correction)
British Airways	Straight Out (ICAO) and West Corridor (ICAO with course correction**)
Hainan	Straight Out for 12L (ICAO), West Corridor for 12R (ICAO with course correction)
Hawaiian	West Corridor (AC 120-91 with course correction)
Air Canada	Straight Out (ICAO)
ANA	Straight Out (ICAO)
Lufthansa	Straight Out (ICAO)
Volaris	Straight Out (ICAO)
FedEx	Straight Out (ICAO)
UPS	Straight Out (ICAO)
Delta	Straight Out (AC 120-91)
JetBlue	Straight Out (AC 120-91)
Southwest	Straight Out (AC 120-91)
United	Straight Out (AC 120-91)
Frontier	TBD

** British Airways utilizes the West Corridor in specific engine-out scenarios.
Note: Updated August 2017
Source: City of San José Airport Department and Airlines

4.5 Airspace Protection Scenarios

As previously mentioned, an assessment of various TERPS and OEI OCS were constructed based upon current procedures at SJC. **Appendix A** contains the aforementioned FAA TERPS airport procedure charts for reference. The following TERPS and OEI surfaces were evaluated and applied to the selected airspace protection scenarios in the study:

TERPS Surfaces:

- Instrument Landing System (ILS) Approach (CAT I & II) – applicable to Runway 12R/30L
- Localizer Only (LOC)
- Localizer Performance with Vertical Guidance (LPV)
- Lateral Navigation (LNAV)
- Lateral Navigation/Vertical Navigation (LNAV-VNAV)
- Required Navigation Performance (RNP 0.11, 0.15, 0.18, 0.30)
- Circling Approaches (CAT A – CAT D)
- Minimum Vectoring Altitude
- Instrument Departure Procedures (200'/NM CG, 261'/NM CG, 290'/NM, 470'/NM CG and 500'/NM CG)

One-Engine Inoperative Surfaces:

- West OEI Corridor
- ICAO Straight-Out Departures
- FAA AC120-91 Straight-Out Departures

4.5.1 Scenario 1 – Existing Airspace Protection

Figure 4-7 and Figure 4-8 display the existing airspace OCS protection south of the Airport. OCS protection consists of a combination of TERPS and OEI airspace surfaces. Existing heights within the Downtown Core range from 290 feet MSL – 390 feet MSL (202 feet AGL – 310 feet AGL). Existing heights within the Diridon Station Area range from 164 feet MSL – 270 feet MSL (84 feet AGL – 185 feet AGL).

4.5.2 Scenario 4 – No OEI Airspace Protection/TERPS Only

As depicted in **Figure 4-9 and Figure 4-10**, the Scenario 4 airspace assumes that the existing OEI OCS protection for Runways 12L/12R departures would be removed and the airspace would consist of TERPS arrivals and departure OCS protection over the Downtown Core and the Diridon Station Area. These identified TERPS OCSs would function as the new OEI OCS surface protection even if the FAA were to increase a TERPS OCS in the future.

Under Scenario 4, maximum heights within the Downtown Core range from 294 feet MSL – 390 feet MSL (212 feet AGL – 315 feet AGL). Scenario 4 heights within the Diridon Station Area range from 235 feet MSL – 400 feet MSL (154 feet AGL – 310 feet AGL).

4.5.3 Scenario 7 – Straight-Out OEI Protection without West OEI Corridor

As depicted in **Figure 4-11 and Figure 4-12**, the Scenario 7 airspace assumes that the existing straight-out OEI OCS protection for Runways 12L/12R departures would be maintained, while the West OEI Corridor surface which directly impacts Diridon Station Area would be removed.

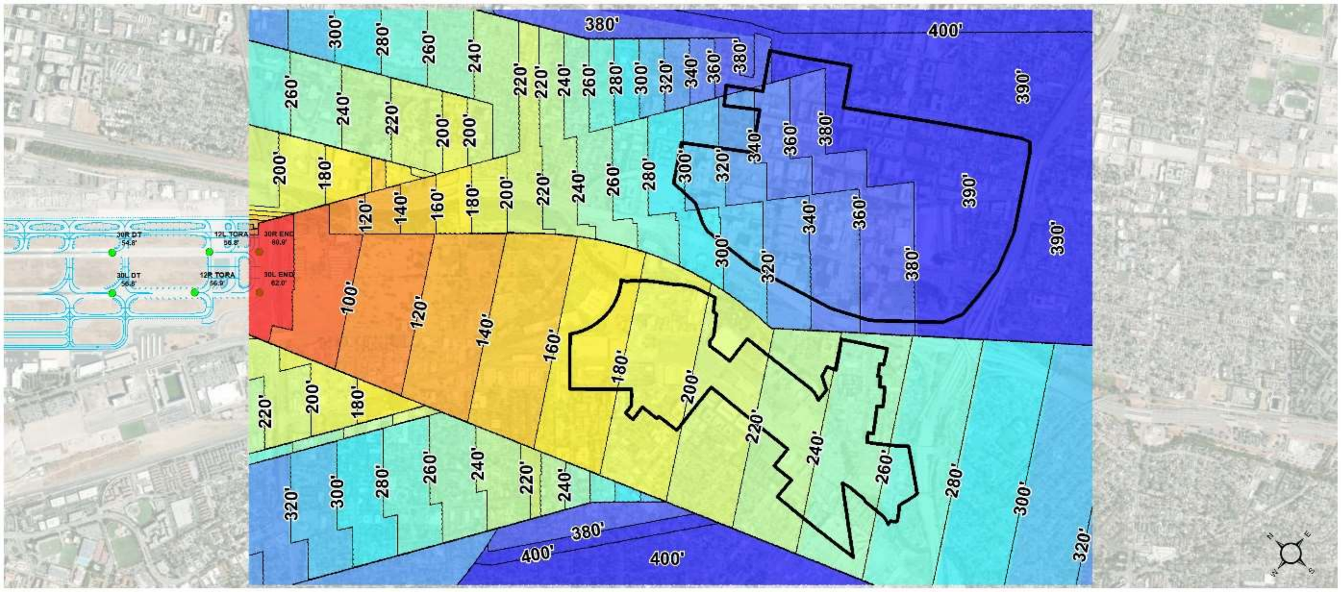
Under Scenario 7, there would be no changes in the existing maximum heights within the Downtown Core, however maximum heights within the Diridon Station Area would increase to 229 feet MSL – 400 feet MSL (149 feet AGL – 310 feet AGL) as the West OEI Corridor is removed and TERPS OCSs would govern over the Diridon Station Area.

4.5.4 Scenario 9 – No OEI, Increased FAA Height Limits

As depicted in **Figure 4-13 and Figure 4-14**, the Scenario 9 airspace assumes that the existing OEI OCS protection for Runways 12L/12R departures would be removed and the airspace would consist of increased TERPS arrivals and departure OCS heights over the Downtown Core and the Diridon Station Area.

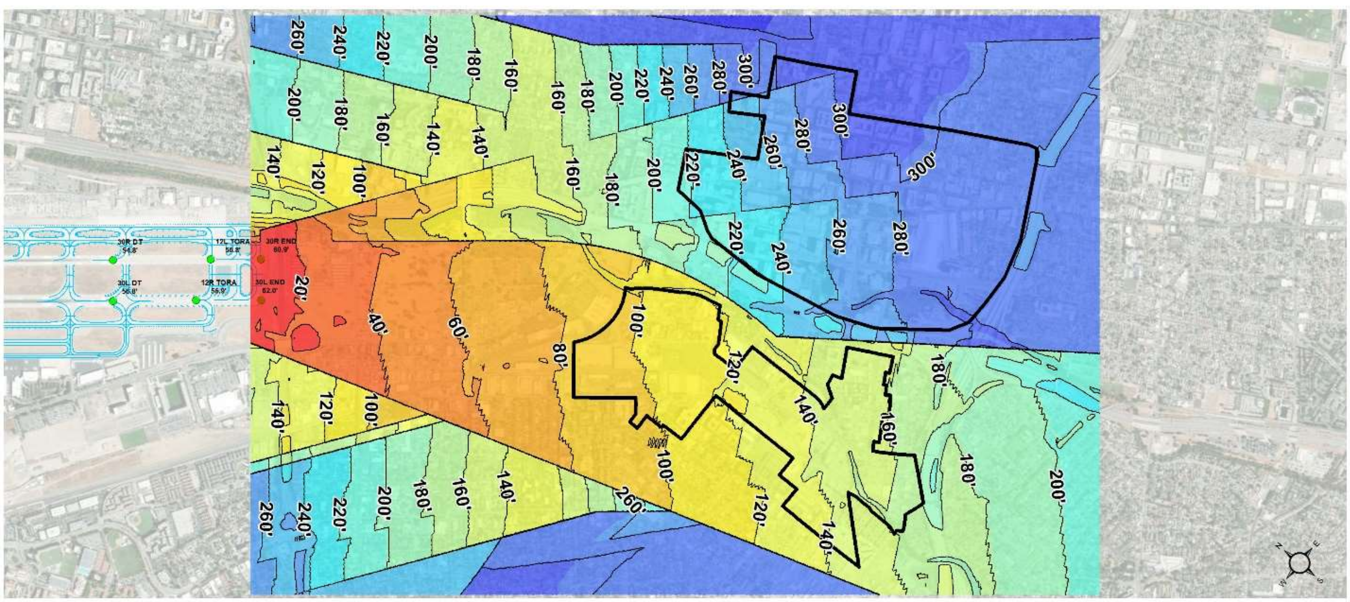
Under Scenario 9, maximum heights within the Downtown Core range from 327 feet MSL – 569 feet MSL (245 feet AGL – 469 feet AGL). Scenario 9 heights within the Diridon Station Area range from 243 feet MSL – 578 feet MSL (161 feet AGL – 473 feet AGL).

Figure 4-7 Scenario 1: Existing Surface Mapping (MSL) Heights



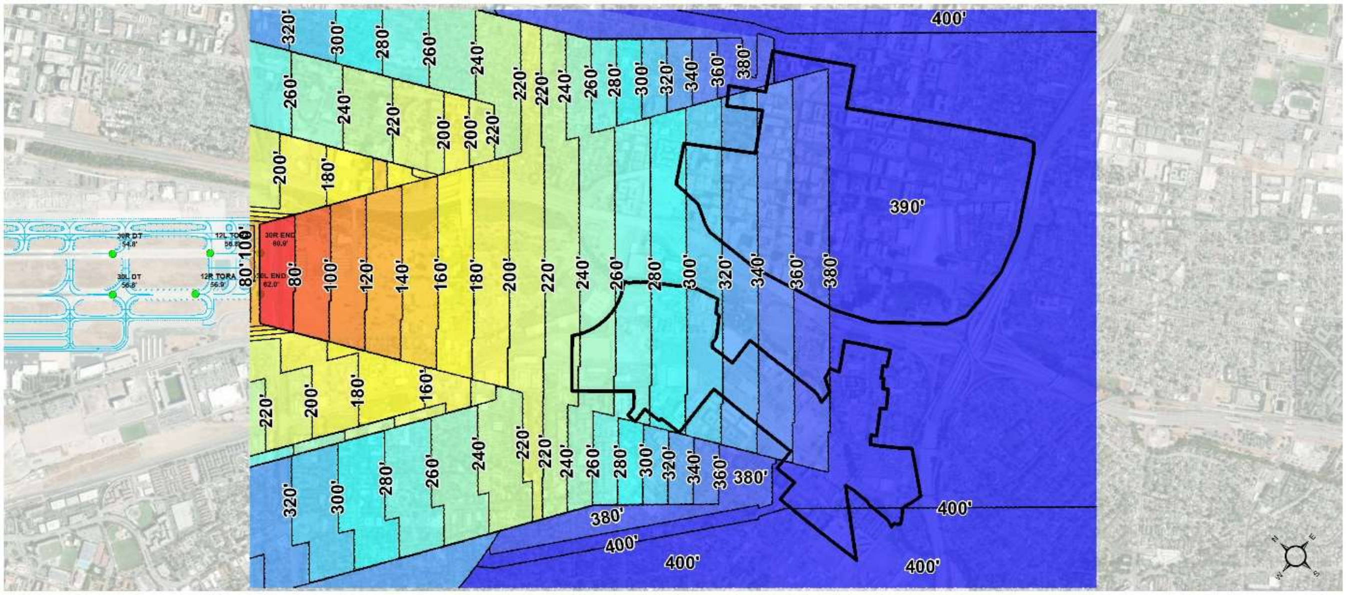
Source: Landrum & Brown

Figure 4-8 Scenario 1: Existing Surface Mapping (AGL) Heights



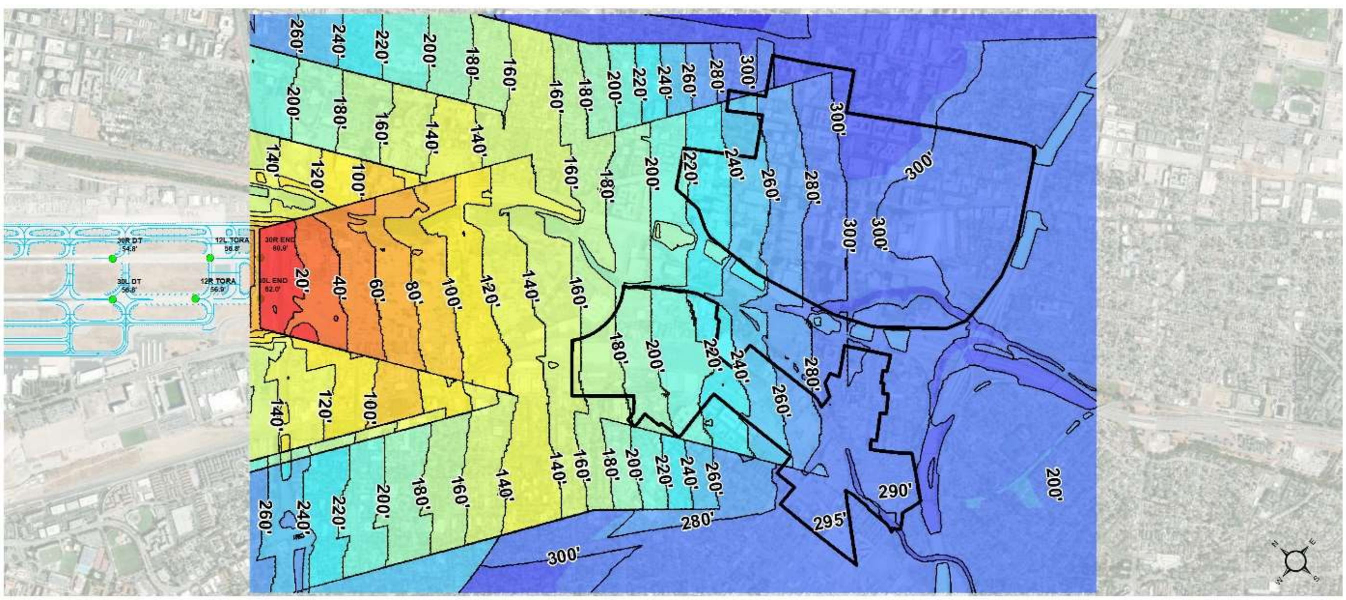
Source: Landrum & Brown

Figure 4-9 Scenario 4: No OEI Protection/TERPS Only Heights (MSL)



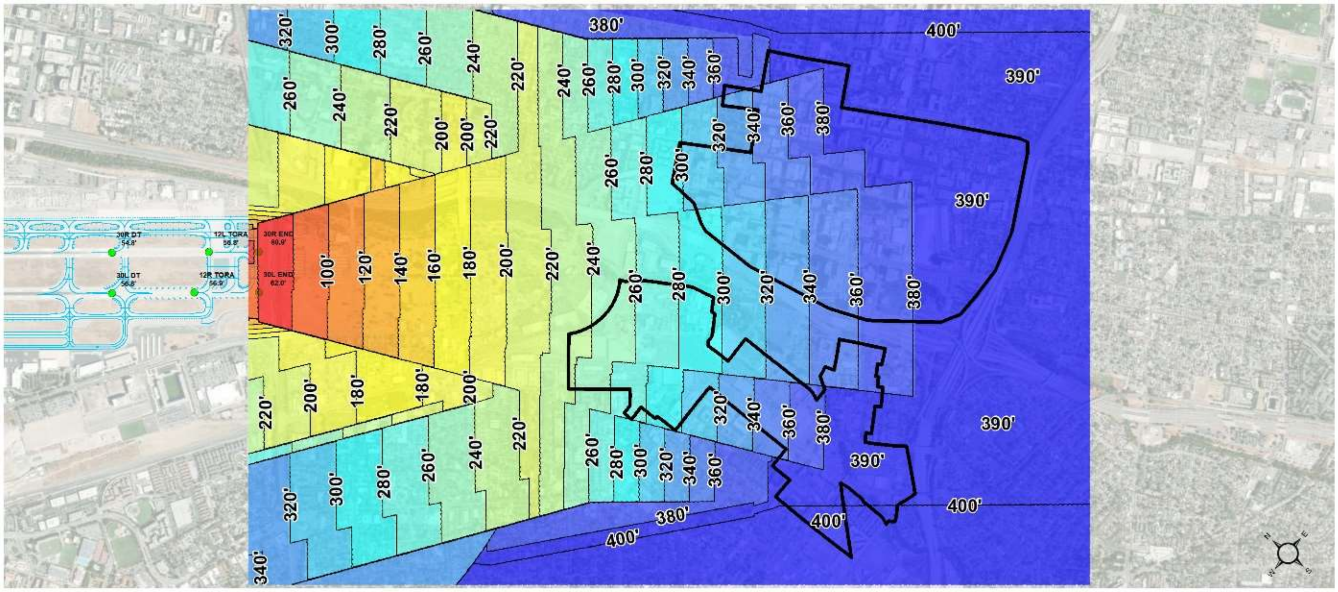
Source: Landrum & Brown

Figure 4-10 Scenario 4: No OEI Protection/TERPS Only Heights (AGL)



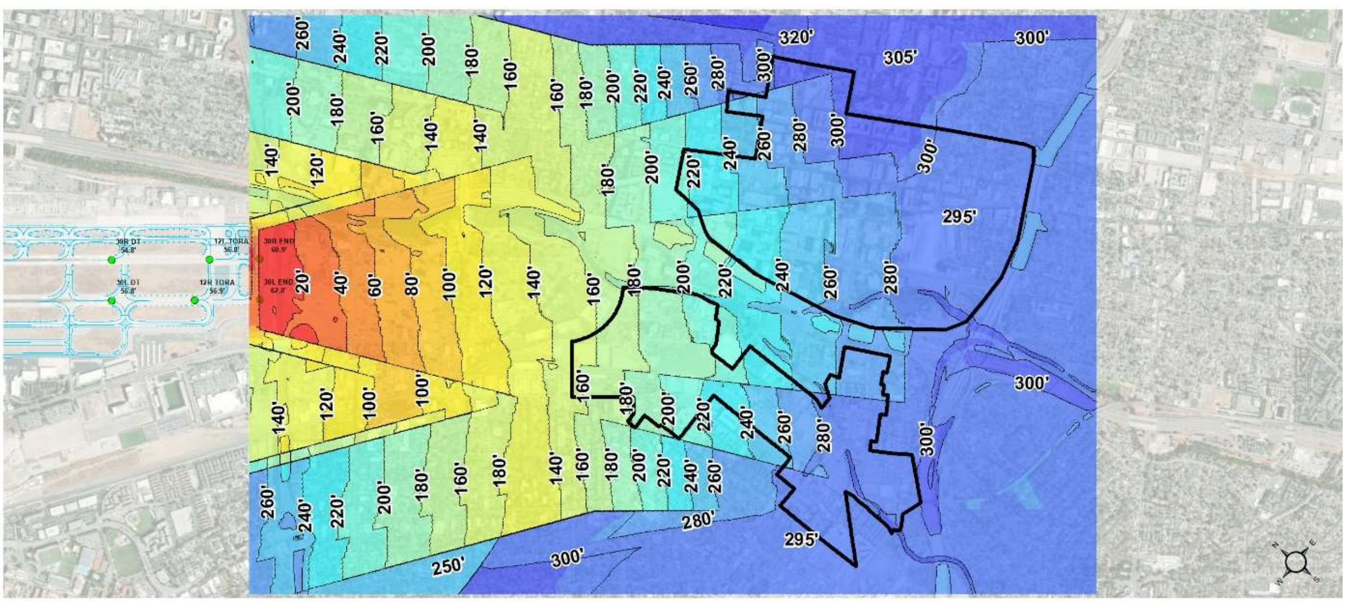
Source: Landrum & Brown

Figure 4-11 Scenario 7: Straight-Out OEI Protection without West OEI Corridor Heights (MSL)



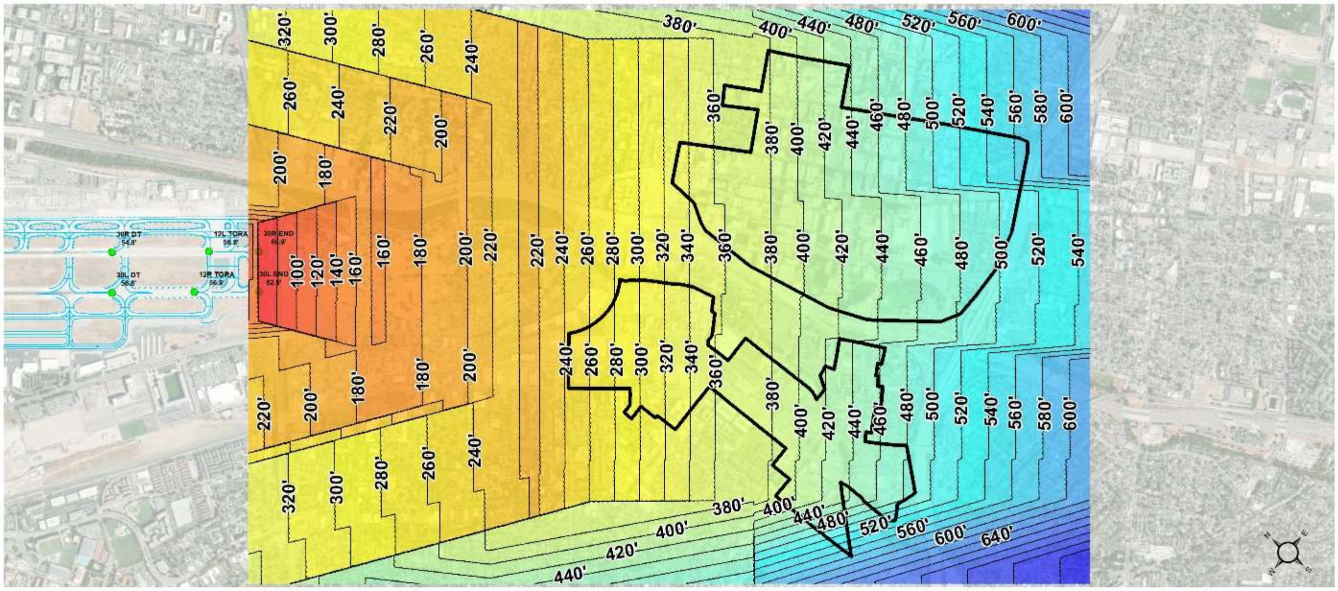
Source: Landrum & Brown

Figure 4-12 Scenario 7: Straight-Out OEI Protection without West OEI Corridor Heights (AGL)



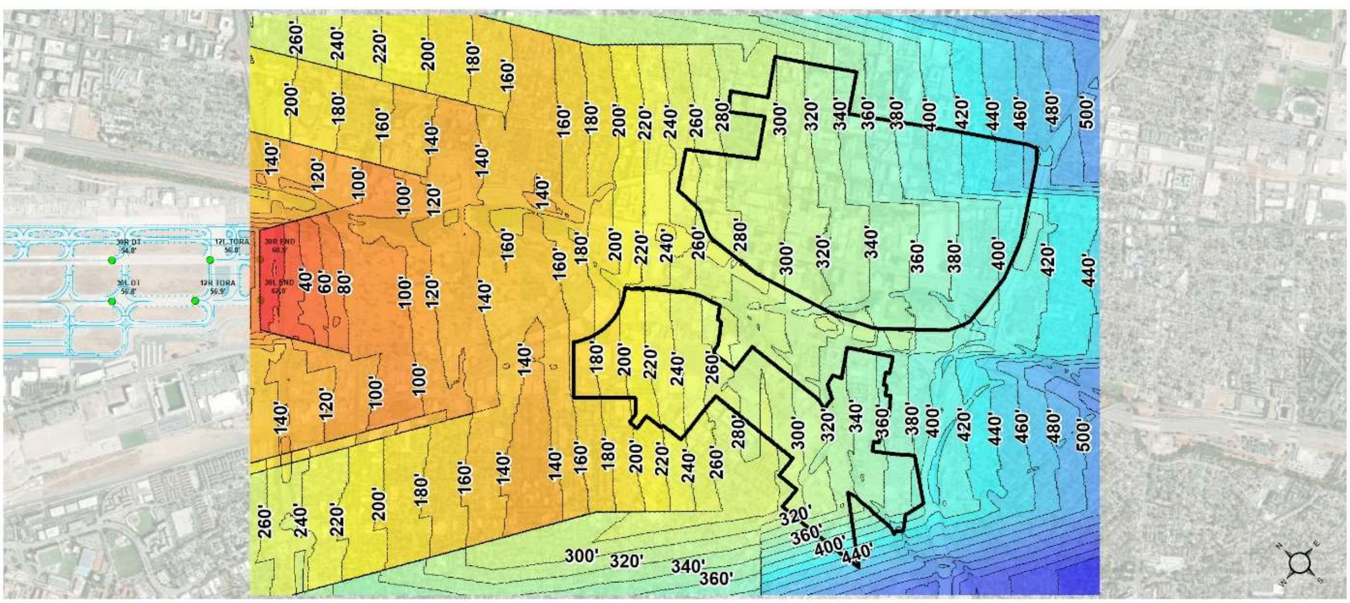
Source: Landrum & Brown

Figure 4-13 Scenario 9: No OEI Protection, Increased FAA Heights (MSL)



Source: Landrum & Brown

Figure 4-14 Scenario 9: No OEI, Increased FAA Height (AGL)



Source: Landrum & Brown

4.5.5 Scenario 10 – Modified West OEI Corridor at Defined Development Heights

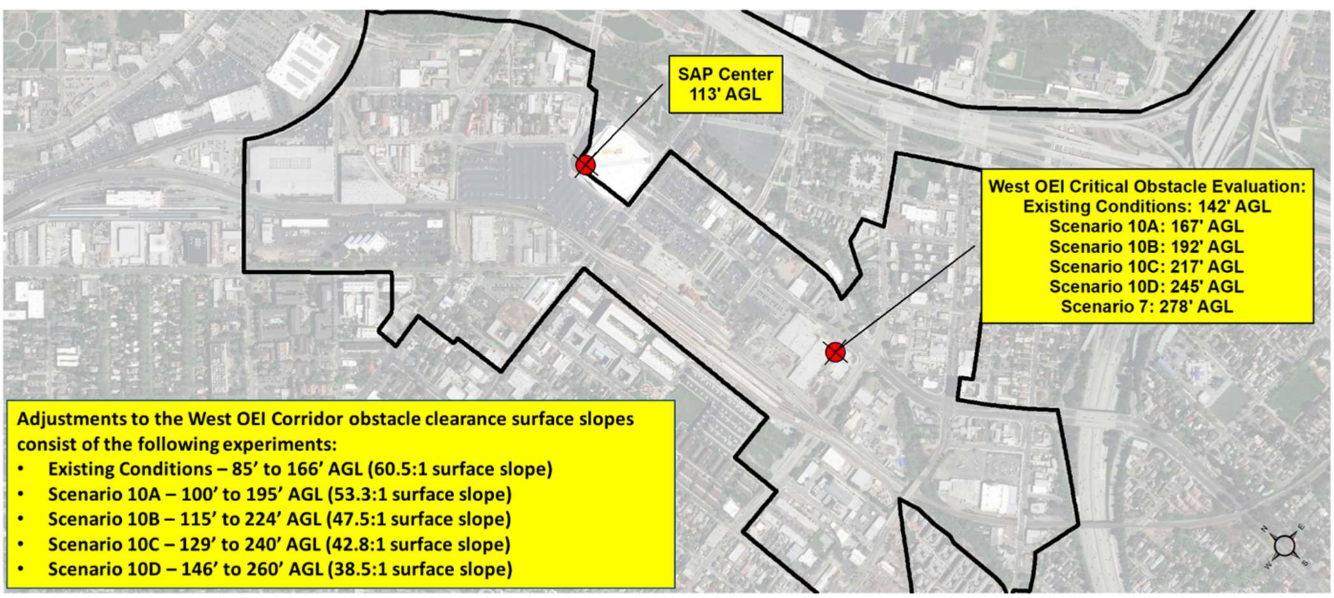
In Scenario 10, the focus was to evaluate the impacts of various increases to the OCS slope of the West OEI Corridor which directly impacts development heights in Diridon Station Area. The existing West OEI Corridor surface is set at a slope of 60.5:1. In the previous airspace study for SJC conducted in 2007, the critical airspace obstacle that was used to define the West OEI Corridor surface slope was the SAP Center, with a maximum height range in Diridon Station Area of 85 feet to 166 feet AGL. For this study a new not-yet constructed critical obstacle was defined in the vicinity where the taller building developments are anticipated.

Four variations of adjustment to the slope of the West OEI Corridor were evaluated in Scenario 10. As depicted in **Figure 4-15**, Scenarios 10A – 10D were evaluated with critical obstacle heights adjust by 25-foot increments (with the exception of Scenario 10D adjustment of 28 feet).

Adjustments to the West OEI Corridor OCS slopes consist of the following experiments:

- Scenario 10A (53.3:1 surface slope) – 178 feet to 298 feet MSL (100 feet to 195 feet AGL)
- Scenario 10B (47.5:1 surface slope) – 193 feet to 328 feet MSL (115 feet to 224 feet AGL)
- Scenario 10C (42.8:1 surface slope) – 207 feet to 357 feet MSL (129 feet to 240 feet AGL)
- Scenario 10D (38.5:1 surface slope) – 224 feet to 390 feet MSL (146 feet to 260 feet AGL)

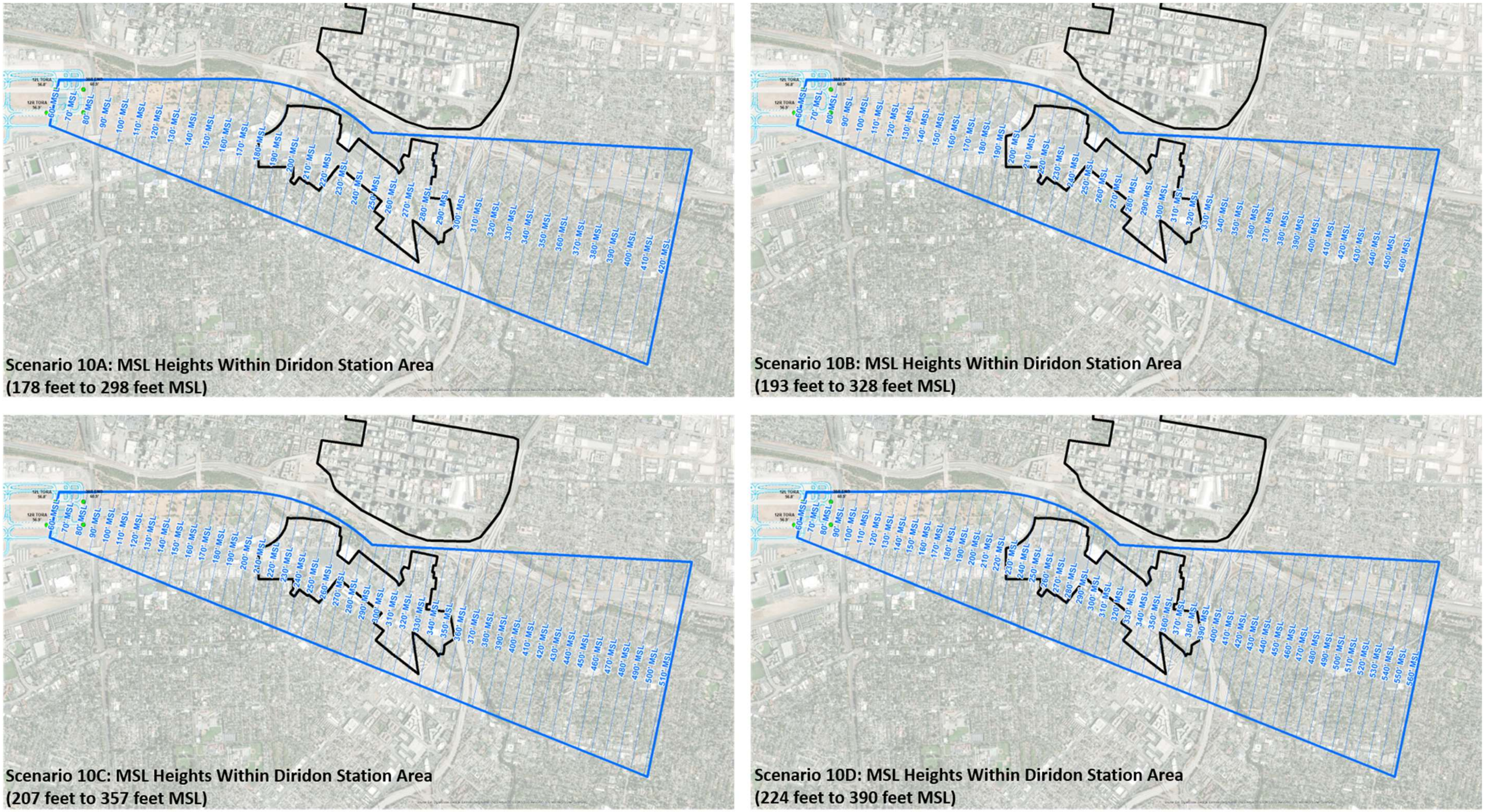
Figure 4-15 Scenario 10: Modified West OEI Corridor at Defined Development Heights Critical Obstacle



Source: Landrum & Brown

Figure 4-16 depicts the MSL heights for the four variants of the Scenario 10 West OEI corridor assessment over the Diridon Station Area.

Figure 4-16 Scenario 10: Modified West OEI Corridor at Defined Development Heights (MSL)



Scenario 10A: MSL Heights Within Diridon Station Area (178 feet to 298 feet MSL)

Scenario 10B: MSL Heights Within Diridon Station Area (193 feet to 328 feet MSL)

Scenario 10C: MSL Heights Within Diridon Station Area (207 feet to 357 feet MSL)

Scenario 10D: MSL Heights Within Diridon Station Area (224 feet to 390 feet MSL)

Source: Landrum & Brown

4.5.6 Airspace Scenario Height Differentials

Table 4-5 provides a general range of additional height gains within the Downtown Core and Diridon Station Area that can be achieved in each of the airspace scenarios when compared to the existing airspace protection (Scenario 1).

It is important to note that in Scenario 7 and 10, the existing airspace protection over the Downtown Core would not change as straight-out OEI protection is maintained in both scenarios.

Table 4-5 Airspace Protection Scenario Height Differentials as Compared to Scenario 1 (Existing Airspace Protection)

Airspace Protection Scenario Height Differentials		
Airspace Scenarios	Height Gain Differentials (feet)	
	Downtown Core	Diridon Station Area
Scenario 4 – No OEI Airspace Protection/TERPS Only	5 feet – 35 feet	70 feet – 150 feet
Scenario 7 – Straight-Out OEI Protection Without West OEI Corridor		70 feet – 150 feet
Scenario 9 – No OEI, Increased FAA Height Limits	35 feet – 100 feet	80 feet – 220 feet
Scenario 10 – Modified West OEI Corridor at Defined Development Heights		
Scenario 10A		15 feet – 25 feet
Scenario 10B		30 feet – 55 feet
Scenario 10C		45 feet – 85 feet
Scenario 10D		65 feet – 115 feet

Source: Landrum & Brown

4.6 Aircraft Performance City Pair Assessment

4.6.1 Assumptions

Aircraft performance assessments were conducted to evaluate the impacts of proposed obstacles heights under each of the shortlisted airspace scenarios. Aircraft types, city pair combinations and seasonal temperature variations were assessed to identify impacts to aircraft payload (allowable PAX and cargo) and range. Passenger (PAX) and cargo penalties were computed for each scenario. The assumptions used in the aircraft performance assessment are listed below. For the aircraft performance assessment, a 100% load factor was applied to each aircraft to determine the maximum PAX and cargo weight penalties that would be incurred under each airspace protection scenarios/destination combination.

Table 4-6 summarizes that various aircraft that were evaluated in the aircraft performance assessment.

An assumed average PAX weight of 228 pounds was used for narrow-body aircraft (domestic and North America) and 248 pounds for wide-body aircraft (international and transoceanic) operations in both the summer and winter aircraft performance analyses.

Table 4-6 Aircraft Fleet Evaluation

Aircraft	Aircraft Type	Engine	Maximum Takeoff Weight (lbs.)	Seating Capacity
Existing Aircraft Types Serving SJC				
A320-200	Narrow-Body	CFM56-5B4	171,960	150
A321 NEO	Narrow-Body	PW 1000G	206,132	189
B737-800	Narrow-Body	CFM56-7B26	174,200	175
A330-200	Wide-Body	Trent 772	524,700	284
B787-9	Wide-Body	GENX-1B74-7	560,000	290
Potential Aircraft Types Serving SJC				
A350-900	Wide-Body	Trent XWB-84	617,294	325
B777-300ER	Wide-Body	GE90-115BL	775,000	370

Source: Flight Engineering LLC.

Table 4-7 provides a summary of the seasonal temperatures in the aircraft performance assessment that account for the season and reflect the temperatures at the typical time of day these operations occur.

A weather analysis using historical weather data from 2003 – 2017 was conducted. Additionally, an evaluation of aircraft operations was conducted to identify typical departure patterns based upon the time of day specific flights operate in order to focus the weather assessment around those time periods, specifically during the winter season.

For summer temperatures, the Boeing 85% reliability temperature was used as the basis of the aircraft performance assessment. Boeing publishes reliability temperature charts and these datasets are based upon annual historical weather trends at individual airports. The 85% reliability temperature is typically used by Airlines when conducting aircraft performance evaluations, assessing weight penalty impacts to aircraft operations, and to ultimately make decisions regarding starting, maintaining or ending service at a particular airport.

Table 4-7 Seasonal Temperatures

Aircraft	Temperature (ºF)	Notes
Winter		
A320-200, A321 NEO & B737-800	63ºF	Early morning and evening departures
A330-200, A350-900, B787-9 & B777-300ER	68ºF	Morning and afternoon departures
Summer		
A320-200, A321 NEO & B737-800	81.3ºF	Boeing 85% reliability temperature
A330-200, A350-900, B787-9 & B777-300ER	81.3ºF	Boeing 85% reliability temperature

Source: Landrum & Brown

4.6.2 Narrow-Body (Domestic/North America) Aircraft Performance

The preliminary Narrow-body aircraft assessment included the A320-200, A321 NEO and B737-800. Two domestic markets were evaluated:

- John F. Kennedy International Airport (JFK)
- Honolulu International Airport (HNL)

JFK and HNL are non-stop destinations which are currently served by airlines at SJC. The A321 NEO was only evaluated to the HNL market as the A320-200 is not currently used to that market and the A321 NEO has entered that market by a current airline.

Table 4-8 summarizes the results of the aircraft performance assessment for JFK.

- A320-200 operations to JFK result in minor PAX and cargo penalties under Scenarios 4 and 9 in both summer and winter.
- B737-800 operations to JFK results in PAX and minor cargo penalties under Scenario 9 in the summer.

Table 4-8 JFK PAX & Cargo Penalty Assessment

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583
New York - JFK Summer (81.3° F)		**A320-200 (150 seats/2,384 lbs. cargo)**		**B737-800 (175 seats/1,138 lbs. cargo)**	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Source: Flight Engineering LLC & Landrum & Brown

Table 4-9 summarizes the results of the aircraft performance assessment for HNL for the A321 NEO and B737-800 aircraft.

- A321 NEO operations to HNL result in no PAX penalties under any of the airspace scenarios and minor cargo penalties incurred in Scenarios 4 and 9
- B737-800 operations to HNL results in one PAX penalty in summer with no additional cargo allowed. In the winter, operations to HNL are fuel capacity limited due to increased headwinds resulting in a lower overall seat count (173 PAX) and a three PAX penalty.

After the completion of the preliminary aircraft performance assessment, a secondary analysis of various transcontinental destinations was assessed to identify weight and cargo penalty impacts to Anchorage (ANC), Boston (BOS) and Miami (MIA) markets. ANC and MIA are non-stop markets not currently served at SJC, but were evaluated given their distance from SJC in order to more fully understand the impacts of the various airspace scenario heights on aircraft performance.

Table 4-9 Hawaii PAX & Cargo Penalty Assessment

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-
Hawaii - HNL Summer (81.3° F)		**A321 NEO (189 seats/21,658 lbs.)**		**B737-800 (175 seats/1,599 lbs. cargo)**	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Source: Flight Engineering LLC & Landrum & Brown

Two summer weather airspace scenarios were evaluated in this assessment, Scenario 1 (existing airspace protection) and Scenario 4 (No OEI/TERPS Only). The focus of this analysis was to evaluate the impacts of increased heights for straight-out departures over the Downtown Core. For this analysis, the A320-200 and the B737-800 aircraft types were evaluated. **Table 4-10** provides a summary of the results of this assessment.

- The B737-800 aircraft for all three markets would have minor PAX penalties and no cargo penalties in both Scenarios 1 and 4. The one to three PAX penalties incurred for BOS and MIA result from maximum structural takeoff weight limits and are not related to the proposed airspace scenario obstacle heights or runway lengths at SJC.
- The A320-200 would incur minor PAX penalties to BOS and MIA in Scenario 1 and no PAX penalties to ANC. No additional cargo penalties are incurred when operating to the three markets under both scenarios.
- The A320-200 will incur moderate PAX penalties to BOS and MIA in Scenario 4 and no PAX penalties to ANC. No additional cargo penalties are incurred when operating to the three markets under both scenarios.

Table 4-10 ANC, BOS and MIA PAX & Cargo Penalty Assessment

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-

Boston - BOS Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-

Miami - MIA Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

Source: Flight Engineering LLC & Landrum & Brown

4.6.3 Wide-Body (International) Aircraft Performance

A wide-body aircraft assessment was performed for the typical aircraft from SJC to various transoceanic destinations. A preliminary aircraft performance assessment was conducted using the B787-9 and B777-300ER aircraft to two destinations, Beijing International Airport (PEK) and Frankfurt International Airport (FRA).

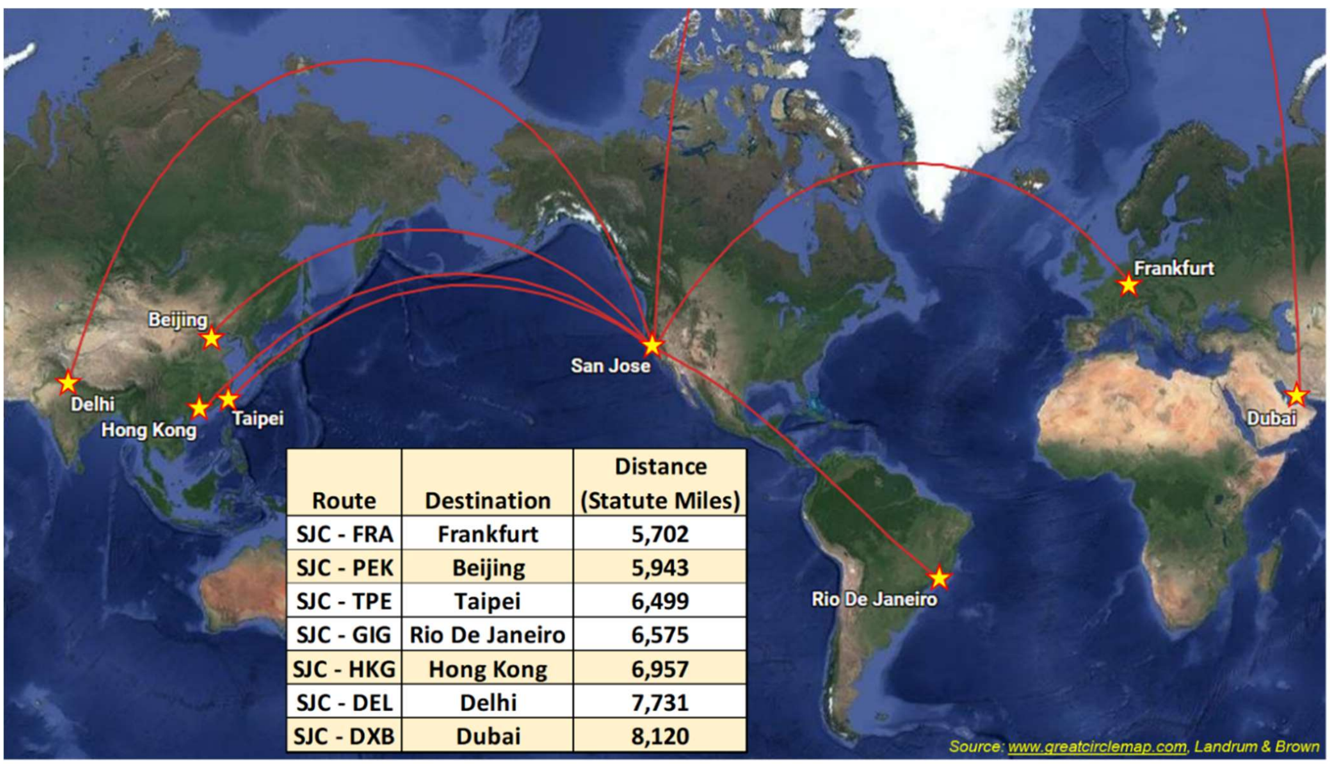
A secondary wide-body aircraft performance evaluation assessment was conducted for additional transoceanic destinations that are currently not served from SJC. The intent of the assessment was to evaluate the operational limitations of each of the aircraft to these long-haul transoceanic destinations to better understand if non-stop air service from SJC would be achievable. The following destinations were evaluated to identify the weight and cargo penalties associated with both Scenarios 1 and 4 airspace protection:

- Rio de Janeiro (GIG)
- Taipei (TPE)
- Hong Kong (HKG)
- Delhi (DEL)
- Dubai (DXB)

As part of the secondary wide-body performance assessment, two additional wide-body aircraft types (A330-200 and A350-900) were evaluated along with the B787-9 and B777-300ER. The A330-200 recently operated service from SJC to China. The A350-900 is a new aircraft that could possibly enter service at SJC in the future.

Figure 4-17 depicts the great circle distances from SJC to the previously mentioned transoceanic destinatoins.

Figure 4-17 Great Circle Map of International Destinations



Route	Destination	Distance (Statute Miles)
SJC - FRA	Frankfurt	5,702
SJC - PEK	Beijing	5,943
SJC - TPE	Taipei	6,499
SJC - GIG	Rio De Janeiro	6,575
SJC - HKG	Hong Kong	6,957
SJC - DEL	Delhi	7,731
SJC - DXB	Dubai	8,120

Source: Greatcirclemap.com and Landrum & Brown

Table 4-11 summarizes the wide-body aircraft performance assessment for PEK for the B787-9 and B777-300ER aircraft:

- B787-9 operation to Asia results in significant PAX and cargo penalties under Scenarios 4, 7, 9 and 10D in both summer and winter.
- B787-9 operation to Asia results in moderate PAX and significant cargo penalties under Scenario 10C in both summer and winter.
- No airlines at SJC currently operate the B777-300ER. However, it is anticipated that this aircraft will operate out of SJC in the future as airlines operating successful international routes from SJC may opt to increase passenger volumes thereby moving to larger wide-body aircraft such as the B777-300ER.
- B777-300ER incurs no PAX penalties under any scenarios, however cargo penalties are incurred in all scenarios except Scenario 1 with Scenarios 4, 7 and 10D being most significant.

Table 4-11 Beijing PAX & Cargo Penalty Assessment

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672
Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

Source: Flight Engineering LLC & Landrum & Brown

Table 4-12 summarizes the wide-body aircraft performance assessment to FRA for the B787-9 and B777-300ER aircraft:

- B787-9 operation to Europe results in significant PAX and cargo penalties under Scenario 9 and significant cargo penalties under Scenarios 4, 7, 9, 10C and 10D.
- B777-300ER incurs no PAX penalties under any scenarios, however cargo penalties are incurred in Scenarios 4, 9 and 10D with Scenario 9 being most significant.

Table 4-12 Frankfurt PAX & Cargo Penalty Assessment

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	21,580	-	4,400
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	15,338	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	10,000	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	9,349	-	-
	Opt 10C: 129' - 240' AGL	-	14,096	-	-
	Opt 10D: 146' - 260' AGL	-	19,282	-	2,027
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	29	26,198	-	11,735
Frankfurt - FRA Summer (81.3° F)		**B787-9 (290 seats/23,514 lbs. cargo)**		**B777-300ER (370 seats/62,240 lbs. cargo)**	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	2	22,911	-	7,811
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	16,407	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,217	-	-
	Opt 10B: 115' - 224' AGL	-	9,353	-	-
	Opt 10C: 129' - 240' AGL	-	14,270	-	-
	Opt 10D: 146' - 260' AGL	-	19,612	-	3,876
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	41	23,514	-	15,397

Source: Flight Engineering LLC & Landrum & Brown

Table 4-13 summarizes the results of the secondary wide-body aircraft performance assessment for the previously mentioned transoceanic destination. As mentioned, the A330-200, A350-900, B777-300ER and B787-9 aircraft were evaluated to each destination:

- A330-200, A350-900 and B777-300ER operations to GIG, TPE and HKG would incur minor PAX penalties in all scenarios. Utilizing the existing West OEI Corridor would not result in any additional cargo penalties, however, when utilizing existing straight-out OEI or Scenario 4 straight-out, additional cargo penalties ranging from minor to significant will be incurred.
- B787-9 would incur significant PAX penalties under existing straight-out and Scenario 4 straight-out scenario heights for GIG, TPE, HKG, DEL and DXB operations.
- Given the extended distance from SJC to DEL and DXB, it is unlikely that non-stop service to these destinations would be achievable operating the B787-9 aircraft. No additional cargo would be allowed to any of the destinations when operating the B787-9 aircraft.

Table 4-13 Potential International Market PAX & Cargo Penalty Assessment

Rio de Janeiro - GIG Summer (81.3° F)	A330-200 (284 seats/39,344 lbs. cargo)		A350-900 (325 seats/37,963 lbs. cargo)		B777-300ER (370 seats/48,211 lbs. cargo)		B787-9 (290 seats/7,144 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	-	-
TERPS Only	-	20,072	-	23,528	-	18,975	60	7,144
	A330-200 (284 seats/21,199 lbs. cargo)		A350-900 (325 seats/16,520 lbs. cargo)		B777-300ER (370 seats/32,012 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	51	-
TERPS Only	-	1,927	-	2,085	-	2,776	60	-
Taipei - TPE Summer (81.3° F)	A330-200 (284 seats/28,577 lbs. cargo)		A350-900 (325 seats/27,582 lbs. cargo)		B777-300ER (370 seats/35,569 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	12	-
TERPS Only	-	1,976	-	23,195	-	18,742	96	-
	A330-200 (284 seats/10,635 lbs. cargo)		A350-900 (325 seats/6,439 lbs. cargo)		B777-300ER (370 seats/19,465 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	89	-
TERPS Only	-	1,976	-	2,052	-	2,638	96	-
Hong Kong - HKG Summer (81.3° F)	A330-200 (284 seats/18,283 lbs. cargo)		A350-900 (325 seats/17,182 lbs. cargo)		B777-300ER (370 seats/20,785 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	51	-
TERPS Only	5	18,283	23	17,182	-	17,980	134	-
	A330-200 (284 seats/743 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/5,348 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	15	-	-	-	128	-
TERPS Only	5	743	23	-	-	2,543	134	-
Delhi - DEL Summer (81.3° F)	A330-200 (284 seats/5,014 lbs. cargo)		A350-900 (325 seats/3,132 lbs. cargo)		B777-300ER (370 seats/106 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	103	-
TERPS Only	55	5,014	77	3,132	72	106	184	-
	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	48	-	69	-	62	-	178	-
TERPS Only	55	-	77	-	72	-	184	-
Dubai - DXB Summer (81.3° F)	A330-200 (284 seats/3,537 lbs. cargo)		A350-900 (325 seats/2,688 lbs. cargo)		B777-300ER (370 seats/1,828 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	107	-
TERPS Only	65	3,537	79	2,688	72	1,828	191	-
	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	57	-	71	-	62	-	184	-
TERPS Only	65	-	79	-	72	-	191	-

Source: Flight Engineering LLC & Landrum & Brown

4.7 Airline Aircraft Performance Assessment

Participation from the Airlines currently operating at SJC was an integral part of the aircraft performance assessment exercises conducted for this study. Project consultants and Airport staff educated and informed the airlines as to (1) the nature of the project, (2) the various airspace protection scenarios being considered and (3) to provide critical obstacle datasets for the airlines performance engineering departments to evaluate the potential PAX and cargo weight penalties on their respective aircraft fleets.

A conference call was arranged by the Project Consultant and the Airlines at SJC to provide them with an overview of the project and to formally request their assistance with conducting an aircraft performance assessment for the various airspace scenarios. At the conclusion of the conference call, the Project Consultant sent the Airlines a detailed email with a data package containing information about each airspace scenario and critical obstacles. Airlines were requested to evaluate their existing and potential aircraft fleets and markets served from SJC against each of the scenario obstacles. **Appendix B** contains a copy of the email sent to each airline, as well as the dataset provided.

Results of the airlines' aircraft performance assessment were used to double-check the project consultants' analysis of weight penalty impacts for each airspace protection scenario, and to support an informed decision by the City staff regarding future airspace protection. **Table 4-14** lists the airlines that participated in aircraft performance assessment for this study. Thirteen of 19 airlines responded to the project consultant's request to evaluate their aircraft fleets performance against each of the scenario obstacles. Air China provided results of their aircraft performance assessment of the various airspace protection scenarios prior to its decision to discontinue operations at SJC.

Table 4-14 SJC Airline Aircraft Performance Assessment Participants

Responded	No Response
Aeromexico	Air Canada/Jazz
Air China	California Pacific
Alaska	Frontier
American	JetBlue
ANA	Lufthansa
British Air	UPS
Delta	
FedEx	
Hainan Airways	
Hawaiian	
Southwest	
United	
Volaris	

Source: Landrum & Brown

An agreement was made with each airline that participated in the aircraft performance assessment to ensure that the results of their individual aircraft performance assessment would be confidential in nature and proprietary due to the competitive nature of the industry. To maintain confidentiality, all transmittals and aircraft performance assessment results were sent directly to the project consultants. Exact PAX and cargo penalty results calculated by each airline will not be reported publicly. However, a general summary of the results from each participating airline is provided below:

ANA

- Evaluated B787-8 (max 169 PAX configuration)
- No PAX penalty impacts in Scenarios 1, 4, 7 and 10, however cargo impact.
- Scenario 9 results in significant PAX penalties in Summer temperatures (92º F), including additional cargo penalties

Hainan Airways

- For B787-8/9, Scenario 4 obstacles results in significant reduction in cargo and PAX (50+ PAX for B787-9) due to loss of the West Corridor

British Airways

- Scenarios 4 and 7 have no impact at all to current Runway 12L operations but both would result in PAX and cargo penalty impacts to 12R
- Scenario 9 results in greatest impact when operating on Runways 12L/12R
- Scenario 10 has no impact on Runway 12L when departing straight-out which would have a PAX and cargo penalties similar to Scenario 1
- Scenario 10 has a PAX and cargo penalty impacts for Runway 12R when using the West OEI Corridor compared with Scenario 1

Alaska, American, Aeromexico, Delta, and Southwest, Volaris

- No penalties for operations below 92º F

United

- Minor PAX and cargo penalties in Scenario 4 for B737-800; moderate PAX and cargo penalties in Scenario 9 for B737-800
- Significant PAX and cargo penalties for B737-900ER operation in Scenarios 1, 4, 7 and 9.

Hawaiian (Aircraft - A321 NEO)

- HNL, OGG, or KOA has no passenger penalties, some cargo penalties
- LIH has minimal passenger penalties and some cargo penalties

Federal Express

- Cargo penalties in most scenarios; however, the aircraft will run out of space before it reaches the maximum weight limit

4.8 Steering Committee Airspace Protection Recommendation

A new composite airspace protection map has been created which defines the proposed heights within a 3-mile radius from each runway end at SJC for the Scenario 4 airspace. As part of the proposed Scenario 4 airspace protection, the City of San José will work to develop a construction crane operation policy to aid in minimizing the impacts of erected construction cranes on aircraft operations at SJC.

4.8.1 Proposed Scenario 4 Composite Airspace Protection Surfaces

The Scenario 4 composite airspace protection includes the lowest controlling TERPS OCS surfaces within a 3-mile radius of each runway end at SJC. For the Downtown Core and Diridon Station Area, all OEI surface protection as depicted in **Figure 4-4 through Figure 4-6** would no longer be protected by the City, and the new Scenario 4 airspace surface would be used to set the maximum allowable building heights in the Downtown Core and Diridon Station Area.

If the FAA were to change the heights of a TERPS surface in the future, the City would continue to use Scenario 4 to avoid the potential for any further impact on airline OEI performance. The FAA may institute new or modified approach and departure procedures that could lower the TERPS surfaces below those indicated in Scenario 4 (as was the case for some procedures implemented since the 2007 analysis). Therefore, the lower of the Scenario 4 surfaces or an FAA Obstruction Evaluation determination would dictate the height of a proposed structure.

It should be noted that the federal requirement under FAR Part 77 for FAA review of proposed structures which would exceed an airspace surface defined under the regulation is unaffected by any change in City policy on maximum building heights. Further, existing City policy requiring development applicants, if applicable, to obtain "determinations of no hazard" from the FAA, and to comply with any conditions set forth by the FAA in such determinations, will continue. The FAA retains discretion to determine whether any proposed structure elevation would constitute a hazard to aviation. The City can only presume that the FAA would allow a structure to be as tall as indicated under Scenario 4.

Figure 4-18 depicts the 3-mile airspace protection surface coverage for Scenario 4. OEI protection for Runway 30L/30R departures is maintained in this scenario. OEI impacts for northbound departures were not evaluated as part of this study and any impacts to airline operations as it pertains to PAX and/or cargo penalties is unknown. For Runways 30L/30R, straight-out OEI corridor protection is maintained in the Scenario 4 composite airspace. **Figure 4-19** depicts the Scenario 4 composite airspace height limits over the Downtown Core and Diridon Station Area.

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Figure 4-18 SJC Composite Airspace Surface Protection (3-Mile Radius)

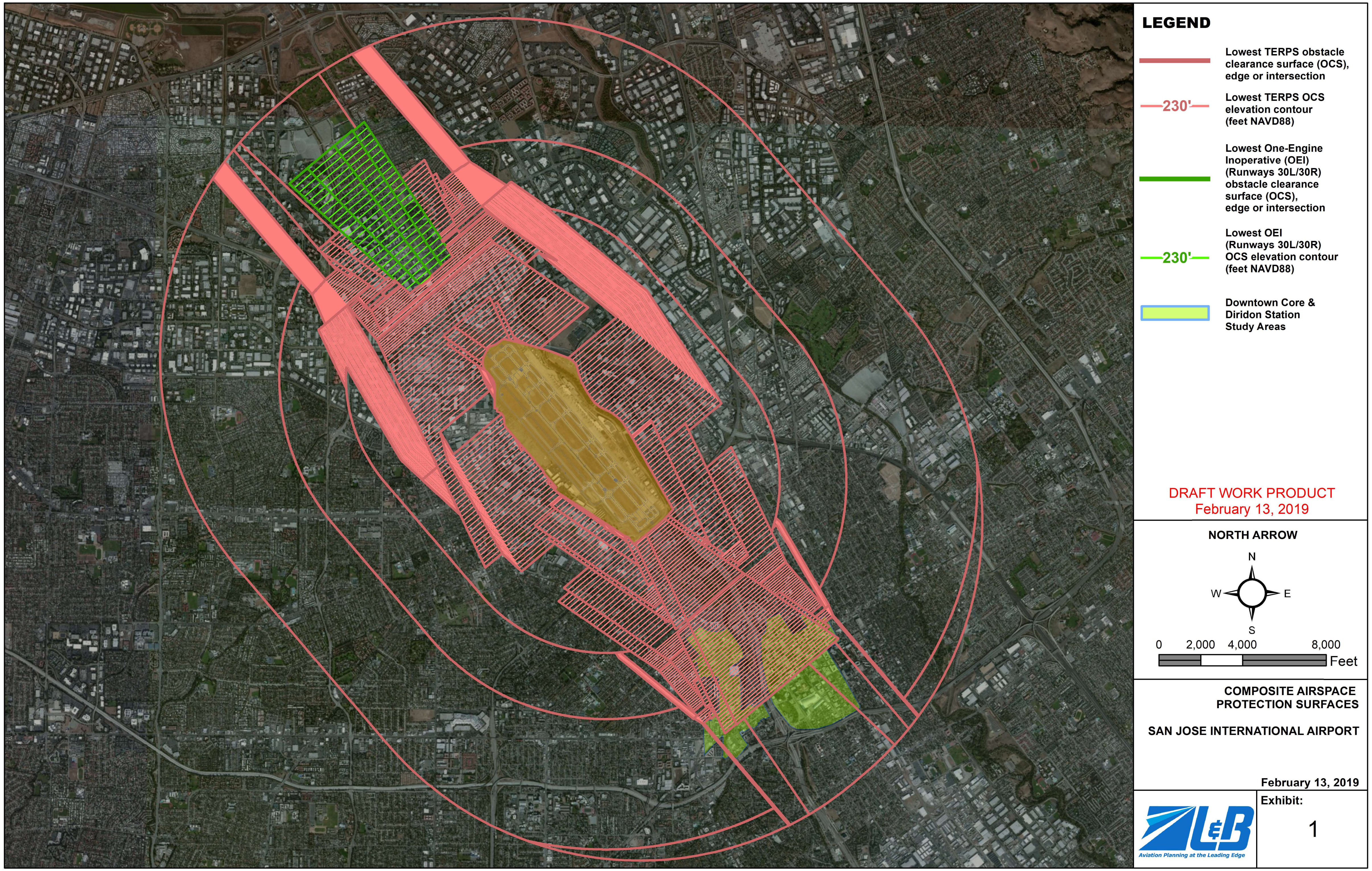

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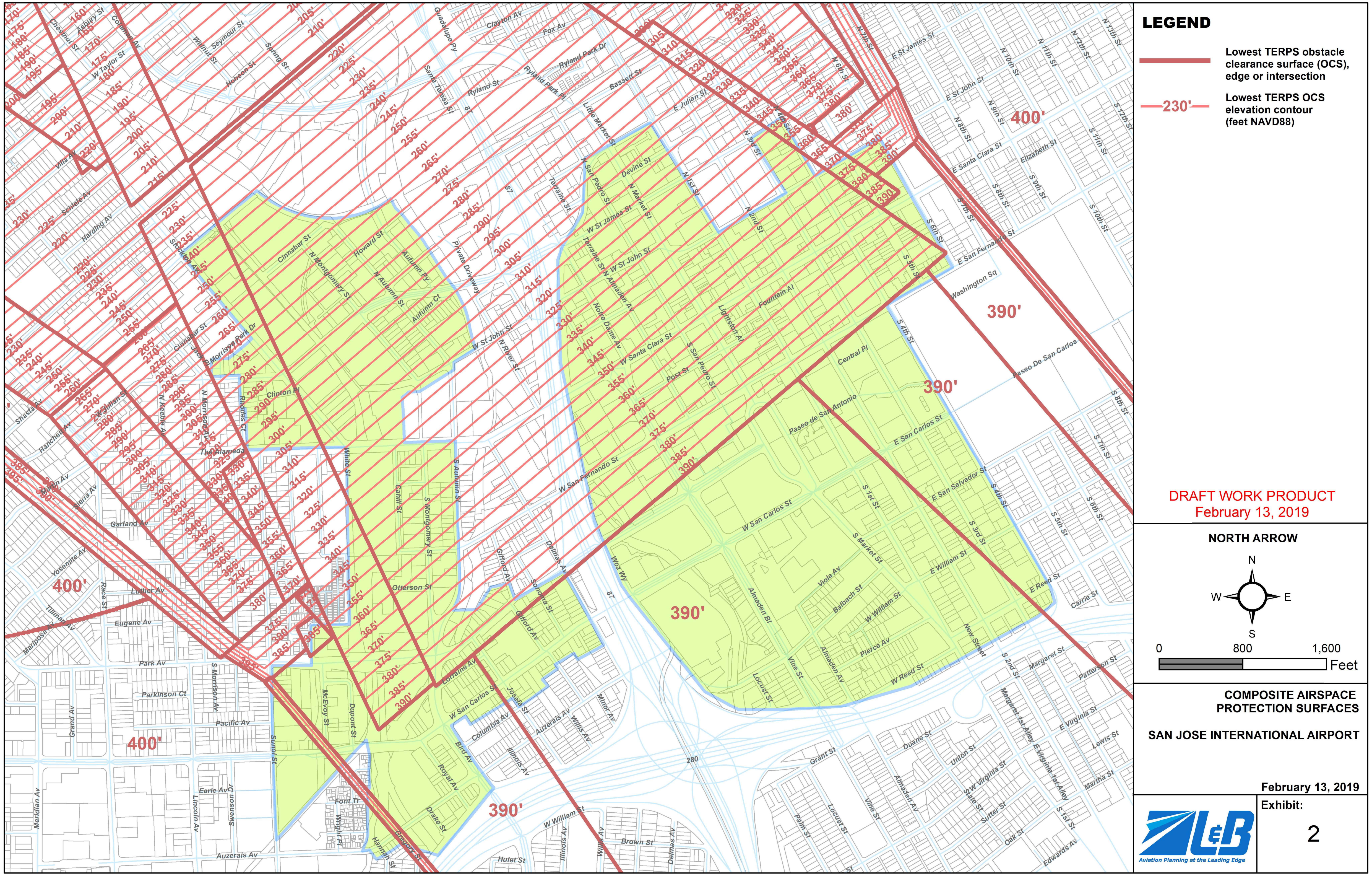
Figure 4-19 SJC Composite Airspace Surface Protection Over Downtown Core and Diridon Station Areas



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5 Airport Case Studies

5.1 Introduction

As part of the Downtown San José Airspace and Development Capacity Study (Project DADCS), three airport case studies were conducted to better understand how other airports and the local development community has worked together to resolve issues of airspace protection and their impacts on proposed developments surrounding the airport environment. As part of the case studies, Landrum & Brown conducted phone interview with staff from the following airports:

- Miami International Airport (MIA)
- Ronald Reagan Washington National Airport (DCA)
- Las Vegas McCarran International Airport (LAS) (later removed due to concerns from the Clark County Department of Aviation, the airport owner, regarding how the information could be used)

Based on the information received from the interviews, the following describes each airport's airspace protection regulatory and policy framework, the development issues faced in the airport area, and the similarities and differences to San José's situation along with the best practices used for dealing with airspace protection and high-rise development.

5.2 Miami International Airport (MIA) Case Study

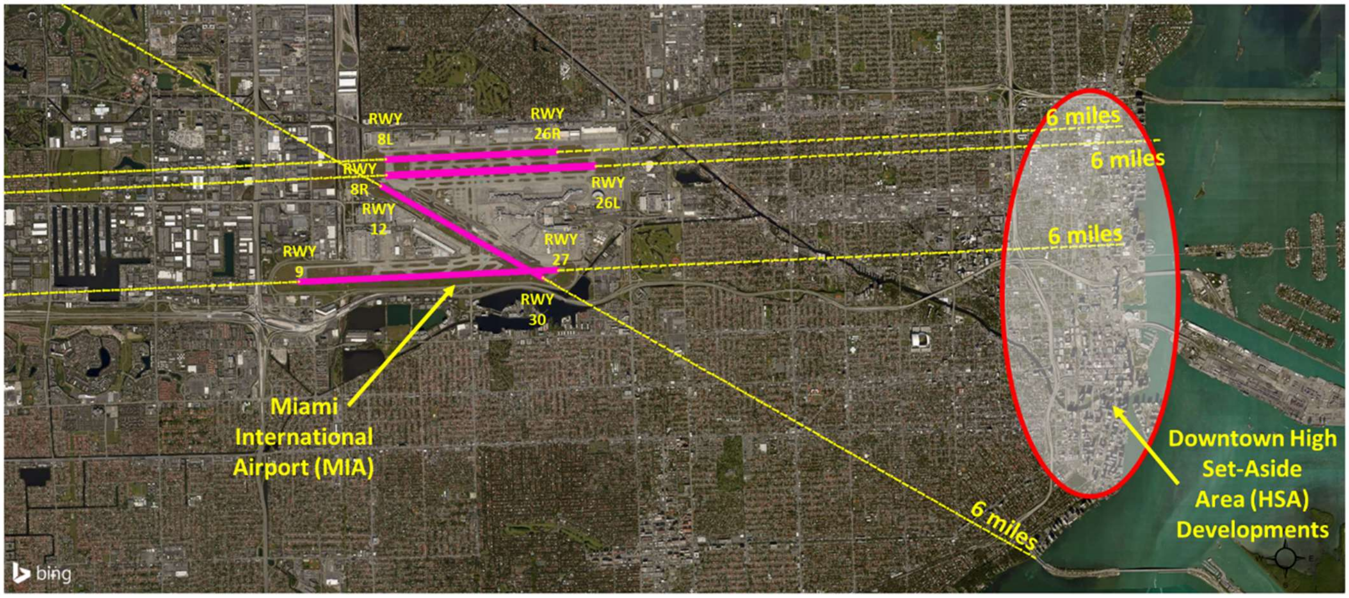
5.2.1 Airport Overview

Miami International Airport (MIA) is located in Miami, Florida and is operated by the Miami Dade Aviation Department (MDAD). For Runway 9/27, the initial 10,000 feet of the instrument approach district has a slope of 50:1 with an additional 40,000 feet at a slope of 40:1, which is consistent with Part 77 standards.

Figure 5-1 depicts the existing runway configuration at MIA and the downtown high-rise development area. MIA operates four active runways Runway 08L/26R (8,600 feet x 150 feet), Runway 08R/26L (10,506 feet x 200 feet), Runway 09/27 (13,016 feet x 150 feet) and Runway 12/30 (9,355 feet x 150 feet), three of which send departures over the downtown high-rise area during west flow conditions.

Downtown is located approximately six miles to the east of the airport. Given the distance between the runway departure ends and the downtown high-rise area, airlines do not experience OEI weight penalties and range impacts.

Figure 5-1 MIA Airport Runway Configuration



Source: Landrum & Brown

Airspace Protection

In 1969, Miami-Dade County (airport operator) established airport height zoning districts enforced by an official Height Zoning Code. The protected airspace surfaces are mostly modeled after FAA airspace safety criteria contained in 14 CFR Part 77. In general, the airspace protection surfaces conform to Part 77 surface standards, however in some cases, airspace protection is more restrictive than the Part 77 imaginary surfaces. MDAD does protect for OEI corridors, which slope upward at a 65:1 surface slope for Runways 8R/26L and 12/30. For both runways, the initial 10,000 feet of the instrument approach surface has a slope of 65:1 with an additional 40,000 feet at a slope of 40:1.

For Runway 9/27, the initial 10,000 feet of the instrument approach district has a slope of 50:1 with an additional 40,000 feet at a slope of 40:1, which is consistent with Part 77 standards.

The Miami-Dade County Height Zoning Code is explicit and municipalities and communities have to follow the code. MDAD does not issue any variances to the height limitations and will not approve any developments that exceed the airspace heights established as part of the code. MDAD also has memorandums of understanding with local municipalities to ensure that they abide by and enforce the Height Zoning Code for proposed developments.

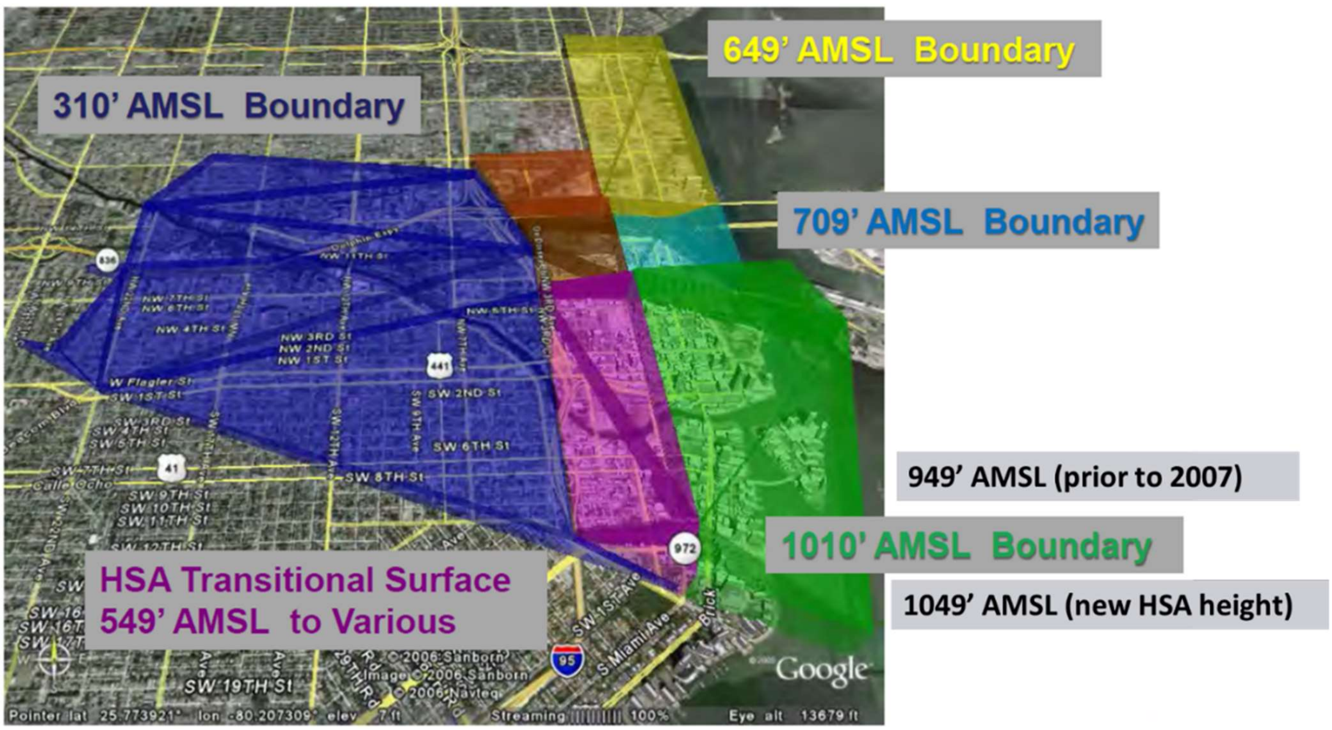
As part of the zoning code, developers are required to file an application with the local municipality and MDAD also requires that the developer to comply with Part 77 by filing a 7460-1 "Notice of Proposed Construction or Alteration" form with the FAA to initiate an airspace study of the proposed development. If the FAA issues a favorable "determination of no hazard", MDAD will issue a letter of approval to the developer.

There have been cases where a developer has built a structure that penetrated the protected airspace surfaces. MDAD notified the developer by letter and ensured that the incompatible structure height was lowered, as required under the zoning code.

5.2.2 Examples of Collaboration between the Airport and the Local Development Community

As part of the Height Zoning Code, "high structure-set aside districts (HSAs)" are established. These areas are located between 4-6 miles east of the Airport, including downtown, where high-rise development is most prominent or desired. **Figure 5-2** depicts the HSA development areas and the associated height limit at the outer edge of each of the individual areas.

Figure 5-2 MDAD High-Set Aside District Areas Heights Limits



Source: Airspace Solutions and Protection in the City of Miami; "Changes in Zoning Surfaces and UAV Restrictions" presentation. José A. Ramos, Division Director of Aviation Planning, Land Use and Grants. December 15, 2015.

In 2014 the local development community proposed a change to the Height Zoning Code to allow additional high-rise development heights in downtown Miami. The proposal was to raise the ceiling of the HSA from a maximum of 1,010 feet above mean sea level (MSL) to 1,049 feet above MSL. MDAD reached out to airlines at MIA to engage them in the analysis of potential impacts to their aircraft operations. The airlines evaluated and verified that there would be no impacts to departure payloads with the proposed airspace protection modifications, however they were concerned with the prospect of losing non-precision approaches. MDAD, provided this feedback to the FAA and a collaborative effort over the course of three years was undertaken to evaluate the proposed change to the zoning code. The outcome of the process was that airlines at MIA confirmed that the increase to the 1,049-foot MSL height would have no impact on departure payloads and OEI as straight-out OEI protection surfaces do not directly overfly the 1,049-foot MSL HSA zone.

5.2.3 Similarities, Difference and Best Practices for Airspace Protection

Figure 5-3 summarizes some of the similarities, differences and best practices for that MDAD use for airspace protection at MIA as compared to airspace protection practices at SJC.

Figure 5-3 Similarities, Differences and Best Practices for Airspace Protection

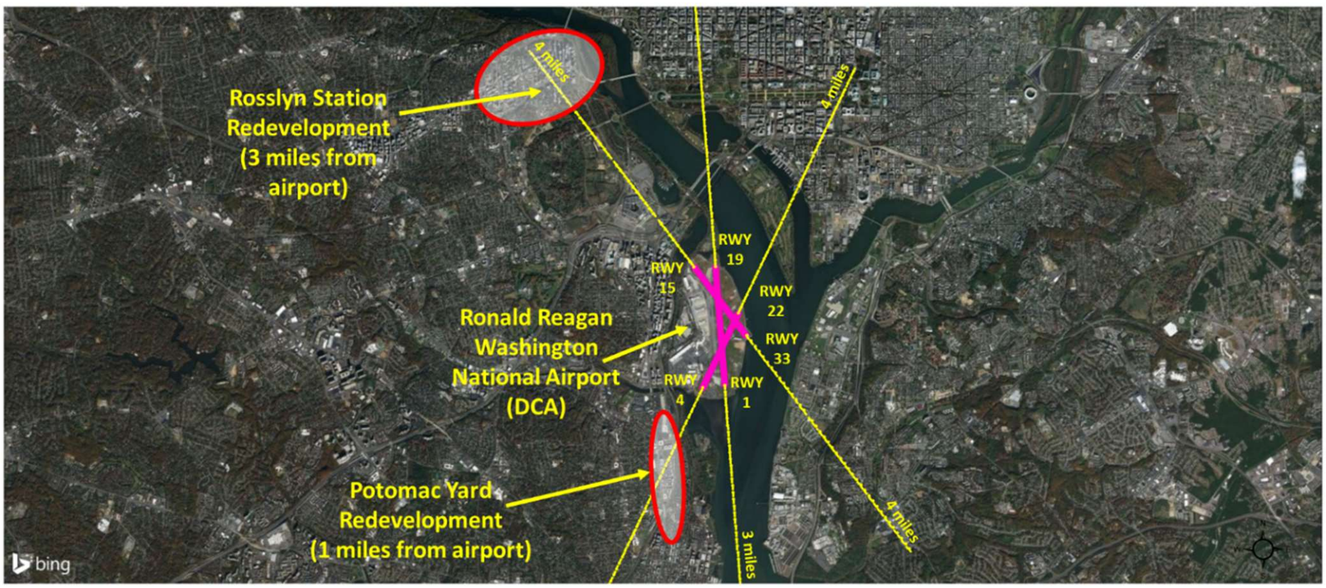
Similarities	Airport works with developers identifying available heights Protects for OEI
Differences	High-rise development areas 4-6 miles from runways, much of which are outside of flight corridors Height Zoning Code based primarily on Part 77 and protection for OEI MDAD has approval authority over development projects Straight-out OEI on two runways at 65:1 slopes for first 10,000 feet
Best Practices	Height Zoning Code that protects airspace and allows for high-rise development in certain areas Airport, airlines, development community, and FAA work collaboratively to proposed changes to Height Zoning Code

5.3 Ronald Reagan Washington National Airport (DCA) Case Study

5.3.1 Airport Overview

Ronald Reagan Washington National Airport (DCA) is located in Arlington, Virginia and is operated by the Metropolitan Washington Airports Authority (MWAA). MWAA also operates Washington Dulles International Airport (IAD). **Figure 5-4** depicts the existing runway configuration at DCA. DCA operates three active runways Runway 01/19 (7,169 feet x 150 feet), Runway 15/33 (5,204 feet x 150 feet) and Runway 04/22 (5,000 feet x 150 feet). Currently, new high-rise development is taking place in Arlington Country, specifically in the Rosslyn Station area which is located approximately 3 miles northwest of the Airport.

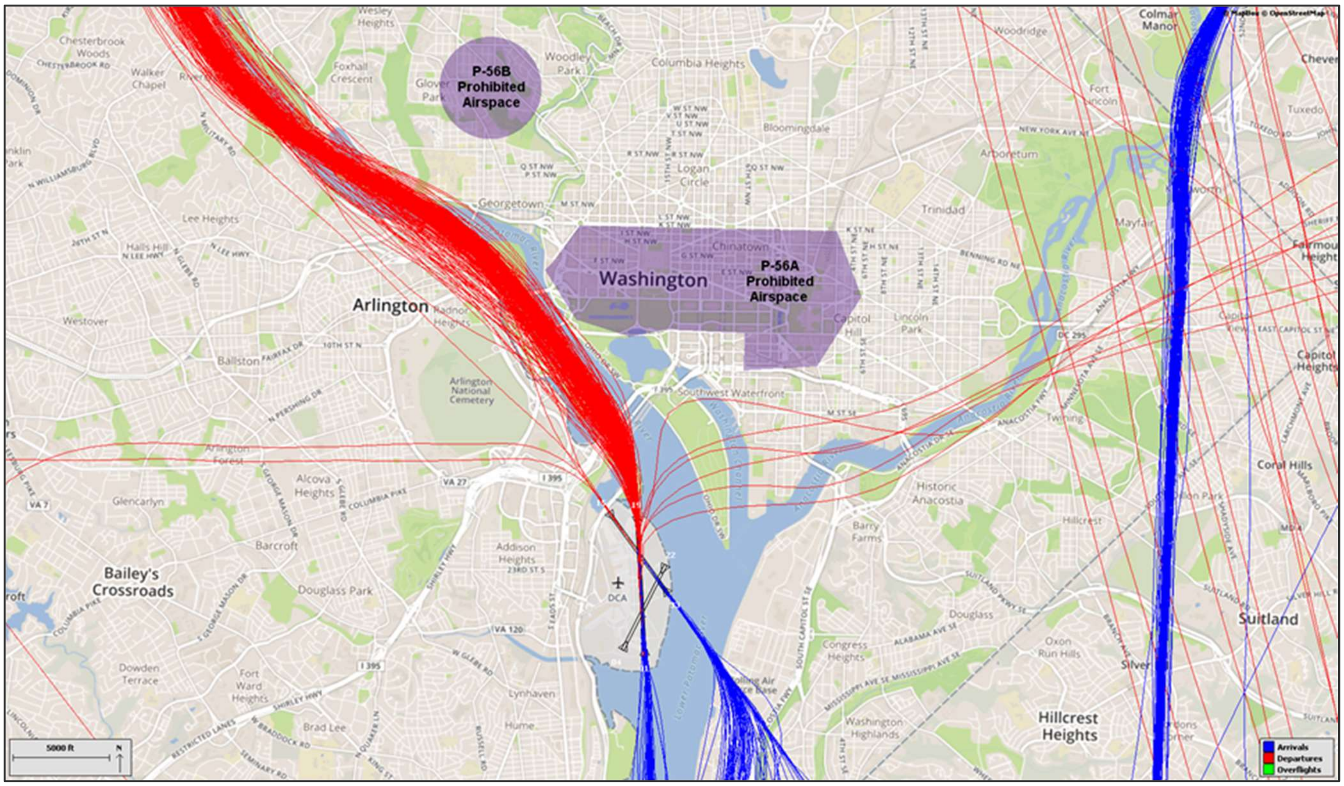
Figure 5-4 DCA Airport Runway Configuration



Source: Landrum & Brown

When operating in north flow, departure flight tracks from Runway 33 are generally routed north and follow the path of the Potomac River as depicted in the in **Figure 5-5**. Flight tracks (both arrivals and departures must remain clear of the federally protected P-56 airspace. Within the P-56 airspace, operation of commercial and private aircraft near the White House, U.S. National Mall and the Naval Observatory is prohibited which makes options for OEI corridor alignment very restrictive.

Figure 5-5 Departure Flight Tracks from Runway 33 at DCA



Source: The Metropolitan Washington Airport Authority (MWAA)

5.3.2 Airspace Protection Surfaces

The MWAA produces composite airspace surface protection mapping to provide guidance for airspace height limitations surrounding the Airport. Airspace protection mapping consists of a combination of the lowest controlling FAR Part 77 imaginary, TERPS and OEI surfaces surrounding the Airport. Airspace protection at DCA is not governed by law or enforced by an ordinance, rather it is policy based and used as a planning tool by MWAA to protect the airspace from obstacles which may have an adverse impact on aviation operations. MWAA work directly with airlines operating at DCA to maintain OEI airspace protection corridors to ensure departure operations in north flow are not impacted by incompatible obstacles. Given the defined OEI protection corridors for Runways 01 and 33 at DCA, OEI protection is not an issue for Airlines at the DCA as the primary flight tracks follow the Potomac River and airspace protection surfaces limit heights of building developments.

Developers that seek guidance pertaining to building height impacts on aviation operations at DCA will often coordinate directly with MWAA. However, the formal process for an official airspace evaluation is to require property developers in the vicinity of DCA to file a FAA 7460-1 “Notice of Proposed Construction or Alteration” form with the FAA so that a formal airspace evaluation can be initiated. MWAA receives notifications and monitors the FAA’s Obstacle Evaluation/Airport Airspace Analysis (OE/AAA) system for submissions of proposed developments, status updates and final determinations that are accessible from the system. During the OE/AAA evaluation process, if the FAA provides a determination of no hazard to a potential development with heights that may not impact TERPS, but may exceed to OEI corridor height limitations, MWAA will typically try to petition the FAA to consider lowering the determination height. However, this has varied success rates according to MWAA staff. It should be noted that the OEI composite airspace protection mapping developed by MWAA is not enforced by the FAA, however MWAA and the FAA have a collaborative working relationship to help protect the interest of the aviation community.

According to MWAA staff, there have been cases when pressure from outside entities to raises FAA arrival and departure minimums for aircraft operations to foster increased developments surrounding the Airport. However, impacts to the aviation community at DCA is a priority and MWAA does not typically promote increasing arrival and departure procedures minimums at DCA, which would raise protected airspace surfaces to accommodate taller developments surrounding the Airport.

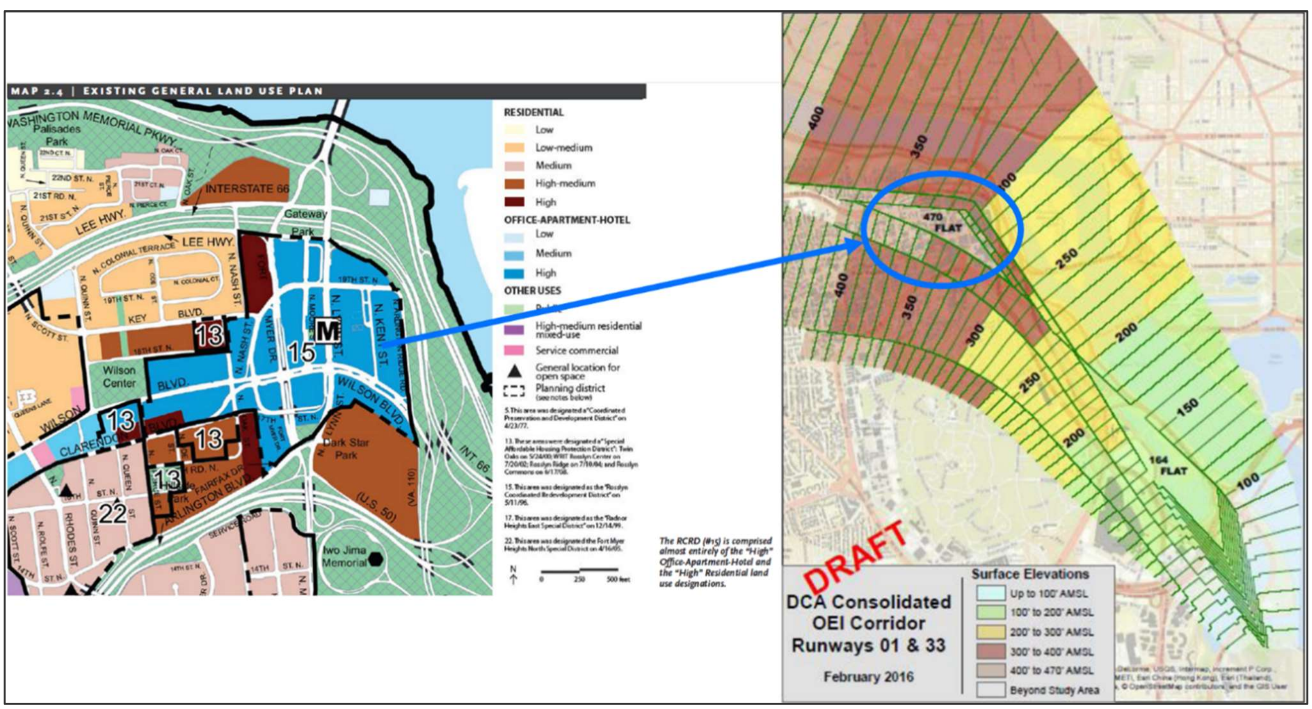
5.3.3 Examples of Collaboration between the Airport and the Local Development Community

Figure 5-6 depicts an example of the DCA Consolidated OEI Corridor composite mapping for Runways 01 and 33. The mapping primarily consist of several OEI corridors with various surface slopes, however MWAA staff worked with the airlines and the FAA to modify OEI protection heights by assessing the impacts of incorporating a section of heights governed by TERPS into the composite OEI protection mapping.

A land use redevelopment known as the Rosslyn Coordinated Development District (RCRD) in Arlington, Virginia, which is located approximately 3 miles northwest of DCA, consist of the redevelopment of the Rosslyn Station Area (RSA). RSA redevelopment includes various developments including high-rise building developments. During the planning process for RSA, it was determined that the existing OEI protection surfaces over RCRD would limit the ability to build high-rise developments to desired heights.

Property developers desired additional development height within the RCRD to accommodate taller structures which would require modifications to the OEI protection heights. The lowest governing TERPS surface within this area is a non-precision instrument Vertical Navigation (VNAV) surface with a height of 470 feet above MSL. This surface is a flat surface which will allow for the additional heights for high-rise developments within the RCRD. Through coordination with the airlines, it was determined that the additional heights would not have adverse impacts on OEI operations at DCA. Additionally, there would be no impacts to TERPS according to the FAA, so MWAA modified the OEI protection surfaces and incorporated the 470 feet AMSL flat surface protection over the desire high-rise development area.

Figure 5-6 DCA Consolidated OEI Corridors – Runways 01 & 33

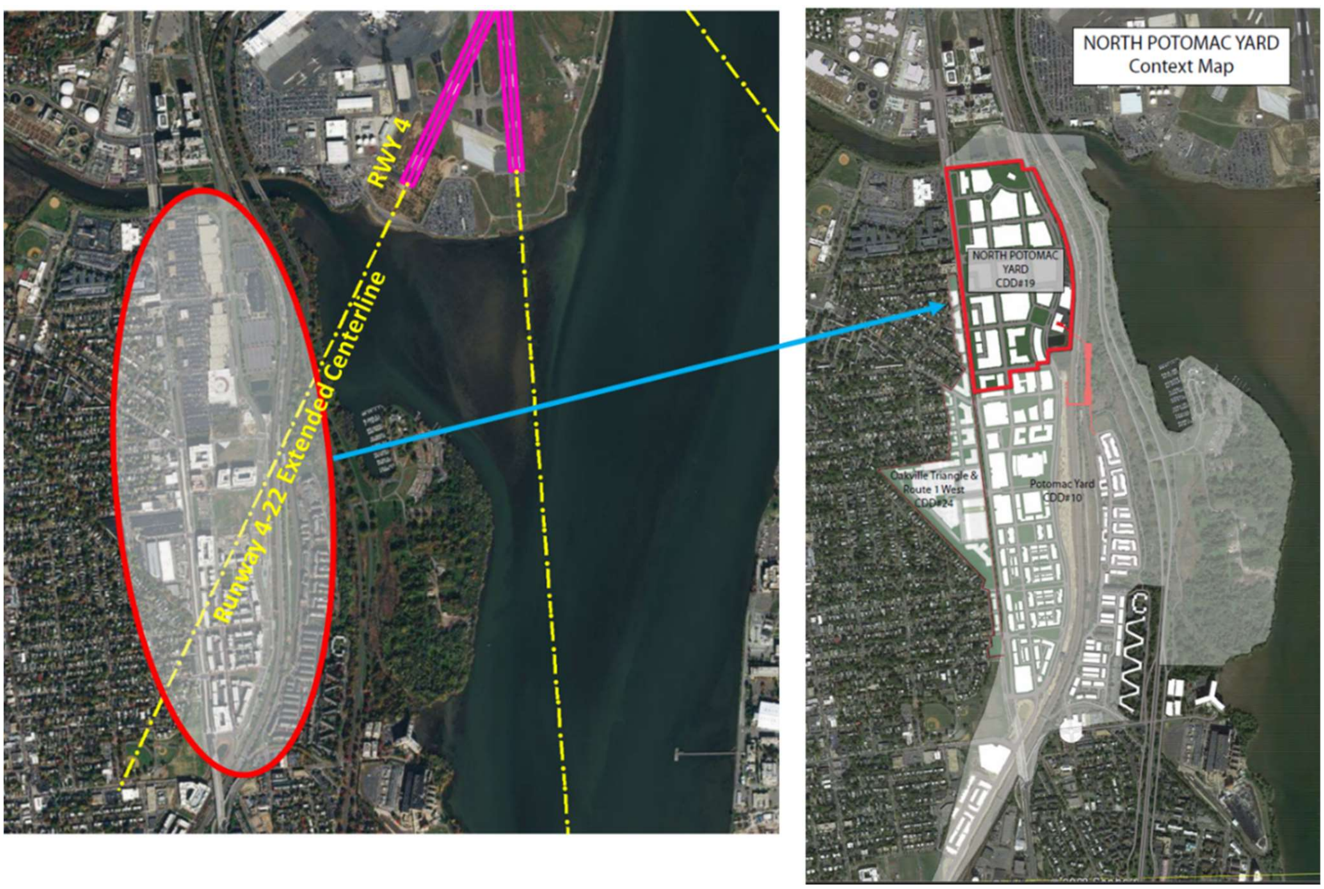


Source: The Metropolitan Washington Airport Authority (MWAA)

Another example of MWAA coordination with the local development community involves the redevelopment of the North Potomac Yard, located approximately 1 mile southwest of DCA and directly under the final approach and departure of Runway 04/22. As depicted in **Figure 5-7**, the North Potomac Yard redevelopment consists of various commercial and residential developments. Property developers requested additional development heights as primary airspace protection over North Potomac Yard is governed by FAR Part 77 imaginary surfaces according to MWAA's composite airspace surface protection map.

To allow increased development heights in this area, MWAA worked with the airlines and the FAA to increase the glide path angle (GPA) for approaches to Runway 04 at DCA. Runway 04 at DCA is a non-precision instrument runway with visibility minimums greater than ¾ statute miles and is not a primary arrival runway at the Airport, therefore increases to the GPA for this runway would have minimal impacts on aviation operations. There was no impact to OEI operations as Runway 22 is not a primary departure runway and aircraft departure in South Flow would primarily use Runway 33 with a flight path following the Potomac River.

Figure 5-7 North Potomac Yard Redevelopment Area Proximity to Runway 4 at DCA



Source: Landrum & Brown and https://www.alexandriava.gov/uploadedFiles/PYLandbayMap.pdf

5.3.4 Similarities, Difference and Best Practices for Airspace Protection

Figure 5-8 summarizes some of the similarities, differences and best practices for that MWAA use for airspace protection at DCA as compared to airspace protection practices at SJC.

Figure 5-8 Similarities, Differences and Best Practices for Airspace Protection

Similarities	Airport works with developers identifying available heights Use of Part 77, TERPS and OEI composite airspace height mapping Rosslyn high-rise development area 3.0 miles from runway along flight path Potomac Yard redevelopment area 1.0 miles from runway along flight path Policy-based
Differences	Unique OEI corridors based on restricted airspace
Best Practices	Redevelopment plans integrating airspace protection surfaces FAA, Airport and development community coordination to adjust procedures

Source: Landrum & Brown

6 Real Estate Impacts Assessment

6.1 Introduction

Section 6 reports the assumptions, methodology, and findings of an assessment and comparison between aviation and real estate related economic gains and losses associated with airspace protection Scenarios considered under the Downtown Airspace and Development Capacity Study (DADCS).

For reference, the following airspace protection Scenarios were evaluated:

- **Scenario 1: Existing Airspace Protection**
  - Existing West OEI Corridor and straight-out ICAO OEI surface protection for Runways 12L/12R
  - Used as the base case and comparison to potential heights gained in other Scenarios
- **Scenario 4: No OEI Protection/TERPS Only**
  - Removal of existing straight-out and West OEI Corridor surface protection for Runways 12L/12R
  - TERPS Only scenario would essentially provide increased development heights over Downtown Core and Diridon Station Area
- **Scenario 7: Straight-Out OEI Protection Without West OEI Corridor**
  - Maintain existing straight-out OEI surface protection for Runway 12L/12R departures
  - West OEI corridor would be removed, allowing for additional development height within Diridon Station Area
- **Scenario 9: No OEI Protection, Increased FAA Height Limits**
  - Assumes that the lowest TERPS departure surface climb gradient protection (261 feet/NM and 290 feet/NM) would be eliminated for Runway 12L/12R and non-precision instrument circling approach surface heights would be increased
  - Assumes no changes to vertically guided precision instrument approach procedures for Runway 30L/30R operations
- **Scenario 10: Modified West OEI Corridor at Defined Development Heights**
  - Assumes that the surface slope of the West OEI Corridor could be adjusted to allow for additional development heights in Diridon Station Area
  - Incremental surface slopes adjustments conducted to determine the impact on aircraft performance and development height

Scenario 1 describes airspace protection zone ceiling heights under existing OEI and TERPS. The remaining Scenarios describe increases in airspace protection zone ceiling heights associated with various modifications to each procedure. **Increases in ceiling heights under each scenario must be compensated by reductions in aircraft departure weights during airport south flow conditions**. These "weight penalties" were calculated for each airspace protection scenario. Similarly, the local economic benefits of increasing ceiling heights for new development within each scenario was also calculated.

The weight penalty/building height trade-off creates two opposing economic effects. Raising existing ceiling heights can adversely affect the level of airline service through the imposition of weight penalties. Loss of airline service reduces regional connectivity and the agglomerative effects of the airport on the economic geography of the region- particularly how and where industries tend to cluster. By contrast, raising existing ceiling heights positively affects potential real estate development density. Increases in development density enhance the agglomerative effects of real estate development- in terms of how firms and residents make locational decisions.

The objective of this economic analysis was to quantify these opposing effects under each scenario for comparative purposes.

6.1.1 Study Methodology

The general approach used in the study was to measure existing levels of aviation and real estate development related local industry output and employment, then measure changes in those levels caused by adjustments in ceiling heights under each airspace protection scenario. Direct aviation related economic impacts were calculated by using weight penalties assessed under each scenario to estimate passenger and visitor losses that were then used to calculate lost aviation related industry output. Lost industry output was measured as reductions in airline revenue and local expenditures by passengers and visitors. Direct real estate related economic impacts were calculated by using elevations in airspace protection zone ceiling heights under each scenario to estimate new development potential square footage that was then used to predict gained real estate related industry output. Gained real estate related industry output was measured as increases in construction expenditures and office space absorption related employment.

IMPLAN economic impact forecasting software was then used to simulate induced and total overall economic impacts across all local industrial sectors. The study area was defined as only the City of San José, although the economic impacts associated with aviation activity and real estate development are spread throughout the region (on other areas of Santa Clara County, Silicon Valley, and the Greater Bay Area).

Existing economic variables and forecasts were used as inputs into IMPLAN to project future economic growth in the City of San José under Scenario 1 to establish an economic growth baseline. Changes in local forecasted output of both aviation and real estate development related industries related to changes in airspace protection zone ceiling heights were projected for each of the remaining scenarios. IMPLAN estimated the overall effect across all industries that comprise the local economy, and therefore the total economic impact of ceiling height adjustments on the City of San José.

IMPLAN estimates 3 types of economic impact- direct, indirect (supply-chain) and induced (secondary demand). Direct economic impacts are changes in local employment, revenues or expenditures in aviation and real estate related industries that are caused by the changes in ceiling heights. Supply-chain and secondary demand impacts, combined in this study as induced impacts, are economic impacts across all local industries that are caused by the initial set of direct impacts. The study period is 2019 through 2038, although the economic impacts from both aviation activity losses and real estate development gains are not expected to occur until the year 2032.

6.1.2 Direct Economic Impacts

6.1.2.1 Direct Aviation Related Impacts

Landrum & Brown (L&B) estimated the annual number of passengers lost when reductions in aircraft departure weights (“weight penalties”) during south flow conditions are applied under each scenario. Passenger “losses” occur when the number of weight-restricted seats on a flight exceeds the typical number of empty (unsold) seats. This calculation is made on the basis of the following considerations:

- Directional flow of airport departures (which flights are affected)
- Aircraft seating capacity
- Distance to market served
- Time of year
- Flight frequency
- Market load factor

L&B then estimated the portion of annual lost passengers that were visitors to the region. Once the annual number of lost passengers and visitors was estimated, the direct economic impact to airlines, the airport, and the City of San José was measured as reductions in local expenditures by both passengers and visitors. Reductions in passengers and visitors directly impact the local economy in the form of reductions in revenues earned by airlines from passengers and decreases in local spending by passengers and visitors. The following types of airline and airport related revenue reductions were calculated:

- Reductions in airline revenues and increases in airline voucher costs (2018 dollars)
- Reductions in passenger expenditures at the airport- concessions sales (2018 dollars)
- Reductions in passenger facility charge (pfc) revenue to the airport (2018 dollars)
- Reductions in local spending by visitors within the City of San José (2018 dollars)

The earliest year that passenger losses are assumed to occur is the year 2032, when Diridon Station Area estimated existing development potential (Scenario 1) is exceeded by development potential estimated under each scenario. This difference is referred to in this study as "net new development density", when existing Diridon Station Area development potential is fully absorbed and new construction begins to add net new development density. L&B also estimates that these losses occur only under Scenarios 4 and 9. Lost passenger traffic, number of visitors, and associated lost aviation related revenue under these two scenarios is illustrated for selected years in **Table 6-1**. Between 2032 and 2038 these losses growth at an average annual compounded rate of approximately 3.5%.

Table 6-1 Direct Aviation Related Economic Impacts

Metric	Year and Scenario					
	2032		2036		2038	
	Scenario 4 No OEI	Scenario 9 No OEI, incr. height	Scenario 4 No OEI	Scenario 9 No OEI, incr. height	Scenario 4 No OEI	Scenario 9 No OEI, incr. height
Lost enplanements	(1,434)	(8,599)	(1,628)	(9,710)	(1,716)	(10,237)
Lost visitors	(384)	(2,532)	(436)	(2,859)	(459)	(3,014)
Lost Airline revenue	($ 979,429)	($5,849,839)	($1,111,959)	($6,606,156)	($1,171,781)	($6,964,187)
Passenger vouchers	($286,825)	($1,719,825)	($325,639)	($1,942,039)	($343,158)	($2,07,358)
Lost visitor expenditures	($1,083,063)	($5460,878)	($1,224,982)	($6,163,749)	($1,292,206)	($6,495,390)
Lost Passenger expenditures	(55,285)	($303,177)	($62,529)	($342,046)	($65,961)	($360,370)
Lost PFCs	($15,425)	($77,424)	($17,465)	($87,500)	($18,485)	($92,538)

6.1.2.2 Direct Real Estate Related Impacts

Real estate related economic impacts are derived from increases in **development potential** or **"net new development density"** that are associated with the elevation of air protection zones under each scenario. Jones Lang LaSalle (JLL) estimated total **existing available density** under the current TERPS and OEI protection zone (Scenario 1) ceiling heights for both the Downtown Core and the Diridon Station Area using the following:

- Minimum floor requirement of 14 feet per
- Exiting building heights
- Existing parcel footprints

An estimate was then made of existing total potential density under Scenario 1. Average annual absorption (excluding build to suit projects) of existing density was also calculated based on:

- Distribution between the rate of absorption between office and residential use
- Annual amount of square footage absorbed for both office and residential use

JLL then estimated existing development potential as the difference between:

- Existing available density
- Annual absorption
- Existing total potential density

Downtown Core

JLL concluded that without increasing the height limits on development in the Downtown Core, there is significant enough "room" for new density that any increases to the height limits may not have a meaningful impact for a long period of time (70 years for office construction and 55 years for residential construction) based on current rates of absorption. There are then no anticipated increases in economic activity related to real estate development that can be attributed to an increase in airspace ceiling heights under any of the scenarios.

Diridon Station Area

For the Diridon Area, 55 parcels were identified that satisfied the following development criteria:

- Located within the airspace protection zone
- Are of sufficient size for development
- Have an existing underproductive, or underutilized use or is undeveloped

Using the above methodology, JLL then calculated on an annual basis the development potential under each scenario. The "net new development density" (the difference between Scenario 1 and the development potential of each scenarios was measured in terms of the net new square footage available for residential and commercial development on an annual basis. Assumptions were then made as the extent to which net new density would be constructed and absorbed by the Diridon Station Area residential and commercial real estate markets, using a 90%/10% mix between residential and commercial construction. JLL estimated annual increases in the following real estate related economic variables:

- Residential construction expenditures (2018 dollars)
- Commercial construction expenditures (2018 dollars)
- Permanent absorption related employment (individuals)
- Annual tax revenues (2018 dollars)
- One-time tax revenues (2018 dollars)
- Permanent residents (individuals)

IMPLAN software limits the economic variables that can be used to illustrate the economic impact of a policy choice. Therefore, only residential and commercial construction expenditures and employment related to the absorption of net new office construction could be used in the study. IMPLAN software determines the remaining changes in economic variable values by its own internal calculations.

Annual increases in estimated amounts of both construction expenditures and absorption related employment are equal under Scenarios 4, 7, 9, 10c and 10d throughout the study period. Direct economic gains from each are larger than those of Scenarios 10a and 10b. This is because they produced larger annual construction expenditures and cumulative absorption related employment over the study period. Scenarios 7, 10a, 10b, 10c and 10d produce no aviation related losses. Therefore, over the study period these Scenarios can be evaluated on the basis of the economic gains they produce and other aeronautical considerations and need not be compared to coincidental aviation related economic loses. Scenarios 4 and 9 have the same annual direct economic impact each year. Direct economic impacts under each scenario are shown in **Table 6-2**. Because annual increases in employment are assumed to be permanent employment, gains are cumulative.

Table 6-2 Direct Real Estate Related Economic Impacts, Scenarios 4 and 9

Metric	2032	2036	2038
Net new square feet	637,500	637,500	637,500
Net-new commercial construction	$15,170,000	$15,170,000	$15,170,000
Net-new residential construction	$340,170,000	$340,170,000	$340,170,000
Absorption related employment	230	1,150	1,610

Source: Landrum & Brown

6.1.3 Adjusted Direct, Induced and Total Economic Impacts

Estimates of decreases in aviation related outputs that were estimated by L&B and increases in key real estate outputs developed by JLL for each airspace protection scenario were then used as inputs into the IMPLAN software to simulate changes in the City of San José baseline economic forecasts across all industries. Inputs were made as either expenditure increases or reduces, or as increases in employment. Each input was assigned to the industrial sector of the NAICS (North American Industrial Classification System) where it was expected to occur.

Broad descriptions of expenditures, such as visitor spending or passenger spending at the airport (concessions), were distributed to more detail industrial classifications. For example, visitor spending was assigned to more narrowly defined industrial sectors such as hotel, restaurants, retail sales and other such industry classes.
The amount of each estimated direct expenditure was adjusted by IMPLAN to account for the extent to which it could be satisfied by locally produced goods and services. Increases and decreases in expenditures by industry were also codified as increase and decreases in employment by industry sector.

Each simulation resulted in the multiplication of direct impacts based on additional economic exchanges it induced in the local economy. For example, when an airport worker loses his or her job, they lose wages that would have been used to make purchases, many of which would be local. Because lost local purchases represent reductions in income to local business and labor, another round of economic reductions is put in motion. Through this process, additional economic loses are induced. Direct and induced impacts are summed to produce total economic impacts. Adjusted direct and induced aviation related and real estate related economic impacts are summarized in **Tables 6-3 and 6-4** for study years 2032, 2036 and 2038.

Table 6-3 Adjusted Direct and Induced and Aviation Related Economic Impacts, Scenarios 4 and 9

Type	Scenario	Year					
		2032		2036		2038	
		Employ.	Regional GDP	Employ.	Regional GDP	Employ.	Regional GDP
Adjusted Direct	4	(18)	($1,267,000)	(20)	($1,406,000)	(21)	($1,464,000)
Induced		(5)	($566,000)	(5)	($629,000)	(5)	($655,000)
Adjusted Direct	9	(94)	($6,921,000)	(104)	($7,635,000)	(109)	($7,964,000)
Induced		(26)	($3,108,000)	(28)	($3,436,000)	(30)	($3,584,000)

Source: Landrum & Brown

Table 6-4 Adjusted Direct and Induced and Real Estate Related Economic Impacts, Scenarios 4 and 9

Type	Scenario	Year					
		2032		2036		2038	
		Employ.	Regional GDP	Employ.	Regional GDP	Employ.	Regional GDP
Adjusted Direct	4, 9	1,463	$188,290,000	2,383	$406,588,000	2,843	$511,631,000
Induced		882	$97,610,000	1,651	$190,131,000	2,023	$234,896,000

Source: Landrum & Brown

6.1.4 Comparison of Total Aviation and Real Estate Impacts

Since there are no estimated aviation related losses associated with Scenarios 7, 10c and 10d, only Scenarios 4 and 9 need be assessed for comparative purposes. Scenarios 7, 10c and 10d are shown below however, for economic impact assessment purposes. Scenarios 10a and 10b were dropped from the analysis because Scenarios 7, 10c and 10d produced higher economic gains than either. The table below reports results for the years 2032, 2036 and 2038.

Table 6-5 Net Economic Impacts by Scenario

Scenario	Year	Aviation Related Impacts		Real Estate Related Impacts		Net Economic Impact	
		Employment	Regional GDP	Employment	Regional GDP	Employment	Regional GDP
		(Losses)	(Losses)	Gains	Gains	Gains	Gains
4	2032	(23)	($1,833,000)	2,345	$285,901,000	2,322	$284,068,000
	2036	(25)	($2,035,000)	4,034	$596,718,000	4,009	$594,683,000
	2038	(26)	($2,119,000)	4,866	$746,527,000	4,840	$744,408,000
9	2032	(120)	($10,028,000)	2,345	$285,901,000	2,225	$275,873,000
	2036	(132)	($11,070,000)	4,034	$596,718,000	3,902	$585,648,000
	2038	(138)	($11,548,000)	4,866	$746,527,000	4,728	$734,979,000
7, 10c, 10d	2032	(0)	($)	2,345	$285,901,000	2,345	$285,901,000
	2036	(0)	($)	4,034	$596,718,000	4,034	$596,718,000
	2038	(0)	($)	4,866	$746,527,000	4,866	$746,527,000

Source: Landrum & Brown

6.1.5 Local Tax Implications

The table below shows estimated one-time and annual real estate and sale tax increases associated with each scenario. Amounts indicated represent the net difference between tax revenue increases from real estate economic gains and decreases from aviation related economic losses. One-time taxes were estimated by JLL and include increases in building, parking and school district fees and development taxes. JLL also estimated increase in annual real estate tax revenues. Annual sales tax revenues were estimated by L&B by apportioning net annual sales tax increases between the State, County and City of San José.

Table 6-6 Estimated One-Time Real Estate and Annual Real Estate and Net Local Sales Tax Increases

Scenario	One-Time Real Estate	2032		2036		2038	
		Annual Real Estate Tax	Annual Sales Tax (San José)	Annual Real Estate Tax	Annual Sales Tax (San José)	Annual Real Estate Tax	Annual Sales Tax (San José)
4	$320,320,000	$450,600	$106,800	$450,600	$203,300	$450,600	$249,700
7	$314,590,000	$450,600	$110,000	$450,600	$206,800	$450,600	$253,400
9	$366,450,000	$450,600	$92,200	$450,600	$187,200	$450,600	$232,900
10a	$41,040,000	$450,600	$110,000	$0	$57,700	$0	$57,700
10b	$116,590,000	$450,600	$110,000	$181,600	$141,100	$13,100	$137,400
10c	$183,120,000	$450,600	$110,000	$450,600	$206,800	$391,600	$226,800
10c	$255,340,000	$450,600	$110,000	$450,600	$206,800	$450,600	$253,400

Source: Landrum & Brown

6.1.6 Observations and Conclusions

- Annual and total economic gains related to real estate development of the Diridon Station Area significantly exceed aviation loses in the scenarios where both occur.
- Assuming aviation related economic losses continue to grow at an annual rate of 3.5%, the difference between such losses and real estate related economic gains is expected to persist into the distant future.
- Over the study term, and beyond, Scenario 4 maximizes the difference between real estate related economic gains and aviation related economic loses to the City of San José.

6.1.7 Agglomerative Effects and Other Considerations

Even though economic benefits associated with real estate impacts are relatively larger than losses associated with lost airport activity, caution should be exercised in interpreting these results. While subtle, the diminished agglomerative economic impacts of the airport should not be understated. The airport offers local industries access to global markets, and vice-versa. Domestic and global accessibility offered by the airport positively affects locational decisions of both households and businesses. At the point that operating constraints placed on the airport begin to cause reductions in airport connectivity and connective frequency, those decisions become adversely affected. The airport and airlines that serve it are an essential part of the supply chain of every industry that comprises the greater San José economy. Moreover, the airport helps to establish the region's identity and signals the competitiveness of the region. The point at which the agglomerative effects of the airport start to be diminished is difficult to assess but nonetheless real. This study does not assume any reductions in airport connectivity or connective frequency.

The agglomerative effects related to real estate development of the Diridon Station Area are positive and essential to the success of the infrastructure investment this decision analysis supports. The economic and environmental benefits BART, electrified Caltrain and high-speed rail investments cannot be realized unless a significant amount of new growth can occur in a compact form around Diridon Station and in downtown San José.

The massing of local consumption demand expands the variety of locally available goods and services, which in turn positively affects the locational decisions of future potential residents. The massing of residents increases the availability of specialized labor, which in turn raises the area's productivity, which then positively affects the locational decisions of firms. This process both supports and is supported by the development of the local infrastructure.

Finally, real estate economic gains estimated in this study will be realized only to the extent that assumed absorption related employment is "new" employment and is not "cannibalized" from absorption related employment that would otherwise take place in other areas of the city.

6.2 Aviation Economic Impacts (Direct)

This analysis estimates the revenues lost by the airlines, the airport, and the community as a result of passenger weight penalties for long haul aircraft departures in Southeast Flow. The loss is calculated by taking the average load factor for the impacted flights, by season, and determining the number of additional seats that must be left vacant due to the weight penalty.

6.2.1 Airline Load Factors

Airline load factor refers to the average percentage of occupied seats on airline flights. The Bureau of Transportation Statistics (BTS) Air Carrier Statistics Database (T100) provides average historical load factor data for each season (winter and summer). Load factors for the Hawaii and Transcontinental markets are based on airline departures from SJC. Load factors for the Europe and Asia markets are based on airline departures from the Bay Area (SFO, OAK, and SJC combined) to account for the limited number and fairly recent growth of international service at SJC.

These historical load factors were used to forecast anticipated load factors for the year 2024, the first year assumed to be when new Downtown Core or Diridon Station Area construction reaching the airspace height surfaces of each scenario could be completed.

Table 6-7 provides the load factors by market region for the past three years. The load factors were adjusted for year 2024 based on passenger forecasts for each market and the seating configuration for the representative aircraft assumed to serve the markets. This was used to determine the average number of projected empty passenger seats. Additional empty passenger seats due to OEI-related weight penalties can then be derived to determine the assumed number of passengers lost per departure.

Table 6-7 Airline Load Factor by Market by Season – 2015-2018 Three-Year Average

Region	Winter	Summer
Hawaii	89.7%	90.5%
Transcontinental	84.9%	82.2%
Europe	75.1%	88.0%
Asia	79.6%	82.4%

Source: Bureau of Transportation Statistics, Air Carrier Statistics Database

6.2.2 Airport Revenue and Local Economic Spending Losses

Revenue and economic spending losses were calculated based on the number of impacted flights per year due to weight penalties for Southeast Flow departures. According to the Airport Noise and Monitoring Management System (ANOMS) data, an average of 13.0% of all departing flights from 2003 through 2017 at the Airport were in Southeast Flow, more so in winter (22.3% of the time) than in summer (7.0% of the time). It was assumed that these Southeast Flow percentages would remain constant in the future.

In June 2017, Kimley Horn Associates updated the aviation activity forecasts for SJC (2017 forecast) for the proposed update to the Airport Master Plan. The year-over-year growth rates provided were applied to actual 2018 operations. The resulting projection for 2024 is 2,140 flights to Hawaii, 1,940 transcontinental flights, 628 Europe flights, and 888 Asia flights.

The number of annual flights impacted was calculated by applying the South Flow occurrence rates to the number of operations within the season. Based on this information, there will be approximately 83 Europe flights, 112 Asia flights, 280 Hawaii flights, and 250 transcontinental flights in 2024 in South Flow. The lost passengers per operation, provided in the weight penalty analysis, were multiplied by the annual impacted operations. The result was the total number of annual passengers lost. **Table 6-8** provides the annual lost passengers by scenario for 2024.

Table 6-8 Summary of 2024 Lost Passengers

Scenario	Airspace Protection	Baseline
1	Existing airspace protection	0
4	TERPS Only	908
7	Straight-Out ICAO OEI surface protection without West OEI Corridor	0
10	Existing Conditions: 85' - 166' AGL	0
	Opt 10A: 100' - 195' AGL	0
	Opt 10B: 115' - 224' AGL	0
	Opt 10C: 129' - 240' AGL	0
	Opt 10D: 146' - 260' AGL	0
9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	6,327

Sources: Bureau of Transportation Statistics, Air Carrier Statistics Database; Bureau of Transportation Statistics, Airline Origin and Destination Survey; Kimley Horn Associates; Landrum & Brown Analysis.

6.2.3 Airline Costs

The BTS Airline Origin and Destination (O&D) Survey was reviewed to determine the average revenue for each of the impacted markets. The total revenue as provided in the O&D survey for each route was divided by the O&D passengers to determine an average passenger revenue. It was assumed that airlines would lose 100% of the passenger revenue for each lost passenger as once the seat was gone, the revenue was lost. Additionally, airlines typically provide vouchers for passengers that are reassigned to a later flight. The amount for each voucher is at the discretion of the airline. For the purpose of this analysis, it was assumed that all airlines would provide a $200 voucher for each lost passenger. The airline cost per lost passenger by market is provided in **Table 6-9.**

Table 6-9 Airline Cost Per Lost Passenger

Market	Passenger Revenue	Voucher Cost	Total Airline Cost
Hawaii	$251	$200	$451
Transcontinental	$211	$200	$411
Europe	$658	$200	$858
Asia	$683	$200	$883

Source: Bureau of Transportation Statistics, Airline Origin and Destination Survey

6.2.4 Passenger Facility Charges

The Passenger Facility Charge (PFC) is a federal authorized program allowing airports to charge passengers boarding a flight (enplaned passengers) a fee of up to $4.50 per flight. Airports use these fees to fund FAA-approved projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition. Airlines collect the PFC fees as part of the airline ticket price and remit up to $4.39 to the airport with the airlines retaining the difference. The annual number of lost enplaned passengers was multiplied by SJC’s share of the PFC fee, $4.39. The result is the total lost PFC revenue for the Airport.

6.2.5 Airport Concession Revenue

The Airport receives a portion of all concession sales from retail and food/beverage businesses operating within the passenger terminal facilities. The airport revenue on concession sales divided by the number of enplaned passengers for fiscal year (FY) 2018 was used to determine an estimate of $2.26 on Airport concession revenue per enplaned passenger. Multiplying the annual number of lost passengers by $2.26 determines the lost airport concession revenue.

6.2.6 Terminal Concession Spending

The gross concession sales divided by enplaned passengers for FY2018 was used to determine an estimate of passenger spending on concessions. On average, passenger spend $13.60 on concession in the terminal at SJC. The per passenger concession revenue was multiplied by the annual number of lost passengers to determine the concession revenue lost for the local economy.

6.2.7 Additional Loss from Weight Penalties

A recent economic impact report for prepared in 2015 for SJC states that local international visitor spending was $746.94 per passenger and domestic visitor spending was $433.01 per passenger. Per passenger visitor spending is multiplied by the number of annual lost passengers per market to determine the loss in visitor spending to the region.

6.2.8 Lost Revenue Results

In 2024, the number of lost passengers due to weight penalties exceeds the number of available empty seats for only Scenario 4 and Scenario 9. Therefore, these are the only Scenarios with actual direct impacts. Scenario 4 would result in a loss of $1.5 million and Scenario 9 would result in a loss of $9.8 million in 2024. A detailed breakdown of the loss by scenario is provided in **Table 6-10**.

Table 6-10 Summary of 2024 Annual Direct Impacts - Baseline

Scenarios		Airline Revenue	PFC Revenue	Terminal Concession Spending (Airport Share)	Terminal Concession Spending (Concession Share)	Additional Loss from Weight Penalties	Total
1	Existing airspace protection	$0	$0	$0	$0	$0	$0
4	TERPS Only	$802,000	$10,000	$5,000	$31,000	$669,000	$1,517,000
7	Straight-Out ICAO OEI surface protection without West OEI Corridor	$0	$0	$0	$0	$0	$0
10	Existing Conditions: 85' - 166' AGL	$0	$0	$0	$0	$0	$0
	Opt 10A: 100' - 195' AGL	$0	$0	$0	$0	$0	$0
	Opt 10B: 115' - 224' AGL	$0	$0	$0	$0	$0	$0
	Opt 10C: 129' - 240' AGL	$0	$0	$0	$0	$0	$0
	Opt 10D: 146' - 260' AGL	$0	$0	$0	$0	$0	$0
9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	$5,566,000	$57,000	$32,000	$191,000	$3,966,000	$9,812,000

Sources: Bureau of Transportation Statistics, Air Carrier Statistics Database; Bureau of Transportation Statistics, Airline Origin and Destination Survey; Kimley Horn Associates; Landrum & Brown Analysis.

6.2.9 Lost Revenue Results with Higher Load Factors

In order to determine the potential impact of higher than anticipated load factors, two additional sensitivity scenarios were analyzed. The baseline load factor for 2024 that was provided earlier was tested with load factors of 90% and 95% respectively. The results of this analysis are provided in **Table 6-11**.

Table 6-11 Summary of 2024 Annual Direct Impacts – Sensitivity Tests

Scenario	Airspace Protection	Baseline	90% Load Factor	95% Load Factor
1	Existing airspace protection	$0	$0	$0
4	TERPS Only	$1,517,000	$6,320,000	$9,007,000
7	Straight-Out ICAO OEI surface protection without West OEI Corridor	$0	$1,961,000	$4,455,000
10	Existing Conditions: 85' - 166' AGL	$0	$0	$0
	Opt 10A: 100' - 195' AGL	$0	$0	$0
	Opt 10B: 115' - 224' AGL	$0	$0	$0
	Opt 10C: 129' - 240' AGL	$0	$0	$2,268,000
	Opt 10D: 146' - 260' AGL	$0	$3,199,000	$5,776,000
9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	$9,812,000	$16,627,000	$19,468,000

Sources: Bureau of Transportation Statistics, Air Carrier Statistics Database; Bureau of Transportation Statistics, Airline Origin and Destination Survey; Kimley Horn Associates; Landrum & Brown Analysis.

6.3 Aviation Economic Impacts (Induced)

6.3.1 Economic Impact Assessment Methodology

Assessment of economic impacts related to reductions in local spending associated with lost passengers and visitors required estimation of the existing size and economic growth potential of the City of San José local economy. Using IMPLAN, this estimate was calibrated to the existing economic conditions and structure of the local economy. This initial forecast excluded any assumptions pertaining to the imposition of aircraft weight penalties associated with development of new Diridon Station Area development density. As a result, a baseline set of economic forecasts was generated that were unaffected by reductions in local spending associated with lost passenger activity at the airport and visitors to the region. The data sets used for this purpose are shown in **Table 6-12.**

Estimates of reductions in airline and airport revenues and local visitor spending under each airspace protection scenario were then used as inputs in the IMPLAN software to generate changes in the City of San José baseline economic forecasts for selected years. Of the various airspace protection Scenarios considered in the assessment of the economic impact of new Diridon Station Area development density, only two, Scenarios 4 and 9, indicated measurable direct economic impacts to airline and airport revenues and local visitor spending.

Table 6-12 IMPLAN Data Sets

IMPLAN Data Sets
U.S. Bureau of Labor Statistics (BLS) Covered Employment and Wages (CEW) program
U.S. Bureau of Economic Analysis (BEA) Regional Economic Information System (REA) program
U.S. Bureau of Economic Analysis Benchmark I/O Accounts of the U.S., BEA Output estimate
BLS Consumer Expenditure Survey
U.S. Census County Business Patterns (CBP) program
U.S. Census Bureau Decennial Census and Population Surveys
U.S. Census Bureau Economic Censuses and Surveys
U.S. Department of Agriculture Census

Source: Source: Principles of Impact Analysis and IMPLAN Applications

6.3.2 Airline and Airport Direct Expenditure Reductions

Table 6-12 presents estimated direct economic impact of airline and airport lost revenues and local consumption by visitors for selected years. Airline lost revenue is measured as reductions in expenditures by passengers for air transportation services. Airport lost revenue is measured in terms of reductions in passenger expenditures at the airport and reductions in passenger facility charges paid to the airport by passengers. Visitor expenditures are measured based on average expenditures within the city of San José per trip.

L&B estimates that measurable airline and Airport related impacts exceeding the typical unsold seats on a route (accounting for the average load factors presented previously for the specific markets) occur only with regard to passenger related activities for Scenarios 4 and 9 and do not occur at all for cargo related activity under any scenario. The estimated direct reductions in air travel expenditures by passengers and visitors to the City related to Scenarios 4 and 9 are illustrated in **Table 6-13**. By year 2038, reductions in passenger and visitor related expenditures are projected to reach $16.0 million. Reductions in expenditures related to airline revenues ($9.0 million) and visitor spending ($6.5 million) account for the largest portion of these losses.

Table 6-13 Airlines and Airport Related Direct Expenditure Reductions (Losses in 1,000's)

Economic Impact Type	Year ($1,000)									
	2024		2028		2032		2036		2038	
	Scenario		Scenario		Scenario		Scenario		Scenario	
	4	9	4	9	4	9	4	9	4	9
Airline Revenue and Vouchers	(802)	(5,566)	(1,107)	(6,594)	(1,266)	(7,562)	(1,438)	(8,540)	(1,515)	(9,003)
Visitor Expenditures	(669)	(3,966)	(941)	(4,750)	(1,083)	(5,461)	(1,225)	(6,164)	(1,292)	(6,495)
Airport Concessions Expenditures	(31)	(222)	(48)	(264)	(47)	(303)	(54)	(342)	(57)	(360)
Airport PFC Construction Expenditures	(16)	(57)	(13)	(67)	(23)	(77)	(26)	(88)	(28)	(93)
Total Aviation Direct Economic Impacts	(1,518)	(9,811)	(2,110)	(11,675)	(2,420)	(13,403)	(2,743)	(15,133)	(2,892)	(15,951)

Source: Landrum & Brown

6.3.3 Airline and Airport Induced Employment (Losses) Impacts

Direct local expenditure reductions by passengers and visitors are used as inputs into the IMPLAN software. The IMPLAN model calibrated by L&B to the economic conditions and structure of the City of San José is used to simulate induced economic impacts. IMPLAN simulates reductions in local spending that are determined by complex economic relationships that define the City's local economy. The direct economic impacts illustrated in **Table 6-13** were allocated by the industrial sector of the local economy where direct reductions in spending would likely occur. **Table 6-14** provides a summary of the IMPLAN input choice variables that were factored into this analysis. Visitor expenditures are based on the Bureau of Economic Analysis tourism industry satellite statistic.

Table 6-14 IMPLAN Input Choice Variable

Selected Industrial Sectors
Airline
Air transportation (408), Air passenger carriers, scheduled 481111
Visitors
Hotels (except casino hotels) with golf courses, tennis. (499) 721110
Bars and restaurants (57, 23)
Retail- miscellaneous store retailers (412)
Performing arts companies (488)
Amusement park and arcades (494)
Other amusement and recreation industries (496)
Water transportation (410)
Transit and ground passenger transportation 412)
Rail transportation (409)
Facilities support services (462)
Office administrative and support services (461)
Real estate (440)
Concessions
All other food and drinking places (503)
Food and beverage stores (400)
Retail- Miscellaneous store retailers (406)
Retail- Miscellaneous store retailers (406) (Duty-Free)
Personal care services (509)
PFC
Construction of other new commercial structures (58)
Architectural, engineering, and related services (449)

Source: 2018 Minnesota IMPLAN Group, Inc.

IMPLAN reports economic impacts in terms of several economic variables that describe the size and changes in the size of the local economy. In this section, economic impact is reported in terms of reductions in local employment. **Table 6-15** illustrates the economic impact of passenger and visitor spending reductions in terms of related reductions in local permanent employment for the years 2024, 2028, 2032, 2036 and 2038.

The size of estimated employment losses is determined by a number of factors that include, but are not limited to, the size, industrial base, demography and economic composition of the City of San José local economy. Because the study area is defined as the City of San José, some economic impacts “leak” into other Santa Clara County cities and other counties that comprise the Bay Area and Silicon Valley. This is due to the fact that some industries where reductions in visitor and passenger spending takes place may not represent a significant portion of the City’s industrial base.

By 2038 projected induced employment associated with Scenario 4 increase to 5 workers, while for Scenario 9 increases to 30 jobs. Total employment losses for each of these Scenarios increase to 26 and 138 respectively by the year 2038.

Table 6-15 Airline and Airport Related Local Employment Impacts (Losses)

Economic Impact Type	Year ($1,000s)									
	2024		2028		2032		2036		2038	
	Scenario		Scenario		Scenario		Scenario		Scenario	
	4	9	4	9	4	9	4	9	4	9
Direct	(12)	(71)	(14)	(75)	(18)	(94)	(20)	(104)	(21)	(109)
Induced	(3)	(20)	(4)	(23)	(5)	(26)	(5)	(28)	(5)	(30)
Total Employment Impacts	(15)	(91)	(21)	(107)	(23)	(120)	(25)	(132)	(26)	(138)

Source: Landrum & Brown, IMPLAN

6.3.4 Airline and Airport Induced Regional GDP (Losses) Impacts

Regional Gross Domestic Product (GDP) impacts are illustrated in **Table 6-16**. Direct GDP reductions in each category from **Table 6-13** have been adjusted to reflect the extent to which reductions in passenger and visitor expenditures occur within the boundaries of the City of San José. For example, in year 2038, $16.0 million in projected direct reductions in airline revenue and other passenger and visitor expenditures have been adjusted down to $8.0 million in direct impacts. This adjustment also reflects the fact that in some industries where expenditure reductions occur, such as retail, expenditures reductions are largely composed of items not locally produced and therefore only marginally impact local GDP.

By 2038 total reductions in local GDP are estimated to reach $11.5 million, composed of $8.0 million in direct spending reductions by passengers and visitors and $3.6 million in induced local spending reductions. Adjustments for retail cost of goods sold also account for the relatively low observed economic multipliers.

Table 6-16 Airline and Airport Related Regional GDP Impacts (Losses in 1,000s)

Economic Impact Type	Year ($1,000s)									
	2024		2028		2032		2036		2038	
	Scenario		Scenario		Scenario		Scenario		Scenario	
	4	9	4	9	4	9	4	9	4	9
Direct	(829)	(5,292)	(1,147)	(6,217)	(1,267)	(6,921)	(1,406)	(7,635)	(1,464)	(7,964)
Induced	(371)	(2,380)	(512)	(2,793)	(566)	(3,108)	(629)	(3,436)	(655)	(3,584)
Regional GDP Impacts	(1,200)	(7,672)	(1,659)	(9,010)	(1,833)	(10,028)	(2,035)	(11,070)	(2,119)	(11,548)
Economic Multipliers	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.4	1.5

Source: Landrum & Brown, IMPLAN

Table 6-17 summarizes the total economic impact in 2038 for both aviation and real estate direct impacts driven by new Diridon Station Area development density. By observation, aviation impacts are relatively small when compared to real estate impacts. This is due primarily to the condition that aviation impacts are assumed to be marginal and do not reflect changes in the existing airport service market under any airspace protection scenario. At the same time, real estate assessments under each of the Scenarios presented in the table include an assumption of a relatively significant increase in permanent employment associated with new Diridon Station Area development density.

Table 6-17 Total Economic Impact Summary (2038)

Airspace	Aviation Impact		Real Estate Impact	
Scenario	Employment	GDP Gain/Loss	Employment	GDP Gain/Loss
10A	-	-	1,000	$184,000,000
10B	-	-	2,400	$438,000,000
10C	-	-	4,300	$700,000,000
4, 7, 10D	(27)	($2,000,000)	4,900	$747,000,000

Source: Landrum & Brown, IMPLAN

Table 6-18 summarizes the estimated City of San José local sales tax implications associated with each of the airspace protection Scenarios and is broken down further by airlines/airport and real estate tax impacts.

Table 6-18 Estimated City of San José Local Sales Tax

Airspace Scenario	2024		2028		2032		2036		2038	
	Airline/ Airport	Real Estate	Airline/ Airport	Real Estate	Airline/ Airport	Real Estate	Airline/ Airport	Real Estate	Airline/ Airport	Real Estate
4	($2,100)	-	($2,873)	-	($3,200)	$110,000	($3,500)	$206,800	($3,700)	$253,400
7	-	-	-	-	-	$110,000	-	$206,800	-	$253,400
9	($13,700)	-	($16,002)	-	($17,800)	$110,000	($19,600)	$206,800	($20,500)	$253,400
10A	-	-	-	-	-	$110,000	-	$57,700	-	$57,700
10B	-	-	-	-	-	$110,000	-	$141,100	-	$137,400
10C	-	-	-	-	-	$110,000	-	$206,800	-	$226,800
10D	-	-	-	-	-	$110,000	-	$206,800	-	$253,400

Source: Landrum & Brown, IMPLAN

6.4 Real Estate Density Impacts

6.4.1 Real Estate Impact Methodology

To assess impacts to real estate development by the airspace protection Scenarios, JLL first identified parcels or collections of parcels which may be candidates for development or redevelopment in the future. Not all areas of the Downtown Core and Diridon Station Area will be impacted by changes to the airspace protection surfaces. Many parcels are already developed with high-density land uses, and/or other "productive" uses (such as city parking garages) which are not redevelopment candidates.

JLL's analysis is based on the following assumptions:

1. Using County parcel data, JLL first identified all parcels that are at least 0.2 acres (or approximately 8,700 square feet) in size.
2. Among those parcels, JLL then conducted a visual survey to identify those parcels that were vacant or underutilized. "Underutilized" parcels include those that have improvements significantly below allowable density afforded by City of San José zoning regulations and the General Plan.
3. Based on the Preliminary Assessment published on August 31, 2018, which estimated that each floor of new construction in Downtown San José is an average of 14 feet in height, JLL calculated the total existing density available under the current TERPS and OEI protection areas, and used this number to estimate any potential increase in density due to height limit increases (for example, a height limit increase of only 10 feet would not be sufficient to add a new floor, and therefore would not result in increased density).
4. Based on the market analysis in the Preliminary Assessment published on August 31, 2018, since 2009, average annual absorption of office space in San José is 50,000 square feet. Average new delivery of residential units is 750 units, or an average of 450,000 square feet each year (assuming an average of 600 sf per unit based on a survey of new construction in the market). That is, office has historically accounted for approximately 10% of net new demand by square feet compared to residential. The analysis assumes that square footage of new development moving forward comprises 10% office and 90% residential.
   - It should be noted that this does not include any potential new office construction which may result from build-to-suit projects, as many in Downtown San José have. These dynamics may also change as the economic environment changes and as new development plans are put into place. Predicting the delivery of new build-to-suit projects over period requires predicting which companies will relocate to San José and the extent to which they will require new office buildings of their own (as opposed to renting space in existing buildings). There are no metrics that lend themselves to this assessment, therefore, historical performance of "organic" office and residential demand is used in this analysis as a conservative measure.
5. The analysis assumes 80% lot coverage to calculate the total potential footprint of any new construction. Though the City does not maintain lot coverage standards in its zoning code, there are setback requirements that vary with lot size and land use. A lot coverage assumption of 80% was confirmed as appropriate by City staff.
6. To estimate construction value, JLL's Project and Development Services professionals provided an average "all-in" cost (including hard costs, soft costs, and contingencies) of $534.51/sf for residential and $303.40/sf for office construction.

7. Annual property taxes to the City of San José are calculated at a millage rate of 0.12660 per $100 in assessed value per tax records for Santa Clara County. “Assessed value” for the purposes of this analysis is new construction value, as the assessed value for new buildings in the County is assessed in the first year based on total construction cost. It is difficult to predict the performance of properties over long periods of time, therefore making the income-based approach to assessment an unreliable indicator of value. In addition, improvements and land are assessed separately; and because this study is focused only on incremental value, assessing land value is not necessary. Therefore, incremental assessed value equals new construction value for the purposes of this analysis.
8. The analysis also estimates the increase in one-time fees due to increased density. These one-time fees are depicted in **Table 6-19.**

Table 6-19 One-Time Fees and Taxes

Output	Value	Source
Building Fees		
Plan Review Fee	Office: $172 per 1,000 sf above 40,000 sf Residential: $418 per 1,000 sf above 40,000 sf	City of San José
Inspection Fee	Office: $112 per 1,000 sf above 40,000 sf Residential: $502 per 1,000 sf above 40,000 sf	City of San José
Development Taxes		
CRMP	Office: 3.00% of valuation Residential: 2.42% of valuation	City of San José
Building and Structure Construction Tax	Office: 1.50% of valuation Residential: 1.54% of valuation	City of San José
Construction Tax	Office: $0.08 per sf Residential: $75 - $100 per unit	City of San José
Residential Construction Tax	$90 - $180 per unit	City of San José
School District Fees		
New Construction Fee	Office/Residential: $0.56 per sf	San José Unified School District

Source: JLL

Using the above assumptions, JLL calculated the total potential density under existing airspace protection areas as well as San José's General Plan using existing height limits. Then, JLL calculated the additional density afforded by each of the airspace protection Scenarios by calculating the difference in maximum height between existing and each scenario and applying the assumptions above.

For example:

- 20,000 square feet parcel × 80% lot coverage = 16,000 square feet development footprint
- 100 feet existing height limit ÷ 14 feet per floor = 7 floor existing limit
- 16,000 square feet development footprint × 7 floor existing limit = 112,000 square feet existing total development potential

If a scenario allows for an additional 50 feet of height, then:

- 50 feet additional height limit ÷ 14 feet per floor = 3 floor additional limit
- 16,000 square feet development footprint × 3 floor additional limit = 48,000 additional square feet existing total development potential

6.4.2 Diridon Station Area

JLL first assessed the impact to the Diridon Station Area and this analysis ultimately included 55 parcels in the defined geography, accounting for 32 out of a total of 250 acres.

For the Diridon Station Area, the maximum additional square feet in density afforded by each scenario as depicted in **Table 6-20**.

Table 6-20 Net New Density Increase in Diridon Station Area

Scenario	Net New Square Feet
4: No OEI	8,600,000
7: Straight-Out OEI	8,500,000
9: No OEI, incr. height limits	10,000,000
10A: Straight-Out OEI w/ West OEI Alts.	1,100,000
10B: Straight-Out OEI w/ West OEI Alts.	3,100,000
10C: Straight-Out OEI w/ West OEI Alts.	4,900,000
10D: Straight-Out OEI w/ West OEI Alts.	6,800,000

Source: JLL

It is important to note that the number of square feet noted above is incremental to existing density. JLL has estimated that the Diridon Station Area, under existing height limitations, can support 10.7 million square feet of existing density using the assumptions above. The values in the table above are in addition to that base amount.

These values are also aggregate, in that they indicate the total increase in density under each scenario, but do not reflect specific projects or the timing of those projects. These estimates only provide an indication of the maximum additional density the Diridon Station Area may achieve under each scenario, not necessarily when and over what timeline this may occur.

Based on these estimates of increased allowable density, JLL calculated that the total increase in construction value and requisite increase in annual tax revenue as depicted in **Table 6-21**.

Table 6-21 Net new increase in Construction Value and Annual Tax Revenue in the Diridon Station Area

Scenario	Maximum Increase in Construction Value	Maximum Increase in Annual Tax Revenue
4: No OEI	$4,380,000,000	$5,550,000
7: Straight-Out OEI	$4,300,000,000	$5,450,000
9: No OEI, incr. height limits	$5,030,000,000	$6,370,000
10A: Straight-Out OEI w/ West OEI Alts.	$560,000,000	$710,000
10B: Straight-Out OEI w/ West OEI Alts.	$1,590,000,000	$2,020,000
10C: Straight-Out OEI w/ West OEI Alts.	$2,500,000,000	$3,160,000
10D: Straight-Out OEI w/ West OEI Alts.	$3,490,000,000	$4,420,000

Source: JLL

As with density, these values indicate the additional construction value and tax revenue over what the Diridon Station Area can support today. These values include both office and residential construction.

Finally, JLL calculated the total, aggregate impact (from both office and residential construction) on one-time fees to the City and School District for each scenario as depicted **Table 6-22**.

Table 6-22 Increase in One-Time Taxes and Fees in the Diridon Station Area

Scenario	Building Fees	Development Taxes	Park Impact Fee	School District Fees
4	$7,300,000	$177,150,000	$131,040,000	$4,830,000
7	$7,170,000	$173,890,000	$128,790,000	$4,740,000
9	$8,340,000	$203,720,000	$148,810,000	$5,580,000
10A	$930,000	$22,660,000	$16,830,000	$620,000
10B	$2,660,000	$64,260,000	$47,920,000	$1,750,000
10C	$4,180,000	$101,050,000	$75,150,000	$2,740,000
10D	$5,810,000	$141,100,000	$104,600,000	$3,830,000

Source: JLL

Regarding the timing of these impacts, JLL looked to the historical pace of absorption and new construction to determine what the impact of each scenario may look like in specific years. These are distinct from the total, aggregate impacts outlined above, in that they focus solely on the increase in density that the City may experience in a particular year. This allows IMPLAN to then calculate the economic impacts of new construction just in that year.

Using the previously described assumptions, JLL identified the potential increase in density for the years 2024, 2028, 2032, 2036, and 2038 to gain a sample understanding of these long-term impacts. The results are depicted in **Table 6-23** and these values were used in the IMPLAN analysis.

JLL estimates that, should new airspace protection Scenarios go into effect in 2019, the impact of development above and beyond what is allowed presently would not be realized until approximately 2032. That is, it would take 13 years before demand in the Diridon Station Area would reach a point that today's available density would be absorbed, and the additional density afforded by each scenario is realized. Again, this assessment is in aggregate and does not speak to specific projects. It indicates that, under today's height limitations, the Diridon Station Area may have approximately 13 years of available development capacity based on historical demand.

In addition, each scenario has varying effects on development capacity in Diridon Station Area over time. For example, Scenario 10A only increases the height limits by a marginal amount, therefore impacts are not felt beyond 2036. That is, after 2036, the density increases offered by Scenario 10A has been fully realized. Similarly, for Scenarios 10B and 10C, the impacts are strongest in 2032, but begin to decline as years go on and as density is absorbed. For Scenarios 4, 7, 9, and 10D the density increase is significant enough that the impacts will be felt beyond 2038.

Table 6-23 One-Year Sample of Density Increases in the Diridon Station Area

Scenario	2024	2028	2032	2036	2038
4	0	0	687,500	687,500	687,500
7	0	0	687,500	687,500	687,500
9	0	0	687,500	687,500	687,500
10A	0	0	687,500	16,223	0
10B	0	0	687,500	687,500	0
10C	0	0	687,500	687,500	50,000
10D	0	0	687,500	687,500	687,500

Source: JLL

JLL also estimated the increase in annual tax revenues in these years as depicted in **Table 6-24**.

Table 6-24 One-Year Sample of Annual Tax Revenue Increase to the City of San José from additional development in the Diridon Station Area

Scenario	2024	2028	2032	2036	2038
4	$0	$0	$450,600	$450,600	$450,600
7	$0	$0	$450,600	$450,600	$450,600
9	$0	$0	$450,600	$450,600	$450,600
10A	$0	$0	$450,600	$0	$0
10B	$0	$0	$450,600	$181,600	$13,100
10C	$0	$0	$450,600	$450,600	$391,600
10D	$0	$0	$450,600	$450,600	$450,600

Source: JLL

While not explored more in depth, JLL did assess how varying levels of office versus residential development may impact development potential in the Diridon Station Area. The assessment above assumes that, based on historical performance, 10% of new development will be office product and 90% will be residential product. As these ratios shift, net new development capacity also changes, as does potential employment and new residents. The results of these scenarios are summarized in **Tables 6-25 through 6-28**:

Table 6-25 65% Office and 35% Residential

	Net New Square Feet	Employees	Residents
4: No OEI	9,500,000	30,600	5,000
7: Straight-Out OEI	9,100,000	29,300	4,900
9: No OEI, incr. height limits	11,900,000	40,000	5,700
10a: Straight-Out OEI w/ West OEI Alts.	1,200,000	3,500	600
10b: Straight-Out OEI w/ West OEI Alts.	3,300,000	10,200	1,800
10c: Straight-Out OEI w/ West OEI Alts.	5,100,000	16,100	2,900
10d: Straight-Out OEI w/ West OEI Alts.	7,300,000	22,800	4,000

Source: JLL

Table 6-26 10% Office and 90% Residential

	Net New Square Feet	Employees	Residents
4: No OEI	8,600,000	4,700	12,800
7: Straight-Out OEI	8,500,000	4,500	12,600
9: No OEI, incr. height limits	10,000,000	6,200	14,500
10a: Straight-Out OEI w/ West OEI Alts.	1,100,000	500	1,600
10b: Straight-Out OEI w/ West OEI Alts.	3,100,000	1,600	4,700
10c: Straight-Out OEI w/ West OEI Alts.	4,900,000	2,500	7,300
10d: Straight-Out OEI w/ West OEI Alts.	6,800,000	3,500	10,200

Source: JLL

Table 6-27 100% Office and 0% Residential

	Net New Square Feet	Employees	Residents
4: No OEI	10,000,000	47,000	0
7: Straight-Out OEI	9,600,000	45,000	0
9: No OEI, incr. height limits	13,100,000	61,600	0
10a: Straight-Out OEI w/ West OEI Alts.	1,200,000	5,500	0
10b: Straight-Out OEI w/ West OEI Alts.	3,300,000	15,700	0
10c: Straight-Out OEI w/ West OEI Alts.	5,300,000	24,700	0
10d: Straight-Out OEI w/ West OEI Alts.	7,500,000	35,100	0

Source: JLL

Table 6-28 0% Office and 100% Residential

	Net New Square Feet	Employees	Residents
4: No OEI	8,500,000	0	14,200
7: Straight-Out OEI	8,300,000	0	14,000
9: No OEI, incr. height limits	9,600,000	0	16,100
10a: Straight-Out OEI w/ West OEI Alts.	1,100,000	0	1,800
10b: Straight-Out OEI w/ West OEI Alts.	3,100,000	0	5,200
10c: Straight-Out OEI w/ West OEI Alts.	4,900,000	0	8,200
10d: Straight-Out OEI w/ West OEI Alts.	6,800,000	0	11,400

Source: JLL

6.4.3 Downtown Core

JLL conducted a similar analysis for the Downtown Core. As in the Diridon Station Area, the Downtown Core can support a certain amount of existing density under existing height restrictions imposed by both airspace protection surfaces and the City of San José General Plan. However, the Downtown Core is considerably larger than the Diridon Station Area and contains a far greater number of underutilized parcels.

As a result, and using the previously described assumptions, the Downtown Core can support between 34.8 million and 32.9 million in additional density under existing conditions and depending on if construction is 100% office or 100% residential. As development is not likely to be 100% of either land use, the full development potential of the Downtown Core will be somewhere in between.

That is, even without increasing the height limits on development in the Downtown Core, there is significant enough "room" for new density that any increases to the height limits may not have a meaningful impact for a long period of time. If the 10% office/90% residential assumption is carried over to the Downtown Core, based on past absorption and new construction rates, it may be 70 years until the current available density is realized for office construction under existing conditions, and 55 years until residential density is fully realized under existing conditions as depicted in **Table 6-29**.

Table 6-29 Maximum Potential Density Under Existing Conditions for Office and Residential in the Downtown Core

Land Use	Maximum Existing Development Potential (total square feet)	Estimated Number of Years Until Existing Density Realized
Office	34,800,000	70
Residential	32,900,000	55

Source: JLL

6.5 Real Estate Economic Impacts

6.5.1 Economic Impact Assessment Methodology

Assessment of economic impacts related to Diridon Station Area new development density first required estimation of the existing size and economic growth potential of the City San José local economy. Using IMPLAN, this estimate was calibrated to the existing economic conditions and structure of the local economy. This initial forecast excluded any assumptions pertaining to new Diridon Station Area development density. As a result, a baseline set of economic forecasts was generated that were unaffected by increases in development density of each of the various airspace protection Scenarios. The data sets used for this purpose were previously described and depicted in **Table 6-12**.

Estimates of increases in key real estate outputs developed by JLL for each airspace protection scenario were then used as inputs into the IMPLAN software to generate changes in the City of San José baseline economic forecasts for selected years. The selection of real estate outputs used as inputs in the IMPLAN modeling software were based on the extent they could be used to change or otherwise modify the IMPLAN baseline forecasts. Changes in most indicators of economic growth for the IMPLAN City of San José Model are determined by the software, leaving a limited set of economic variables from which to input direct economic impacts related to new Diridon Station Area development density.

For each of the airspace protection Scenarios (4, 7, 9, 10A, 10B, 10C and 10D), only increases in annual local expenditures for residential and office construction and annual permanent employment that were strictly related to new Diridon Station Area development density were selected. The remaining projected increases in real estate outputs were excluded as IMPLAN inputs because they are determined by calculations embedded in the modeling software. The selected real estate outputs were then translated into direct economic expenditure and employment impacts within the City of José local economy.

6.5.2 Diridon Station Area Development Direct Expenditure and Employment Impacts

Table 6-30 illustrates estimated direct economic impacts from construction related expenditures and permanent employment associated with new development density of the Diridon Station Area for selected years.

Table 6-30 Diridon Station Area Development Direct Expenditure and Employment Impacts (Gains)

Economic Impact Variable	Year ($1,000)							
	2032	2036			2038			
	Scenario	Scenario			Scenario			
	4, 7, 9, 10A, 10B, 10C, 10D	4, 7, 9, 10C, 10D	10A	10B	4, 7, 9, 10D	10A	10B	10C
Construction (Office)	15,170	15,170	-	15,170	15,170	-	10,378	15,170
Construction (Residential)	340,751	340,751	-	128,301	340,751	-	-	294,164
Total Construction	355,921	355,921	-	143,471	355,921	-	10,378	309,334
Permanent Employment	230	1,150	540	1,150	1,610	540	1,540	1,610

Source: JLL

The year 2032 is projected to be the first-year real estate construction and employment occurs under each scenario and is the same across each of the airspace protection Scenarios. This reflects that there would be development in the Diridon Station Area under each scenario but that 2032 is the first year in which there would be net new square footage development greater than what could be achieved in existing conditions airspace Scenario 1.

In the year 2032, annual construction expenditures related to developing new Diridon Station Area development density were estimated to be $355.9 million with an associated increase of 230 permanently employed office workers. By 2036, economic impacts under several Scenarios differentiate. In particular, there is no annual construction under scenario 10A and less under scenario 10B ($143.5 million) than under the remaining Scenarios 4, 7, 9, 10C and 10D. As construction of commercial real estate is completed and occupied, it is assumed that 1,150 permanent jobs will be created under each scenario, with the exception of Scenario 10A, which creates 540 jobs.

In year 2038 construction will continue to contribute $355.9 million in local construction expenditures under Scenarios 4, 7, 9 and 10D and none under scenario 10A. Only office related construction expenditures occur under Scenario 10B ($10.3 million). Construction under Scenario 10C decreases to $309.3 million. Permanent employment increases under all Scenarios with the exception of Scenario 10A (540 jobs), increasing to 1,540 jobs under scenario 10B and to 1,610 jobs under Scenarios 4, 7, 9 and 10D.

6.5.3 Diridon Station Area Development Induced Employment Impacts

New construction expenditures and permanent employment associated with new Diridon Station Area development density are catalyst for successive additional rounds of economic exchange and spending. This additional spending occurs because, in economic exchange, expenditures of a buyer of goods, services and labor represents income to the seller of the same. This income is then, for the most part, spent, initiating another iteration of income and spending in economic exchange. When these induced exchanges occur locally, they result in additional local economic growth. IMPLAN estimates the final amount of this “induced” economic growth that may be associated any initial amount of direct expenditures or direct employment.

The amount of induced economic growth associated with new Diridon Station Area development density is determined by the amount of annual construction expenditures and permanent employment associated with that development and the industrial sector of the local economy in which it occurs. **Table 6-31** lists the industrial sectors selected to input new construction and permanent employment into the IMPLAN software.

Table 6-31 IMPLAN Input Choice Variables

Selected Industrial Sectors
Construction of other new commercial structures
Construction of multifamily homes
Architectural, engineering, and related services
Custom computer programming services

Source: 2018 Minnesota IMPLAN Group, Inc.

Table 6-32 illustrates the economic impact of new Diridon Station Area development density in terms of increased total employment for the years 2032, 2036 and 2038. Direct employment is employment related to Diridon Station Area incremental construction and new permanent employment related to the absorption of newly constructed incremental office spaces. Real estate construction expenditures and permanent employment under each scenario were translated by IMPLAN into 1,463 incremental local direct jobs and total local incremental employment of 2,345 jobs in 2032. Additional employment of 882 jobs are induced and distributed across various industrial sectors. Local employment multipliers are indicated for each scenario for each year. Local employment multipliers estimate total local employment created for each additional direct local job created.

Table 6-32 Diridon Station Area Development Related Total Local Employment Impacts (Gains)

Economic Impact Type	Year							
	2032	2036			2038			
	Scenario	Scenario			Scenario			
	4, 7, 9, 10A, 10B, 10C, 10D	4, 7, 9, 10C, 10D	10A	10B	4, 7, 9, 10D	10A	10B	10C
Direct	1463	2383	540	1514	2843	540	1300	2533
Induced	882	1651	459	1123	2023	459	1091	1810
Total Employment Impacts	2345	4034	999	2637	4866	999	2391	4342
Local Employment Multipliers	1.6	1.7	1.9	1.7	1.7	1.9	1.8	1.7

Source: Landrum & Brown, IMPLAN

By 2038, projected induced employment associated with Scenarios 4, 7, 9 and 10D increases by 2,023 workers. These workers are again distributed to multiple industrial sectors such as architectural, engineering and related services, employment services and full-time restaurant workers. IMPLAN estimates incremental employment of 2,843 workers in construction and office employment directly related to new Diridon Station Area development density. Total employment gains from each of these Scenarios are estimated to be 4,866 jobs.

6.5.4 Diridon Station Area Development Induced Local GDP Impacts

Total, direct and induced local economic impacts in terms of incremental GDP growth are depicted in **Table 6-33.** Local GDP is reported because it measures local increases in value-added to goods and services associated new Diridon Station Area development density and is therefore a good measure of the economic benefits to the City of San José local community.

Table 6-33 Diridon Station Area Development Related Total Local GDP Impacts (Gains)

Economic Impact Type	Year ($1,000s)							
	2032	2036			2038			
	Scenario	Scenario			Scenario			
	4, 7, 9, 10A, 10B, 10C, 10D	4, 7, 9, 10C, 10D	10A	10B	4, 7, 9, 10D	10A	10B	10C
Direct	188,290	406,588	129,233	293,971	511,631	129,233	306,932	459,497
Induced	97,610	190,131	55,124	131,897	234,896	55,124	131,087	210,413
Total Local GDP Impacts	285,901	596,718	184,357	425,867	746,527	184,357	438,019	669,910
Local GDP Multipliers	1.5	1.5	1.4	1.4	1.5	1.4	1.4	1.5

Source: Landrum & Brown, IMPLAN

Two types of economic impact are indicated: direct and induced. Direct impacts are construction expenditures and expenditures of employers directly related to developing new Diridon Station Area development density. IMPLAN adjusts these amounts to reflect the extent to which they can be spent locally within the City of San José. In year 2032, under all Scenarios, $355.9 million in construction expenditures and 230 permanent jobs translate into $188.3 million in direct economic impacts in terms of local GDP. By the year 2038, direct impacts on City GDP for Scenarios 4, 7, 9 and 10D of $511.6 million are equivalent to $355.9 million in construction expenditures plus an increase of 1,610 jobs.

Induced GDP impacts include expenditures and or employment by businesses within the City of José that provide goods and services in the supply-chain of construction companies and occupants of newly constructed commercial spaces. It also includes economic impacts represented by local expenditures by workers for purposes of consumption. By year 2038 it is estimated that new Diridon Station Area development density described in Scenarios 4, 7, 9 and 10D will each contribute an additional $746.5 million to local GDP. In the same year, Scenarios 10A, 10B and 10C are estimated to contribute an additional $184.4, $438.0 and 669.9 million to local GDP respectively.

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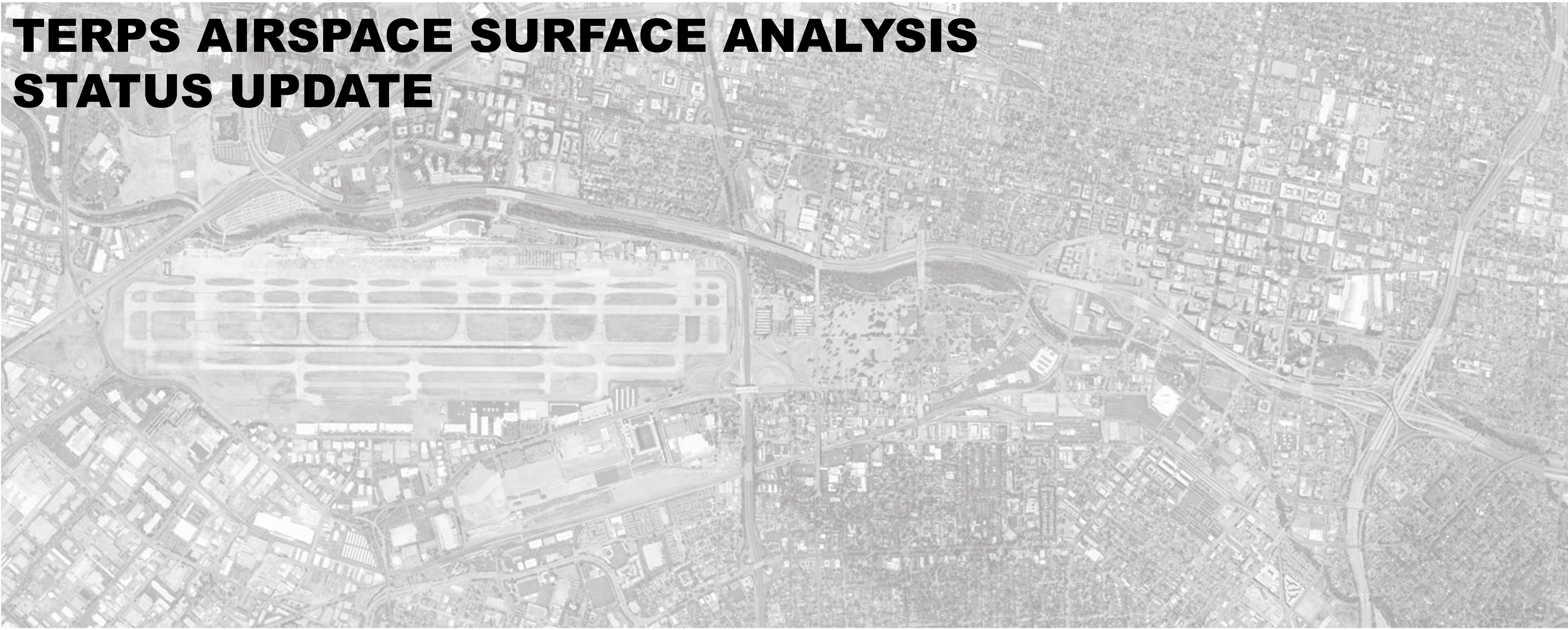
Appendix A – TERPS Surface Assessment

Appendix A contains exhibits depicting the various TERPS airspace protection surfaces described in **Section 4.5, *Airspace Protection Scenarios***. The TERPS surface assessment was completed on April 18, 2018.

Additionally, the FAA instrument procedure charts which were used a reference during the creation of the TERPS OCS evaluated in this study are included. The publishing cycle date for these procedures was “SW-2, 01 FEB 2018 to 01 MAR 2018”.

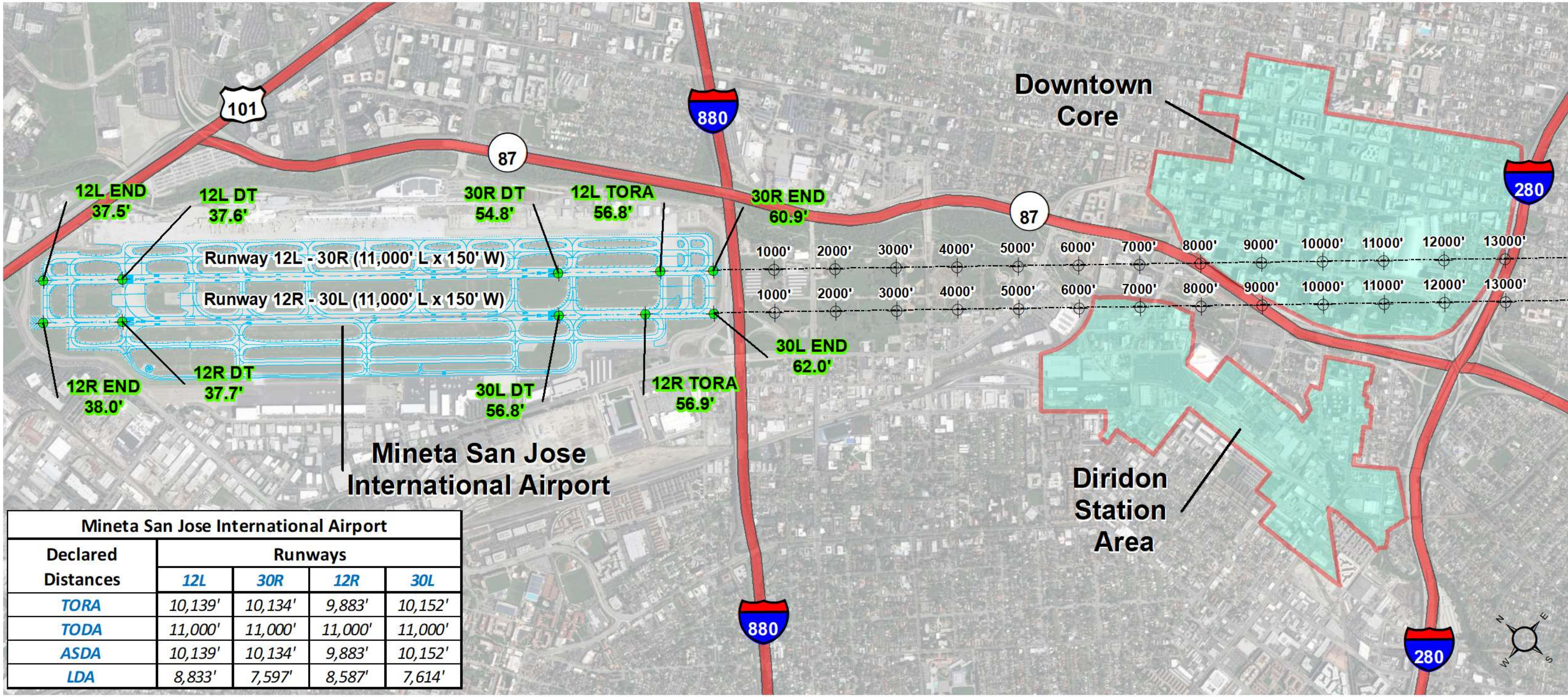
DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

TERPS AIRSPACE SURFACE ANALYSIS STATUS UPDATE



April 18, 2018

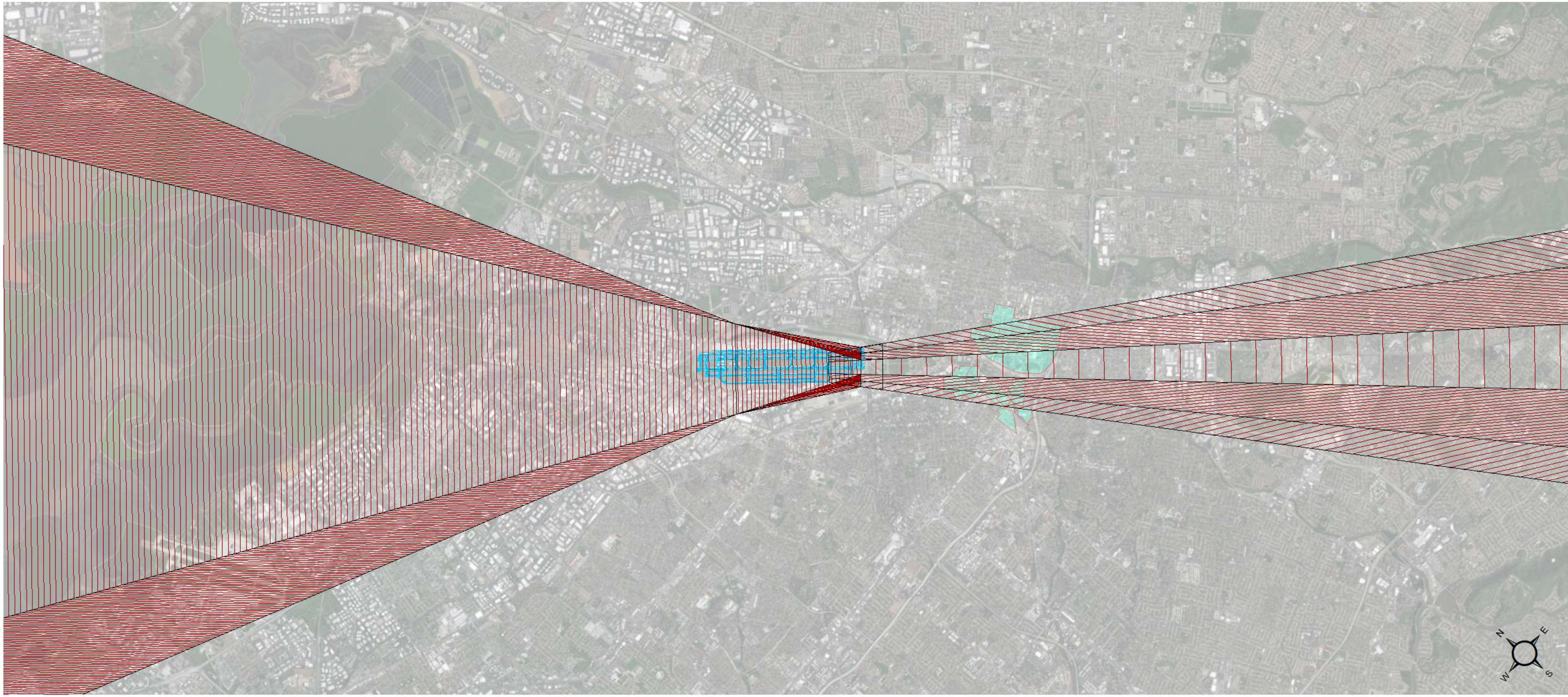
EXISTING AIRPORT LAYOUT & STUDY EVALUTION AREA



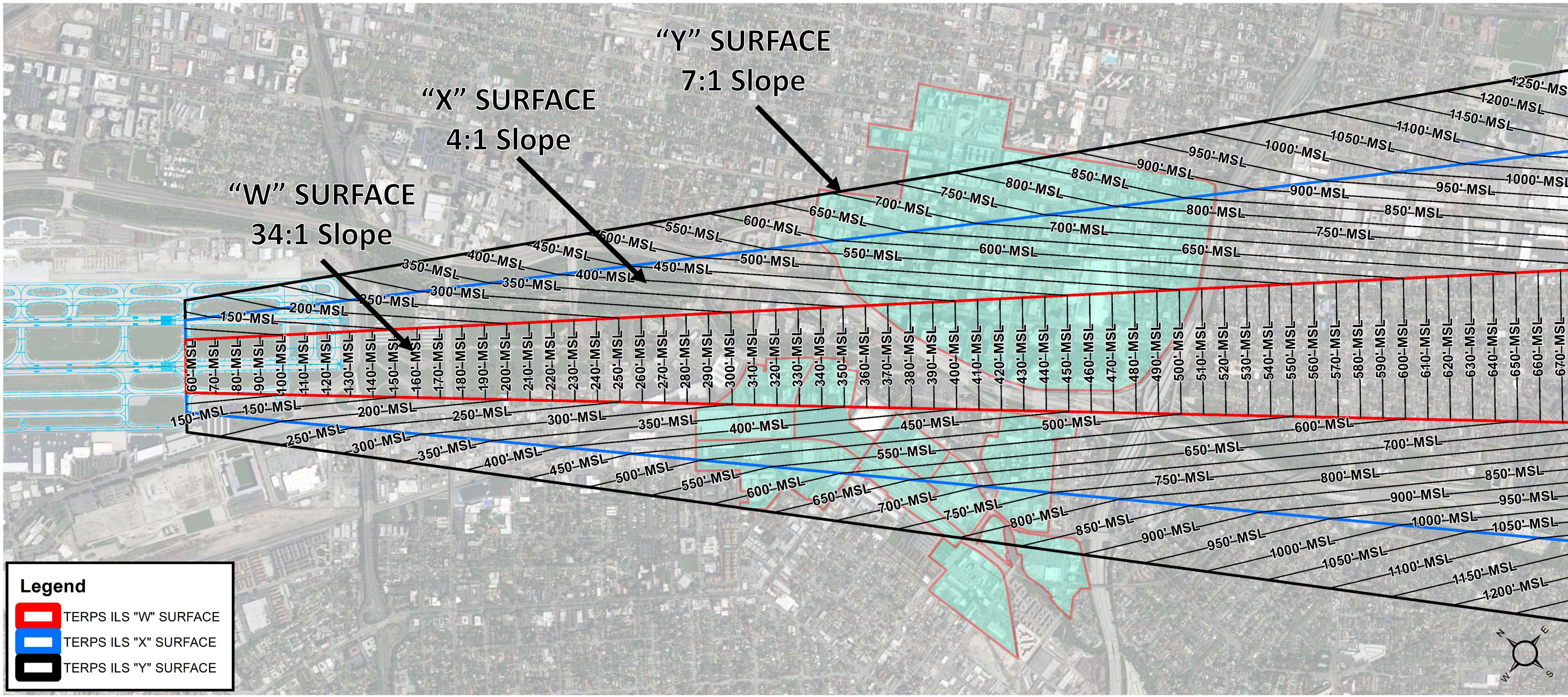
Mineta San Jose International Airport				
Declared Distances	Runways			
	12L	30R	12R	30L
TORA	10,139'	10,134'	9,883'	10,152'
TODA	11,000'	11,000'	11,000'	11,000'
ASDA	10,139'	10,134'	9,883'	10,152'
LDA	8,833'	7,597'	8,587'	7,614'

ILS SURFACES

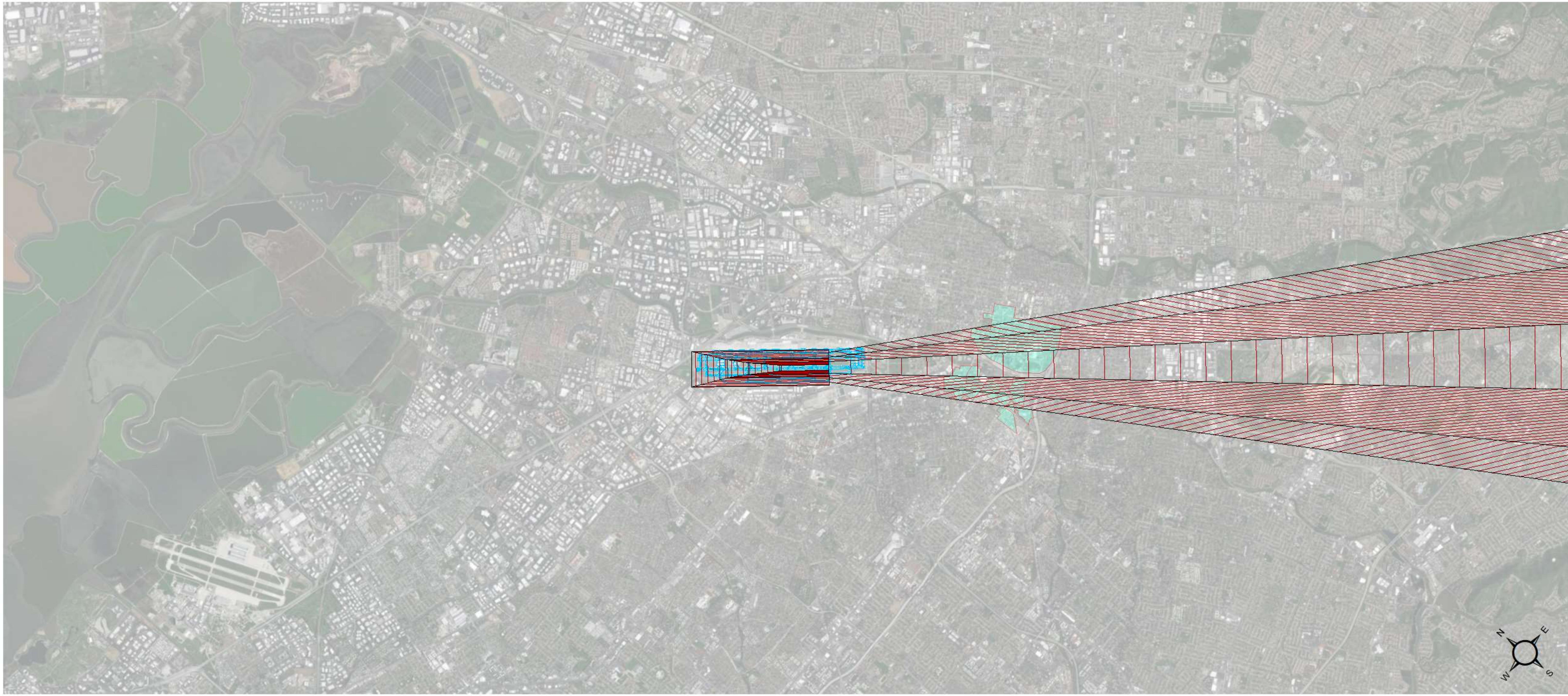
RUNWAY 30L CAT I ILS (STANDARD) SURFACE



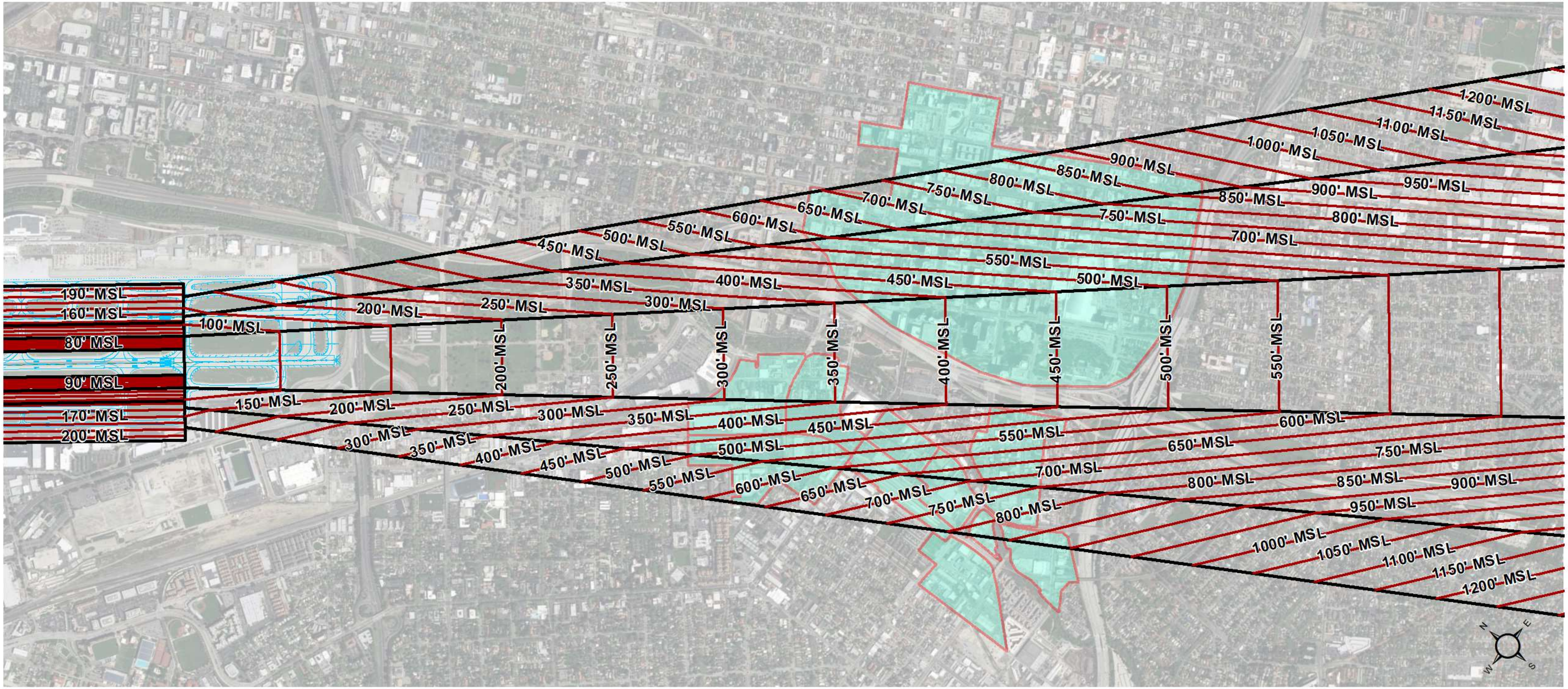
TERPS ILS CAT I/II – FINAL SEGMENT – RUNWAY 30L



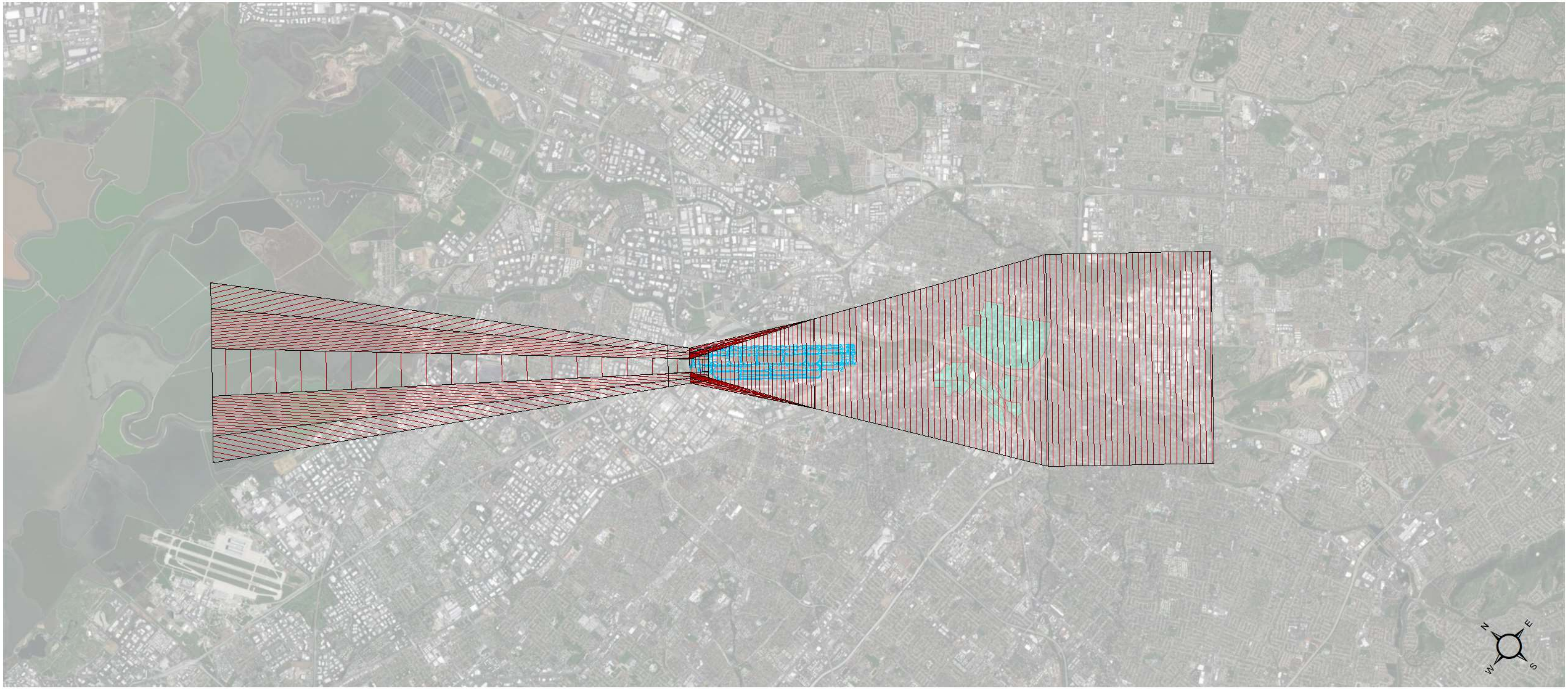
RUNWAY 30L CAT II ILS (SPECIAL AUTHORIZATION) SURFACE



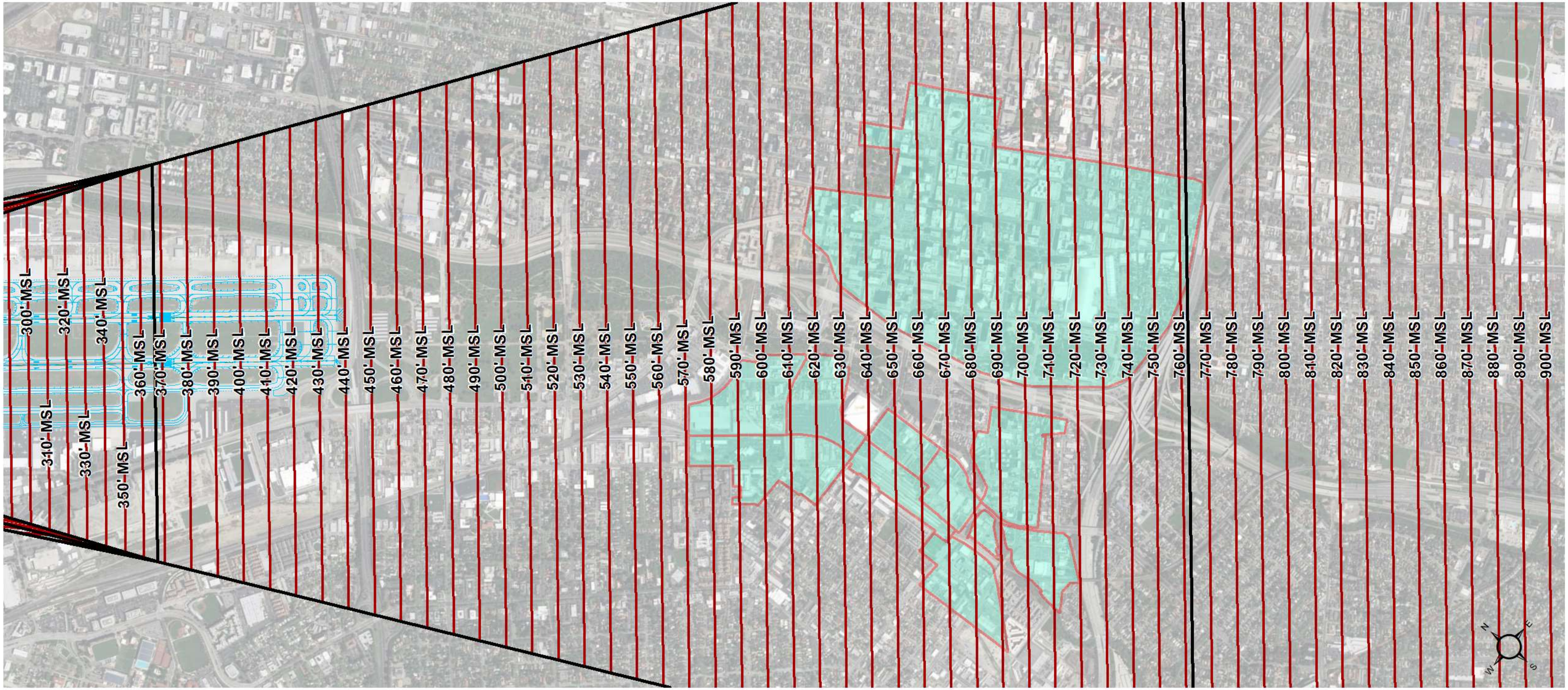
RUNWAY 30L CAT II ILS (SPECIAL AUTHORIZATION) SURFACE – FINAL APPROACH



RUNWAY 12R CAT I ILS (STANDARD) SURFACE

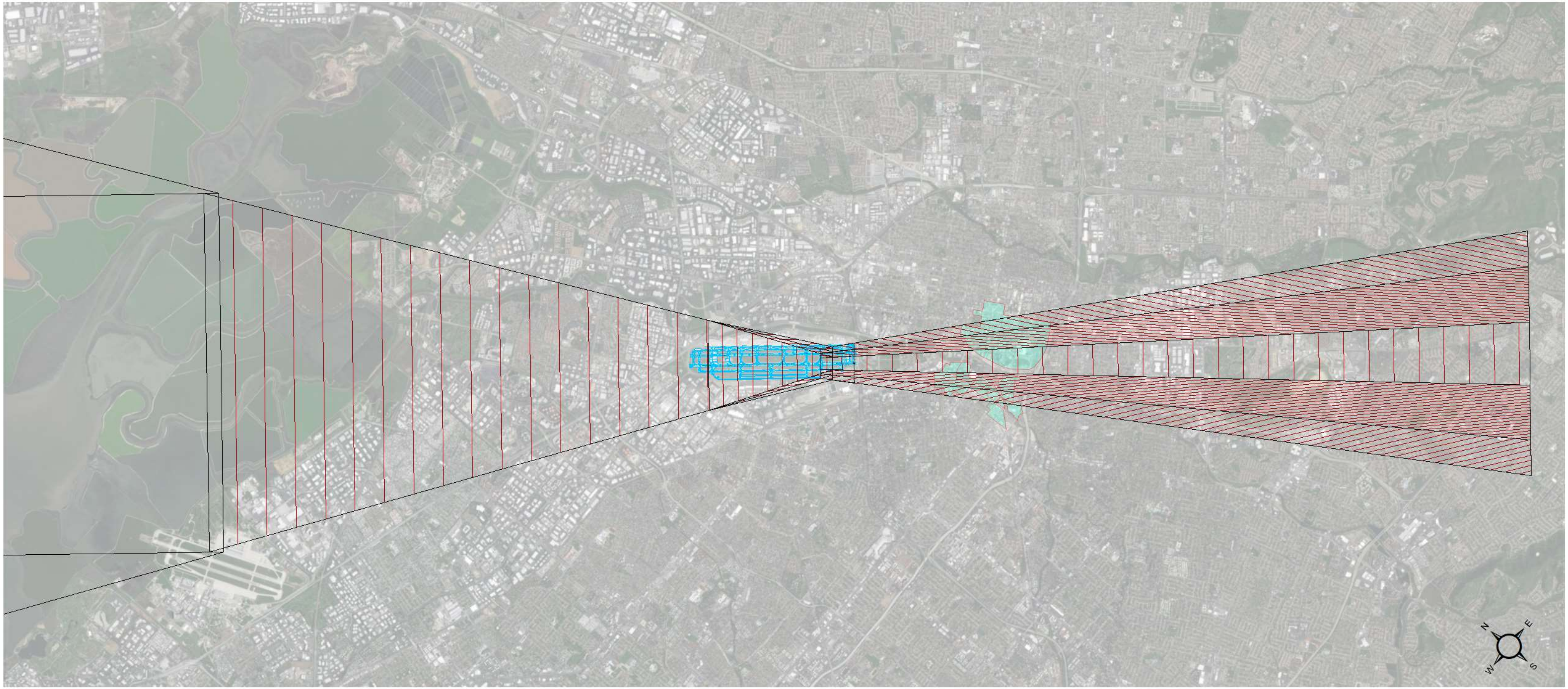


RUNWAY 12R CAT I ILS (STANDARD) SURFACE – MISSED APPROACH

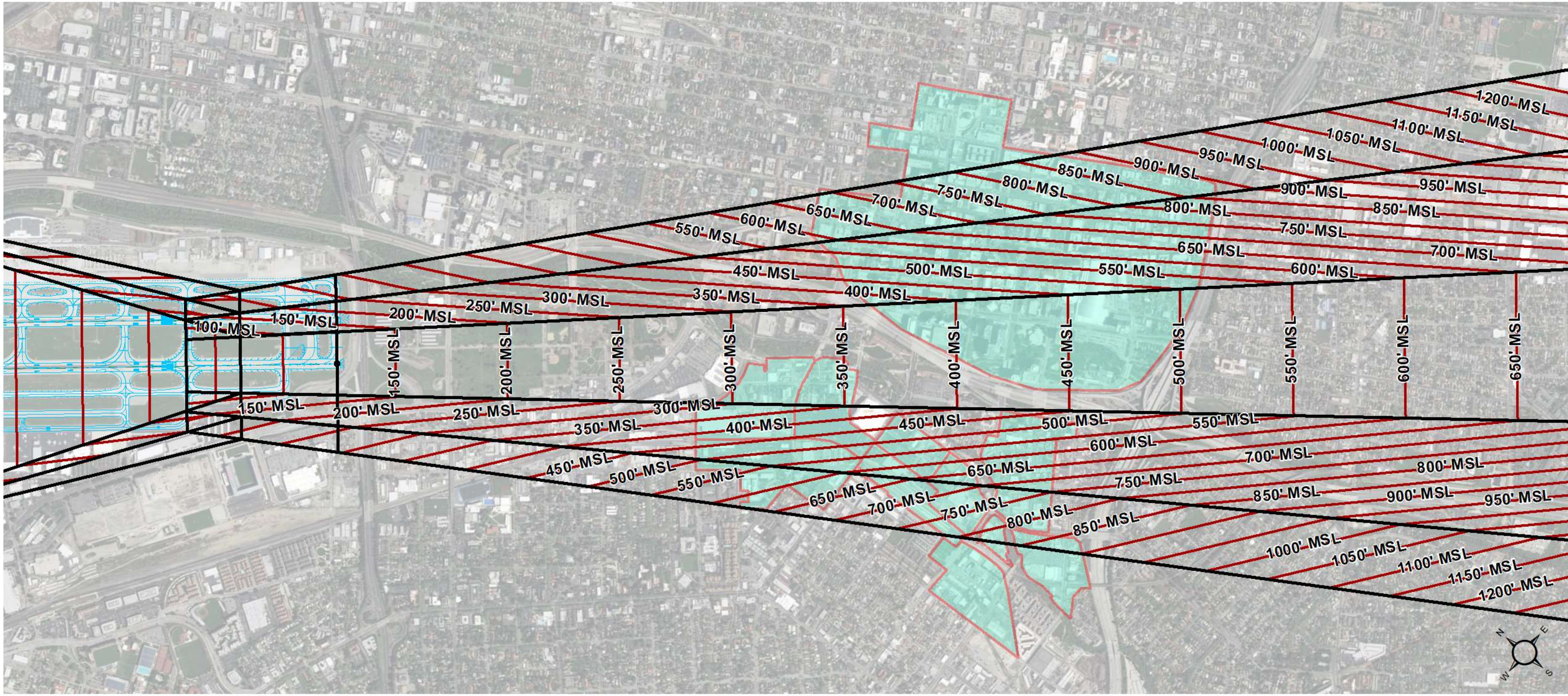


LPV SURFACES

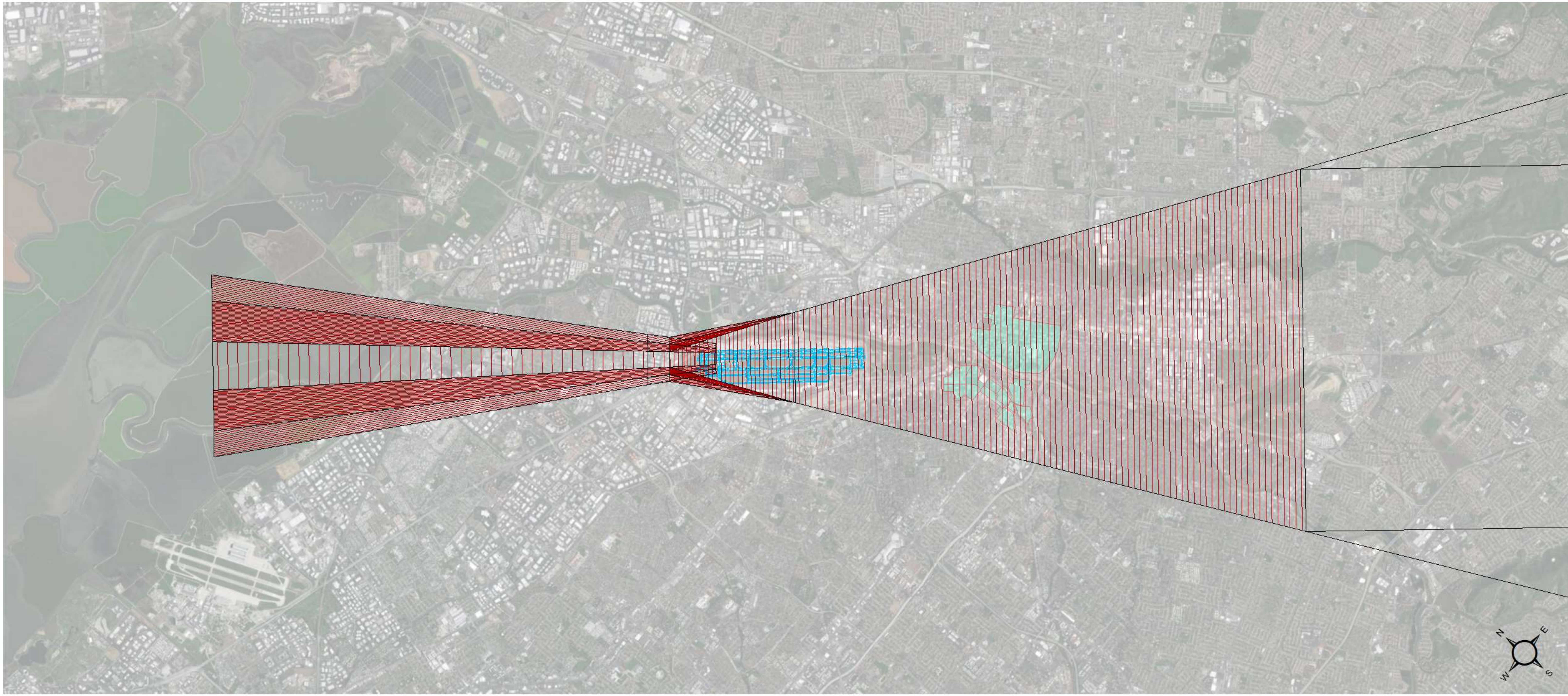
RUNWAY 30L LPV SURFACE



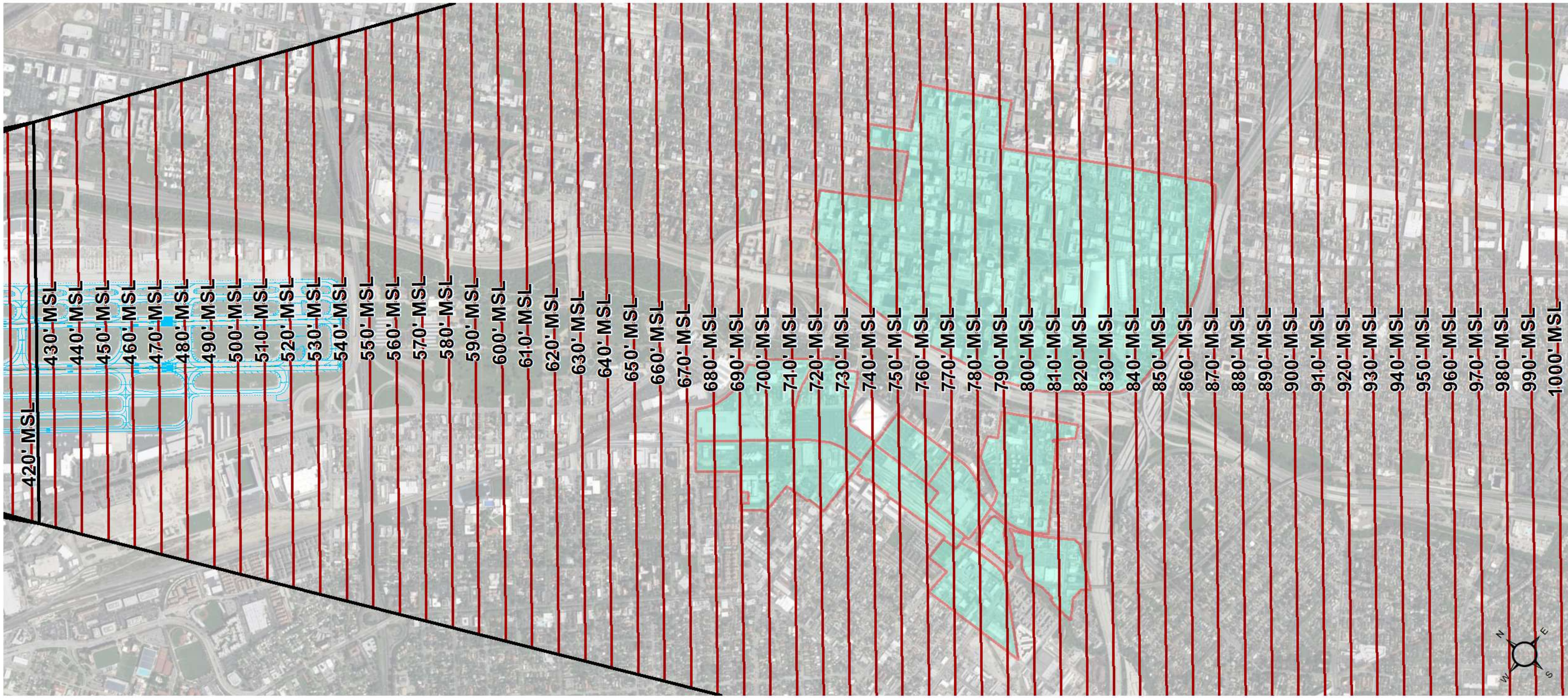
RUNWAY 30L LPV SURFACE – FINAL APPROACH



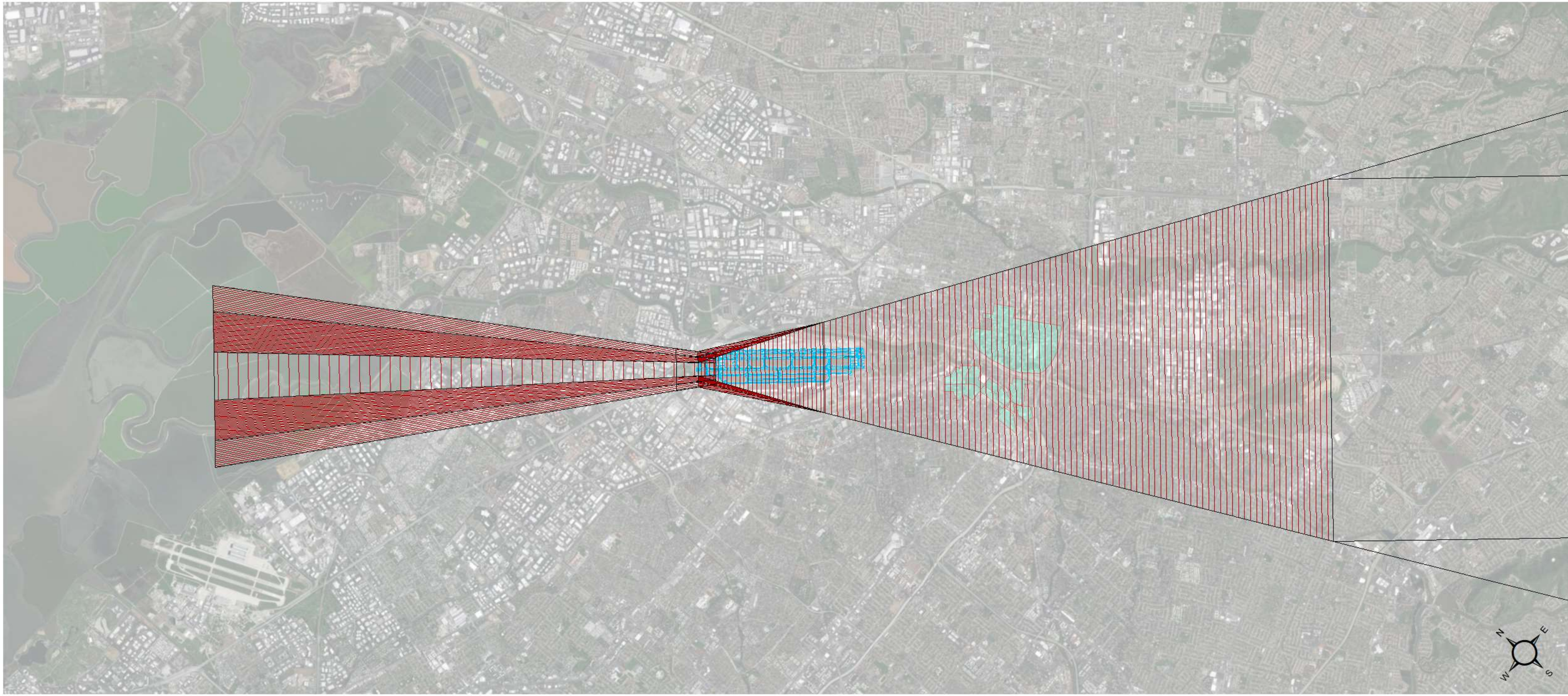
RUNWAY 12L LPV SURFACE



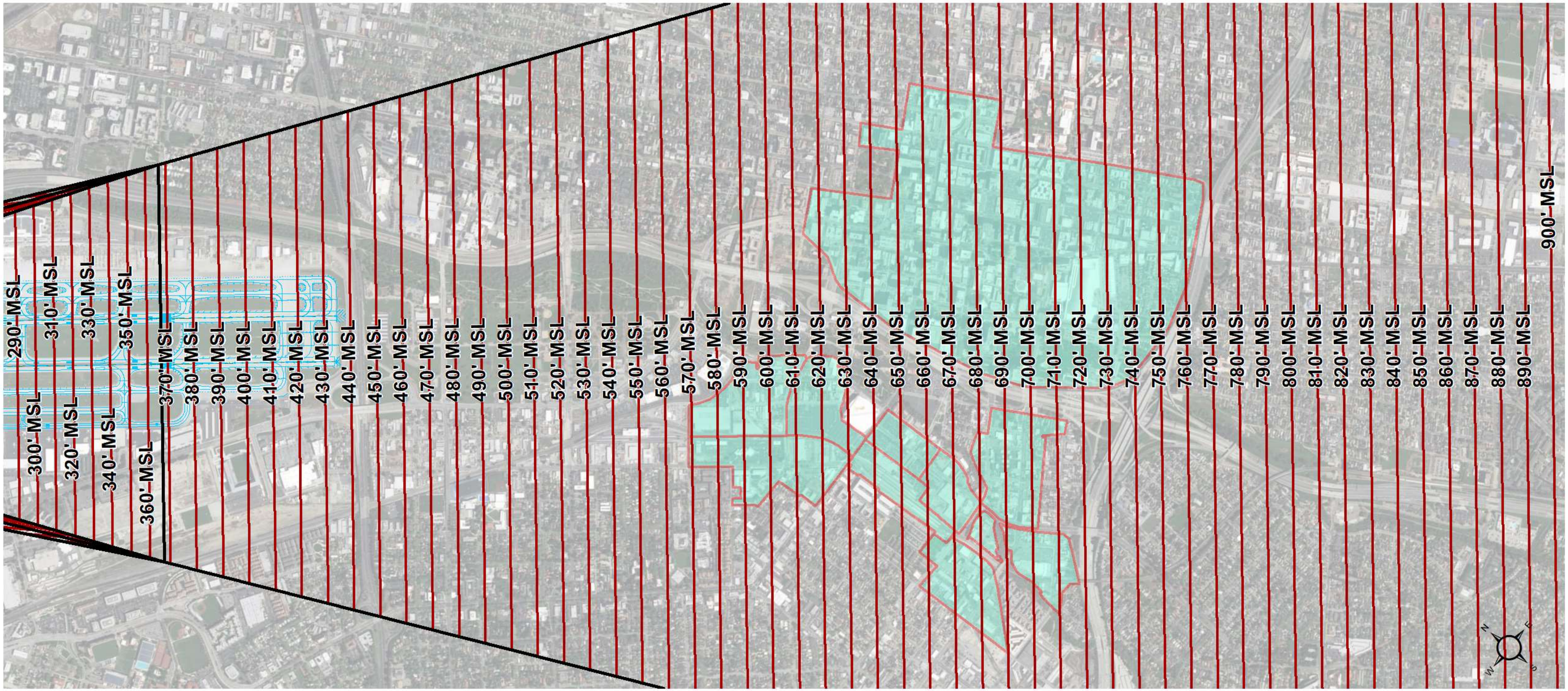
RUNWAY 12L LPV SURFACE – MISSED APPROACH



RUNWAY 12R LPV SURFACE

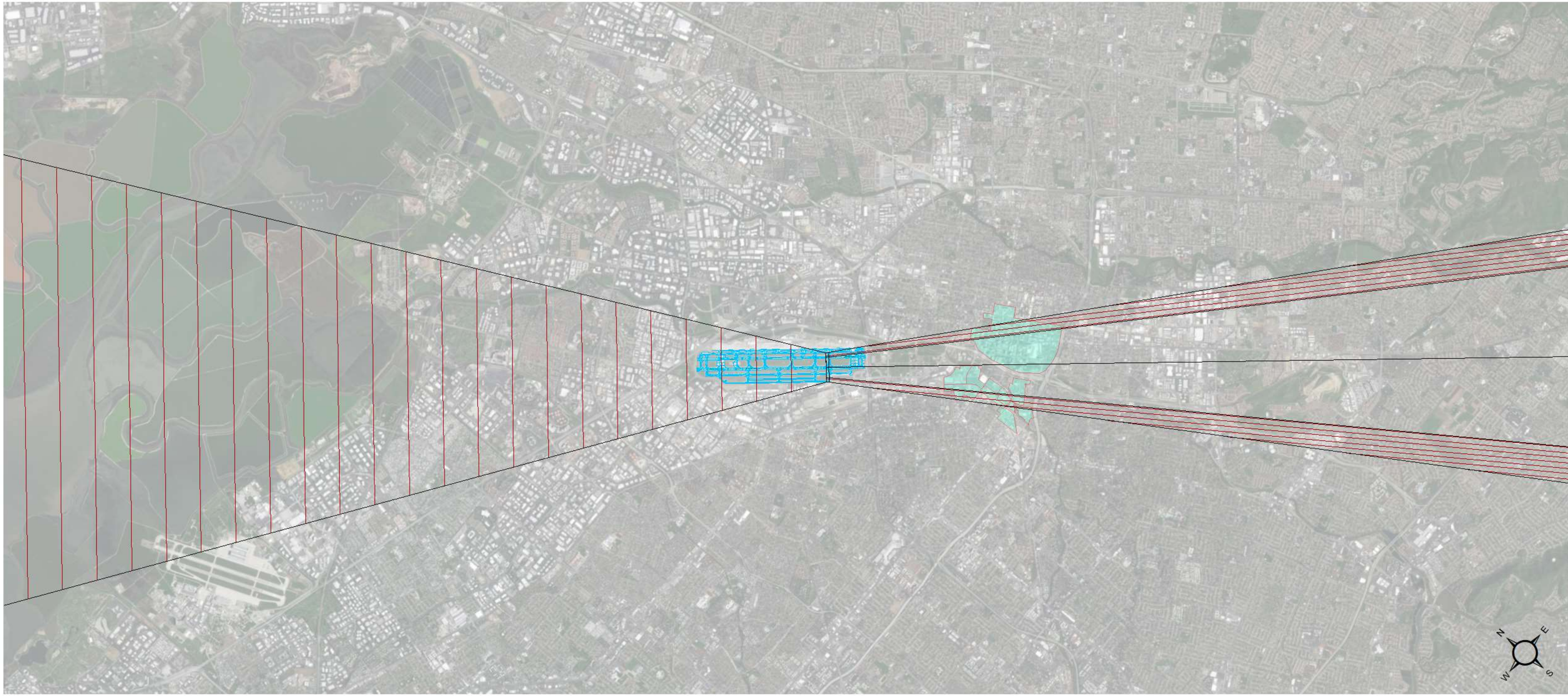


RUNWAY 12R LPV SURFACE – MISSED APPROACH

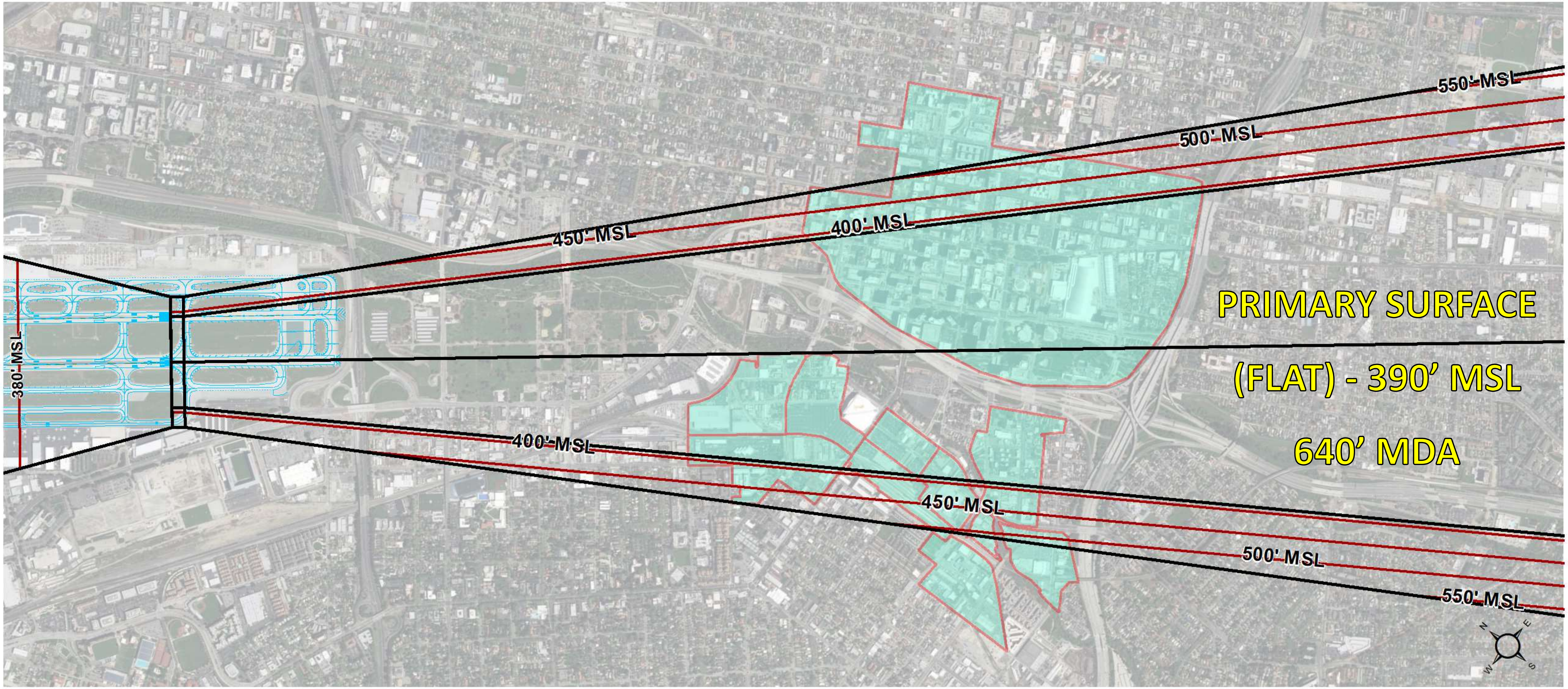


LOCALIZER PRECISION (LP) SURFACES

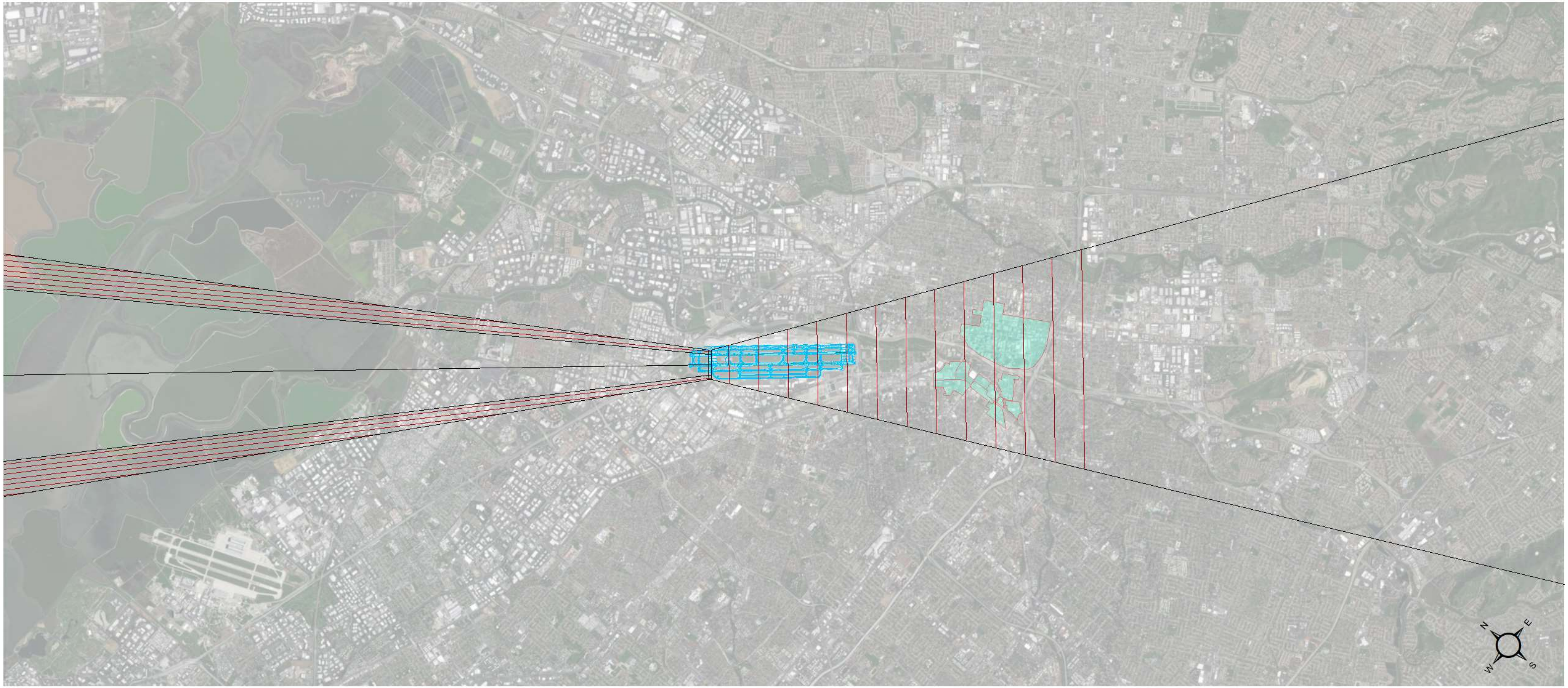
RUNWAY 30L LP SURFACE



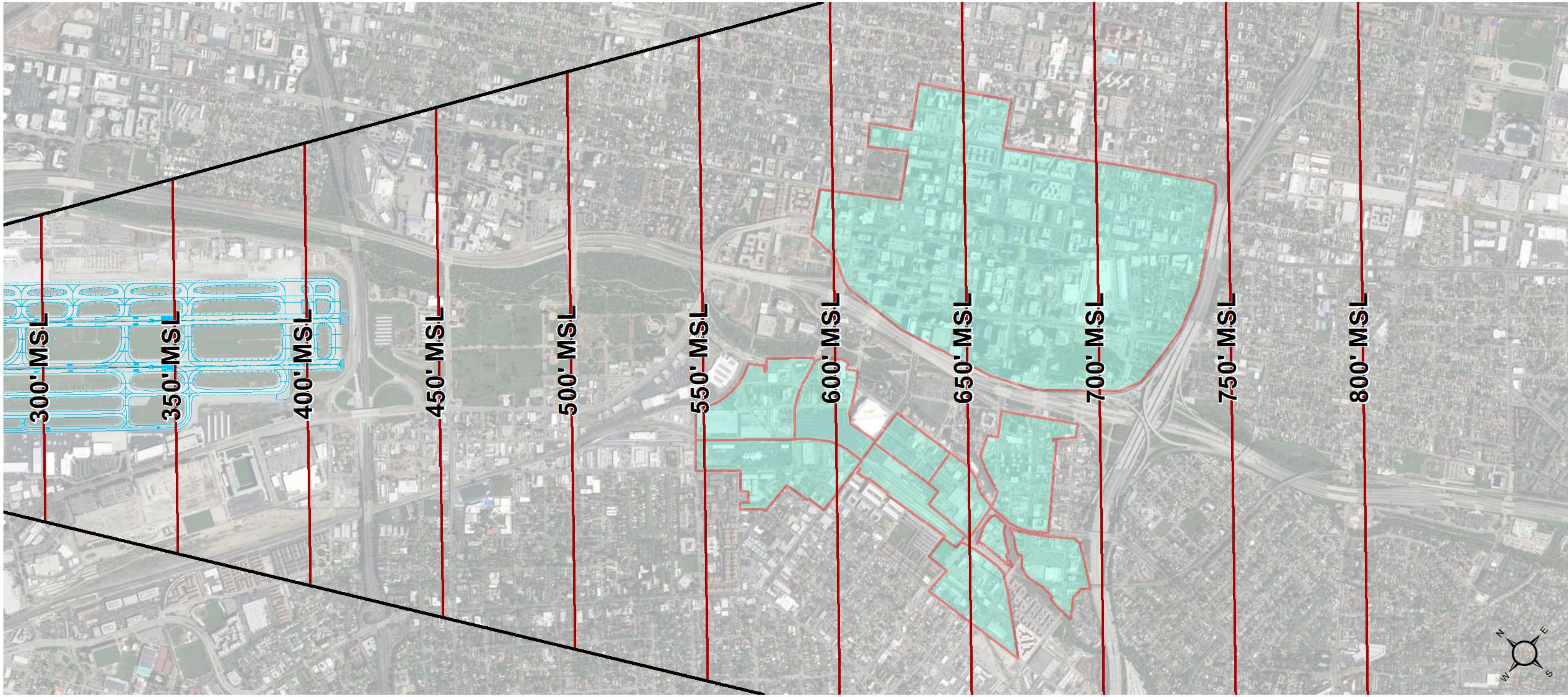
RUNWAY 30L LP SURFACE – FINAL APPROACH



RUNWAY 12R LP SURFACE

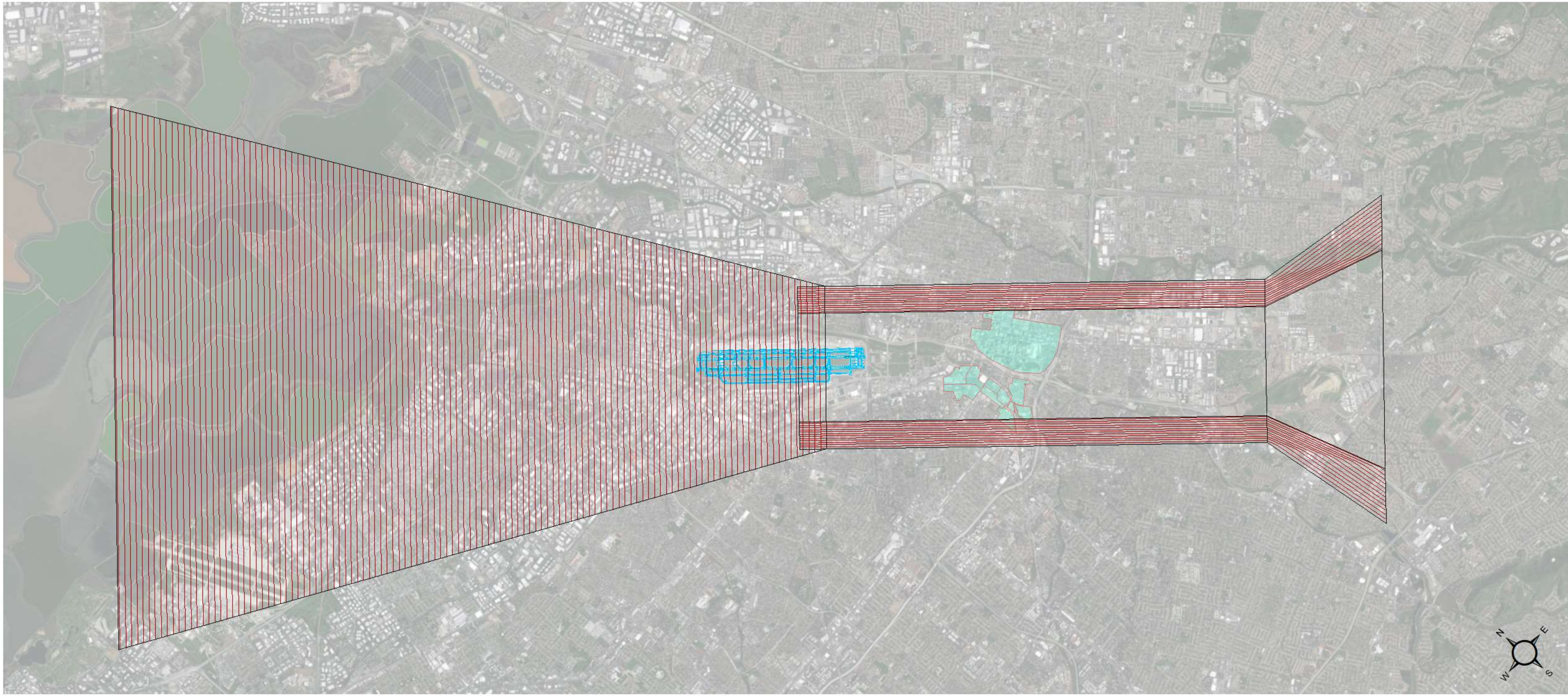


RUNWAY 12R LP SURFACE – MISSED APPROACH

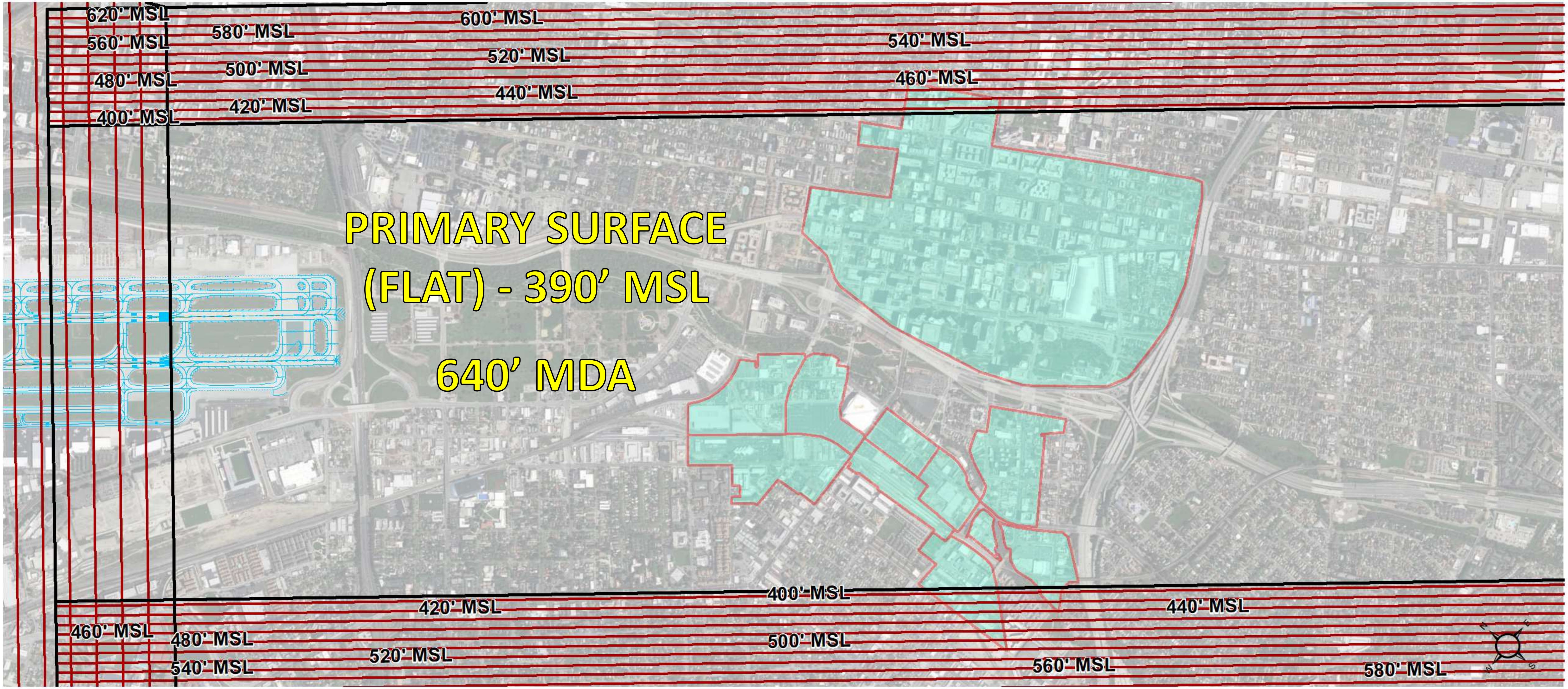


LNAV SURFACES

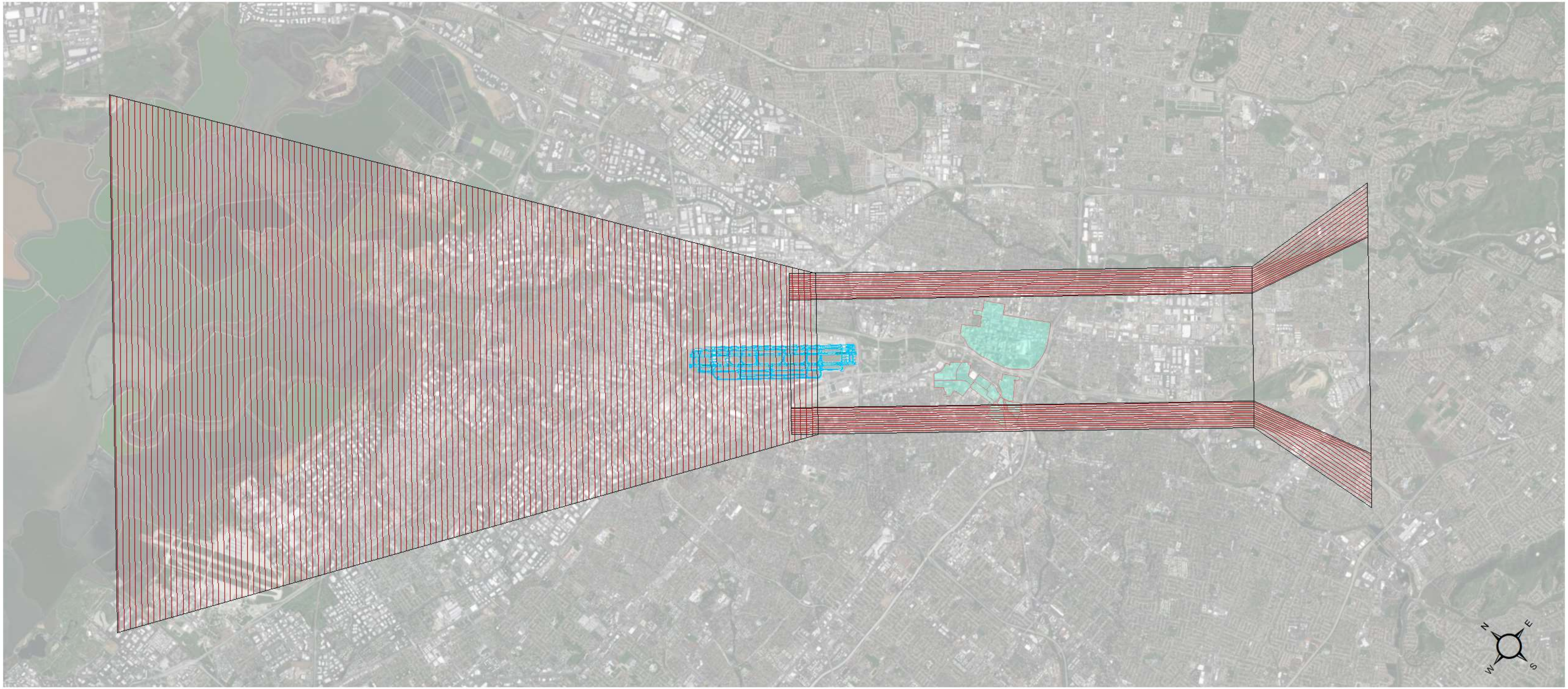
RUNWAY 30L LNAV SURFACE



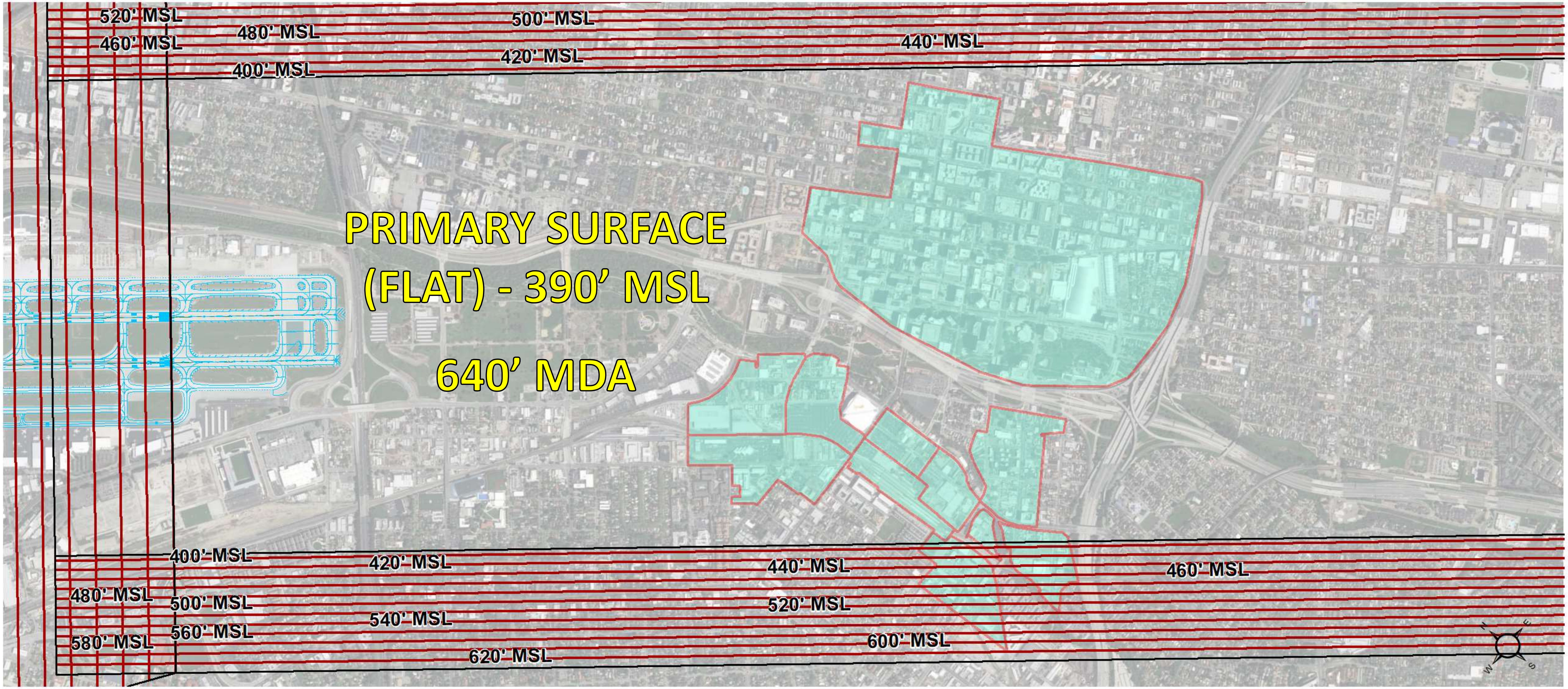
RUNWAY 30L LNAV SURFACE – FINAL APPROACH



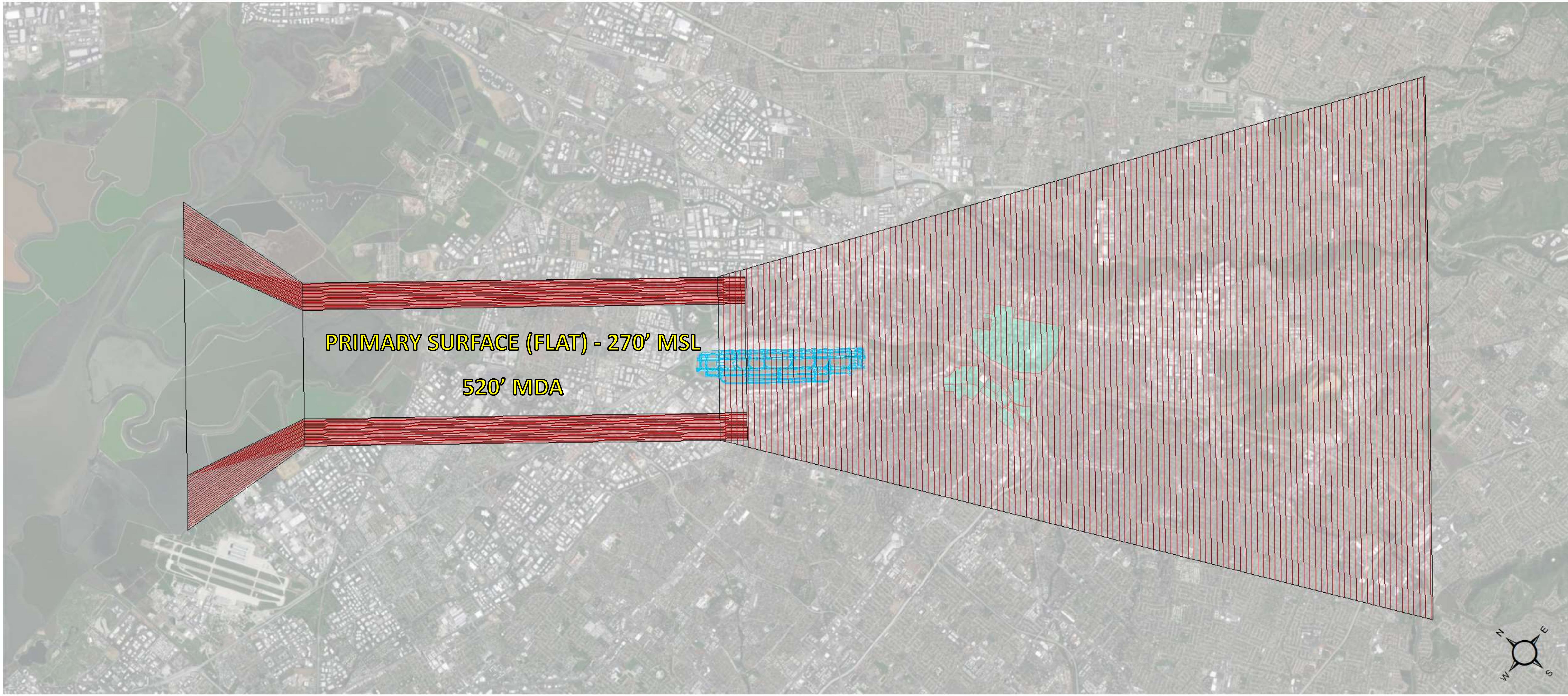
RUNWAY 30R LNAV SURFACE



RUNWAY 30R LNAV SURFACE – FINAL APPROACH

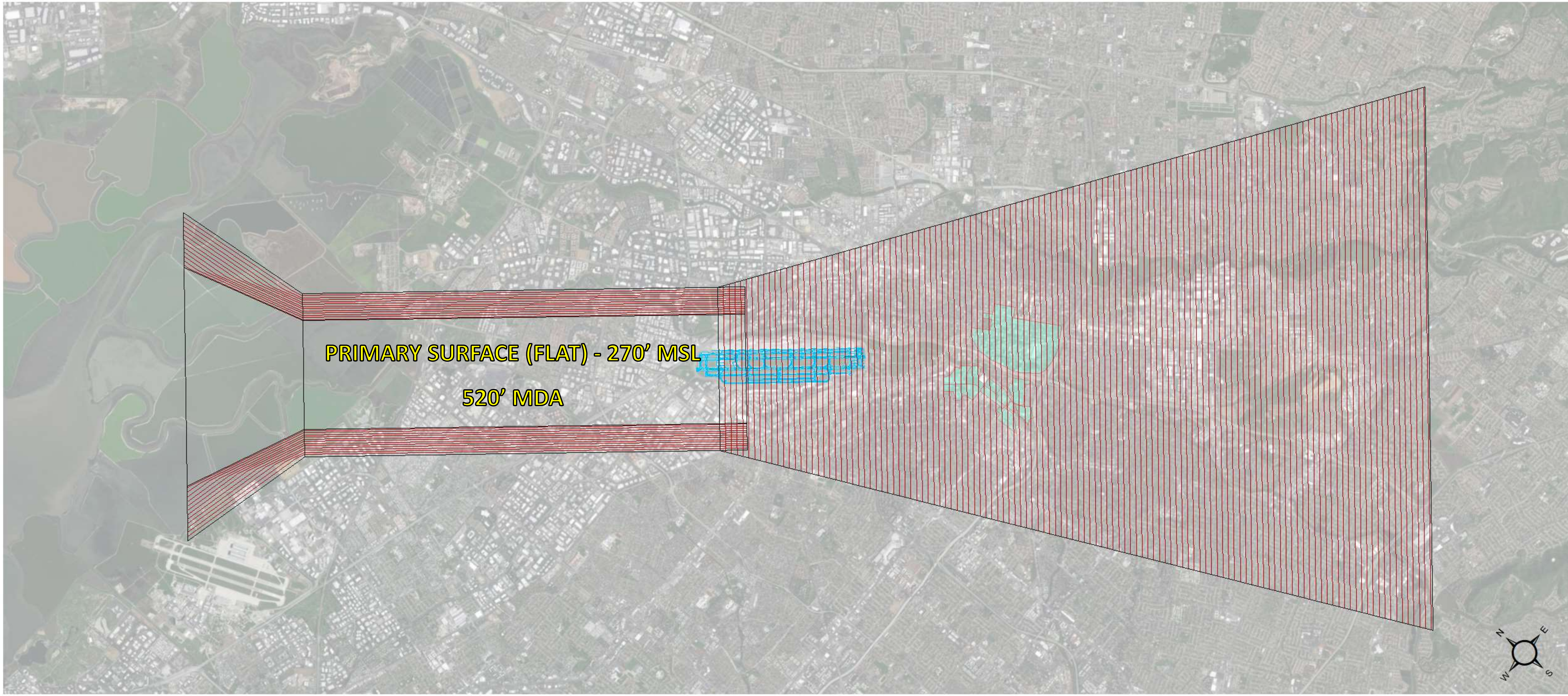


RUNWAY 12L LNAV SURFACE



RUNWAY 12L LNAV SURFACE – MISSED APPROACH

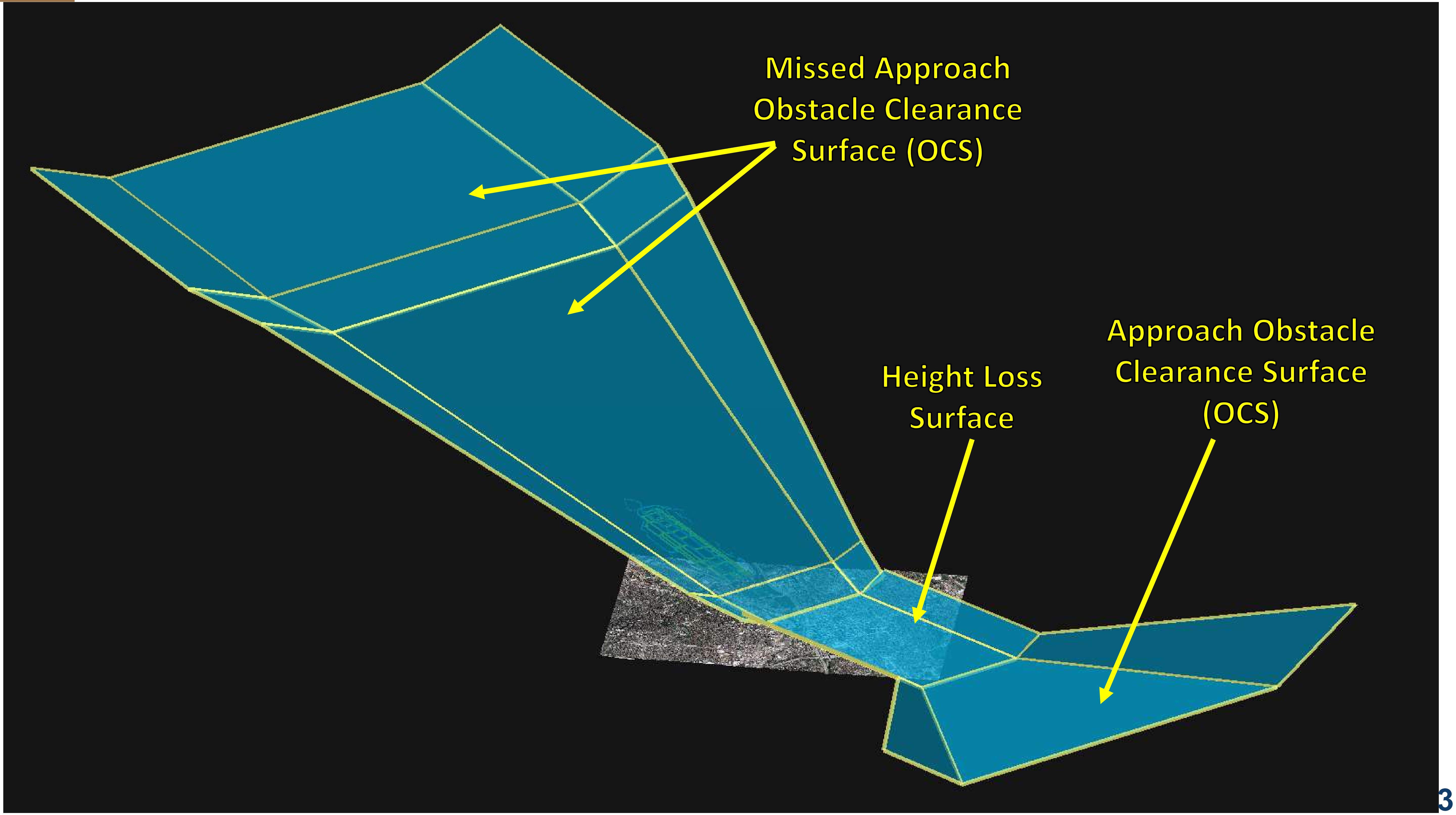
RUNWAY 12R LNAV SURFACE



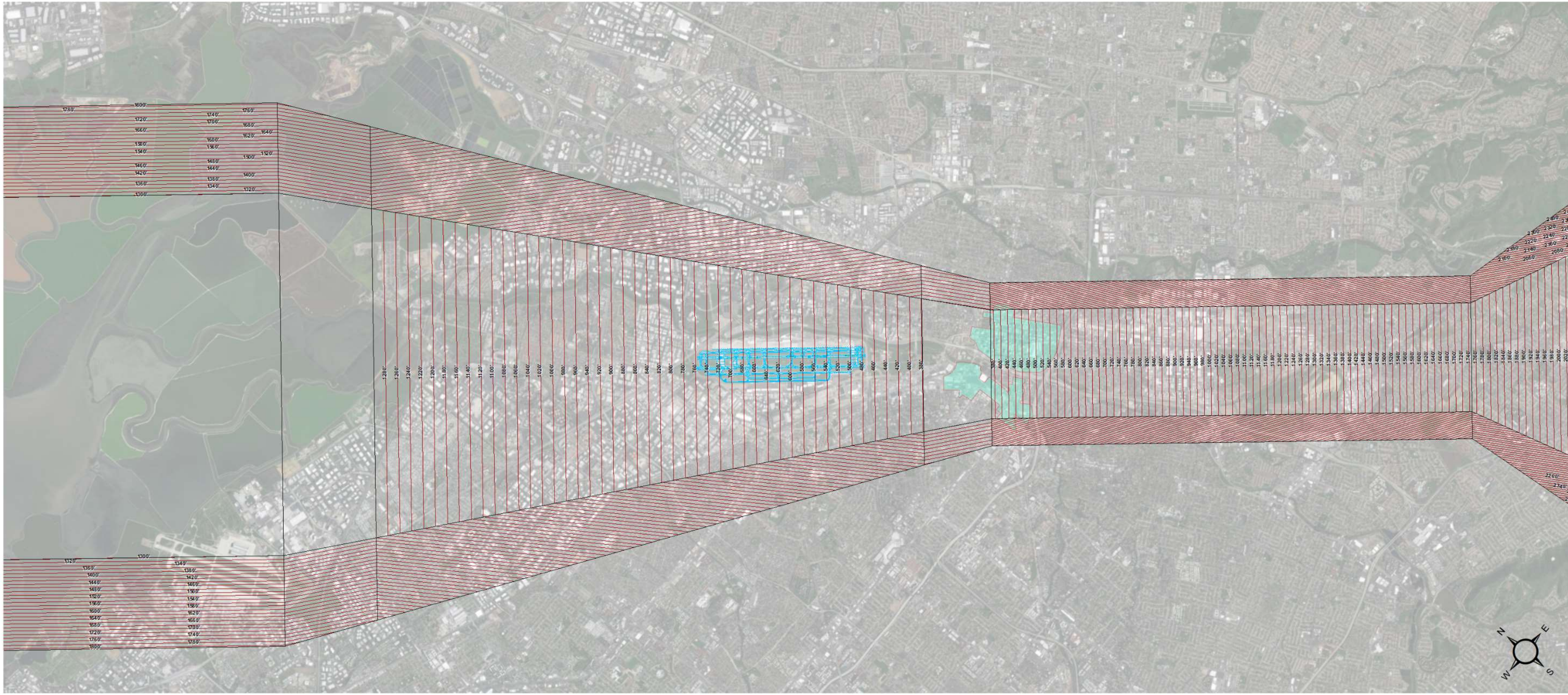
RUNWAY 12R LNAV SURFACE – MISSED APPROACH

LNAV-VNAV SURFACES

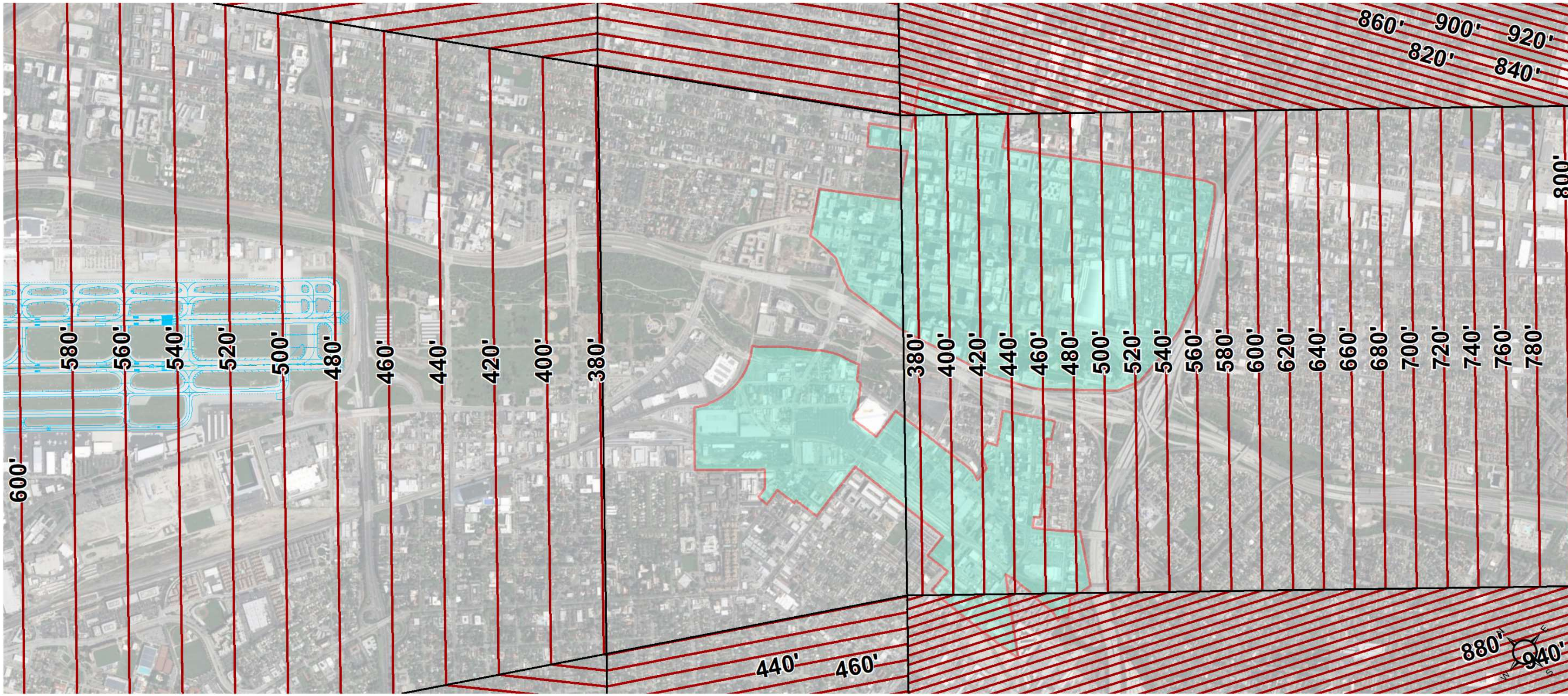
RUNWAY 30R LNAV-VNAV 3D RENDERING EXAMPLE



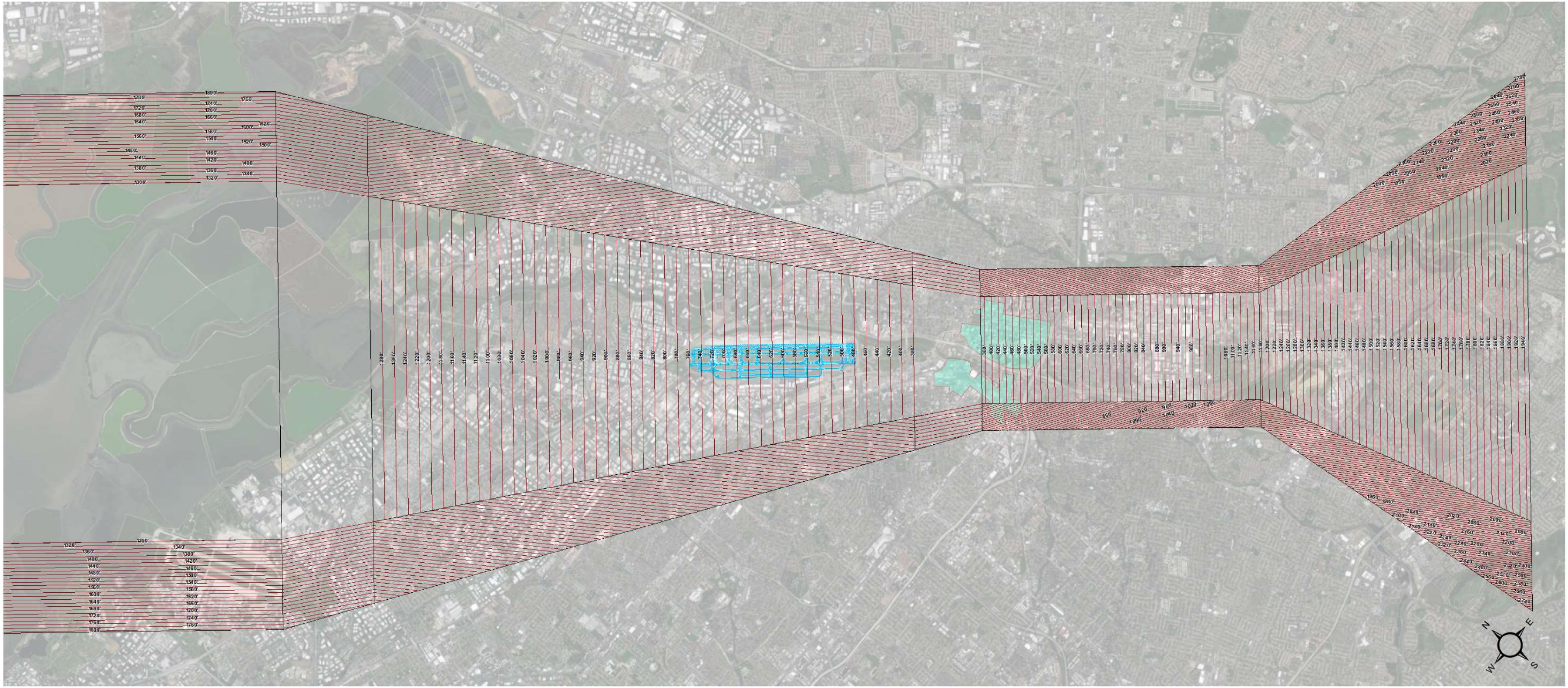
RUNWAY 30L LNAV-VNAV – OVERVIEW



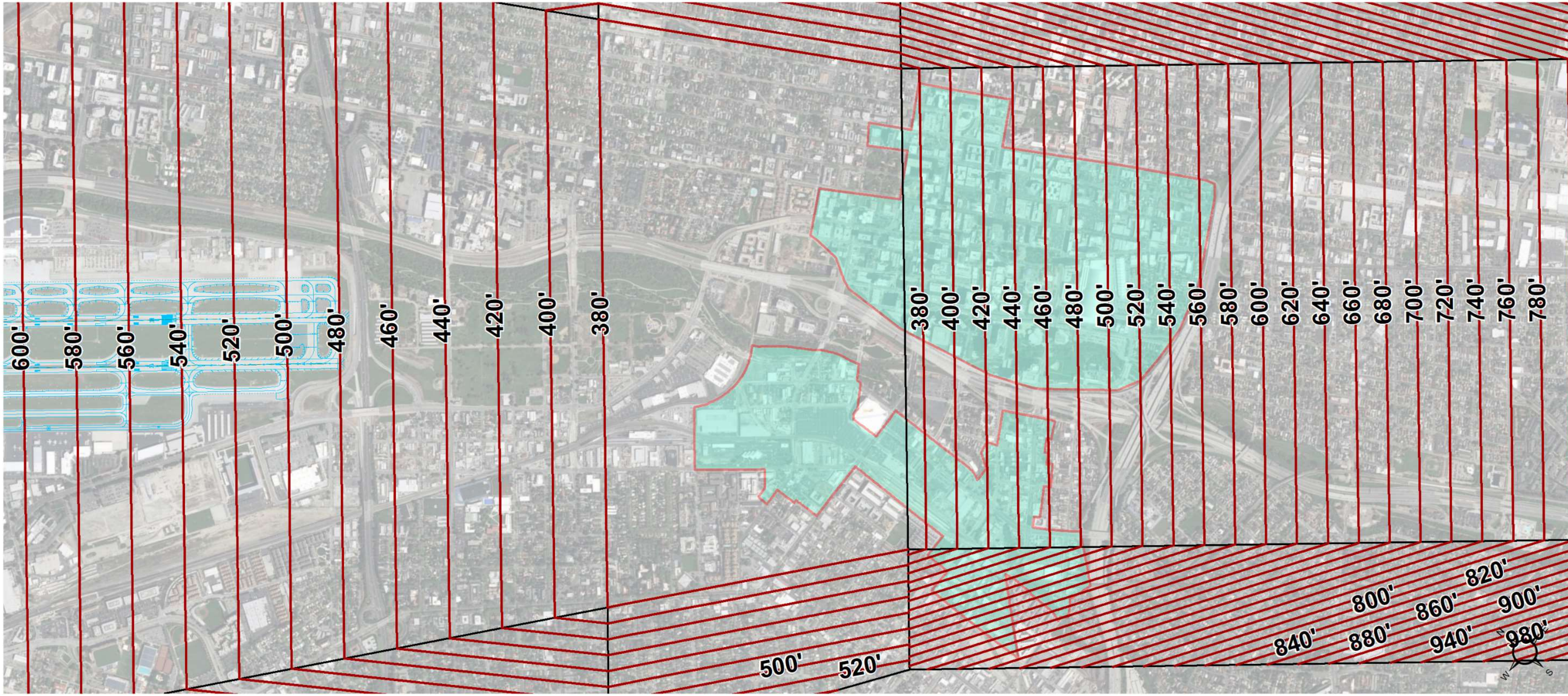
RUNWAY 30L LNAV-VNAV – FINAL APPROACH



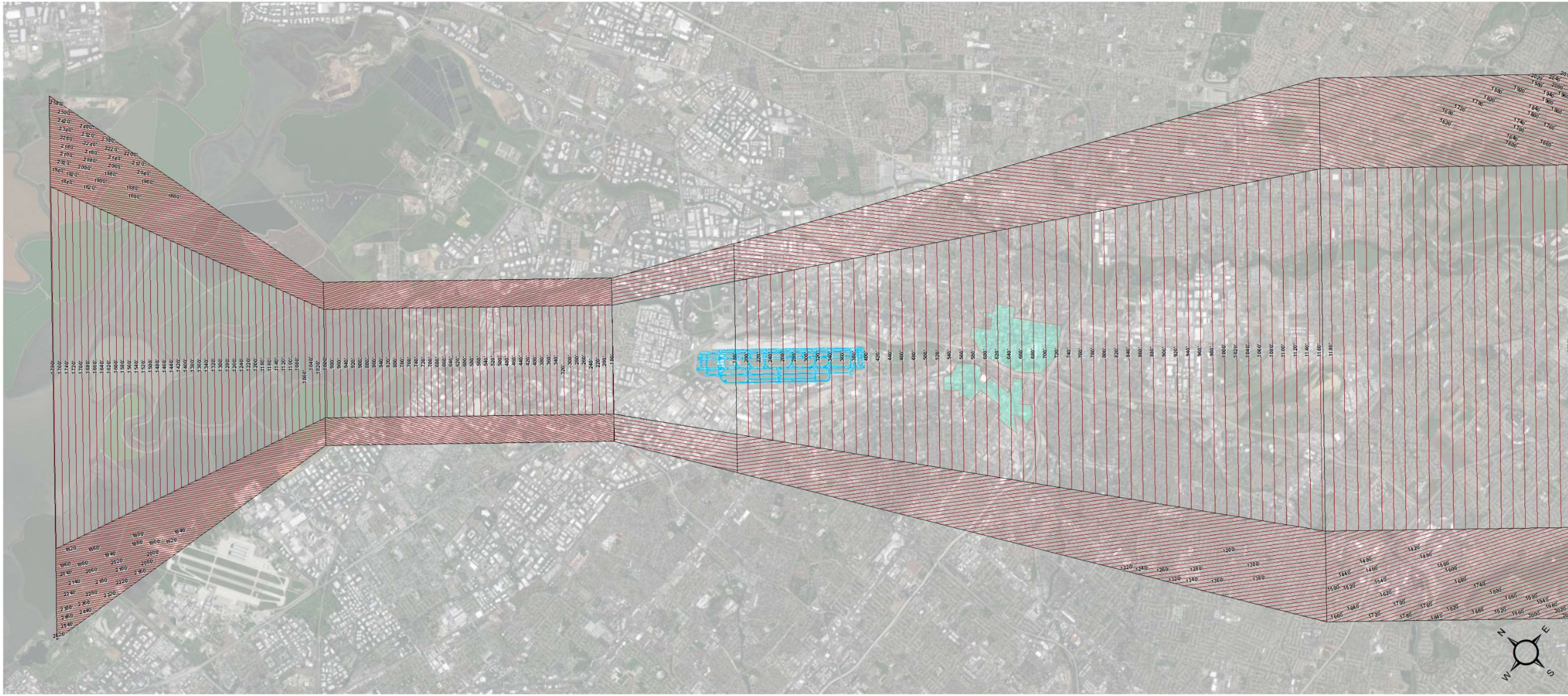
RUNWAY 30R LNAV-VNAV – OVERVIEW



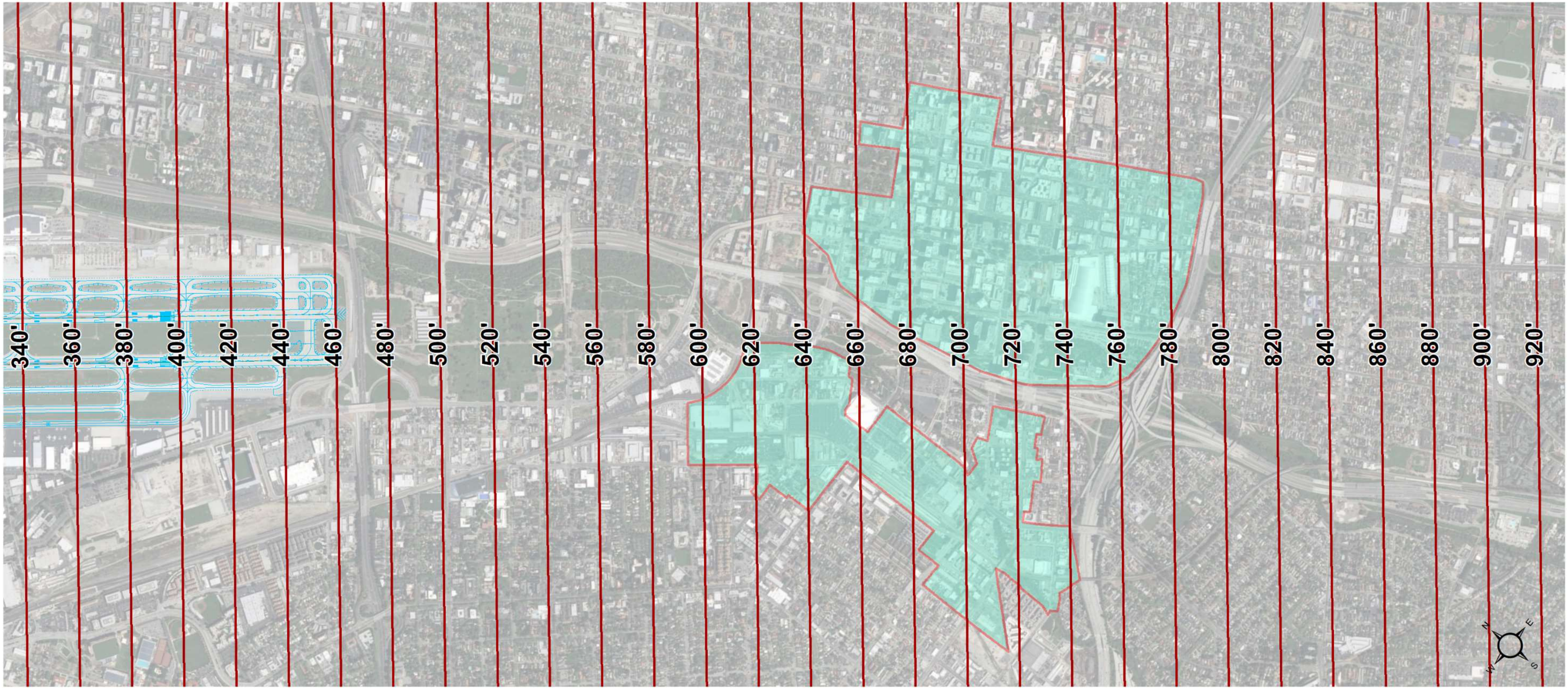
RUNWAY 30R LNAV-VNAV – FINAL APPROACH



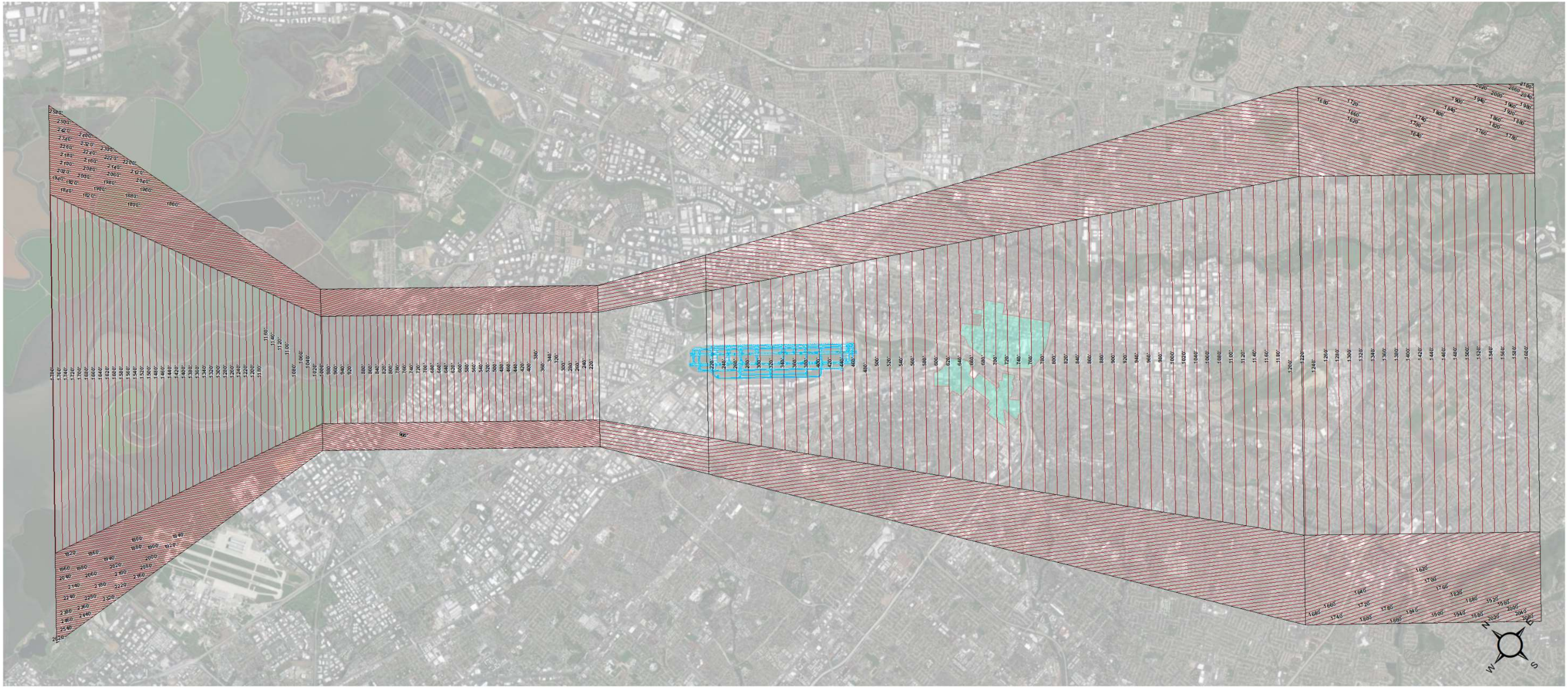
RUNWAY 12L LNAV-VNAV – OVERVIEW



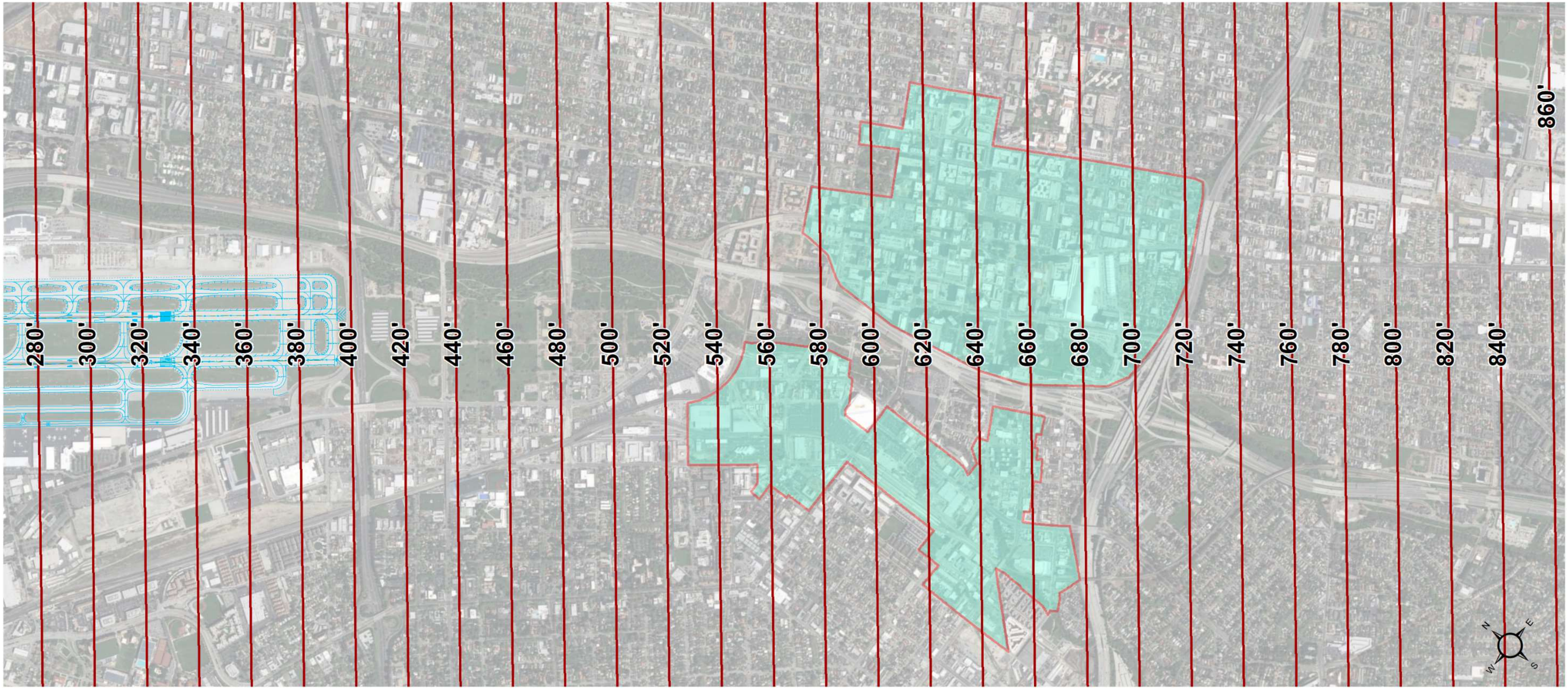
RUNWAY 12L LNAV-VNAV – MISSED APPROACH



RUNWAY 12R LNAV-VNAV – OVERVIEW



RUNWAY 12R LNAV-VNAV – MISSED APPROACH

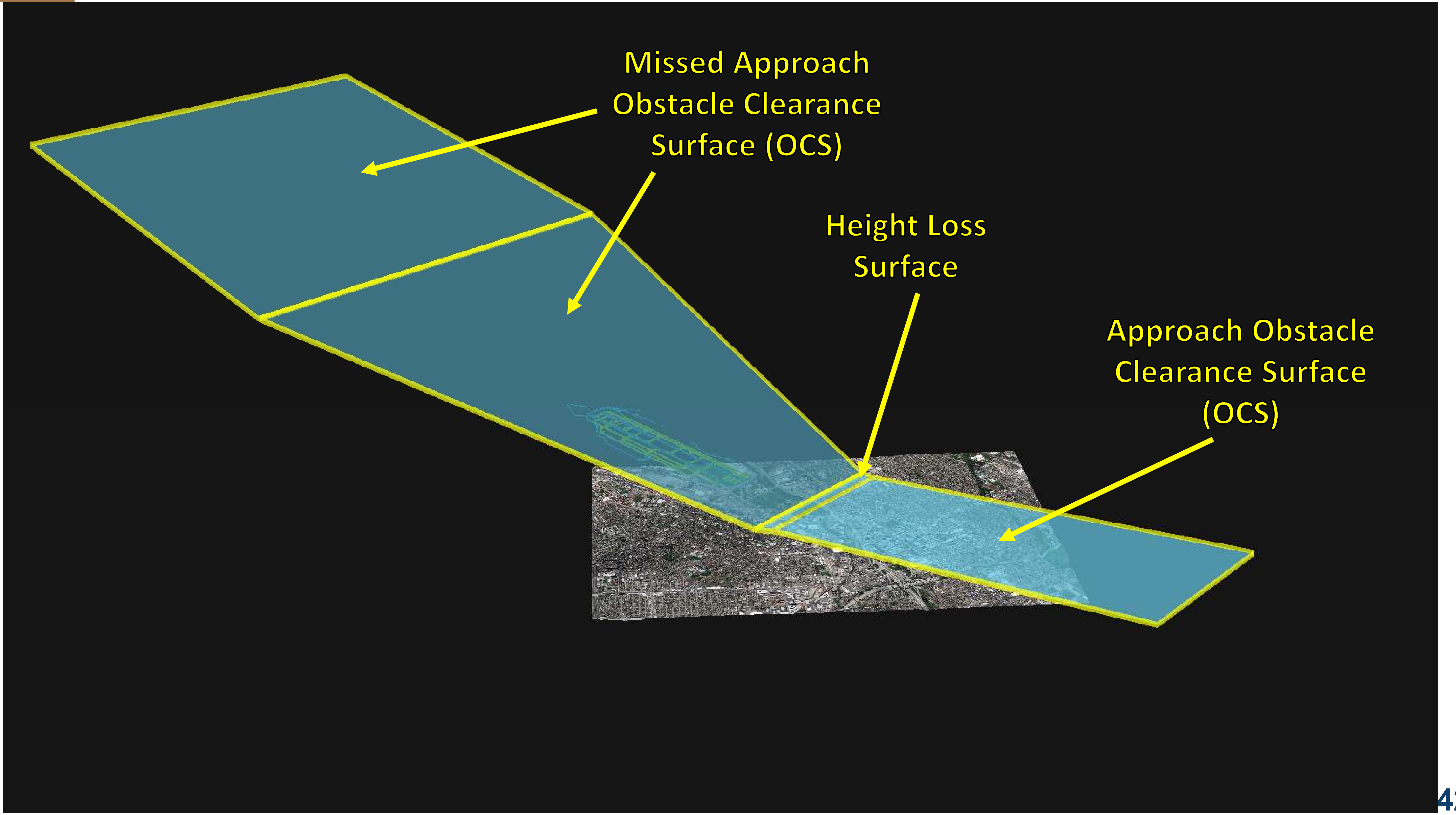


RNP SURFACES

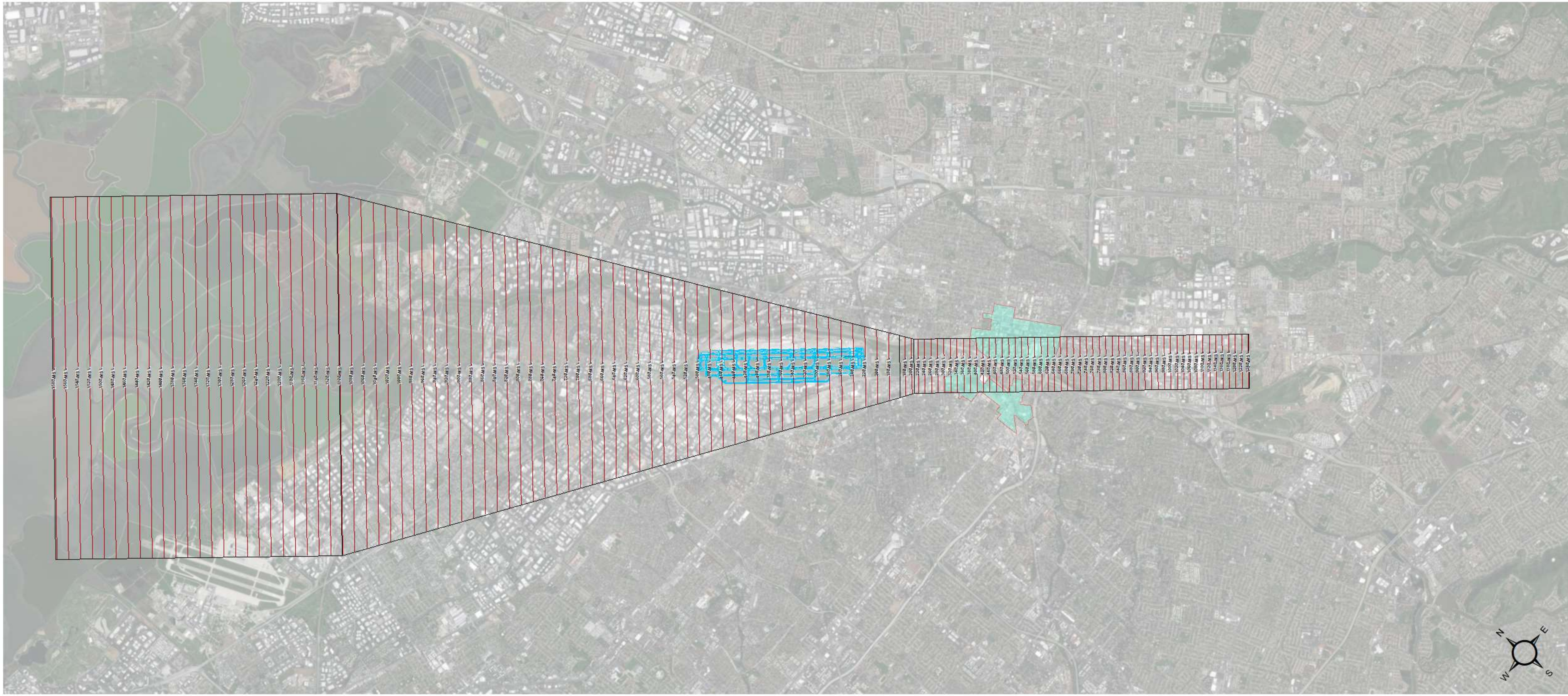
RNP SURFACE STATUS UPDATE

- QA/QC OF RNP SURFACE IS COMPLETE
- COMPLETED RNP SURFACES
  - RUNWAY 30L RNP 0.15 and 0.30)
  - RUNWAY 30R (0.11 DA, 0.20 DA and 0.30 DA)
  - RUNWAY 12L (0.18 DA and 0.30 DA)
  - RUNWAY 12R (0.15 DA and 0.30 DA)

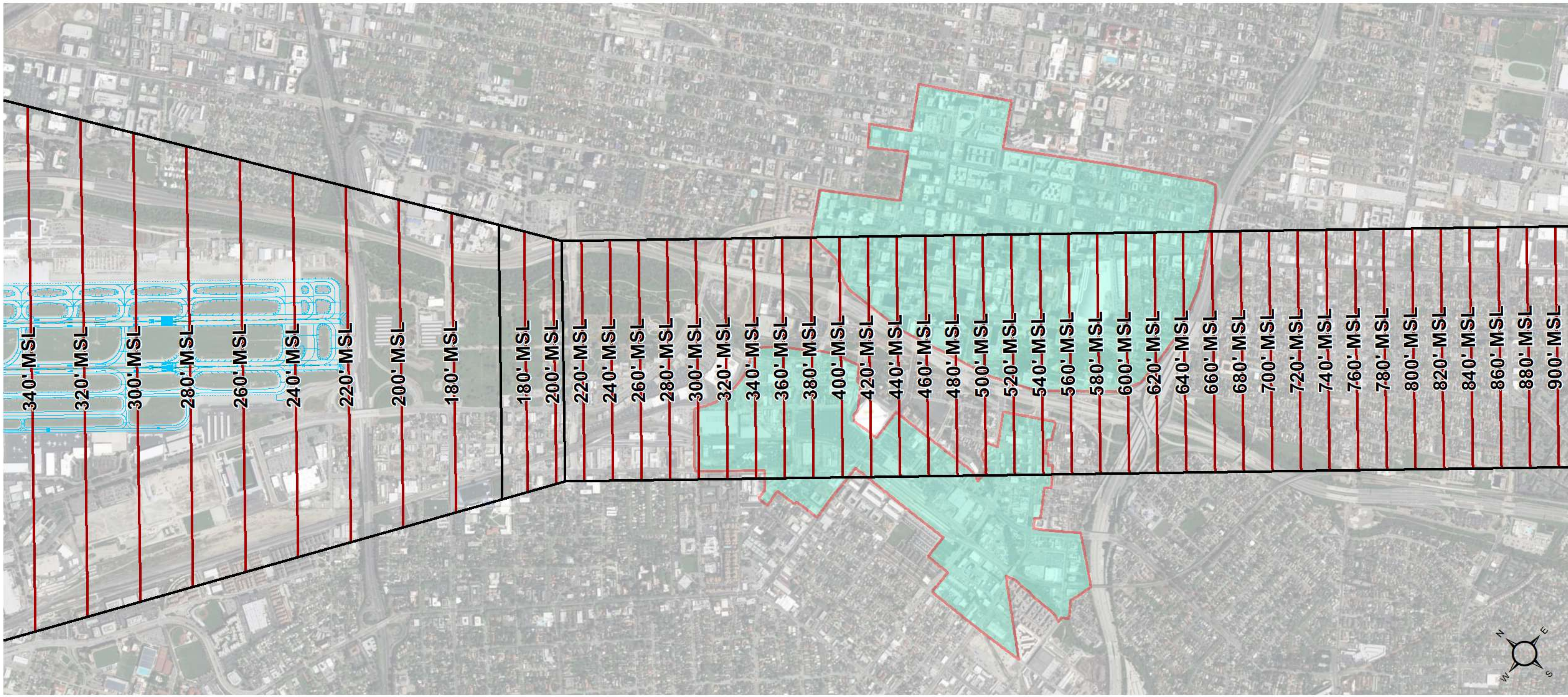
RUNWAY 30R RNP 0.3 3D RENDERING EXAMPLE



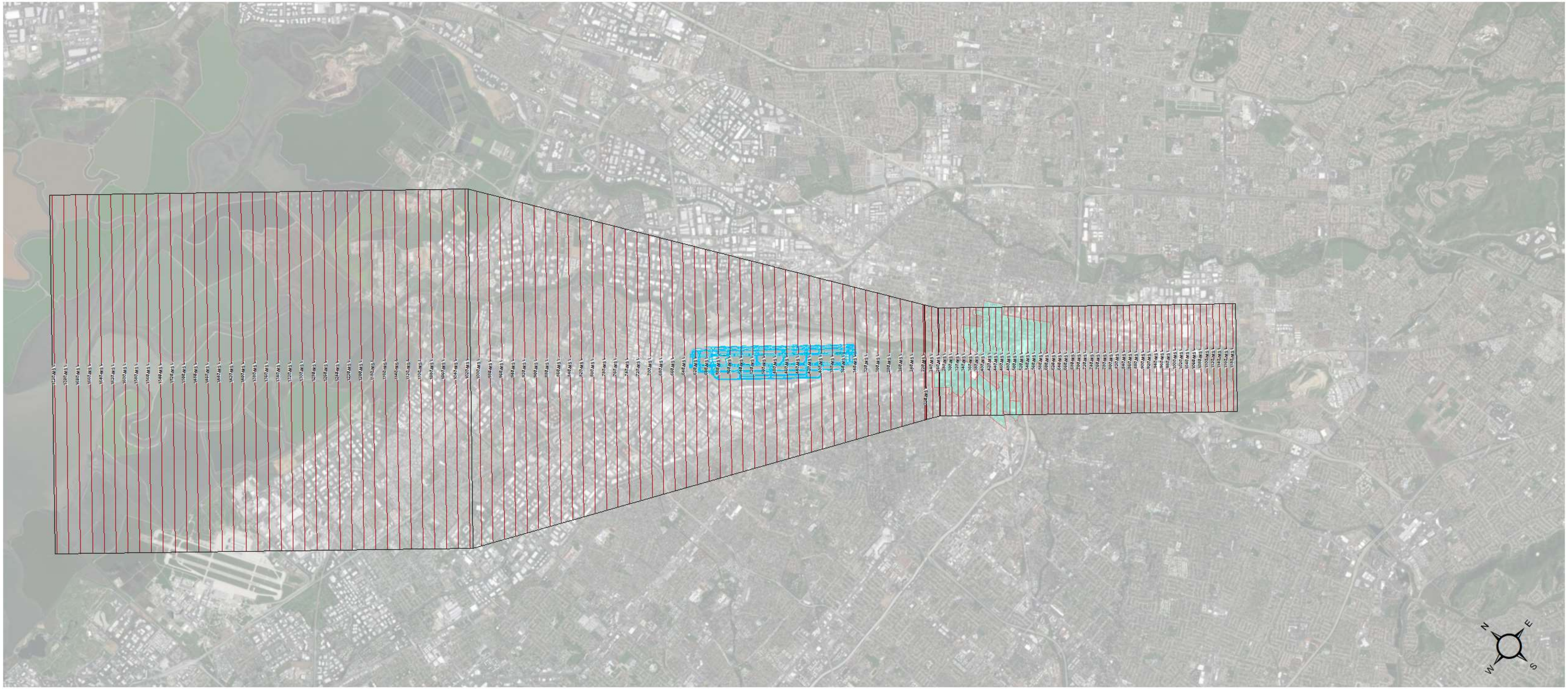
RUNWAY 30L RNP 0.15 SURFACE



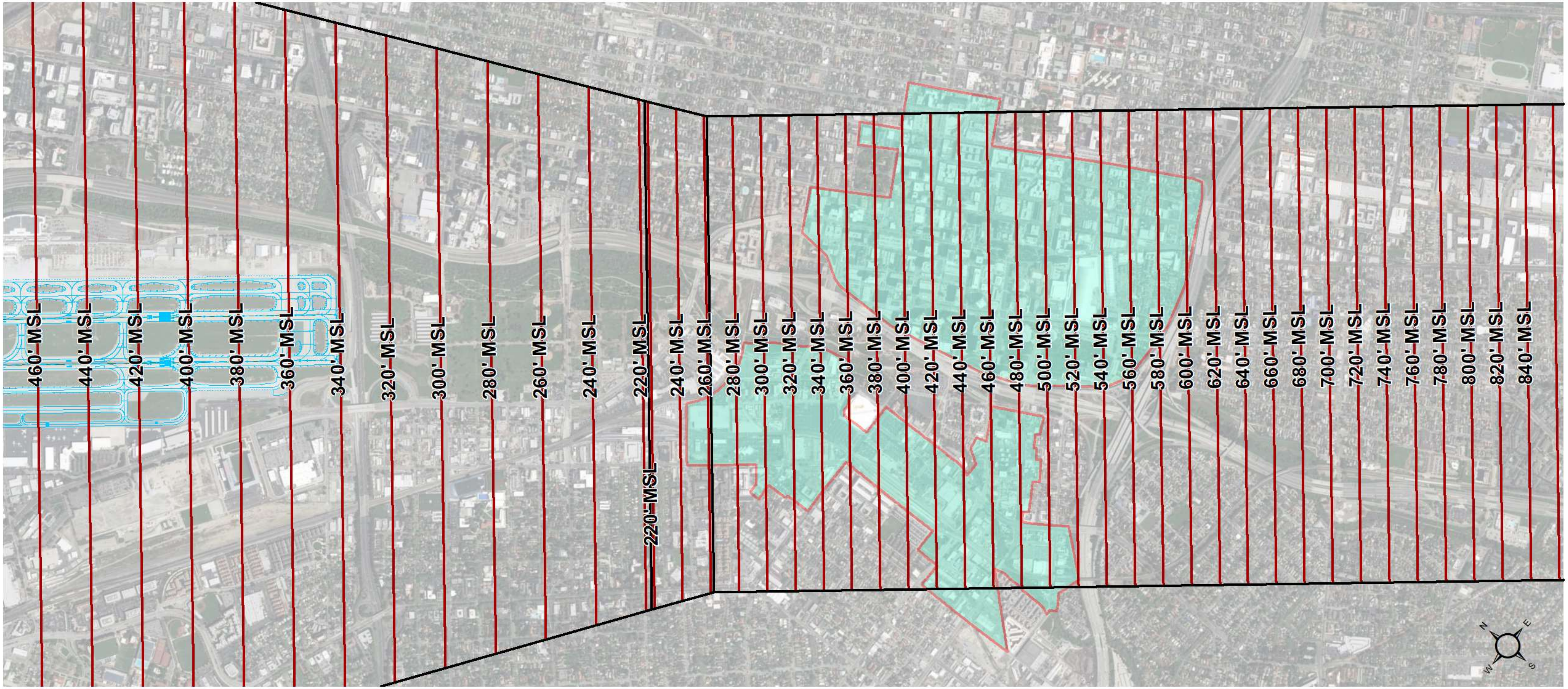
RUNWAY 30L RNP 0.15 SURFACE – FINAL APPROACH



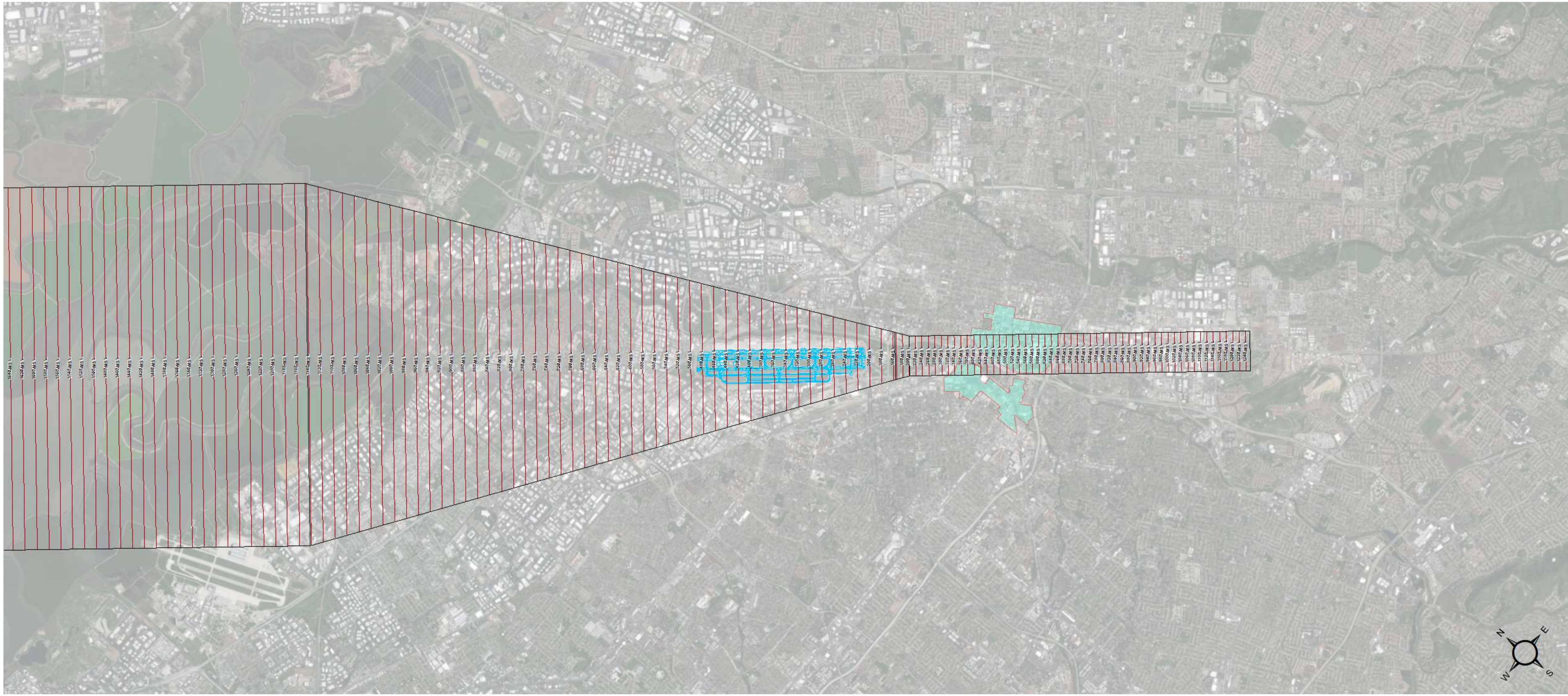
RUNWAY 30L RNP 0.3 SURFACE



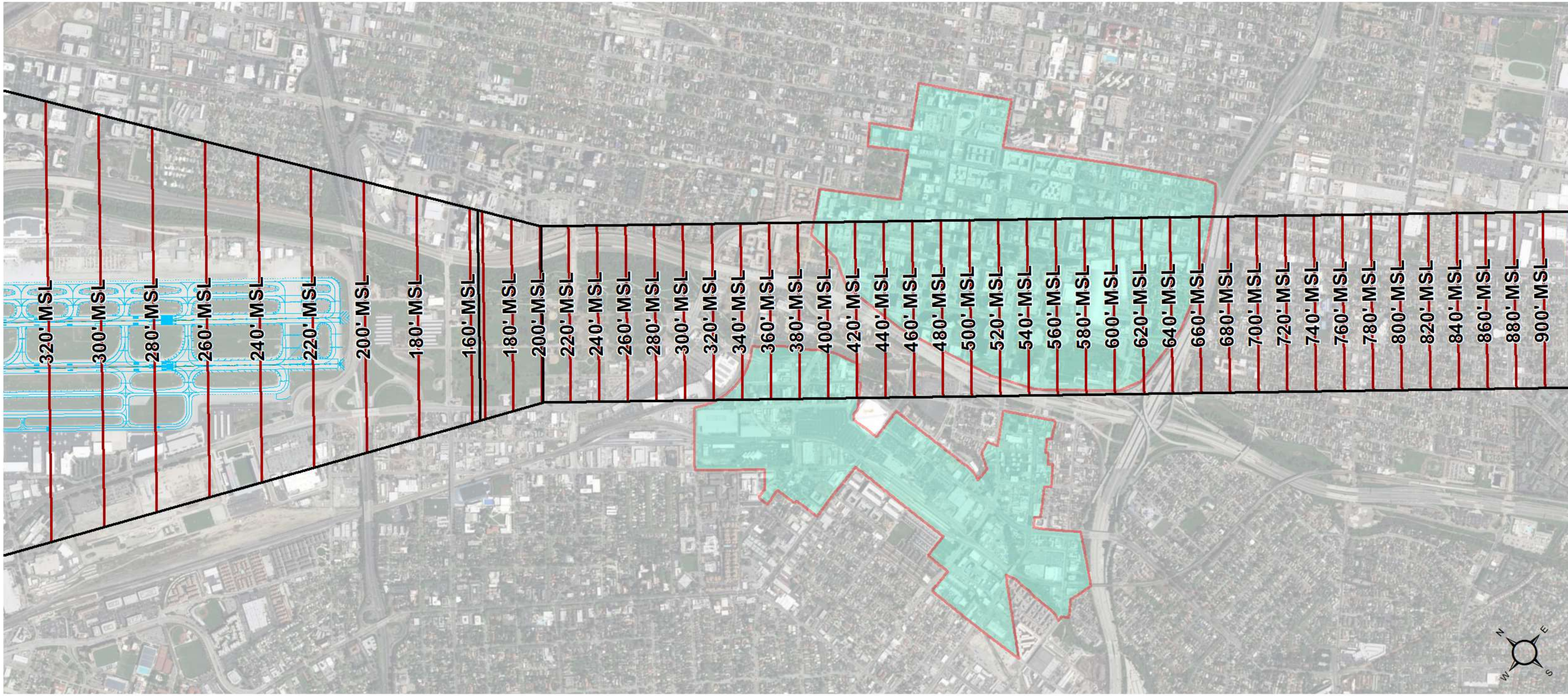
RUNWAY 30L RNP 0.3 SURFACE – FINAL APPROACH



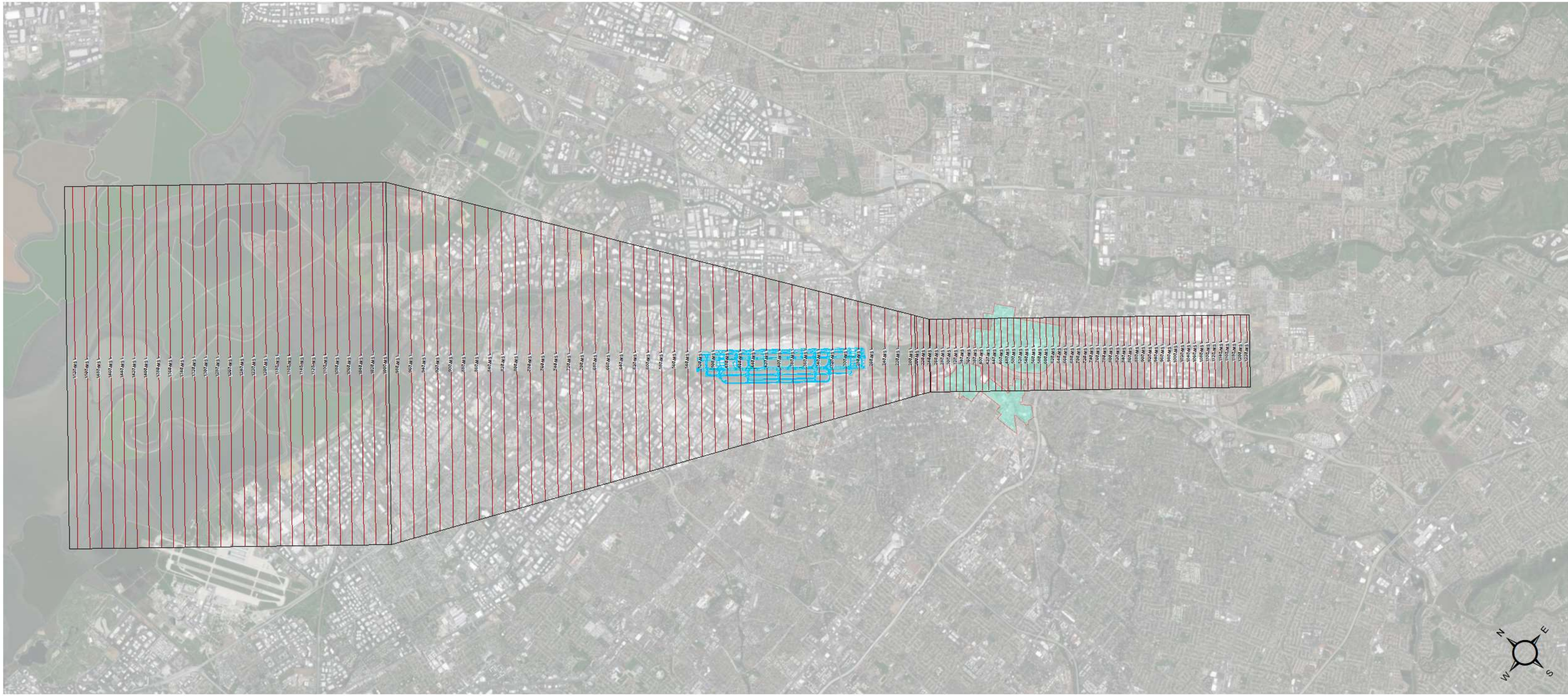
RUNWAY 30R RNP 0.11 SURFACE



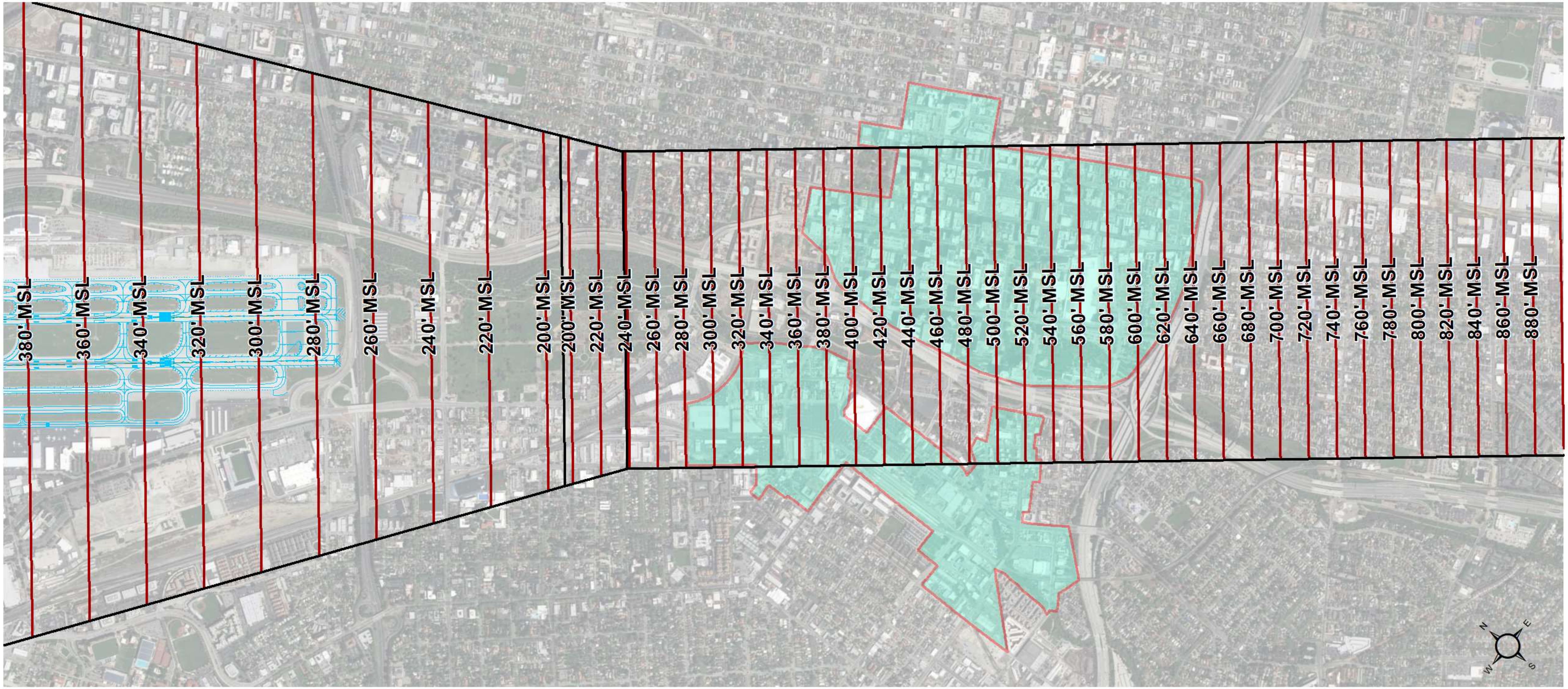
RUNWAY 30R RNP 0.11 SURFACE – FINAL APPROACH



RUNWAY 30R RNP 0.2 SURFACE

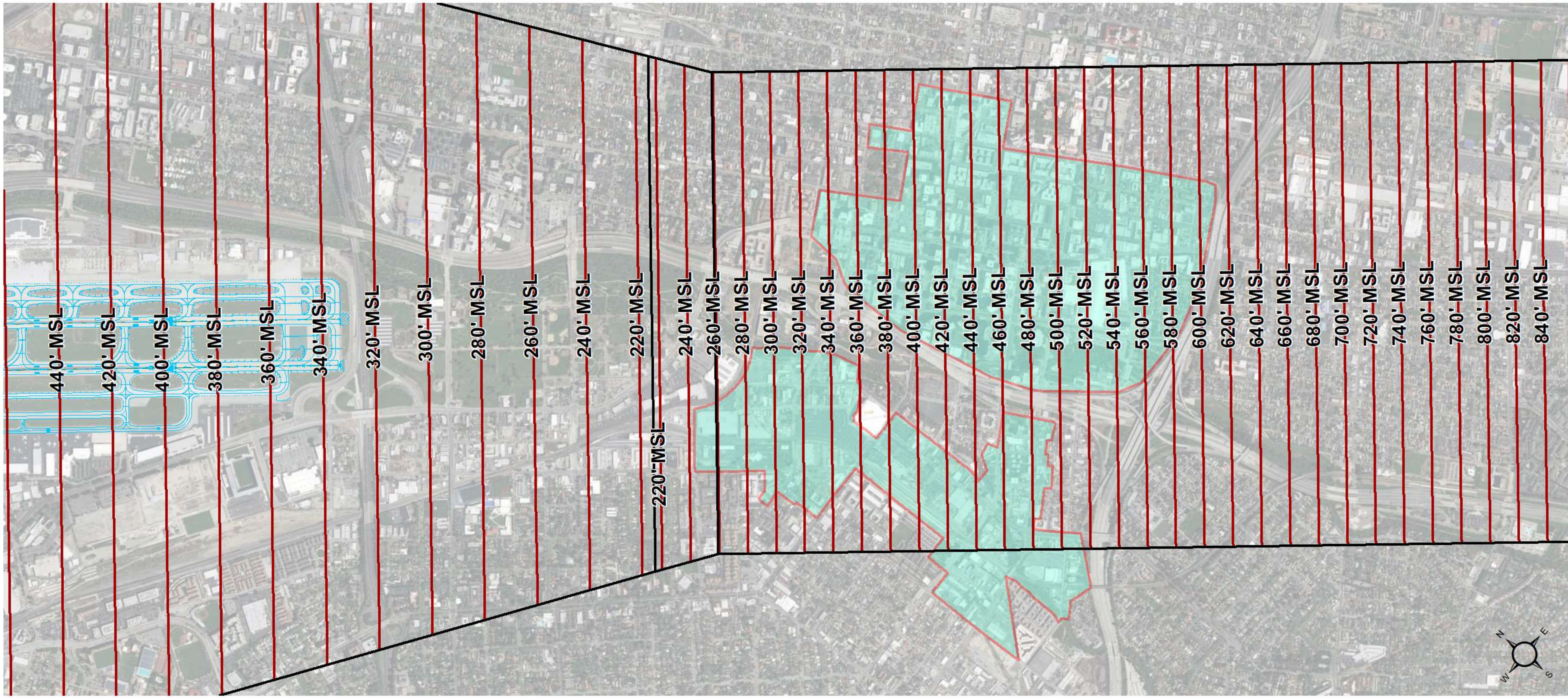


RUNWAY 30R RNP 0.2 SURFACE – FINAL APPROACH

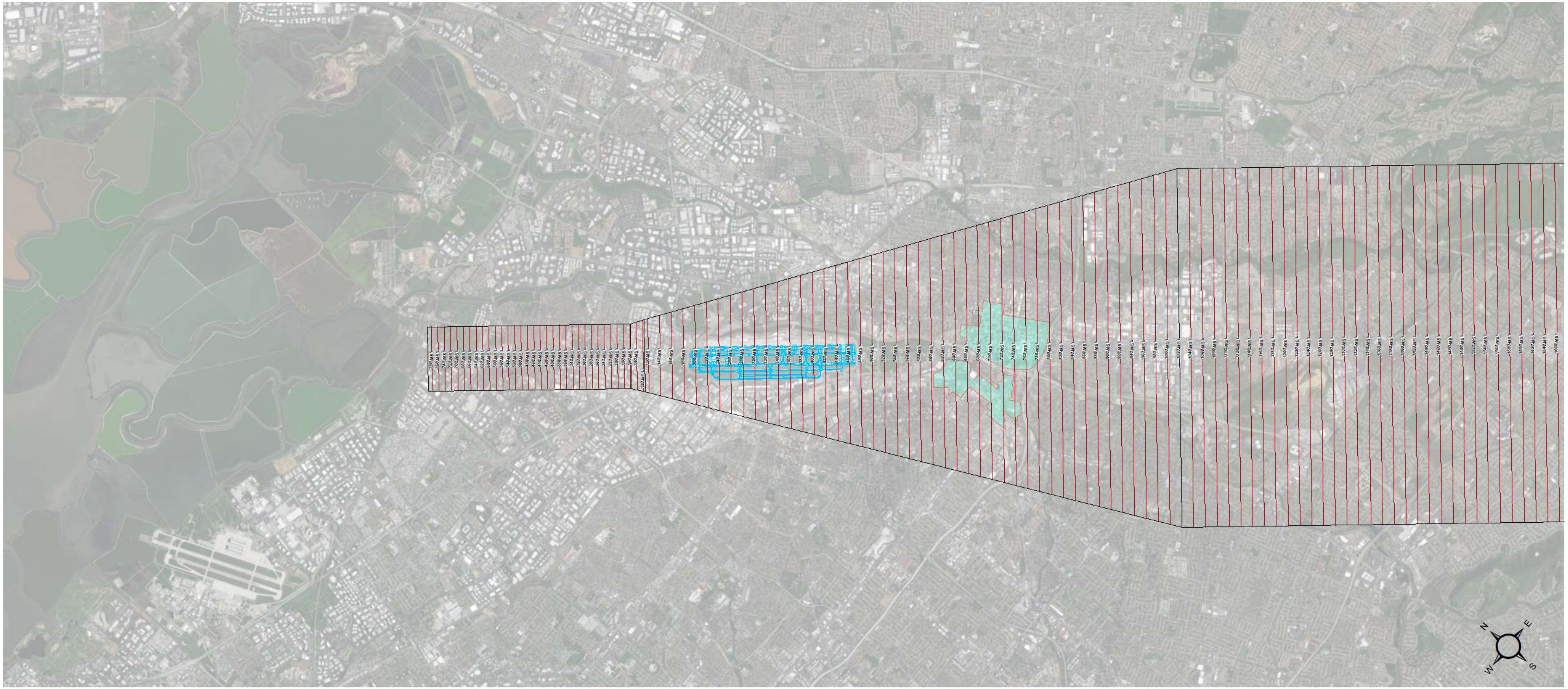


RUNWAY 30R RNP 0.3 SURFACE

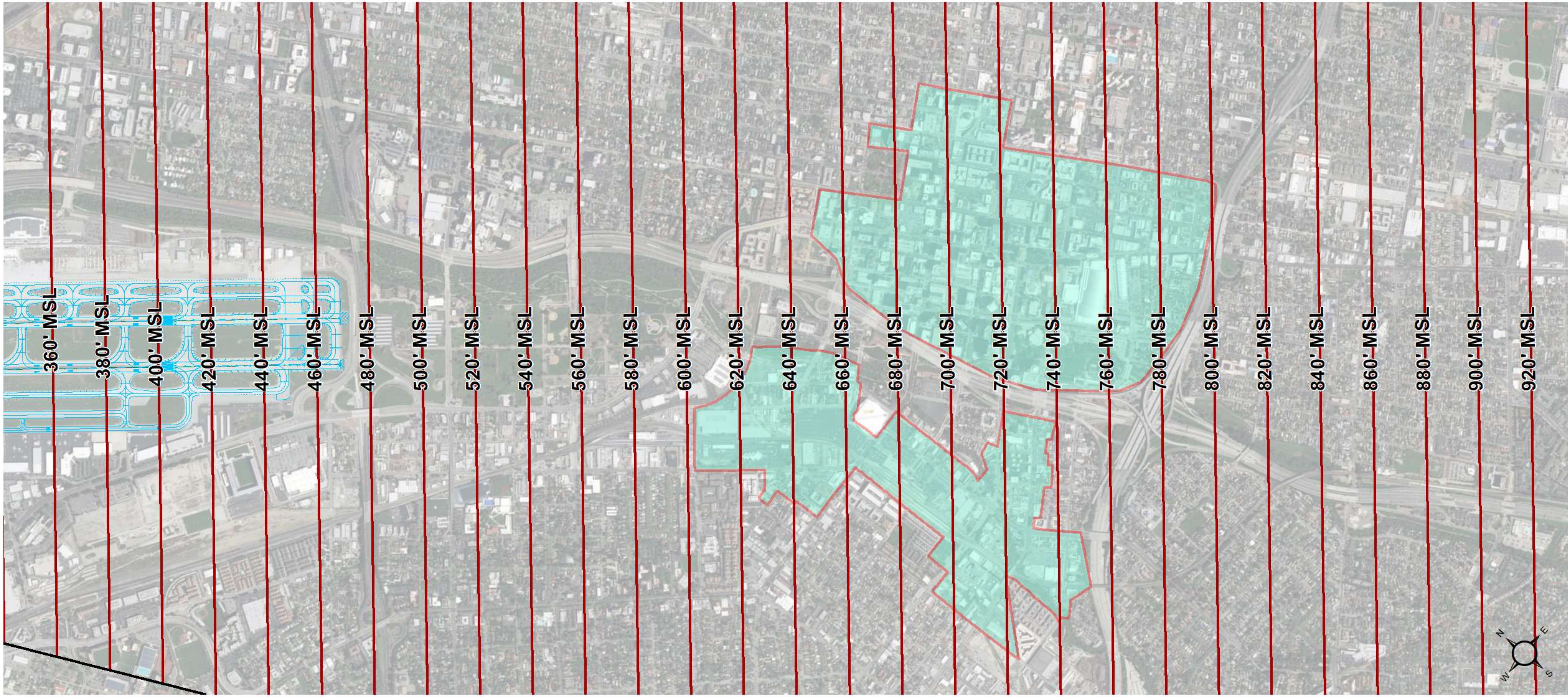
RUNWAY 30R RNP 0.3 SURFACE – FINAL APPROACH



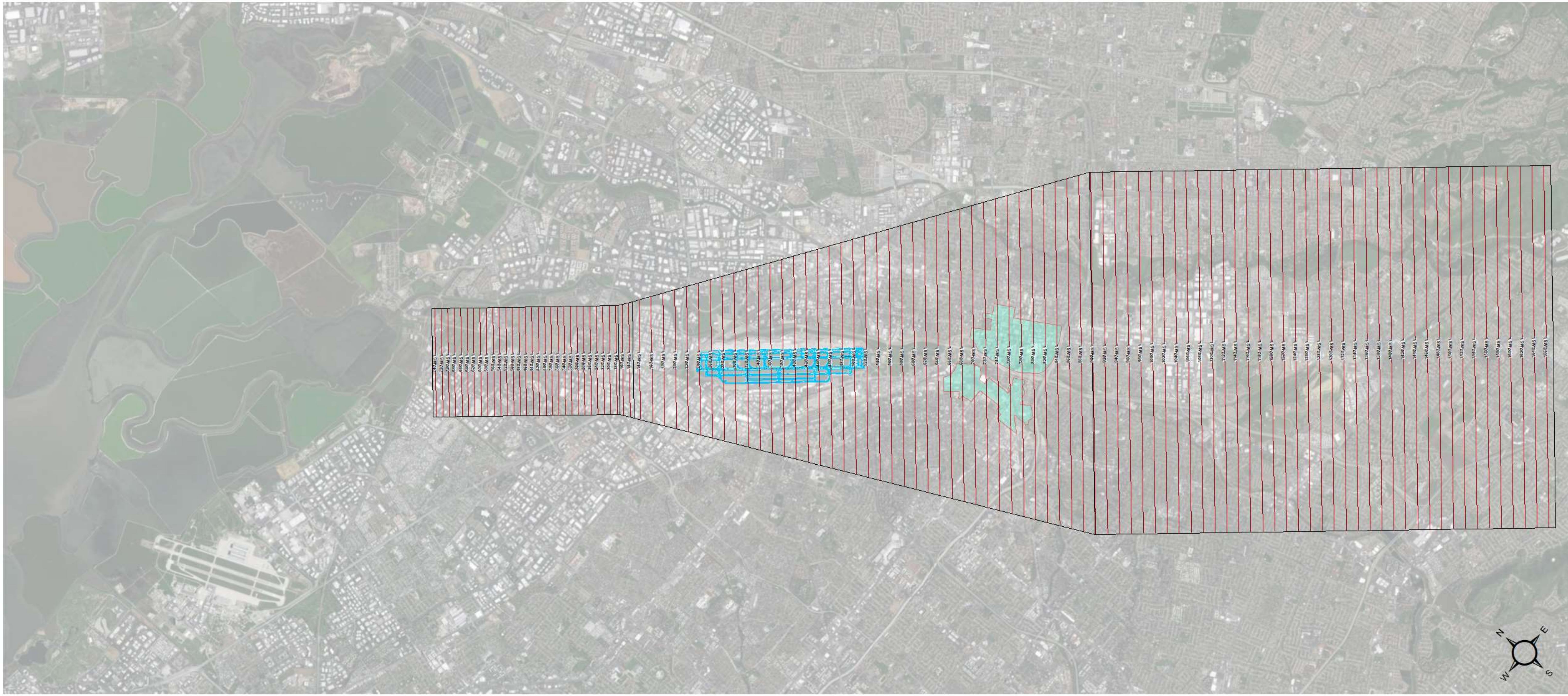
RUNWAY 12L RNP 0.18 SURFACE



RUNWAY 12L RNP 0.18 SURFACE – MISSED APPROACH

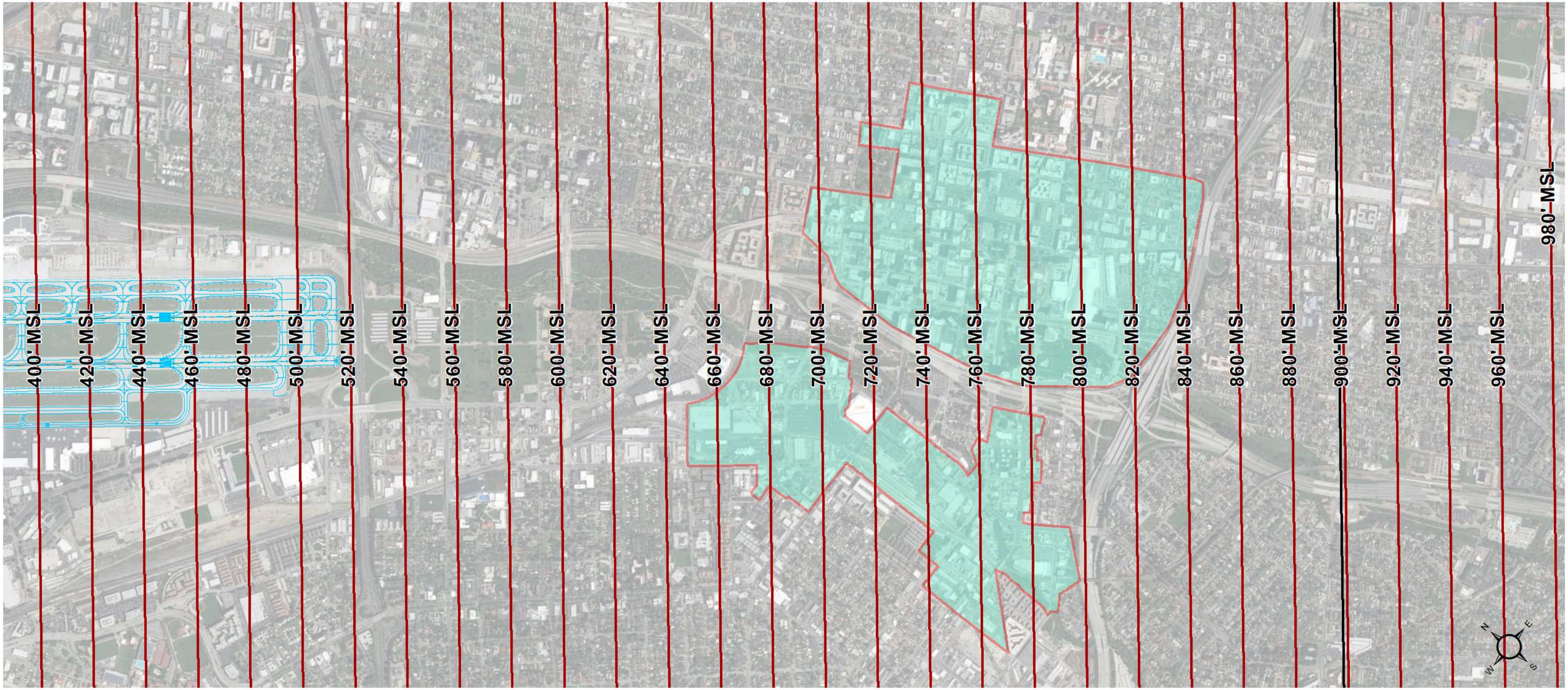


RUNWAY 12L RNP 0.3 SURFACE

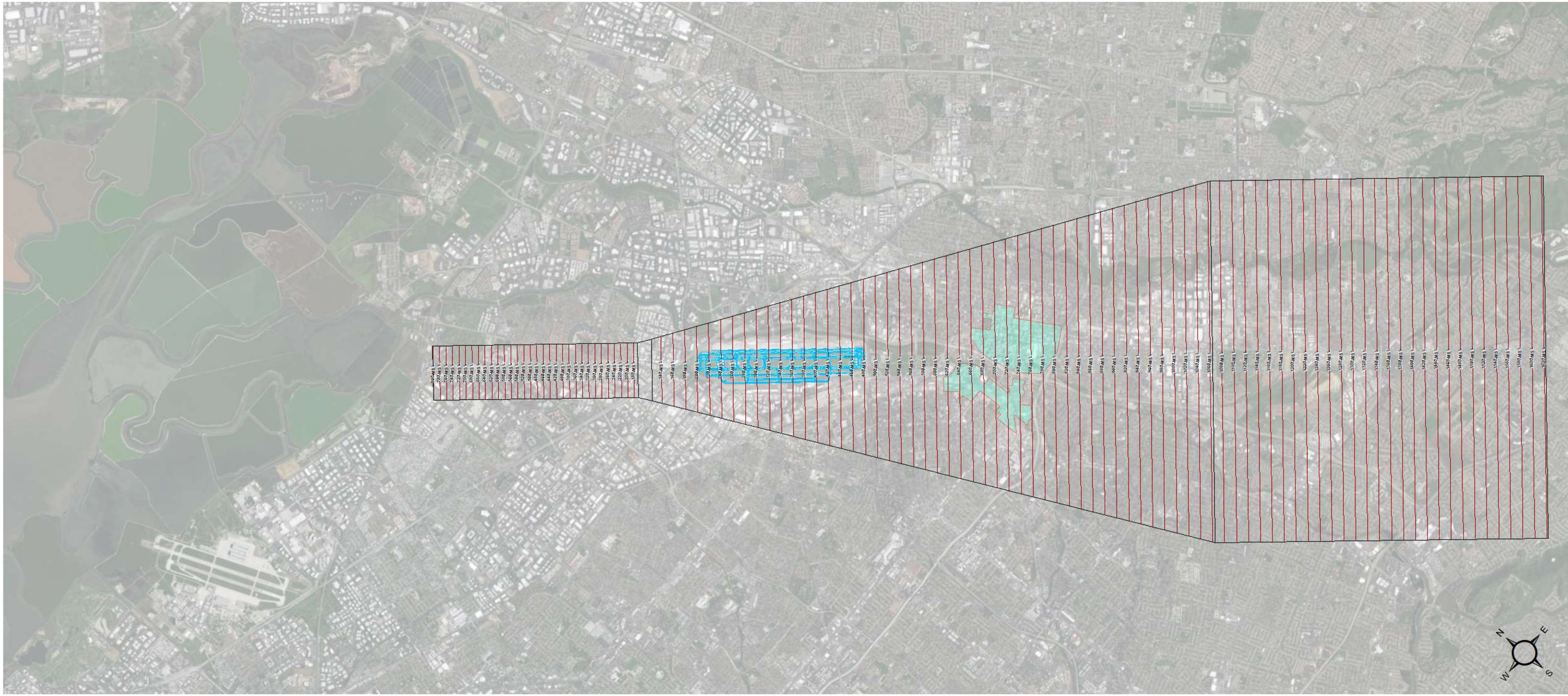


L&B

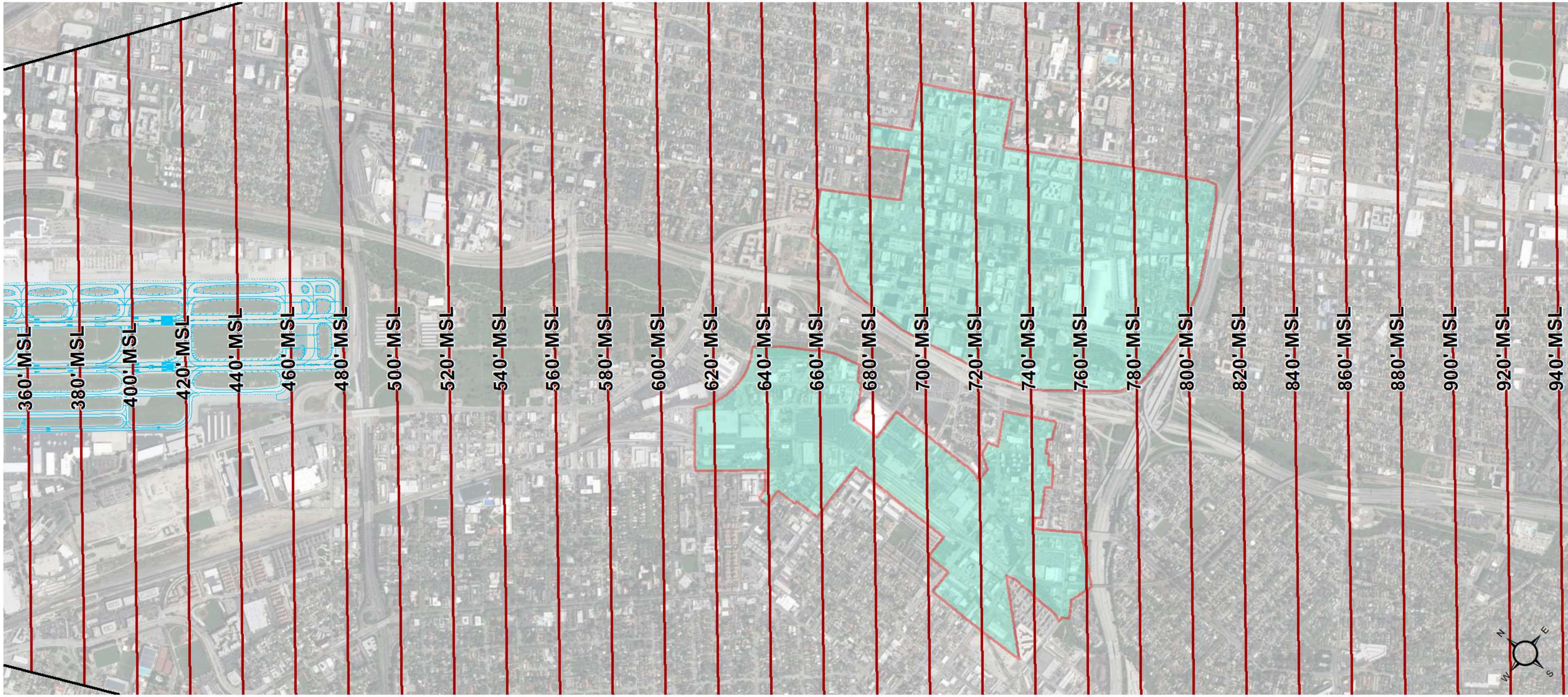
RUNWAY 12L RNP 0.3 SURFACE – MISSED APPROACH



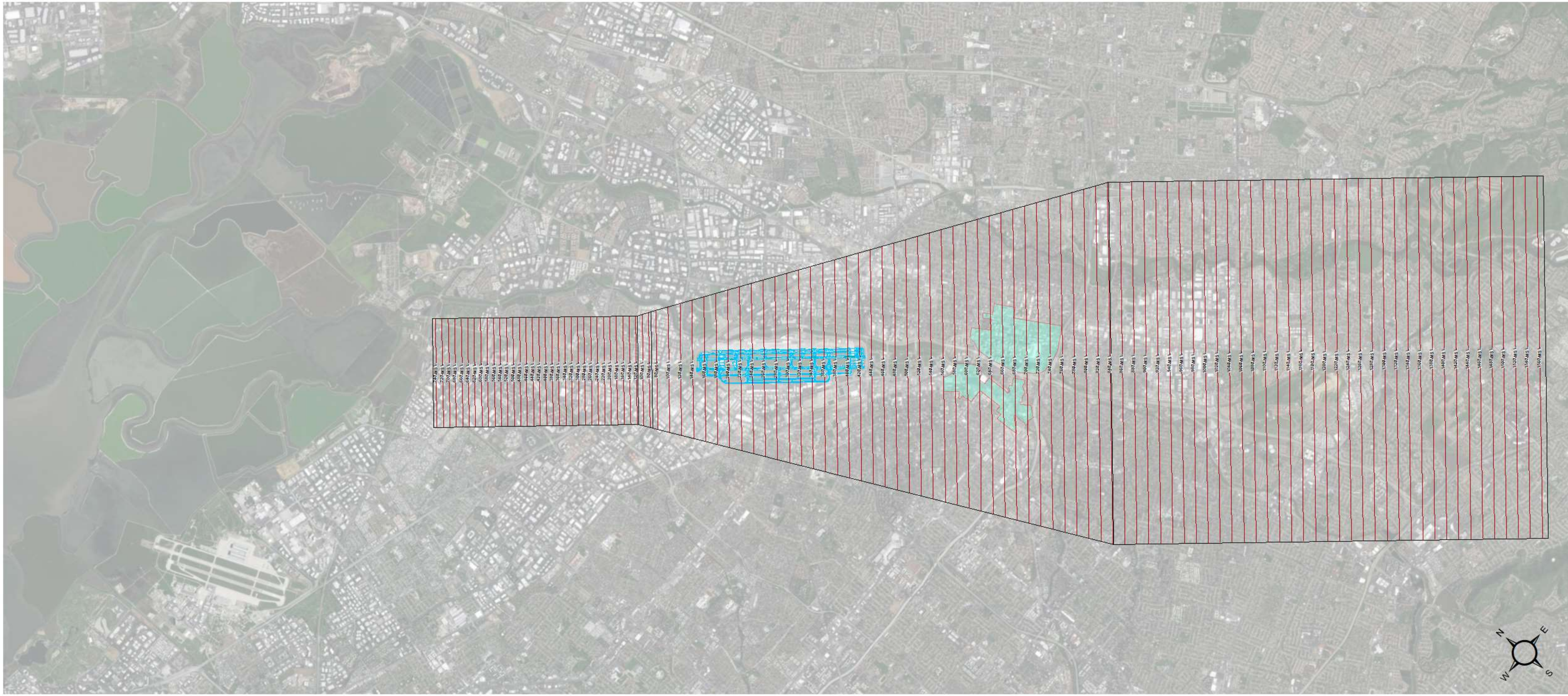
RUNWAY 12R RNP 0.15 SURFACE



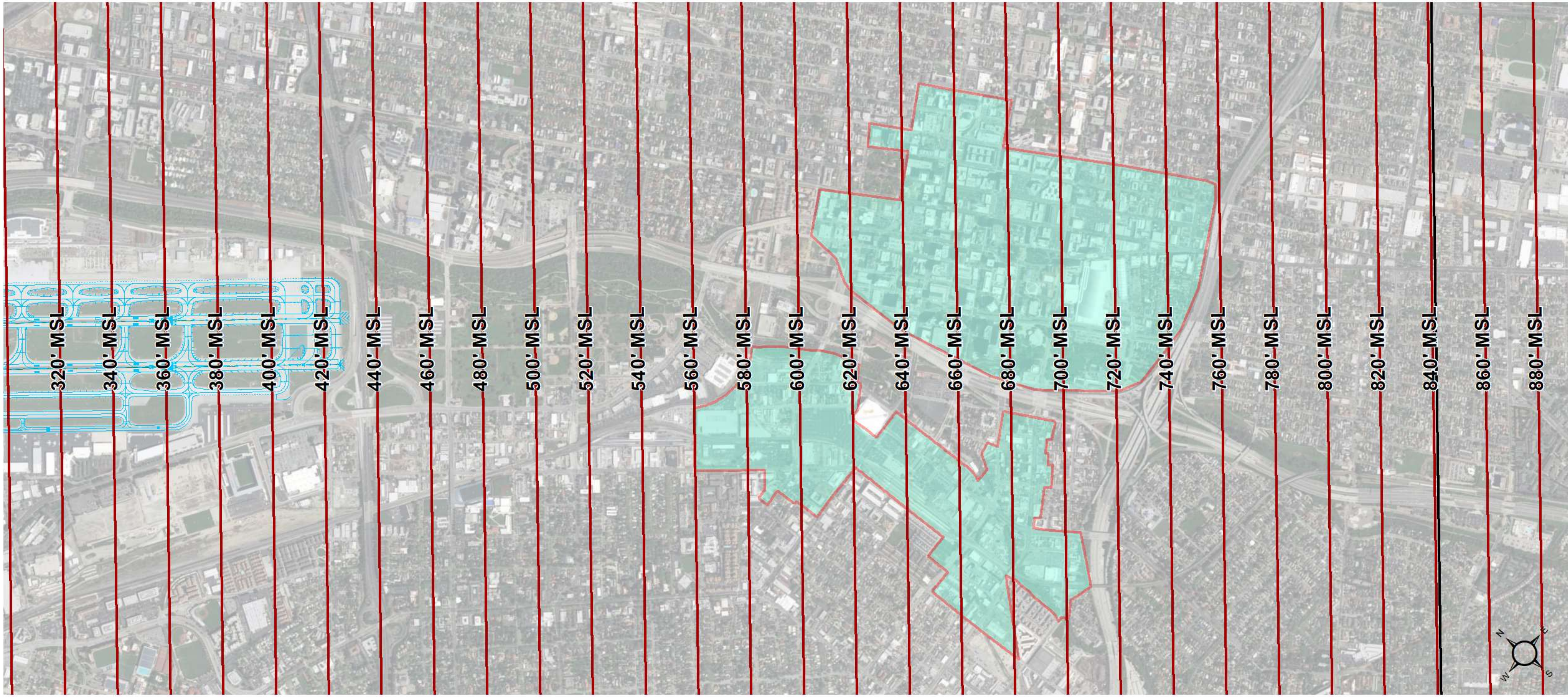
RUNWAY 12R RNP 0.15 SURFACE – MISSED APPROACH



RUNWAY 12R RNP 0.3 SURFACE



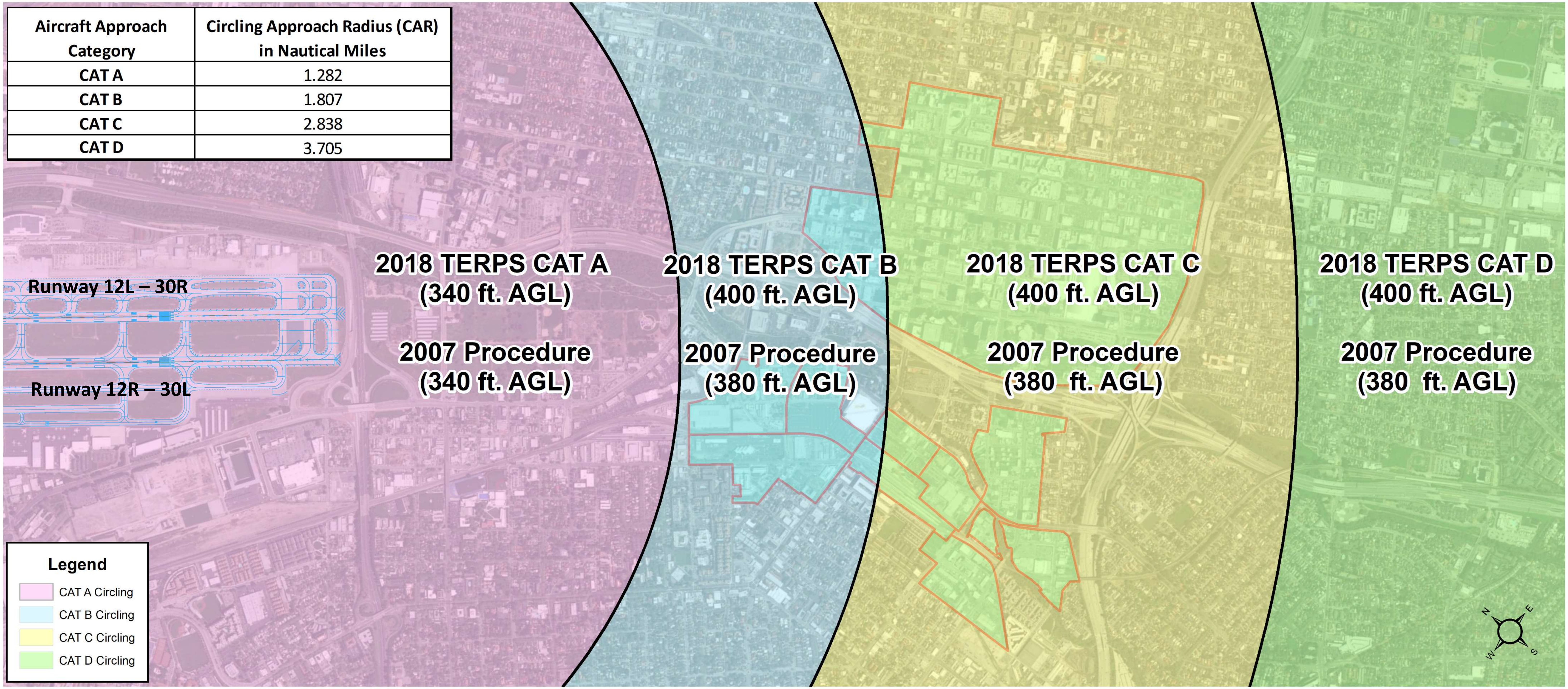
RUNWAY 12R RNP 0.3 SURFACE – MISSED APPROACH



CIRCLING APPROACH

TERPS NON-PRECISION APPROACH CIRCLING MINIMUMS

Aircraft Approach Category	Circling Approach Radius (CAR) in Nautical Miles
CAT A	1.282
CAT B	1.807
CAT C	2.838
CAT D	3.705



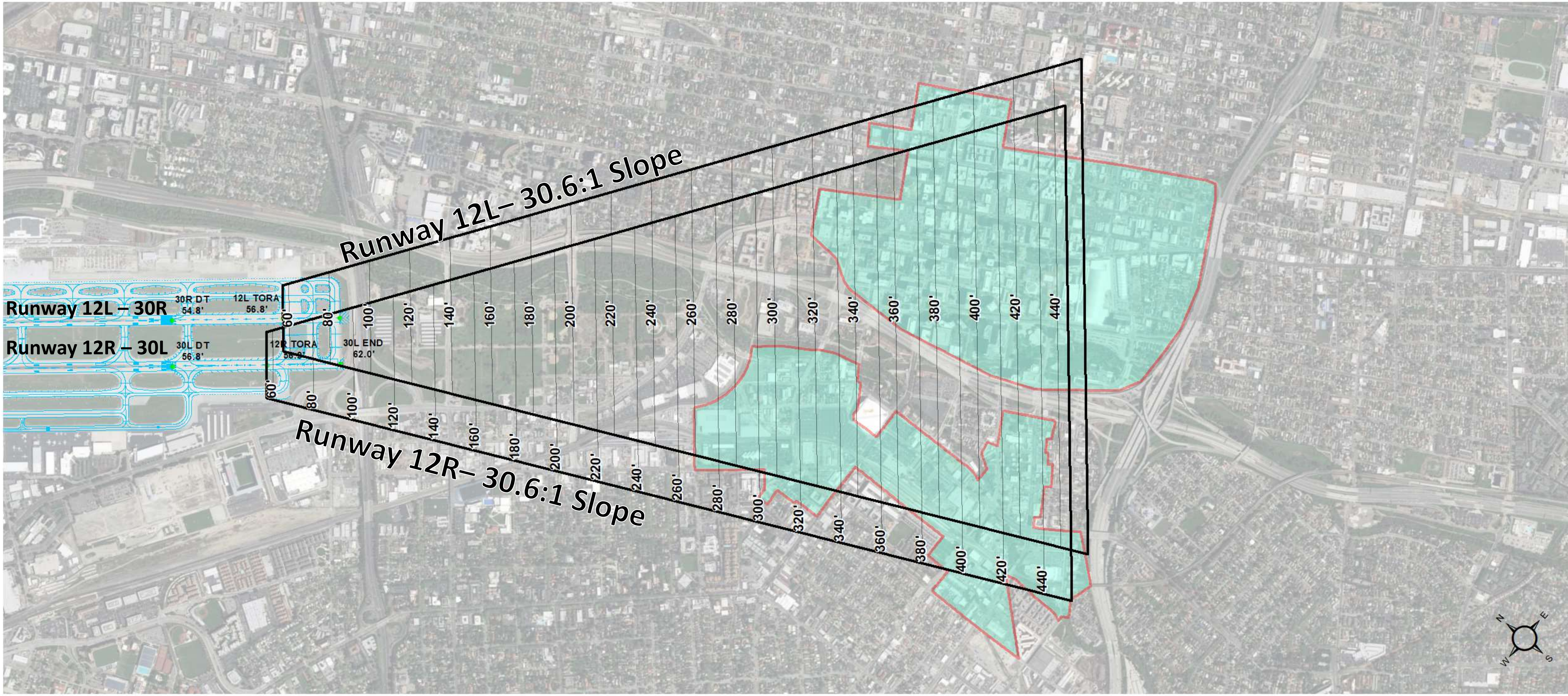
The 2018 CAT B, C and D circling minimums have increased 20 feet as compared to the 2007 circling minimums.

DEPARTURE SURFACE CLIMB GRADIENT ANALYSIS

TERPS DEPARTURE SURFACE STATUS UPDATE

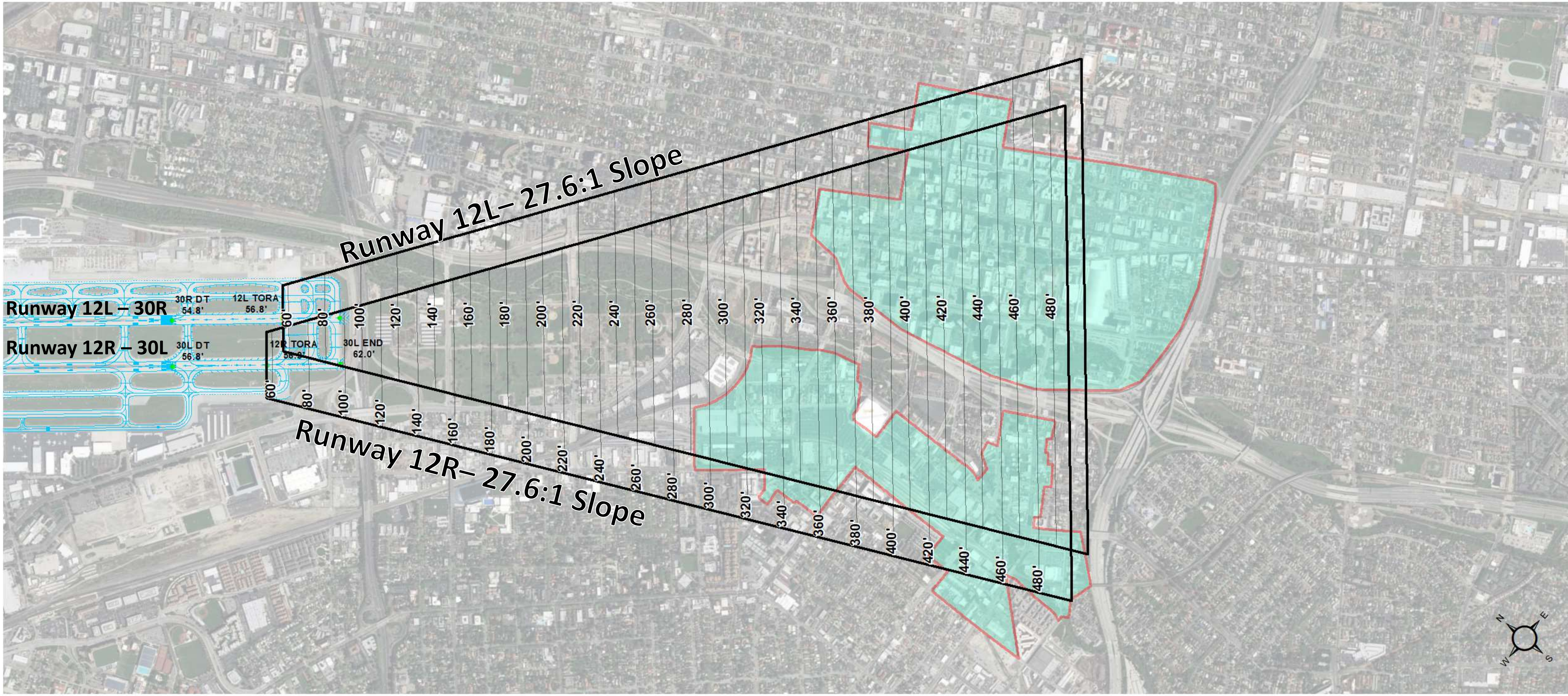
- REVIEW OF DEPARTURE SURFACE CLIMB GRADIENTS OVER DOWNTOWN CORE AND DIRIDON STATION
  - OBSTACLE DEPARTURE PROCEDURE (ODP) – 261’ FT./NM
  - SUNOL NINE DEPARTURE (RNAV) – 290 FT./NM CG TO 4,000 FT.
  - BMRNG FOUR DEPARTURE (RNAV) – 470 FT./NM CG TO 5,600 FT.
  - TECKY THREE DEPARTURE (RNAV) – 500 FT./NM CG TO 570 FT.
  - ALMDN FOUR DEPARTURE (RNAV) – 500 FT./NM CG TO 2,500 FT

TERPS DEPARTURE SURFACE – RUNWAY 12L/12R – 261 FT./NM CG



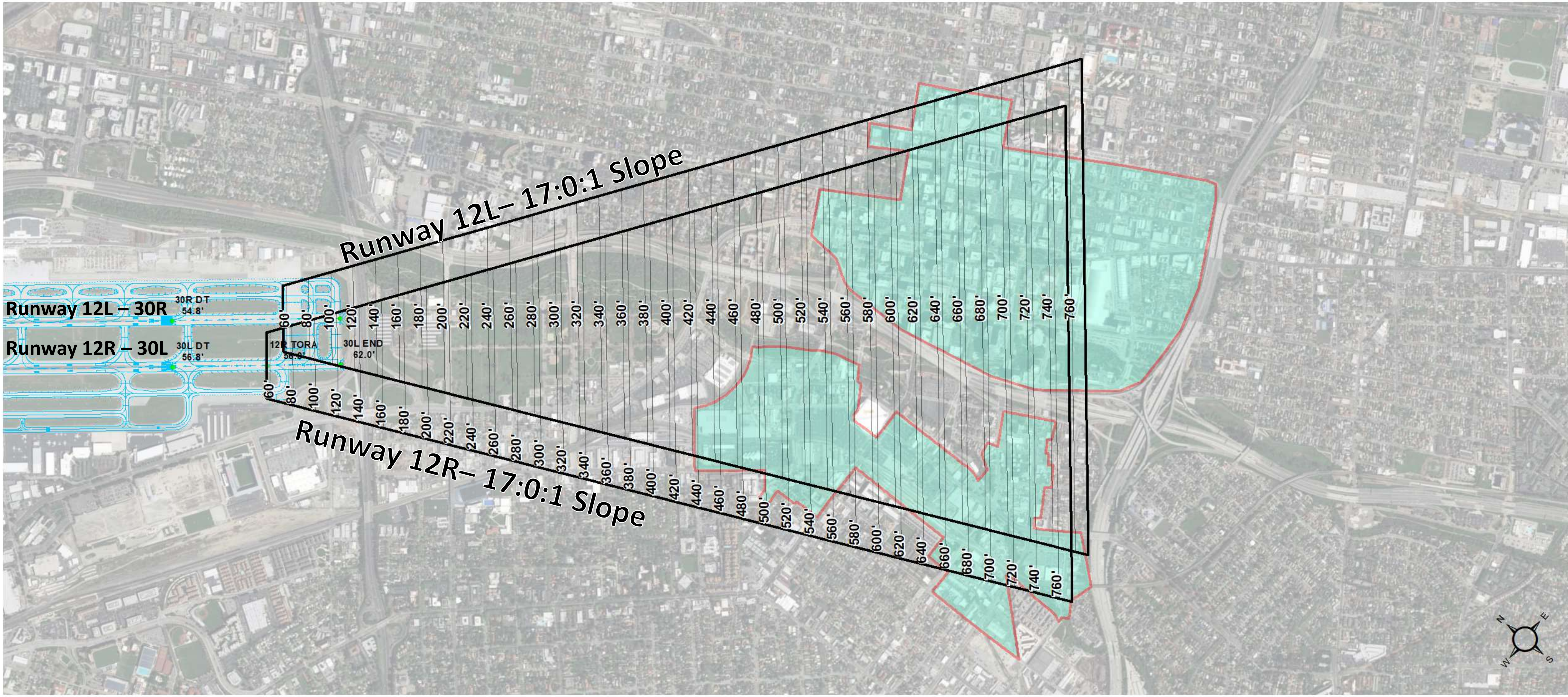
L&B

TERPS DEPARTURE SURFACE – RUNWAY 12L/12R – 290 FT./NM CG

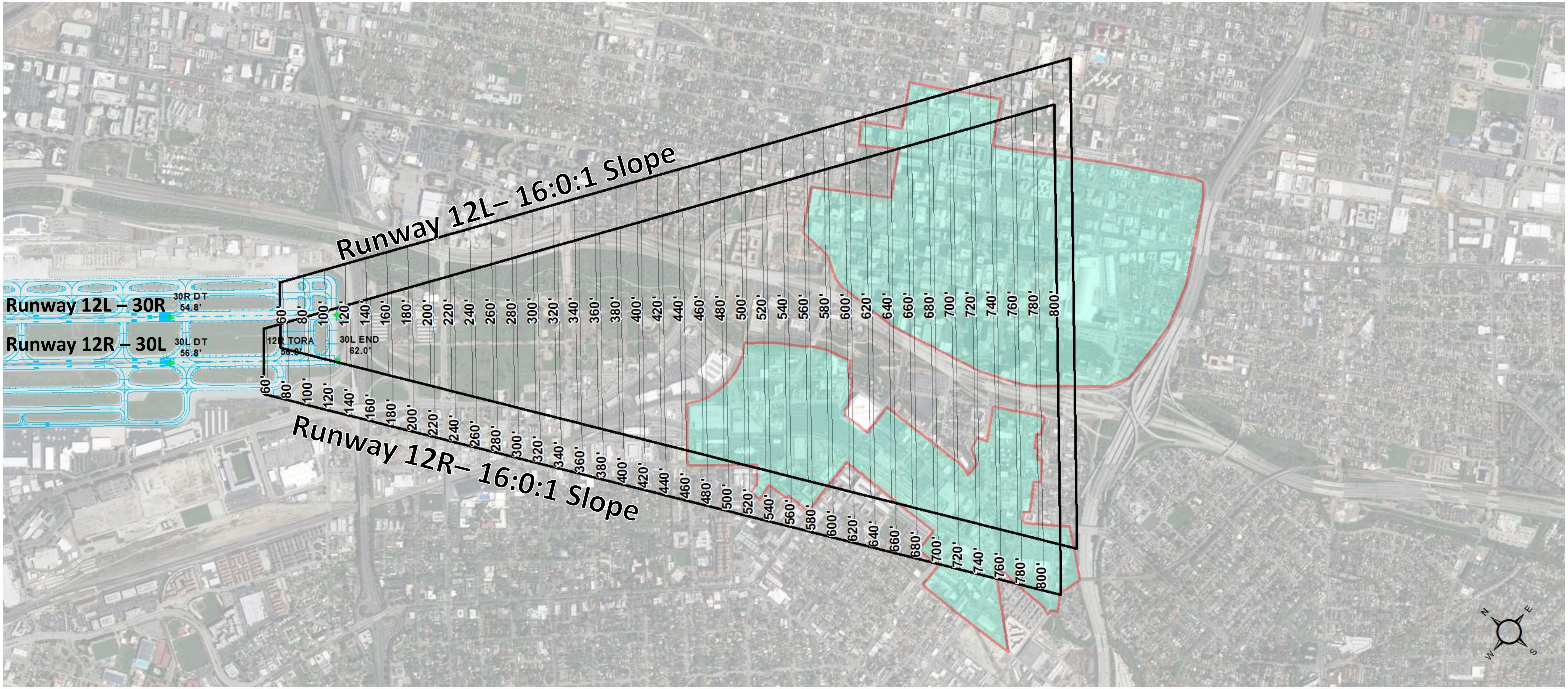


NOTE: SUNOL NINE DEPARTURE LIMITED TO PROP AIRCRAFT ONLY

TERPS DEPARTURE SURFACE – RUNWAY 12L/12R – 470 FT./NM CG



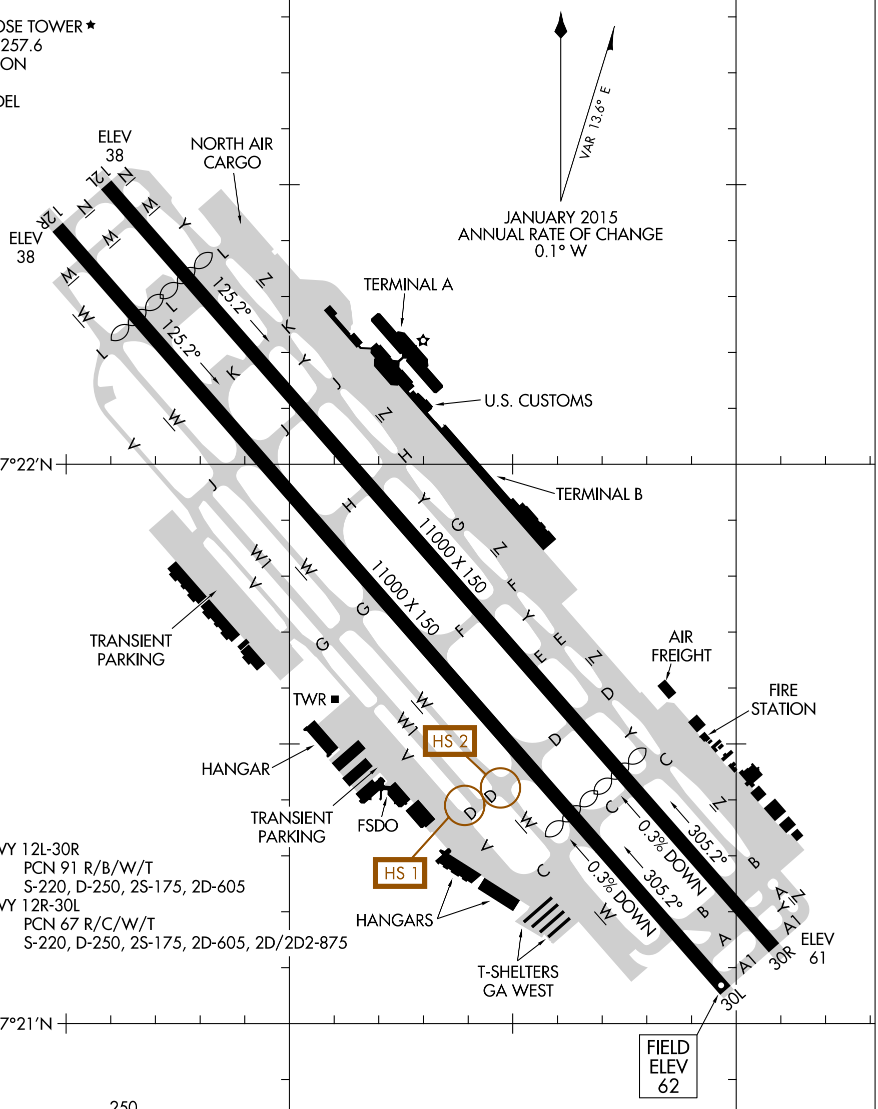
TERPS DEPARTURE SURFACE – RUNWAY 12L/12R – 500 FT./NM CG



AIRPORT DIAGRAM

NORMAN Y MINETA SAN JOSE INTL (SJC)
AL-693 (FAA)
SAN JOSE, CALIFORNIA

D-ATIS
126.95
SAN JOSE TOWER ★
124.0 257.6
GND CON
121.7
CLNC DEL
118.0
CPDLC
D



RWY 12L-30R
PCN 91 R/B/W/T
S-220, D-250, 2S-175, 2D-605
RWY 12R-30L
PCN 67 R/C/W/T
S-220, D-250, 2S-175, 2D-605, 2D/2D2-875

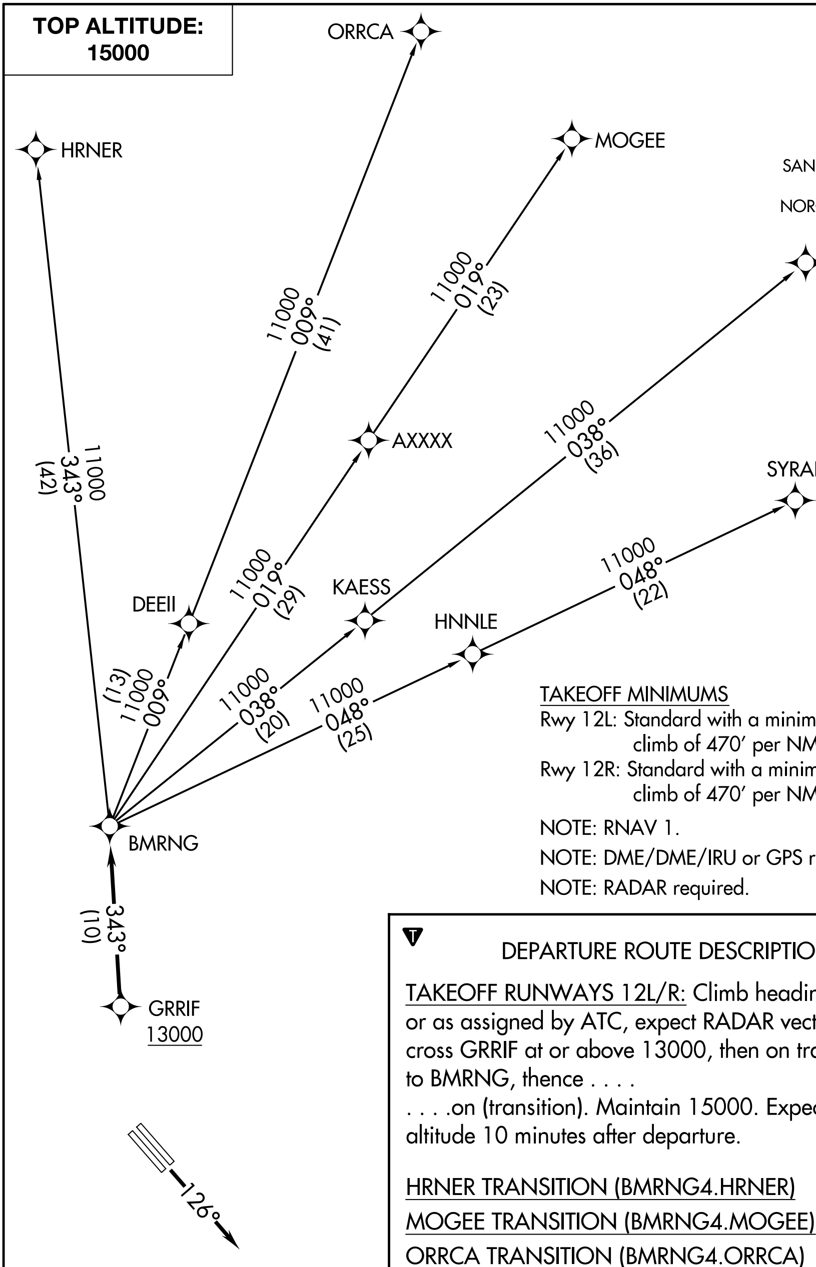
CAUTION: BE ALERT TO RUNWAY CROSSING CLEARANCES.
READBACK OF ALL RUNWAY HOLDING INSTRUCTIONS IS REQUIRED.

SW-2, 01 FEB 2018 to 01 MAR 2018

SW-2, 01 FEB 2018 to 01 MAR 2018

TOP ALTITUDE: 15000

D-ATIS 126.95
CLNC DEL 118.0
CPDLC
GND CON 121.7
SAN JOSE TOWER ★ 124.0 257.6
NORCAL DEP CON 121.3 270.35



TAKEOFF MINIMUMS

Rwy 12L: Standard with a minimum climb of 470' per NM to 5600.

Rwy 12R: Standard with a minimum climb of 470' per NM to 5600.

NOTE: RNAV 1.

NOTE: DME/DME/IRU or GPS required.

NOTE: RADAR required.

NOTE: Chart not to scale.

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAYS 12L/R: Climb heading 126° or as assigned by ATC, expect RADAR vectors to cross GRRIF at or above 13000, then on track 343° to BMRNG, thence . . . .

. . . .on (transition). Maintain 15000. Expect filed altitude 10 minutes after departure.

HRNER TRANSITION (BMRNG4.HRNER)

MOGEE TRANSITION (BMRNG4.MOGEE)

ORRCA TRANSITION (BMRNG4.ORRCA)

SYRAH TRANSITION (BMRNG4.SYRAH)

TIPRE TRANSITION (BMRNG4.TIPRE)

SW-2, 01 FEB 2018 to 01 MAR 2018

SW-2, 01 FEB 2018 to 01 MAR 2018

TECKY THREE DEPARTURE (RNAV)
(TECKY3.TECKY)

21JUL16

17341

AL-693 (FAA)

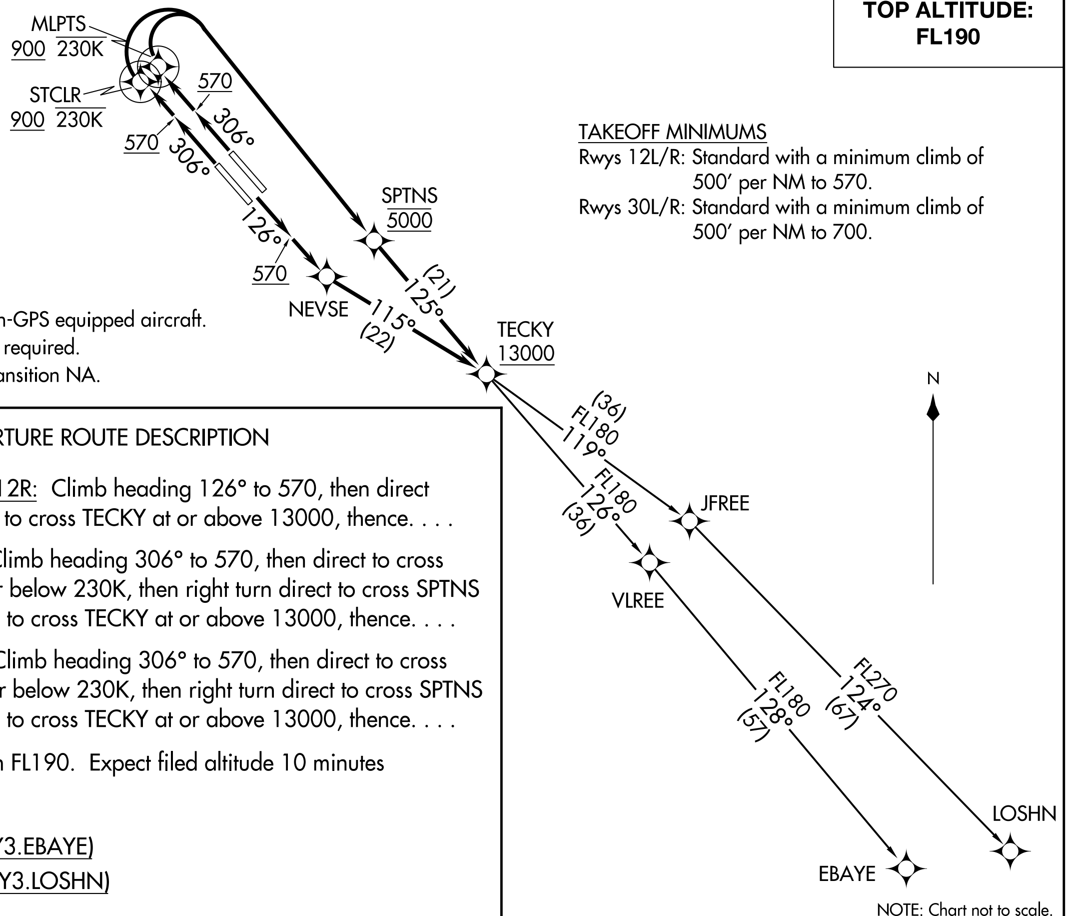
NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA

D-ATIS
126.95
CLNC DEL
118.0
CPDLC
GND CON
121.7
SAN JOSE TOWER ★
124.0 257.6
NORCAL DEP CON
121.3 270.35

TOP ALTITUDE: FL190

TAKEOFF MINIMUMS
Rwys 12L/R: Standard with a minimum climb of 500′ per NM to 570.
Rwys 30L/R: Standard with a minimum climb of 500′ per NM to 700.

NOTE: RNAV 1
NOTE: RADAR required for non-GPS equipped aircraft.
NOTE: DME/DME/IRU or GPS required.
NOTE: Rwys 12L/R: LOSHN transition NA.



DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAYS 12L, 12R: Climb heading 126° to 570, then direct NEVSE, then on track 115° to cross TECKY at or above 13000, thence. . . .

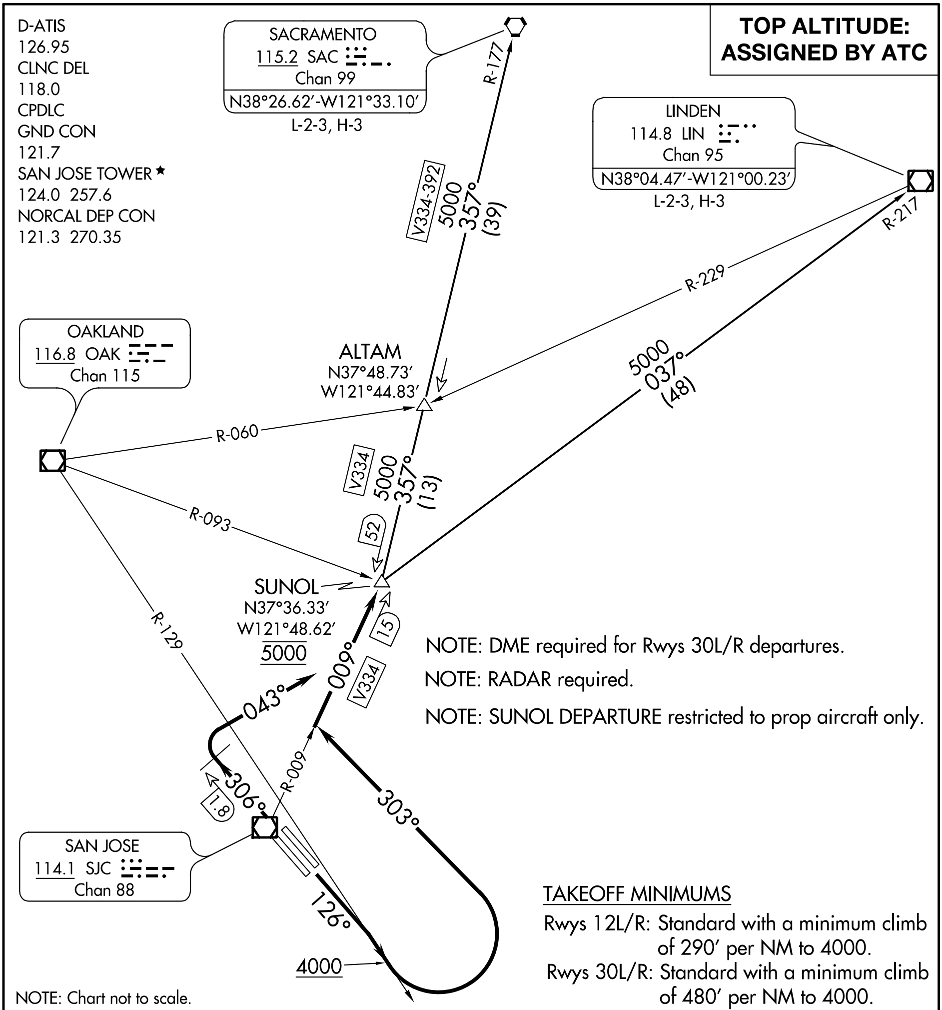
TAKEOFF RUNWAY 30L: Climb heading 306° to 570, then direct to cross STCLR at or above 900 at or below 230K, then right turn direct to cross SPTNS at 5000, then on track 125° to cross TECKY at or above 13000, thence. . . .

TAKEOFF RUNWAY 30R: Climb heading 306° to 570, then direct to cross MLPTS at or above 900 at or below 230K, then right turn direct to cross SPTNS at 5000, then on track 125° to cross TECKY at or above 13000, thence. . . .

. . . .on (transition), maintain FL190. Expect filed altitude 10 minutes after departure.

EBAYE TRANSITION (TECKY3.EBAYE)
LOSHN TRANSITION (TECKY3.LOSHN)

TECKY THREE DEPARTURE (RNAV)
(TECKY3.TECKY)
NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA



DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAYS 12L/R: Climb heading 126° to intercept and proceed on OAK R-129 to 4000, then turn left heading 303° for RADAR vectors to intercept and proceed on SJC R-009 to SUNOL. . . .

TAKEOFF RUNWAYS 30L/R: Climb heading 306°. At SJC 1.8 DME northwest of SJC VOR/DME, turn right heading 043° to intercept and proceed on SJC R-009 to SUNOL . . . .

. . . .cross SUNOL at 5000, then on (transition) or (assigned route).

LINDEN TRANSITION (SUNOL9.LIN): From over SUNOL INT on LIN R-217 to LIN VOR/DME.

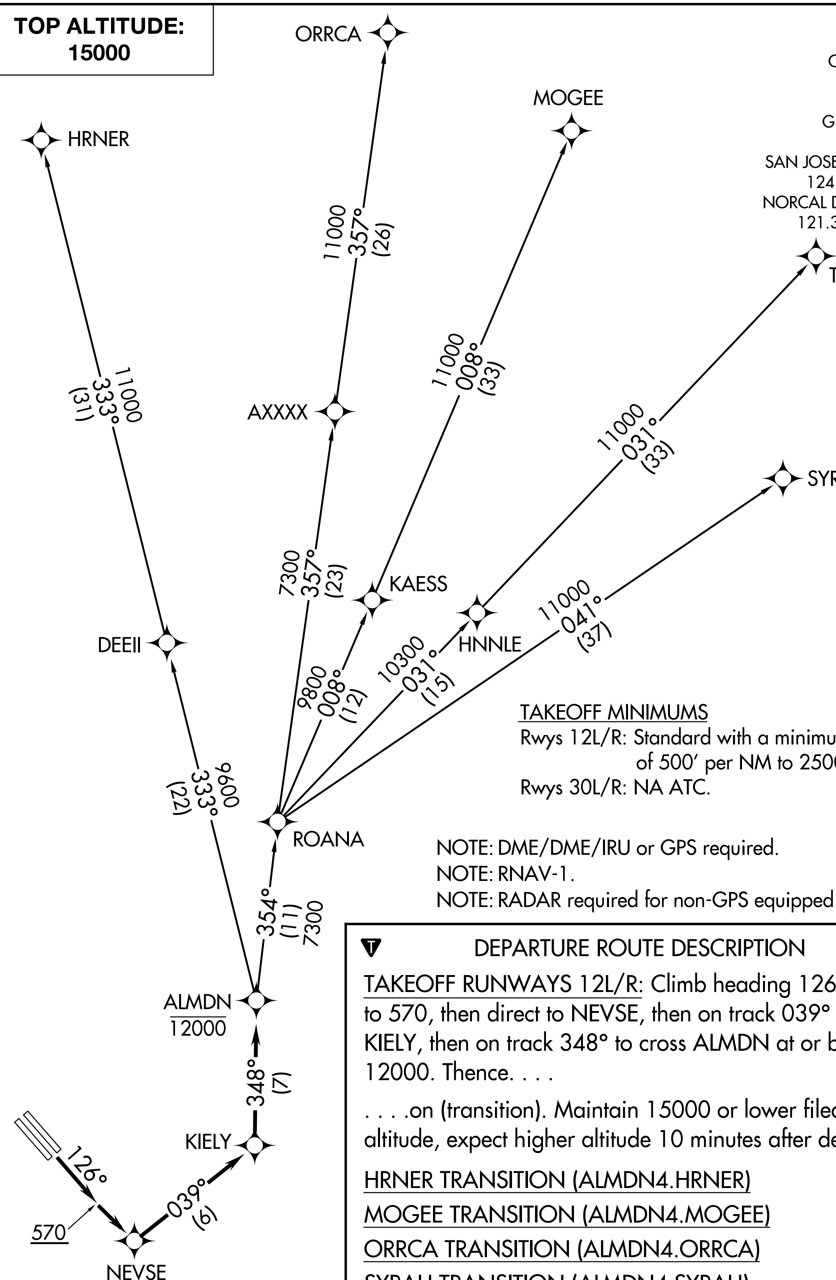
SACRAMENTO TRANSITION (SUNOL9.SAC): From over SUNOL INT on SAC R-177 to SAC VORTAC.

SW-2, 01 FEB 2018 to 01 MAR 2018

SW-2, 01 FEB 2018 to 01 MAR 2018

TOP ALTITUDE: 15000

D-ATIS
126.95
CLNC DEL
118.0
CPDLC
GND CON
121.7
SAN JOSE TOWER ★
124.0 257.6
NORCAL DEP CON
121.3 270.35



TAKEOFF MINIMUMS

Rwys 12L/R: Standard with a minimum climb of 500′ per NM to 2500.

Rwys 30L/R: NA ATC.

NOTE: DME/DME/IRU or GPS required.

NOTE: RNAV-1.

NOTE: RADAR required for non-GPS equipped aircraft.

NOTE: Chart not to scale.

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAYS 12L/R: Climb heading 126° to 570, then direct to NEVSE, then on track 039° to KIELY, then on track 348° to cross ALMDN at or below 12000. Thence. . . .

. . . .on (transition). Maintain 15000 or lower filed altitude, expect higher altitude 10 minutes after departure.

HRNER TRANSITION (ALMDN4.HRNER)

MOGEE TRANSITION (ALMDN4.MOGEE)

ORRCA TRANSITION (ALMDN4.ORRCA)

SYRAH TRANSITION (ALMDN4.SYRAH)

TIPRE TRANSITION (ALMDN4.TIPRE)

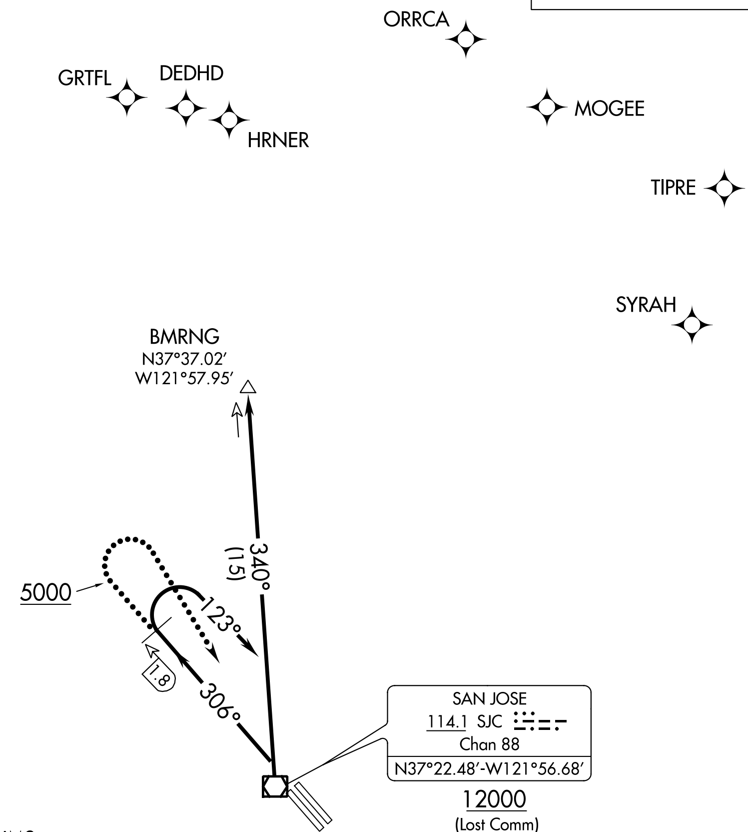
LOUPE FOUR DEPARTURE

AL-693 (FAA)

NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA

D-ATIS
126.95
CLNC DEL
118.0
CPDLC
GND CON
121.7
SAN JOSE TOWER ★
124.0 257.6
NORCAL DEP CON
121.3 270.35

TOP ALTITUDE:
5000



TAKEOFF MINIMUMS
Rwys 12L/R: NA-ATC.
Rwys 30L/R: Standard with a minimum climb of 470′ per NM to 5000.

NOTE: RADAR and DME required.

NOTE: Chart not to scale.

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAYS 30L/R: Climb heading 306°, at SJC VOR/DME 1.8 DME northwest turn right heading 123°. Expect vectors to SJC VOR/DME, then via SJC R-340 to BMRNG INT. Maintain 5000. Expect filed altitude 10 minutes after departure.

LOST COMMUNICATIONS
RUNWAYS 30L/R: If not in contact with departure control after reaching 5000′ turn right direct SJC VOR/DME thence via SJC VOR/DME R-340 to BMRNG INT, thence via assigned route. Cross SJC VOR/DME at or above 12000, then climb to filed altitude.

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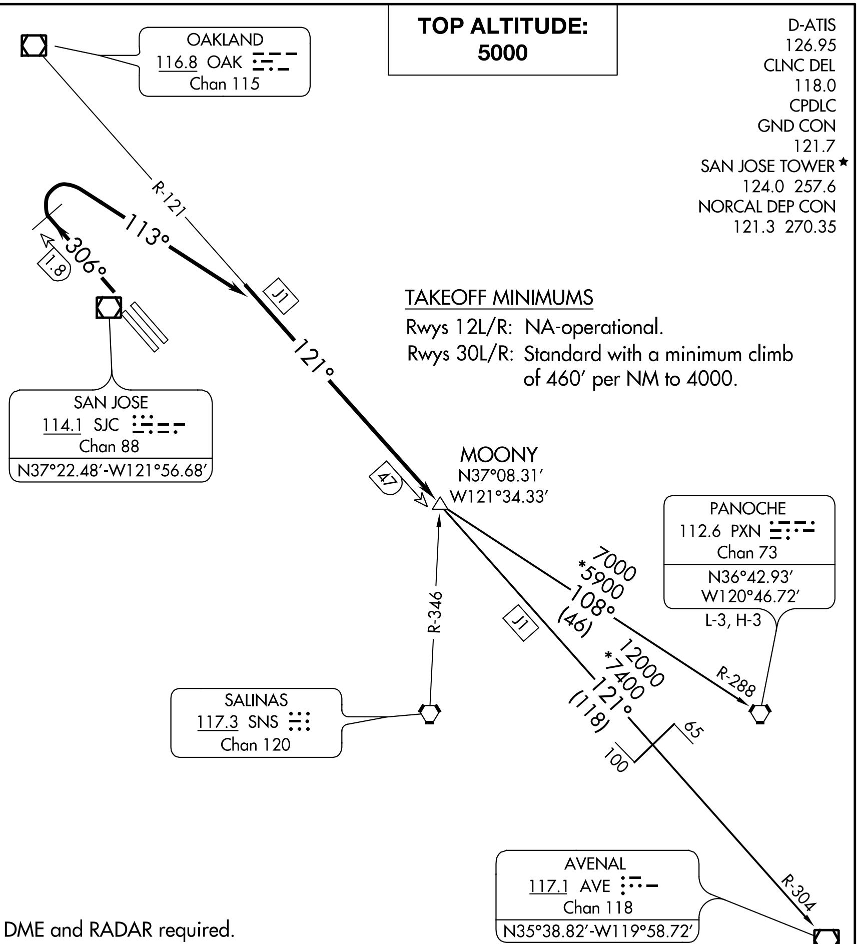
TOP ALTITUDE: 5000

D-ATIS 126.95
CLNC DEL 118.0
CPDLC
GND CON 121.7
SAN JOSE TOWER ★ 124.0 257.6
NORCAL DEP CON 121.3 270.35



TAKEOFF MINIMUMS
Rwys 12L/R: NA-operational.
Rwys 30L/R: Standard with a minimum climb of 460′ per NM to 4000.

NOTE: DME and RADAR required.

NOTE: Chart not to scale.

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAYS 12L/R: NA.

TAKEOFF RUNWAYS 30L/R: Climb heading 306° to SJC 1.8 DME NW of SJC VOR/DME, then turn right heading 113° to intercept and proceed on OAK R-121 to MOONY INT, thence. . . .

. . . .on (transition) or (assigned route). Maintain 5000, expect clearance to filed altitude ten minutes after departure.

AVENAL TRANSITION (SJC2.AVE): From over MOONY INT on OAK R-121 and AVE R-304 to AVE VOR/DME.

PANOCHE TRANSITION (SJC2.PXN): From over MOONY INT on PXN R-288 to PXN VORTAC.

RNAV (GPS) Y RWY 12R
NORMAN Y MINETA SAN JOSE INTL (SJC)

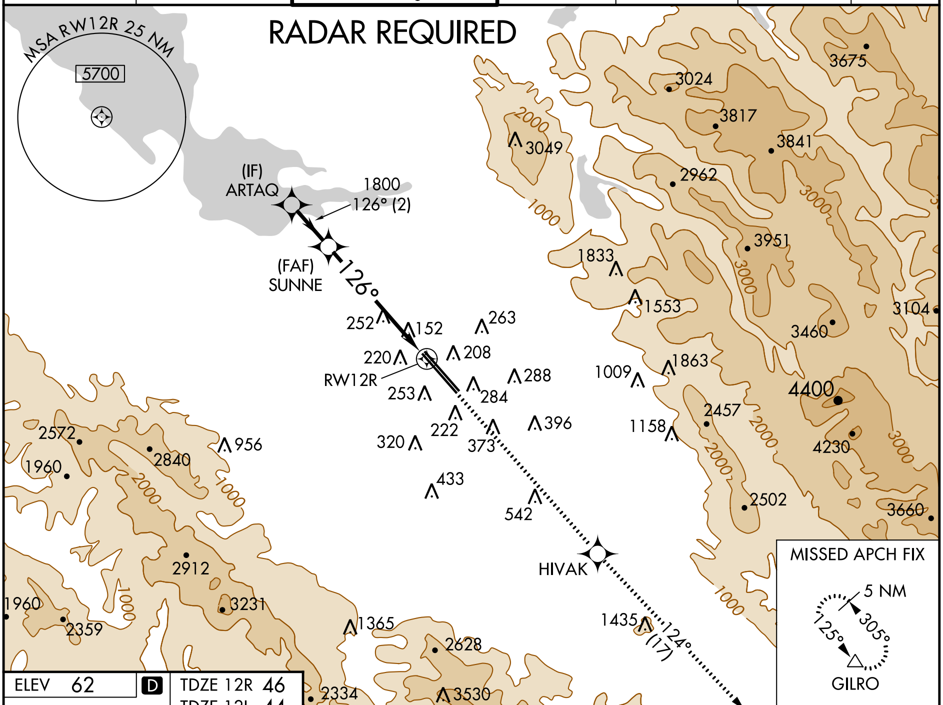
WAAS CH 90106 W12A	APP CRS 126°		12R	12L
		Rwy ldg	8587	8833
		TDZE	46	44
		Apt Elev	62	62

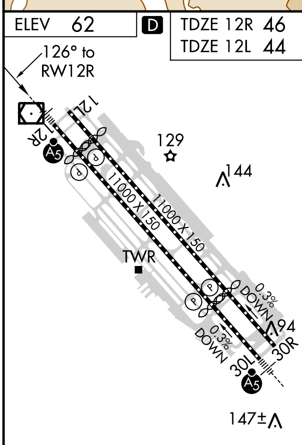
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -1°C (31°F) or above 54°C (130°F). DME/DME RNP-0.3 NA. For inoperative MALSR, increase LNAV/VNAV all Cats visibility to 1 mile and LNAV Cats C/D visibility to 1⅜ mile.

MALSR Rwy 12R

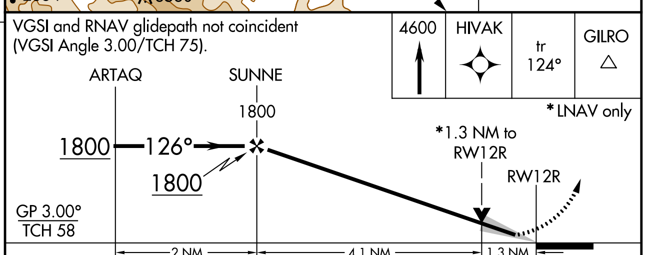
MISSED APPROACH: Climb to 4600 direct HIVAK and on track 124° to GILRO and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) Ⓛ 257.6	121.7	118.0		122.95





REIL Rwy 12L
HIRL Rwys 12L-30R and 12R-30L Ⓛ



CATEGORY		A	B	C	D
LPV	DA	246-½ 200 (200-½)			
LNAV/VNAV	DA	371-⅝ 325 (400-⅝)	371-1 325 (400-1)		
LNAV MDA		520-½ 474 (500-½)		520-1 474 (500-1)	
SIDESTEP 12L		520-1 476 (500-1)		520-1½ 476 (500-1½)	520-2 476 (500-2)

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ILS or LOC RWY 12R

NORMAN Y MINETA SAN JOSE INTL (SJC)

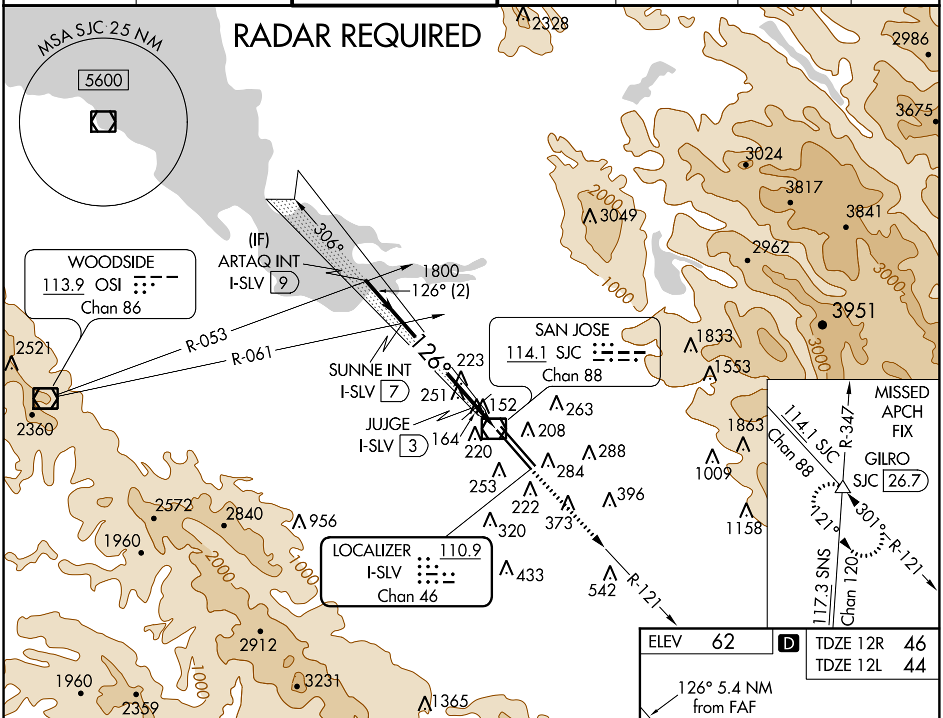
LOC/DME I-SLV 110.9 Chan 46	APP CRS 126°	Rwy ldg / TDZE / Apt Elev	12R	12L
		Rwy ldg	8587	8833
		TDZE	46	44
		Apt Elev	62	62

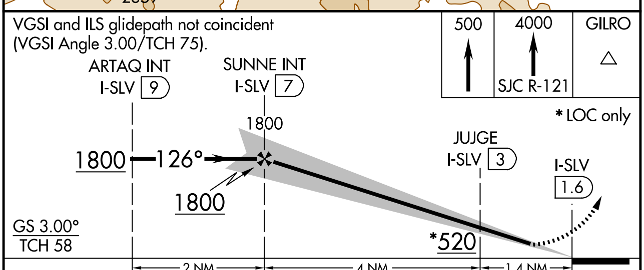
DME required.
For inoperative MALSR, increase S-LOC 12R Cat C/D visibility to 1 mile.

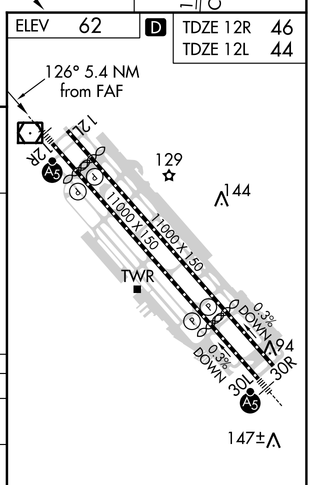
MALSR Rwy 12R

MISSED APPROACH: Climb to 500 then climb to 4000 on SJC VOR/DME R-121 to GILRO/SJC 26.7 DME and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) L 257.6	121.7	118.0		122.95







CATEGORY	A	B	C	D
S-ILS 12R	251-½ 205 (200-½)			
S-LOC 12R	420-½ 374 (400-½)		420-⅝ 374 (400-⅝)	
SIDESTEP RWY 12L	600-1 556 (600-1)		600-1½ 556 (600-1½)	600-2 556 (600-2)

REIL Rwy 12L
HIRL Rwys 12L-30R and 12R-30L L

APP CRS	Rwy ldg	7614
306°	TDZE	57
	Apt Elev	62

RNAV (RNP) Z RWY 30L

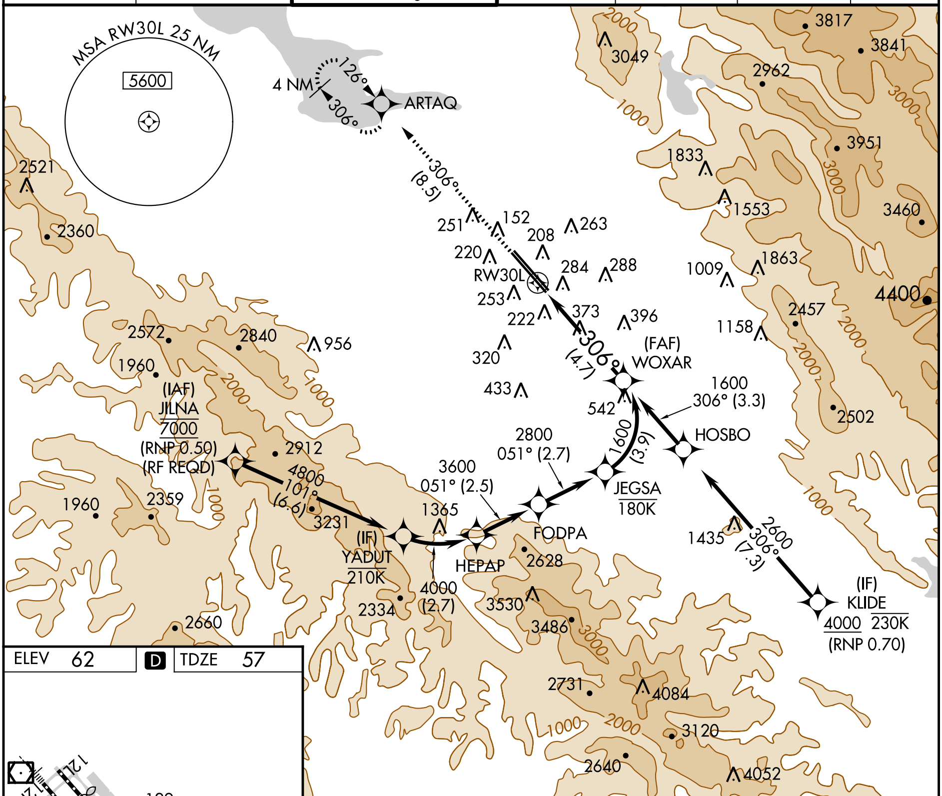
NORMAN Y MINETA SAN JOSE INTL (SJC)

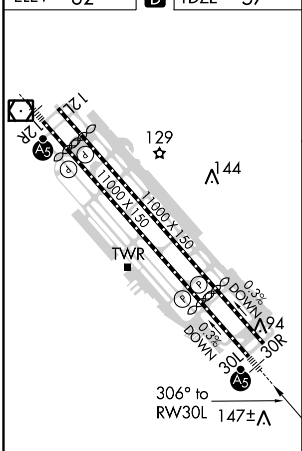
For uncompensated Baro-VNAV systems, procedure NA below -1°C (31°F) or above 54°C (130°F). GPS required. For inoperative MALSR, increase RNP 0.15 all Cats visibility to RVR 6000 and increase RNP 0.30 all Cats visibility to 1⅝ mile.

MALSR (A5)

MISSED APPROACH: Climb to 2300 on track 306° to ARTAQ and hold.

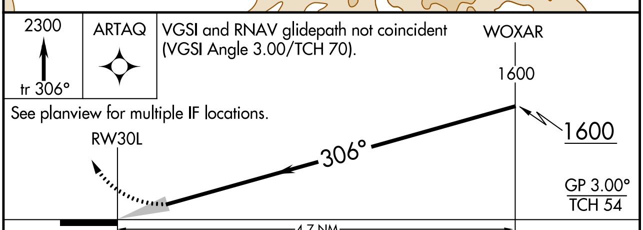
D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) Ⓛ 257.6	121.7	118.0		122.95





REIL Rwy 12L

HIRL Rwys 12L-30R and 12R-30L Ⓛ



CATEGORY	A	B	C	D
RNP 0.15 DA	421/40 364 (400-¾)			
RNP 0.30 DA	544/60 487 (500-1¼)			

AUTHORIZATION REQUIRED

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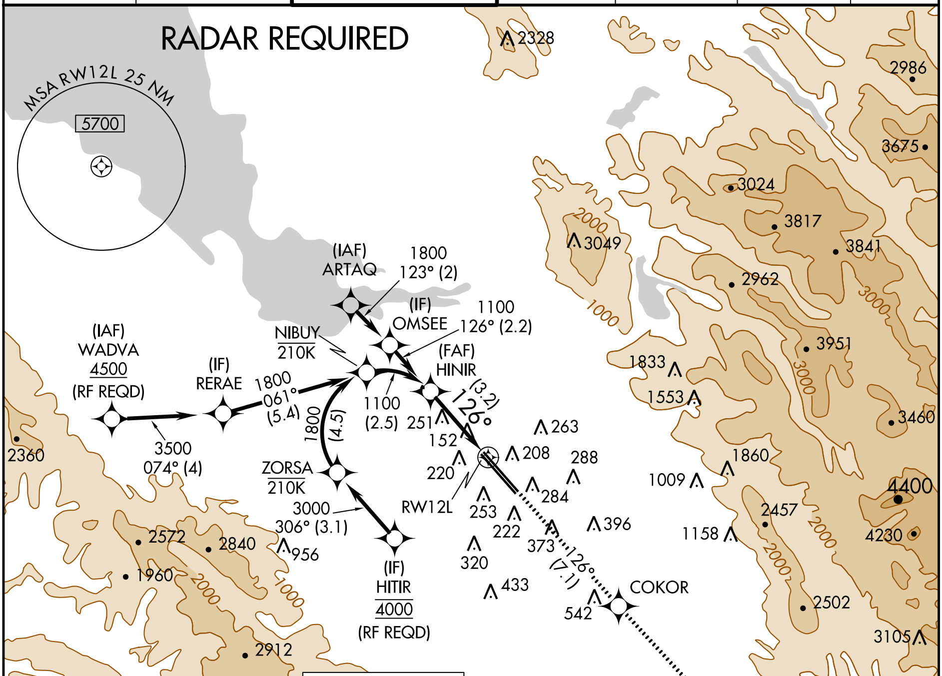
RNAV (RNP) Z RWY 12L
NORMAN Y MINETA SAN JOSE INTL (SJC)

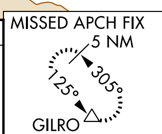
APP CRS	Rwy ldg	8833
126°	TDZE	44
	Apt Elev	62

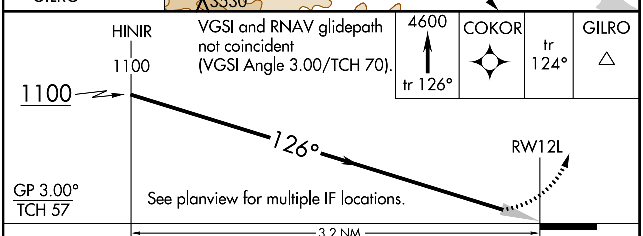
For uncompensated Baro-VNAV systems, procedure NA below 0°C (32°F) or above 54°C (130°F). GPS required.

MISSED APPROACH: Climb to 4600 on track 126° to COKOR and on track 124° to GILRO and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) L 257.6	121.7	118.0		122.95



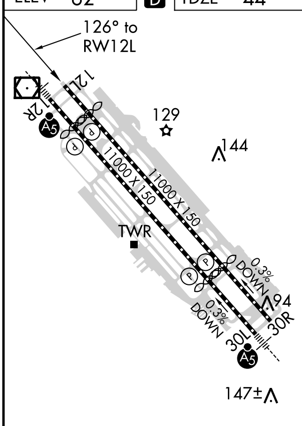




CATEGORY	A	B	C	D
RNP 0.18 DA	385-1⅛ 341 (400-1⅛)			
RNP 0.30 DA	451-1⅜ 407 (400-1⅜)			

AUTHORIZATION REQUIRED

ELEV 62 D TDZE 44



REIL Rwy 12L
HIRL Rwys 12L-30R and 12R-30L L

RNAV (RNP) Z RWY 12R

NORMAN Y MINETA SAN JOSE INTL (SJC)

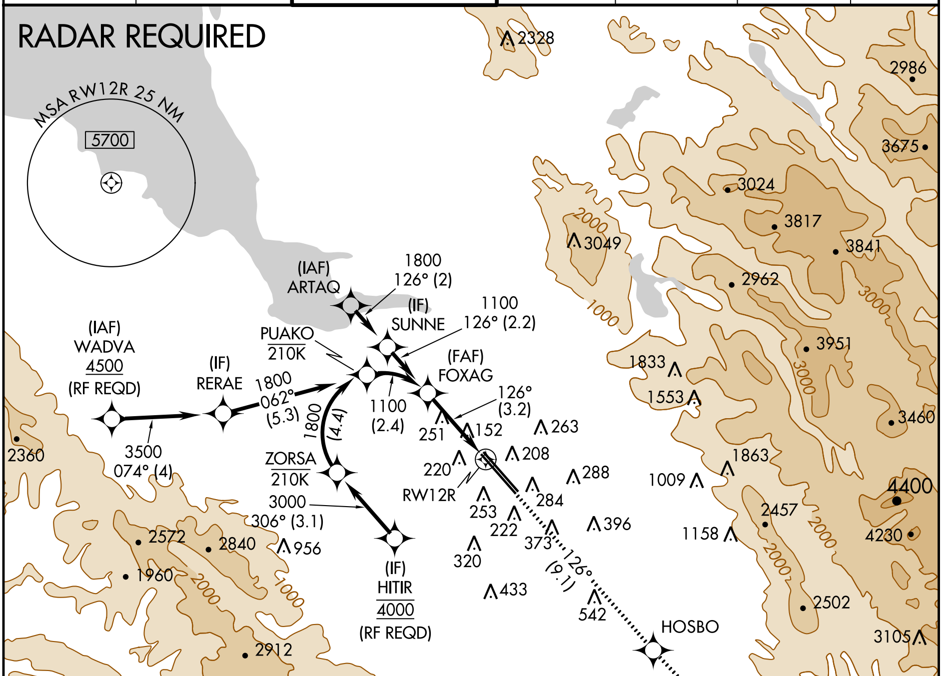
APP CRS	Rwy ldg	8587
126°	TDZE	46
	Apt Elev	62

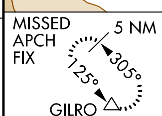
For uncompensated Baro-VNAV systems, procedure NA below 0°C (32°F) or above 54°C (130°F). GPS required.

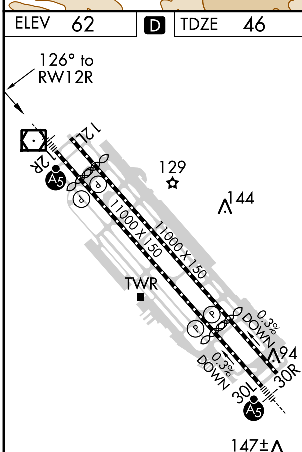
MALSR (A5)

MISSED APPROACH: Climb to 4600 on track 126° to HOSBO and on track 124° to GILRO and hold.

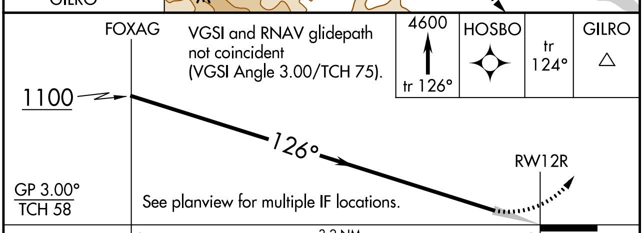
D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) L 257.6	121.7	118.0		122.95







REIL Rwy 12L
HIRL Rwys 12L-30R and 12R-30L L



CATEGORY	A	B	C	D
RNP 0.15 DA	380-5/8 334 (400-5/8)			
RNP 0.30 DA	486-1 440 (500-1)			

AUTHORIZATION REQUIRED

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ILS RWY 30L (SA CAT I & II)

NORMAN Y MINETA SAN JOSE INTL (SJC)

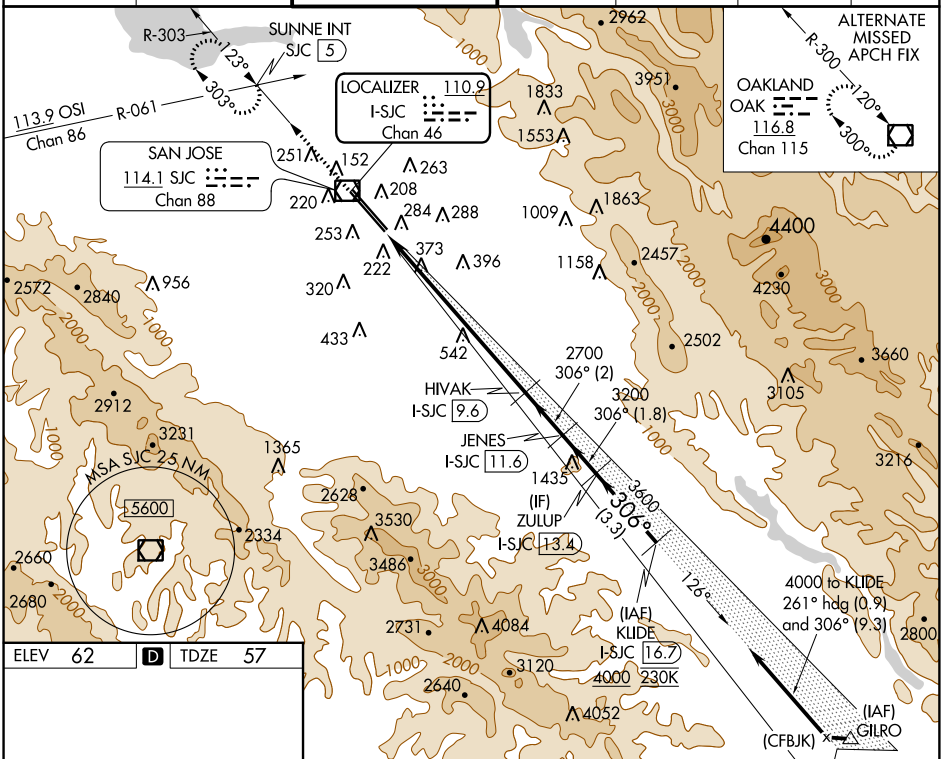
LOC/DME I-SJC	APP CRS	Rwy ldg 7614
110.9	**306°**	TDZE 57
Chan 46		Apt Elev 62

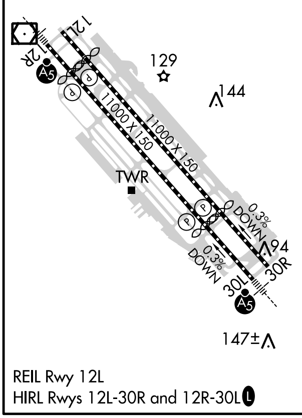
DME required. SA CAT I: Requires specific OPSPEC, MSPEC, or LOA approval and use of HUD to DH. SA CAT II: Reduced lighting: requires specific OPSPEC, MSPEC, or LOA approval and use of Autoland or HUD to touchdown. SA CAT I/II: NA when tower closed.

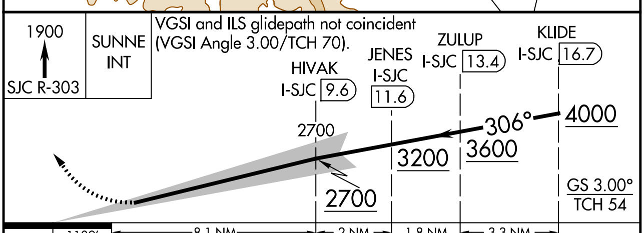
MALSR A5

MISSED APPROACH: Climb to 1900 on SJC VOR/DME R-303 to SUNNE INT/SJC 5 DME and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) L 257.6	121.7	118.0		122.95







CATEGORY	A	B	C	D
S-ILS 30L	SA CAT I RA 147/14 150 DA 207			
S-ILS 30L	SA CAT II RA 97/12 100 DA 157			

SA CATEGORY I & II ILS - SPECIAL AIRCREW AND AIRCRAFT CERTIFICATION REQUIRED

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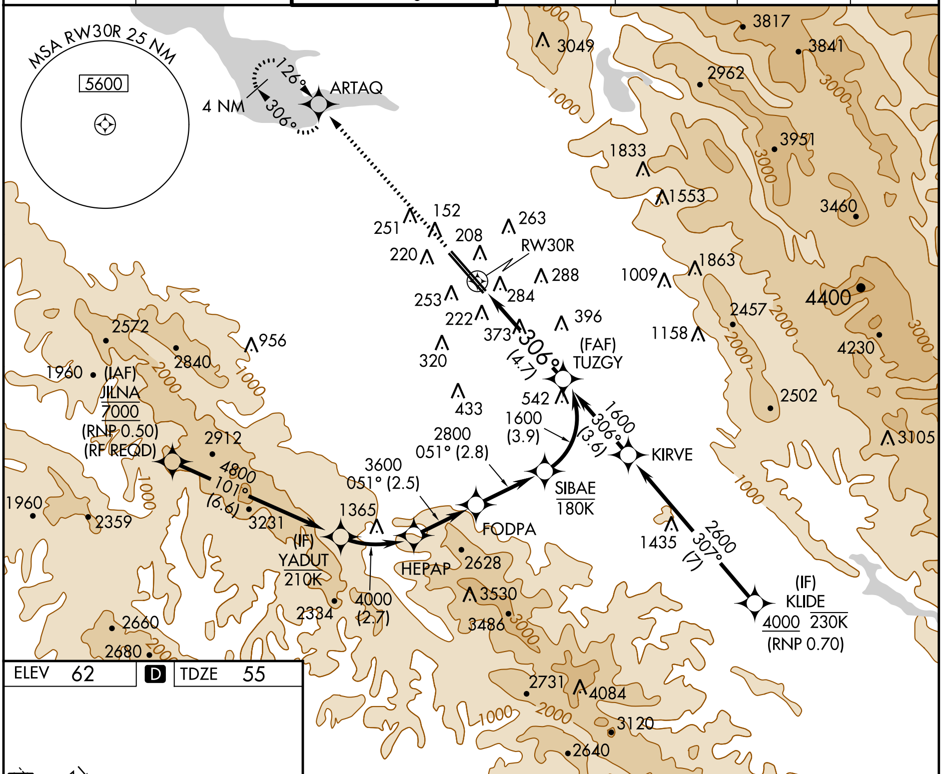
APP CRS	Rwy ldg	7597
306°	TDZE	55
	Apt Elev	62

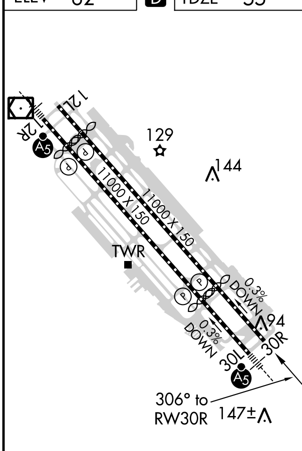
RNAV (RNP) Z RWY 30R
NORMAN Y MINETA SAN JOSE INTL (SJC)

For uncompensated Baro-VNAV systems, procedure NA below -1°C (31°F) or above 54°C (130°F). GPS required.

MISSED APPROACH: Climb to 600 then climb to 2300 direct ARTAQ and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) Ⓛ 257.6	121.7	118.0		122.95



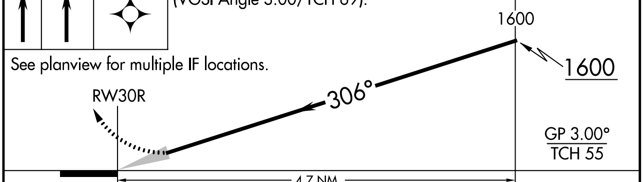


REIL Rwy 12L
HIRL Rwys 12L-30R and 12R-30L Ⓛ

600	2300	ARTAQ

VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 69).

See planview for multiple IF locations.



CATEGORY	A	B	C	D
RNP 0.11 DA	404-1⅛ 349 (400-1⅛)			
RNP 0.20 DA	475-1⅜ 420 (500-1⅜)			
RNP 0.30 DA	541-1⅝ 486 (500-1⅝)			

AUTHORIZATION REQUIRED

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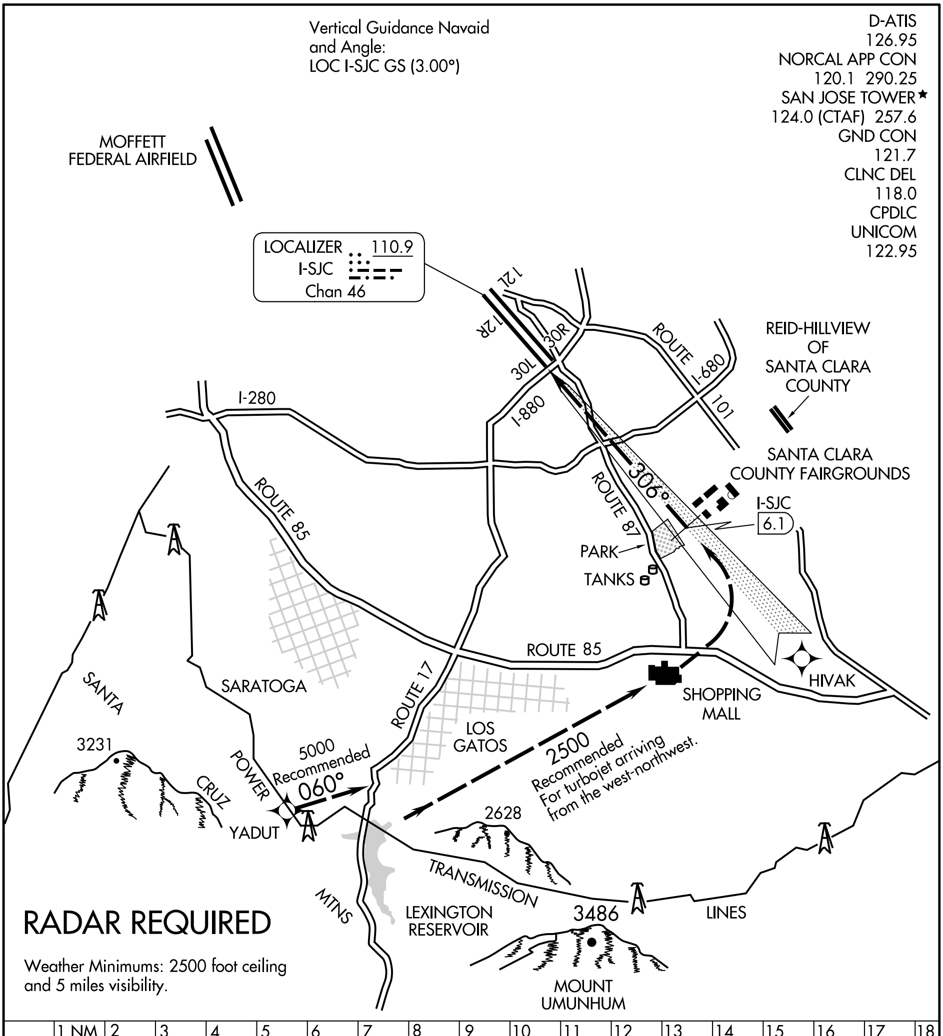
FAIRGROUNDS VISUAL RWYS 30L/R

SAN JOSE, CALIFORNIA



FAIRGROUNDS VISUAL APPROACH RUNWAYS 30L/R

When cleared for Fairgrounds Visual Approach, aircraft should turn final no closer than I-SJC 6.1 DME for noise abatement.

NOTE: Closely spaced parallel visual approaches may be in progress to Runways 30L/R. In the event of a go-around on Runway 30L, proceed straight-ahead heading 300°, or on Runway 30R, turn right heading 120°, climb and maintain 4000, or as directed by ATC.

ILS or LOC RWY 30L

NORMAN Y MINETA SAN JOSE INTL (SJC)

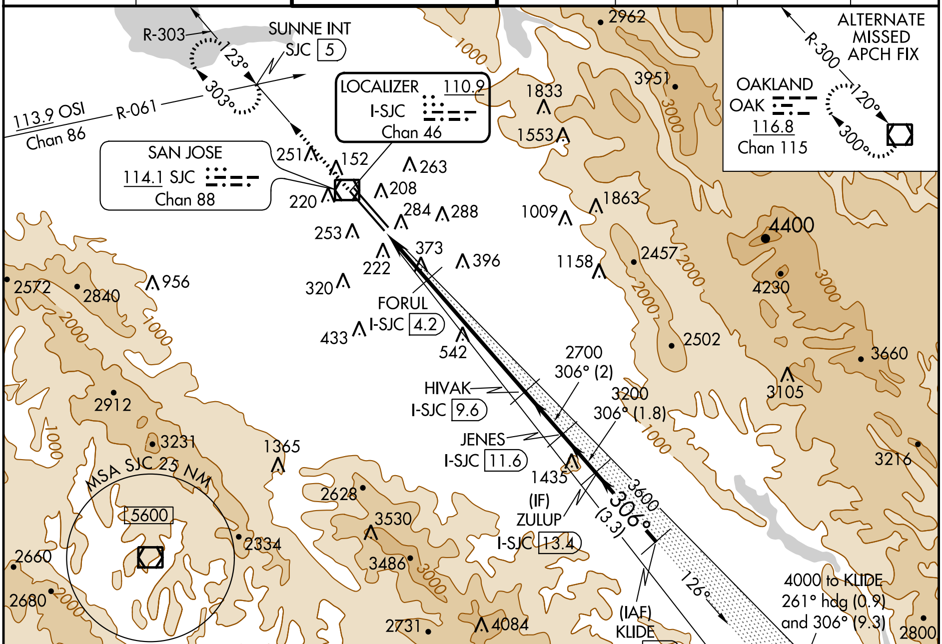
LOC/DME I-SJC	APP CRS		30L	30R
110.9	**306°**	Rwy ldg	**7614**	**7597**
Chan **46**		TDZE	**57**	**55**
		Apt Elev	**62**	**62**

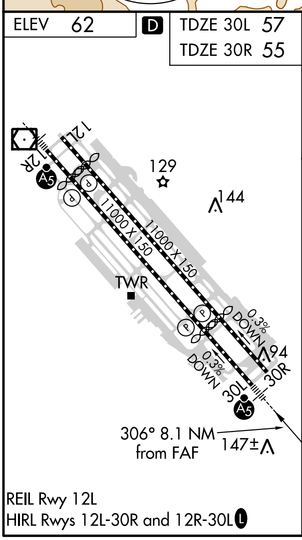
T A DME required.
RVR 1800 authorized with use of FD or AP or HUD to DA.

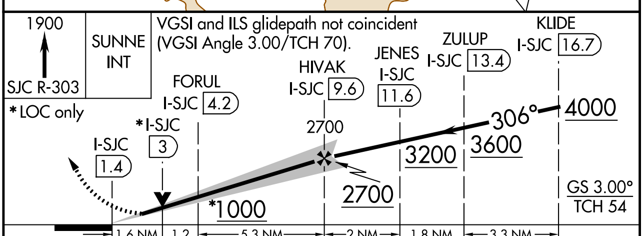
MALSR Rwy 30L A5

MISSED APPROACH: Climb to 1900 on SJC VOR/DME R-303 to SUNNE INT/SJC 5 DME and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	**120.1 290.25**	**124.0** (CTAF) L **257.6**	**121.7**	**118.0**		**122.95**







CATEGORY	A	B	C	D
S-ILS 30L #	257/24 200 (200-½)			
S-LOC 30L	640/24 583 (600-½)		640-1¼ 583 (600-1¼)	
SIDESTEP 30R	640-1 585 (600-1)		640-1½ 585 (600-1½)	640-2 585 (600-2)

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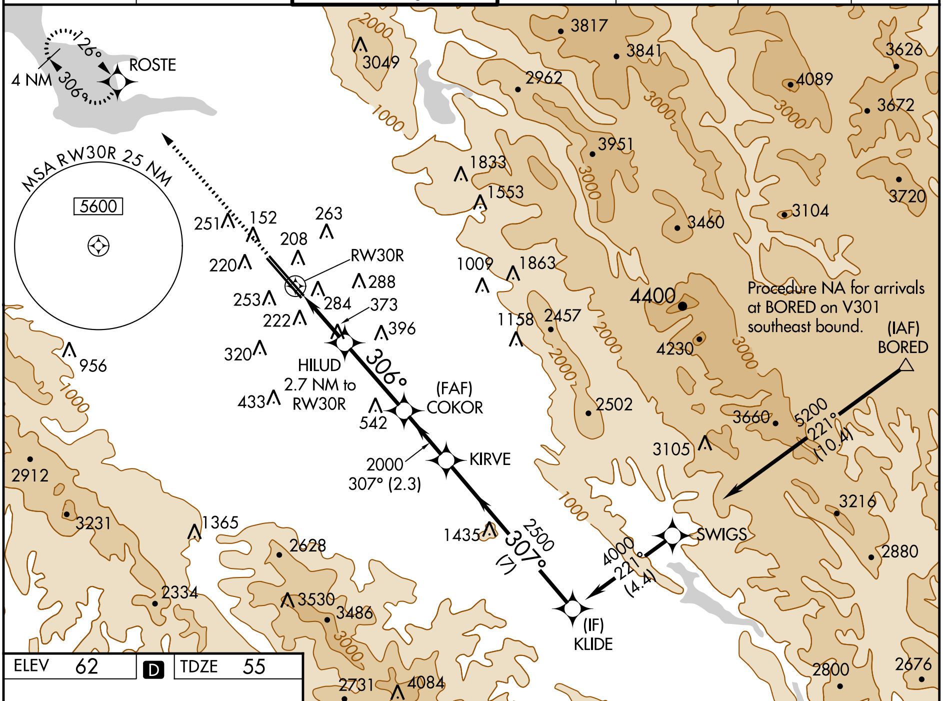
WAAS CH 72901 W30B	APP CRS 306°	Rwy ldg 7597 TDZE 55 Apt Elev 62

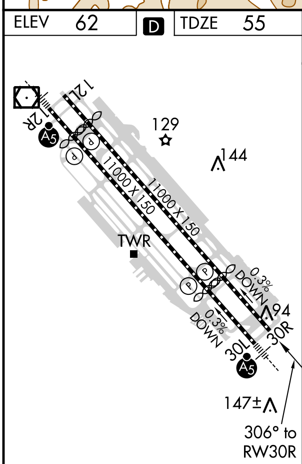
RNAV (GPS) Y RWY 30R
NORMAN Y MINETA SAN JOSE INTL (SJC)

T For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -1°C (31°F) or above 54°C (130°F). DME/DME RNP-0.3 NA.

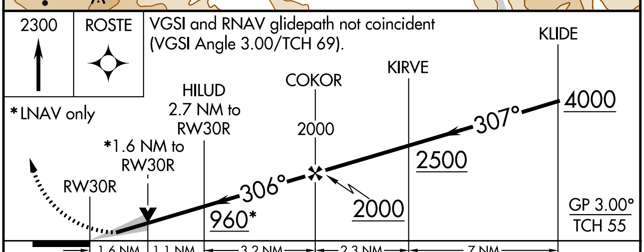
MISSED APPROACH: Climb to 2300 direct ROSTE and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) L 257.6	121.7	118.0		122.95





REIL Rwy 12L
HIRL Rwys 12L-30R and 12R-30L L



CATEGORY	A	B	C	D
LPV DA	255-¾ 200 (200-¾)			
LNAV/VNAV DA	541-1⅝ 486 (500-1⅝)			
LNAV MDA	640-1 585 (600-1)		640-1¾ 585 (600-1¾)	
C CIRCLING	640-1 578 (600-1)	700-1 638 (700-1)	700-1¾ 638 (700-1¾)	700-2 638 (700-2)

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RNAV (GPS) Y RWY 30L

NORMAN Y MINETA SAN JOSE INTL (SJC)

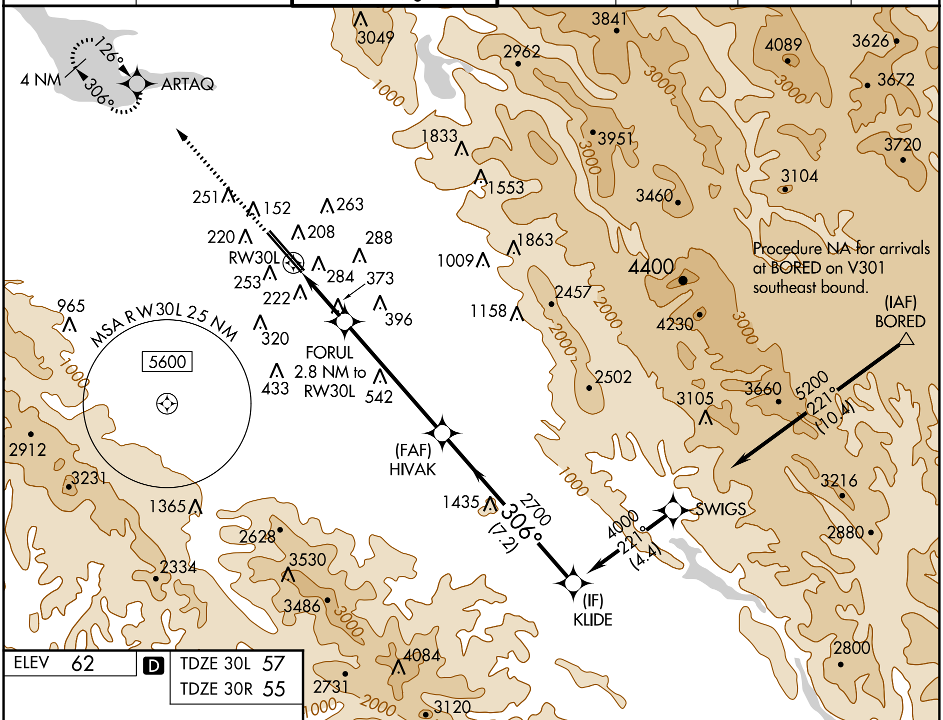
WAAS CH 97306 W30A	APP CRS 306°		30L	30R
		Rwy ldg	7614	7597
		TDZE	57	55
		Apt Elev	62	62

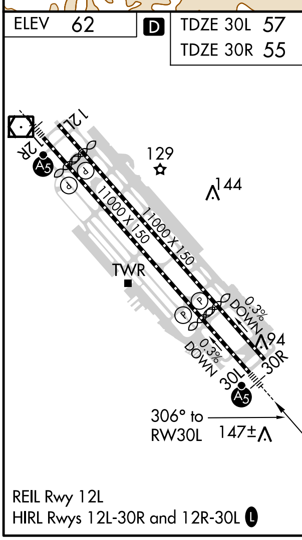
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -1°C (31°F) or above 54°C (130°F).
DME/DME RNP-0.3 NA.
RVR 1800 authorized with use of FD or AP or HUD to DA.

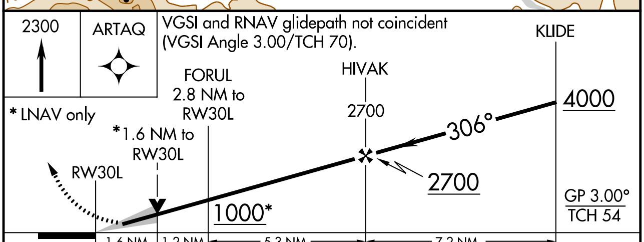
MALSR Rwy 30L

MISSED APPROACH: Climb to 2300 direct ARTAQ and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) L 257.6	121.7	118.0		122.95







CATEGORY	A	B	C	D
LPV DA #	257/24 200 (200-½)			
LNAV/VNAV DA	540/60 483 (500-1¼)			
LNAV MDA	640/24 583 (600-½)		640-1¼ 583 (600-1¼)	
SIDESTEP 30R	640-1 585 (600-1)			

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WAAS CH 69501 W12B	APP CRS 126°	Rwy ldg 8833 TDZE 44 Apt Elev 62

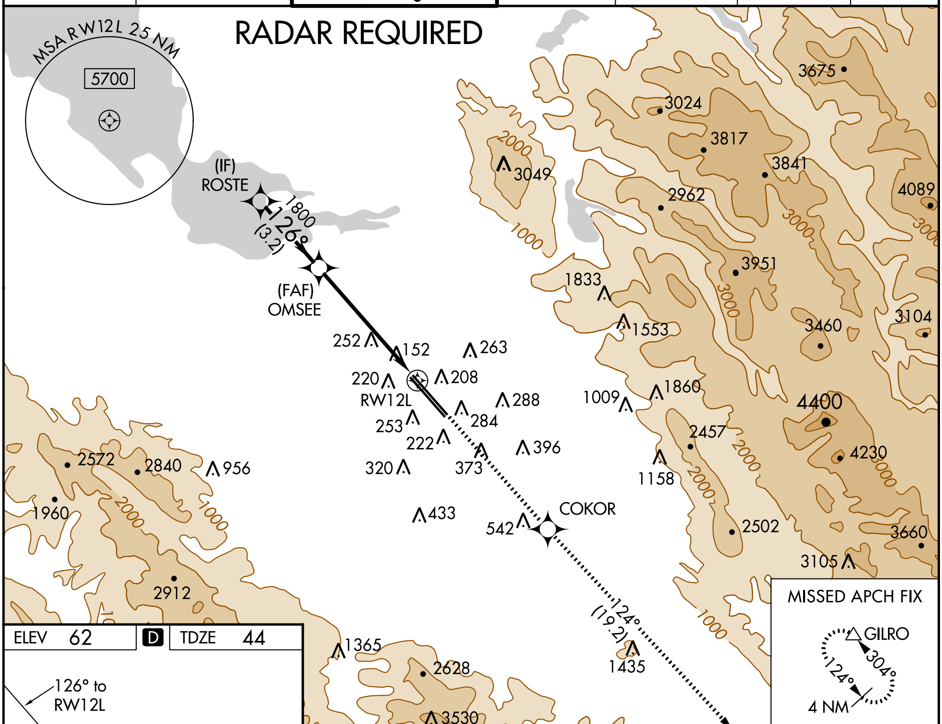
RNAV (GPS) Y RWY 12L

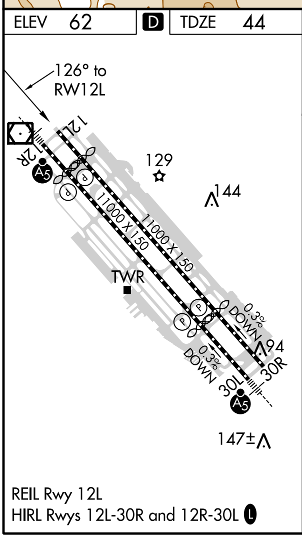
NORMAN Y MINETA SAN JOSE INTL (SJC)

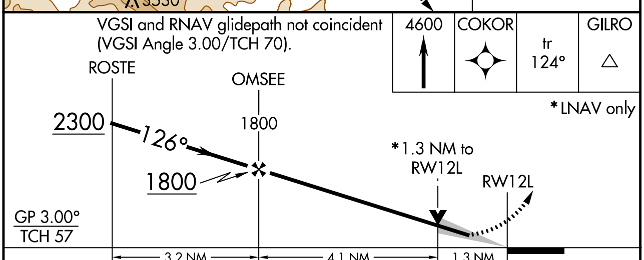
For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -1°C (31°F) or above 54°C (130°F).
DME/DME RNP- 0.3 NA.

MISSED APPROACH: Climb to 4600 direct COKOR and on track 124° to GILRO and hold.

D-ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL	CPDLC	UNICOM
126.95	120.1 290.25	124.0 (CTAF) L 257.6	121.7	118.0		122.95







CATEGORY	A	B	C	D
LPV DA	294-¾ 250 (300-¾)			
LNAV/VNAV DA	341-1 297 (300-1)			
LNAV MDA	520-1 476 (500-1)		520-1⅜ 476 (500-1⅜)	

IFR TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES

Civil Airports and Selected Military Airports

ALL USERS: Airports that have Departure Procedures (DPs) designed specifically to assist pilots in avoiding obstacles during the climb to the minimum enroute altitude, and/or airports that have civil IFR takeoff minimums other than standard, are listed below. Takeoff Minimums and Departure Procedures apply to all runways unless otherwise specified. An entry may also be listed that contains only Takeoff Obstacle Notes. Altitudes, unless otherwise indicated, are minimum altitudes in MSL.

DPs specifically designed for obstacle avoidance are referred to as Obstacle Departure Procedures (ODPs) and are textually described below, or published separately as a graphic procedure. If the ODP is published as a graphic procedure, its name will be listed below, and it can be found in either this volume (civil), or the applicable military volume, as appropriate. Users will recognize graphic obstacle DPs by the term "(OBSTACLE)" included in the procedure title; e.g., TETON TWO (OBSTACLE). If not specifically assigned an ODP, SID, or radar vector as part of an IFR clearance, an ODP may be required to be flown for obstacle clearance, even though not specifically stated in the IFR clearance. When doing so in this manner, ATC should be informed when the ODP being used contains a specified route to be flown, restrictions before turning, and/or altitude restrictions.

Some ODPs, which are established solely for obstacle avoidance, require a climb in visual conditions to cross the airport, a fix, or a NAVAID in a specified direction, at or above a specified altitude. These procedures are called Visual Climb Over Airport (VCOA). To ensure safe and efficient operations, the pilot must verbally request approval from ATC to fly the VCOA when requesting their IFR clearance.

At some locations where an ODP has been established, a diverse vector area (DVA) may be created to allow radar vectors to be used in lieu of an ODP. DVA information will state that headings will be as assigned by ATC and climb gradients, when applicable, will be published immediately following the specified departure procedure.

Graphic DPs designed by ATC to standardize traffic flows, ensure aircraft separation and enhance capacity are referred to as "Standard Instrument Departures (SIDs)". SIDs also provide obstacle clearance and are published under the appropriate airport section. ATC clearance must be received prior to flying a SID.

CIVIL USERS NOTE: Title 14 Code of Federal Regulations Part 91 prescribes standard takeoff rules and establishes takeoff minimums for certain operators as follows: (1) For aircraft, other than helicopters, having two engines or less – one statute mile visibility. (2) For aircraft having more than two engines – one-half statute mile visibility. (3) For helicopters – one-half statute mile visibility. These standard minima apply in the absence of any different minima listed below.

MILITARY USERS NOTE: Civil (nonstandard) takeoff minima are published below. For military takeoff minima, refer to appropriate service directives.

NAME | TAKEOFF MINIMUMS

ALTURAS, CA

ALTURAS MUNI (AAT)

TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES
AMDT 2 08101 (FAA)

DEPARTURE PROCEDURE: Use BACHS DEPARTURE.

AMEDEE AAF (KAHC), HERLONG, CA

TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES
AMDT 1, 09239

Rwy 8, 26: 4000-3 for climb in visual conditions.
Rwy 8, 26: Cross Amedee AAF at or above 7900 before proceeding on course.

01 FEB 2018 to 01 MAR 2018

SAN JOSE, CA

NORMAN Y MINETA SAN JOSE INTL (SJC)

TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES
AMDT 6C 16203 (FAA)

TAKEOFF MINIMUMS: **Rwy12 L/R,** 400-2½ or std. w/min. climb of 261' per NM to 500.

DEPARTURE PROCEDURE: **Rwy 12L/R,** climbing right turn to 2000 on Heading 318° and on OAK R-135 to OAK VOR/DME before proceeding on course. **Rwy 30L/R,** climb via heading 315° to 2000, then via OAK R-132 to OAK VOR/DME before proceeding on course.

TAKEOFF OBSTACLE NOTES: **Rwy 12L,** fence 156' from DER, 57' left of centerline, 14' AGL/73' MSL. Ol on blast fence, 156' from DER, 57' left of centerline, 73' MSL. Pole 191' from DER, 81' left of centerline, 34' AGL/93' MSL. Trees beginning 286' from DER, 161' right of centerline, up to 107' MSL. T-L twr, pole beginning 466' from DER, 228' left of centerline, up to 46' AGL/105' MSL. Tree 1281' from DER, 529' left of centerline, 117' MSL. T-L twr 1731' from DER, 729' left of centerline, 86' AGL/156' MSL. Tree 1799' from DER, 273' left of centerline, 144' MSL. Tree 1887' from DER, 68' right of centerline, 124' MSL. T-L twr 3047' from DER, 543' left of centerline, 73' AGL/147' MSL. Building 1.2 NM from DER, 630' left of centerline, 170' AGL/250' MSL. Building 1.3 NM from DER, 1051' left of centerline, 265' MSL. Building 1.3 NM from DER, 445' left of centerline, 217' AGL/301' MSL. Building 1.3 NM from DER, 51' left of centerline, 228' AGL/309' MSL. Buildings beginning 1.3 NM from DER, 81' left of centerline, up to 312' MSL. Building 1.5 NM from DER, 975' left of centerline, 262' AGL/351' MSL. Building 1.5 NM from DER, 1591' left of centerline, 268' AGL/358' MSL. Buildings beginning 1.5 NM from DER, 82' left of centerline, up to 365' MSL. Buildings beginning 1.6 NM from DER, 280' right of centerline, up to 346' MSL. Buildings beginning 1.6 NM from DER, 350' right of centerline, up to 260' AGL/350' MSL. Building 1.6 NM from DER, 1977' left of centerline, 286' AGL/368' MSL. Buildings beginning 1.6 NM from DER, 640' left of centerline, up to 274' AGL/370' MSL. Building 1.9 NM from DER, 313' right of centerline, 284' AGL/373' MSL. Building 1.9 NM from DER, 282' right of centerline, 281' AGL/372' MSL. **Rwy 12R,** ol on loc 10' from DER, on centerline, 68' MSL. Ol on blast fence 45' from DER, 115' right of centerline, 75' MSL. Fence 45' from DER, 115' right of centerline, 14' AGL/75' MSL. Tree 269' from DER, 149' right of centerline, 100' MSL. Trees, beginning 285' from DER, 193' left of centerline, up to 107' MSL. Rd 338' from DER, 2' right of centerline, 82' MSL. Tree, pole beginning 519 ' from DER, 279' right of centerline, up to 122' MSL. Trees beginning 1798' from DER, 631' left of centerline, up to 144' MSL. Poles beginning 1948' from DER, 688' right of centerline, up to 59' AGL/128 ' MSL. Tree 2604' from DER, 551' right of centerline, 133' MSL. T-L twr 3046' from DER, 1243' left of centerline, 73' AGL/147' MSL. Tree 3079' from DER, 873' right of centerline, 142' MSL. Building 1.3 NM from DER, 1145' left of centerline, 217' AGL/301' MSL. Building 1.3 NM from DER, 751' left of centerline, 228' AGL/309' MSL. Buildings beginning 1.3 NM from DER, 781' left of centerline, up to 312' MSL. Building 1.5 NM from DER, 1676' left of centerline, 262' AGL/351' MSL. Building 1.5 NM from DER, 2291' left of centerline, 268' AGL/358' MSL. Buildings beginning 1.5 NM from DER, 134' left of centerline, up to 365' MSL. Building 1.6 NM from DER, 2678' left of centerline, 286' AGL/368' MSL. Buildings beginning 1.6 NM from DER, 1340' left of centerline, up to 274' AGL/370' MSL. Building 1.6 NM from DER, 345' right of centerline, 320' MSL. Building 1.9 NM from DER, 386' left of centerline, 284' AGL/373' MSL. Building 1.9 NM from DER, 417' left of centerline, 281' AGL/372' MSL.

Rwy 30L, poles beginning 166' from DER, 494' left of centerline, up to 69' MSL. NAVAID 174' from DER, on centerline, 7' AGL/44' MSL. Fence 184' from DER, 369' right of centerline, 15' AGL/51' MSL. Tree 308' from DER, 424' left of centerline, 71' MSL. Tree, pole beginning 473' from DER, 118' right of centerline, up to 72' MSL. Poles beginning 711' from DER, 544' right of centerline, up to 75' MSL. NAVAID 782' from DER, 350' left of centerline, 47' AGL/83' MSL. Pole 1227' from DER, 607' left of centerline, 48' AGL/86' MSL. Pole 1315' from DER, 548' right of centerline, 49' AGL/80' MSL. Pole 1329' from DER, 743' left of centerline, 57' AGL/94' MSL. Tree 1852' from DER, 179' right of centerline, 85' MSL. Tree 2561' from DER, 738' right of centerline, 108' MSL. Trmsn twr, t-l twr, beginning 2616' from DER, 1130' left of centerline, up to 120' MSL. Pole 2806' from DER, 1215' left of centerline, 135' MSL. Pole 2897' from DER, 614' left of centerline, 113' MSL. Pole, t-l twr, beginning 4145' from DER, 1329' left of centerline, up to 152' MSL. **Rwy 30R**, pole 100' from DER, 449' right of centerline, 40' AGL/75' MSL. Fence 138' from DER 243' right of centerline, 13' AGL/47' MSL. Fence 184' from DER, 329' left of centerline, 15' AGL/51' MSL. Tree 411' from DER, 37' left of centerline, 70' MSL. Tree 473' from DER, 319' left of centerline, 72' MSL. Pole 526' from DER, 580' left of centerline, 26' AGL/61' MSL. Pole 657' from DER, 369' right of centerline, 53' AGL/84' MSL. Vehicle on rd beginning 688' from DER, on centerline, up to 68' MSL. Poles beginning 711' from DER, 57' left of centerline, up to 25' AGL/75' MSL. Pole 961' from DER, 133' right of centerline, 56' AGL/88' MSL. Pole 1315' from DER, 150' left of centerline, 49' AGL/80' MSL. Tree 1852' from DER, 519' left of centerline, 85' MSL. Tree 2561' from DER, 39' right of centerline, 108' MSL. Building 3424' from DER, 146' right of centerline, 96' AGL/124' MSL.

DIVERSE VECTOR AREA (RADAR VECTORS)
AMDT 1 16203(FAA)

Rwy 12L/12R, heading as assigned by ATC; requires minimum climb of 470' per NM to 5600. **Rwys 30L/30R,** heading as assigned by ATC; requires minimum climb of 490' per NM to 5600 and do not exceed 210 KTS until established on assigned heading.

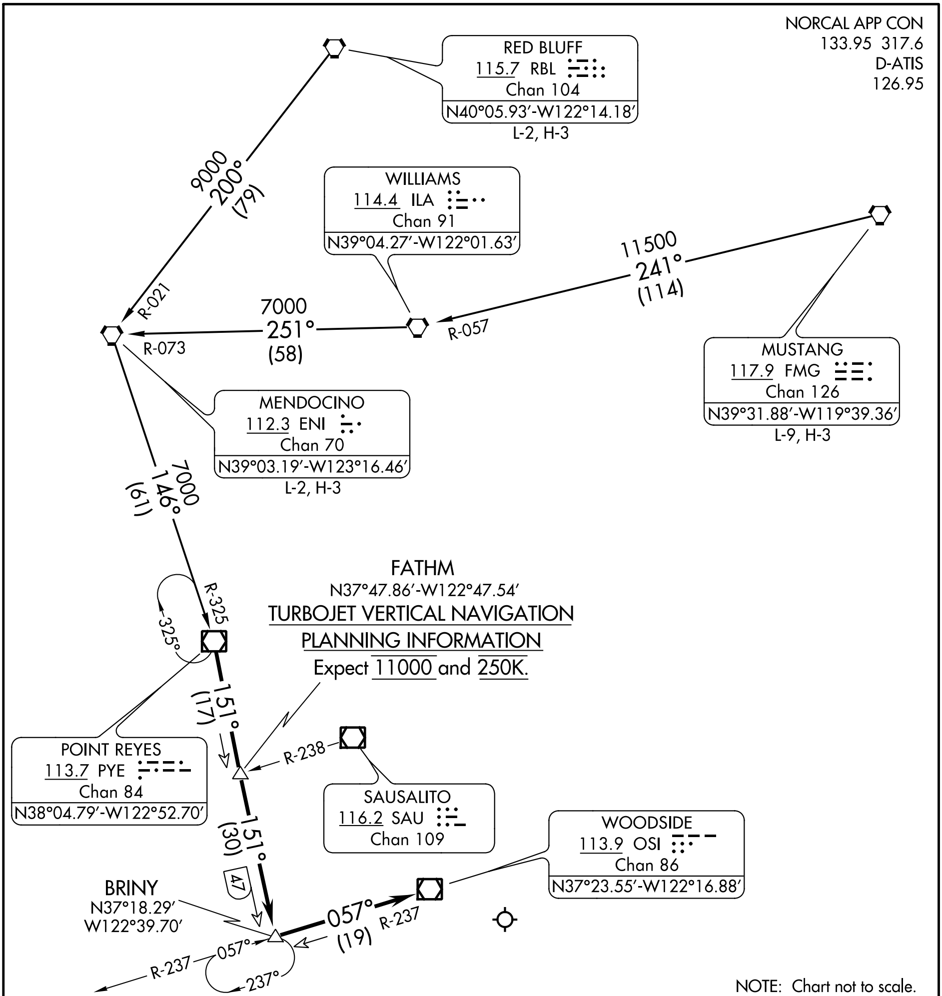
REID-HILLVIEW OF SANTA CLARA COUNTY (RHV)

TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES

TAKEOFF MINIMUMS: **Rwys 13L, 13R,** NA - environmental.

DEPARTURE PROCEDURE: Use DECOT DEPARTURE.

01 FEB 2018 to 01 MAR 2018



ARRIVAL ROUTE DESCRIPTION

MENDOCINO TRANSITION (ENI.BRINY2): From over ENI VORTAC via ENI R-146 and PYE R-325 to PYE VOR/DME. Thence . . . .

MUSTANG TRANSITION (FMG.BRINY2): From over FMG VORTAC via FMG R-241 to ILA VORTAC then via ILA R-251 to ENI VORTAC, then via ENI R-146 to PYE VOR/DME. Thence . . . .

RED BLUFF TRANSITION (RBL.BRINY2): From over RBL VORTAC via RBL R-200 and ENI R-146 to PYE VOR/DME. Thence . . . .

. . . . From over PYE VOR/DME via PYE R-151 to BRINY INT/DME, then via OSI R-237 to OSI VOR/DME. Expect RADAR vectors to Rwy 12R final approach course.

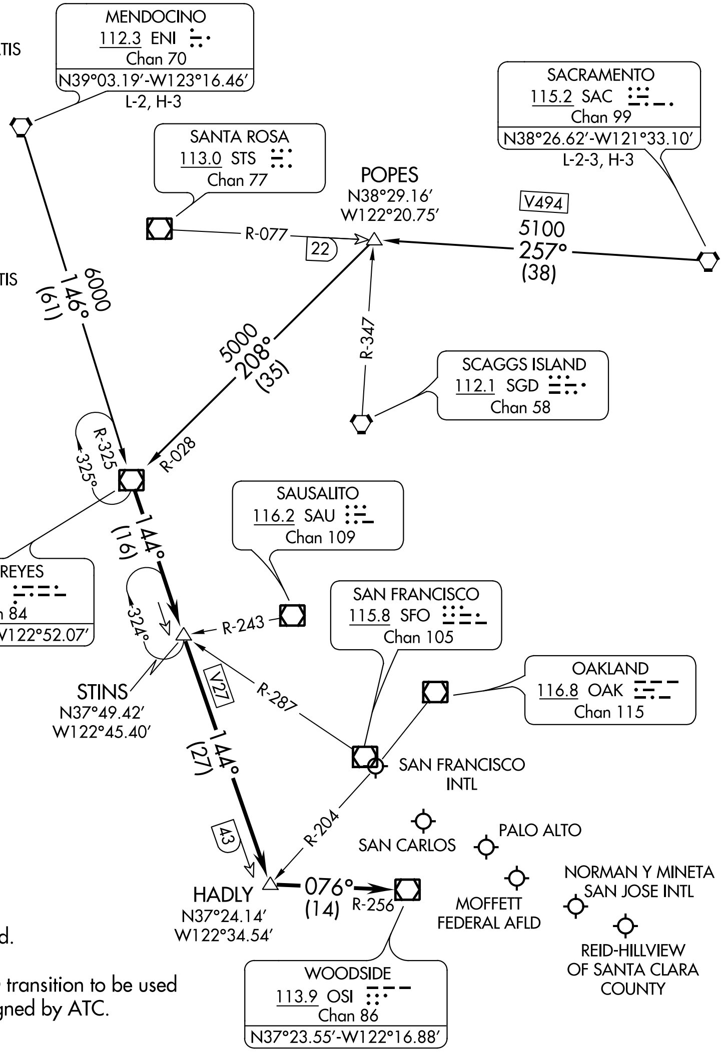
SW-2, 01 FEB 2018 to 01 MAR 2018

POINT REYES THREE ARRIVAL

AL-375 (FAA)

SAN FRANCISCO, CALIFORNIA

NORCAL APP CON
133.95 317.6
SAN FRANCISCO INTL D-ATIS
113.7 115.8 118.85
SAN FRANCISCO TOWER
120.5 269.1
SAN CARLOS ATIS
125.9
SAN CARLOS TOWER ★
119.0 326.2
PALO ALTO ATIS
135.275
PALO ALTO TOWER ★
118.6
MOFFETT FEDERAL AFLD ATIS
124.175 283.0
MOFFETT TOWER ★
119.55 259.65
NORMAN Y MINETA
SAN JOSE INTL D-ATIS
126.95
SAN JOSE TOWER ★
124.0 257.6
REID-HILLVIEW ATIS
125.2
REID-HILLVIEW TOWER ★
119.8 RWY 13L/31R
126.1 RWY 13R/31L



NOTE: RADAR required.

NOTE: SACRAMENTO transition to be used only when assigned by ATC.

NOTE: Chart not to scale.

ARRIVAL ROUTE DESCRIPTION

MENDOCINO TRANSITION (ENI.PYE3): From over ENI VORTAC on ENI R-146 and PYE R-325 to PYE VOR/DME. Thence. . . .

SACRAMENTO TRANSITION (SAC.PYE3): From over SAC VORTAC on SAC R-257 and PYE R-028 to PYE VOR/DME. Thence. . . .

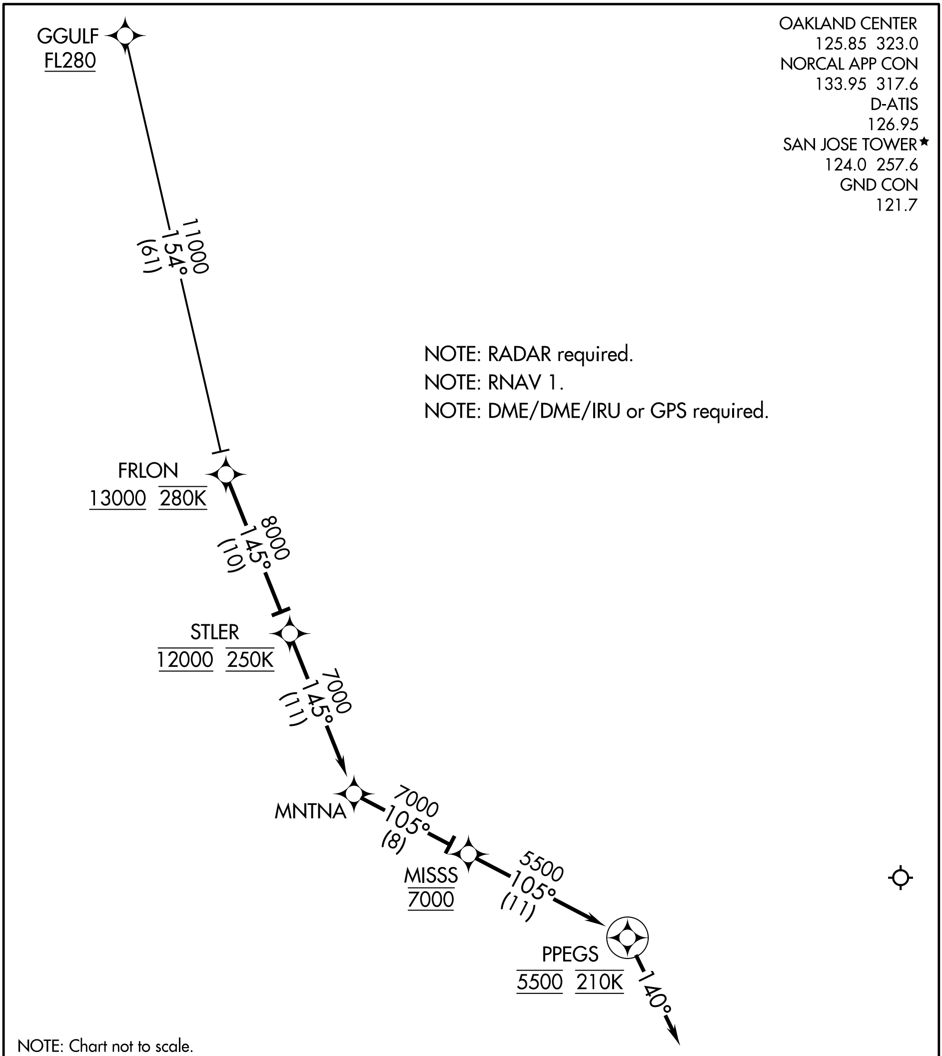
. . . .From over PYE VOR/DME on PYE R-144 to HADLY, then on OSI R-256 to OSI VOR/DME. Expect RADAR vectors to final approach course.

SW-2, 01 FEB 2018 to 01 MAR 2018

FRLON TWO ARRIVAL (RNAV)

AL-693 (FAA)

NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA



ARRIVAL ROUTE DESCRIPTION

GGULF TRANSITION (GGULF.FRLON2)

From FRLON on track 145° to cross STLER at 12000 and at 250K, then on track 145° to MNTNA, then on track 105° to cross MISSS at 7000, then on track 105° to cross PPEGS at 5500 and at 210K, then on track 140°. Expect RADAR vectors to final approach course.

SW-2, 01 FEB 2018 to 01 MAR 2018

RAZRR FOUR ARRIVAL (RNAV) Arrival Routes

(STUBL.RAZRR4) 21JUL16

NORMAN Y MINETA SAN JOSE INTL (SJC)

SAN JOSE, CALIFORNIA

(STUBL.RAZRR4) 17173

AL-693 (FAA)

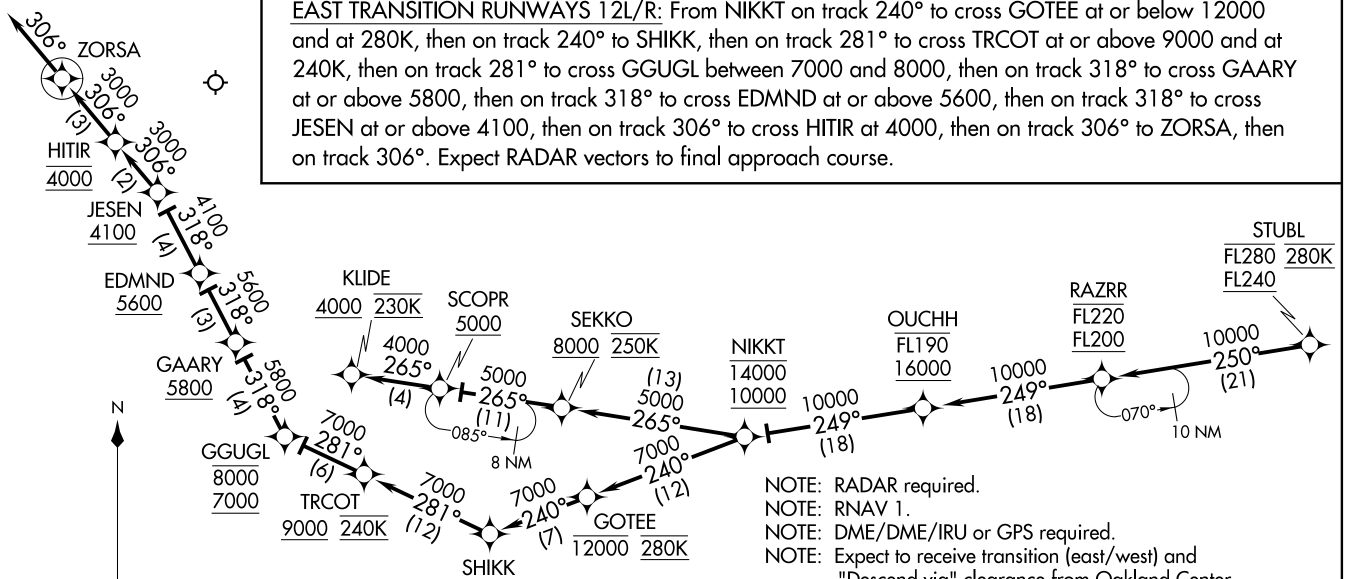
OAKLAND CENTER
121.25 327.0
NORCAL APP CON
126.475 317.775
D-ATIS
126.95
SAN JOSE TOWER★
124.0 257.6
GND CON
121.7

ARRIVAL ROUTE DESCRIPTION

From STUBL on track 250° to cross RAZRR between FL200 and FL220, then on track 249° to cross OUCHH between 16000 and FL190, then on track 249° to cross NIKKT between 10000 and 14000.

WEST TRANSITION RUNWAYS 30L/R: From NIKKT on track 265° to cross SEKKO at or above 8000 and at 250K, then on track 265° to cross SCOPR at or above 5000, then on track 265° to cross KLIDE at or above 4000 and at 230K. Expect assigned instrument approach procedure.

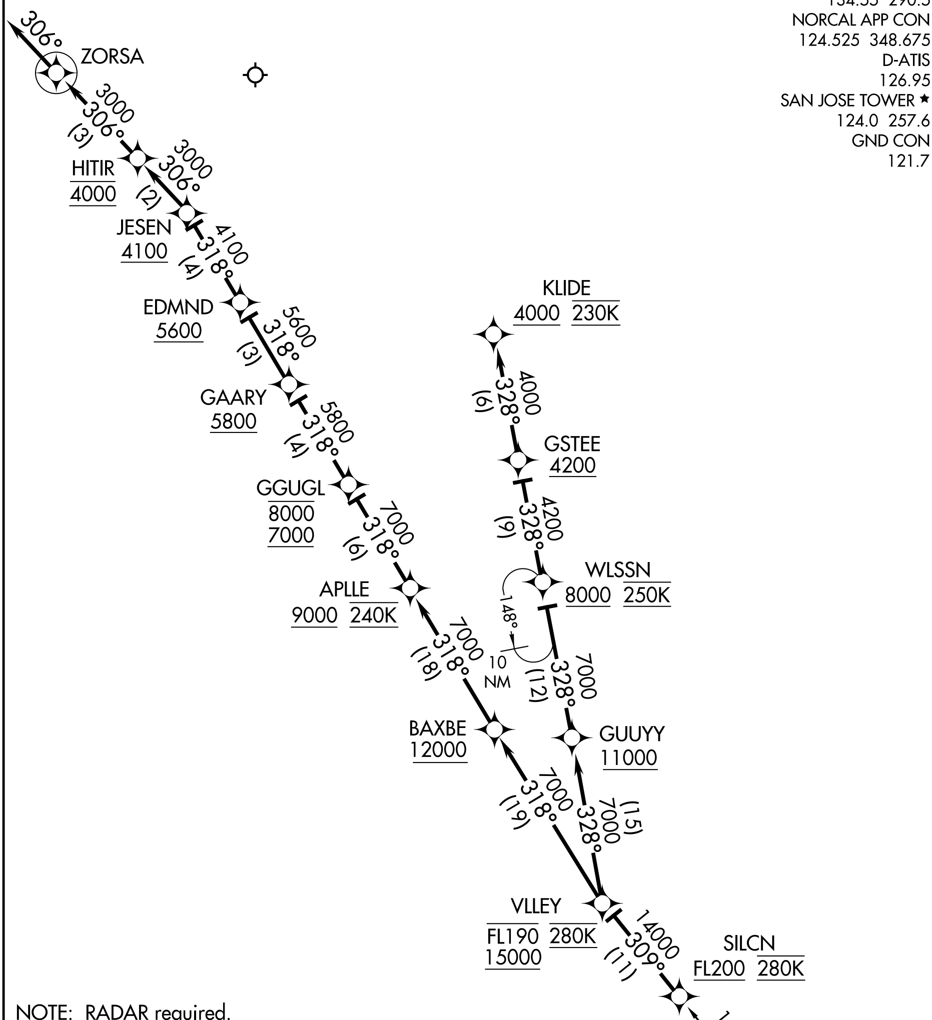
EAST TRANSITION RUNWAYS 12L/R: From NIKKT on track 240° to cross GOTEE at or below 12000 and at 280K, then on track 240° to SHIKK, then on track 281° to cross TRCOT at or above 9000 and at 240K, then on track 281° to cross GGUGL between 7000 and 8000, then on track 318° to cross GAARY at or above 5800, then on track 318° to cross EDMND at or above 5600, then on track 318° to cross JESEN at or above 4100, then on track 306° to cross HITIR at 4000, then on track 306° to ZORSA, then on track 306°. Expect RADAR vectors to final approach course.



NOTE: RADAR required.
NOTE: RNAV 1.
NOTE: DME/DME/IRU or GPS required.
NOTE: Expect to receive transition (east/west) and "Descend via" clearance from Oakland Center. Northern California TRACON will assign landing runway.
NOTE: West transition indicates Rwys 30L/R.
NOTE: East transition indicates Rwys 12L/R.
NOTE: Expect west transition unless otherwise advised.

NOTE: Chart not to scale.

OAKLAND CENTER
134.55 290.5
NORCAL APP CON
124.525 348.675
D-ATIS
126.95
SAN JOSE TOWER ★
124.0 257.6
GND CON
121.7



NOTE: RADAR required.
NOTE: RNAV 1.
NOTE: DME/DME/IRU or GPS required.
NOTE: Expect to receive transition (west/east) and "Descend via" clearance from Oakland Center. Northern California TRACON will assign landing runway.
NOTE: West transition indicates Rwys 30L/R.
NOTE: East transition indicates Rwys 12L/R.
NOTE: Expect west transition unless otherwise advised.

NOTE: Chart not to scale.

(NARRATIVE ON FOLLOWING PAGE)

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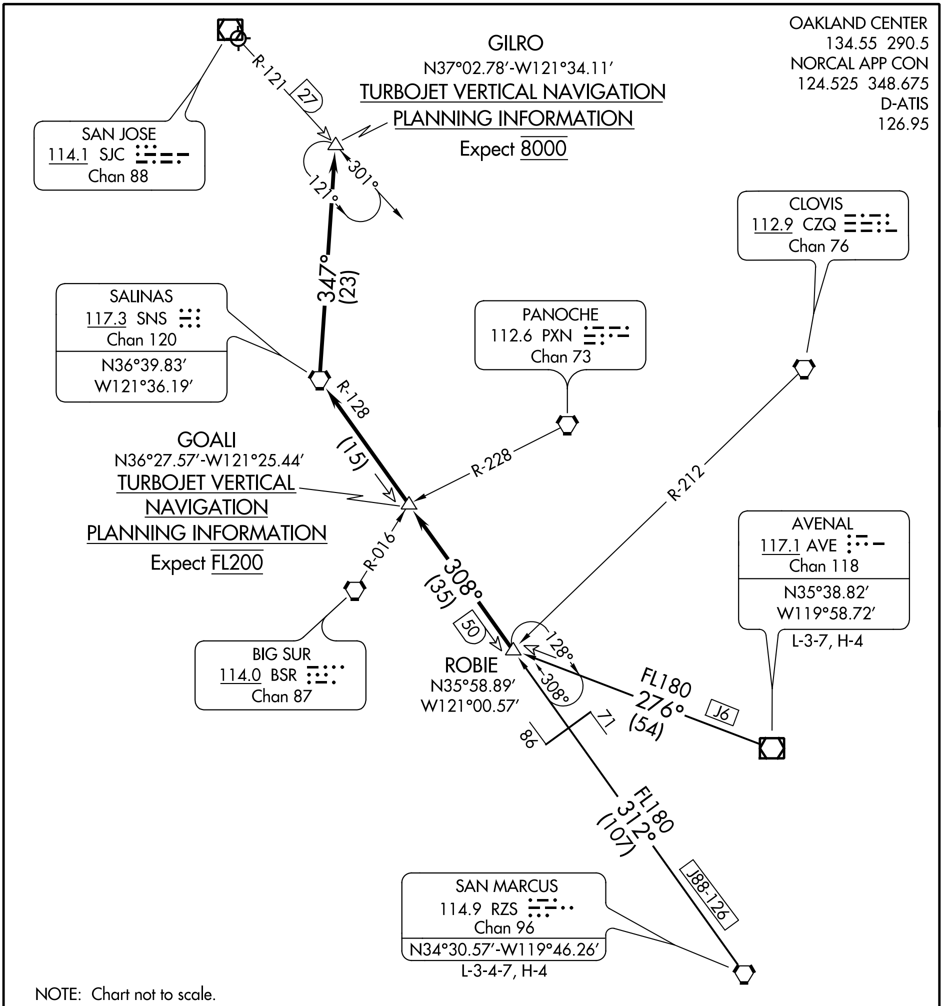
SW-2, 01 FEB 2018 to 01 MAR 2018



ARRIVAL ROUTE DESCRIPTION

AVENAL TRANSITION (AVE.ROBIE4): From over AVE VOR/DME on AVE R-276 to ROBIE INT. Thence . . . .

SAN MARCUS TRANSITION (RZS.ROBIE4): From over RZS VORTAC on RZS R-312 and SNS R-128 to ROBIE INT. Thence . . . .

. . . . From over ROBIE INT via SNS R-128 to SNS VORTAC. Then via SNS R-347 to GILRO INT/DME fix. Expect the ILS RWY 30L approach.

FOR RUNWAY 12 OPERATIONS: Expect routing via SNS direct SJC VOR/DME and RADAR vectors to final approach course.

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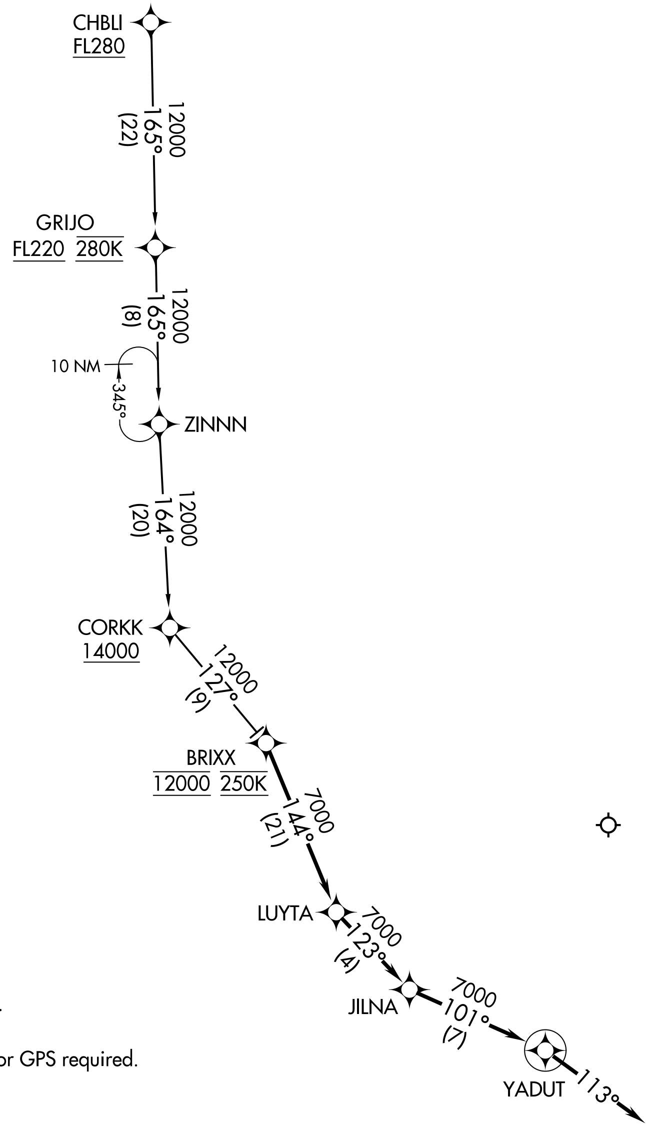
SW-2, 01 FEB 2018 to 01 MAR 2018

OAKLAND CENTER
125.85 323.0
NORCAL APP CON
133.95 317.6
D-ATIS
126.95
SAN JOSE TOWER ★
124.0 257.6
GND CON
121.7



NOTE: RADAR required.
NOTE: RNAV 1.
NOTE: DME/DME/IRU or GPS required.

NOTE: Chart not to scale.

SW-2, 01 FEB 2018 to 01 MAR 2018

SW-2, 01 FEB 2018 to 01 MAR 2018

ARRIVAL ROUTE DESCRIPTION

CHBLI TRANSITION (CHBLI.BRIXX2)

From BRIXX on track 144° to LUYTA, then on track 123° to JILNA, then on track 101° to YADUT, then on track 113°. Expect RADAR vectors to final approach course.

SW-2, 01 FEB 2018 to 01 MAR 2018

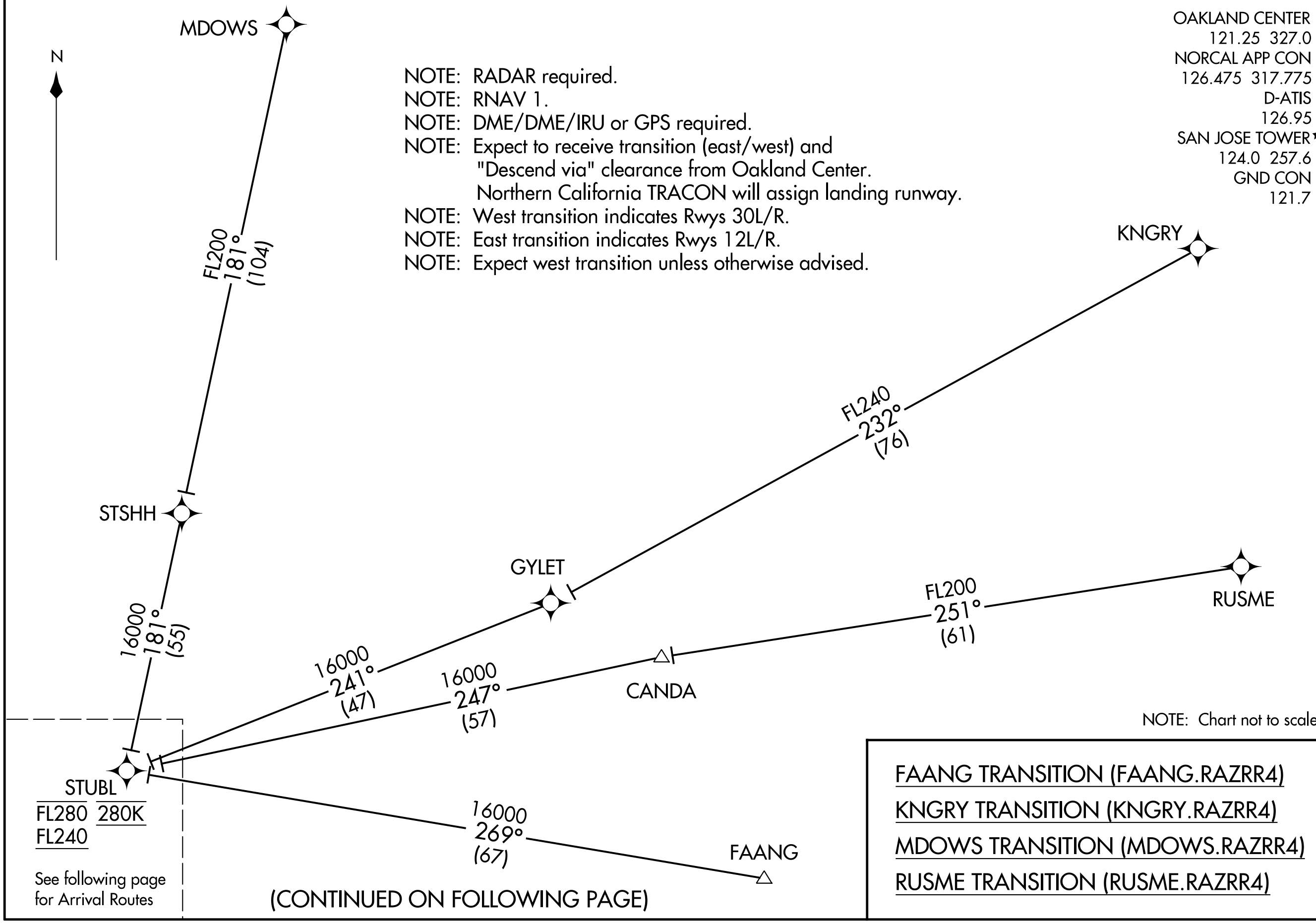
RAZRR FOUR ARRIVAL (RNAV) Transition Routes
(STUBL.RAZRR4) 21JUL16

NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA

AL-693 (FAA) 17173

OAKLAND CENTER
121.25 327.0
NORCAL APP CON
126.475 317.775
D-ATIS
126.95
SAN JOSE TOWER★
124.0 257.6
GND CON
121.7

NOTE: RADAR required.
NOTE: RNAV 1.
NOTE: DME/DME/IRU or GPS required.
NOTE: Expect to receive transition (east/west) and "Descend via" clearance from Oakland Center. Northern California TRACON will assign landing runway.
NOTE: West transition indicates Rwys 30L/R.
NOTE: East transition indicates Rwys 12L/R.
NOTE: Expect west transition unless otherwise advised.

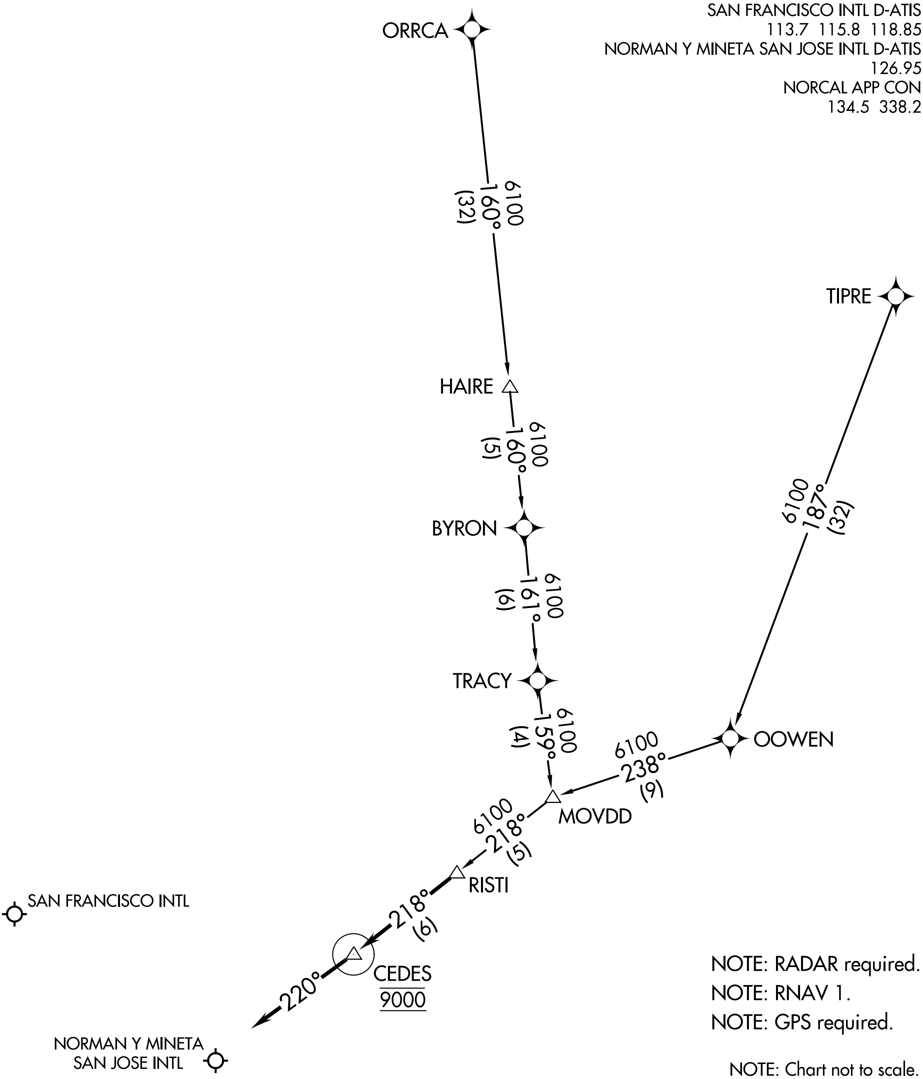


NOTE: Chart not to scale.

(CONTINUED ON FOLLOWING PAGE)

FAANG TRANSITION (FAANG.RAZRR4)
KNGRY TRANSITION (KNGRY.RAZRR4)
MDOWS TRANSITION (MDOWS.RAZRR4)
RUSME TRANSITION (RUSME.RAZRR4)

SAN FRANCISCO INTL D-ATIS
113.7 115.8 118.85
NORMAN Y MINETA SAN JOSE INTL D-ATIS
126.95
NORCAL APP CON
134.5 338.2



NOTE: RADAR required.

NOTE: RNAV 1.

NOTE: GPS required.

NOTE: Chart not to scale.

SW-2, 01 FEB 2018 to 01 MAR 2018

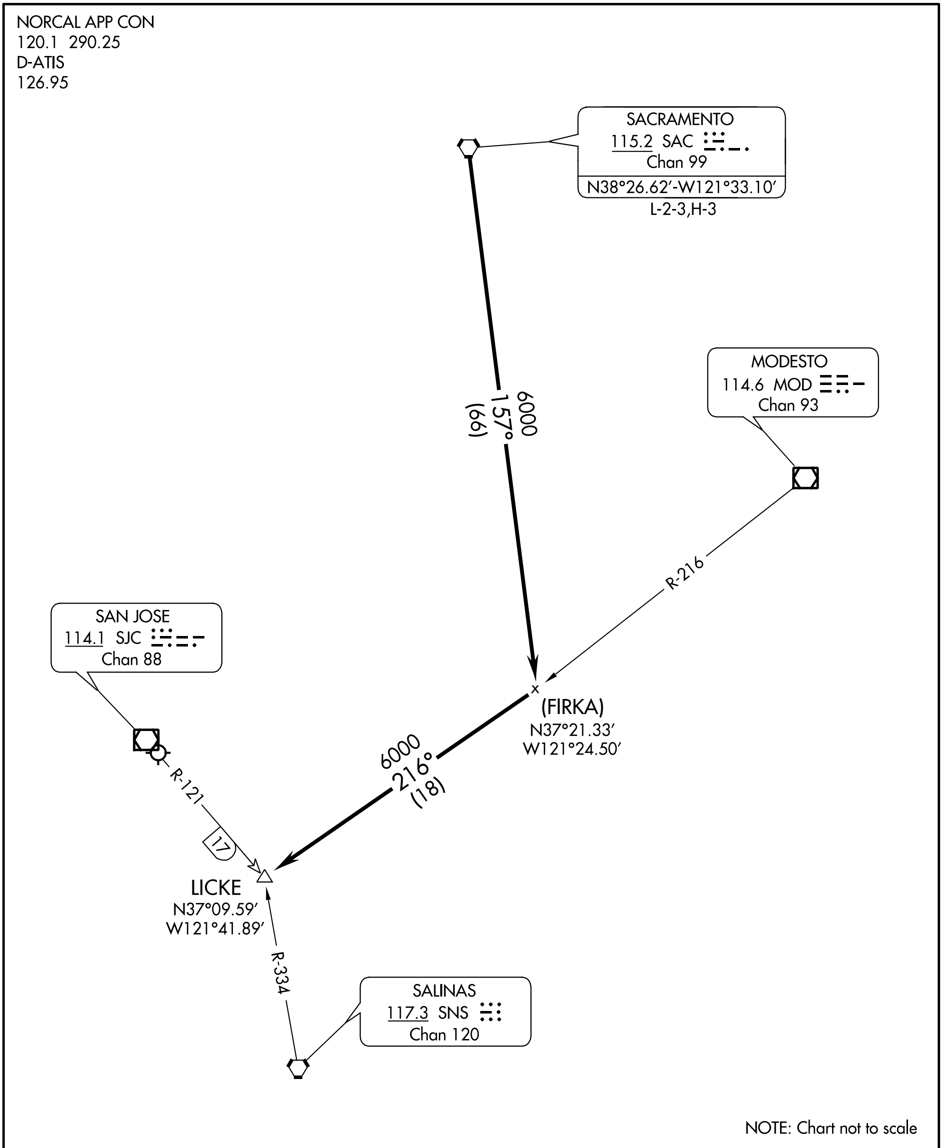
ARRIVAL ROUTE DESCRIPTION

ORRCA TRANSITION (ORRCA.RISTI1)

TIPRE TRANSITION (TIPRE.RISTI1)

LANDING KSFO/KSJC: From RISTI on track 218° to cross CEDES at 9000, then on heading 220° or as assigned by ATC. Expect RADAR vectors to final approach course.

SW-2, 01 FEB 2018 to 01 MAR 2018



SW-2, 01 FEB 2018 to 01 MAR 2018

ARRIVAL ROUTE DESCRIPTION

From over SAC VORTAC via SAC R-157 to intercept and proceed via MOD R-216 to LICKE INT. Then via RADAR vector to Norman Y Mineta San Jose Intl.

ARRIVAL ROUTE DESCRIPTION

TROXX TRANSITION (TROXX.SILCN4)

From SILCN on track 309° to cross VLLEY between 15000 and FL190 and at 280K.

WEST TRANSITION RUNWAYS 30L/R: From VLLEY on track 328° to cross GUUYY at or above 11000, then on track 328° to cross WLSSN at or above 8000 and at 250K, then on track 328° to cross GSTEE at or above 4200, then on track 328° to cross KLIDE at or above 4000 and at 230K. Expect assigned instrument approach procedure.

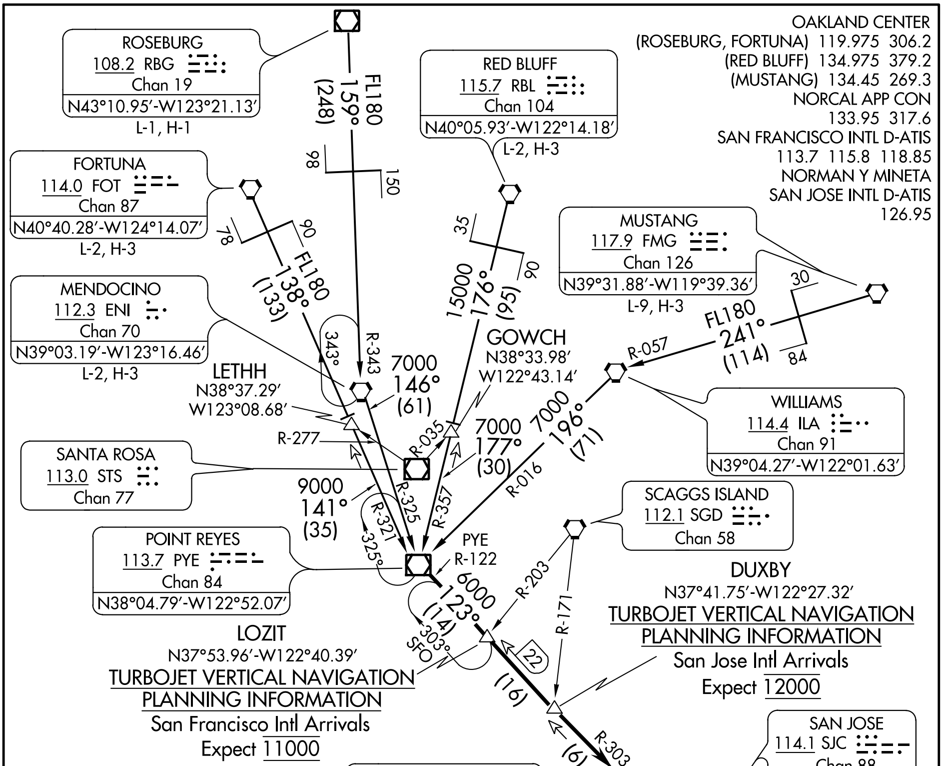
EAST TRANSITION RUNWAYS 12L/R: From VLLEY on track 318° to cross BAXBE at or above 12000, then on track 318° to cross APLLE at or above 9000 and at 240K, then on track 318° to cross GGUGL between 7000 and 8000, then on track 318° to cross GAARY at or above 5800, then on track 318° to cross EDMND at or above 5600, then on track 318° to cross JESEN at or above 4100, then on track 306° to cross HITIR at 4000, then on track 306° to ZORSA, then on track 306°. Expect RADAR vectors to final approach course.

SW-2, 01 FEB 2018 to 01 MAR 2018

GOLDEN GATE SEVEN ARRIVAL

AL-375 (FAA)

SAN FRANCISCO, CALIFORNIA



NOTE: STAR for use by turbojet aircraft only.

NOTE: RADAR required.

NOTE: Chart not to scale.

ARRIVAL ROUTE DESCRIPTION

FORTUNA TRANSITION (FOT.GOLDN7): From over FOT VORTAC on FOT R-138 to LETHH INT, then on PYE R-321 to PYE VOR/DME. Thence. . . .

MENDOCINO TRANSITION (ENI.GOLDN7): From over ENI VORTAC on ENI R-146 and PYE R-325 to PYE VOR/DME. Thence. . . .

MUSTANG TRANSITION (FMG.GOLDN7): From over FMG VORTAC on FMG R-241 and ILA R-057 to ILA VORTAC, then via ILA R-196 and PYE R-016 to PYE VOR/DME. Thence. . . .

RED BLUFF TRANSITION (RBL.GOLDN7): From over RBL VORTAC on RBL R-176 to GOWCH INT, then on PYE R-357 to PYE VOR/DME. Thence. . . .

ROSEBURG TRANSITION (RBG.GOLDN7): From over RBG VOR/DME on RBG R-159 and ENI R-343 to ENI VORTAC, then on ENI R-146 and PYE R-325 to PYE VOR/DME. Thence. . . .

. . . .From over PYE VOR/DME via SFO R-303 to SFO VOR/DME. Expect RADAR vectors to final approach course.

LOST COMMUNICATIONS: San Jose Intl: After SFO VOR/DME proceed direct SJC VOR/DME.

EL NIDO FIVE ARRIVAL (HYP.HYP5)

17173

NORCAL APP CON
126.475 317.775
D-ATIS
126.95

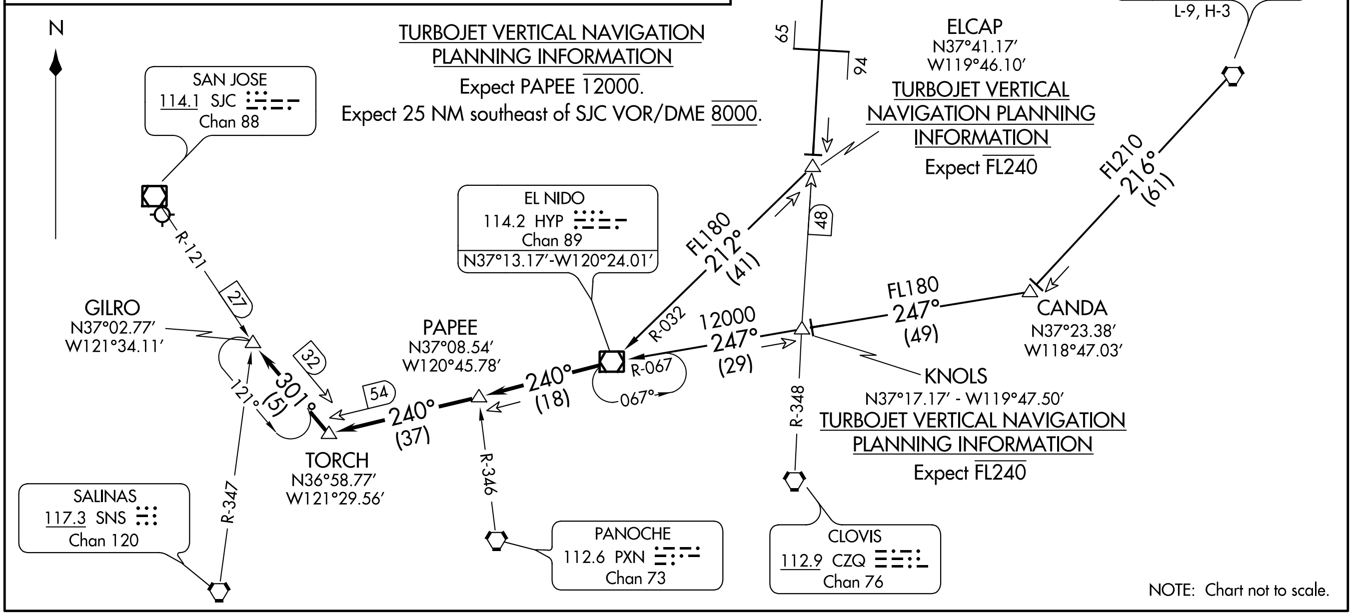
ARRIVAL ROUTE DESCRIPTION

COALDALE TRANSITION (OAL.HYP5): From over OAL VORTAC on OAL R-216 and HYP R-067 to HYP VOR/DME. Thence . . . .

MUSTANG TRANSITION (FMG.HYP5): From over FMG VORTAC on FMG R-167 and CZQ R-348 to ELCAP INT, then on HYP R-032 to HYP VOR/DME. Thence . . . .

. . . . From over HYP VOR/DME via HYP R-240 to PAPEE DME fix, then via HYP R-240 to TORCH DME fix, thence via SJC R-121 to GILRO INT. Expect the ILS Rwy 30L Approach.

For Rwy 12 Operations: Expect RADAR vectors to final approach course.



EL NIDO FIVE ARRIVAL (HYP.HYP5) 06SEP01

NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA

AL-693 (FAA)

NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA

Appendix B – Airline Aircraft Performance Assessment Dataset

As previously mentioned in **Section 4.7, *Airline Aircraft Performance Assessment***, a conference call with the airlines was facilitated by Landrum & Brown to provide them with an introduction to the Project DADCS study and to educate them about the proposed airspace protection scenarios that were being considered.

At the conclusion of the conference call, a summary email along with a comprehensive dataset attachment was provided to the participating carriers for use in their individual aircraft performance assessments.

James Terry

Subject: RE: SJC Project CAKE Aircraft Performance Assessment - Obstacle Data Transfer

Hello All,

Thank you for participating in the conference call this afternoon pertaining to the Project CAKE Airline Aircraft Performance Assessment at Mineta San José International Airport. And thank you in advance for your assistance in performing the requested aircraft performance /obstacle evaluation assessment to assist us in furthering progress on this project.

Attached to this email are the following documents that should be used for the requested aircraft performance assessment:

1. **2018-10-04 SJC_CAKE - Airline Aircraft Performance Assessment.pdf** (Presentation that was presented on the conference call this afternoon. Please refer to this document for reference purposes.)
2. **SJC Project CAKE Critical Obstacles for Aircraft Performance – 20180904.xls** (Spreadsheet contained obstacle data for the five airspace scenarios that we are requesting your assistance with evaluating.)
3. **SJC Project CAKE Aircraft Performance Assessment Results Template – 20180904.xls** (Spreadsheet and requested format for the results of the airline aircraft performance assessment to be populated.)

For your reference, the obstacle spreadsheet contains data for the following scenarios:

Scenario 1: Existing airspace (OEI and TERPS)
Scenario 4: No OEI protection (TERPS Only)
Scenario 7: Straight-Out OEI protection (no West OEI Corridor)
Scenario 9: No OEI Protection (TERPS Only) with increased FAA procedure minimum heights
Scenario 10: Straight-Out OEI with West OEI Corridor alternatives

Please note that all heights listed in the obstacle data spreadsheet are in feet mean sea level (MSL).

We are requesting that the obstacle evaluation be completed and returned to us no later than October 25, 2018 which is approximately three weeks from today. This will allow us time to compile and process the results of your assessment in preparation for meetings in early November 2018.

If requested, the airline performance assessment results can be generalized and not depicted on a specific airline basis. If requested, teleconferences with individual carriers can be arranged if additional clarification or coordination is required.

<u>Newly Published SJC Obstacle Data:</u>

We wanted to make sure that carriers at SJC were aware that the newly published airport obstacle dataset for SJC is available from the FAA. **I have attached the new SJC UDDF obstacle file to this email (2018_SJC_VGA_6371.SPC.txt**). Please note that we encourage air carriers participating in this assessment to supplement the previously described obstacle data for each airspace scenario that we are providing you with and incorporate this new obstacle data into your assessment. If any existing man-made or vegetative (trees) obstacles from the UDDF file are identified in your aircraft performance assessment as being more critical in nature, please feel free to report this information back to us and we will forward it to the City of San Jose Planning staff. However for vegetative (tree) obstacles, please note that these obstacles can reasonably be mitigated so for aircraft performance assessment purposes please **identify**, but **do not include** these as critical obstacles as this may skew the results of your assessment for each of the individual airspace protection scenarios that we are requesting you to evaluate. Our primary focus is on the impacts of man-made obstacles.

Thank you again for your assistance as your feedback and the results of your aircraft performance assessment will be very helpful in our ongoing study. Please feel free to contact me directly with any questions that may arise during your evaluation. If I have not included key staff member within your company on this email, please forward the information to them and I will add them to my contact list for future correspondence.

Thank you!

James Terry
Managing Consultant

Landrum & Brown
Global Aviation Planning & Development

T +1 510 220 6612

landrum-brown.com

DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

AIRLINE AIRCRAFT PERFORMANCE ASSESSMENT

October 4, 2018

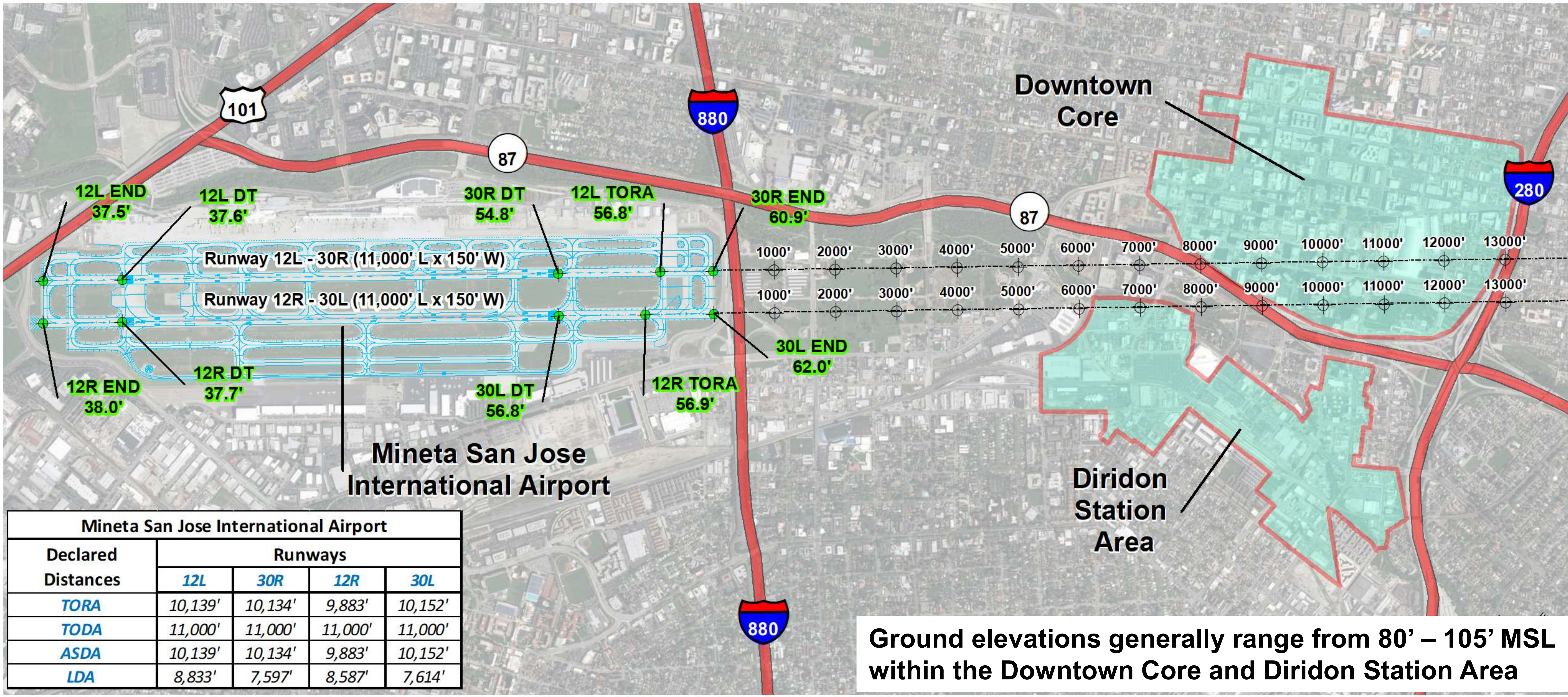
AGENDA

- Introduction
- Project Study Area
- Airspace Protection Scenarios

INTRODUCTION

- A previous TERPS and OEI assessment was conducted in 2008 and the establishment of airspace protection mapping was adopted as a city policy to limit the impact of tall structures on aviation activities at SJC
- The Downtown San José Airspace & Development Capacity Study (referred to as Project CAKE) revisits TERPS and OEI airspace protection
- Evaluation of various airspace protection scenarios to identify potential impacts to aviation activities as a result of potential future development in the Downtown Core and Diridon Station Areas
- Primarily impacts departure operations in a Southeast Flow runway configuration (Runway 12L/12R) which occurs approximately 13% annually; predominately in the winter but sometimes in the summer

PROJECT CAKE STUDY AREA



Mineta San Jose International Airport				
Declared Distances	Runways			
	12L	30R	12R	30L
TORA	10,139'	10,134'	9,883'	10,152'
TODA	11,000'	11,000'	11,000'	11,000'
ASDA	10,139'	10,134'	9,883'	10,152'
LDA	8,833'	7,597'	8,587'	7,614'

Ground elevations generally range from 80' – 105' MSL within the Downtown Core and Diridon Station Area

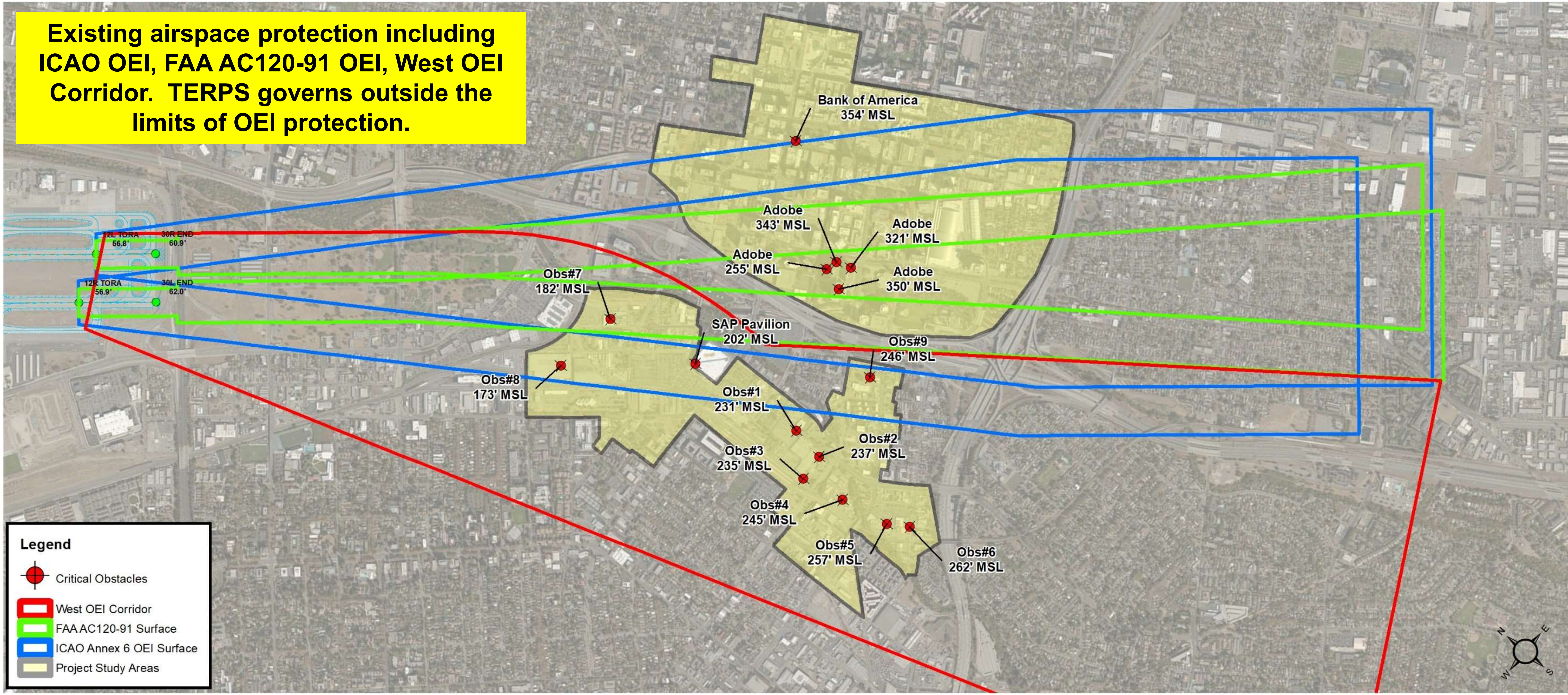
Graphic Source: Landrum & Brown
Aerial Image Source: Bing

AIRSPACE PROTECTION SCENARIOS

- Five Airspace Scenarios
  - **Scenario 1**: Existing
  - **Scenario 4**: No OEI (#1)
  - **Scenario 7:** Straight-out OEI (#2)
  - **Scenario 9**: No OEI, increased FAA height limits (#4)
  - **Scenario 10**: Straight-out OEI with West OEI Corridor alternatives (#3)
    - Baseline
    - Scenario 10A (#3D)
    - Scenario 10B (#3C)
    - Scenario 10C (#3B)
    - Scenario 10D (#3A)

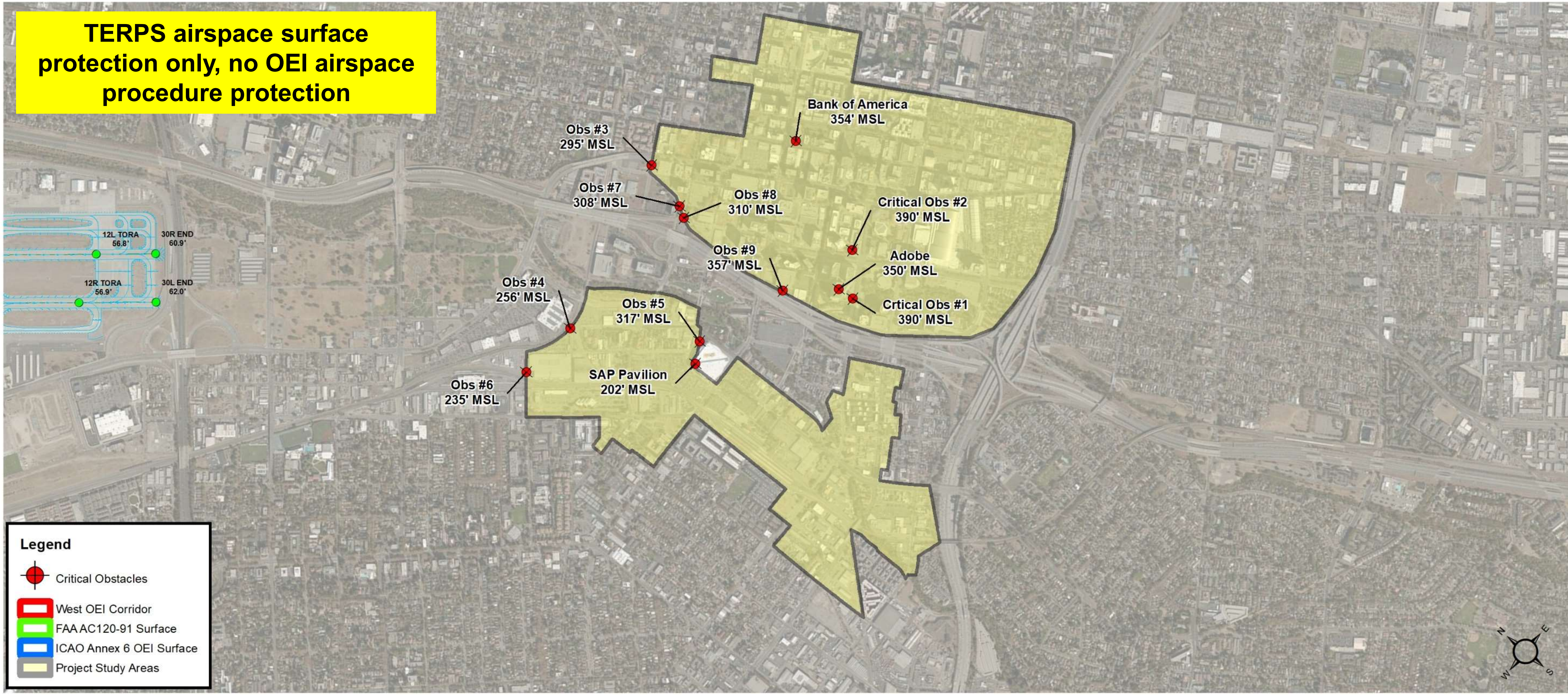
Note: (#) denotes the order/prioritization of the airspace scenarios that are being requested for performance evaluation by the participating Airlines. Ranked in order from highest to lowest priority.

SCENARIO 1 – EXISTING



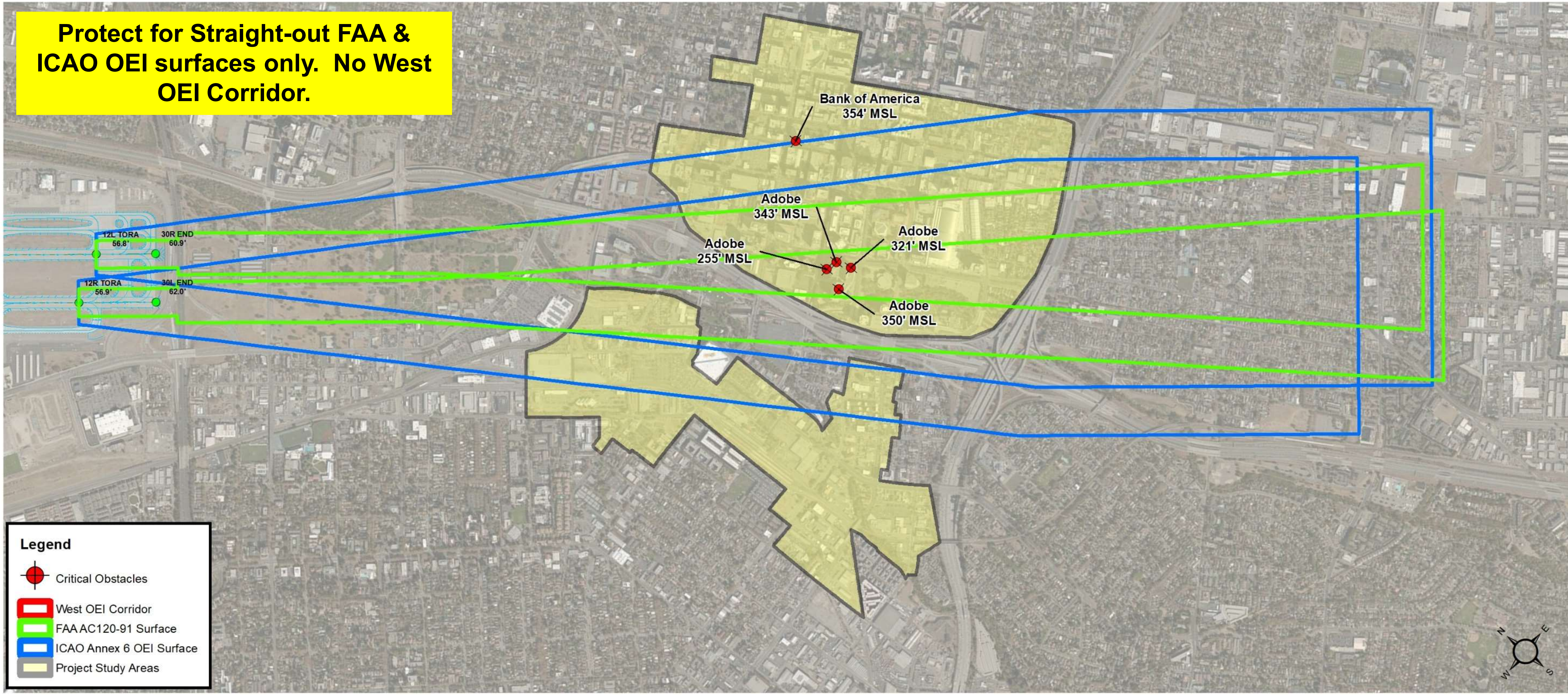
Graphic Source: Landrum & Brown

SCENARIO 4 – NO OEI



Graphic Source: Landrum & Brown

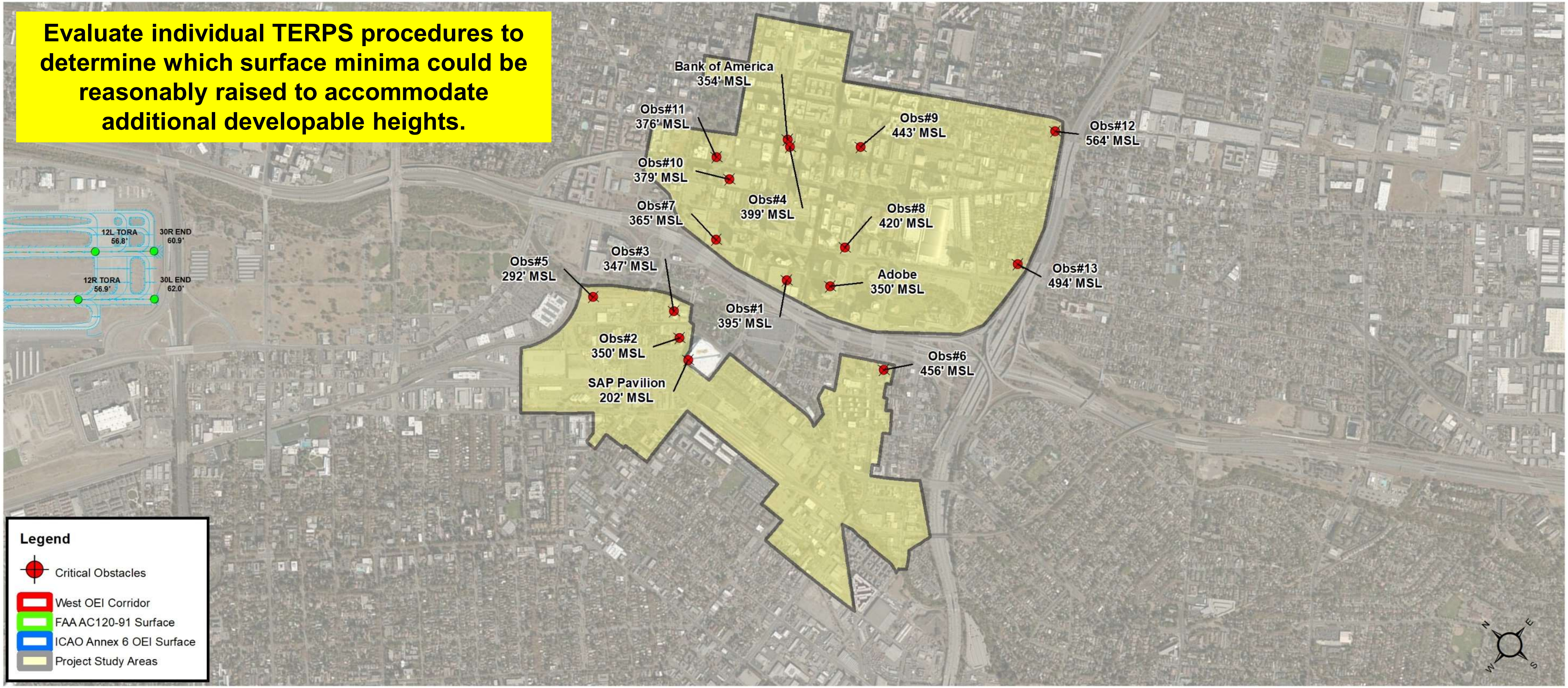
SCENARIO 7 – STRAIGHT-OUT OEI



Graphic Source: Landrum & Brown

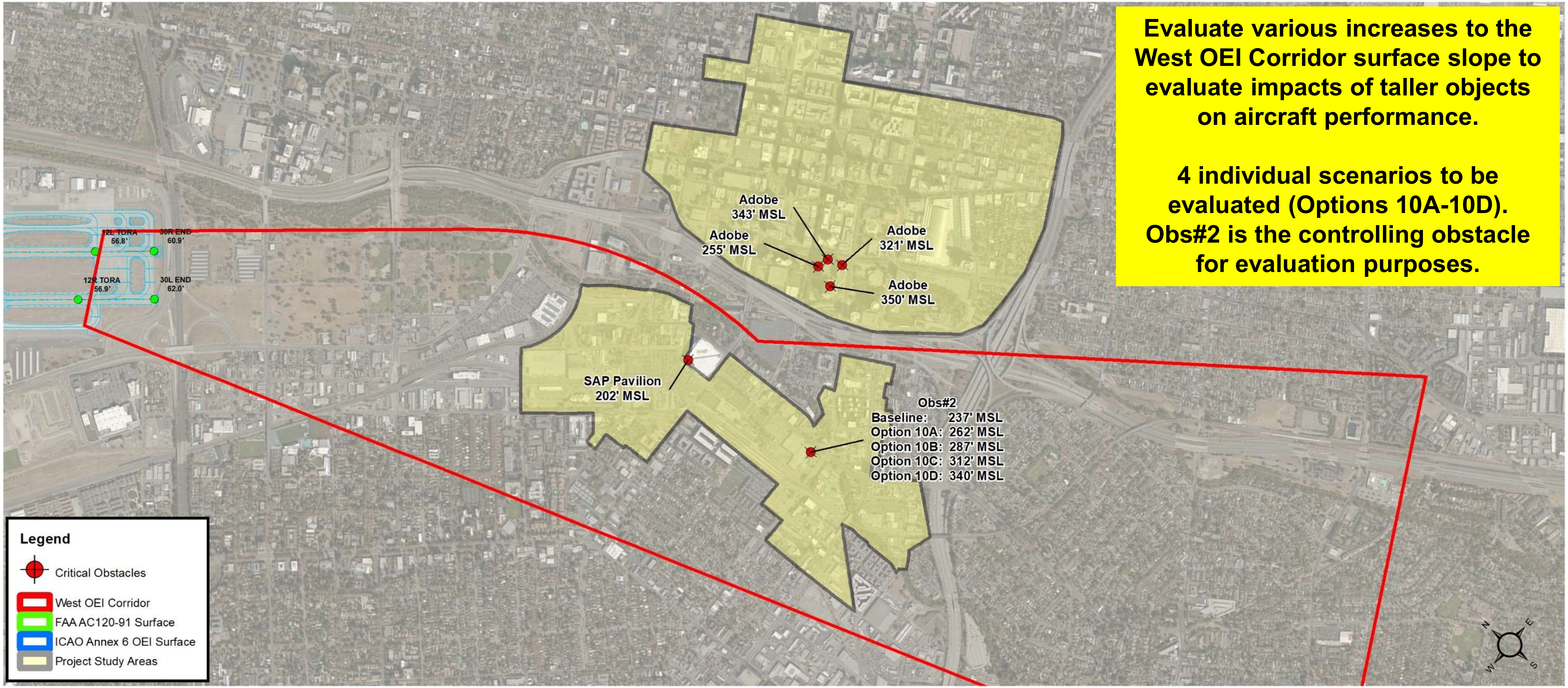
SCENARIO 9 – NO OEI, INCREASED FAA HEIGHT LIMITS

Evaluate individual TERPS procedures to determine which surface minima could be reasonably raised to accommodate additional developable heights.



Graphic Source: Landrum & Brown

SCENARIO 10 – STRAIGHT-OUT OEI WITH WEST OEI CORRIDOR ALTERNATIVES



Evaluate various increases to the West OEI Corridor surface slope to evaluate impacts of taller objects on aircraft performance.

4 individual scenarios to be evaluated (Options 10A-10D). Obs#2 is the controlling obstacle for evaluation purposes.

Graphic Source: Landrum & Brown

SAMPLE OBSTACLE EVALUATION DATA FORMAT

FID	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
0	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R	9883	136L	9883
1	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
2	255	Adobe	6156386.62	1946261.926	37° 19' 54.088" N	121° 53' 38.336" W	278R	9708	425L	9707
3	343	Adobe	6156559.009	1946221.246	37° 19' 53.711" N	121° 53' 36.194" W	173R	9850	530L	9850
4	321	Adobe	6156628.35	1946008.93	37° 19' 51.622" N	121° 53' 35.297" W	257R	10057	445L	10057
5	231	Obs#1	6154315.299	1945101.864	37° 19' 42.313" N	121° 54' 3.765" W	2608R	9251	1905R	9252
6	237	Obs#2	6154240.507	1944600.667	37° 19' 37.347" N	121° 54' 4.598" W	2989R	9585	2286R	9586
7	235	Obs#3	6153842.571	1944574.473	37° 19' 37.029" N	121° 54' 9.520" W	3309R	9348	2607R	9348
8	245	Obs#4	6153978.184	1943940.881	37° 19' 30.786" N	121° 54' 7.723" W	3616R	9918	2913R	9919
9	257	Obs#5	6154125.763	1943225.245	37° 19' 23.733" N	121° 54' 5.764" W	3967R	10559	3264R	10560
10	262	Obs#6	6154302.893	1942944.989	37° 19' 20.988" N	121° 54' 3.519" W	4013R	10888	3310R	10889
11	182	Obs#7	6153818.205	1948196.92	37° 20' 12.838" N	121° 54' 10.494" W	984R	6570	282R	6570
12	173	Obs#8	6152844.322	1948312.317	37° 20' 13.834" N	121° 54' 22.573" W	1651R	5852	950R	5852
13	246	Obs#9	6155589.233	1944779.287	37° 19' 39.313" N	121° 53' 47.934" W	1845R	10322	1142R	10322

Note: Please note that the distance “out” is measured from the physical end of the runway pavement for Runway 12L/12R. The “over” distance is measured from left or right of the extended runway centerline for Runway 12L/12R.

REQUESTED AIRCRAFT PERFORMANCE RESULTS FORMAT

Destination (ex. JFK) Temperature (ex 83° F)		AIRCRAFT TYPE (ex. B737-800) SEAT CAPACITY (ex. 150 seats) CARGO CAPACITY (ex. 2,000 lbs.)					
		PAX Penalty	**PAX Penalty (lbs.)**	**Cargo Penalty (lbs.)**	**Weight Penalty Total (lbs.)**	**PAX Penalty Cost Per Flight**	**Cargo Penalty Cost Per Flight**
Scenario 1	Existing airspace protection	**4**	**912**	**500**	**1,412**	**$**	**$**
Scenario 4	TERPS Only	**20**	**4,560**	**1,200**	**5,760**	**$**	**$**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**12**	**2,736**	**600**	**3,336**	**$**	**$**
Scenario 10	Existing Conditions: 85' - 166' AGL	**6**	**1,368**		**1,368**	**$**	**$**
	Opt 10A: 100' - 195' AGL	**6**	**1,368**		**1,368**	**$**	**$**
	Opt 10B: 115' - 224' AGL	**6**	**1,368**		**1,368**	**$**	**$**
	Opt 10C: 129' - 240' AGL	**8**	**1,824**		**1,824**	**$**	**$**
	Opt 10D: 146' - 260' AGL	**14**	**3,192**		**3,192**	**$**	**$**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**29**	**6,612**		**6,612**	**$**	**$**

REQUESTED AIRCRAFT PERFORMANCE ASSESSMENT

- Airlines will be provided with obstacle data for each aircraft scenario
- Airlines to performance aircraft performance assessment for:
  1. Existing aircraft and markets served to/from SJC
  2. Future aircraft fleet and markets to potentially be served to/from SJC (within the next 10 years)
  3. If possible, assess summer and winter temperatures
  4. Provide passenger and cargo weight penalties for each aircraft and destination under each airspace scenario
  5. Monetize the PAX and cargo weight penalties to better understanding the economic impacts incurred by Airline operators
- Results of the aircraft performance assessment are requested no later than **October 25, 2018**

REQUESTED AIRCRAFT PERFORMANCE ASSESSMENT

- If requested, the airline performance assessment results can be generalized and not depicted on a specific airline basis
- If requested, teleconferences with individual carriers can be arranged if additional clarification or coordination is required

CONTACT INFORMATION

- James Terry, Managing Consultant, Landrum & Brown
  - 510-220-6612 or jterry@landrum-brown.com

- Tom Cornell, Principal, Landrum & Brown
  - 415-307-2202 and tcornell@landrum-brown.com

- Matthew Kazmierczak, Manager of Strategy and Policy, Mineta San José International Airport
  - 408-392-3640 and MKazmierczak@sjc.org

THANK YOU

FID	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R	9883	136L	9883
2	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
3	255	Adobe	6156386.62	1946261.926	37° 19' 54.088" N	121° 53' 38.336" W	278R	9708	425L	9707
4	343	Adobe	6156559.009	1946221.246	37° 19' 53.711" N	121° 53' 36.194" W	173R	9850	530L	9850
5	321	Adobe	6156628.35	1946008.93	37° 19' 51.622" N	121° 53' 35.297" W	257R	10057	445L	10057
6	231	Obs#1	6154315.299	1945101.864	37° 19' 42.313" N	121° 54' 3.765" W	2608R	9251	1905R	9252
7	237	Obs#2	6154240.507	1944600.667	37° 19' 37.347" N	121° 54' 4.598" W	2989R	9585	2286R	9586
8	235	Obs#3	6153842.571	1944574.473	37° 19' 37.029" N	121° 54' 9.520" W	3309R	9348	2607R	9348
9	245	Obs#4	6153978.184	1943940.881	37° 19' 30.786" N	121° 54' 7.723" W	3616R	9918	2913R	9919
10	257	Obs#5	6154125.763	1943225.245	37° 19' 23.733" N	121° 54' 5.764" W	3967R	10559	3264R	10560
11	262	Obs#6	6154302.893	1942944.989	37° 19' 20.988" N	121° 54' 3.519" W	4013R	10888	3310R	10889
12	182	Obs#7	6153818.205	1948196.92	37° 20' 12.838" N	121° 54' 10.494" W	984R	6570	282R	6570
13	173	Obs#8	6152844.322	1948312.317	37° 20' 13.834" N	121° 54' 22.573" W	1651R	5852	950R	5852
14	246	Obs#9	6155589.233	1944779.287	37° 19' 39.313" N	121° 53' 47.934" W	1845R	10322	1142R	10322
15	354	Bank of America	6157520.336	1947801.754	37° 20' 9.478" N	121° 53' 24.583" W	1583L	9267	2285L	9267

Scenario 1 Critical Obstacles

FID	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	390	Crtical Obs #1	6156303.83	1945702.897	37° 19' 48.549" N	121° 53' 39.258" W	703R	10080	0R	10080
2	390	Critical Obs #2	6156839.597	1946157.498	37° 19' 53.122" N	121° 53' 32.709" W	0R	10080	703L	10080
3	354	Bank of America	6157520.336	1947801.754	37° 20' 9.478" N	121° 53' 24.583" W	1583L	9267	2285L	9267
4	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R	9883	136L	9883
5	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
6	295	Obs #3	6155908.654	1949175.325	37° 20' 22.820" N	121° 53' 44.792" W	1243L	7177	1945L	7177
7	256	Obs #4	6153344.702	1948557.966	37° 20' 16.337" N	121° 54' 16.423" W	1111R	5989	409R	5989
8	317	Obs #5	6154402.503	1947003.05	37° 20' 1.122" N	121° 54' 3.038" W	1311R	7858	609R	7859
9	235	Obs #6	6152449.053	1948631.045	37° 20' 16.927" N	121° 54' 27.526" W	1746R	5353	1045R	5353
10	308	Obs #7	6155717.274	1948477.779	37° 20' 15.896" N	121° 53' 47.032" W	646L	7585	1348L	7585
11	310	Obs #8	6155627.052	1948325.585	37° 20' 14.378" N	121° 53' 48.121" W	479L	7643	1181L	7642
12	357	Obs #9	6155744.129	1946550.229	37° 19' 56.843" N	121° 53' 46.344" W	581R	9072	121L	9072

Scenario 4 Critical Obstacles

FID	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	354	Bank of America	6157520.336	1947801.754	37° 20' 9.478" N	121° 53' 24.583" W	1583L	9267	2285L	9267
2	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R	9883	136L	9883
3	255	Adobe	6156386.62	1946261.926	37° 19' 54.088" N	121° 53' 38.336" W	278R	9708	425L	9707
4	343	Adobe	6156559.009	1946221.246	37° 19' 53.711" N	121° 53' 36.194" W	173R	9850	530L	9850
5	321	Adobe	6156628.35	1946008.93	37° 19' 51.622" N	121° 53' 35.297" W	257R	10057	445L	10057

Scenario 7 Critical Obstacles

FID_	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	420	Obs#8	6156853.137	1946141.547	37° 19' 52.966" N	121° 53' 32.538" W	0R	10101	703L	10101
2	354	Bank of America	6157520.336	1947801.754	37° 20' 9.478" N	121° 53' 24.583" W	1583L	9267	2285L	9267
3	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R	9883	136L	9883
4	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
5	376	Obs#11	6156658.984	1948430.101	37° 20' 15.563" N	121° 53' 35.364" W	1333L	8231	2035L	8230
6	365	Obs#7	6155728.724	1947659.49	37° 20' 7.807" N	121° 53' 46.739" W	125L	8216	827L	8216
7	395	Obs#1	6155939.407	1946486.899	37° 19' 56.246" N	121° 53' 43.914" W	473R	9247	229L	9247
8	379	Obs#10	6156531.822	1948075.624	37° 20' 12.040" N	121° 53' 36.873" W	1007L	8419	1709L	8418
9	443	Obs#9	6158128.428	1946913.684	37° 20' 0.787" N	121° 53' 16.891" W	1472L	10338	2175L	10337
10	564	Obs#12	6160135.441	1944883.194	37° 19' 41.007" N	121° 52' 51.672" W	1688L	13185	2391L	13184
11	399	Obs#4	6157463.99	1947705.53	37° 20' 8.518" N	121° 53' 25.263" W	1478L	9304	2180L	9304
12	292	Obs#5	6153930.962	1948501.026	37° 20' 15.861" N	121° 54' 9.154" W	701R	6411	1L	6411
13	347	Obs#3	6154532.304	1947459.136	37° 20' 5.650" N	121° 54' 1.515" W	917R	7595	215R	7595
14	350	Obs#2	6154282.06	1947143.026	37° 20' 2.488" N	121° 54' 4.555" W	1312R	7674	610R	7674
15	494	Obs#13	6158289.838	1944047.141	37° 19' 32.472" N	121° 53' 14.367" W	260R	12628	443L	12628
16	456	Obs#6	6155844.832	1944557.835	37° 19' 37.161" N	121° 53' 44.729" W	1794R	10656	1091R	10656

Scenario 9 Critical Obstacles

Baseline Obstacle Data

FID	Shape *	FID_	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	Point	15	237	Obs#2	6154240.507	1944600.667	37° 19' 37.347" N	121° 54' 4.598" W	2989R	9586	2286R	9586
2	Point	3	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R567R	9883	136L	9883
3	Point	4	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
4	Point	1000	255	Adobe	6156386.62	1946261.926	37° 19' 54.088" N	121° 53' 38.336" W	278R	9797	425L	9707
5	Point	1001	343	Adobe	6156559.009	1946221.246	37° 19' 53.711" N	121° 53' 36.194" W	173R	9850	530L	9850
6	Point	1004	321	Adobe	6156628.35	1946008.93	37° 19' 51.622" N	121° 53' 35.297" W	257R	10057	445L	10057

Scenario 10A Obstacle Data

FID	Shape *	FID_	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	Point	15	262	Obs#2	6154240.507	1944600.667	37° 19' 37.347" N	121° 54' 4.598" W	2989R	9586	2286R	9586
2	Point	3	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R567R	9883	136L	9883
3	Point	4	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
4	Point	1000	255	Adobe	6156386.62	1946261.926	37° 19' 54.088" N	121° 53' 38.336" W	278R	9797	425L	9707
5	Point	1001	343	Adobe	6156559.009	1946221.246	37° 19' 53.711" N	121° 53' 36.194" W	173R	9850	530L	9850
6	Point	1004	321	Adobe	6156628.35	1946008.93	37° 19' 51.622" N	121° 53' 35.297" W	257R	10057	445L	10057

Scenario 10B Obstacle Data

FID	Shape *	FID_	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	Point	15	287	Obs#2	6154240.507	1944600.667	37° 19' 37.347" N	121° 54' 4.598" W	2989R	9586	2286R	9586
2	Point	3	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R567R	9883	136L	9883
3	Point	4	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
4	Point	1000	255	Adobe	6156386.62	1946261.926	37° 19' 54.088" N	121° 53' 38.336" W	278R	9797	425L	9707
5	Point	1001	343	Adobe	6156559.009	1946221.246	37° 19' 53.711" N	121° 53' 36.194" W	173R	9850	530L	9850
6	Point	1004	321	Adobe	6156628.35	1946008.93	37° 19' 51.622" N	121° 53' 35.297" W	257R	10057	445L	10057

Scenario 10C Obstacle Data

FID	Shape *	FID_	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	Point	15	312	Obs#2	6154240.507	1944600.667	37° 19' 37.347" N	121° 54' 4.598" W	2989R	9586	2286R	9586
2	Point	3	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R567R	9883	136L	9883
3	Point	4	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
4	Point	1000	255	Adobe	6156386.62	1946261.926	37° 19' 54.088" N	121° 53' 38.336" W	278R	9797	425L	9707
5	Point	1001	343	Adobe	6156559.009	1946221.246	37° 19' 53.711" N	121° 53' 36.194" W	173R	9850	530L	9850
6	Point	1004	321	Adobe	6156628.35	1946008.93	37° 19' 51.622" N	121° 53' 35.297" W	257R	10057	445L	10057

Scenario 10D Obstacle Data

FID	Shape *	FID_	Elv_MSL	Name	Easting	Northing	Lat	Long	Over12L	Out12L	Over12R	Out12R
1	Point	15	340	Obs#2	6154240.507	1944600.667	37° 19' 37.347" N	121° 54' 4.598" W	2989R	9586	2286R	9586
2	Point	3	350	Adobe	6156279.846	1945941.228	37° 19' 50.902" N	121° 53' 39.599" W	567R567R	9883	136L	9883
3	Point	4	202	SAP Pavilion	6154115.628	1946839.133	37° 19' 59.459" N	121° 54' 6.559" W	1636R	7798	933R	7798
4	Point	1000	255	Adobe	6156386.62	1946261.926	37° 19' 54.088" N	121° 53' 38.336" W	278R	9797	425L	9707
5	Point	1001	343	Adobe	6156559.009	1946221.246	37° 19' 53.711" N	121° 53' 36.194" W	173R	9850	530L	9850
6	Point	1004	321	Adobe	6156628.35	1946008.93	37° 19' 51.622" N	121° 53' 35.297" W	257R	10057	445L	10057

Scenario 10 Critical Obstacles

Note: Please note that in Scenario 10, the critical obstacle for evaluation is named "Obs#2".
This obstacle has five heights that we are requesting you to evaluate in your obstacle performance assessment:
Baseline: 237' MSL
Option 10A: 262' MSL
Option 10B: 287' MSL
Option 10C: 312' MSL
Option 10D: 340' MSL

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|SJC   |02204.A   |AWP |1.07|
|NORMAN Y MINETA SAN JOSE INTL                                                |3572016|
|SAN JOSE                                |CALIFORNIA                      |
|NAD83     |5 CM      |15 CM     |NAVD88    |25 CM           |
|-13.4|3572016|
|   62.2|  -45.0|30L+10  |3572016|
|       |       |       |
| 372145.6|-1215544.8|
@
|11   |P|3572016|
| |       |
| 372157.4164|-1215611.9716|1384847| 4626|100|3572016|
|   48.9|  -58.3|3572016|
|            |             |       |       |
|    0|   41.9|  -65.3|3572016|
| 2313|   47.2|  -60.0|3572016|
| 4626|   51.7|  -55.5|3572016|
#
|29   |P|3572016|
| |       |
| 372122.9983|-1215534.2452|3184910| 4626|100|3572016|
|   51.8|  -55.3|3572016|
|            |             |       |       |
|    0|   51.7|  -55.5|3572016|
| 2313|   47.2|  -60.0|3572016|
| 4626|   41.9|  -65.3|3572016|
#
|12L  |P|3572016|
| |       |
| 372229.9801|-1215624.6377|1384833|11000|150|3572016|
|   43.8|  -63.3|3572016|
| 372220.2525|-1215613.9699|   1308|3572016|
|    0|   37.7|  -69.5|3572016|
| 1308|   37.8|  -69.4|3572016|
| 2920|   38.5|  -68.7|3572016|
| 4250|   43.8|  -63.4|3572016|
| 5500|   47.0|  -60.1|3572016|
| 8463|   55.2|  -51.9|3572016|
|10060|   56.7|  -50.4|3572016|
|11000|   61.1|  -46.0|3572016|
#
|30R  |P|3572016|
| |       |
| 372108.1324|-1215454.9212|3184927|11000|150|3572016|
|   55.2|  -51.9|3572016|
| 372127.0149|-1215515.6102|   2537|3572016|
|    0|   61.1|  -46.0|3572016|
|  940|   56.7|  -50.4|3572016|
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| 2537|   55.2|  -51.9|3572016|
| 5500|   47.0|  -60.1|3572016|
| 6750|   43.8|  -63.4|3572016|
| 8080|   38.5|  -68.7|3572016|
| 9692|   37.8|  -69.4|3572016|
|11000|   37.7|  -69.5|3572016|
#
|12R  |P|3572016|
| |       |
| 372225.4266|-1215631.1597|1384834|11000|150|3572016|
|   45.6|  -61.6|3572016|
| 372215.7747|-1215620.5816|   1297|3572016|
|    0|   38.2|  -69.0|3572016|
| 1297|   37.9|  -69.3|3572016|
| 5500|   48.9|  -58.3|3572016|
| 8463|   57.0|  -50.2|3572016|
|10070|   57.7|  -49.4|3572016|
|10990|   62.2|  -45.0|3572016|
|11000|   62.1|  -45.0|3572016|
#
|30L  |P|3572016|
| |       |
| 372103.5766|-1215501.4432|3184928|11000|150|3572016|
|   57.0|  -50.2|3572016|
| 372122.4564|-1215522.1304|   2537|3572016|
|    0|   62.1|  -45.0|3572016|
|   10|   62.2|  -45.0|3572016|
|  930|   57.7|  -49.4|3572016|
| 2537|   57.0|  -50.2|3572016|
| 5500|   48.9|  -58.3|3572016|
| 9703|   37.9|  -69.3|3572016|
|11000|   38.2|  -69.0|3572016|
@
|DME    (12R_SLV)                 | 372227.5750|-1215632.6145|   56.0|  -51.2|
|       |3572016|
|DME    (30L_SJC)                 | 372102.6639|-1215501.3459|   81.4|  -25.8|
|       |3572016|
|GS CE  (30L_SJC)                 | 372133.0094|-1215527.8798|   48.6|  -58.6|
|       |3572016|
|GS CE  (30L_SJC)          PP     | 372130.7086|-1215531.1746|   54.0|       |
353R|  1109|3572016|
|GS SB  (12R_SLV)                 | 372206.0334|-1215614.5901|   36.8|  -70.4|
|       |3572016|
|GS SB  (12R_SLV)          PP     | 372207.8901|-1215611.9316|   40.3|       |
285R|  1060|3572016|
|LOC    (12R_SLV)                 | 372103.0434|-1215500.8585|   75.1|  -32.1|
|     72|3572016|
|LOC    (30L_SJC)                 | 372227.1917|-1215633.1047|   49.6|  -57.5|
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|   238|3572016|
|VOR/DME(SJC)                      | 372228.9638|-1215640.8069|   34.5|  -72.7|
|      |3572016|
#
|ALS/MALSR      (12R)              | 372234.9685|-1215641.6333|   33.1|  -74.1|
|      |3572016|
|ALS/MALSR      (12R)              | 372215.7705|-1215620.5718|   38.0|  -69.1|
|      |3572016|
|ALS/MALSR      (30L)              | 372122.3916|-1215522.0599|   57.1|  -50.1|
|      |3572016|
|ALS/MALSR      (30L)              | 372104.5999|-1215502.5648|   61.6|  -45.5|
|      |3572016|
|APBN                              | 372210.4564|-1215542.4811|   36.1|  -71.0|
|      |3572016|
|PAPI/PAPI4     (12L)              | 372209.2023|-1215604.6523|   35.7|  -71.4|
|      |3572016|
|PAPI/PAPI4     (12L)            PP| 372210.3086|-1215603.0682|   38.3|        |
170R|  1336|3572016|
|PAPI/PAPI4     (12R)              | 372204.4841|-1215611.1667|   37.7|  -69.5|
|      |3572016|
|PAPI/PAPI4     (12R)            PP| 372205.6586|-1215609.4850|   41.1|        |
180R|  1360|3572016|
|PAPI/PAPI4     (29) [INACTIVE]   | 372128.2145|-1215541.7774|   48.7|  -58.5|
|      |3572016|
|PAPI/PAPI4     (29) [INACTIVE] PP| 372128.9327|-1215540.7490|   50.7|        |
110L|   798|3572016|
|PAPI/PAPI4     (30L)              | 372131.7671|-1215535.2961|   49.7|  -57.5|
|      |3572016|
|PAPI/PAPI4     (30L)            PP| 372132.9386|-1215533.6186|   53.1|        |
180L|  1409|3572016|
|PAPI/PAPI4     (30R)              | 372136.4130|-1215528.7064|   48.6|  -58.5|
|      |3572016|
|PAPI/PAPI4     (30R)            PP| 372137.5183|-1215527.1237|   51.3|        |
170L|  1412|3572016|
|REIL           (12L)              | 372219.7285|-1215615.2858|   36.4|  -70.8|
|      |3572016|
|REIL           (12L)              | 372221.2225|-1215613.1454|   36.2|  -71.0|
|      |3572016|
|REIL           (29) [INACTIVE]   | 372123.3000|-1215533.0865|   51.0|  -56.1|
|      |3572016|
|REIL           (29) [INACTIVE]   | 372122.1215|-1215534.7570|   52.0|  -55.2|
|      |3572016|
#
|AWOS                              | 372133.8610|-1215527.9346|   49.1|  -58.0|
|      |3572016|
|WIND CONE                         | 372145.5676|-1215541.7151|   42.1|  -65.1|
|      |3572016|
|WIND CONE                         | 372114.5051|-1215506.3449|   52.4|  -54.8|
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|       |3572016|
|WIND CONE                           | 372132.1672|-1215536.8878|   47.9|  -59.2|
|       |3572016|
|WIND CONE                           | 372206.9395|-1215606.7842|   37.2|  -70.0|
|       |3572016|
|WIND CONE                           | 372221.6723|-1215619.6997|   36.6|  -70.5|
|       |3572016|
@
|11  |VGA    |
#
|29  |VGA    |
#
|12L |VGA    |
#
|30R |VGA    |
#
|12R |VGA    |
#
|30L |VGA    |
#
|ARP |HCT    |
|SIGN                             | 372143.50|-1215549.37|1A|   50|      |    5|  -12|
  |     |      |3572016|
|SIGN                             | 372139.80|-1215543.62|1A|   52|      |    5|  -10|
  |     |      |3572016|
|GRD                              | 372138.55|-1215541.06|1A|   50|      |     |  -12|
  |     |      |3572016|
|GRD                              | 372151.04|-1215552.15|1A|   45|      |     |  -17|
  |     |      |3572016|
|GRD                              | 372136.45|-1215544.05|1A|   48|      |     |  -14|
  |     |      |3572016|
|GRD                              | 372147.92|-1215556.63|1A|   45|      |     |  -17|
  |     |      |3572016|
|RWY LT                           | 372146.72|-1215559.34|1A|   46|      |    2|  -16|
  |     |      |3572016|
|FENCE                            | 372139.20|-1215557.99|1A|   57|      |   10|   -5|
  |     |      |3572016|
|ANT                              | 372137.83|-1215532.37|1A|   81|      |   34|   19|
  |     |      |3572016|
|GRD                              | 372141.93|-1215600.01|1A|   47|      |     |  -15|
  |     |      |3572016|
|NAVAID                           | 372136.19|-1215555.47|1A|  137|      |   90|   75|
  |     |      |3572016|
|CONTROL TWR                      | 372134.96|-1215553.83|1A|  156|      |  108|   94|
  |     |      |3572016|
|TREE                             | 372135.06|-1215554.24|1A|   74|      |     |   12|
  |     |      |3572016|
|POLE                             | 372137.38|-1215557.75|1A|   73|      |   26|   11|
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  |     |     |3572016|
|NAVAID                        | 372144.67|-1215602.32|1A|   46|     |   2|  -16|
  |     |     |3572016|
|GRD                           | 372142.15|-1215602.07|1A|   47|     |    |  -15|
  |     |     |3572016|
|WALL                          | 372133.47|-1215554.40|1A|   66|     |  18|    4|
  |     |     |3572016|
|FENCE                         | 372137.85|-1215559.93|1A|   57|     |  10|   -5|
  |     |     |3572016|
|POLE                          | 372135.45|-1215557.64|1A|   74|     |  25|   12|
  |     |     |3572016|
|GRD                           | 372139.64|-1215601.80|1A|   47|     |    |  -15|
  |     |     |3572016|
|WSK                           | 372132.17|-1215536.89|1A|   59|     |  11|   -3|
  |     |     |3572016|
|SIGN                          | 372154.65|-1215559.97|1A|   47|     |   5|  -15|
  |     |     |3572016|
|BLDG                          | 372131.00|-1215549.76|1A|   74|     |  24|   12|
  |     |     |3572016|
|GRD                           | 372131.72|-1215552.46|1A|   49|     |    |  -13|
  |     |     |3572016|
|POLE                          | 372135.79|-1215600.02|1A|   74|     |  25|   12|
  |     |     |3572016|
|GRD                           | 372141.33|-1215603.62|1A|   47|     |    |  -15|
  |     |     |3572016|
|GRD                           | 372142.76|-1215604.06|1A|   47|     |    |  -15|
  |     |     |3572016|
|GRD                           | 372144.19|-1215604.41|1A|   46|     |    |  -16|
  |     |     |3572016|
|BLDG                          | 372137.11|-1215601.77|1A|   98|     |  50|   36|
  |     |     |3572016|
|BLDG                          | 372132.62|-1215556.59|1A|   91|     |  25|   29|
  |     |     |3572016|
|GRD                           | 372129.45|-1215545.37|1A|   50|     |    |  -12|
  |     |     |3572016|
|ANT                           | 372134.16|-1215559.55|1A|  132|     |  82|   70|
  |     |     |3572016|
|BLDG                          | 372140.29|-1215605.22|1A|   98|     |  51|   36|
  |     |     |3572016|
|HGR                           | 372129.69|-1215553.37|1A|   91|     |  39|   29|
  |     |     |3572016|
|GRD                           | 372144.91|-1215606.58|1A|   46|     |    |  -16|
  |     |     |3572016|
|BLDG                          | 372128.40|-1215549.55|1A|   90|     |  39|   28|
  |     |     |3572016|
|GRD                           | 372146.70|-1215606.85|1A|   46|     |    |  -16|
  |     |     |3572016|
|GRD                           | 372127.95|-1215543.95|1A|   51|     |    |  -11|
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  |     |     |3572016|
|ANT                             | 372132.48|-1215559.69|1A|  132|     |   82|   70|
  |     |     |3572016|
|VERTICAL POINT                  | 372127.89|-1215542.32|1A|   54|     |    4|   -8|
  |     |     |3572016|
|POLE                            | 372134.39|-1215602.17|1A|   74|     |   25|   12|
  |     |     |3572016|
|POLE                            | 372136.17|-1215603.99|1A|   78|     |   30|   16|
  |     |     |3572016|
|TREE                            | 372141.27|-1215606.77|1A|   71|     |     |    9|
  |     |     |3572016|
|GRD                             | 372131.42|-1215530.64|1A|   53|     |     |   -9|
  |     |     |3572016|
|GRD                             | 372158.69|-1215600.55|1A|   43|     |     |  -19|
  |     |     |3572016|
|BLDG                            | 372142.02|-1215607.10|1A|   97|     |   49|   35|
  |     |     |3572016|
|GRD                             | 372130.40|-1215532.19|1A|   53|     |     |   -9|
  |     |     |3572016|
|GRD                             | 372157.72|-1215602.07|1A|   43|     |     |  -19|
  |     |     |3572016|
|TWR                             | 372133.02|-1215527.88|1A|   98|     |   50|   36|
  |     |     |3572016|
|GRD                             | 372134.94|-1215525.64|1A|   51|     |     |  -11|
  |     |     |3572016|
|POLE                            | 372130.75|-1215559.05|1A|   99|     |   48|   37|
  |     |     |3572016|
|GRD                             | 372202.25|-1215555.54|1A|   41|     |     |  -21|
  |     |     |3572016|
|SIGN                            | 372137.74|-1215523.21|1A|   54|     |    4|   -8|
  |     |     |3572016|
|SIGN                            | 372139.72|-1215522.09|1A|   54|     |    3|   -8|
  |     |     |3572016|
|GRD                             | 372135.99|-1215524.15|1A|   51|     |     |  -11|
  |     |     |3572016|
|POLE                            | 372138.52|-1215607.03|1A|   79|     |   32|   17|
  |     |     |3572016|
|BLDG                            | 372127.80|-1215553.50|1A|   82|     |   31|   20|
  |     |     |3572016|
|GRD                             | 372203.26|-1215554.05|1A|   41|     |     |  -21|
  |     |     |3572016|
|GRD                             | 372126.59|-1215541.83|1A|   52|     |     |  -10|
  |     |     |3572016|
|GRD                             | 372146.44|-1215609.05|1A|   45|     |     |  -17|
  |     |     |3572016|
|BLDG                            | 372126.80|-1215551.15|1A|   90|     |   39|   28|
  |     |     |3572016|
|TREE                            | 372128.51|-1215556.63|1A|   96|     |     |   34|
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  |     |     |3572016|
|BLDG                            | 372126.00|-1215545.72|1A|   92|     |   39|   30|
  |     |     |3572016|
|GRD                             | 372148.80|-1215609.16|1A|   44|     |     |  -18|
  |     |     |3572016|
|GRD                             | 372125.85|-1215543.62|1A|   51|     |     |  -11|
  |     |     |3572016|
|SIGN                            | 372128.83|-1215531.35|1A|   55|     |    4|   -7|
  |     |     |3572016|
|TRMSN TWR                       | 372202.49|-1215531.55|1A|  149|     |  103|   87|
  |     |     |3572016|
|POLE                            | 372140.23|-1215608.90|1A|   78|     |   32|   16|
  |     |     |3572016|
|BLDG                            | 372125.54|-1215548.07|1A|  100|     |   48|   38|
  |     |     |3572016|
|BLDG                            | 372145.18|-1215610.56|1A|   97|     |   51|   35|
  |     |     |3572016|
|SIGN                            | 372205.23|-1215553.29|1A|   42|     |    4|  -20|
  |     |     |3572016|
|POLE                            | 372142.03|-1215610.48|1A|   76|     |   30|   14|
  |     |     |3572016|
|GRD                             | 372125.02|-1215540.08|1A|   52|     |     |  -10|
  |     |     |3572016|
|GRD                             | 372139.14|-1215519.61|1A|   52|     |     |  -10|
  |     |     |3572016|
|WALL                            | 372125.05|-1215551.04|1A|   71|     |   19|    9|
  |     |     |3572016|
|BLDG                            | 372124.07|-1215542.65|1A|   94|     |   42|   32|
  |     |     |3572016|
|TREE                            | 372124.95|-1215552.83|1A|  109|     |     |   47|
  |     |     |3572016|
|GRD                             | 372149.12|-1215611.75|1A|   44|     |     |  -18|
  |     |     |3572016|
|TREE                            | 372123.85|-1215547.22|1A|  125|     |     |   63|
  |     |     |3572016|
|POLE                            | 372143.63|-1215612.22|1A|   76|     |   31|   14|
  |     |     |3572016|
|BLDG                            | 372147.00|-1215612.52|1A|   96|     |   50|   34|
  |     |     |3572016|
|GRD                             | 372126.51|-1215529.96|1A|   53|     |     |   -9|
  |     |     |3572016|
|GRD                             | 372152.75|-1215611.58|1A|   43|     |     |  -19|
  |     |     |3572016|
|GRD                             | 372127.10|-1215528.55|1A|   54|     |     |   -8|
  |     |     |3572016|
|TREE                            | 372122.83|-1215545.06|1A|  102|     |     |   40|
  |     |     |3572016|
|GRD                             | 372150.80|-1215612.60|1A|   45|     |     |  -17|
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  |     |      |3572016|
|TREE                           | 372122.91|-1215549.42|1A|  102|     |     |   40|
  |     |      |3572016|
|NAVAID                         | 372123.33|-1215537.45|1A|   55|     |    2|   -7|
  |     |      |3572016|
|POLE                           | 372145.28|-1215613.98|1A|   75|     |   30|   13|
  |     |      |3572016|
|NAVAID                         | 372125.58|-1215529.75|1A|   55|     |    3|   -7|
  |     |      |3572016|
|GRD                            | 372122.61|-1215539.61|1A|   53|     |     |   -9|
  |     |      |3572016|
|TREE                           | 372134.07|-1215610.47|1A|  150|     |     |   88|
  |     |      |3572016|
|POLE                           | 372141.90|-1215515.68|1A|  136|     |   84|   74|
  |     |      |3572016|
|GRD                            | 372152.12|-1215613.85|1A|   44|     |     |  -18|
  |     |      |3572016|
|SIGN                           | 372200.78|-1215608.26|1A|   42|     |    4|  -20|
  |     |      |3572016|
|GRD                            | 372122.59|-1215535.56|1A|   53|     |     |   -9|
  |     |      |3572016|
|BLDG                           | 372121.53|-1215541.66|1A|  101|     |   47|   39|
  |     |      |3572016|
|SIGN                           | 372123.35|-1215532.73|1A|   53|     |    3|   -9|
  |     |      |3572016|
|SIGN                           | 372127.14|-1215525.02|1A|   57|     |    4|   -5|
  |     |      |3572016|
|BLDG                           | 372149.24|-1215614.96|1A|   96|     |   51|   34|
  |     |      |3572016|
|GRD                            | 372121.96|-1215536.72|1A|   54|     |     |   -8|
  |     |      |3572016|
|GRD                            | 372122.10|-1215534.75|1A|   52|     |     |  -10|
  |     |      |3572016|
|TREE                           | 372120.87|-1215547.57|1A|  116|     |     |   54|
  |     |      |3572016|
|SIGN                           | 372202.12|-1215608.11|1A|   44|     |    5|  -18|
  |     |      |3572016|
|SIGN                           | 372121.84|-1215535.11|1A|   56|     |    3|   -6|
  |     |      |3572016|
|TREE                           | 372120.52|-1215544.38|1A|  113|     |     |   51|
  |     |      |3572016|
|SIGN                           | 372121.71|-1215535.01|1A|   56|     |    3|   -6|
  |     |      |3572016|
|POLE                           | 372147.42|-1215616.32|1A|   75|     |   31|   13|
  |     |      |3572016|
|GRD                            | 372121.53|-1215535.21|1A|   53|     |     |   -9|
  |     |      |3572016|
|GRD                            | 372120.78|-1215538.46|1A|   54|     |     |   -8|
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  |     |     |3572016|
|SIGN                       | 372156.94|-1215613.52|1A|   43|     |    3|  -19|
  |     |     |3572016|
|BLDG                       | 372150.10|-1215616.40|1A|  134|     |   90|   72|
  |     |     |3572016|
|TREE                       | 372120.07|-1215541.08|1A|  134|     |     |   72|
  |     |     |3572016|
|TREE                       | 372120.06|-1215541.22|1A|  138|     |     |   76|
  |     |     |3572016|
|GRD                        | 372153.54|-1215615.48|1A|   44|     |     |  -18|
  |     |     |3572016|
|SIGN                       | 372157.16|-1215613.78|1A|   43|     |    3|  -19|
  |     |     |3572016|
|SIGN                       | 372121.40|-1215532.41|1A|   67|     |   16|    5|
  |     |     |3572016|
|TREE                       | 372119.17|-1215544.62|1A|  117|     |     |   55|
  |     |     |3572016|
|SIGN                       | 372158.96|-1215613.57|1A|   55|     |   16|   -7|
  |     |     |3572016|
|POLE                       | 372206.77|-1215605.26|1A|   58|     |   23|   -4|
  |     |     |3572016|
|POLE                       | 372154.71|-1215616.75|1A|   66|     |   25|    4|
  |     |     |3572016|
|VERTICAL POINT             | 372120.49|-1215531.98|1A|   57|     |    4|   -5|
  |     |     |3572016|
|TREE                       | 372118.44|-1215541.77|1A|  100|     |     |   38|
  |     |     |3572016|
|BLDG                       | 372151.89|-1215618.35|1A|  134|     |   89|   72|
  |     |     |3572016|
|POLE                       | 372153.91|-1215617.88|1A|   68|     |   25|    6|
  |     |     |3572016|
|TREE                       | 372137.76|-1215618.69|1A|  155|     |     |   93|
  |     |     |3572016|
|RD (N)                     | 372117.38|-1215543.67|1A|   69|     |     |    7|
  |     |     |3572016|
|TREE                       | 372116.80|-1215541.09|1A|  106|     |     |   44|
  |     |     |3572016|
|TREE                       | 372122.00|-1215608.25|1A|  172|     |     |  110|
  |     |     |3572016|
|TREE                       | 372206.94|-1215517.66|1A|  154|     |     |   92|
  |     |     |3572016|
|TREE                       | 372151.65|-1215622.28|1A|   98|     |     |   36|
  |     |     |3572016|
|TWR                        | 372206.03|-1215614.61|1A|   62|     |   26|    0|
  |     |     |3572016|
|ANT                        | 372154.90|-1215624.09|1A|  106|     |   64|   44|
  |     |     |3572016|
|TREE                       | 372156.51|-1215623.50|1A|  116|     |     |   54|
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  |      |      |3572016|
|TREE                          | 372157.01|-1215623.92|1A|  104|      |     |   42|
  |      |      |3572016|
|TRMSN TWR                     | 372218.71|-1215540.39|1A|  168|      |  127|  106|
  |      |      |3572016|
|TREE                          | 372157.95|-1215625.97|1A|  109|      |     |   47|
  |      |      |3572016|
|BLDG                          | 372109.96|-1215538.26|1A|  161|      |  103|   99|
  |      |      |3572016|
|BLDG                          | 372110.06|-1215533.85|1A|  147|      |   88|   85|
  |      |      |3572016|
|POLE                          | 372222.25|-1215600.91|1A|  122|      |   87|   60|
  |      |      |3572016|
|TREE                          | 372109.75|-1215522.81|1A|   80|      |     |   18|
  |      |      |3572016|
|TREE                          | 372109.60|-1215522.60|1A|   84|      |     |   22|
  |      |      |3572016|
|TREE                          | 372109.47|-1215522.91|1A|   97|      |     |   35|
  |      |      |3572016|
|POLE                          | 372110.26|-1215520.36|1A|   90|      |   35|   28|
  |      |      |3572016|
|POLE                          | 372107.02|-1215528.14|1A|  142|      |   81|   80|
  |      |      |3572016|
|TREE                          | 372109.04|-1215521.43|1A|   84|      |     |   22|
  |      |      |3572016|
|STADIUM                       | 372106.34|-1215528.95|1A|  137|      |   79|   75|
  |      |      |3572016|
|TREE                          | 372108.25|-1215522.27|1A|  105|      |     |   43|
  |      |      |3572016|
|POLE                          | 372208.16|-1215628.67|1A|   78|      |   40|   16|
  |      |      |3572016|
|TREE                          | 372107.99|-1215521.85|1A|  109|      |     |   47|
  |      |      |3572016|
|POLE                          | 372109.12|-1215519.12|1A|   88|      |   33|   26|
  |      |      |3572016|
|POLE                          | 372107.32|-1215522.28|1A|   92|      |   35|   30|
  |      |      |3572016|
|BLDG                          | 372217.21|-1215509.16|1A|  215|      |  175|  153|
  |      |      |3572016|
|POLE                          | 372210.53|-1215628.65|1A|   83|      |   44|   21|
  |      |      |3572016|
|POLE                          | 372106.82|-1215521.07|1A|  105|      |   48|   43|
  |      |      |3572016|
|POLE                          | 372108.11|-1215518.00|1A|   91|      |   36|   29|
  |      |      |3572016|
|TREE                          | 372209.21|-1215630.13|1A|   86|      |     |   24|
  |      |      |3572016|
|TREE                          | 372209.41|-1215630.50|1A|   87|      |     |   25|
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  |     |     |3572016|
|TREE                   | 372210.05|-1215630.23|1A|   88|     |    |   26|
  |     |     |3572016|
|POLE                   | 372106.20|-1215520.03|1A|   89|     |  32|   27|
  |     |     |3572016|
|TREE                   | 372211.08|-1215630.04|1A|   80|     |    |   18|
  |     |     |3572016|
|TREE                   | 372211.49|-1215630.05|1A|   78|     |    |   16|
  |     |     |3572016|
|POLE                   | 372107.09|-1215516.89|1A|   89|     |  32|   27|
  |     |     |3572016|
|TREE                   | 372211.98|-1215630.19|1A|   82|     |    |   20|
  |     |     |3572016|
|POLE                   | 372105.68|-1215518.98|1A|   88|     |  32|   26|
  |     |     |3572016|
|TREE                   | 372212.34|-1215630.26|1A|   84|     |    |   22|
  |     |     |3572016|
|TREE                   | 372105.58|-1215518.16|1A|   99|     |    |   37|
  |     |     |3572016|
|TREE                   | 372106.11|-1215516.74|1A|  100|     |    |   38|
  |     |     |3572016|
|POLE                   | 372104.65|-1215519.79|1A|   89|     |  32|   27|
  |     |     |3572016|
|POLE                   | 372105.14|-1215517.93|1A|   89|     |  32|   27|
  |     |     |3572016|
|POLE                   | 372106.09|-1215515.78|1A|   91|     |  34|   29|
  |     |     |3572016|
|TREE                   | 372211.54|-1215632.16|1A|   99|     |    |   37|
  |     |     |3572016|
|BLDG                   | 372203.93|-1215452.05|1A|  195|     | 151|  133|
  |     |     |3572016|
|TREE                   | 372105.58|-1215516.11|1A|   94|     |    |   32|
  |     |     |3572016|
|TREE                   | 372212.12|-1215632.27|1A|   78|     |    |   16|
  |     |     |3572016|
|POLE                   | 372103.95|-1215518.87|1A|   89|     |  32|   27|
  |     |     |3572016|
|TREE                   | 372212.68|-1215632.20|1A|   79|     |    |   17|
  |     |     |3572016|
|POLE                   | 372104.59|-1215516.90|1A|   89|     |  31|   27|
  |     |     |3572016|
|TREE                   | 372212.70|-1215632.54|1A|   86|     |    |   24|
  |     |     |3572016|
|TREE                   | 372105.21|-1215515.10|1A|  102|     |    |   40|
  |     |     |3572016|
|TREE                   | 372212.69|-1215632.78|1A|   89|     |    |   27|
  |     |     |3572016|
|POLE                   | 372105.13|-1215514.61|1A|   91|     |  34|   29|
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  |      |      |3572016|
|TREE                       | 372214.03|-1215631.89|1A|   81|     |     |   19|
  |      |      |3572016|
|TREE                       | 372104.89|-1215514.87|1A|   93|     |     |   31|
  |      |      |3572016|
|TREE                       | 372213.47|-1215632.80|1A|   85|     |     |   23|
  |      |      |3572016|
|TREE                       | 372212.68|-1215633.52|1A|   85|     |     |   23|
  |      |      |3572016|
|TREE                       | 372212.69|-1215633.70|1A|   87|     |     |   25|
  |      |      |3572016|
|TREE                       | 372104.58|-1215514.54|1A|   95|     |     |   33|
  |      |      |3572016|
|TREE                       | 372212.61|-1215633.92|1A|   90|     |     |   28|
  |      |      |3572016|
|TREE                       | 372214.48|-1215632.39|1A|   88|     |     |   26|
  |      |      |3572016|
|TREE                       | 372213.59|-1215633.33|1A|   89|     |     |   27|
  |      |      |3572016|
|TREE                       | 372213.94|-1215633.09|1A|   89|     |     |   27|
  |      |      |3572016|
|TREE                       | 372212.60|-1215634.47|1A|   81|     |     |   19|
  |      |      |3572016|
|TREE                       | 372214.81|-1215632.96|1A|   97|     |     |   35|
  |      |      |3572016|
|TREE                       | 372213.70|-1215634.03|1A|   94|     |     |   32|
  |      |      |3572016|
|POLE                       | 372103.62|-1215514.77|1A|   95|     |   36|   33|
  |      |      |3572016|
|POLE                       | 372103.74|-1215514.28|1A|   95|     |   35|   33|
  |      |      |3572016|
|TREE                       | 372213.71|-1215634.32|1A|   91|     |     |   29|
  |      |      |3572016|
|TREE                       | 372215.04|-1215633.09|1A|   96|     |     |   34|
  |      |      |3572016|
|TREE                       | 372102.29|-1215517.28|1A|   92|     |     |   30|
  |      |      |3572016|
|TREE                       | 372215.66|-1215632.68|1A|   86|     |     |   24|
  |      |      |3572016|
|POLE                       | 372120.27|-1215452.77|1A|  145|     |   86|   83|
  |      |      |3572016|
|POLE                       | 372102.66|-1215515.55|1A|   94|     |   35|   32|
  |      |      |3572016|
|TREE                       | 372215.16|-1215633.73|1A|  116|     |     |   54|
  |      |      |3572016|
|POLE                       | 372103.23|-1215513.80|1A|   94|     |   35|   32|
  |      |      |3572016|
|TREE                       | 372215.25|-1215634.08|1A|  112|     |     |   50|
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  |     |     |3572016|
|POLE                            | 372102.44|-1215515.00|1A|   94|     |   35|   32|
  |     |     |3572016|
|POLE                            | 372102.93|-1215513.72|1A|   95|     |   35|   33|
  |     |     |3572016|
|TREE                            | 372215.54|-1215634.28|1A|   87|     |     |   25|
  |     |     |3572016|
|TREE                            | 372101.60|-1215515.99|1A|   94|     |     |   32|
  |     |     |3572016|
|TREE                            | 372215.22|-1215634.72|1A|   87|     |     |   25|
  |     |     |3572016|
|POLE                            | 372102.10|-1215514.39|1A|   94|     |   35|   32|
  |     |     |3572016|
|BLDG                            | 372215.13|-1215637.64|1A|  101|     |   61|   39|
  |     |     |3572016|
|SIGN                            | 372109.25|-1215458.44|1A|   62|     |    4|    0|
  |     |     |3572016|
|GRD                             | 372102.38|-1215508.25|1A|   65|     |     |    3|
  |     |     |3572016|
|TREE                            | 372059.53|-1215512.78|1A|  106|     |     |   44|
  |     |     |3572016|
|SIGN                            | 372110.60|-1215455.33|1A|   62|     |    3|    0|
  |     |     |3572016|
|RD SIGN                         | 372101.84|-1215507.62|1A|   84|     |     |   22|
  |     |     |3572016|
|POLE                            | 372100.38|-1215510.31|1A|  100|     |   35|   38|
  |     |     |3572016|
|TREE                            | 372059.08|-1215513.11|1A|  103|     |     |   41|
  |     |     |3572016|
|POLE                            | 372100.29|-1215509.82|1A|  100|     |   35|   38|
  |     |     |3572016|
|POLE                            | 372059.66|-1215510.77|1A|  100|     |   35|   38|
  |     |     |3572016|
|POLE                            | 372059.84|-1215509.46|1A|  103|     |   36|   41|
  |     |     |3572016|
|TREE                            | 372216.77|-1215639.72|1A|  108|     |     |   46|
  |     |     |3572016|
|GRD                             | 372109.33|-1215454.86|1A|   60|     |     |   -2|
  |     |     |3572016|
|POLE                            | 372058.14|-1215512.77|1A|  105|     |   42|   43|
  |     |     |3572016|
|POLE                            | 372102.26|-1215504.48|1A|   79|     |   18|   17|
  |     |     |3572016|
|POLE                            | 372221.16|-1215635.78|1A|   61|     |   24|   -1|
  |     |     |3572016|
|WALL                            | 372232.28|-1215619.20|1A|   47|     |   13|  -15|
  |     |     |3572016|
|POLE                            | 372059.09|-1215510.01|1A|  103|     |   35|   41|
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			3572016
GRD	372104.21|-1215500.76|1A| 61|		-1
			3572016
GRD	372104.91|-1215459.56|1A| 61|		-1
			3572016
GRD	372107.62|-1215455.69|1A| 61|		-1
			3572016
WALL	372102.52|-1215502.72|1A| 73|	14| 11
			3572016
TREE	372115.70|-1215447.04|1A| 96|		34
			3572016
TREE	372221.03|-1215637.46|1A| 90|		28
			3572016
WALL	372103.18|-1215500.97|1A| 75|	14| 13
			3572016
WALL	372102.53|-1215501.90|1A| 76|	15| 14
			3572016
LOC	372103.41|-1215500.45|1A| 82|	22| 20
			3572016
RD (N)	372101.84|-1215502.85|1A| 77|		15
			3572016
WALL	372103.72|-1215459.87|1A| 76|	15| 14
			3572016
LOC	372102.67|-1215501.34|1A| 85|	25| 23
			3572016
ELEC BOX	372102.62|-1215501.19|1A| 64|	3| 2
			3572016
WALL	372102.01|-1215502.09|1A| 72|	12| 10
			3572016
TREE	372219.95|-1215639.16|1A| 84|		22
			3572016
TREE	372221.46|-1215637.67|1A| 94|		32
			3572016
TREE	372235.73|-1215614.51|1A| 70|		8
			3572016
WALL	372104.10|-1215458.70|1A| 75|	15| 13
			3572016
TREE	372221.73|-1215637.60|1A| 96|		34
			3572016
POLE	372101.97|-1215501.75|1A| 77|	15| 15
			3572016
POLE	372101.45|-1215502.40|1A| 80|	17| 18
			3572016
WALL	372102.20|-1215500.83|1A| 72|	12| 10
			3572016
RD (N)	372101.91|-1215501.21|1A| 76|		14
			3572016
FENCE	372224.57|-1215634.96|1A| 49|	15| -13

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  |     |     |3572016|
|WALL                               | 372101.34|-1215501.87|1A|   65|     |    3|    3|
  |     |     |3572016|
|WALL                               | 372105.68|-1215455.61|1A|   74|     |   15|   12|
  |     |     |3572016|
|POLE                               | 372102.21|-1215500.37|1A|   77|     |   16|   15|
  |     |     |3572016|
|WALL                               | 372106.35|-1215454.65|1A|   74|     |   15|   12|
  |     |     |3572016|
|WALL                               | 372102.60|-1215459.65|1A|   72|     |   12|   10|
  |     |     |3572016|
|WALL                               | 372107.02|-1215453.69|1A|   74|     |   15|   12|
  |     |     |3572016|
|RD (N)                             | 372101.00|-1215502.04|1A|   73|     |     |   11|
  |     |     |3572016|
|POLE                               | 372233.66|-1215621.27|1A|   74|     |   40|   12|
  |     |     |3572016|
|WALL                               | 372103.20|-1215458.60|1A|   72|     |   12|   10|
  |     |     |3572016|
|FENCE                              | 372229.55|-1215628.71|1A|   50|     |   15|  -12|
  |     |     |3572016|
|RD (N)                             | 372102.23|-1215459.96|1A|   76|     |     |   14|
  |     |     |3572016|
|WALL                               | 372232.69|-1215623.34|1A|   49|     |   15|  -13|
  |     |     |3572016|
|POLE                               | 372101.59|-1215500.92|1A|   79|     |   17|   17|
  |     |     |3572016|
|POLE                               | 372223.36|-1215637.05|1A|   70|     |   32|    8|
  |     |     |3572016|
|WALL                               | 372107.69|-1215452.72|1A|   73|     |   16|   11|
  |     |     |3572016|
|RD SIGN                            | 372057.53|-1215508.18|1A|  106|     |     |   44|
  |     |     |3572016|
|FENCE                              | 372225.44|-1215634.59|1A|   49|     |   14|  -13|
  |     |     |3572016|
|WALL                               | 372230.14|-1215627.88|1A|   49|     |   14|  -13|
  |     |     |3572016|
|POLE                               | 372102.71|-1215459.15|1A|   77|     |   17|   15|
  |     |     |3572016|
|POLE                               | 372103.41|-1215458.10|1A|   77|     |   17|   15|
  |     |     |3572016|
|WALL                               | 372105.42|-1215455.37|1A|   72|     |   12|   10|
  |     |     |3572016|
|WALL                               | 372230.68|-1215627.11|1A|   49|     |   14|  -13|
  |     |     |3572016|
|POLE                               | 372104.16|-1215457.02|1A|   77|     |   17|   15|
  |     |     |3572016|
|WALL                               | 372108.38|-1215451.79|1A|   73|     |   15|   11|
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   |     |     |3572016|
 |FENCE                         | 372232.35|-1215624.28|1A|   48|     |   15|  -14|
   |     |     |3572016|
 |WALL                          | 372106.10|-1215454.40|1A|   72|     |   12|   10|
   |     |     |3572016|
 |WALL                          | 372231.36|-1215626.13|1A|   49|     |   16|  -13|
   |     |     |3572016|
 |RD (N)                        | 372102.89|-1215458.62|1A|   76|     |     |   14|
   |     |     |3572016|
 |RD (N)                        | 372103.44|-1215457.80|1A|   75|     |     |   13|
   |     |     |3572016|
 |POLE                          | 372234.85|-1215619.33|1A|   79|     |   45|   17|
   |     |     |3572016|
 |WALL                          | 372106.78|-1215453.44|1A|   72|     |   12|   10|
   |     |     |3572016|
 |WALL                          | 372101.50|-1215500.62|1A|   66|     |    3|    4|
   |     |     |3572016|
 |RD SIGN                       | 372106.13|-1215454.19|1A|   70|     |     |    8|
   |     |     |3572016|
 |WALL                          | 372232.00|-1215625.22|1A|   49|     |   16|  -13|
   |     |     |3572016|
 |RD (N)                        | 372105.23|-1215455.23|1A|   76|     |     |   14|
   |     |     |3572016|
 |WALL                          | 372107.46|-1215452.49|1A|   71|     |   12|    9|
   |     |     |3572016|
 |RD (N)                        | 372105.88|-1215454.30|1A|   75|     |     |   13|
   |     |     |3572016|
 |WALL                          | 372228.11|-1215631.63|1A|   49|     |   15|  -13|
   |     |     |3572016|
 |RD (N)                        | 372103.23|-1215457.78|1A|   76|     |     |   14|
   |     |     |3572016|
 |WALL                          | 372227.13|-1215633.02|1A|   51|     |   14|  -11|
   |     |     |3572016|
 |WALL                          | 372108.16|-1215451.54|1A|   71|     |   12|    9|
   |     |     |3572016|
 |POLE                          | 372105.40|-1215454.78|1A|   81|     |   20|   19|
   |     |     |3572016|
 |WALL                          | 372226.28|-1215634.23|1A|   50|     |   14|  -12|
   |     |     |3572016|
 |POLE                          | 372101.99|-1215459.46|1A|   79|     |   17|   17|
   |     |     |3572016|
 |RD SIGN                       | 372100.88|-1215501.19|1A|   71|     |     |    9|
   |     |     |3572016|
 |RD (N)                        | 372106.60|-1215453.27|1A|   75|     |     |   13|
   |     |     |3572016|
 |WALL                          | 372101.00|-1215500.87|1A|   67|     |    6|    5|
   |     |     |3572016|
 |POLE                          | 372106.12|-1215453.75|1A|   81|     |   21|   19|
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  |     |     |3572016|
|WALL                                | 372101.90|-1215459.42|1A|   66|      |    5|    4|
  |     |     |3572016|
|RD (N)                              | 372107.23|-1215452.37|1A|   75|      |     |   13|
  |     |     |3572016|
|POLE                                | 372108.28|-1215451.19|1A|   76|      |   17|   14|
  |     |     |3572016|
|RD (N)                              | 372101.19|-1215500.46|1A|   76|      |     |   14|
  |     |     |3572016|
|POLE                                | 372106.83|-1215452.74|1A|   80|      |   21|   18|
  |     |     |3572016|
|POLE                                | 372102.56|-1215458.30|1A|   79|      |   17|   17|
  |     |     |3572016|
|FENCE                               | 372225.86|-1215635.09|1A|   47|      |   10|  -15|
  |     |     |3572016|
|WALL                                | 372102.44|-1215458.39|1A|   66|      |    5|    4|
  |     |     |3572016|
|RD (N)                              | 372108.01|-1215451.32|1A|   74|      |     |   12|
  |     |     |3572016|
|RD (N)                              | 372105.73|-1215453.91|1A|   65|      |     |    3|
  |     |     |3572016|
|POLE                                | 372107.56|-1215451.75|1A|   80|      |   20|   18|
  |     |     |3572016|
|POLE                                | 372109.38|-1215449.77|1A|   76|      |   17|   14|
  |     |     |3572016|
|WALL                                | 372232.98|-1215624.41|1A|   44|      |    9|  -18|
  |     |     |3572016|
|RD SIGN                             | 372107.71|-1215451.51|1A|   67|      |     |    5|
  |     |     |3572016|
|RD SIGN                             | 372107.91|-1215451.26|1A|   67|      |     |    5|
  |     |     |3572016|
|WALL                                | 372103.00|-1215457.37|1A|   67|      |    5|    5|
  |     |     |3572016|
|RD (N)                              | 372106.35|-1215453.00|1A|   70|      |     |    8|
  |     |     |3572016|
|WALL                                | 372104.86|-1215454.83|1A|   66|      |    4|    4|
  |     |     |3572016|
|WALL                                | 372232.45|-1215625.58|1A|   45|      |   10|  -17|
  |     |     |3572016|
|WALL                                | 372231.84|-1215626.69|1A|   44|      |    9|  -18|
  |     |     |3572016|
|POLE                                | 372105.36|-1215454.10|1A|   83|      |   21|   21|
  |     |     |3572016|
|RD SIGN                             | 372101.16|-1215459.92|1A|   72|      |     |   10|
  |     |     |3572016|
|WALL                                | 372105.51|-1215453.89|1A|   65|      |    4|    3|
  |     |     |3572016|
|WALL                                | 372231.26|-1215627.73|1A|   44|      |    9|  -18|
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  |     |      |3572016|
|WALL                           | 372100.83|-1215500.43|1A|   67|     |    5|    5|
  |     |      |3572016|
|RD (N)                         | 372101.59|-1215459.24|1A|   77|     |     |   15|
  |     |      |3572016|
|RD (N)                         | 372107.06|-1215452.01|1A|   73|     |     |   11|
  |     |      |3572016|
|RD SIGN                        | 372105.71|-1215453.60|1A|   73|     |     |   11|
  |     |      |3572016|
|WALL                           | 372230.71|-1215628.72|1A|   45|     |    9|  -17|
  |     |      |3572016|
|RD (N)                         | 372104.73|-1215454.78|1A|   77|     |     |   15|
  |     |      |3572016|
|FENCE                          | 372226.33|-1215635.02|1A|   47|     |   10|  -15|
  |     |      |3572016|
|RD (N)                         | 372102.93|-1215457.16|1A|   77|     |     |   15|
  |     |      |3572016|
|POLE                           | 372106.08|-1215453.07|1A|   82|     |   21|   20|
  |     |      |3572016|
|FENCE                          | 372226.76|-1215634.51|1A|   47|     |   10|  -15|
  |     |      |3572016|
|RD (N)                         | 372107.77|-1215451.06|1A|   75|     |     |   13|
  |     |      |3572016|
|RD (N)                         | 372102.19|-1215458.13|1A|   78|     |     |   16|
  |     |      |3572016|
|RD (N)                         | 372105.45|-1215453.72|1A|   77|     |     |   15|
  |     |      |3572016|
|RD SIGN                        | 372101.43|-1215459.13|1A|   72|     |     |   10|
  |     |      |3572016|
|POLE                           | 372106.78|-1215452.05|1A|   82|     |   18|   20|
  |     |      |3572016|
|WALL                           | 372104.64|-1215454.64|1A|   69|     |    6|    7|
  |     |      |3572016|
|RD (N)                         | 372226.14|-1215635.50|1A|   53|     |     |   -9|
  |     |      |3572016|
|RD (N)                         | 372106.14|-1215452.74|1A|   77|     |     |   15|
  |     |      |3572016|
|RD SIGN                        | 372107.42|-1215451.19|1A|   67|     |     |    5|
  |     |      |3572016|
|FENCE                          | 372229.02|-1215631.77|1A|   46|     |   10|  -16|
  |     |      |3572016|
|FENCE                          | 372227.57|-1215633.80|1A|   47|     |   10|  -15|
  |     |      |3572016|
|POLE                           | 372107.52|-1215451.05|1A|   80|     |   17|   18|
  |     |      |3572016|
|RD SIGN                        | 372107.62|-1215450.93|1A|   70|     |     |    8|
  |     |      |3572016|
|RD SIGN                        | 372105.31|-1215453.61|1A|   78|     |     |   16|
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										3572016
TREE	372114.03	-1215444.76	1A	128			66			3572016
RD (N)	372106.87	-1215451.72	1A	76			14			3572016
WALL	372105.25	-1215453.64	1A	69		5	7			3572016
RD (N)	372104.52	-1215454.53	1A	79			17			3572016
FENCE	372228.34	-1215632.86	1A	46		9	-16			3572016
RD SIGN	372101.23	-1215459.10	1A	72			10			3572016
RD SIGN	372232.86	-1215625.78	1A	45			-17			3572016
POLE	372104.75	-1215454.14	1A	85		21	23			3572016
RD (N)	372232.16	-1215627.05	1A	50			-12			3572016
RD (N)	372107.56	-1215450.79	1A	75			13			3572016
FENCE	372227.31	-1215634.40	1A	43		7	-19			3572016
RD SIGN	372106.97	-1215451.44	1A	83			21			3572016
RD (N)	372231.68	-1215627.93	1A	51			-11			3572016
RD (N)	372232.57	-1215626.41	1A	49			-13			3572016
WALL	372105.86	-1215452.64	1A	70		6	8			3572016
RD (N)	372226.95	-1215635.04	1A	53			-9			3572016
RD (N)	372105.32	-1215453.23	1A	80			18			3572016
RD (N)	372231.34	-1215628.74	1A	50			-12			3572016
WALL	372106.57	-1215451.66	1A	70		6	8			3572016
RD (N)	372102.55	-1215456.69	1A	79			17			3572016
RD (N)	372101.87	-1215457.65	1A	78			16			3572016
POLE	372105.87	-1215452.34	1A	86		21	24			3572016
RD (N)	372101.10	-1215458.71	1A	78			16			3572016
WALL	372107.35	-1215450.60	1A	71		6	9			

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  |     |      |3572016|
|RD (N)                        | 372106.29|-1215451.74|1A|   81|     |     |   19|
  |     |      |3572016|
|RD (N)                        | 372100.36|-1215459.75|1A|   77|     |     |   15|
  |     |      |3572016|
|RD (N)                        | 372231.08|-1215629.50|1A|   50|     |     |  -12|
  |     |      |3572016|
|RD (N)                        | 372233.30|-1215625.85|1A|   49|     |     |  -13|
  |     |      |3572016|
|RD (N)                        | 372059.64|-1215500.75|1A|   76|     |     |   14|
  |     |      |3572016|
|RD SIGN                       | 372228.26|-1215633.83|1A|   45|     |     |  -17|
  |     |      |3572016|
|RD (N)                        | 372227.70|-1215634.63|1A|   53|     |     |   -9|
  |     |      |3572016|
|RD (N)                        | 372107.27|-1215450.42|1A|   81|     |     |   19|
  |     |      |3572016|
|RD (N)                        | 372233.75|-1215625.17|1A|   48|     |     |  -14|
  |     |      |3572016|
|RD SIGN                       | 372228.52|-1215633.72|1A|   45|     |     |  -17|
  |     |      |3572016|
|TREE                          | 372219.82|-1215643.62|1A|  110|     |     |   48|
  |     |      |3572016|
|WALL                          | 372104.26|-1215453.64|1A|   68|     |    2|    6|
  |     |      |3572016|
|RD (N)                        | 372232.61|-1215627.66|1A|   48|     |     |  -14|
  |     |      |3572016|
|WALL                          | 372104.80|-1215452.90|1A|   68|     |    2|    6|
  |     |      |3572016|
|TREE                          | 372113.19|-1215444.32|1A|  120|     |     |   58|
  |     |      |3572016|
|RD (N)                        | 372228.31|-1215634.26|1A|   52|     |     |  -10|
  |     |      |3572016|
|WALL                          | 372105.16|-1215452.39|1A|   69|     |    3|    7|
  |     |      |3572016|
|RD SIGN                       | 372229.05|-1215633.31|1A|   48|     |     |  -14|
  |     |      |3572016|
|RD (N)                        | 372102.19|-1215456.24|1A|   79|     |     |   17|
  |     |      |3572016|
|RD (N)                        | 372101.50|-1215457.20|1A|   79|     |     |   17|
  |     |      |3572016|
|TREE                          | 372219.97|-1215643.67|1A|  112|     |     |   50|
  |     |      |3572016|
|RD (N)                        | 372232.01|-1215628.83|1A|   50|     |     |  -12|
  |     |      |3572016|
|RD (N)                        | 372103.87|-1215453.94|1A|   80|     |     |   18|
  |     |      |3572016|
|WALL                          | 372105.56|-1215451.83|1A|   69|     |    3|    7|
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  |     |     |3572016|
|RD (N)                          | 372100.73|-1215458.28|1A|   78|     |     |   16|
  |     |     |3572016|
|RD (N)                          | 372104.34|-1215453.29|1A|   80|     |     |   18|
  |     |     |3572016|
|RD (N)                          | 372104.90|-1215452.50|1A|   81|     |     |   19|
  |     |     |3572016|
|WALL                            | 372106.15|-1215451.02|1A|   69|     |    3|    7|
  |     |     |3572016|
|RD (N)                          | 372059.99|-1215459.29|1A|   77|     |     |   15|
  |     |     |3572016|
|TREE                            | 372112.50|-1215444.66|1A|  131|     |     |   69|
  |     |     |3572016|
|RD SIGN                         | 372227.34|-1215635.86|1A|   49|     |     |  -13|
  |     |     |3572016|
|RD (N)                          | 372105.36|-1215451.87|1A|   81|     |     |   19|
  |     |     |3572016|
|WALL                            | 372106.70|-1215450.27|1A|   70|     |    3|    8|
  |     |     |3572016|
|RD (N)                          | 372059.23|-1215500.35|1A|   77|     |     |   15|
  |     |     |3572016|
|RD (N)                          | 372105.81|-1215451.24|1A|   81|     |     |   19|
  |     |     |3572016|
|POLE                            | 372229.40|-1215633.24|1A|   60|     |   26|   -2|
  |     |     |3572016|
|RD (N)                          | 372229.02|-1215633.85|1A|   52|     |     |  -10|
  |     |     |3572016|
|RD (N)                          | 372106.35|-1215450.49|1A|   82|     |     |   20|
  |     |     |3572016|
|TREE                            | 372221.33|-1215642.82|1A|   87|     |     |   25|
  |     |     |3572016|
|RD (N)                          | 372106.83|-1215449.83|1A|   82|     |     |   20|
  |     |     |3572016|
|RD (N)                          | 372233.38|-1215627.26|1A|   48|     |     |  -14|
  |     |     |3572016|
|BUSH                            | 372233.06|-1215627.92|1A|   45|     |     |  -17|
  |     |     |3572016|
|TREE                            | 372113.07|-1215443.70|1A|  145|     |     |   83|
  |     |     |3572016|
|BUSH                            | 372232.78|-1215628.52|1A|   47|     |     |  -15|
  |     |     |3572016|
|RD (N)                          | 372230.18|-1215632.67|1A|   49|     |     |  -13|
  |     |     |3572016|
|RD SIGN                         | 372100.88|-1215457.10|1A|   75|     |     |   13|
  |     |     |3572016|
|TREE                            | 372232.57|-1215629.11|1A|   59|     |     |   -3|
  |     |     |3572016|
|RD (N)                          | 372101.57|-1215455.84|1A|   75|     |     |   13|
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  |     |      |3572016|
|POLE                           | 372106.48|-1215449.65|1A|   95|     |   29|   33|
  |     |      |3572016|
|POLE                           | 372105.20|-1215451.12|1A|   90|     |   24|   28|
  |     |      |3572016|
|RD SIGN                        | 372104.16|-1215452.35|1A|   80|     |     |   18|
  |     |      |3572016|
|RD (N)                         | 372229.99|-1215633.46|1A|   52|     |     |  -10|
  |     |      |3572016|
|RD (N)                         | 372232.22|-1215630.07|1A|   53|     |     |   -9|
  |     |      |3572016|
|POLE                           | 372228.94|-1215635.03|1A|   47|     |   13|  -15|
  |     |      |3572016|
|RD (N)                         | 372230.52|-1215632.97|1A|   52|     |     |  -10|
  |     |      |3572016|
|FENCE                          | 372103.35|-1215452.98|1A|   69|     |    6|    7|
  |     |      |3572016|
|BUSH                           | 372232.70|-1215629.71|1A|   47|     |     |  -15|
  |     |      |3572016|
|RD (N)                         | 372100.67|-1215456.42|1A|   74|     |     |   12|
  |     |      |3572016|
|POLE                           | 372234.22|-1215627.41|1A|   65|     |   33|    3|
  |     |      |3572016|
|POLE                           | 372230.05|-1215634.11|1A|   61|     |   25|   -1|
  |     |      |3572016|
|TREE                           | 372106.02|-1215448.93|1A|   95|     |     |   33|
  |     |      |3572016|
|TREE                           | 372230.24|-1215634.37|1A|   70|     |     |    8|
  |     |      |3572016|
|RD (N)                         | 372234.57|-1215627.50|1A|   48|     |     |  -14|
  |     |      |3572016|
|TREE                           | 372111.01|-1215443.88|1A|  124|     |     |   62|
  |     |      |3572016|
|RD (N)                         | 372230.71|-1215633.78|1A|   51|     |     |  -11|
  |     |      |3572016|
|BLDG                           | 372102.69|-1215452.74|1A|   76|     |   14|   14|
  |     |      |3572016|
|POLE                           | 372107.08|-1215447.58|1A|  101|     |   42|   39|
  |     |      |3572016|
|TREE                           | 372233.01|-1215630.44|1A|   56|     |     |   -6|
  |     |      |3572016|
|TREE                           | 372111.73|-1215442.95|1A|  125|     |     |   63|
  |     |      |3572016|
|RD (N)                         | 372059.70|-1215456.64|1A|   72|     |     |   10|
  |     |      |3572016|
|RD (I)                         | 372235.15|-1215626.96|1A|   51|     |     |  -11|
  |     |      |3572016|
|BLDG                           | 372103.33|-1215451.65|1A|   72|     |   11|   10|
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  |     |      |3572016|
|TREE                           | 372232.63|-1215631.43|1A|   66|     |     |    4|
  |     |      |3572016|
|TREE                           | 372112.38|-1215442.23|1A|   91|     |     |   29|
  |     |      |3572016|
|BLDG                           | 372102.81|-1215452.01|1A|   72|     |   11|   10|
  |     |      |3572016|
|RD (N)                         | 372233.12|-1215630.84|1A|   59|     |     |   -3|
  |     |      |3572016|
|BLDG                           | 372104.00|-1215450.50|1A|   71|     |   12|    9|
  |     |      |3572016|
|ELEC TRANSMISSION LINE         | 372108.88|-1215445.21|1A|   90|     |   26|   28|
  |     |      |3572016|
|BUSH                           | 372233.58|-1215630.15|1A|   53|     |     |   -9|
  |     |      |3572016|
|SIGN                           | 372235.03|-1215627.75|1A|   46|     |   12|  -16|
  |     |      |3572016|
|BLDG                           | 372103.52|-1215450.93|1A|   72|     |   13|   10|
  |     |      |3572016|
|TREE                           | 372100.38|-1215455.06|1A|   86|     |     |   24|
  |     |      |3572016|
|TREE                           | 372233.45|-1215630.53|1A|   63|     |     |    1|
  |     |      |3572016|
|RD (N)                         | 372231.36|-1215633.78|1A|   50|     |     |  -12|
  |     |      |3572016|
|RD (N)                         | 372232.80|-1215631.62|1A|   58|     |     |   -4|
  |     |      |3572016|
|POLE                           | 372234.96|-1215628.18|1A|   72|     |   40|   10|
  |     |      |3572016|
|TREE                           | 372104.17|-1215449.72|1A|  124|     |     |   62|
  |     |      |3572016|
|TREE                           | 372052.89|-1215507.60|1A|  123|     |     |   61|
  |     |      |3572016|
|RD (N)                         | 372233.44|-1215631.24|1A|   62|     |     |    0|
  |     |      |3572016|
|RD (I)                         | 372235.36|-1215628.09|1A|   51|     |     |  -11|
  |     |      |3572016|
|TREE                           | 372107.77|-1215445.52|1A|  118|     |     |   56|
  |     |      |3572016|
|TREE                           | 372100.45|-1215454.14|1A|   83|     |     |   21|
  |     |      |3572016|
|RD (N)                         | 372058.65|-1215456.73|1A|   73|     |     |   11|
  |     |      |3572016|
|TREE                           | 372105.21|-1215447.96|1A|   84|     |     |   22|
  |     |      |3572016|
|RD (N)                         | 372234.08|-1215630.72|1A|   65|     |     |    3|
  |     |      |3572016|
|GUARDRAIL                      | 372234.24|-1215630.51|1A|   54|     |    3|   -8|
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  |     |     |3572016|
|TREE                           | 372109.82|-1215443.17|1A|  129|     |     |   67|
  |     |     |3572016|
|RD (I)                         | 372235.98|-1215627.60|1A|   51|     |     |  -11|
  |     |     |3572016|
|RD SIGN                        | 372233.41|-1215632.19|1A|   54|     |     |   -8|
  |     |     |3572016|
|POLE                           | 372234.52|-1215630.42|1A|   73|     |   21|   11|
  |     |     |3572016|
|TREE                           | 372100.15|-1215453.75|1A|   87|     |     |   25|
  |     |     |3572016|
|TREE                           | 372059.78|-1215454.18|1A|  110|     |     |   48|
  |     |     |3572016|
|RD (N)                         | 372104.99|-1215447.54|1A|   75|     |     |   13|
  |     |     |3572016|
|RD SIGN                        | 372234.90|-1215630.15|1A|   64|     |     |    2|
  |     |     |3572016|
|POLE                           | 372058.15|-1215456.45|1A|   95|     |   38|   33|
  |     |     |3572016|
|POLE                           | 372235.39|-1215629.38|1A|   64|     |   31|    2|
  |     |     |3572016|
|TREE                           | 372104.69|-1215447.72|1A|   89|     |     |   27|
  |     |     |3572016|
|TREE                           | 372059.91|-1215453.58|1A|  108|     |     |   46|
  |     |     |3572016|
|BRDG                           | 372235.12|-1215630.11|1A|   58|     |   11|   -4|
  |     |     |3572016|
|POLE                           | 372234.19|-1215631.80|1A|   74|     |   26|   12|
  |     |     |3572016|
|RD (I)                         | 372235.55|-1215629.73|1A|   51|     |     |  -11|
  |     |     |3572016|
|RD (N)                         | 372057.62|-1215456.53|1A|   75|     |     |   13|
  |     |     |3572016|
|TREE                           | 372111.80|-1215440.38|1A|   78|     |     |   16|
  |     |     |3572016|
|TREE                           | 372104.58|-1215447.32|1A|   86|     |     |   24|
  |     |     |3572016|
|TREE                           | 372059.61|-1215453.50|1A|   82|     |     |   20|
  |     |     |3572016|
|RD (N)                         | 372235.49|-1215630.03|1A|   70|     |     |    8|
  |     |     |3572016|
|RD (I)                         | 372236.21|-1215628.78|1A|   51|     |     |  -11|
  |     |     |3572016|
|TREE                           | 372059.74|-1215453.24|1A|   90|     |     |   28|
  |     |     |3572016|
|RD SIGN                        | 372057.28|-1215456.83|1A|   77|     |     |   15|
  |     |     |3572016|
|POLE                           | 372236.67|-1215628.08|1A|   67|     |   34|    5|
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  |     |      |3572016|
|POLE                              | 372235.10|-1215631.01|1A|   87|     |   34|   25|
  |     |      |3572016|
|TREE                              | 372103.18|-1215448.57|1A|   99|     |     |   37|
  |     |      |3572016|
|RD SIGN                           | 372235.09|-1215631.14|1A|   63|     |     |    1|
  |     |      |3572016|
|TREE                              | 372104.91|-1215446.53|1A|  121|     |     |   59|
  |     |      |3572016|
|POLE                              | 372235.07|-1215631.21|1A|   80|     |   27|   18|
  |     |      |3572016|
|TREE                              | 372107.70|-1215443.59|1A|  133|     |     |   71|
  |     |      |3572016|
|TREE                              | 372110.45|-1215441.07|1A|   83|     |     |   21|
  |     |      |3572016|
|RD SIGN                           | 372236.10|-1215629.51|1A|   67|     |     |    5|
  |     |      |3572016|
|TREE                              | 372104.37|-1215447.03|1A|   83|     |     |   21|
  |     |      |3572016|
|BRDG                              | 372235.41|-1215630.85|1A|   58|     |   23|   -4|
  |     |      |3572016|
|RD SIGN                           | 372057.36|-1215456.18|1A|   75|     |     |   13|
  |     |      |3572016|
|RD SIGN                           | 372236.30|-1215629.39|1A|   61|     |     |   -1|
  |     |      |3572016|
|WALL                              | 372059.25|-1215453.19|1A|   66|     |    3|    4|
  |     |      |3572016|
|TREE                              | 372102.95|-1215448.33|1A|   96|     |     |   34|
  |     |      |3572016|
|TREE                              | 372108.60|-1215442.30|1A|  101|     |     |   39|
  |     |      |3572016|
|TREE                              | 372102.79|-1215448.41|1A|   95|     |     |   33|
  |     |      |3572016|
|TREE                              | 372106.15|-1215444.63|1A|  118|     |     |   56|
  |     |      |3572016|
|TREE                              | 372104.11|-1215446.72|1A|   86|     |     |   24|
  |     |      |3572016|
|RD (N)                            | 372236.72|-1215629.30|1A|   70|     |     |    8|
  |     |      |3572016|
|RD (I)                            | 372235.90|-1215630.90|1A|   51|     |     |  -11|
  |     |      |3572016|
|RD (N)                            | 372059.02|-1215452.92|1A|   78|     |     |   16|
  |     |      |3572016|
|BRDG                              | 372237.08|-1215628.94|1A|   58|     |   17|   -4|
  |     |      |3572016|
|RD SIGN                           | 372236.40|-1215630.27|1A|   65|     |     |    3|
  |     |      |3572016|
|RD (N)                            | 372056.62|-1215456.26|1A|   78|     |     |   16|
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  |     |     |3572016|
|TREE                          | 372102.56|-1215448.09|1A|   92|     |    |  30|
  |     |     |3572016|
|POLE                          | 372059.15|-1215452.40|1A|   77|     |  13|  15|
  |     |     |3572016|
|POLE                          | 372059.00|-1215452.54|1A|   95|     |  32|  33|
  |     |     |3572016|
|TREE                          | 372103.86|-1215446.44|1A|   77|     |    |  15|
  |     |     |3572016|
|TREE                          | 372051.18|-1215506.06|1A|  114|     |    |  52|
  |     |     |3572016|
|TREE                          | 372100.53|-1215450.34|1A|   77|     |    |  15|
  |     |     |3572016|
|TREE                          | 372102.61|-1215447.74|1A|   93|     |    |  31|
  |     |     |3572016|
|TREE                          | 372100.76|-1215450.01|1A|   76|     |    |  14|
  |     |     |3572016|
|RD (I)                        | 372236.53|-1215630.50|1A|   51|     |    | -11|
  |     |     |3572016|
|POLE                          | 372235.69|-1215631.96|1A|   72|     |  39|  10|
  |     |     |3572016|
|BLDG                          | 372153.63|-1215426.84|1B|  183|     | 135| 121|
  |     |     |3572016|
|DEBRIS/RUINS                  | 372059.42|-1215451.57|1A|   68|     |   2|   6|
  |     |     |3572016|
|DEBRIS/RUINS                  | 372059.88|-1215450.87|1A|   69|     |   4|   7|
  |     |     |3572016|
|DEBRIS/RUINS                  | 372059.20|-1215451.78|1A|   68|     |   2|   6|
  |     |     |3572016|
|TREE                          | 372103.63|-1215446.18|1A|   84|     |    |  22|
  |     |     |3572016|
|DEBRIS/RUINS                  | 372059.42|-1215451.29|1A|   69|     |   3|   7|
  |     |     |3572016|
|BRDG                          | 372237.33|-1215629.71|1A|   58|     |  11|  -4|
  |     |     |3572016|
|GRD                           | 372058.80|-1215452.03|1A|   69|     |   2|   7|
  |     |     |3572016|
|POLE                          | 372237.08|-1215630.30|1A|   65|     |  32|   3|
  |     |     |3572016|
|GRD                           | 372058.99|-1215451.68|1A|   69|     |   3|   7|
  |     |     |3572016|
|RD (I)                        | 372236.11|-1215632.03|1A|   51|     |    | -11|
  |     |     |3572016|
|SIGN                          | 372055.68|-1215456.53|1A|   76|     |  11|  14|
  |     |     |3572016|
|TREE                          | 372105.79|-1215443.50|1A|  105|     |    |  43|
  |     |     |3572016|
|TREE                          | 372108.63|-1215440.64|1A|  108|     |    |  46|
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  |     |      |3572016|
|POLE                          | 372237.94|-1215629.36|1A|   88|     |   34|   26|
  |     |      |3572016|
|RD (N)                        | 372055.63|-1215456.09|1A|   81|     |     |   19|
  |     |      |3572016|
|TREE                          | 372109.67|-1215439.43|1A|  105|     |     |   43|
  |     |      |3572016|
|GRD                           | 372058.96|-1215451.00|1A|   71|     |    5|    9|
  |     |      |3572016|
|RD SIGN                       | 372238.08|-1215629.43|1A|   62|     |     |    0|
  |     |      |3572016|
|TREE                          | 372240.65|-1215624.48|1A|  123|     |     |   61|
  |     |      |3572016|
|GRD                           | 372058.81|-1215451.02|1A|   70|     |    4|    8|
  |     |      |3572016|
|TREE                          | 372058.23|-1215451.65|1A|   97|     |     |   35|
  |     |      |3572016|
|TREE                          | 372106.72|-1215441.72|1A|  116|     |     |   54|
  |     |      |3572016|
|TREE                          | 372103.75|-1215444.68|1A|  111|     |     |   49|
  |     |      |3572016|
|TREE                          | 372240.78|-1215624.68|1A|  115|     |     |   53|
  |     |      |3572016|
|TREE                          | 372104.38|-1215443.63|1A|  119|     |     |   57|
  |     |      |3572016|
|RD (N)                        | 372102.93|-1215445.09|1A|   76|     |     |   14|
  |     |      |3572016|
|POLE                          | 372238.00|-1215631.29|1A|   87|     |   56|   25|
  |     |      |3572016|
|TREE                          | 372055.59|-1215454.26|1A|   91|     |     |   29|
  |     |      |3572016|
|RD (N)                        | 372054.57|-1215455.84|1A|   84|     |     |   22|
  |     |      |3572016|
|TREE                          | 372243.47|-1215619.87|1A|  101|     |     |   39|
  |     |      |3572016|
|RD (N)                        | 372057.47|-1215451.31|1A|   79|     |     |   17|
  |     |      |3572016|
|TREE                          | 372242.81|-1215621.83|1A|  103|     |     |   41|
  |     |      |3572016|
|TREE                          | 372057.61|-1215450.98|1A|   90|     |     |   28|
  |     |      |3572016|
|TREE                          | 372059.01|-1215448.68|1A|   80|     |     |   18|
  |     |      |3572016|
|TREE                          | 372104.57|-1215442.16|1A|  122|     |     |   60|
  |     |      |3572016|
|TREE                          | 372102.10|-1215444.80|1A|   81|     |     |   19|
  |     |      |3572016|
|TREE                          | 372105.01|-1215441.61|1A|  117|     |     |   55|
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  |     |     |3572016|
|TREE                           | 372242.87|-1215622.65|1A|  105|     |    |   43|
  |     |     |3572016|
|POLE                           | 372102.38|-1215444.35|1A|   93|     |  33|   31|
  |     |     |3572016|
|TREE                           | 372106.99|-1215439.54|1A|   97|     |    |   35|
  |     |     |3572016|
|TREE                           | 372055.27|-1215453.56|1A|  104|     |    |   42|
  |     |     |3572016|
|RD SIGN                        | 372109.23|-1215437.44|1A|  126|     |    |   64|
  |     |     |3572016|
|TREE                           | 372058.79|-1215448.42|1A|   80|     |    |   18|
  |     |     |3572016|
|TREE                           | 372108.03|-1215438.42|1A|  118|     |    |   56|
  |     |     |3572016|
|TREE                           | 372058.36|-1215448.62|1A|   79|     |    |   17|
  |     |     |3572016|
|TREE                           | 372058.30|-1215448.54|1A|   81|     |    |   19|
  |     |     |3572016|
|TREE                           | 372059.30|-1215447.13|1A|  105|     |    |   43|
  |     |     |3572016|
|TREE                           | 372101.99|-1215443.75|1A|   91|     |    |   29|
  |     |     |3572016|
|TREE                           | 372102.36|-1215443.15|1A|   91|     |    |   29|
  |     |     |3572016|
|TREE                           | 372059.17|-1215446.75|1A|   91|     |    |   29|
  |     |     |3572016|
|TREE                           | 372058.50|-1215447.60|1A|  125|     |    |   63|
  |     |     |3572016|
|TREE                           | 372105.30|-1215439.90|1A|   93|     |    |   31|
  |     |     |3572016|
|TREE                           | 372101.58|-1215443.78|1A|   92|     |    |   30|
  |     |     |3572016|
|ELEC TRANSMISSION LINE         | 372238.31|-1215633.86|1A|   67|     |  33|    5|
  |     |     |3572016|
|TREE                           | 372103.05|-1215442.14|1A|   97|     |    |   35|
  |     |     |3572016|
|POLE                           | 372056.60|-1215449.96|1A|   90|     |  27|   28|
  |     |     |3572016|
|TREE                           | 372057.96|-1215447.99|1A|   99|     |    |   37|
  |     |     |3572016|
|POLE                           | 372237.88|-1215634.84|1A|   73|     |  39|   11|
  |     |     |3572016|
|TREE                           | 372056.76|-1215449.56|1A|   92|     |    |   30|
  |     |     |3572016|
|TREE                           | 372105.86|-1215439.10|1A|  110|     |    |   48|
  |     |     |3572016|
|TREE                           | 372058.25|-1215447.50|1A|  124|     |    |   62|
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  |      |      |3572016|
|TREE                             | 372100.90|-1215444.24|1A|   99|      |     |   37|
  |      |      |3572016|
|TREE                             | 372059.37|-1215446.06|1A|   83|      |     |   21|
  |      |      |3572016|
|TREE                             | 372059.04|-1215446.40|1A|   90|      |     |   28|
  |      |      |3572016|
|TREE                             | 372050.27|-1215459.93|1A|  131|      |     |   69|
  |      |      |3572016|
|TREE                             | 372059.77|-1215445.35|1A|  101|      |     |   39|
  |      |      |3572016|
|TREE                             | 372058.35|-1215447.11|1A|   82|      |     |   20|
  |      |      |3572016|
|POLE                             | 372057.99|-1215447.58|1A|   93|      |   32|   31|
  |      |      |3572016|
|TREE                             | 372050.04|-1215500.03|1A|  136|      |     |   74|
  |      |      |3572016|
|TREE                             | 372106.96|-1215437.68|1A|  113|      |     |   51|
  |      |      |3572016|
|TREE                             | 372059.33|-1215445.70|1A|   82|      |     |   20|
  |      |      |3572016|
|TREE                             | 372049.97|-1215459.80|1A|  139|      |     |   77|
  |      |      |3572016|
|POLE                             | 372100.02|-1215444.60|1A|   92|      |   32|   30|
  |      |      |3572016|
|TREE                             | 372101.41|-1215442.98|1A|  120|      |     |   58|
  |      |      |3572016|
|TREE                             | 372101.22|-1215443.18|1A|  116|      |     |   54|
  |      |      |3572016|
|POLE                             | 372100.77|-1215443.66|1A|   92|      |   32|   30|
  |      |      |3572016|
|TREE                             | 372103.91|-1215440.22|1A|  118|      |     |   56|
  |      |      |3572016|
|POLE                             | 372058.75|-1215445.91|1A|   92|      |   32|   30|
  |      |      |3572016|
|TREE                             | 372101.87|-1215442.15|1A|  100|      |     |   38|
  |      |      |3572016|
|TREE                             | 372058.35|-1215446.25|1A|   84|      |     |   22|
  |      |      |3572016|
|TREE                             | 372058.59|-1215445.91|1A|   95|      |     |   33|
  |      |      |3572016|
|TREE                             | 372055.95|-1215449.29|1A|   98|      |     |   36|
  |      |      |3572016|
|TREE                             | 372100.47|-1215443.33|1A|  110|      |     |   48|
  |      |      |3572016|
|TREE                             | 372056.05|-1215448.93|1A|  102|      |     |   40|
  |      |      |3572016|
|POLE                             | 372238.72|-1215635.37|1A|   73|      |   42|   11|
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  |     |     |3572016|
|FLGPL                          | 372059.81|-1215443.98|1A|   92|     |   31|   30|
  |     |     |3572016|
|TREE                           | 372102.45|-1215440.81|1A|  125|     |     |   63|
  |     |     |3572016|
|POLE                           | 372230.65|-1215646.80|1A|   83|     |   46|   21|
  |     |     |3572016|
|TREE                           | 372055.80|-1215448.77|1A|   98|     |     |   36|
  |     |     |3572016|
|TREE                           | 372104.85|-1215438.12|1A|   94|     |     |   32|
  |     |     |3572016|
|POLE                           | 372058.29|-1215445.07|1A|   82|     |   22|   20|
  |     |     |3572016|
|TREE                           | 372059.84|-1215443.12|1A|   88|     |     |   26|
  |     |     |3572016|
|POLE                           | 372230.64|-1215647.52|1A|   84|     |   48|   22|
  |     |     |3572016|
|POLE                           | 372238.78|-1215636.64|1A|   80|     |   50|   18|
  |     |     |3572016|
|TREE                           | 372059.37|-1215443.38|1A|  101|     |     |   39|
  |     |     |3572016|
|POLE                           | 372100.13|-1215442.24|1A|   94|     |   34|   32|
  |     |     |3572016|
|TREE                           | 372103.65|-1215438.28|1A|  100|     |     |   38|
  |     |     |3572016|
|TREE                           | 372059.33|-1215442.72|1A|  104|     |     |   42|
  |     |     |3572016|
|POLE                           | 372059.00|-1215443.08|1A|   92|     |   32|   30|
  |     |     |3572016|
|POLE                           | 372237.31|-1215639.79|1A|   76|     |   40|   14|
  |     |     |3572016|
|TREE                           | 372104.98|-1215436.70|1A|  105|     |     |   43|
  |     |     |3572016|
|TREE                           | 372237.06|-1215640.44|1A|   69|     |     |    7|
  |     |     |3572016|
|TREE                           | 372058.74|-1215443.06|1A|   98|     |     |   36|
  |     |     |3572016|
|ELEC TRANSMISSION LINE         | 372238.92|-1215637.85|1A|   74|     |   40|   12|
  |     |     |3572016|
|TREE                           | 372237.16|-1215640.60|1A|   67|     |     |    5|
  |     |     |3572016|
|TREE                           | 372102.47|-1215438.44|1A|   95|     |     |   33|
  |     |     |3572016|
|BLDG                           | 372059.62|-1215441.35|1A|   98|     |   37|   36|
  |     |     |3572016|
|TREE                           | 372053.69|-1215448.77|1A|  101|     |     |   39|
  |     |     |3572016|
|TREE                           | 372100.87|-1215439.51|1A|  120|     |     |   58|
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  |     |       |3572016|
|TREE                                | 372058.16|-1215442.51|1A|   95|      |     |   33|
  |     |       |3572016|
|TREE                                | 372103.54|-1215436.66|1A|  124|      |     |   62|
  |     |       |3572016|
|POLE                                | 372239.14|-1215639.12|1A|   78|      |   47|   16|
  |     |       |3572016|
|TREE                                | 372237.58|-1215641.73|1A|   67|      |     |    5|
  |     |       |3572016|
|TREE                                | 372047.99|-1215457.10|1A|  140|      |     |   78|
  |     |       |3572016|
|POLE                                | 372058.13|-1215441.89|1A|   92|      |   32|   30|
  |     |       |3572016|
|TREE                                | 372237.61|-1215642.03|1A|   72|      |     |   10|
  |     |       |3572016|
|TREE                                | 372058.23|-1215441.48|1A|  106|      |     |   44|
  |     |       |3572016|
|TREE                                | 372051.04|-1215451.22|1A|  107|      |     |   45|
  |     |       |3572016|
|POLE                                | 372237.84|-1215641.91|1A|   77|      |   41|   15|
  |     |       |3572016|
|TREE                                | 372057.69|-1215441.99|1A|  101|      |     |   39|
  |     |       |3572016|
|TREE                                | 372237.82|-1215642.25|1A|   64|      |     |    2|
  |     |       |3572016|
|TREE                                | 372237.68|-1215642.65|1A|   65|      |     |    3|
  |     |       |3572016|
|TREE                                | 372058.84|-1215440.17|1A|   96|      |     |   34|
  |     |       |3572016|
|TREE                                | 372059.32|-1215439.50|1A|  131|      |     |   69|
  |     |       |3572016|
|TREE                                | 372050.69|-1215450.86|1A|  105|      |     |   43|
  |     |       |3572016|
|BLDG                                | 372239.66|-1215640.24|1A|   67|      |   36|    5|
  |     |       |3572016|
|TREE                                | 372237.81|-1215643.08|1A|   72|      |     |   10|
  |     |       |3572016|
|TREE                                | 372057.68|-1215440.94|1A|  101|      |     |   39|
  |     |       |3572016|
|COMMUNICATION TWR                   | 372201.25|-1215710.39|1A|  171|      |  125|  109|
  |     |       |3572016|
|TREE                                | 372242.82|-1215635.55|1A|   63|      |     |    1|
  |     |       |3572016|
|TREE                                | 372057.48|-1215440.86|1A|  107|      |     |   45|
  |     |       |3572016|
|TREE                                | 372058.56|-1215439.57|1A|   94|      |     |   32|
  |     |       |3572016|
|TREE                                | 372102.35|-1215435.54|1A|  113|      |     |   51|
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  |     |     |3572016|
|TREE                          | 372057.33|-1215440.87|1A|   87|     |     |   25|
  |     |     |3572016|
|TREE                          | 372054.34|-1215444.62|1A|   95|     |     |   33|
  |     |     |3572016|
|TREE                          | 372054.62|-1215444.21|1A|   92|     |     |   30|
  |     |     |3572016|
|TREE                          | 372238.08|-1215643.51|1A|   66|     |     |    4|
  |     |     |3572016|
|TREE                          | 372057.42|-1215440.56|1A|   95|     |     |   33|
  |     |     |3572016|
|POLE                          | 372242.65|-1215636.40|1A|   72|     |   43|   10|
  |     |     |3572016|
|TREE                          | 372058.34|-1215439.38|1A|   97|     |     |   35|
  |     |     |3572016|
|POLE                          | 372052.58|-1215446.70|1A|   95|     |   32|   33|
  |     |     |3572016|
|FLGPL                         | 372057.34|-1215440.48|1A|  103|     |   41|   41|
  |     |     |3572016|
|TREE                          | 372057.57|-1215440.20|1A|   88|     |     |   26|
  |     |     |3572016|
|POLE                          | 372055.74|-1215442.40|1A|   89|     |   27|   27|
  |     |     |3572016|
|POLE                          | 372054.39|-1215444.06|1A|   94|     |   32|   32|
  |     |     |3572016|
|POLE                          | 372049.57|-1215451.10|1A|   97|     |   32|   35|
  |     |     |3572016|
|TREE                          | 372242.29|-1215637.47|1A|   72|     |     |   10|
  |     |     |3572016|
|TREE                          | 372238.09|-1215643.92|1A|   70|     |     |    8|
  |     |     |3572016|
|POLE                          | 372055.45|-1215442.51|1A|   94|     |   32|   32|
  |     |     |3572016|
|POLE                          | 372056.51|-1215440.98|1A|   95|     |   34|   33|
  |     |     |3572016|
|POLE                          | 372239.65|-1215642.02|1A|   80|     |   48|   18|
  |     |     |3572016|
|TREE                          | 372241.97|-1215638.47|1A|   71|     |     |    9|
  |     |     |3572016|
|POLE                          | 372057.21|-1215440.05|1A|   94|     |   32|   32|
  |     |     |3572016|
|SIGN                          | 372239.82|-1215641.92|1A|   67|     |   36|    5|
  |     |     |3572016|
|POLE                          | 372044.49|-1215459.77|1A|  128|     |   58|   66|
  |     |     |3572016|
|POLE                          | 372057.93|-1215438.98|1A|   97|     |   32|   35|
  |     |     |3572016|
|POLE                          | 372052.77|-1215445.38|1A|   95|     |   32|   33|
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  |     |     |3572016|
|POLE                           | 372243.29|-1215636.68|1A|   74|     |   44|   12|
  |     |     |3572016|
|POLE                           | 372049.72|-1215449.79|1A|   97|     |   33|   35|
  |     |     |3572016|
|TREE                           | 372101.40|-1215435.07|1A|  114|     |     |   52|
  |     |     |3572016|
|TREE                           | 372049.79|-1215449.47|1A|   89|     |     |   27|
  |     |     |3572016|
|TREE                           | 372051.06|-1215447.45|1A|  103|     |     |   41|
  |     |     |3572016|
|TREE                           | 372050.91|-1215447.68|1A|  105|     |     |   43|
  |     |     |3572016|
|POLE                           | 372056.63|-1215439.97|1A|   96|     |   35|   34|
  |     |     |3572016|
|POLE                           | 372057.52|-1215438.61|1A|   97|     |   33|   35|
  |     |     |3572016|
|TREE                           | 372054.61|-1215441.93|1A|  107|     |     |   45|
  |     |     |3572016|
|POLE                           | 372241.18|-1215641.31|1A|   68|     |   38|    6|
  |     |     |3572016|
|POLE                           | 372051.95|-1215445.41|1A|   95|     |   32|   33|
  |     |     |3572016|
|TREE                           | 372238.38|-1215645.52|1A|   73|     |     |   11|
  |     |     |3572016|
|TREE                           | 372052.14|-1215444.97|1A|  120|     |     |   58|
  |     |     |3572016|
|TREE                           | 372056.31|-1215439.43|1A|   90|     |     |   28|
  |     |     |3572016|
|TREE                           | 372057.28|-1215438.26|1A|   89|     |     |   27|
  |     |     |3572016|
|ELEC TRANSMISSION LINE         | 372239.99|-1215643.58|1A|   74|     |   41|   12|
  |     |     |3572016|
|TREE                           | 372056.17|-1215439.43|1A|  104|     |     |   42|
  |     |     |3572016|
|POLE                           | 372244.24|-1215637.05|1A|   73|     |   43|   11|
  |     |     |3572016|
|TREE                           | 372050.57|-1215446.70|1A|  111|     |     |   49|
  |     |     |3572016|
|TREE                           | 372238.41|-1215646.15|1A|   68|     |     |    6|
  |     |     |3572016|
|POLE                           | 372239.74|-1215644.49|1A|   73|     |   41|   11|
  |     |     |3572016|
|TREE                           | 372056.04|-1215439.14|1A|  102|     |     |   40|
  |     |     |3572016|
|POLE                           | 372241.70|-1215641.62|1A|   68|     |   38|    6|
  |     |     |3572016|
|TREE                           | 372051.71|-1215444.64|1A|  104|     |     |   42|
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  |      |      |3572016|
|POLE                              | 372244.54|-1215637.17|1A|   73|      |   45|   11|
  |      |      |3572016|
|TREE                              | 372240.01|-1215644.55|1A|   72|      |     |   10|
  |      |      |3572016|
|POLE                              | 372244.65|-1215637.21|1A|   75|      |   45|   13|
  |      |      |3572016|
|TREE                              | 372238.60|-1215646.58|1A|   68|      |     |    6|
  |      |      |3572016|
|TREE                              | 372051.47|-1215444.39|1A|  116|      |     |   54|
  |      |      |3572016|
|TREE                              | 372049.96|-1215446.48|1A|  114|      |     |   52|
  |      |      |3572016|
|TREE                              | 372050.97|-1215444.97|1A|  105|      |     |   43|
  |      |      |3572016|
|TREE                              | 372050.78|-1215445.26|1A|  106|      |     |   44|
  |      |      |3572016|
|TREE                              | 372048.56|-1215448.37|1A|  114|      |     |   52|
  |      |      |3572016|
|TREE                              | 372240.44|-1215644.62|1A|   94|      |     |   32|
  |      |      |3572016|
|TREE                              | 372052.32|-1215442.53|1A|  103|      |     |   41|
  |      |      |3572016|
|POLE                              | 372240.31|-1215645.15|1A|   79|      |   48|   17|
  |      |      |3572016|
|TREE                              | 372050.48|-1215445.06|1A|  105|      |     |   43|
  |      |      |3572016|
|TREE                              | 372240.41|-1215645.05|1A|   70|      |     |    8|
  |      |      |3572016|
|TREE                              | 372049.17|-1215446.95|1A|  108|      |     |   46|
  |      |      |3572016|
|TREE                              | 372056.35|-1215437.39|1A|  128|      |     |   66|
  |      |      |3572016|
|TREE                              | 372048.15|-1215448.36|1A|   94|      |     |   32|
  |      |      |3572016|
|TREE                              | 372050.20|-1215445.00|1A|  100|      |     |   38|
  |      |      |3572016|
|TREE                              | 372240.50|-1215645.38|1A|   78|      |     |   16|
  |      |      |3572016|
|TREE                              | 372052.43|-1215441.85|1A|   98|      |     |   36|
  |      |      |3572016|
|TREE                              | 372053.62|-1215440.14|1A|  131|      |     |   69|
  |      |      |3572016|
|TREE                              | 372240.57|-1215645.55|1A|   75|      |     |   13|
  |      |      |3572016|
|TREE                              | 372240.57|-1215645.71|1A|   81|      |     |   19|
  |      |      |3572016|
|TREE                              | 372051.80|-1215442.27|1A|  109|      |     |   47|
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  |       |       |3572016|
|TREE                              | 372056.21|-1215436.78|1A|  112|      |      |   50|
  |       |       |3572016|
|TREE                              | 372055.67|-1215437.30|1A|  122|      |      |   60|
  |       |       |3572016|
|TREE                              | 372055.25|-1215437.63|1A|  100|      |      |   38|
  |       |       |3572016|
|TREE                              | 372050.64|-1215443.49|1A|   97|      |      |   35|
  |       |       |3572016|
|TREE                              | 372048.42|-1215446.74|1A|  101|      |      |   39|
  |       |       |3572016|
|TREE                              | 372055.08|-1215437.70|1A|   96|      |      |   34|
  |       |       |3572016|
|TREE                              | 372240.74|-1215646.15|1A|   92|      |      |   30|
  |       |       |3572016|
|TREE                              | 372055.48|-1215436.45|1A|  107|      |      |   45|
  |       |       |3572016|
|TREE                              | 372240.82|-1215646.74|1A|   93|      |      |   31|
  |       |       |3572016|
|TREE                              | 372048.06|-1215446.13|1A|  105|      |      |   43|
  |       |       |3572016|
|POLE                              | 372246.53|-1215637.95|1A|   73|      |   44|   11|
  |       |       |3572016|
|TREE                              | 372053.90|-1215438.01|1A|   98|      |      |   36|
  |       |       |3572016|
|TREE                              | 372054.40|-1215437.29|1A|   97|      |      |   35|
  |       |       |3572016|
|POLE                              | 372243.79|-1215642.90|1A|   70|      |   39|    8|
  |       |       |3572016|
|TREE                              | 372240.90|-1215647.22|1A|   74|      |      |   12|
  |       |       |3572016|
|TREE                              | 372048.40|-1215445.14|1A|   97|      |      |   35|
  |       |       |3572016|
|TREE                              | 372055.08|-1215436.17|1A|  117|      |      |   55|
  |       |       |3572016|
|TREE                              | 372051.12|-1215441.02|1A|   99|      |      |   37|
  |       |       |3572016|
|CHIMNEY/SMOKESTACK                | 372223.94|-1215704.99|1A|  168|      |  130|  106|
  |       |       |3572016|
|TREE                              | 372049.88|-1215442.57|1A|  108|      |      |   46|
  |       |       |3572016|
|TREE                              | 372055.27|-1215435.70|1A|  112|      |      |   50|
  |       |       |3572016|
|TREE                              | 372053.80|-1215437.42|1A|  100|      |      |   38|
  |       |       |3572016|
|TREE                              | 372055.40|-1215435.53|1A|  106|      |      |   44|
  |       |       |3572016|
|TREE                              | 372240.98|-1215647.61|1A|   99|      |      |   37|
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  |       |       |3572016|
|TREE                                   | 372046.59|-1215447.39|1A|  105|      |     |   43|
  |       |       |3572016|
|TREE                                   | 372049.81|-1215442.48|1A|  105|      |     |   43|
  |       |       |3572016|
|SIGN                                   | 372238.67|-1215650.83|1A|   83|      |   44|   21|
  |       |       |3572016|
|TREE                                   | 372054.55|-1215435.99|1A|  109|      |     |   47|
  |       |       |3572016|
|TREE                                   | 372055.09|-1215435.35|1A|  100|      |     |   38|
  |       |       |3572016|
|TREE                                   | 372241.08|-1215648.04|1A|   76|      |     |   14|
  |       |       |3572016|
|TREE                                   | 372052.08|-1215438.68|1A|  107|      |     |   45|
  |       |       |3572016|
|TREE                                   | 372049.86|-1215441.47|1A|  112|      |     |   50|
  |       |       |3572016|
|TREE                                   | 372054.71|-1215435.34|1A|  101|      |     |   39|
  |       |       |3572016|
|TREE                                   | 372054.87|-1215435.09|1A|  105|      |     |   43|
  |       |       |3572016|
|POLE                                   | 372241.09|-1215648.66|1A|   75|      |   44|   13|
  |       |       |3572016|
|POLE                                   | 372247.66|-1215638.43|1A|   74|      |   45|   12|
  |       |       |3572016|
|TREE                                   | 372054.11|-1215435.76|1A|  101|      |     |   39|
  |       |       |3572016|
|TREE                                   | 372054.48|-1215435.23|1A|  108|      |     |   46|
  |       |       |3572016|
|TREE                                   | 372053.32|-1215436.55|1A|  113|      |     |   51|
  |       |       |3572016|
|TREE                                   | 372054.64|-1215434.88|1A|  114|      |     |   52|
  |       |       |3572016|
|TREE                                   | 372241.21|-1215648.98|1A|   88|      |     |   26|
  |       |       |3572016|
|TREE                                   | 372239.53|-1215651.41|1A|   80|      |     |   18|
  |       |       |3572016|
|TREE                                   | 372239.24|-1215651.84|1A|   88|      |     |   26|
  |       |       |3572016|
|TREE                                   | 372054.17|-1215435.07|1A|  111|      |     |   49|
  |       |       |3572016|
|TREE                                   | 372054.36|-1215434.82|1A|  111|      |     |   49|
  |       |       |3572016|
|TREE                                   | 372048.19|-1215442.75|1A|  105|      |     |   43|
  |       |       |3572016|
|TREE                                   | 372241.27|-1215649.40|1A|   81|      |     |   19|
  |       |       |3572016|
|TREE                                   | 372239.58|-1215651.63|1A|   74|      |     |   12|
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  |      |      |3572016|
|TREE                                  | 372239.25|-1215652.22|1A|  100|      |      |   38|
  |      |      |3572016|
|TREE                                  | 372049.01|-1215441.24|1A|  113|      |      |   51|
  |      |      |3572016|
|TREE                                  | 372239.63|-1215651.86|1A|   73|      |      |   11|
  |      |      |3572016|
|TREE                                  | 372054.04|-1215434.69|1A|  115|      |      |   53|
  |      |      |3572016|
|TREE                                  | 372053.47|-1215435.30|1A|  118|      |      |   56|
  |      |      |3572016|
|TREE                                  | 372048.43|-1215441.71|1A|  106|      |      |   44|
  |      |      |3572016|
|TREE                                  | 372241.40|-1215649.81|1A|   78|      |      |   16|
  |      |      |3572016|
|TREE                                  | 372241.28|-1215650.13|1A|   79|      |      |   17|
  |      |      |3572016|
|TREE                                  | 372053.79|-1215434.63|1A|  117|      |      |   55|
  |      |      |3572016|
|TREE                                  | 372053.10|-1215435.31|1A|  112|      |      |   50|
  |      |      |3572016|
|TREE                                  | 372048.21|-1215441.45|1A|  106|      |      |   44|
  |      |      |3572016|
|TREE                                  | 372046.62|-1215443.76|1A|  122|      |      |   60|
  |      |      |3572016|
|TREE                                  | 372053.52|-1215434.52|1A|  122|      |      |   60|
  |      |      |3572016|
|TREE                                  | 372053.69|-1215434.07|1A|  113|      |      |   51|
  |      |      |3572016|
|TREE                                  | 372241.58|-1215650.57|1A|   83|      |      |   21|
  |      |      |3572016|
|TREE                                  | 372052.85|-1215434.95|1A|  120|      |      |   58|
  |      |      |3572016|
|TREE                                  | 372048.00|-1215441.19|1A|  106|      |      |   44|
  |      |      |3572016|
|TREE                                  | 372047.14|-1215442.35|1A|  106|      |      |   44|
  |      |      |3572016|
|TREE                                  | 372053.22|-1215434.34|1A|  117|      |      |   55|
  |      |      |3572016|
|TREE                                  | 372046.18|-1215443.58|1A|  128|      |      |   66|
  |      |      |3572016|
|TREE                                  | 372052.70|-1215434.64|1A|  117|      |      |   55|
  |      |      |3572016|
|TREE                                  | 372047.74|-1215441.06|1A|  105|      |      |   43|
  |      |      |3572016|
|TREE                                  | 372051.36|-1215436.23|1A|   99|      |      |   37|
  |      |      |3572016|
|TRMSN TWR                             | 372039.49|-1215455.19|1A|  138|      |    67|   76|
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  |      |      |3572016|
|TREE                            | 372241.42|-1215651.41|1A|   77|      |     |   15|
  |      |      |3572016|
|TREE                            | 372241.54|-1215651.27|1A|   77|      |     |   15|
  |      |      |3572016|
|TREE                            | 372048.06|-1215440.53|1A|  124|      |     |   62|
  |      |      |3572016|
|TREE                            | 372241.35|-1215651.59|1A|   79|      |     |   17|
  |      |      |3572016|
|TREE                            | 372241.46|-1215651.69|1A|   78|      |     |   16|
  |      |      |3572016|
|TREE                            | 372052.80|-1215434.13|1A|  117|      |     |   55|
  |      |      |3572016|
|TRMSN TWR                       | 372037.35|-1215459.42|1A|  177|      |  102|  115|
  |      |      |3572016|
|TREE                            | 372050.65|-1215436.65|1A|  113|      |     |   51|
  |      |      |3572016|
|TREE                            | 372047.80|-1215440.42|1A|  123|      |     |   61|
  |      |      |3572016|
|TREE                            | 372047.50|-1215440.75|1A|  110|      |     |   48|
  |      |      |3572016|
|BLDG                            | 372105.09|-1215422.10|1A|  235|      |  171|  173|
  |      |      |3572016|
|TREE                            | 372053.20|-1215433.11|1A|  106|      |     |   44|
  |      |      |3572016|
|TREE                            | 372052.45|-1215433.87|1A|  114|      |     |   52|
  |      |      |3572016|
|TREE                            | 372045.61|-1215442.81|1A|  136|      |     |   74|
  |      |      |3572016|
|POLE                            | 372241.13|-1215653.41|1A|   79|      |   34|   17|
  |      |      |3572016|
|TREE                            | 372051.97|-1215433.79|1A|  121|      |     |   59|
  |      |      |3572016|
|TREE                            | 372051.65|-1215433.71|1A|  126|      |     |   64|
  |      |      |3572016|
|TREE                            | 372248.76|-1215642.89|1A|   79|      |     |   17|
  |      |      |3572016|
|POLE                            | 372241.09|-1215654.21|1A|   79|      |   33|   17|
  |      |      |3572016|
|TREE                            | 372051.65|-1215433.47|1A|  124|      |     |   62|
  |      |      |3572016|
|TREE                            | 372051.79|-1215433.27|1A|  123|      |     |   61|
  |      |      |3572016|
|TREE                            | 372242.11|-1215653.17|1A|  100|      |     |   38|
  |      |      |3572016|
|TREE                            | 372242.31|-1215653.06|1A|  106|      |     |   44|
  |      |      |3572016|
|TREE                            | 372051.60|-1215433.12|1A|  115|      |     |   53|
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  |       |       |3572016|
|TREE                              | 372051.83|-1215432.80|1A|  104|      |      |   42|
  |       |       |3572016|
|TREE                              | 372242.42|-1215653.29|1A|   98|      |      |   36|
  |       |       |3572016|
|TREE                              | 372242.57|-1215653.20|1A|   95|      |      |   33|
  |       |       |3572016|
|TREE                              | 372051.40|-1215432.85|1A|  121|      |      |   59|
  |       |       |3572016|
|TREE                              | 372242.66|-1215653.37|1A|   91|      |      |   29|
  |       |       |3572016|
|TREE                              | 372245.56|-1215649.49|1A|   82|      |      |   20|
  |       |       |3572016|
|TREE                              | 372050.60|-1215433.53|1A|  103|      |      |   41|
  |       |       |3572016|
|BLDG                              | 372028.40|-1215522.41|1A|  178|      |    96|  116|
  |       |       |3572016|
|TREE                              | 372043.20|-1215443.60|1A|  108|      |      |   46|
  |       |       |3572016|
|TREE                              | 372046.42|-1215438.75|1A|  109|      |      |   47|
  |       |       |3572016|
|TREE                              | 372043.52|-1215442.82|1A|  117|      |      |   55|
  |       |       |3572016|
|TREE                              | 372246.64|-1215648.56|1A|  100|      |      |   38|
  |       |       |3572016|
|TREE                              | 372246.95|-1215648.13|1A|  100|      |      |   38|
  |       |       |3572016|
|TREE                              | 372051.76|-1215431.46|1A|  115|      |      |   53|
  |       |       |3572016|
|TREE                              | 372251.12|-1215641.37|1A|  125|      |      |   63|
  |       |       |3572016|
|TREE                              | 372246.19|-1215649.49|1A|   98|      |      |   36|
  |       |       |3572016|
|TREE                              | 372250.02|-1215643.56|1A|  100|      |      |   38|
  |       |       |3572016|
|TREE                              | 372051.64|-1215431.35|1A|  115|      |      |   53|
  |       |       |3572016|
|TREE                              | 372046.09|-1215438.31|1A|  123|      |      |   61|
  |       |       |3572016|
|TREE                              | 372042.79|-1215443.18|1A|  107|      |      |   45|
  |       |       |3572016|
|TREE                              | 372250.59|-1215642.90|1A|  130|      |      |   68|
  |       |       |3572016|
|TREE                              | 372249.66|-1215644.52|1A|  113|      |      |   51|
  |       |       |3572016|
|TREE                              | 372043.03|-1215442.68|1A|  108|      |      |   46|
  |       |       |3572016|
|TREE                              | 372249.19|-1215645.33|1A|  114|      |      |   52|
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  |      |      |3572016|
|TREE                           | 372051.49|-1215431.22|1A|  114|      |      |   52|
  |      |      |3572016|
|POLE                           | 372040.22|-1215447.29|1A|  123|      |    55|   61|
  |      |      |3572016|
|TREE                           | 372242.14|-1215655.56|1A|   82|      |      |   20|
  |      |      |3572016|
|TREE                           | 372250.52|-1215643.18|1A|  115|      |      |   53|
  |      |      |3572016|
|TREE                           | 372051.13|-1215431.47|1A|  112|      |      |   50|
  |      |      |3572016|
|TREE                           | 372045.46|-1215438.76|1A|  122|      |      |   60|
  |      |      |3572016|
|TREE                           | 372242.37|-1215655.44|1A|   80|      |      |   18|
  |      |      |3572016|
|TRMSN TWR                      | 372037.26|-1215452.65|1A|  149|      |    76|   87|
  |      |      |3572016|
|TREE                           | 372250.61|-1215643.28|1A|  122|      |      |   60|
  |      |      |3572016|
|TREE                           | 372051.35|-1215431.08|1A|  114|      |      |   52|
  |      |      |3572016|
|TREE                           | 372045.79|-1215438.12|1A|  112|      |      |   50|
  |      |      |3572016|
|TREE                           | 372249.65|-1215645.04|1A|   91|      |      |   29|
  |      |      |3572016|
|TREE                           | 372248.81|-1215646.42|1A|  101|      |      |   39|
  |      |      |3572016|
|TREE                           | 372250.94|-1215642.87|1A|  100|      |      |   38|
  |      |      |3572016|
|TREE                           | 372042.15|-1215443.53|1A|  125|      |      |   63|
  |      |      |3572016|
|TREE                           | 372246.49|-1215650.07|1A|   92|      |      |   30|
  |      |      |3572016|
|TREE                           | 372046.64|-1215436.79|1A|  108|      |      |   46|
  |      |      |3572016|
|TREE                           | 372044.03|-1215440.43|1A|  112|      |      |   50|
  |      |      |3572016|
|TREE                           | 372043.73|-1215440.88|1A|  105|      |      |   43|
  |      |      |3572016|
|TREE                           | 372045.84|-1215437.79|1A|  121|      |      |   59|
  |      |      |3572016|
|TREE                           | 372249.23|-1215645.98|1A|   98|      |      |   36|
  |      |      |3572016|
|TREE                           | 372242.36|-1215655.83|1A|   86|      |      |   24|
  |      |      |3572016|
|TREE                           | 372046.85|-1215436.34|1A|  111|      |      |   49|
  |      |      |3572016|
|TREE                           | 372047.58|-1215435.29|1A|  116|      |      |   54|
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  |      |      |3572016|
|TREE                          | 372047.92|-1215434.80|1A|  116|      |      |   54|
  |      |      |3572016|
|TREE                          | 372042.20|-1215442.99|1A|  126|      |      |   64|
  |      |      |3572016|
|TREE                          | 372247.89|-1215648.42|1A|   83|      |      |   21|
  |      |      |3572016|
|TREE                          | 372040.65|-1215445.47|1A|  141|      |      |   79|
  |      |      |3572016|
|TREE                          | 372246.80|-1215650.40|1A|   88|      |      |   26|
  |      |      |3572016|
|TREE                          | 372246.29|-1215651.25|1A|  102|      |      |   40|
  |      |      |3572016|
|TREE                          | 372049.92|-1215431.80|1A|  116|      |      |   54|
  |      |      |3572016|
|TREE                          | 372249.64|-1215646.16|1A|   83|      |      |   21|
  |      |      |3572016|
|TREE                          | 372043.35|-1215440.59|1A|  114|      |      |   52|
  |      |      |3572016|
|TREE                          | 372043.06|-1215441.02|1A|  111|      |      |   49|
  |      |      |3572016|
|TREE                          | 372043.59|-1215440.20|1A|  111|      |      |   49|
  |      |      |3572016|
|TREE                          | 372246.12|-1215651.60|1A|   81|      |      |   19|
  |      |      |3572016|
|TREE                          | 372045.59|-1215437.17|1A|  115|      |      |   53|
  |      |      |3572016|
|TREE                          | 372042.77|-1215441.29|1A|  107|      |      |   45|
  |      |      |3572016|
|TREE                          | 372251.21|-1215643.76|1A|  127|      |      |   65|
  |      |      |3572016|
|TREE                          | 372041.86|-1215442.67|1A|  107|      |      |   45|
  |      |      |3572016|
|TREE                          | 372245.99|-1215652.09|1A|   96|      |      |   34|
  |      |      |3572016|
|TREE                          | 372043.04|-1215440.69|1A|  114|      |      |   52|
  |      |      |3572016|
|TREE                          | 372042.37|-1215441.64|1A|  108|      |      |   46|
  |      |      |3572016|
|TREE                          | 372251.43|-1215643.77|1A|  130|      |      |   68|
  |      |      |3572016|
|TREE                          | 372045.18|-1215437.36|1A|  106|      |      |   44|
  |      |      |3572016|
|TREE                          | 372048.35|-1215433.10|1A|  104|      |      |   42|
  |      |      |3572016|
|BLDG                          | 372109.41|-1215414.06|1A|  285|      |   220|  223|
  |      |      |3572016|
|TREE                          | 372049.68|-1215431.35|1A|  121|      |      |   59|
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  |      |       |3572016|
|TREE                           | 372252.05|-1215642.88|1A|  112|      |      |   50|
  |      |       |3572016|
|TREE                           | 372251.74|-1215643.73|1A|  119|      |      |   57|
  |      |       |3572016|
|TREE                           | 372251.64|-1215643.93|1A|  107|      |      |   45|
  |      |       |3572016|
|TREE                           | 372245.87|-1215652.94|1A|   89|      |      |   27|
  |      |       |3572016|
|POLE                           | 372039.23|-1215446.21|1A|  124|      |   55|   62|
  |      |       |3572016|
|TREE                           | 372252.24|-1215642.96|1A|  111|      |      |   49|
  |      |       |3572016|
|TREE                           | 372252.06|-1215643.33|1A|  134|      |      |   72|
  |      |       |3572016|
|TREE                           | 372041.93|-1215441.45|1A|  113|      |      |   51|
  |      |       |3572016|
|TREE                           | 372044.94|-1215436.77|1A|  116|      |      |   54|
  |      |       |3572016|
|TREE                           | 372252.03|-1215643.79|1A|  112|      |      |   50|
  |      |       |3572016|
|TREE                           | 372046.36|-1215434.83|1A|  120|      |      |   58|
  |      |       |3572016|
|TREE                           | 372251.92|-1215644.00|1A|  118|      |      |   56|
  |      |       |3572016|
|TREE                           | 372251.78|-1215644.25|1A|  114|      |      |   52|
  |      |       |3572016|
|TREE                           | 372049.93|-1215430.10|1A|  108|      |      |   46|
  |      |       |3572016|
|TREE                           | 372248.28|-1215650.57|1A|   93|      |      |   31|
  |      |       |3572016|
|TREE                           | 372044.56|-1215436.61|1A|  107|      |      |   45|
  |      |       |3572016|
|TREE                           | 372248.19|-1215650.81|1A|   93|      |      |   31|
  |      |       |3572016|
|TREE                           | 372046.00|-1215434.44|1A|  119|      |      |   57|
  |      |       |3572016|
|TREE                           | 372050.28|-1215429.14|1A|  108|      |      |   46|
  |      |       |3572016|
|TREE                           | 372248.36|-1215650.74|1A|   90|      |      |   28|
  |      |       |3572016|
|TREE                           | 372045.75|-1215434.72|1A|  119|      |      |   57|
  |      |       |3572016|
|TREE                           | 372049.81|-1215429.47|1A|  109|      |      |   47|
  |      |       |3572016|
|TREE                           | 372049.56|-1215429.68|1A|  115|      |      |   53|
  |      |       |3572016|
|TREE                           | 372044.46|-1215435.96|1A|  112|      |      |   50|
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  |      |      |3572016|
|TREE                              | 372049.34|-1215429.69|1A|  111|     |     |   49|
  |      |      |3572016|
|TREE                              | 372045.76|-1215434.12|1A|  113|     |     |   51|
  |      |      |3572016|
|TREE                              | 372045.35|-1215434.39|1A|  114|     |     |   52|
  |      |      |3572016|
|TREE                              | 372047.68|-1215431.33|1A|  109|     |     |   47|
  |      |      |3572016|
|BLDG                              | 372109.07|-1215412.09|1A|  264|     |  199|  202|
  |      |      |3572016|
|TREE                              | 372046.41|-1215432.66|1A|  112|     |     |   50|
  |      |      |3572016|
|TREE                              | 372046.60|-1215432.40|1A|  111|     |     |   49|
  |      |      |3572016|
|TRMSN TWR                         | 372237.94|-1215704.85|1A|  131|     |   96|   69|
  |      |      |3572016|
|POLE                              | 372246.77|-1215654.52|1A|   84|     |   52|   22|
  |      |      |3572016|
|TREE                              | 372049.40|-1215428.75|1A|  112|     |     |   50|
  |      |      |3572016|
|TREE                              | 372045.22|-1215433.90|1A|  112|     |     |   50|
  |      |      |3572016|
|TREE                              | 372048.59|-1215428.90|1A|  115|     |     |   53|
  |      |      |3572016|
|TRMSN TWR                         | 372238.40|-1215705.41|1A|  135|     |  103|   73|
  |      |      |3572016|
|TREE                              | 372048.14|-1215429.24|1A|  122|     |     |   60|
  |      |      |3572016|
|TREE                              | 372043.37|-1215435.39|1A|  125|     |     |   63|
  |      |      |3572016|
|TREE                              | 372048.35|-1215428.71|1A|  116|     |     |   54|
  |      |      |3572016|
|TREE                              | 372039.34|-1215441.21|1A|  110|     |     |   48|
  |      |      |3572016|
|TREE                              | 372107.70|-1215411.45|1A|  186|     |     |  124|
  |      |      |3572016|
|TREE                              | 372047.92|-1215428.98|1A|  127|     |     |   65|
  |      |      |3572016|
|TREE                              | 372049.04|-1215427.60|1A|  121|     |     |   59|
  |      |      |3572016|
|TREE                              | 372048.12|-1215428.53|1A|  119|     |     |   57|
  |      |      |3572016|
|TREE                              | 372047.72|-1215428.70|1A|  135|     |     |   73|
  |      |      |3572016|
|TREE                              | 372047.79|-1215428.25|1A|  131|     |     |   69|
  |      |      |3572016|
|TREE                              | 372047.55|-1215428.49|1A|  128|     |     |   66|
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  |     |      |3572016|
|TREE                                 | 372047.60|-1215428.03|1A|  126|     |     |   64|
  |     |      |3572016|
|TREE                                 | 372047.34|-1215428.31|1A|  125|     |     |   63|
  |     |      |3572016|
|TREE                                 | 372039.59|-1215438.89|1A|  117|     |     |   55|
  |     |      |3572016|
|TREE                                 | 372047.30|-1215428.07|1A|  129|     |     |   67|
  |     |      |3572016|
|TREE                                 | 372039.42|-1215438.40|1A|  112|     |     |   50|
  |     |      |3572016|
|BLDG                                 | 372246.84|-1215659.39|1A|   88|     |   56|   26|
  |     |      |3572016|
|TREE                                 | 372047.45|-1215426.19|1A|  121|     |     |   59|
  |     |      |3572016|
|TREE                                 | 372044.90|-1215428.90|1A|  143|     |     |   81|
  |     |      |3572016|
|POLE                                 | 372039.62|-1215436.07|1A|  119|     |   53|   57|
  |     |      |3572016|
|TREE                                 | 372043.46|-1215430.64|1A|  114|     |     |   52|
  |     |      |3572016|
|TREE                                 | 372047.21|-1215425.97|1A|  116|     |     |   54|
  |     |      |3572016|
|POLE                                 | 372038.69|-1215437.34|1A|  121|     |   53|   59|
  |     |      |3572016|
|TREE                                 | 372043.72|-1215430.17|1A|  146|     |     |   84|
  |     |      |3572016|
|TREE                                 | 372043.94|-1215429.78|1A|  114|     |     |   52|
  |     |      |3572016|
|TREE                                 | 372238.59|-1215709.63|1A|  126|     |     |   64|
  |     |      |3572016|
|POLE                                 | 372043.05|-1215430.85|1A|  128|     |   63|   66|
  |     |      |3572016|
|POLE                                 | 372043.72|-1215429.96|1A|  121|     |   57|   59|
  |     |      |3572016|
|POLE                                 | 372044.37|-1215429.07|1A|  120|     |   55|   58|
  |     |      |3572016|
|TREE                                 | 372035.34|-1215441.63|1A|  145|     |     |   83|
  |     |      |3572016|
|POLE                                 | 372044.33|-1215428.34|1A|  121|     |   57|   59|
  |     |      |3572016|
|POLE                                 | 372039.51|-1215433.73|1A|  118|     |   53|   56|
  |     |      |3572016|
|TREE                                 | 372046.28|-1215424.60|1A|  115|     |     |   53|
  |     |      |3572016|
|POLE                                 | 372043.58|-1215427.55|1A|  126|     |   61|   64|
  |     |      |3572016|
|TREE                                 | 372024.15|-1215504.85|1A|  191|     |     |  129|
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  |     |     |3572016|
|TREE                      | 372040.31|-1215431.59|1A|  125|     |     |   63|
  |     |     |3572016|
|TREE                      | 372035.65|-1215437.87|1A|  136|     |     |   74|
  |     |     |3572016|
|TRMSN TWR                 | 372207.68|-1215731.73|1B|  177|     |  131|  115|
  |     |     |3572016|
|POLE                      | 372042.83|-1215426.76|1A|  129|     |   63|   67|
  |     |     |3572016|
|POLE                      | 372038.47|-1215432.59|1A|  118|     |   53|   56|
  |     |     |3572016|
|ANT                       | 372256.41|-1215651.28|1A|  120|     |   92|   58|
  |     |     |3572016|
|POLE                      | 372038.34|-1215431.99|1A|  124|     |   59|   62|
  |     |     |3572016|
|POLE                      | 372037.84|-1215432.69|1A|  125|     |   58|   63|
  |     |     |3572016|
|POLE                      | 372038.08|-1215432.32|1A|  124|     |   58|   62|
  |     |     |3572016|
|POLE                      | 372037.60|-1215433.02|1A|  124|     |   58|   62|
  |     |     |3572016|
|POLE                      | 372037.36|-1215433.36|1A|  125|     |   58|   63|
  |     |     |3572016|
|POLE                      | 372037.11|-1215433.73|1A|  125|     |   57|   63|
  |     |     |3572016|
|POLE                      | 372036.83|-1215434.10|1A|  125|     |   58|   63|
  |     |     |3572016|
|TREE                      | 372102.91|-1215406.85|1A|  185|     |     |  123|
  |     |     |3572016|
|TREE                      | 372039.09|-1215430.26|1A|  119|     |     |   57|
  |     |     |3572016|
|TREE                      | 372038.01|-1215430.17|1A|  122|     |     |   60|
  |     |     |3572016|
|TREE                      | 372040.95|-1215426.11|1A|  120|     |     |   58|
  |     |     |3572016|
|TREE                      | 372037.45|-1215429.78|1A|  123|     |     |   61|
  |     |     |3572016|
|TREE                      | 372041.37|-1215424.40|1A|  123|     |     |   61|
  |     |     |3572016|
|TREE                      | 372041.30|-1215424.04|1A|  145|     |     |   83|
  |     |     |3572016|
|TREE                      | 372041.09|-1215424.24|1A|  139|     |     |   77|
  |     |     |3572016|
|TREE                      | 372254.48|-1215659.67|1A|  104|     |     |   42|
  |     |     |3572016|
|TREE                      | 372034.52|-1215433.10|1A|  123|     |     |   61|
  |     |     |3572016|
|TREE                      | 372034.57|-1215432.98|1A|  124|     |     |   62|
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  |      |      |3572016|
|TREE                                 | 372034.54|-1215432.84|1A|  125|      |      |   63|
  |      |      |3572016|
|TREE                                 | 372254.68|-1215659.98|1A|  116|      |      |   54|
  |      |      |3572016|
|TREE                                 | 372254.84|-1215659.77|1A|  111|      |      |   49|
  |      |      |3572016|
|TREE                                 | 372043.15|-1215420.95|1A|  132|      |      |   70|
  |      |      |3572016|
|TREE                                 | 372043.08|-1215420.68|1A|  129|      |      |   67|
  |      |      |3572016|
|TREE                                 | 372042.82|-1215420.83|1A|  130|      |      |   68|
  |      |      |3572016|
|TREE                                 | 372255.00|-1215700.21|1A|  104|      |      |   42|
  |      |      |3572016|
|TREE                                 | 372255.24|-1215700.06|1A|  102|      |      |   40|
  |      |      |3572016|
|TREE                                 | 372042.85|-1215420.36|1A|  125|      |      |   63|
  |      |      |3572016|
|TREE                                 | 372255.36|-1215700.38|1A|  104|      |      |   42|
  |      |      |3572016|
|TREE                                 | 372041.83|-1215420.80|1A|  125|      |      |   63|
  |      |      |3572016|
|TREE                                 | 372042.58|-1215419.81|1A|  127|      |      |   65|
  |      |      |3572016|
|TREE                                 | 372042.36|-1215419.70|1A|  127|      |      |   65|
  |      |      |3572016|
|TREE                                 | 372036.25|-1215427.34|1A|  129|      |      |   67|
  |      |      |3572016|
|TREE                                 | 372041.97|-1215419.86|1A|  127|      |      |   65|
  |      |      |3572016|
|TREE                                 | 372253.70|-1215704.17|1A|  101|      |      |   39|
  |      |      |3572016|
|TREE                                 | 372253.79|-1215704.10|1A|  106|      |      |   44|
  |      |      |3572016|
|TREE                                 | 372036.00|-1215427.40|1A|  132|      |      |   70|
  |      |      |3572016|
|TREE                                 | 372041.66|-1215419.19|1A|  136|      |      |   74|
  |      |      |3572016|
|TREE                                 | 372042.00|-1215418.74|1A|  128|      |      |   66|
  |      |      |3572016|
|TREE                                 | 372039.04|-1215422.16|1A|  138|      |      |   76|
  |      |      |3572016|
|TREE                                 | 372041.36|-1215418.55|1A|  130|      |      |   68|
  |      |      |3572016|
|TREE                                 | 372259.71|-1215659.26|1A|  110|      |      |   48|
  |      |      |3572016|
|TREE                                 | 372259.49|-1215659.64|1A|  112|      |      |   50|
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TREE	372037.92|-1215420.96|1A| 136|		74
		3572016
TREE	372039.62|-1215417.86|1A| 137|		75
		3572016
TREE	372039.42|-1215417.40|1A| 132|		70
		3572016
TREE	372039.50|-1215416.32|1A| 138|		76
		3572016
TREE	372037.30|-1215418.09|1A| 136|		74
		3572016
TREE	372037.95|-1215417.19|1A| 145|		83
		3572016
TREE	372038.27|-1215416.80|1A| 134|		72
		3572016
BLDG	372054.59|-1215400.13|1A| 253|	188| 191
		3572016
TREE	372036.06|-1215415.44|1A| 136|		74
		3572016
TREE	372035.46|-1215415.30|1A| 139|		77
		3572016
TREE	372029.80|-1215420.15|1A| 149|		87
		3572016
TREE	372327.51|-1215552.12|1B| 128|		66
		3572016
BLDG	372008.05|-1215502.86|1A| 231|	139| 169
		3572016
TREE	372038.40|-1215723.99|1B| 224|		162
		3572016
TREE	372041.85|-1215401.38|1A| 188|		126
		3572016
TRMSN TWR	372312.12|-1215657.93|1A| 143|	119| 81
		3572016
TREE	372028.25|-1215416.73|1A| 140|		78
		3572016
TRMSN TWR	372031.03|-1215411.99|1A| 158|	86| 96
		3572016
TRMSN TWR	372306.87|-1215710.11|1A| 155|	130| 93
		3572016
TREE	372005.79|-1215455.65|1A| 222|		160
		3572016
TRMSN TWR	372303.30|-1215718.46|1A| 114|	88| 52
		3572016
TREE	372002.56|-1215503.09|1A| 211|		149
		3572016
TRMSN TWR	372027.06|-1215411.04|1A| 153|	78| 91
		3572016
TREE	372230.32|-1215340.86|1B| 160|		98

		3572016
TREE	371956.18|-1215545.55|1B| 222|		160
		3572016
TRMSN TWR	372309.81|-1215712.40|1A| 122|	98| 60
		3572016
TRMSN TWR	372028.52|-1215406.66|1A| 173|	98| 111
		3572016
TREE	371955.05|-1215543.45|1B| 219|		157
		3572016
TWR	372028.95|-1215404.59|1A| 166|	92| 104
		3572016
TRMSN TWR	372026.53|-1215407.29|1A| 161|	86| 99
		3572016
TRMSN TWR	372029.06|-1215404.02|1A| 153|	81| 91
		3572016
TRMSN TWR	372017.32|-1215420.40|1A| 147|	68| 85
		3572016
TREE	371954.34|-1215542.34|1B| 234|		172
		3572016
TRMSN TWR	372029.44|-1215403.14|1A| 163|	90| 101
		3572016
TREE	372334.32|-1215614.65|1B| 116|		54
		3572016
TRMSN TWR	372022.08|-1215410.87|1A| 168|	90| 106
		3572016
TREE	371952.99|-1215540.57|1B| 235|		173
		3572016
TREE	372305.88|-1215724.57|1A| 113|		51
		3572016
TRMSN TWR	372027.07|-1215402.74|1A| 157|	83| 95
		3572016
TRMSN TWR	372016.75|-1215416.38|1A| 147|	69| 85
		3572016
POLE	372032.35|-1215355.69|1A| 177|	82| 115
		3572016
BLDG	372306.74|-1215727.43|1A| 164|	137| 102
		3572016
TREE	371950.61|-1215615.21|1B| 220|		158
		3572016
TREE	371957.80|-1215433.81|1A| 186|		124
		3572016
TREE	372159.18|-1215816.93|1B| 165|		103
		3572016
TREE	371944.95|-1215617.94|1B| 236|		174
		3572016
BLDG	372348.30|-1215604.74|1B| 144|	122| 82
		3572016
TREE	372331.18|-1215715.04|1A| 122|		60

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  |      |      |3572016|
|BLDG                          | 372017.70|-1215344.65|1A|  253|      |  173|  191|
  |      |      |3572016|
|CRANE                         | 372015.25|-1215344.10|1A|  366|      |  306|  304|
  |      |      |3572016|
|BLDG                          | 372020.15|-1215336.73|1A|  239|      |  157|  177|
  |      |      |3572016|
|TREE                          | 372112.08|-1215302.02|1B|  164|      |     |  102|
  |      |      |3572016|
|CRANE                         | 372013.49|-1215342.39|1A|  315|      |  250|  253|
  |      |      |3572016|
|BLDG                          | 372016.02|-1215338.92|1A|  233|      |  152|  171|
  |      |      |3572016|
|BLDG                          | 372014.44|-1215338.37|1A|  255|      |  172|  193|
  |      |      |3572016|
|BLDG                          | 372010.35|-1215343.18|1A|  306|      |  225|  244|
  |      |      |3572016|
|BLDG                          | 372402.78|-1215549.99|1B|  129|      |  106|   67|
  |      |      |3572016|
|TREE                          | 372043.79|-1215309.38|1B|  164|      |     |  102|
  |      |      |3572016|
|BLDG                          | 372005.13|-1215344.70|1A|  316|      |  237|  254|
  |      |      |3572016|
|BLDG                          | 372313.19|-1215800.44|1A|  210|      |  183|  148|
  |      |      |3572016|
|BLDG                          | 372001.76|-1215347.00|1A|  255|      |  175|  193|
  |      |      |3572016|
|BLDG                          | 372022.07|-1215322.64|1A|  230|      |  153|  168|
  |      |      |3572016|
|BLDG                          | 372005.18|-1215340.08|1A|  298|      |  215|  236|
  |      |      |3572016|
|BLDG                          | 372000.47|-1215342.38|1A|  258|      |  176|  196|
  |      |      |3572016|
|TREE                          | 372030.88|-1215309.98|1A|  169|      |     |  107|
  |      |      |3572016|
|BLDG                          | 372015.62|-1215323.23|1A|  267|      |  186|  205|
  |      |      |3572016|
|BLDG                          | 372012.37|-1215326.49|1A|  237|      |  152|  175|
  |      |      |3572016|
|BLDG                          | 372005.14|-1215334.57|1A|  281|      |  193|  219|
  |      |      |3572016|
|BLDG                          | 372001.62|-1215338.68|1A|  301|      |  219|  239|
  |      |      |3572016|
|BLDG                          | 372006.26|-1215332.32|1A|  328|      |  242|  266|
  |      |      |3572016|
|BLDG                          | 372013.16|-1215321.93|1A|  277|      |  191|  215|
  |      |      |3572016|
|BLDG                          | 372009.59|-1215324.61|1A|  342|      |  256|  280|
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  |      |      |3572016|
|BLDG                          | 371956.94|-1215339.85|1A|  241|     |  156|  179|
  |      |      |3572016|
|BLDG                          | 372002.70|-1215330.49|1A|  311|     |  226|  249|
  |      |      |3572016|
|BLDG                          | 372307.88|-1215819.95|1A|  204|     |  173|  142|
  |      |      |3572016|
|BLDG                          | 371958.83|-1215334.74|1A|  255|     |  173|  193|
  |      |      |3572016|
|BLDG                          | 372004.25|-1215328.09|1A|  302|     |  213|  240|
  |      |      |3572016|
|BLDG                          | 372021.15|-1215308.97|1A|  179|     |   98|  117|
  |      |      |3572016|
|BLDG                          | 371954.09|-1215338.34|1A|  255|     |  169|  193|
  |      |      |3572016|
|BLDG                          | 372308.48|-1215823.45|1A|  209|     |  179|  147|
  |      |      |3572016|
|TREE                          | 372006.71|-1215320.93|1A|  194|     |     |  132|
  |      |      |3572016|
|BLDG                          | 371953.71|-1215336.19|1A|  343|     |  257|  281|
  |      |      |3572016|
|BLDG                          | 372019.28|-1215308.22|1A|  243|     |  162|  181|
  |      |      |3572016|
|BLDG                          | 371951.11|-1215338.83|1A|  349|     |  262|  287|
  |      |      |3572016|
|BLDG                          | 371954.54|-1215334.04|1A|  314|     |  232|  252|
  |      |      |3572016|
|BLDG                          | 372018.04|-1215308.24|1A|  368|     |  286|  306|
  |      |      |3572016|
|BLDG                          | 372301.36|-1215830.93|1B|  176|     |  144|  114|
  |      |      |3572016|
|TREE                          | 372319.04|-1215817.85|1A|  155|     |     |   93|
  |      |      |3572016|
|BLDG                          | 371951.62|-1215335.30|1A|  321|     |  234|  259|
  |      |      |3572016|
|BLDG                          | 371957.48|-1215326.62|1A|  300|     |  211|  238|
  |      |      |3572016|
|BLDG                          | 372001.88|-1215320.98|1A|  362|     |  275|  300|
  |      |      |3572016|
|BLDG                          | 372015.61|-1215306.64|1A|  358|     |  276|  296|
  |      |      |3572016|
|BLDG                          | 372016.06|-1215306.22|1A|  371|     |  292|  309|
  |      |      |3572016|
|BLDG                          | 371945.46|-1215341.46|1A|  319|     |  230|  257|
  |      |      |3572016|
|BLDG                          | 372006.19|-1215314.10|1A|  369|     |  286|  307|
  |      |      |3572016|
|BLDG                          | 372000.33|-1215320.47|1A|  323|     |  233|  261|
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  |     |      |3572016|
|BLDG                            | 372314.56|-1215826.50|1A|  217|     |  192|  155|
  |     |      |3572016|
|BLDG                            | 371959.58|-1215319.05|1A|  347|     |  260|  285|
  |     |      |3572016|
|BLDG                            | 372317.05|-1215825.90|1A|  218|     |  192|  156|
  |     |      |3572016|
|BLDG                            | 372008.60|-1215307.46|1A|  233|     |  151|  171|
  |     |      |3572016|
|BLDG                            | 371943.59|-1215335.91|1A|  317|     |  228|  255|
  |     |      |3572016|
|BLDG                            | 371956.76|-1215318.49|1A|  256|     |  167|  194|
  |     |      |3572016|
|ANT                             | 372126.95|-1215223.26|1B|  277|     |  189|  215|
  |     |      |3572016|
|WATER TWR                       | 371921.73|-1215410.20|1A|  235|     |  135|  173|
  |     |      |3572016|
|BLDG                            | 371944.31|-1215329.15|1A|  244|     |  154|  182|
  |     |      |3572016|
|ANT                             | 372129.09|-1215221.76|1B|  263|     |  176|  201|
  |     |      |3572016|
|BLDG                            | 371945.39|-1215326.02|1A|  310|     |  222|  248|
  |     |      |3572016|
|ANT                             | 372127.55|-1215221.10|1B|  287|     |  199|  225|
  |     |      |3572016|
|AMUSEMENT PARK STRUCTURE        | 372336.71|-1215817.93|1A|  251|     |  230|  189|
  |     |      |3572016|
|BLDG                            | 371949.23|-1215317.58|1A|  365|     |  275|  303|
  |     |      |3572016|
|ANT                             | 372128.73|-1215218.44|1B|  286|     |  199|  224|
  |     |      |3572016|
|TREE                            | 372414.91|-1215721.27|1A|  140|     |     |   78|
  |     |      |3572016|
|TREE                            | 372232.59|-1215222.63|1B|  199|     |     |  137|
  |     |      |3572016|
|BLDG                            | 371948.29|-1215313.05|1A|  359|     |  265|  297|
  |     |      |3572016|
|BLDG                            | 371902.86|-1215650.71|1B|  310|     |  170|  248|
  |     |      |3572016|
|TREE                            | 372331.47|-1215833.46|1A|  119|     |     |   57|
  |     |      |3572016|
|BLDG                            | 371937.90|-1215321.26|1A|  372|     |  283|  310|
  |     |      |3572016|
|CRANE                           | 372300.61|-1215900.56|1B|  179|     |  146|  117|
  |     |      |3572016|
|CRANE                           | 372256.96|-1215902.72|1B|  176|     |  143|  114|
  |     |      |3572016|
|BLDG                            | 372432.54|-1215646.49|1B|  203|     |  190|  141|
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  |     |     |3572016|
|TREE                         | 372244.11|-1215217.26|1B|  208|     |     |  146|
  |     |     |3572016|
|AMUSEMENT PARK STRUCTURE     | 372345.23|-1215828.63|1A|  195|     |  176|  133|
  |     |     |3572016|
|TREE                         | 371930.00|-1215321.29|1A|  207|     |     |  145|
  |     |     |3572016|
|BLDG                         | 372006.05|-1215239.09|1B|  305|     |  210|  243|
  |     |     |3572016|
|AMUSEMENT PARK STRUCTURE     | 372350.24|-1215830.74|1A|  216|     |  200|  154|
  |     |     |3572016|
|TREE                         | 371842.78|-1215531.94|1B|  256|     |     |  194|
  |     |     |3572016|
|TREE                         | 371914.19|-1215321.85|1A|  205|     |     |  143|
  |     |     |3572016|
|STADIUM                      | 372416.00|-1215811.35|1A|  218|     |  198|  156|
  |     |     |3572016|
|BLDG                         | 372418.32|-1215834.95|1A|  181|     |  166|  119|
  |     |     |3572016|
|TREE                         | 371825.00|-1215446.31|1B|  262|     |     |  200|
  |     |     |3572016|
|TREE                         | 372503.58|-1215844.88|1A|  125|     |     |   63|
  |     |     |3572016|
|CRANE                        | 372506.44|-1215842.88|1A|  222|     |  164|  160|
  |     |     |3572016|
|CRANE                        | 372509.20|-1215843.21|1A|  229|     |  170|  167|
  |     |     |3572016|
|TREE                         | 371815.90|-1215256.76|1A|  227|     |     |  165|
  |     |     |3572016|
|TREE                         | 371912.54|-1215203.43|1A|  221|     |     |  159|
  |     |     |3572016|
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|Additional Information:
                                    |
|THE NATIONAL GEODETIC SURVEY (NGS) CONDUCTED A VALIDATION REVIEW ON THIS SURVEY.
                                    |
|
                                    |
|THE SOURCE SURVEY DATA WAS RETRIEVED FROM THE FAA AIRPORTS SURVEY-GIS PROGRAM
PROJECT SJC-184363.                       |
|
                                    |
|THE DATA WAS COLLECTED IN ACCORDANCE WITH FAA ADVISORY CIRCULAR 150/5300-18B
SPECIFICATIONS.                            |
|
                                    |
|THE DATA WAS VALIDATED THROUGH A MODIFIED NGS QA REVIEW PROCESS (DID NOT INCLUDE
VERIFICATION OF THE DATA RELATIVE TO A |
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|SOURCE OF KNOWN ACCURACY). |

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|THIS UDDF WAS CREATED BY NGS AND POSTED TO THE FAA THIRD PARTY SURVEY SYSTEM (TPSS) AS REQUESTED BY |
|FAA AERONAUTICAL INFORMATION SERVICES (AIS). |

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|ANCILLARY INFORMATION (NOT REPORTED IN THE RETRIEVED FILES) WAS OBTAINED FROM FAA PUBLICATIONS AND ADDED TO THE FILE BY |
|NGS. COMPUTED DATA VALUES WERE DERIVED BY NGS USING THE SUBMITTED INFORMATION AND ADDED TO THE FILE. |
|IN ADDITION, THE SUBMITTED DATA WAS CORRECTED WHEN NECESSARY AND PRACTICAL AND/OR DATA WAS ADDED TO THE DATASET |
|BY NGS. |

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|Features reported in the third segment of the NAVAID section are not considered "safety critical" per |
|AC 150/5300-18B and were not reviewed by NGS. |

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|TO THE BEST OF NGS'S KNOWLEDGE THE AERONAUTICAL DATA IN THIS FILE REPRESENT FEATURES THAT EXISTED AT THE TIME OF |
|SURVEY. |

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EOF

Appendix C – City of San José Council Meeting (February 26, 2019)

Appendix C consists of background information presented at the City of San José City Council Meeting held on February 26, 2019. Information provided is a compilation of City Council meeting agendas, presentations, technical memorandums from the consultant team, memorandums from City Council members, letters from the public and final meeting minutes for each session.

City Council Meeting
Amended Agenda

Tuesday, February 26, 2019

SAM LICCARDO, MAYOR
CHAPPIE JONES, VICE MAYOR, DISTRICT 1
SERGIO JIMENEZ, DISTRICT 2
RAUL PERALEZ, DISTRICT 3
LAN DIEP, DISTRICT 4
MAGDALENA CARRASCO, DISTRICT 5
DEV DAVIS, DISTRICT 6
MAYA ESPARZA, DISTRICT 7
SYLVIA ARENAS, DISTRICT 8
PAM FOLEY, DISTRICT 9
JOHNNY KHAMIS, DISTRICT 10

6.2 [18-1944] **Actions Related to the Downtown Airspace and Development Capacity Study.**

Recommendation: As recommended by the Rules and Open Government on February 20, 2019, review and discuss, with no Council action:

(a) Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.

(b) Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.

(c) Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:

(1) Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.

(2) Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.

(3) Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.

(4) Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.

(5) Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

(d) Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

CEQA: Not a Project, File No. PP17-008, General Procedure & Policy Making resulting in no changes to the physical environment and File No. PP17-001, Feasibility and Planning Studies with no commitment to future actions. (Airport)
[Community and Economic Development Committee referral 1/28/19 - Item (d)5]

Attachments Memorandum
Presentation
2/19/19 Airport Case Studies Memo
2/19/19 Existing Conditions Assessment Memo
2/19/19 Project Steering Committee Presentations
2/19/19 Airspace Scenarios and Aircraft Performance Assessmen
1/28/19 CED Presentation
CED Supplemental Memorandum, 1/28/2019
Letters from the Public 1
Letters from the Public 2

6.3 18-1945 **Actions Related to the 2019 Major Streets Concrete & ADA Ramps Project.**

Recommendation: (a) Approve award of a construction contract for the 2019 Major Streets Concrete & ADA Ramps Project #1, to the low bidder, Rosas Brothers Construction, Inc. in the amount of $2,010,800.
(b) Approve a ten percent contingency in the amount of $201,080.
CEQA: Categorically Exempt, File No. PP18-029, CEQA Guidelines Section 15301(c), Existing Facilities. Council Districts 1, 3, 4, 5, & 6. (Transportation)

Attachments Memorandum

7. ENVIRONMENTAL & UTILITY SERVICES

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

COUNCIL AGENDA: 2/26/2019
ITEM: 6.2
FILE NO: 18-1944

Memorandum

TO: HONORABLE MAYOR AND CITY COUNCIL

FROM: Toni J. Taber, CMC
City Clerk

SUBJECT: **SEE BELOW**

DATE: February 26, 2019

SUBJECT: Actions Related to the Downtown Airspace and Development Capacity Study.

RECOMMENDATION:

As recommended by the Community and Economic Development Committee on January 28, 2019:

(a) Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.

(b) Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.

(c) Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:

(1) Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.

(2) Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.

(3) Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.

(4) Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.

(5) Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

(d) Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and

conduct outreach with the downtown development community to provide information and guidance on development height restrictions.
CEQA: Not a Project, File No. PP17-008, General Procedure & Policy Making resulting in no changes to the physical environment and File No. PP17-001, Feasibility and Planning Studies with no commitment to future actions. (Airport)
[Community and Economic Development Committee referral 1/28/19 - Item (d)5]

CED AGENDA: 1/28/19
ITEM: D (5)

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: COMMUNITY & ECONOMIC DEVELOPMENT COMMITTEE

FROM: Kim Walesh
John Aitken
Rosalynn Hughey

SUBJECT: SEE BELOW

DATE: January 14, 2019

Approved D. DSyL

Date 1/18/19

COUNCIL DISTRICT: 3 & 6

SUBJECT: DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY REPORT FINDINGS AND RECOMMENDATIONS

RECOMMENDATION

1. Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.
2. Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.
3. Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:
    a. Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.
    b. Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.
    c. Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including

accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.

d. Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.

e. Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

4. Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

OUTCOME

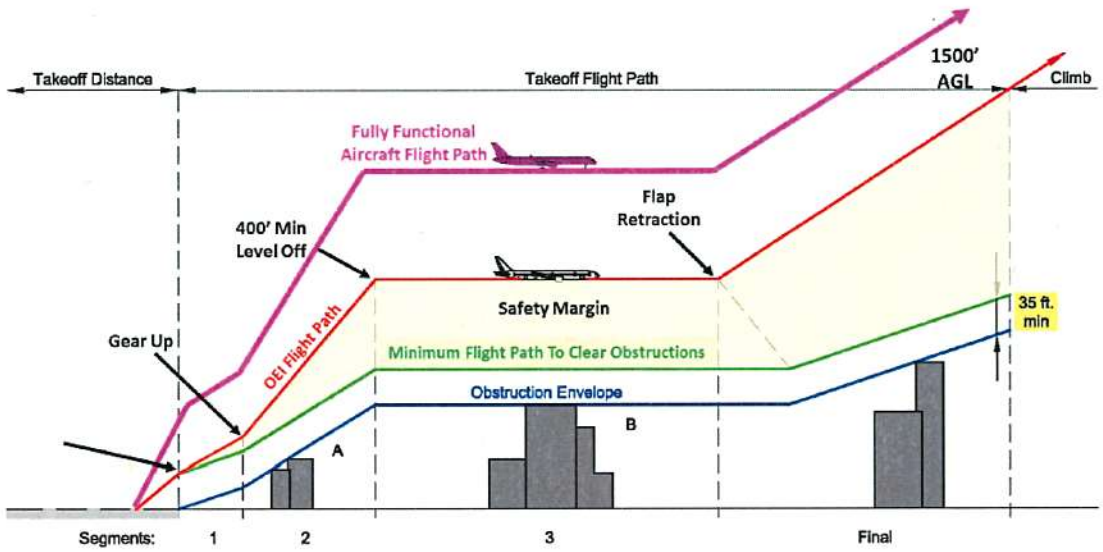
City Council approval of the above recommendations would allow maximum safe development heights and provide increased economic benefits in the Downtown, including the Diridon Station Area.

BACKGROUND

Two of the City's primary economic priorities are the continued development of Downtown and growth in air service at Mineta San Jose International Airport (Airport). The Airport and Downtown are within two miles of each other and the primary aircraft approach and departure paths for the Airport are directly over Downtown, which places limitations on Downtown building heights.

The Federal Aviation Administration (FAA) protects airspace around airports through the application of Federal Aviation Regulations (FAR) Part 77 and Terminal Instrument Procedures (TERPS). These regulations define various airspace "surfaces" or slopes which radiate out from an airport's runway and mandate an FAA obstruction evaluation of any proposed structure that exceeds one or more of these surfaces. In San Jose, as in most local land use jurisdictions, proposed structures subject to FAA review are typically required to obtain a "determination of no hazard" clearance from the FAA prior to, or as a condition of, City development permit approval.

While FAA applies Part 77 and TERPS to safely operate the airspace around an airport, it does not consider airline emergency procedures as part of the review. Under Part 25 of the Federal Aviation Regulations, airlines are required to have emergency flight procedures in place for every departure in the event of an engine power loss during take-off. These emergency flight procedures are known as "one-engine inoperative (OEI)" procedures and are designed so that an aircraft can gain sufficient altitude immediately upon takeoff even if an engine loses power, follow a prescribed flight path over any obstacles and surrounding terrain, and safely circle back to the airport for an emergency landing. Each airline develops its own OEI procedures based on guidelines set forth by the FAA and the International Civil Aviation Organization (ICAO). The diagram below illustrates the requirements in these guidelines.



Protecting for OEI emergency procedures can limit maximum building heights around an airport more severely than the FAA evaluations conducted under FAR Part 77 and TERPS. The FAA believes that airlines can mitigate OEI airspace obstructions by revising their emergency procedures or by reducing takeoff weight to improve climb performance to safely clear obstructions. However, implementing takeoff weight restrictions by reducing passengers, cargo, or fuel can impact the economic viability of airline service. Even small weight penalties can affect the feasibility of airline service to a destination, most notably transcontinental and transoceanic destinations typically serviced by large, heavy aircraft. Therefore, obstructions within the surrounding airspace can be a factor in an airport's ability to attract or retain desired air service.

The City's 2007 Airport Obstruction Study mapped out airline OEI protection surfaces and associated building elevation limits around the Airport. The 2007 study identified two OEI corridors used by the airlines: one over the Downtown core (east of Highway 87 and referred to as the "straight out corridor") and one over the Diridon area (west of Highway 87 and referred to as the "west corridor"). Airlines determine which corridor they will use – straight out or west corridor – depending on the aircraft being flown, the aircraft's destination, and the airline's pilot training program. Those airlines using the west corridor in their OEI procedures do so to avoid the existing high-rise buildings in the Downtown core. Since the OEI west corridor requires a shallower aircraft climb rate due to the turning maneuver, OEI building height limits in the Diridon area are more restrictive than in the Downtown core. Toward the southern end of Downtown, the FAA TERPS surfaces become more restrictive than the OEI procedure surfaces. To date, with developer cooperation, all approved high-rise building projects in the Downtown core and Diridon Station area have been consistent with the OEI surfaces.

In June 2017, City Council directed staff to update the 2007 study and include an economic analysis to identify the trade-offs between maintaining OEI protection surfaces and potential increased building heights under a no-OEI protection or alternative policy. Pursuant to that direction, the Office of Economic Development and the Airport Department have conducted the Downtown Airspace and Development Capacity Study. Landrum & Brown, a national aviation planning/engineering consultant with extensive experience working for the City on OEI and other airport technical issues, was contracted to perform the technical work on the study, with assistance from the economic analysis firm of Jones, Lang, & LaSalle. A project Steering Committee, comprised of stakeholder representatives including the San Jose Downtown Association, SPUR, Silicon Valley Organization, Silicon Valley Leadership Group, Santa Clara & San Benito Counties Building and Construction Trades Council, Santa Clara County Residents for Responsible Development, and Airport Commission was convened to provide review and input on the technical analysis and resulting strategy. City staff participation on the Steering Committee included representatives from the Mayor's Office, Councilmember Peralez's Office, Planning, Building and Code Enforcement Department, Office of Economic Development, and the Airport Department. The project Steering Committee met eight (8) times over the course of the study to review extensive technical materials and provide input and comments during the process.

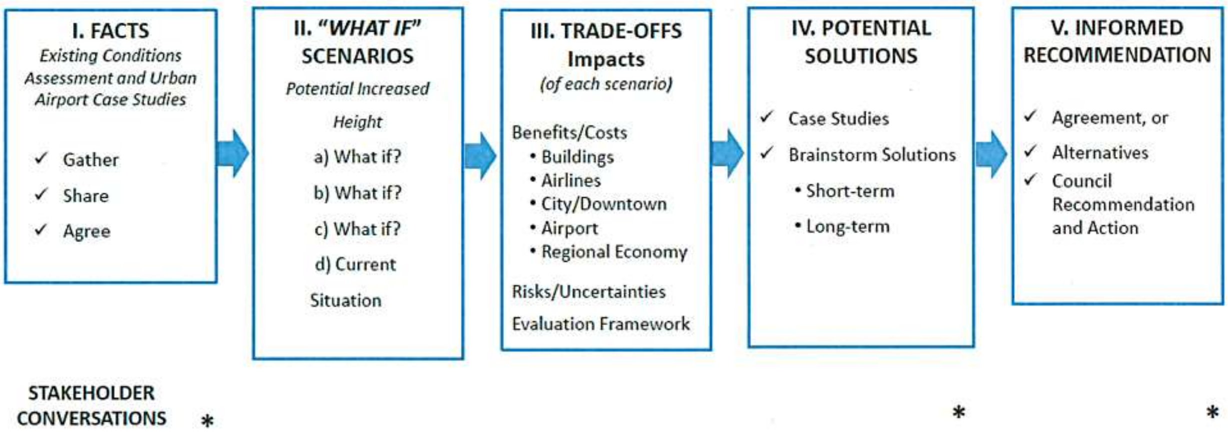
Additionally, three larger downtown stakeholder information meetings were held during the study, once at the initial launch of the study, once to report on study progress and initial findings, and once to present a proposed strategy. The stakeholder meetings were well attended and served as opportunities for the development community to ask questions and provide input to the study.

ANALYSIS

The Downtown Airspace and Development Capacity Study consisted of three major tasks:

- Task 1 Existing Condition Assessment
- Task 2 OEI Feasibility Studies and Impact
- Task 3 Economic Analysis

The collaborative framework outlined below, developed with the project Steering Committee, augmented the project's technical scope:



Task 1: Existing Condition Assessments

Landrum & Brown evaluated and updated the City's Downtown and Diridon Station area obstruction data, existing airline OEI procedures, critical aircraft for SJC current and anticipated air service, and the FAA's 30+ TERPS arrival, departure, and circling procedures to the south of the Airport.

In addition, a weather analysis over the last 15 years was completed, which confirmed that the Airport is in south flow operations (departures to the south) an average of 13% of the time, most often during winter months and morning hours. All-day south flow operations occurred an average of 17 days annually. It is during south flow that airlines need to depart over Downtown.

Task 2: Feasibility Study and Impact

Ten conceptual airspace protection scenarios were formulated to test various alternative combinations of OEI and FAA/TERPS airspace surface protections on maximum building heights. With input from the project Steering Committee, four of the ten scenarios were selected for detailed analysis:

- Scenario 4: No OEI protection (FAA/TERPS only)
- Scenario 7: Straight-out OEI protection with no OEI west corridor protection
- Scenario 9: No OEI protection plus potential elevation increase to some FAA/TERPS surface projections
- Scenario 10 (A–D): Straight-out OEI protection with four alternative OEI west corridor surface protections

The following table displays the range of increased maximum building heights for each scenario compared to existing OEI protection conditions:

Scenario	**Additional Height Downtown Core**	**Additional Height Diridon Station Area**
Scenario 4: No OEI	5' - 35'	70'-150'
Scenario 7: Straight-out OEI protection with no OEI west corridor	0'	70'-150'
Scenario 9: No OEI protection plus increased FAA/TERPS surfaces	35'-100'	80'-220'
Scenario 10: Straight-out OEI projection with alternative west corridor protection		
Option A (Increase of 25')	0'	15'-25'
Option B (Increase of 50')	0'	30'-55'
Option C (Increase of 75')	0'	45'-85'
Option D (Increase of 103')	0'	65'-115'

After determining the potential building height increases in the study areas, a technical analysis was conducted to assess the aircraft performance impact (weight penalties) under each scenario using various combinations of aircraft types, destinations, and seasonal temperatures. The following charts illustrate the passenger (PAX) and cargo penalties for specific aircrafts serving selected existing non-stop markets and impacts under each scenario in the summer and winter months.

Transcontinental – New York Market – Assessment of Potential Weight Penalties

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Hawaii – Honolulu Market – Assessment of Potential Weight Penalties

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Europe - Frankfurt Market - Assessment of Potential Weight Penalties

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	21,580	-	4,400
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	15,338	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	10,000	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	9,349	-	-
	Opt 10C: 129' - 240' AGL	-	14,096	-	-
	Opt 10D: 146' - 260' AGL	-	19,282	-	2,027
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	29	26,198	-	11,735

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	2	22,911	-	7,811
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	16,407	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,217	-	-
	Opt 10B: 115' - 224' AGL	-	9,353	-	-
	Opt 10C: 129' - 240' AGL	-	14,270	-	-
	Opt 10D: 146' - 260' AGL	-	19,612	-	3,876
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	41	23,514	-	15,397

Asia – Beijing Market - Assessment of Potential Weight Penalties

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

After much discussion with the project Steering Committee, Scenario 4 was selected as the most promising alternative to the existing OEI protection practice. Scenario 4 demonstrates that the transcontinental market (represented by New York), European market (represented by Frankfurt), and Hawaiian market (represented by Honolulu) would have minimal weight penalties, if any. The Asian market (represented by Beijing) would have passenger and/or cargo penalties under south flow conditions (13% of annual operations). The Steering Committee noted that if air service demand to Asia could be built up to support the transition of service from a smaller 787 aircraft to a larger 777, no passenger penalties would be incurred.

The Steering Committee discussed the possibility of creating a "Community Air Service Support Fund" that could compensate an airline for OEI-related weight penalties when incurred, if needed to keep the flight viable. Federal regulations prohibit the City from funding this type of effort, but other airport service support funds, generated by a private sector partner, such as a Chamber of Commerce, may be feasible.

The airline service analysis conducted for the existing destinations, was expanded to potential future markets. Boston, Miami, and Anchorage were analyzed as additional domestic non-stop destinations, and the charts below show that 737-800 service to these cities would not sustain any significate weight penalties under Scenario 4. It is important to note that Jet Blue Airlines currently serves Boston with an A320.

Additional Domestic Markets - Assessment of Potential Weight Penalties

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Boston - BOS Summer (81.3° F)		**A320 (150 seats/0 lbs. cargo)**		**B737-800 (175 seats/0 lbs. cargo)**	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-
Miami - MIA Summer (81.3° F)		**A320 (150 seats/0 lbs. cargo)**		**B737-800 (175 seats/0 lbs. cargo)**	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

For international air service markets, Rio de Janeiro (6,575 miles), Taipei (6,499 miles), Hong Kong (6,957 miles), Delhi (7,731 miles), and Dubai (8,120 miles) were analyzed, using aircraft typical on such international routes. The analysis indicated that the maximum route distance that could be served from San Jose under Scenario 4 is approximately 6,500 miles, as illustrated in the charts below. The implication of this is that very long haul international destinations may not be able to be served directly from San José and would need to make at least one stop.

Long Range Markets Stress Test - Assessment of Potential Weight Penalties

Rio de Janeiro - GIG Summer (81.3° F) 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144
Taipei - TPE Summer (81.3° F) 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							89	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	
Hong Kong - HKG Summer (81.3° F) 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	
Delhi - DEL Summer (81.3° F) 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor								
TERPS Only	55	5,014	77	3,132	72	106	184	
Dubai - DXB Summer (81.3° F) 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor								
TERPS Only	65	3,537	79	2,688	72	1,828	191	

*Existing Straight Out OEI calculations use different cargo capacity numbers than West OEI and TERPS Only.

As a check of the technical analysis described above, Landrum & Brown also reached out to all the airlines serving San Jose to request their independent analysis of how each of the four scenarios would impact their current and future air service markets at the Airport during south flow conditions. 12 airlines responded and provided the following feedback with respect to Scenario 4:

- Alaska, American, Aeromexico, Delta, Southwest, and Volaris reported no weight penalties to any of its destinations below a temperature of 92° F.
- Hawaiian and United reported only minor cargo penalties, and potentially minor passenger penalties and larger cargo penalties depending on destination and aircraft.
- Federal Express reported no significant cargo penalties.
- British Airways reported no weight penalty impacts for its London service.
- ANA reported minor cargo penalty impacts and no passenger penalties for its Tokyo service.
- Hainan reported the most significant impacts for its Beijing service, resulting in a significant reduction in cargo and passenger payload (up to 50+ passengers on the B787-9 when all seats are sold).

Overall, these airline responses are consistent with the consultant's technical analysis.

Task 3: Economic Analysis

The economic impacts to the Downtown Core, Diridon Station area, airlines, and the Airport were calculated based on the net new development that may occur with an increase from OEI-restricted heights to current FAA/TERPS surface heights. In the Downtown core, the findings indicate that there is already significant density available under the OEI height limits, so setting allowable heights up to the FAA/TERPS limits would not have a significant impact for many years (based on historical development trends), although certain development sites might experience incremental gains.

The most significant economic gains resulting from no OEI protection surfaces are expected to occur in the Diridon Station Area. Development capacity in this area under Scenario 4 is estimated at a net building addition of 8.6 million square feet, resulting in net new construction value of $4.4 billion and net new annual property tax revenue to the City of San Jose of $5.5 million once the construction of all 8.6 million square feet is complete. One-time revenue for building fees, development taxes, park impact fees, and school district fees would also be collected. A split of 10% commercial construction and 90% residential construction for this additional development would result in an increase of 4,700 employees and 12,800 residents in the area.

The economic impact on the Airport and the airlines was studied for the year 2024, the estimated time that impacts could occur as new development starts coming on line. In 2024, Scenario 4 would result in potential airline losses of $802,000 in seat revenue and compensation to passengers as compared to a scenario where building heights were limited to the OEI surfaces. These losses could grow to slightly over $1.2 million in 2032 and to $1.5 million by 2038 as the market, costs, and load factors increase over time. The establishment of an ongoing Community Air Service Support Fund by 2024, as a mechanism to support ongoing international air service, particularly to Asia, could serve to offset these airline economic losses.

The economic impacts over time to the Airport Enterprise Fund would be minimal, consisting mainly of lost Passenger Facility Charge (PFC) revenue and terminal concession spending. The positive economic impact of increasing development heights in the Downtown core and Diridon Station Area significantly outweighs aviation-related economic impacts.

SUMMARY

The Downtown Airspace and Development Capacity Study analysis was one of the most extensive studies that the City has conducted on how the Airport and the Downtown core and Diridon Station area can both thrive as economic drivers of San José and the Silicon Valley region. With the dedicated involvement of the project Steering Committee, staff is recommending that the City move forward with the study's Scenario 4 and allow development height to be governed by FAA obstruction evaluation determinations. However, to protect the viability of current and future international air service markets, particularly to Asia, staff also recommends that Council approval of Scenario 4 be accompanied by direction to work with the private sector to establish community-funded Air Service Support Fund. This fund would mitigate the occasional airline economic penalties that would incur during south flow conditions and to support retention and expansion of transoceanic airline service.

In addition, it is recommended that the Council actions include direction to the Administration to implement refinements to the development review process for projects subject to FAA obstruction evaluations.

EVALUATION AND FOLLOW-UP

Airport, Planning, Building, and Code Enforcement and Office of Economic Development staff shall implement the recommendations brought forward in this memorandum upon Council approval and report the relevant impacts of these recommendations back to the appropriate council committee, as necessary.

POLICY ALTERNATIVES

Alternative: Maintain existing OEI airspace protection surfaces above the Downtown Core and Diridon Station Area.
Pros: This alternative would provide the maximum protection of the airspace for Mineta San Jose International Airport.
Cons: Maintaining the existing practice for airspace protection would not provide any opportunities for additional development heights in the Downtown Core or the Diridon Station Area.
Reason for not recommending: Implementing this policy alternative would prevent San Jose from maximizing the development of its urban core, which is a fundamental principal of the Envision 2040 General Plan, without significant gains to airport or airline operations.

PUBLIC OUTREACH

A project Steering Committee, comprised of stakeholder representatives from the San Jose Downtown Association, SPUR, Silicon Valley Organization, Silicon Valley Leadership Group, Santa Clara & San Benito Counties Building and Construction Trades Council, Santa Clara County Residents for Responsible Development, and Airport Commission was convened to provide review and input on the technical analysis and resulting strategy. The project Steering

Committee met eight (8) times over the course of the study to review extensive technical materials and provide guidance and feedback during the process.

In addition to the project Steering Committee, three broader downtown stakeholder informational meetings were held, once at the initial launch of the study, once to report on study progress and initial findings, and once to present a proposed strategy. Staff will present the information in this memorandum to the Delmas Park Neighborhood Association on January 22 and the Team San Jose board of directors on January 23.

This memorandum will be posted to the City of San Jose's website for the January 28, 2019 Community and Economic Development Committee meeting and the February 12, 2019 City Council meeting.

COMMISSION RECOMMENDATION/INPUT

The Airport Commission held a special public meeting on January 14 to receive updates and discuss the Downtown Airspace and Development Capacity Study. The commission will continue its discussion of this study at a second special meeting on January 24.

COORDINATION

This memorandum has been coordinated with the Office of Economic Development, Planning, Building, and Code Enforcement, and the City Attorney's Office.

FISCAL/POLICY ALIGNMENT

The recommendations in this memorandum are consistent with the Envision San José 2040 General Plan amended on February 27, 2018 to continue developing a world-class airport and build national and international connections by attracting new air service to it (Goal IE-4.2).

CEQA

Not a Project, PP17-008, general procedure and policy making resulting in no physical changes to the environment.

/s/
JOHN AITKEN, A.A.E.
Director of Aviation

/s/
KIM WALESH
Deputy City Manager
Director of Economic Development

/s/
ROSALYNN HUGHEY, Director
Planning, Building and Code Enforcement

For questions, please contact John Aitken, Airport Director, at 408-392-3610.

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

City Council Meeting Synopsis

Tuesday, February 26, 2019

SAM LICCARDO, MAYOR
CHAPPIE JONES, VICE MAYOR, DISTRICT 1
SERGIO JIMENEZ, DISTRICT 2
RAUL PERALEZ, DISTRICT 3
LAN DIEP, DISTRICT 4
MAGDALENA CARRASCO, DISTRICT 5
DEV DAVIS, DISTRICT 6
MAYA ESPARZA, DISTRICT 7
SYLVIA ARENAS, DISTRICT 8
PAM FOLEY, DISTRICT 9
JOHNNY KHAMIS, DISTRICT 10

6.2 18-1944 Actions Related to the Downtown Airspace and Development Capacity Study.

Recommendation: As recommended by the Rules and Open Government on February 20, 2019, review and discuss, with no Council action:

(a) Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.

(b) Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.

(c) Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:

(1) Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.

(2) Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.

(3) Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.

(4) Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.

(5) Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

(d) Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

CEQA: Not a Project, File No. PP17-008, General Procedure & Policy Making resulting in no changes to the physical environment and File No. PP17-001, Feasibility and Planning Studies with no commitment to future actions. (Airport)

[Community and Economic Development Committee referral 1/28/19 - Item (d)5]

Continued to the March 12 Council Agenda.

SILICON VALLEY'S AIRPORT

SJC

Downtown Airspace and Development Capacity Study

February 26, 2019

The Situation

- Downtown and Airport are two of San Jose’s economic priorities
- One priority: increase the density of the Downtown Core and the Diridon Station Area
- Another priority: continue developing a world-class airport and build national and international connections by attracting new air service
- Need to balance these two priorities, since taller buildings can impact certain flights to certain markets

Safety Is Top Priority and Not Changing

- FAA protects arriving and departing airspace around airport.
  - Invisible “surfaces” known as Part 77 and FAA/TERPS
  - Protect all aircraft types, all engines under normal operations

- Any proposed structure near this protected airspace requires FAA approval, which is incorporated into the City’s permitting requirements.

- Any potential changes to San Jose building heights do not affect FAA-mandated TERPS procedures or safety.

One-Engine Inoperative (OEI)

- One-engine inoperative (OEI) is a procedure in case one engine on a two-engine commercial aircraft becomes inoperative upon take-off.

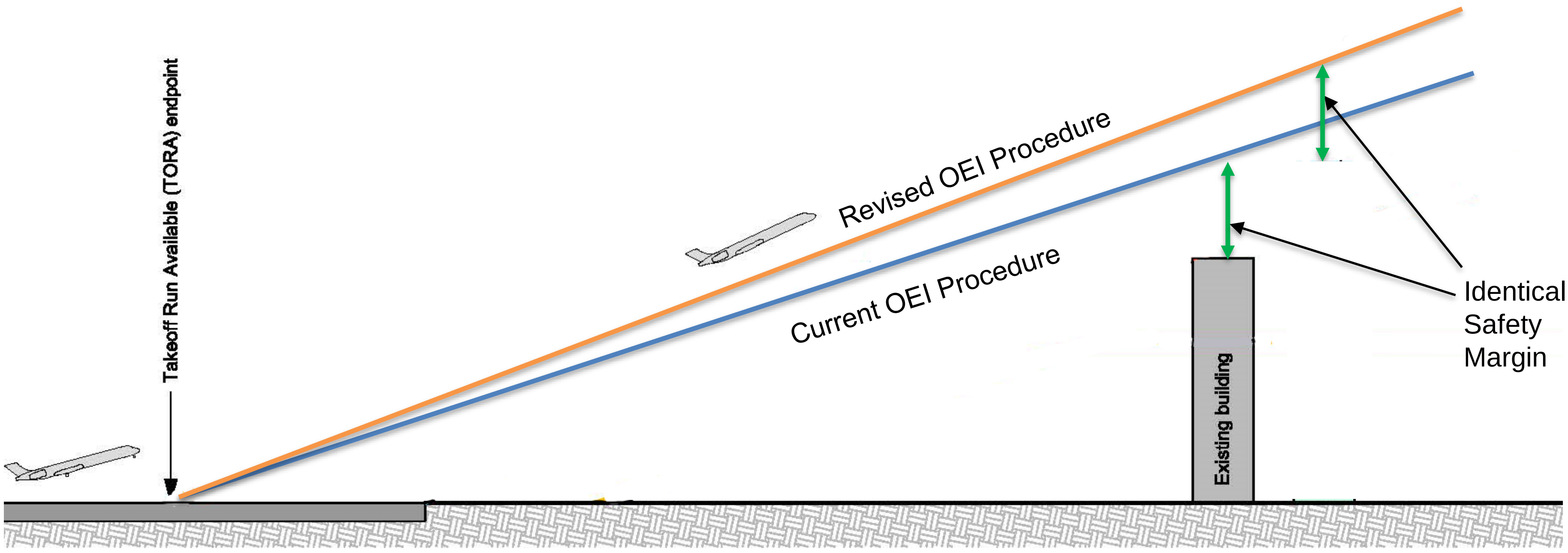
- The FAA requires airlines to develop their own OEI procedures based on their specific aircraft for each departure.

- FAA does not consider OEI procedures to be a factor in height limits because airlines have the option to offload passengers, cargo, and fuel to clear structures safely with OEI.

- A plane that cannot safely climb out of SJC and avoid structures on one engine would NOT be allowed to take-off ***in any scenario***.

- OEI is not a safety issue.

Identical Safety Margin



Note: for Illustrative Purposes Only

Considerations for South Flow Departures

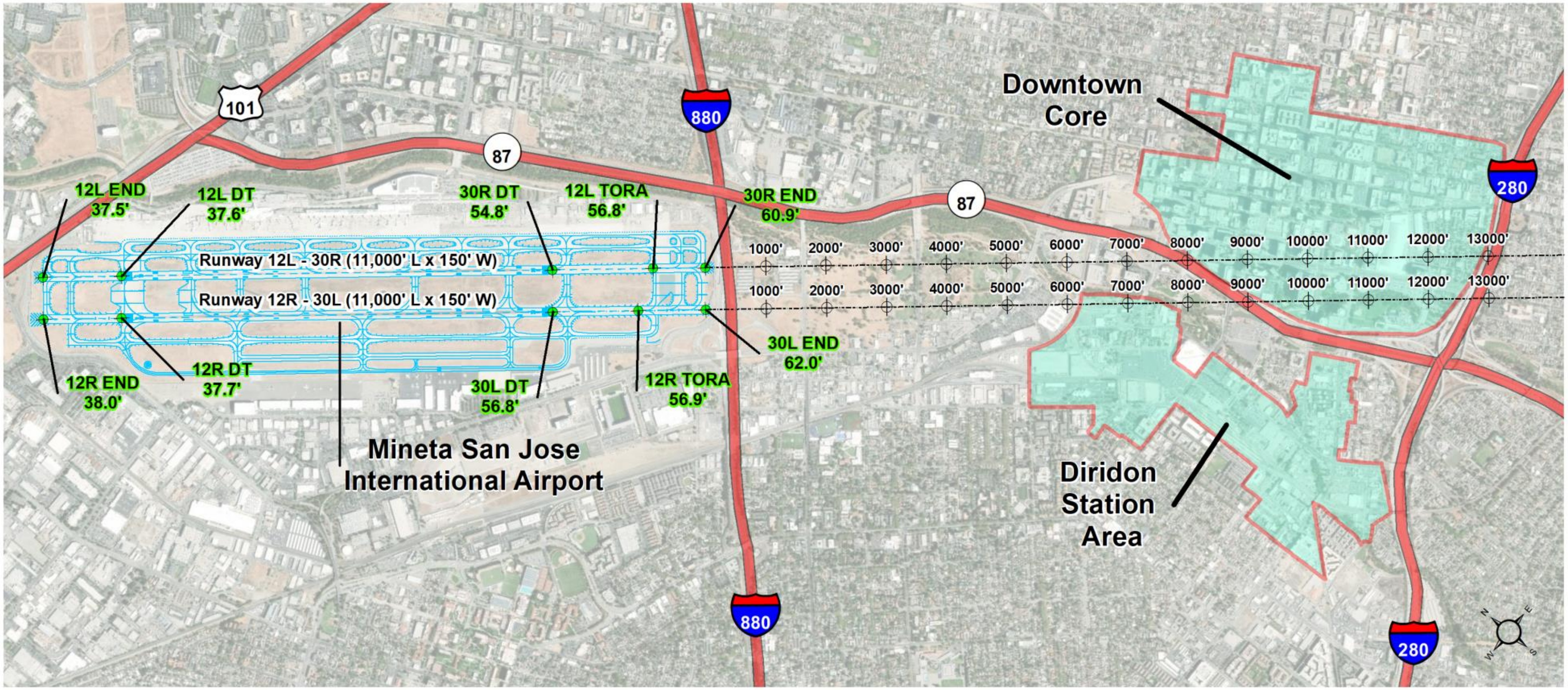
- What is “South Flow”?
  - Aircraft depart to the south during strong winds from the south
  - More typical in winter than summer (associated with cooler temps)
- Weight of the Aircraft
  - Passengers (“Load Factors”), cargo & fuel
- Temperature
  - Aircraft can climb faster in cooler weather
- Aircraft and Configuration
  - Certain aircraft have more power to take-off
  - Seating configuration of the aircraft can mean fewer passengers on the plane

2007 Obstruction Study

In 2007, San José conducted an Obstruction Study that established:

- The Straight Out OEI procedure, based on existing buildings working with developers
- The West Corridor OEI procedure, based on height of SAP Center

Study Evaluation Area



Council Direction to Staff (June 2017)

- Re-evaluate the 2007 Obstruction Study, with a goal of determining if changes can be made to maximize potential development densities Downtown

- Remain consistent with FAA and airline safety requirements

- Develop a collaborative process

Project Steering Committee

Community Representatives

Teresa Alvarado – SPUR

Scott Knies – San Jose Downtown Association

Matt Mahood – Silicon Valley Organization

David Bini – Building & Construction Trades Council

Josue Garcia – Santa Clara County Residents for Responsible Development

Matt Quevedo – Silicon Valley Leadership Group

Julie Matsushima – Airport Commissioner and Downtown Resident

City Staff

John Aitken and Judy Ross – Airport Department

Kim Walesh and Blage Zelalich – City Manager's Office/Office of Economic Development

Rosalynn Hughey – Planning, Building and Code Enforcement

David Hai Tran & Christina Ramos – District 3 Office

Kelly Kline – Mayor's Office

Consultants

Landrum and Brown & Jones, Lang, and LaSalle

Collaborative Process

I. FACTS

Existing Conditions Assessment and Urban Airport Case Studies

- ✓ Gather
- ✓ Share
- ✓ Agree

II. "*WHAT IF*" SCENARIOS

Potential Increased Height

a) What if?

b) What if?

c) What if?

d) Current Situation

III. TRADE-OFFS Impacts

(of each scenario)

Benefits/Costs

- Buildings
- Airlines
- City/Downtown
- Airport
- Regional Economy

Risks/Uncertainties

Evaluation Framework

IV. POTENTIAL SOLUTIONS

- ✓ Case Studies
- ✓ Brainstorm Solutions
  - Short-term
  - Long-term

V. INFORMED RECOMMENDATION

- ✓ Agreement, or
- ✓ Alternatives
- ✓ Council Recommendation and Action

STAKEHOLDER CONVERSATIONS * * *

CED COMMITTEE PRESENTATIONS * *

Today

Airspace Protection Scenarios

- Started by looking at existing conditions and 10 different scenarios

- Steering Committee narrowed the list down to 4 scenarios for more detailed analysis:
  - **Scenario 4**: FAA/TERPS Height
  - **Scenario 7**: Existing Straight-out OEI protection
  - **Scenario 10**: Existing Straight-out OEI protection with West Corridor OEI protection alternatives
  - **Scenario 9**: Increased FAA/TERPS Height

Steering Committee Recommendation

Scenario 4 – FAA/TERPS Height

Steering Committee concluded this option had the right balance of:

- Allowing building heights to increase
- Maintaining key nonstop routes for Mineta San José International Airport

Development Impact of Scenario 4

Downtown Core

- Specific development sites may achieve some additional height: 5’-35’

Diridon Station Area

- Developable heights could increase by 70’-150’
- Up to 8.6M net new square feet of development
- $4.4B in construction value and $5.5M in annual property tax

Performance Mitigations for OEI

Certain long-haul flights become subject to mitigation procedures to protect OEI when a structure is built to FAA/TERPS.

- Day-to-Day Mitigations
  - Off loading of cargo and/or passengers
  - Request another runway (wind, weather, air traffic permitting)
  - Make a refueling stop
- Long-Term Alternatives
  - Change aircraft type
  - Cancel air service if payload loss affects financial viability

Airline Response to Scenario 4

13 airlines currently serving SJC responded for requests for a performance assessment of the various airspace scenarios.

Hainan indicated a potential concern with their existing service to Beijing.

Responded	No Response
Alaska	Air Canada
American	JetBlue
ANA	
British Airways	
Delta	
FedEx	
Frontier	
Hainan	
Hawaiian	
Southwest	
UPS	
United	
Volaris	

Frequency of Asian South Flow Departures

SJC Operations									
	2015		2016		2017		2018		Average
% Airport Ops in South Flow	9.1		15.9		12.9		11.9*		12.6
	# South Flow Dep.	% of Airline's Dep.	# South Flow Dep.	% of Airline's Dep.	# South Flow Dep.	% of Airline's Dep.	# South Flow Dep.	% of Airline's Dep.	% of Airline's Dep.
ANA	30	8.24%	57	15.83%	40	11.11%	23	6.32%	10.38%
Hainan	5	4.10%	30	13.45%	27	11.20%	10	4.81%	8.39%

** Preliminary*

Asian south flow departures represent >0.06% of total SJC commercial departures.

Nonstop Routes: South Flow Feasibility Today (summer)

London	Frankfurt	Tokyo	Beijing	Shanghai
B787-9 B777-300ER	B787-9 B777-300ER	B787-9 B777-300ER	787-9 B777-300ER	B787-9 B777-300ER A330-200 A350-900

Green – No Significant Weight Penalties
Orange – Some Weight Penalties
Red – Significant Weight Penalties

Rio de Janeiro	Taipei	HK/Shenzhen	Delhi	Dubai
B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900

Nonstop Routes: South Flow Feasibility in Scenario 4 (summer)

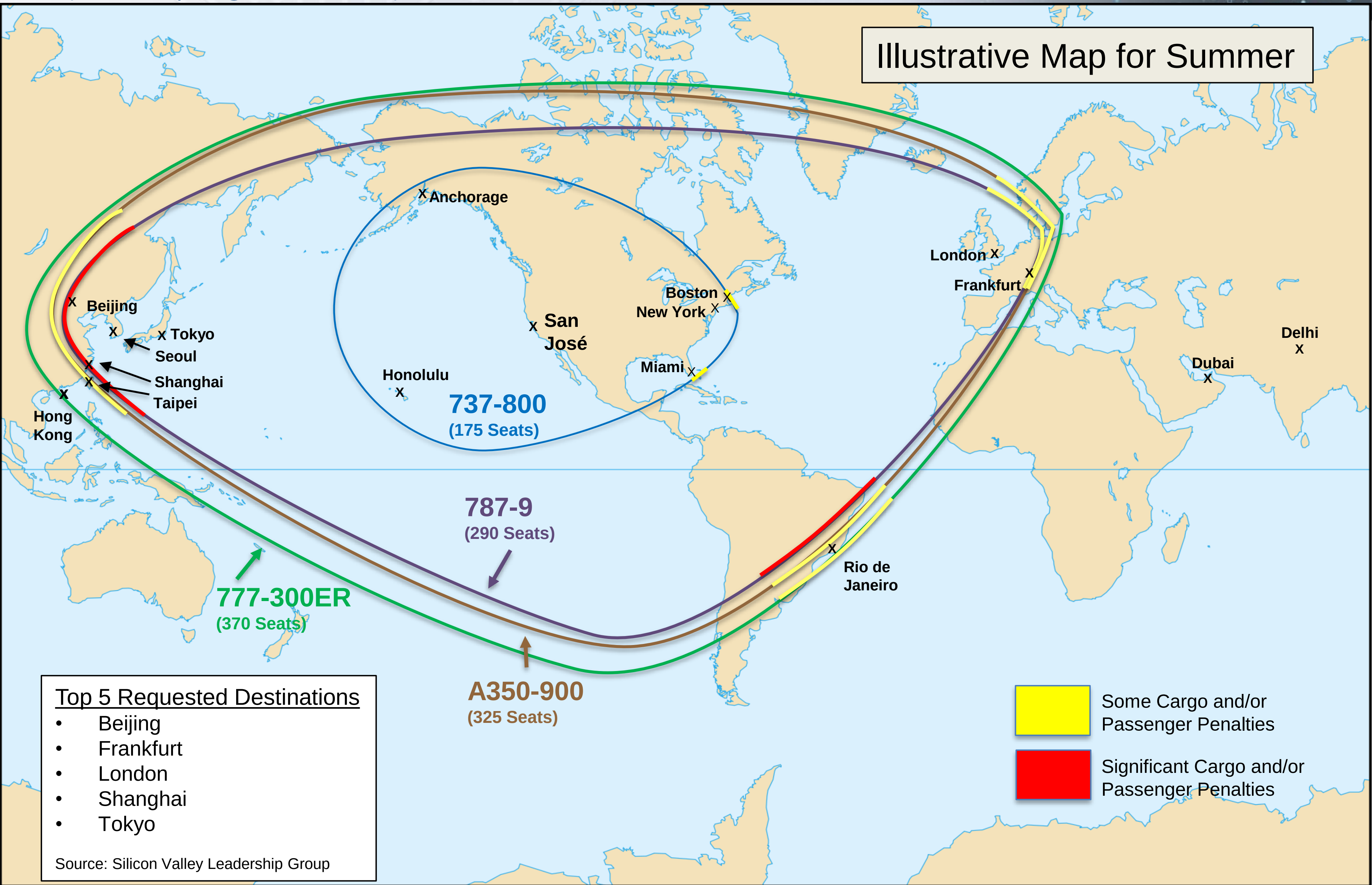
London	Frankfurt	Tokyo	Beijing	Shanghai
B787-9 B777-300ER	B787-9 B777-300ER	B787-9 B777-300ER	787-9 B777-300ER	B787-9 B777-300ER A330-200 A350-900

Green – No Significant Weight Penalties
Orange – Some Weight Penalties
Red – Significant Weight Penalties

Rio de Janeiro	Taipei	HK/Shenzhen	Delhi	Dubai
B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900

Scenario 4 by Plane Type

(Non-Stop Flights from SJC)



Top 5 Requested Destinations

- Beijing
- Frankfurt
- London
- Shanghai
- Tokyo

Source: Silicon Valley Leadership Group

Mitigating the Uncertainty

Create a Community Air Service Fund

- Fund could offset losses to airline for certain situations when they need to offload passengers due to OEI procedures
- Creative solution to address the uncertainty for current and future routes that may be impacted by OEI procedures
- Can support market growth for service by larger, more powerful aircraft that do not have weight penalties

Growing Together

- San José is proud to offer nonstop service to Europe and Asia to meet the needs of the South Bay community.
- Majority of SJC traffic is, and will continue to be, within North America and Hawaii.
- Increased development in Downtown has increased opportunity to grow SJC passengers.
- Community Air Service Support Fund could offset the economic uncertainty for select routes.

SILICON VALLEY'S AIRPORT

SJC

Questions?

Appendix C

Public Comments Submitted for the City Council Meeting on February 26, 2019

Aviation Planning at the Leading Edge

To: Community & Economic Development Committee – San Jose

From: The Sunnyvale-Cupertino Airplane Noise Group

Date: Jan 25, 2019

RE: Meeting Jan 28, 2019

Comment regarding Agenda Item 5. One Engine Inoperative Airport (CC18-419)
One Engine Inoperative (OEI) study & the corresponding recommendation as outlined in the memo to the Community & Economic Development Committee from SJC Director Aitken (Subject: Downtown Airspace And Development Capacity Report Findings And Recommendations)

Below is a statement from the Sunnyvale-Cupertino Airplane Noise Group.

Our group understands that San Jose recently commissioned a study to determine the feasibility of taller building heights in the downtown San Jose and Diridon areas. This study focused on departing flights only, and did not consider any impact on arrivals. As you know, normal flow arrivals fly directly over downtown San Jose, and these arrivals are partly impacted by the current building heights. Decisions regarding taller building heights will have repercussions for decades to come, and these important decisions should not be based on a clearly incomplete study that is missing a major piece of analysis. Without a proper study regarding the arrival flight paths, it is unclear whether the frequency of SJC normal flow or south flow operations (reverse flow) will be impacted in any way by the proposed taller building envelope. Any unintended impact could have major consequences to the airport, the city of San Jose, and surrounding communities.

San Jose Airport typically operates under normal flow operations, where arrivals are flying over downtown San Jose. In contrast, when the wind direction changes to South or East and the wind speed is greater than 5 knots, the direction of operation changes to south flow operations (often called reverse flow). An increase in south flow operations would not only impact the quality of life for your neighbors in Sunnyvale, Cupertino, Mountain View, and Palo Alto - An unintentional increase in south flow operations would have a detrimental impact to airline profitability, airport operations, and FAA safety. Yet an analysis of SJC arrivals was never conducted regarding increased building heights. Normal flow is the preferred path for safety reasons, airline financial benefits, and efficiency. For this reason, a study regarding SJC arrivals and any impact on south flow operations is warranted, and is in the airport's and San Jose's best interest.

Based on an FAA meeting in March 2017 at Congressman Ro Khanna's office, we already know that the south flow trigger is impacted partly due to the existing tall buildings in downtown San Jose. An excerpt from that meeting "*San Jose's runway is too short. Part of the reason that it is too short is the buildings in downtown which make a piece of that end of the runway unusable* *(planes can't drop down until they are past those buildings)."* It is unclear whether the proposed taller building envelope will have a downward pressure on the current south flow trigger, causing an increase in south flow operations over Sunnyvale and Cupertino – Potentially exacerbating an already contentious airplane noise situation.

We request that any San Jose vote that would ultimately result in taller buildings in downtown and/or the Diridon area be temporarily postponed until a supplemental aviation study is commissioned by San Jose, and the FAA is consulted to confirm any potential impact to the SJC south flow trigger. It is possible that the proposed building height changes will have no impact on the trigger. However, this assumption should be confirmed in writing by the FAA and an aviation expert prior to any approval.

To summarize, any San Jose approvals that would result in taller building heights should be delayed until the FAA and an experienced aviation consultant have completed a supplemental report confirming no impact to arrivals and the current south flow trigger (Current trigger > 5 knots south/east wind speed). The current aviation study is incomplete, and further analysis of the arrival flight path over downtown San Jose needs to be completed in order to make a fully informed, proper decision regarding building heights.

Thank you for your help regarding this matter.

Sincerely,

Tony Guan

Jennifer Tasseff

And members of the Sunnyvale-Cupertino Airplane Noise Group
Over 500 members strong

Below is supplemental information and diagrams that were compiled by the Sunnyvale-Cupertino Airplane Noise Group, and which may be helpful in understanding the issue. [Continued]

Supplemental Materials regarding taller building heights in San Jose Downtown and Diridon Area (Document prepared by the Sunnyvale-Cupertino Airplane Noise Group)

Background Information:

Due to FAA flight path changes, tens of thousands of residents in Sunnyvale, Cupertino, and Mountain View are now detrimentally impacted by loud airplane noise during south flow operations. Complaint numbers at San Jose Airport have skyrocketed due to increased airplane noise during south flow operations over these cities. Could taller San Jose buildings indirectly increase the frequency of south flow operations, by forcing the FAA to reduce the south flow wind speed trigger from 5 knots to a lower wind speed threshold? The answer is uncertain, and requires further study.

Excerpts from the March 22, 2017 FAA meeting conducted at Ro Khanna's office:

Original Question submitted during meeting Mar 22, 2017:

> "*As many citizens have noted, San Francisco Airport has a waiver from the 5-knot wind standard, allowing that airport to direct aircraft to land with up to a 10-knot tailwind. What would it take to get San Jose Airport that kind of waiver? If south flow were used only at wind speeds above 10 knots, it would be used much less often and the noise over these neighborhoods would drop.*
>
> *Answer: FAA Flight Standards Program Manager Chris Harris explained that this approach cannot be used at San Jose Airport for two reasons:*
>
> *1. the usable runway for landing is too short for planes to land safely with that strong of a tailwind (SFO's runways are substantially longer), and*
>
> *2. San Jose Airport is used by many general aviation aircraft (small propeller planes) which could not land safely at those wind speeds under any conditions*."

Additional clarification regarding the tall building heights in downtown San Jose, and how these tall buildings currently impact the ability to raise the wind speed trigger for south flow from 5 knots to 10 knots. This information has also been confirmed through supplemental conversations with FAA personnel.

> Response from Director Moylan based on additional info:
>
> "*At the March 2017 meeting that I organized, FAA said that there were two reasons why San Jose Airport would not be granted a waiver of the 5-knot standard for landing with a tailwind. The first is the length of the runway, because it takes more runway to land with the wind at your back. San Jose's runway is too short. Part of the reason that it is too short is the buildings in downtown which make a piece of that end of the runway unusable (planes can't drop down until they are past those buildings). But that was not the whole cause of the runway being too short. It was too short anyway. The other reason is that small planes aren't safe to land in a tailwind no matter how much runway you have. San Francisco can get a waiver because it has only large jets and a long runway. We have small planes and a short runway*."

Commissioned study by San Jose included no analysis regarding possible impact to the south flow trigger:

The studies commissioned by San Jose considered the financial implications of taller buildings for the city at large, the SJ airport, and the airlines. The study also considered various FAA rules and regulations, including OEI (one engine inoperable), FAR Part 77, etc.

In contrast, there was no clear analysis to determine whether taller buildings would impact SJC arrivals and the south flow trigger in any way. The commissioned report specified financial and FAA impacts based directly on DEPARTURE flight paths in relation to building heights. No consideration was given to arrival flight paths. The south flow trigger is partly impacted by the current building heights in downtown San Jose (based on an FAA meeting March 2017).

A supplemental study or consultation with the FAA may be necessary to confirm no impact to the south flow trigger from the proposed taller building envelope. This analysis may require analysis of the arrival flight path during normal-flow operations.

Recommendations under Scenario 4 TERPS include minimal increases in height – Could minimal height increases have impact on the south flow trigger?

Without an analysis by the FAA, the answer is unclear.

Yes, in some areas the recommendations under Scenario 4 call for minimal height adjustments, especially over downtown San Jose. Proposed height adjustments over downtown San Jose under Scenario 4 TERPS are between 5 and 35 feet; Increased heights in the Diridon area are significantly larger deltas (70 – 150 feet).

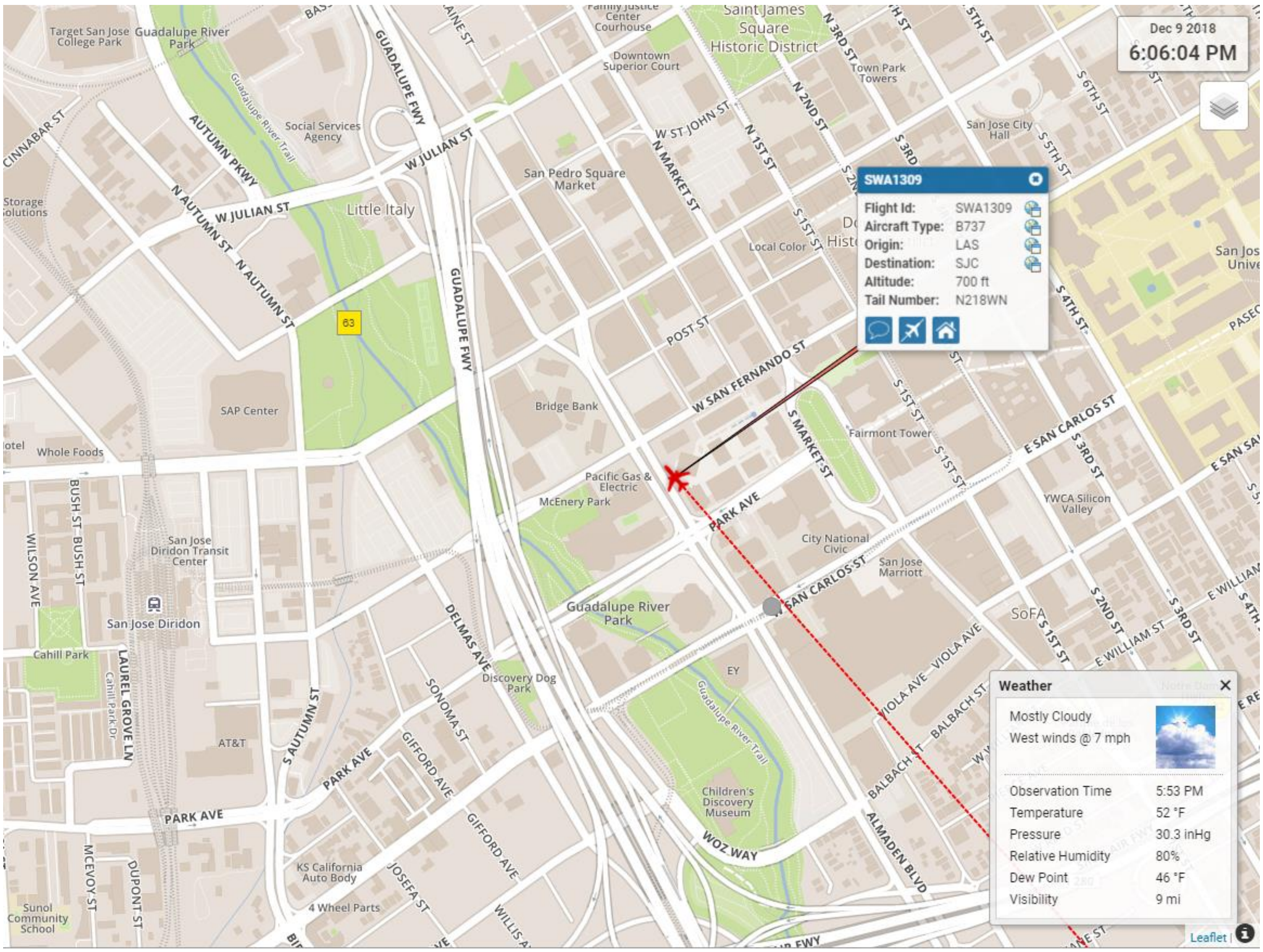
Based on San Jose Web tracker & FAA flight plates, the normal-flow arriving flights use a "straight in" flight pattern for each of the two runways 30L and 30R (during North flow). In many cases (based on San Jose web tracker altitude information), these arriving flights appear to be flying less than 500 feet above the high points of the San Jose downtown buildings.

For example, the Adobe tower at the corner of Park Ave and San Fernando Ave has a recorded height of 260 feet (per Wikipedia). Arriving flights routinely fly over this corner (per web tracker) at approx. 700-foot altitude. Although Web tracker may have some slight discrepancies in the altitudes, these normal-flow arrivals do appear to be flying very close to the tops of the current buildings. (See sample flight pictures next 2 pages.)

This might imply that even small height increases in buildings directly under the two arrival normal-flow flight paths could indirectly force the FAA to lower the south flow trigger criteria, especially if these changes result in the need for a steeper descent slope or closer proximity to building roof tops & other associated obstacles. A 35-foot change might be considered significant if arriving flights are indeed flying closer than 500 feet from the tops of the downtown buildings, which is what SJC flight tracker altitudes seem to indicate.

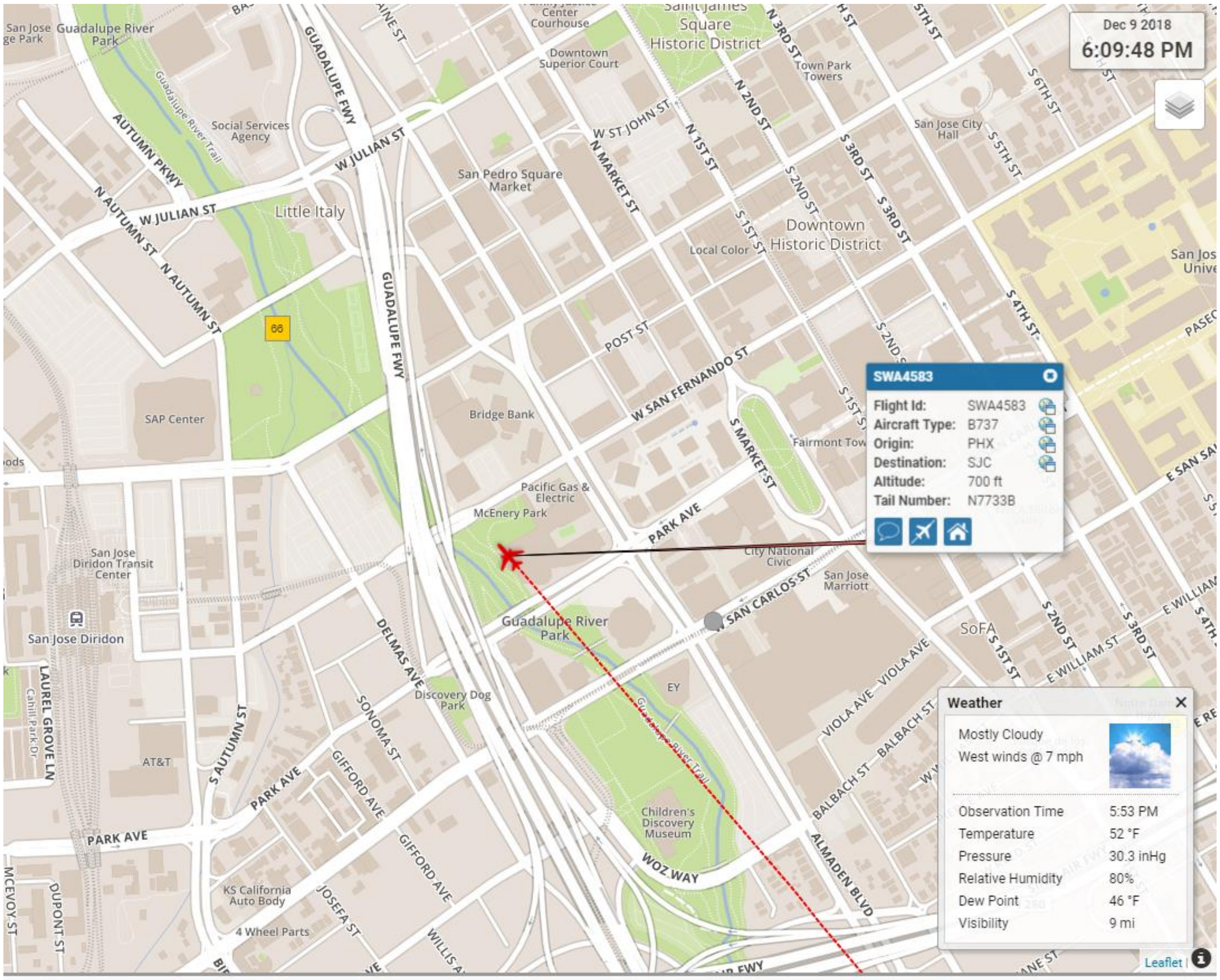
Only analysis by the FAA or an experienced aviation consultant can confirm whether the proposed small adjustments to height will impact the south flow trigger.

Sample flight flying right next to the Adobe tower at an altitude of 700 feet. The Adobe tower is 260 feet, so height delta is approx. 440 feet between the plane and the top of the building. (Approach to runway 30R)



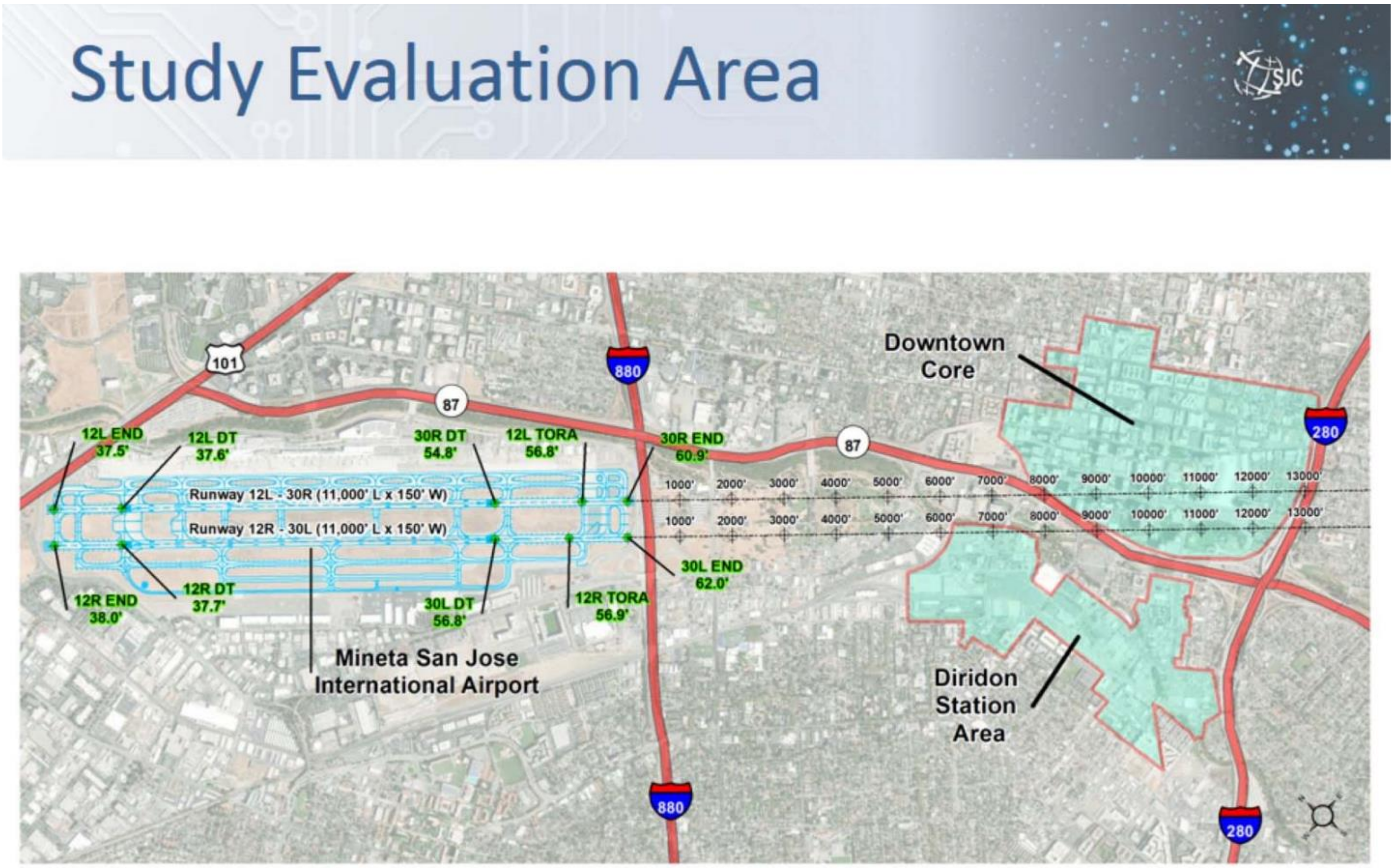
DOCUMENT CONTINUED

The two approach flight paths straddle the Adobe towers on each side (Approach to runway 30L). Flight at 700 foot altitude over Adobe Tower, which is 260 feet building height. Delta 440 feet (700 – 260).



CONTINUED

Proposed increases in building heights include taller buildings directly below the two normal-flow arrival flight paths (30L and 30R).



The two normal-flow arrival flight paths correspond to the two black lines extending beyond each of the two SJC runways, and showing the distance in feet from the end of each runway (30R and 30L).

The arrival flight paths extend directly into the downtown core, and into a small section of the Diridon evaluation area.

CONTINUED

Meeting packet for the San Jose Airport Commission meetings on Jan 14 & Jan 24:

Meeting Link for Jan 14, 2019 San Jose Airport Commission meeting:
https://www.flysanjose.com/node/5086

Meeting Link for Jan 24, 2019 San Jose Commission meeting:
https://www.flysanjose.com/node/5136

Memo regarding newly proposed height recommendations from airport (from Director Aitken):
https://www.flysanjose.com/sites/default/files/commission/Airport%20Commission%20Memo%20OEI%20for%20January%2014%202019%20final.pdf

OEI Slide presentation on Jan 14, 2019:
https://www.flysanjose.com/sites/default/files/commission/1%20%2014%2019%20Airport%20Commission%20OEI%20Presentation.pdf

SJC Airport, the airlines, and FAA benefit from limited south flow operations at SJC:

An unintentional increase in south flow operations would not be favorable for the FAA, the airlines, nor San Jose Airport. It appears that normal flow is the preferred path for safety reasons, airline financial benefits, and efficiency.

During the San Jose Airport Ad Hoc Committee meetings on south flow arrivals, FAA staff presented that a south flow arrival approach is a more complicated procedure than north flow given its proximity to other flight procedures for SFO traffic, and as such, it is a less preferred procedure when compared with north flow. The preferred approach is north flow, where planes approach SJC from the south flying north, as there is less air traffic from other airports.

Additionally, the south flow flight path is a longer flight path than the normal flow path. For this reason, it is likely not the preferred flight path for the airlines. The south flow arrival approach is longer, often resulting in as much as 30- 50 miles additional flying distance. Longer flight distances increase airline fuel costs, cut into airline profits, and can impact arrival times. Increases in airline fuel costs and/or impacts to arrival times associated with an increase in south flow operations, could indirectly factor into an airport's ability to attract or retain desired air service, therefore potentially impacting the profitability of the airport.

Finally, an unintended increase in south flow operations would further impact cities like Sunnyvale, Cupertino, Mountain View, and Palo Alto and would exacerbate an already contentious airplane noise problem.

Could the proposed building height increases impact any possible improvement currently being considered for the south flow trigger?

Perhaps.

We understand that the FAA has been working on its' response to the San Jose Airport Adhoc Committee recommendations and questions. It is expected that an FAA response will be available soon after the government shut down ends.

One of the requests in the adhoc report includes a question regarding the south flow trigger, and whether it is feasible for the FAA to slightly increase the south flow wind speed threshold (i.e. from the current 5 knot threshold to a wind speed threshold of 6 or 7 knots). An FAA response is pending.

It is likely that an increase in the proposed building height envelope in certain areas of downtown San Jose and the Diridon area directly below the normal-flow arrival flight path might impact any ability to raise the south flow wind speed trigger in the future. Already the FAA states that the trigger is partially impacted by current tall buildings in downtown SJ.

For this reason, we would recommend no adjustments to the previous building height envelope for areas directly below the normal-flow arrival flight path. In other words, current city codes regarding maximum building heights directly below the "straight in" normal flow arrival flight path would remain unchanged; In contrast, newly proposed height increases for areas a specified horizontal distance AWAY from the normal flow arrival flight path would be fine to implement – assuming the FAA has no objection and no impact to the south flow trigger is identified for these new locations.

Future Airline Technology and its possible impact to south flow operations:

For fuel efficiency purposes, newer airlines are generally being engineered with shallower descent profiles.

General questions that we may wish to pose to the FAA:

- Does the FAA anticipate that future aircraft designs and potential shallower descents would place downward pressure on the south flow trigger, thereby potentially increasing the frequency of south flow flights?
- For the following question assume that the FAA has confirmed no current impact to the south flow trigger based on the proposed taller building envelope in San Jose:
    - Assuming this is the case, then could the proposed taller San Jose buildings in conjunction with a trend toward airline shallower descents cause potential FUTURE impact on the south flow trigger? In other words, is there a synergistic effect between the proposed taller buildings and shallower descent rates that could require a lowering of the south flow trigger wind speed in the future?

END OF SUPPLEMENTAL DOCUMENT

SPUR
San Francisco | San Jose | Oakland

January 28, 2019

Re: Item CC 18-419 on January 28, 2019 Community & Economic Development Committee

Chair Khamis and Councilmembers:

On behalf of SPUR, I am writing to support the completed Downtown Airspace and Development Capacity Study and **recommend acceptance of Scenario 4, which would use the Federal Aviation Administration's own safety standards to determine maximum building height limits in the Downtown Core and Diridon Station Area.**

For the past couple of years, SPUR has actively looked at the possibilities to increase height limits in downtown and the Diridon Station Area. Over the next ten years the downtown and station area will become large transit hubs for BART, Caltrain, high-speed rail and VTA light rail. It is imperative that these future projects be coupled with world-class mixed-use developments that generate transit riders.

Maximizing the amount of jobs and housing within walking distance of the station will connect lots of residents and workers to high-quality transit and help to alleviate the congestion of workers flowing north by creating a regional job center for the South Bay. With $10 billion of public investment going into these transit improvements, we must ensure they have the ridership to support them.

Perhaps more importantly, maximizing development will generate more fees to support the creation of thousands of affordable housing units as well as community benefitting amenities, such as parks.

That's why a cross-sector committee of business, labor and civic organizations sought to examine downtown airspace and development capacity in the first place. With the technical support of the city's own aviation consultant, Landrum and Brown, we evaluated several possible scenarios that would allow for increased floor area ratio (FAR) in downtown with the least negative impact on airport operations.

By removing the economic—not safety—procedures followed by airlines, development within the Downtown Core and Diridon Station Area will be able to build at a height allowance that will help us achieve our commercial and residential growth numbers and community development goals.

SPUR
San Francisco | San Jose | Oakland

After more than a year of intensive research, coordination with airlines and consideration on how to maximize community benefit, SPUR strongly supports adopting Scenario 4 and urges the City Council to allow this new policy to go into effect immediately to spur development within these two districts.

As this policy is further developed, we believe the city has the opportunity, and responsibility, to capture the value of these height increases. The incentive for increased FAR should require that development be of world class urban design. Commercial and residential properties should incorporate privately-owned public open spaces (POPOS) and ensure access for all of San Jose. New development should use this density bonus to invest deeply in blue and green infrastructure and create a model eco-district that helps further the city's ambitious and vitally important climate aspirations.

We strongly believe that a healthy and vibrant downtown along with a well-operated and growing regional airport will further the success of San Jose. This is our opportunity to bring our vision for the future into action today.

Thank you for the opportunity to comment on this item.

Sincerely,

Teresa Alvarado
San José Director

SPUR

San Francisco | San Jose | Oakland

February 21, 2019

Submitted electronically

Hon. Mayor Liccardo and City Council
San Jose City Hall
200 E. Santa Clara
San Jose, CA 95113

Re: 18-1944 Actions Related to the Downtown Airspace and Development Capacity Study

Dear Mayor, Vice Mayor and City Council:

Thank you for discussing the Airspace Capacity Study. This session is an important opportunity for the community to learn about and contribute to the conversation about increasing the development capacity of the greater downtown while ensuring we continue to have a safe and successful San Jose International Airport. Both are critical regional assets.

Over the next ten years the downtown and station area will become transit hubs for BART, Caltrain, high-speed rail and VTA light rail. It is imperative that these projects be coupled with mixed-use developments that generate riders. With $10 billion of public transit investments, we must ensure they have the ridership to support them.

That's a major reason why a cross-sector committee of business, labor and civic organizations, as well as a representative of the city's Airport Commission, sought to examine downtown airspace and development capacity. With the technical support of the city's aviation consultant and feedback from the airlines, we evaluated several possible scenarios that would increase development with the least negative impact on airport operations.

The committee recommends using the Federal Aviation Administration's own safety standards, as reflected in Scenario 4, for those rare times that planes must—due to weather conditions—depart to the South. This would allow for modestly taller buildings, at most an additional 150 feet.

In addition to more transit riders, maximizing development will generate more fees to support the creation of thousands of affordable housing units as well as community amenities, such as parks.

Oftentimes, saying yes to one opportunity means saying no to another. This time, we can achieve what downtown advocates and airport advocates want and maximize the opportunity and safety of both of the greater downtown and SJC.

Sincerely,

[redacted]

Teresa Alvarado, San Jose Director

Statement from the Sunnyvale-Cupertino Airplane Noise group

Presented during public comment at San Jose Community & Economic Development Committee meeting on Jan 28, 2019

Agenda Item #5 - One Engine Inoperative Airport (CC18-419)

Public comment recorded in video beginning at 2:12:27 to 2:14:33

Group comment presented by Jennifer (Member Sunnyvale-Cupertino Airplane Noise Group)

I am here representing the Sunnyvale-Cupertino Airplane Noise Group.

Due to recent FAA flight path changes, the cities of Sunnyvale and Cupertino are now heavily impacted by airplane noise during San Jose Airport reverse flow, also called south flow operations.

Now San Jose is considering taller buildings in downtown and Diridon.

What is NOT clear is whether these taller buildings could indirectly impact the frequency of south flow operations over our cities – In other words, resulting in MORE south flow operations.

The San Jose building height study considered departure flights, but never studied arrivals. Yet normal flow arrivals fly directly over downtown San Jose. And based on a 2017 FAA Congressional meeting, we already know that these arrivals are partly impacted by the existing tall downtown buildings.

We ask that ANY San Jose vote that will ultimately result in taller buildings in downtown or Diridon be postponed until a supplemental aviation study is commissioned by San Jose, and the FAA is consulted to confirm no possible increase in south flow traffic. For example, no possible lowering of the south flow wind speed trigger.

Again, any San Jose approvals should be delayed until the FAA and an aviation consultant have completed a report confirming no possible increase in the frequency of south flow operations.

Decisions regarding building heights will have repercussions for decades, yet decisions are being based on an incomplete study that missed any analysis regarding arriving flights.

A formal letter from our group was submitted under public comment.

The current aviation study is incomplete, and further analysis is necessary.

Thank you for your time.

From: Ken Pyle < >
Sent: Friday, February 22, 2019 11:37:13 AM
To: City Clerk
Cc: Hendrix, Catherine; Greenlee, Raymond; Connolly, Dan
Subject: Public Record Additions for Item 6.2 for the 02-26-19 Ciy Council Agenda

Please add the following documents to the public record for Item 6.2 for the 02-26-19 Agenda. This is **18-1944** *Actions Related to the Downtown Airspace and Development Capacity Study*.

The following documents are attached:

filepp18-103-connolly-greenlee-hendrix-pylecommentsonairportmasterplan

Recommendation FINAL 10B Approved by Airport Commission STAMPED 01-24-19

OEI Questions

OEI Process Concerns - Bullets

Why the Rush to Adopt Scenario 4

Who will benefit most from Raising OEI Limits

Why are the Temperature Assumptions Lower in 2018 than in 2007

Thank you,

Ken

--

Ken Pyle
Managing Editor

City of San Jose
200 East Santa Clara Street, 3rd Floor Tower January 31st, 2019
San Jose, CA 95113-1905
Attention: City of San Jose Council, Planning Commission and Planning Staff

Subject: File No. PP18-103 Amendment to the San Jose International Airport Master Plan

Messrs. Keyon and Greene

This letter represents comments from the individuals listed at the bottom of this correspondence regarding the proposed amendment to the **Mineta San Jose International Airport Master Plan (File PP18-103)**. Although they are Mineta San Jose International Airport Commissioners, the views are their own. These comments are split into three sections;

- Vision, which talks about the importance of understanding the Airport's expansion plans interact with other San Jose developments.
- Premises – discusses some of the changes we can expect by the year 2037 due to technological and economic changes.
- Comments – reference the proposed changes

Vision:

"Begin with the end in mind," is the wisdom Stephen Covey taught us decades ago. It is important to have a clear and common vision that serves to align the strategies and tactics necessary to accomplish something big and bold. When we look at the proposed changes to the Airport Master Plan, we see a capacity planning exercise, not a vision.

What we don't see is how this incredible community asset ties into other nearby assets such as the adjacent Guadalupe River and its associated park, downtown and Diridon Station to the south, the Santa Clara train station to the west, BART to the East and the economic engine of North San Jose.

Watch the video at https://youtu.be/OoBV64h7A0Y

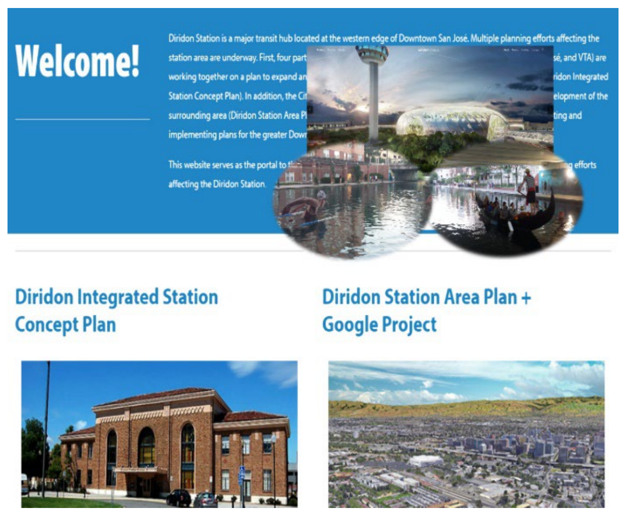
It's time to reimagine the airport as more than just a place that facilitates the movement of people and goods. It can be so much more than that and can be an integral part of the community as a place to live, work, shop, and play.

The author of the blog Airport Urbanism, Professor Max Hirsch indicates that this happening today in places like the Netherlands, Finland and Singapore. He suggests that creative use of airport land can help an airport's finances by dampening the economic volatility of the airline industry. Hirsch writes,

> "Leading global hubs like Amsterdam Schiphol, for example, generate up to 20% of their overall income—and more than a third of their profits—through landside real estate. That's because the profit margins on commercial developments are considerably higher compared to aeronautical charges."

The 20-million passenger Helsinki Airport, located in the nearby city of Vantaa, Finland is creating a dense, urban walkable city center, Aviapolis, where people from bag handlers to knowledge workers will be live. It will also provide foreign visitors a first impression of Finland. Tapping the creativity of the crowds, Vantaa held an international competition to elicit ideas on how to shape this innovate urban airport district.

When you look at SJC's strategic location on a river next to a park - really the Central Park of San Jose - near transportation hubs, it is in a good position to help alleviate some of San Jose's housing, commercial office space, transportation, and limited parkland issues.



We have several activities going on that should be considered as inputs to the master plan, including the one engine inoperative study, the upcoming community meetings for the Diridon Station Area - aka the Google village - the airline lease negotiations. All these things will impact each other, and they are especially going to impact the Master Plan's projections for future growth.

As the community and city participate in these activities, it is important to have a mindset of what will be in 2037 and beyond, not what is today. From air taxies to shared electric, autonomous vehicles to the standardization of modularized, car-free, micro-housing, both mobility, and the built environment are going to be significantly different in 20 years.

Whether this means reduced parking demands or new feeder routes from on-demand air taxies, technology and operational improvements will have impacts on both the landside and airside operations of the airport. None of these potential changes are addressed in the master plan.

it's time we tie those things together with a vision; a vision that will align seemingly disparate projects into a cohesive community; making for a better San Jose and a better Silicon Valley.

Premises:

The proposed changes to the SJC Airport Master Plan extend the plan to the year 2037. Before we look forward, let's look back 18 years ago. In 2001, there was no smartphone, Facebook's Mark Zuckerberg was still in high school, AOL was the World Wide Web for many people, and GE was the world's most valuable company as measured by market capitalization.

Fast-forward two decades from now and we are sure to see similar changes in mobility and the built-environment based on the technological developments occurring today.

Figure 1, The Future at CES2019

Some of these developments include:

- **Autonomous Electric Air Taxies** are likely to be mainstream at some level, given the interest from major companies, such as Airbus, Bell Helicopter, Uber (PDF) and start-ups like Airspace Experience Technologies, Joby Aviation, and Lilium. Bye Aerospace is projecting operating costs for its electric trainer plane, slated for 2020 delivery, of approximately **$3 per hour or 2 cents per mile**. This promises cleaner transportation at a tenth of the current operating cost. The Air Taxi services will most like be intercity transit (e.g. San Jose to San Francisco) as alternatives to traditional transit and/or vehicles, as envisioned, may be as likely to be from building to building, as it is airport to airport.
- **Autonomous Vehicles** – The industry may currently be in the so-called "deflated expectations", just as the broadband ecosystem was with the demise of Webvan, Pets.com, and others at the turn of the century. In the meantime, start-ups and established companies are working on solutions for the operational issues that will be

required for autonomous driving to scale. Policy at the local, state and national will be critical to determining whether the future is shared autonomous or zombie cars; the so-called heaven or hell scenarios. In either scenario, there is likely going to be less demand for parking on a per passenger basis in 2037 as compared in 2019.

- **Boring** – Elon Musk's December 2018 unveiling of his 1+ mile tunnel in Hawthorne, CA was widely derided by transportation experts as being unfeasible as a potential subway alternative. The real break-through was an order of magnitude reduction in cost for boring, compared to traditional methods. The techniques he employed for boring, along with low-cost, autonomous electric shuttles, which will become common by 2037, could make point-to-point transit projects financially viable, such as a connector between the Santa Clara train station and SJC. For a high-level analysis of one such scenario, please **click here.**
- **Solar, Energy Storage & Microgrids** – The cost of electricity from alternative energy sources and associated storage continues to drop and is already close to parity with electricity from fossil fuel powered generators (see this article as a recent example). By combining power generation and storage, it is possible to create a microgrid, independent from the larger grid, providing resilience in the event of an outage from a manmade or natural disaster.

Example of solar panels on/next to a fence

- **Land will Become More Valuable** – Unless there is an economic Armageddon, Silicon Valley land will continue to become more precious and will be reflected in the cost of housing. If we want to have a middle class, we will need to more efficiently utilize the land already devoted to housing, mix-use to reduce vehicle miles traveled and look at ways to better use land now dedicated to automobiles. **Patrick Kennedy of Panoramic Interests** puts it well with his statement that we need high-quality designs that are micro, modular and car-free if we are going to begin to tackle the high cost of housing.

Comments on the EIR

The following comments are made in the context of the above premises for how things will be different in 2037.

1. Do the air traffic growth projections account for possible reduction in international and transcontinental service that will likely result, if the City of San Jose adopts the Airport's recommendation in its January 10th, 2019 memo?
2. What is the plan to accommodate electric vertical take-off & landing (VTOL) and other air taxis that may become both an airport connector (e.g. SJC-SFO, like the helicopter shuttles that flew between those airports in the 1960s), as well as an alternative shuttle to get to the airport (air taxi, such as what Uber proposes)? Specifically,
    1. What will be the impact on the airside operations (e.g. new pads to accommodate electric VTOL shuttle take-off and landings for inter-airport flights)?
    2. What will be the impact on the landside operations? For instance, will the airport need to build new pads, say, on top of a parking lot, to accommodate electric VTOL air taxi take-off and landings for air taxi service (e.g. building to-airport flights, where the passengers check-in and pass through screening after being dropped off by an Air Taxi)?
3. Could **T-8** be more generalized to include other types of buildings, such as hotel, workforce housing, offices, etc.? This might require zoning that isn't possible in today's code (e.g. housing on airport property).
4. Could the scope of **T16** (hotel) include the flexibility to include things such as building above a parking lot? Could it also include a bridge over the road that separates it from the terminal? This bridge might also be part of the building, effectively using the space above the road for offices (e.g. SJC admin offices), hotel rooms and, potentially, workforce housing.
5. Is a connector between the SJC and the Santa Clara train station included in the General Plan changes? A transit connector is part of VTA's 2040 plan (T-18, referenced on page 38 in the VTA plan), but it doesn't seem to be in this plan? Does the terminal need to be included in the General Plan change? See this post for a fresh look at this challenge and how to potentially create a connector that pays for itself.
6. What about the property that is just north of De LaCruz/Trimble that had the Radar field. That should be looked at for some activity, such a solar power field.
7. Regarding solar power and energy storage, what opportunities are there to integrate solar power (e.g. ring the fences with solar collectors, as an example) and does this need to be mentioned in the General Plan?

Sincerely,

Dan Connolly, D10 Airport Commissioner
Raymond Greenlee, D6 Airport Commissioner
Catherine Hendrix, D9 Airport Commissioner
Ken Pyle, D1 Airport Commissioner

TO: SAN JOSE AIRPORT COMMISSION
JOHN AIKEN, A.A.E., DIRECTOR

For C.E.D. Committee 1/28/19
and San Jose City Council

FROM: AIRPORT COMMISSIONERS
Ken Pyle – District 1
Raymond Greenlee – District 6
Catherine Hendrix – District 9
Dan Connolly (Chair) – District 10

SUBJECT: MINETA SAN JOSE AIRPORT COMMISSION'S RESPONSE TO THE DOWTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY REPORT FINDINGS AND RECOMMENDATIONS MEMORANDUM DATED JANUARY 10, 2019

By San Jose Airport Commission 01/24/2019

DATE: JANUARY 24, 2019

RECOMMENDATION

Recommend to the City Council approval of:

1. **Scenario 10B** as identified in the Downtown Airspace and Development Capacity Study which would affirm the City's development policy to use Federal Aviation Administration (FAA) Terminal Instrument Procedures (TERPS) and retains One Engine Inoperable (OEI) protection for departure safety.

   a. **Scenario 10B** provides OEI protection for safety. Mineta San Jose International Airport (Airport) must have OEI protection preserving the ability for disabled aircraft to enter the airspace over the existing West Corridor (Diridon Station area) or proceed straight out in the event of an engine failure on departure.
   b. **Scenario 10B** allows for modest increases in safe building heights in the Diridon Station Area.
   c. **Scenario 10B** offers economic benefits of increased development of the Downtown and Diridon Station areas.
   d. **Scenario 10B** preserves the current, transcontinental and transoceanic (European and Asia service) and allows for future air service expansion in these rapidly growing markets.
   e. **Scenario 10B** allows the Airport to preserve the classification of a medium-hub airport, providing domestic origin-destination service with increasing levels of international air service.
   f. **Scenario 10B** mitigates and eliminates negative air service impacts (weight penalties) as identified in the Downtown Airspace and Development Capacity Study.
   g. **Scenario 10B** eliminates the need for City of San Jose staff to explore the feasibility of establishing a "Community Air Service Fund" designed to subsidize airlines for financial or adverse air service impacts (weight penalties) suffered during south-flow departures for some flights.
   h. The Airport Commission supports the consideration of refinements to the development review process for future development to be built in the Downtown and Diridon Station areas to ensure aviation safety as outlined on Page 1 and 2 of Director Aitken's A.A.E. January 10, 2019 memorandum. **Attachment A.**
   i. **Scenario 10B** allows the airport to offer economically viable service to China, Far East Asia and Europe now and in the future during south flow operations. **While OEI is designated as an economic issue for airlines, the Airport Commissioners believe strongly that OEI airspace must be preserved and safeguarded to protect human life.** If or when an OEI event occurs, during a South Flow takeoff, the City of San Jose must provide the pilots flying that plane, the passengers on board, and the

residents in that flight path the safety cushion provided by unencumbered airspace. According to Boeing, "Pilot error is the leading cause of commercial airline accidents, with close to 80% percent of accidents caused by pilot error."[1]

OUTCOME

City Council approval of **Scenario 10B,** as identified in the Downtown Airspace and Development Capacity Study, would allow for maximum safe development building heights and their associated economic benefits that could be realized in the Downtown and Diridon Station areas.

BACKGROUND

As stated in Director Aitkin's A.A.E January 10, 2019 memorandum to the Airport Commission, in June 2017, City Council directed staff to update the 2007 Obstruction Clearance Study to include an economic analysis to identify tradeoffs between maintaining current OEI protection surfaces and potential increased building heights under a no-OEI protection or alternative policy.

A Steering Committee was formed but the members of the committee did not contain any airlines, pilots or individuals with practical operational experience flying into or out of the Airport nor did it include a representative from the County of Santa Clara Airport Land Use Commission which was established under Article 3.5 Airport Land Use Commission Section 21670 Creation; Membership; Selection of California Public Utilities Code. The Airport Land Use Commission is an important body that promotes the overall goals and objectives of California's airport noise standards and prevents the creation of new noise and safety problems.

E. Ronald Blake, a pilot, serves as a Commissioner for both the Airport Commission and he sits on the County of Santa Clara Airport Land Use Commission. E. Ronald Blake was not selected as a stakeholder nor invited to participate on the Steering Committee. Dan Connolly, Chairperson of the Airport Commission, recommended Commissioner Raymond Greenlee to participate in the Steering Committee. Captain Greenlee has over 35 years of civilian and military flying experience with an extensive background in operations, training and flight standards. The Chairperson's recommendation was not accepted by Airport Staff and Staff appointed Airport Commissioner Julie Matsushima to the Steering Committee for her experience as an Airport Commissioner and to ascertain her perspective as a Downtown resident.

The Steering Committee selected four of the ten conceptual airspace protection scenarios for detailed analysis which was conducted by Landrum & Brown, a national aviation planning/engineering consultant who has done previous work at the Airport:

- Scenario 4: No OEI protection (FAA/TERPS only)
- Scenario 7: Straight-out OEI Protection with no OEI West Corridor/Diridon Station Protection
- Scenario 9: No OEI protections plus potential elevation increase to some FAA/TERPS procedures

[1] BBC Travel May 22, 2013 http://www.bbc.com/travel/story/20130521-how-human-error-can-cause-a-plane-crash

- Scenario 10 (A-D) Straight-out OEI protection with four alternative OEI West Corridor/Diridon station surface protections

Note: Existing Conditions: Building Heights 85' – 166' Above Ground Level

1. Scenario Option 10A: Building Heights 100' – 195' Above Ground Level
2. **Scenario Option 10B**: Building Heights 115' – 224' Above Ground Level
3. Scenario Option 10C: Building Heights 129' – 240' Above Ground Level
4. Scenario Option 10D: Building Heights 146' – 260' Above Ground Level

Generally speaking, the hotter the weather, the lighter the aircraft needs to be to safely depart the Airport. This is especially critical during south flow operations should an engine fail. Also, more aviation fuel is required to take off in the winter than the summer making the aircraft heavier. Additionally, due to increased headwinds during the winter months, departing aircraft are required to add additional fuel when flying to Pacific destinations. Higher temperatures from climate change will only make this problem worse, as evidenced by a study in the journal *Climate Change*.

> "The authors estimate that if globe-warming emission continue unabated, fuel capacities and payload weights will have to be reduced by as much as 4 percent on the hottest days for some aircraft. If the world somehow manages to sharply reduce carbon emissions soon, such reductions may amount to as little as 0.5 percent, they say. Either figure is significant in an industry that operates on thin profit margins. For an average aircraft operating today, a 4 percent weight reduction would mean roughly 12 or 13 fewer passengers on an average 160-seat aircraft. This does not count the major logistical and economic effects of delays and cancellations that can instantly ripple from one air hub to another, said Horton."[2]

While an engine failure is exceptionally rare, pilots train for an engine out scenario as a standard component of flight simulator training. The most common reasons for engine failure are foreign object ingestion (including birds), mechanical component failure, or bad fuel.

Planning for an engine out prior to take off is mandatory to avoid obstacles (such as cranes and tall buildings) in the event of an engine failure on departure. When an engine fails during takeoff two scenarios may occur, often together: 1) the aircraft may not lift off until it is close to the departure end of the runway; and 2) the aircraft may climb at a minimum rate. Therefore, for safety, procedures must be in place to avoid obstacles in the event of an engine failure considering applicable aircraft performance operating limitations.

The Airport Commission received an update on the Downtown Airspace and Development Capacity Study Report at its Special Airport Commission meeting on January 14, 2019. A copy of the final Downtown Airspace and Development Capacity Study Report was requested but, per the Assistant Director of Aviation July Ross, the final report is not available at this time.

[2] "Surging heat may limit aircraft takeoffs globally", EurekAlert, 7-13-2017, https://www.eurekalert.org/pub_releases/2017-07/teia-sh071217.php

The Director of Aviation, John Aitken, A.A.E is recommending to the Community & Economic Development Committee and City Council the selection of Scenario 4 - No OEI protection (FAA/TERPS only). This shortsighted recommendation puts draconian restrictions on the Airport and may prevent the Airport from continuing some critical long-haul service, transcontinental and transoceanic (European and Asian service) and stifles the opportunity for increased international service in the future. ***Under Scenario 4, the Airport likely will never be a transoceanic, international airport.*** The Airport's existing classification as a medium-hub airport may be reduced to a regional airport and likely restricts the ability of providing air service to Asia, the fastest growing market. The Airport's passengers will be forced to utilize Oakland and San Francisco Airports to get to certain destinations.

ANALYSIS

The mission of the Mineta San Jose International Airport is to connect, serve and inspire. The vision of the Airport is to transform how Silicon Valley travels. In our opinion, Scenario 4 voids the Airports mission and vision statements while **Scenario 10B** supports both the mission and vision of the Airport and provides the City benefits of increased building heights in the Diridon Station area.

1. Before the City Council considers adopting Scenario 4, City Council should be provided with a copy of the final Downtown Airspace and Development Capacity Study Report so an informed decision can be made.

a. The Downtown Airspace and Development Capacity Study to the Airport Commission dated January 10, 2019 outlined the following airline solutions to the problem of increased building heights in the OEI areas (Page 6).

Airline Response to Obstacles

- Request another runway (wind, weather, air traffic permitting)
- Off-load passengers and/or cargo (weight penalty)
- Make a refueling stop
- Cancel current day's flight
- Change aircraft
- Change OEI procedure
- Cancel air service if payload loss affects financial viability

Pragmatically, all of these options increase airline costs or decrease profitability and in many instances may effectively eliminate the financial viability of transcontinental and transoceanic service.

b. Aircraft gross weight limitations during south flow departures under Scenario 4 will make many current and future flights economically nonviable. Additionally, the study used Boeing temperature numbers that are 85% reliable. Airport temperatures are often quite higher than those stated in the OEI presentation. Additionally, as seen in Figures 1 and 2 below, there are discrepancies between the December 2018 presentation and the January 10th, 2019 Memorandum regarding the Weight Penalty Assessment. As an example of one inconsistency, using a B777-300ER from Taipei, which was a former commercial route from SJC, the December 2018 presentation suggests a cargo penalty of 2,638 pounds, while the January 10, 2019 suggests an 18,742-pound penalty.

Figure 1, Weight Penalty Assessment from December 2018 Presentation

WEIGHT PENALTY ASSESSMENT – GIG, TPE, HKG, DEL & DXB

Rio de Janeiro - GIG Summer (81.3° F)	A330-200 (284 seats/21,199 lbs. cargo)		A350-900 (325 seats/16,520 lbs. cargo)		B777-300ER (370 seats/32,012 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	51	-
TERPS Only	-	1,927	-	2,085	-	2,776	60	-

Taipei - TPE Summer (81.3° F)	A330-200 (284 seats/10,635 lbs. cargo)		A350-900 (325 seats/6,439 lbs. cargo)		B777-300ER (370 seats/19,465 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	89	-
TERPS Only	-	1,976	-	2,052	-	2,638	96	-

Hong Kong - HKG Summer (81.3° F)	A330-200 (284 seats/743 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/5,348 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	15	-	-	-	128	-
TERPS Only	5	743	23	-	-	2,543	134	-

Delhi - DEL Summer (81.3° F)	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	48	-	69	-	62	-	178	-
TERPS Only	55	-	77	-	72	-	184	-

Dubai - DXB Summer (81.3° F)	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	57	-	71	-	62	-	184	-
TERPS Only	65	-	79	-	72	-	191	-

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Figure 2, Weight Penalty Chart from the January 10, 2019 Memorandum

	A330-200		A350-900		B777-300ER		B787-9	
Rio de Janeiro - GIG Summer (81.3° F) 6,575 miles	(284 seats/39,344 lbs cargo)		(325 seats/37,963 lbs cargo)		(370 seats/48,211 lbs cargo)		(290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144
Taipei - TPE Summer (81.3° F) 6,499 miles	(284 seats/28,577 lbs cargo)		(325 seats/27,582 lbs cargo)		(370 seats/35,569 lbs cargo)		(290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							9	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	
Hong Kong - HKG Summer (81.3° F) 6,957 miles	(284 seats/18,283 lbs cargo)		(325 seats/17,182 lbs cargo)		(370 seats/20,785 lbs cargo)		(290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	
Delhi - DEL Summer (81.3° F) 7,731 miles	(284 seats/5,014 lbs cargo)		(325 seats/3,132 lbs cargo)		(370 seats/106 lbs cargo)		(290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor							103	
TERPS Only	55	5,014	77	3,132	72	106	184	
Dubai - DXB Summer (81.3° F) 8,120 miles	(284 seats/3,537 lbs cargo)		(325 seats/2,688 lbs cargo)		(370 seats/1,828 lbs cargo)		(290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor							107	
TERPS Only	65	3,537	79	2,688	72	1,828	191	

* Existing Straight Out OEI Corridor calculations uses different cargo capacity numbers than the West OEI and TERPS Only.

c. The Downtown Airspace and Development Capacity Study is incomplete. There is no detailed information for Scenarios 7, 10A, 10B, 10C or 10D. Only Scenarios 4 and 9 were fully analyzed. **Before deciding on a path forward**, an analysis should be made for each scenario as to how it would affect current and future air service at the Airport. **Potential loss of airport service is not modeled in the study for domestic and international markets.**

2. The following table shows significant financial penalties to airlines suffering weight penalties realized under Scenario 4. Some flights could be deemed unprofitable which creates the need for Staff to explore the feasibility of establishing an ongoing "Community Air Service Fund" to offset any adverse

air service impacts to the airlines. Under Scenario 4 (TERPS Only) the amount of loss is staggering at any load factor while **Scenario 10B** (With TERPS and OEI surface protections) results in no financial loss. Therefore, there is no need to establish a "Community Air Service Fund" under **Scenario 10B.**

SUMMARY OF 20-YEAR CUMULATIVE DIRECT IMPACTS LOAD FACTOR SENSITIVTY TEST

Cumulative Summary of Losses		Baseline Load Factor	85% Load Factor	90% Load Factor	95% Load Factor
Scenario 1	Existing airspace protection	$0	$0	$0	$0
Scenario 4	TERPS Only	$26,034,000	$89,217,000	$148,827,000	$203,596,000
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	$0	$2,031,000	$47,238,000	$101,472,000
Scenario 10	Existing Conditions: 85' - 166' AGL	$0	$0	$0	$0
	Opt 10A: 100' - 195' AGL	$0	$0	$0	$0
	Opt 10B: 115' - 224' AGL	$0	$0	$0	$0
	Opt 10C: 129' - 240' AGL	$0	$0	$2,255,000	$49,906,000
	Opt 10D: 146' - 260' AGL	$0	$19,636,000	$76,975,000	$131,655,000
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	$211,596,000	$285,294,000	$385,051,000	$455,005,000

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Source: November 13, 2018 Steering Committee Report

3. The City of San Jose stands to realize significant economic benefits under the selection of Scenario 4, but at the cost of crippling the Airport. Economic benefits can be realized under **Scenario 10B** without restricting the Airport's current or future air service. Scenario 4 allows for an increase in buildings heights from 5' to 35' in the Downtown Core and 70' to 150' in the Diridon Station area. According to the December 2018 presentation, these building height increases produce the largest gross economic benefit to the City of San Jose of $747,000,000, but, as seen in Table 1, below, the net benefit will not be as great. **Scenario 10B** does not allow for building height increases in the Downtown core but does allow for an increase in building heights from 30' to 55' (115' to 224' AGL) in the Diridon Station area and significant economic gains of $438,000,000.

   The Airport Commission has specific questions in the following categories pertaining to economic impact, employment projections, incremental commercial and residential square footage, incremental commercial and residential units, incremental valuation based on building heights, tax revenue, one-time park revenues and airport service impacts.

   <u>Economic Impact</u>

   Table 1, Total Economic Impact Summary (2038), summarizes the potential positive and negative impacts for both Aviation and Real Estate as found in the November 2018 and December 2018 presentations. It is unclear whether these impacts include the costs of a "Community Air Service Fund". It is important to note that although a "Community Air Service Fund" would be separate from the airport, it still represents an opportunity cost in that these funds could be providing some other community benefit.

The estimates for this fund ranges from $800,000 in 2024 to $1.2M in 2032 to $1.8M in 2038.[3] This figure does not seem to be included in the total impact and on a cumulative basis would add another $10+M in negative impact to Scenario 4. To be clear, the necessary subsidy amount could be much greater than suggested and up to **$18M per year per flight, as shown in the section Aircraft Technology, Selection and Fuel Economy.**[4]

Table 1 Total Economic Impact Summary (2038)

Total Economic Impact Summary (2038) Gain/Loss[5]		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Aviation Impact	-$26M to – $203M[6]	$0[7]
	Real Estate Impact	$747M[8]	$438M[9]
	Net Impact	**$544M - $721M**	**$438M**

Employment Projections

The employment projections are provided in the November 2018 and December 2018 presentations, as well as the January 10th, 2019 memo. As seen in Table 2, Employment Projections, there are discrepancies between the November and December 2018 presentations. For Scenario 4, the difference is less than 4% (173/4,700) and is insignificant, while the 50% (800/1,600) difference for **Scenario 10B** is significant.

Why is there a significant difference in the number of jobs between the November and December presentations for Scenario 10B?

Table 2 Employment Projections

Employment		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Page 23 of 12/18 presentation	4,873[10]	2,400[11]
	Page 8 of 11/18 presentation	4,700	1,600

[3] Page 11 of the January 10, 2019 Memorandum
[4] See the section "Aircraft Technology, Selection and Fuel Economy", below, which discusses the extra fuel costs for flying a larger B777 series aircraft as a substitute for a more fuel efficient B787 series aircraft.
[5] This is provided on page 23 of the December 2018 presentation and is cumulative over the period ending in 2038.
[6] Page 30 of the November 2018 presentation. Impact to the airport is directly related to Load Factor. The baseline Load Factor results in a $26M negative impact, while it increases to $203M as the Load Factor goes to 95%
[7] ibid
[8] Page 23 of December 2018 presentation.
[9] ibid
[10] This is figure is net of the 27 aviation job losses. Page 11 of the January 10th, 2019 memo suggests a potential increase in employment of 4,700 and residences of 12,800 for Scenario 4.
[11] ibid

Incremental Commercial and Incremental Square Footage

Table 3, Incremental Commercial & Residential Square Footage, summarizes a combination of data from the November 2018 presentation, as well calculated data based on assumptions from that presentation and/or other data sources. As reference, the 2014 Diridon Station Area Plan approved by the City Council assumed a build out of 5.37M square feet of commercial industrial, retail and/or restaurant, along with 2,588 residential and 900 hotel rooms.[12]

How is it that the net additional square feet could more than double (5.37M to 13.97M square feet) without doubling the height of the buildings?

Table 3 Incremental Commercial & Residential Square Footage

Incremental Commercial & Residential Square Footage		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Net New Square Feet[13]	8,600,000 square feet	3,100,000
	Net New Commercial[14]	869,500 square feet	296,000
	Net New Residential[15]	7,730,500 square feet	2,804,000

Table 3 above provides the incremental square footage by apparently raising building heights. This raises several questions, including:

What is the baseline square footage that is assumed for the Diridon Station Area and for the Downtown area? Is it the same square footage (5.37M) as what is assumed in the 2014 Diridon Station Area Plan?

All the scenarios seem to assume that all the area/buildings are built to the maximum height. Is that a realistic assumption?

How much surface area (acres/square miles) is assumed for the Diridon Station Area and in the downtown area? Is it the 240-acres outlined in the 2014 Diridon Station Area Plan?

Did the analysis look at opportunities to be more efficient from a density standpoint? Ideas such as;

a. *Creating a car-free area in the Diridon area (e.g. putting cars at the edge, with personal and shared electric shuttles for last-mile transport).*
b. *Building above rails, freeway and roads, both to better utilize property, as well as to connect divided neighborhoods, while accruing other benefits such as the attenuation of transportation noise.*

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[12] See https://www.diridonsj.org/diridon-stationarea-plan
[13] Page 5 of the November 2018 presentation.
[14] Calculated based on the number of projected additional employees (4,700 for Scenario 4 or 1,600 for Scenario 10B as per page 8 of the November 2018 presentation) and assumes 1 employee per 185 square feet per page 33 of the November 2018 presentation.
[15] Calculated by subtracting the commercial space from the net new space.

Incremental Commercial & Residential Units

The number of net residential units in the Diridon Station Area would increase by 9,095 units in Scenario 4 and 3,299 for Scenario 10B, respectively. In both cases, these numbers are additive to and significantly larger than the estimated 2,588 residences that were assumed in the 2014 Diridon Station Area Plan[16].

Another implication in the assumptions is that these domiciles, on average, would not house families with children, as the number of residents per household is assumed to be 1.43, compared to the existing 2.4 to 2.9 residents per household in the 95126 and 95110 ZIP codes, respectively.[17] At 596 square feet per resident, the average dwelling size would be 850 square feet.[18]

Does the 596 square feet per resident, include "overhead" for things such as stairwells/elevators, common space, hallways, etc.?[19]

Multiplying the average construction cost per dwelling of $534.31 per square foot, yields a construction cost of $454k per dwelling.[20] As noted on page 33 of the November 2018 presentation, construction costs do not include land costs, so the price offered to the homeowner would have to be even higher than projected in Table 4, Incremental Commercial & Residential Units.

Do the construction costs include the various taxes (e.g. New Construction Residential Taxes) and fees or would those be additive to the total price?

Are there other costs that would have to be included to get to a market price?

The estimated housing cost, based solely on the cost of construction, will not be affordable for Low Income and, once other costs are factored, residents at Area Median Income levels.

An important question regarding affordability is what year is the $534.31 construction cost figure assumed?

Is the $534.31 per square foot construction cost measured in 2019 or 2038 dollars?

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[16] 2,588 being the potential number of units that could be developed as indicated in the 2014 Diridon Station Area Plan.
[17] City-data/census data for the 95126 and 95110 ZIP codes can be found at: http://www.city-data.com/zips/95126.html and http://www.city-data.com/zips/95110.html. As another point of reference, according to the City-Data.com site, the average California household size is 3.0.
[18] The 1.43 people per unit figure is consistent with the 1.51 people per unit that the typical downtown residential unit has according to SJ Economy http://sjeconomy.com/downtown-progress-report-mid-year-2018/
[19] If it does, then the effective living space per unit would be reduced by the amount of overhead.
[20] To see the calculations for this, please refer to the worksheet "New Commercial & DU Avg Cost" at https://sanjoseca-my.sharepoint.com/:x:/g/personal/airportcom1_sanjoseca_gov/EfVJmH19pM1PhOZBmLGjF4sBfz4KkgBQe6qI3Ul7ewk-_w?e=QgI3or

The footnote on page 33 of the November 2018 presentation suggests a 3% inflation rate is assumed for construction costs. If $534.51 is 2019 figure, then the cost of construction in 2038 would be $936.92. If the $534.31 figure refers to the cost of construction in 2038, then that translates into $304.71 per square foot in 2019 dollars.

Another concern about the construction costs per dwelling is whether the projects are even feasible. The April 20th 2018 *Report on the Cost of Development in San Jose* Memorandum suggested that projects in Downtown San Jose with similar assumptions and a construction cost of $622,000 per dwelling unit would be unlikely to be developed.[21] Granted, the $454k estimate is significantly lower than in that report, but it is important to know what assumptions are different between that report and this study to understand feasibility.

Table 4 Incremental Commercial & Residential Units

Incremental Commercial & Residential Units		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Additional Residents[22]	12,800	4,700
	Additional Number of Residential Units	9,095	3,299
	Number of Residents/Residence	1.43	
	Average Residential Size	850 square feet	
	Average Construction Cost of Residential Unit	$454k	

Incremental Valuation Based on Building Height Increases

Table 5, Incremental Valuation Based on Building Height Increases, provides the total valuations based on what was provided in the November 2018 presentation as the final numbers and then calculated based on the value per square feet and the projected amount of square feet. It is important to note that these numbers represent the ultimate build-out and assumes it would get there as "a straight-line increase in office and residential development based on historical absorption/delivery pace."[23]

Table 5 Incremental Valuation Based on Building Height Increases

Valuation		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Commercial Valuation[24]	$ 274,577,000	$ 134,709,600
	Residential Valuation[25]	$4,112,252,685	$1,410,658,660
	Total Valuation (calculated)	$4,386,829,685	$1,554,368,160
	Valuation[26] (11/18 presentation)	$4,380,000,000	$1,590,000,000

[21] Please see page 22 of the April 20th, 2018 memo from Kim Walesh and Rosalynn Hughey https://sanjoseca-my.sharepoint.com/:b:/g/personal/airportcom1_sanjoseca_gov/EfoOhN9ehO9BsxNj6jGDzGQBlO1TqYPQSJSzSoDt8NA9Cw?e=qhDaSL

[22] The calculated number of residents based on 596 rentable square feet per new resident is 12,971 and 4,705, respectively.

[23] Page 35 of the November 2018 presentation.

[24] Calculated based on $303.40 per square feet as assumed on page 33 of the November 2018 presentation. Note, doesn't count cost of land, but does assume $40,000 per parking space.

[25] Calculated based on $534.51 per square feet as assumed on page 33 of the November 2018 presentation. Note, does not include cost of land, but does include cost of parking spaces.

[26] These are the estimates provided on page 6 of the November 2018 presentation.

Tax Revenue

What is important is how the above valuations translates into revenue for the City. Rows 1 and 2 in Table 6, Annual Incremental Tax Revenues, represents numbers that were provided in the November 2018 presentation.[27] The third row assumes that the tax revenue given in the table on page 35 is additive year-to-year and increases as the Diridon Station Area is constructed. The final row bases the annual incremental taxes based on a 1% property tax and that the City receives 9% of that total. Of course, this assumes a completely built-out configuration which could be decades from now and does not include sales and other taxes.[28]

This raises several questions including:

Why the large discrepancies between the estimated annual tax revenues?

What is the baseline annual tax revenue that is expected (e.g. the original Diridon Station Area plan)?

Table 6 Annual Incremental Tax Revenues

Incremental Tax Revenues		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Based on Page 6 of Nov 2018 Presentation, [29]	$5,550,000	$2,020,000
	Based on Page 35 of Nov 2018 Presentation	$450,600 starting in year 15 & $450,600 in year 20	450,600 in year 15 dropping to $19,200 in Year 20
	Based on Page 35 of Nov 2018 Presentation, but cumulative	$450,600 starting in year 15 & $2,703,600 in year 20	450,600 starting in year 15 & $2,003,200 in year 20
	Based on Property Tax of Valuation	$3,942,000	$1,431,000

4. **Airport Service Markets Not Modeled**

The potential **negative Net Impact** on the airport could be much greater for Scenario 4, as hinted at on page 22 of the December 2018 presentation,

> **"Potential losses of airport service markets are not modeled."**

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[27] These calculations are in the Worksheets titled "Annual Taxes" and Annual Taxes Based on Construct" found here https://sanjoseca-my.sharepoint.com/:x:/g/personal/airportcom1_sanjoseca_gov/EfVJmH19pM1PhOZBmLGjF4sBfz4KkgBQe6qI3Ul7ewk-_w?e=plsCsI

[28] Based on March 2012 memo from the office of the mayor http://www.sanjoseca.gov/DocumentCenter/View/3162

[29] According to page 6 of the November 2018 presentation. Note, it doesn't indicate at what year these dollar amounts will be achieved. It also doesn't indicate whether these figures include the Local Sales Tax estimates provided on page 23, which estimates $110,000, $206,800 & $253,000 for years 2032, 2036 and 2038, respectively, for scenario 4 and $110,000, $206,800 & $226,800 for those years respectively, for scenario 10B.

The implication is that if an international airline does not see the Airport as sustainable, they will not provide service at the Airport.

If Scenario 4 (TERPS Only) is selected, the Airport may never capture the Asian Market because it may not be able to accommodate air service to China. Buildings will be too high in the Diridon Station area during south flow rendering the flights unsafe unless weight penalties are incurred.

According to a recent article in "*The Telegraph*" dated April 11, 2018, Oliver Smith, Digital Travel Editor, reports that in less than two decades, China has grown to be the world's most powerful market with 136.9 million overseas visits in 2016 and this number continues to increase according to The China Outbound Tourism Research Institute (COTRI). Chinese tourists overseas spent $261.1 billion dollars in 2016. **By 2030 1.8 billion people from China are predicted to travel, accounting for a quarter of international tourism**. Destinations include Thailand, Japan, South Korea, Singapore, the United States and Italy. This is a growing market the Airport will not be able to serve.

5. **<u>The Santa Clara County Airport Land Use Commission</u>**

The Santa Clara County Airport Land Use Commission was not made a partner in the Downtown Airspace and Development Capacity Study. The following description was copied from the Santa Clara County Airport Land Use Commission's website:

The Airport Land-Use Commission (ALUC) was established to provide for appropriate development of areas surrounding public airports in Santa Clara County. **It is intended to minimize the public's exposure to excessive noise and safety hazards, and to ensure that the approaches to airports are kept clear of structures that could pose an aviation safety hazard.**

The Airport Commission recommends involving the Santa Clara County Airport Land Use Commission in further discussions surrounding the Downtown Airspace and Development Capacity Study as this study may lead to land use decisions that will severely impact the Airport.

6. **<u>Commitments to Partners</u>**

In the Spring/Summer of 2019 the Airport will be asking current and future airlines to sign the revised AIRLINE-AIRPORT LEASE AND OPERATING AGREEMENT FOR NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT for a term of 10 years with two, five-year options.

Per Article 8 of this Agreement entitled Operation and Maintenance of the Airport, Section 8.02.2

> "City shall, to the extent it is legally able so to do, use reasonable efforts to keep the Airport and its aerial approaches free from ground obstruction for the safe and proper use thereof by Airline."

If Scenario 4 is selected this could be seen as a direct violation of the Agreement. In addition, the airlines may decide they cannot accept the restrictions provided under Scenario 4 and could decline to sign the Agreement.

The Airport has a robust capital program and considerable capital investments have been made to the Airport. Because of these investments, the Airport's runways can handle long-haul flights and aircraft for many international destinations. Terminal B and a new parking garage were built and improvements to roadways were made. These capital investments were made with the goal of creating a world class international airport. If Scenario 4 is selected, these investments could be underutilized, and future capital investments could be deemed unnecessary or scaled back.

Many projects at the Airport are funded with FAA Grants. As a condition of the FAA grant, Airport Sponsors must meet over 30 FAA Grant Assurances. FAA Assurance for Airport Sponsors dated March 2014 outlines the grant requirements. If Scenario 4 is selected it is possible that FAA Grants could be at risk. The text of FAA Assurance 21 is stated below:

> "FAA Assurance 21 Compatible Land Use. **It will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft.** In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which Federal funds have been expended."

7. **Aircraft Technology, Selection and Fuel Economy**

In the March 14, 2007 Obstacle Clearance Study conducted 12-years ago, Section #5.3 on Page #32 states:

> "While aircraft performance has improved over the years, further technology improvements may not solve this problem. Such aircraft performance improvements have enabled two-engine to serve markets previously served by only four-engine aircraft. Also, given increases in fuel prices, aircraft manufacturers are focusing on fuel efficiency rather than takeoff performance. The aircraft most affected by these OEI Issues are amount the newest aircraft (such as the Boeing 777, Airbus A320 and A330) as well as some of the oldest aircraft (such as the MD-80)."

The above statement was indeed prophetic, as it accurately predicted the aircraft in use today. The majority of overseas flights utilize newer more fuel-efficient aircraft, sacrificing added takeoff performance for lower operating cost. Opening new or operating existing overseas markets require that airlines be nimble and cost efficient with the equipment they purchase, as well as realistically predict the number of passengers and cargo they will fly. In the past year, international flights from the Airport have utilized primarily the B787-8/9 Dreamliner and the A330-200.

An underlying assumption being made is that these international carriers can simply bring in larger aircraft such as the B777-300 series to meet new OEI requirements, if Scenario #4 is chosen by the City. This assumption is not realistic. Currently no Boeing 777's fly out of San Jose, and if there were sufficient bookings of passengers, bringing existing flights to an over capacity situation, the airlines would have already committed those resources.

Cost Estimate Example: For an airline to move from a B787-900 ($281.5M) to a B777-300ER ($361.5M) there is an $80M increase in equipment costs. Due to the stage length of China and further Asian routes from SJC, each single daily operation **requires two aircraft and the additional equipment cost of $160M.** A B777 uses approximately **735 ADDITIONAL** gallons of fuel **per hour**. A 10-hour flight would cost approximately an additional $38,000 per trip. If the carrier operated five days per week (round trip), the airline could have roughly **$1.5 Million dollars PER MONTH** in additional fuel expense for that route. Looking at current and historic passenger loads, it is unrealistic to believe international air routes would be economically feasible, if they had to utilize larger equipment in order to fly out of the Airport.[30]

8. **Customer Inconvenience**

The selection of Scenario 4 (TERPS Only) does not consider the severe inconvenience to customers who utilize the Airport and the potential for increased noise in the Downtown and Diridon Station areas. To reduce weight an airline may reduce the amount of fuel, eliminate cargo and/or remove passengers. If passengers are removed from a flight the general feeling is passengers are made whole by the airlines if they are compensated with a meal voucher and a hotel room. This treatment of the Airport's passengers is unacceptable and a total disregard to the traveling public. Additionally, there will be an increase in noise from Scenario 4 to residents and commercial interests in the Downtown and Diridon Station areas.

9. **Legal Ramifications**

Before any changes are made to existing air space configurations, the Airport Commission is interested in the potential legal ramifications of making any change to existing airspace protections.

SUMMARY

The Airport Commission acknowledges two of the City of San Jose's top economic priorities are the continued development of Downtown and growth in air service at the Airport. The Airport Commission believes a compromise is necessary to satisfy these two important priorities.

Scenario 10B allows the Airport to preserve the classification of a medium-hub airport, providing domestic origin-destination service with increasing levels of international air service.

Scenario 10B eliminates the need to explore the feasibility of establishing a "Community Air Service Fund" as identified in Scenario 4 as a financial solution to subsidize airlines penalized when they cannot operate at full weight capacity out of the Airport during some south-flow operations.

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[30] See Fuel Expense Worksheet at https://sanjoseca-my.sharepoint.com/:x:/g/personal/airportcom1_sanjoseca_gov/EfVJmH19pM1PhOZBmLGjF4sB-jqRMcbqM43ZVLHByPzSgA?e=NonNYL

The Airport Commission urges City Council to fully consider the negative impacts to the Airport if Scenario 4 (No OEI) is selected as the preferred option. If the Airport's airspace is not protected, long-haul flights such as transcontinental, transoceanic, and other international service will negatively impact or possibly prevent flights to Europe and Asia and constrain nonstop flights to the East coast and Hawaii. Scenario 4, if implemented will serve as a significant disincentive for airlines to start new airline service or continue some existing service.

The Airport Commission recommends **Scenario 10B,** as this option provides a reasonable compromise protecting the downtown airspace and maintaining airline safety procedures for aircraft departures. This compromise directly benefits the Airport while allowing for increased development capacity in the Diridon Station area. **Scenario 10B** also allows the airport to retain and continue to attract air service while allowing for safe increase in building heights and supports development and provides reasonable economic benefits desired by the City of San Jose.

Attachment A – January 10, 2019 Memorandum to the Airport Commission Downtown Airspace and Development Capacity Study Report Findings and Recommendations from John Aitken, A.A.E.

AIRPORT COMMISSION AGENDA:

01/14/19

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: AIRPORT COMMISSION

FROM: John Aitken, A.A.E.

SUBJECT: DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY REPORT FINDINGS AND **RECOMMENDATIONS**

DATE: January 10, 2019

RECOMMENDATION

Recommend to the City Council approval of:

1. Acceptance of a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) Terminal Instrument Procedures (TERPS) surfaces to determine maximum building heights in the Downtown Core and Diridon Station.
2. Direction to the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Fund" to financially mitigate any adverse air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.
3. Direction to the Administration to consider potential refinements to the development review process for projects subject to a FAA TERPS airspace determination including:
    a. Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.
    b. Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other

accessory structure.

c. Require that a construction survey prepared by a licensed civil engineer be submitted by applicants to the FAA upon completion of the high-point of the structure and accessory extensions thereof, prior to City issuance of an occupancy certification.

   d. Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.
   e. Develop a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.
4. Direction to the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

OUTCOME

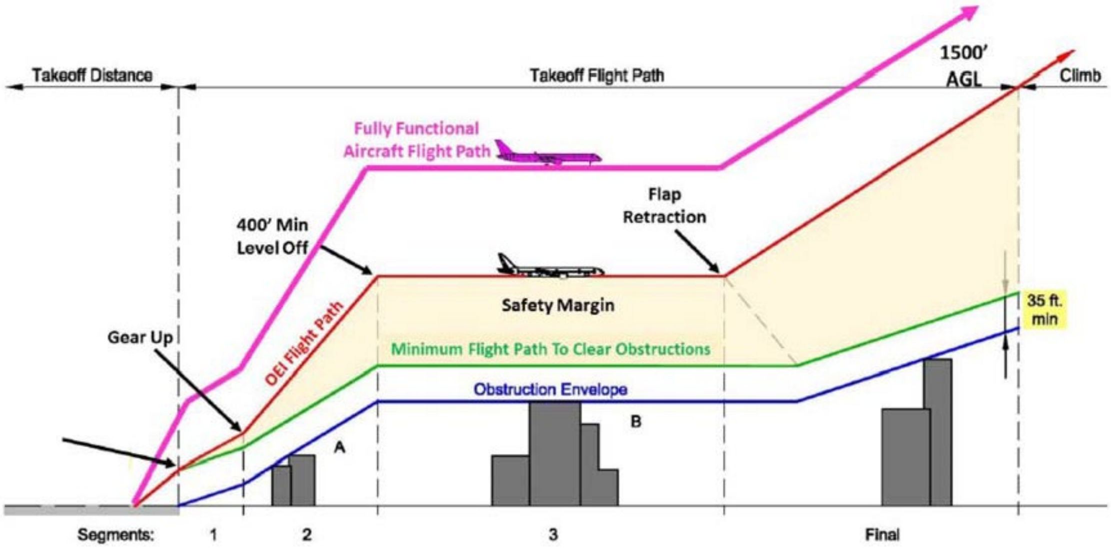
City Council approval of the above recommendations would allow for maximum safe development heights and associated economic benefits in the Downtown and Diridon Station areas.

BACKGROUND

Two of the City's primary economic priorities are the continued development of Downtown and growth in air service at Mineta San Jose International Airport (Airport). The Airport and Downtown are within two miles of each other and the primary aircraft approach and departure paths for the Airport are directly over Downtown, which places limitations on Downtown building heights.

The Federal Aviation Administration (FAA) protects airspace around airports through the application of Federal Aviation Regulations (FAR) Part 77 and Terminal Instrument Procedures (TERPS). These regulations define various airspace "surfaces" or slopes which radiate out from an airport's runway and mandate FAA review of any proposed structure which exceeds one or more of these surfaces. In San Jose, as in most local land use jurisdictions, proposed structures subject to FAA review are typically required to obtain a "determination of no hazard" clearance from the FAA prior to, or as a condition of, City development permit approval.

While FAA applies Part 77 and TERPS to safely operate the airspace around an airport, it does not consider airline emergency procedures as part of the review. Under Part 25 of the Federal Aviation Regulations, airlines are required to have emergency flight procedures in place for every departure in the event of an engine power loss during take-off. These emergency flight procedures are known as "one-engine inoperative (OEI)" procedures and are designed so that an aircraft can gain sufficient altitude immediately upon takeoff even if an engine loses power, follow a prescribed flight path over any obstacles and surrounding terrain, and safely circle back to the airport for an emergency landing. Each airline develops its own OEI procedures based on guidelines set forth by the FAA and the International Civil Aviation Organization (ICAO). The diagram below illustrates the requirements in these guidelines.



Protecting for OEI emergency procedures can limit maximum building heights around an airport more severely that the FAA evaluations conducted under FAR Part 77 and TERPs. The FAA believes that airlines can mitigate OEI airspace obstructions by revising their emergency procedures or by reducing takeoff weight to improve climb performance to safely clear obstructions. However, implementing takeoff weight restrictions by reducing passengers, cargo, or fuel can impact the economic viability of airline service. Even small weight penalties can affect the feasibility of airline service to a destination, most notably transcontinental and transoceanic destinations typically serviced by large, heavy aircraft. Therefore, obstructions within the surrounding airspace can be a factor in an airport's ability to attract or retain desired air service.

The City's 2007 Airport Obstruction Study mapped out airline OEI protection surfaces and associated building elevation limits around the Airport (note: aircraft depart to the south under certain weather conditions that occur approximately 13% of the time annually). The 2007 study identified two OEI corridors used by the airlines: one over the Downtown core (east of Highway 87 and referred to as the straight out corridor) and one over the Diridon area (west of Highway 87 and referred to the west corridor). Airlines determine which corridor they will use – straight out or west corridor– depending on the aircraft being flown, the aircraft's destination, and the airline's pilot training program. Those airlines using the west corridor in their OEI procedures do so to avoid the existing high-rise buildings in the Downtown core. Since the OEI west corridor requires a shallower aircraft climb rate due to the turning maneuver, OEI building height limits in the Diridon area are more restrictive that in the Downtown core. Toward the southern end of Downtown, the FAA TERPS surfaces become more restrictive than the OEI procedure surfaces.

Beginning in 2007, the Administration has successfully implemented an informal OEI protection practice through the development review process by attempting to limit proposed maximum building heights to the elevations mapped out in the study. To date, with developer cooperation, all approved high-rise building projects in the Downtown core and Diridon area have been consistent with the OEI surfaces.

In June 2017, City Council directed staff to update the 2007 study and include an economic analysis to identify the trade-offs between maintaining OEI protection surfaces and potential increased building heights under a no-OEI protection or alternative policy. Pursuant to that direction, the Office of Economic Development and the Airport Department have conducted the Downtown Airspace and Development Capacity Study. Landrum & Brown, a national aviation planning/engineering consultant with extensive experience working for the City on OEI and other airport technical issues, was contracted to perform the technical work on the study, with assistance from the economic analysis firm of Jones, Lang, & LaSalle. A project Steering Committee, comprised of the downtown stakeholder representatives including the San Jose Downtown Association, SPUR, Silicon Valley Organization, Silicon Valley Leadership Group, Santa Clara & San Benito Counties Building and Construction Trades Council, and Airport Commission was convened to provide review and input on the technical analysis and resulting strategy. City staff participation on the Steering Committee included representatives from the Mayor's Office, Councilmember Peralez's Office, Planning, Building and Code Enforcement Department, Office of Economic Development, and the Airport Department. The project Steering Committee met eight (8) times over the course of the study to review extensive technical materials and provide input and comments during the study process.

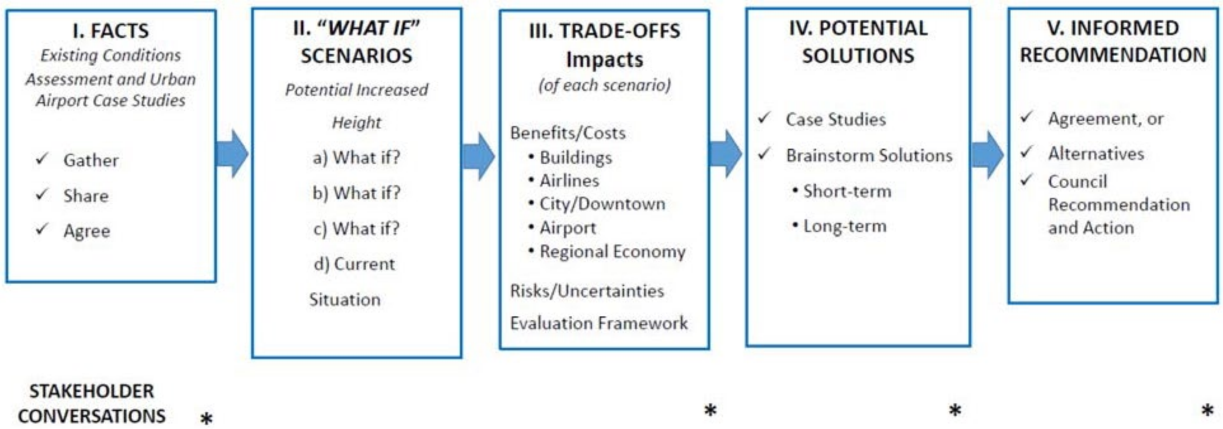
Separately, in addition to the project Steering Committee, three broader downtown stakeholder information meetings were held during the study, once at the initial launch of the study, once to report on study progress and initial findings, and once to present a proposed strategy. The stakeholder meetings were well attended and served as opportunities for the development community to ask questions and provide input into the study.

ANALYSIS

The Downtown Airspace and Development Capacity Study consisted of three major tasks:

- Task 1 Existing Condition Assessment
- Task 2 OEI Feasibility Studies and Impact
- Task 3 Economic Analysis

The technical scope was augmented by the following collaborative framework developed with the project Steering Committee:



Task 1:

The technical consultant evaluated and updated the City's Downtown and Diridon Station area obstruction data, existing airline OEI procedures, critical aircraft for SJC current and anticipated air service, and the FAA's 30+ TERPS arrival, departure, and circling procedures to the south of the Airport.

In addition, a weather analysis over the last 15 years was completed, which confirmed that the Airport in south flow operations (departures to the south) an average of 13% of the time on an annual basis, most likely to occur during winter months and morning hours. All-day southflow operations occurred an average of 17 days annually.

Task 2:

Ten conceptual airspace protection "scenarios" were formulated to test various alternative combinations of OEI and FAA/TERPS airspace surface protections on maximum building heights. With input from the project Steering Committee, four of the ten scenarios were selected for detailed analysis:

- Scenario 4: No OEI protection (FAA/TERPS only)
- Scenario 7: Straight-out OEI protection with no OEI west corridor protection
- Scenario 9: No OEI protection plus potential elevation increase to some FAA/TERPS procedures
- Scenario 10 (A–D): Straight-out OEI protection with four alternative OEI west corridor surface protections

The following table displays the range of increased maximum building heights for each scenario compared to OEI protection conditions:

Scenario	Additional Height Downtown Core	Additional Height Diridon Area
No OEI (Scenario 4)	5' - 35'	70’ to 150’
Straight-out OEI protection with no OEI west corridor (Scenario 7)	0'	70'-150'
No OEI protection plus increased FAA/TERPS surfaces (Scenario 9)	35'-100'	80'-220'
Straight-out OEI projection with alternative west corridor protection (Scenario 10)		
Option A	0'	15'-25'
Option B	0'	30'-55'
Option C	0'	45'-85'
Option D	0'	65'-115'

After determining the potential building height increases in the study areas, a technical analysis was then conducted to assess the aircraft performance impact (weight penalties) under each scenario using various combinations of aircraft types, destinations, and seasonal temperatures. The following set of charts illustrates the ability of specific aircraft to serve selected existing non-stop markets in the summer and winter months.

After much discussion with the project Steering Committee, Scenario 4 was selected as the most promising option to the an OEI protection policy. Scenario 4 demonstrates that the transcontinental market (represented by New York), Europe markets (represented by Frankfurt), and Hawaiian markets (represented by Honolulu) would have minimal weight penalties, if any. The Asian market (represented by Beijing) would have passenger and/or cargo penalties under south flow conditions (13% of annual operations). The Steering Committee discussed the possibility of creating a “Community Fund” that could compensate an airline for OEI-related weight penalties when incurred. The City itself is prohibited by federal regulations from using Airport funds to fund such Community Fund, but other airport proprietors have offered a similar air service fund by a separate agency, such as a Chamber of Commerce.

Transcontinental – New York Market – Assessment of Potential Weight Penalties

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Hawaii – Honolulu Market – Assessment of Potential Weight Penalties

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Europe - Frankfurt Market - Assessment of Potential Weight Penalties

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	21,580	-	4,400
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	15,338	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	10,000	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	9,349	-	-
	Opt 10C: 129' - 240' AGL	-	14,096	-	-
	Opt 10D: 146' - 260' AGL	-	19,282	-	2,027
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	29	26,198	-	11,735

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	2	22,911	-	7,811
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	16,407	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,217	-	-
	Opt 10B: 115' - 224' AGL	-	9,353	-	-
	Opt 10C: 129' - 240' AGL	-	14,270	-	-
	Opt 10D: 146' - 260' AGL	-	19,612	-	3,876
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	41	23,514	-	15,397

Asia – Beijing Market - Assessment of Potential Weight Penalties

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

The airline service analysis conducted for the selected existing destinations, as illustrated above, was expanded to consider potential SJC markets that could be served in the future. For domestic markets, Boston, Miami, and Anchorage were analyzed, and the charts below show that 737-800 service to these destinations would not sustain any significate weight penalty under Scenario 4.

Additional Domestic Markets - Assessment of Potential Weight Penalties

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-

Boston - BOS Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-

Miami - MIA Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

For international air service markets, Rio de Janeiro (6,575 miles), Taipei (6,499 miles), Hong Kong (6,957 miles), Delhi (7,731 miles), and Dubai (8,120 miles) were analyzed, using aircraft typical on such international routes. The analysis indicated that the maximum route distance that could possibly be served from SJC under Scenario 4 is approximately 6,500 miles, as illustrated in the charts below.

Long Range Markets Stress Test - Assessment of Potential Weight Penalties

Rio de Janeiro - GIG **Summer (81.3° F)** 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144

Taipei - TPE **Summer (81.3° F)** 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							89	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	

Hong Kong - HKG **Summer (81.3° F)** 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	

Delhi - DEL **Summer (81.3° F)** 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor							103	
TERPS Only	55	5,014	77	3,132	72	106	184	

Dubai - DXB **Summer (81.3° F)** 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor							107	
TERPS Only	65	3,537	79	2,688	72	1,828	191	

* Existing Straight Out OEI Corridor calculations uses different cargo capacity numbers than the West OEI and TERPS Only.

As a reality check for the technical analysis described above, the study consultant also reached out to all the airlines serving SJC to request their independent analysis of how each of the four scenarios would impact their current and future air service markets at SJC during south flow conditions. Out of 18 airlines, 13 airlines responded, highlighted as follows for Scenario 4:

- Alaska, American, Aeromexico, Delta, Southwest, and Volaris reported no weight penalties to any of its destinations below a temperature of 92º F.
- Hawaiian and United reported only minor cargo penalties, and potentially minor passenger penalties and larger cargo penalties depending on specific destination and aircraft.
- Federal Express reported no significant cargo penalties.
- British Airways reported no weight penalty impacts on its London service.
- ANA reported minor cargo penalty impacts and no passenger penalties for its Tokyo service.
- Hainan reported the most significant impacts for its Beijing service, resulting in a significant reduction in cargo and passenger payload (up to 50+ passengers forB787-900).

Overall, these airline responses are consistent with the consultant's technical analysis.

<u>Task 3</u>

The economic impacts to the Downtown Core, Diridon Station area, airlines, and SJC were calculated based on the net new development that may be able to occur between OEI-restricted heights and the current FAA/TERPS surface heights. For the Downtown Core area, the findings indicate that there is already significant density available under the OEI height limits, so setting allowable heights up to the FAA/TERPS limits would not have a significant aggregate beneficial impact for a long period of time, although certain specific development sites might experience small gains.

The most significant net new economic gains from no OEI protection are expected to occur in the Diridon Station area. Development capacity in this area under Scenario 4 is estimated at a net building addition of 8.6 million square feet, resulting in net new construction value and taxes of $4.4 million and $5.5 million, respectively. In addition, there would be net increases in new employees (4,700) and new residents (12,800) as well as one-time fees collected for building, development, park impact, and school district purposes.

The economic impacts for SJC and the airlines was studied for the year 2024, the estimated time that impacts would occur as new development is built. In 2024, Scenario 4 would result in potential airline losses of $802,000 in seat revenue and compensation to passengers as compared to a scenario where building heights were limited to the OEI surfaces. These losses could grow to slightly over $1.2 million in 2032 and to $1.5 million by 2038 as the market, costs, and load factors increase over time. The potential establishment of an ongoing Community Fund by 2024, and a funding mechanism to support ongoing international air service, particularly to Asia, could serve to offset these airline economic losses.

The economic impacts over time to the Airport Enterprise Fund would be minimal, consisting mainly of lost PFC revenue and terminal concession spending. The aviation-related impacts are significantly outweighed by the Downtown Core and Diridon Station area real estate impacts with continuing increases in construction and other local taxes throughout the years.

Summary

The Downtown Airspace and Development Capacity Study analysis was one of the most extensive studies that the City has conducted on how the Airport and the Downtown Core and Diridon area can all thrive as economic drivers of the greater community. With the dedicated involvement of the project Steering Committee, staff is recommending that the City move forward with the study's Scenario 4 and allow development height to be governed by FAA TERPS surfaces.
However, to protect the viability of current and future international air service markets, particularly to Asia, staff also recommends that Council approval of Scenario 4 be accompanied by efforts to work with the development community to establish a Community Air Service Support Fund to mitigate the occasional airline economic penalties during south flow conditions and to support retention and expansion of transoceanic airline service.

In addition, it is recommended that the Council actions include direction to the Administration to implement refinements to the development review process for projects subject to the FAA TERPS surface elevations, and implement a construction crane policy that addresses the prolonged usage of very tall construction cranes that airlines must account for in their departure weight calculations.

Questions Regarding the 2018 OEI Study

1. What is the difference between the 2007 OEI study and today?
    a. How do these FAQs change based on current information?
    b. How can the use of lower temperatures in the study be justified, given that the City of San Jose is planning on rising temperatures? See https://winchesterurbanvillage.wordpress.com/2019/02/19/why-are-the-temperatures-assumptions-lower-in-2018-than-2007/
2. What do we want SJC to be when we grow up?
    a. A regional or transcontinental/international airport?
    b. What is the financial impact in terms of bond repayments if we revert to a regional airport?
    c. How should the Airport Master Plan be adapted if we choose to be a regional airport?
3. Will the airport take the full negative financial impact with the construction of the first building that reaches past OEI?
    a. If so, what guarantee is there that enough buildings will be built to ensure an overall positive economic impact?
    b. How does the City reconcile that some will benefit from these new air rights, while others will not?
4. What, if any legal ramifications are there for each of the Scenarios? This does not seem to be addressed in the "report".
    a. Noise considerations (this has been brought up by Cupertino noise group)
    b. Air rights?
    c. Process?
    d. Not having Airlines or Airline pilots on the Steering Committee?
    e. Having at least one Committee members that were predisposed to an answer (see this January 11th 2018 article)
5. Has the thrust/lift technology improved in airplanes since the 2007 OEI report?
    a. 787 versus B777 for example?
    b. What is the trend in airplane design - efficiency or power?
6. Did the Steering Committee look at:
    a. Alternative Density conditions (e.g. reduced parking, streets - more horizontal)? From the evidence, it looks like regular planning rules were used (see page 20 of this document, where it suggests Envision 2040 Land-use designations were assumed. Why weren't solutions, such as car-free city centers (such as Oslo, Norway) considered in the modeling?
    b. Runway extensions? Only one slide was given on this topic in May of last year and was not directly presented to the Airport Commission. Would extending over De La Cruz make sense, as depicted here?

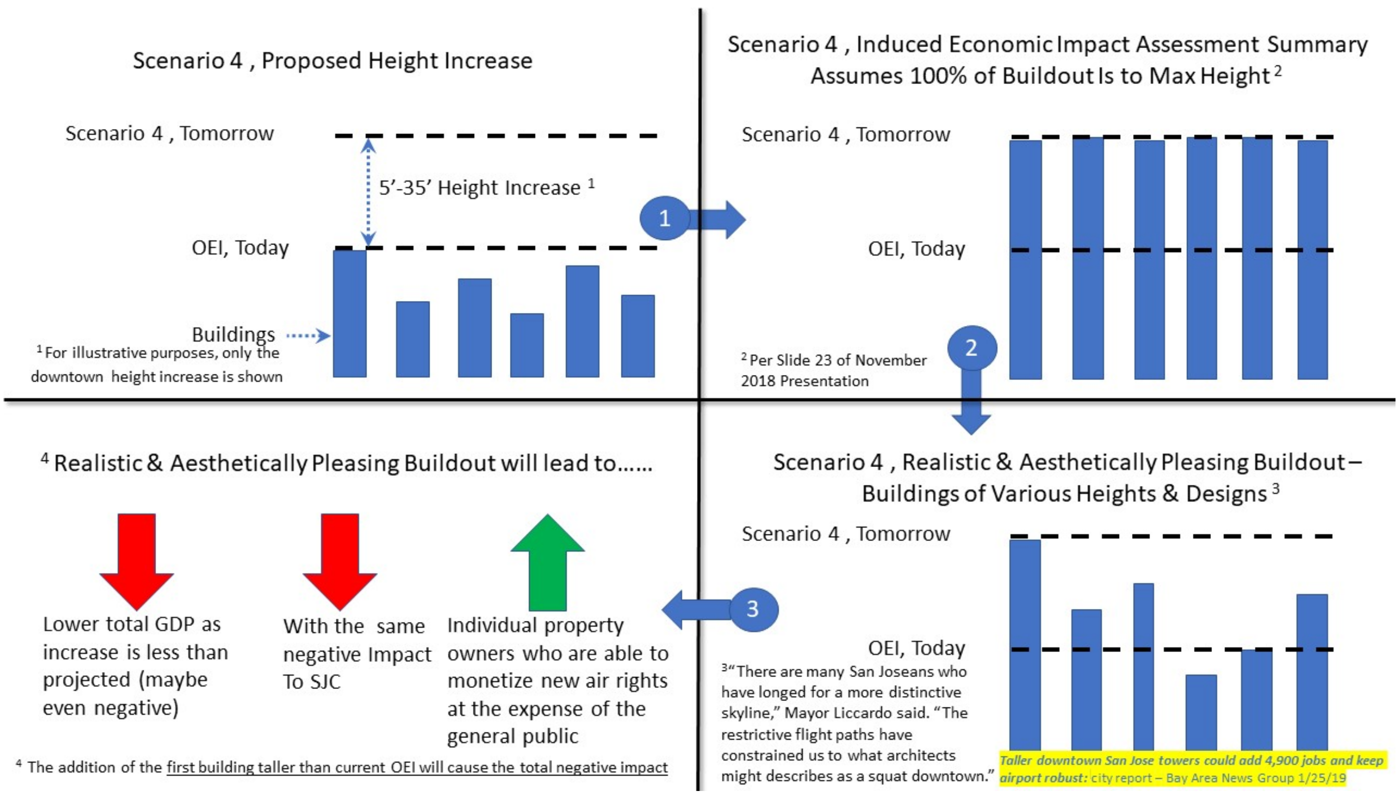
    c. Moving the airport, say to Moffet Field? (approx 1.3 square miles of airport land, not counting Guadalupe Gardens), which is about 832 acres. At $10M/acre (Google's payment to SJ for a plot of land), this would be **8.32B of value**. I am not suggesting that this is feasible, but one would think that a more than $1M study (when staff time is considered) would address this possibility!
7. Why was Google provided information a full two months before the Council-appointed, Airport Commission?
    a. Why was the Airport Commission given only 96 hours to study the material before voting?
    b. Why wasn't the Airport Commission given all the material?
    c. Why wasn't it provided as a report, instead of disparate materials?
8. Why didn't the Committee include representatives from:
    a. The Air Line Pilots Association?
    b. The Airlines?
    c. The Santa Clara County Airport Land-Use Commission?

OEI Study Conclusions:

In a nutshell, the decision that the council is being asked to make (Scenario 4) is whether SJC will be a transoceanic, international airport or a medium, mostly North American, hub airport.   The Airport's passengers will be forced to utilize Oakland and San Francisco Airports to get to certain destinations.

If Scenario 4 is chosen, then there are also huge implications to the Airport Master Plan (which is currently being revised and is in the EIR process), such as how are the proposed expansion plans affected. The final Downtown Airspace and Development Capacity Study Report should be part of an iterative process that includes feedback from the placemaking for the Diridon Station Area, as well as the lease negotiations with airlines and should also inform the preparation of the EIR for the Amendment to the Mineta San Jose International Airport Master Plan

And the economic benefits may not be as great as projected, as the negative impact begins with the first building. The modeling assumes a maximum buildout, although the realistic build-out is expected to feature varying heights, as depicted below.



For more details, please see the recommendation approved by the Airport Commission at its 01/24/19 meeting.

All the documentation from the 2018 OEI study process that has been shared is in this folder.

https://drive.google.com/drive/folders/1ixEPcTR2II4Kj5ei8ic2IBrCYpLLSWS9?usp=sharing

Inconclusive Data, Process Concerns and Questions

1. The Steering Committee did not contain
    a. any airlines, pilots or individuals with practical operational experience flying into or out of the Airport, **even though it was implied that these experts would be included per the budget memo request for the study** (page 1 of the memo) dated 6-12-17
    b. nor did it include a **representative from the County of Santa Clara Airport Land Use Commission** which was established under Article 3.5 Airport Land Use Commission Section 21670 Creation; Membership; Selection of California Public Utilities Code.
2. Mid-Year Action February 12, 2018: Allocate Airport Funds for timely completion of 'worstcase' ,'exhaust all options' full Project Scope of Work (additional $417,000; expect $100,000 Google reimbursement [**Added 2/15/19** - *per the 2/11/19 Airport Commission Meeting, the city decided not to except a reimbursement. Also, in that same meeting it was mentioned that the total contract was for $940,000*].[1] **It also mentions that there was coordination with Google's** *OEI consultant. Who is that person/company and what role did they play?*
3. *What will be the impact of climate change on south flow operations and OEI?* The average summer temperature used was 81.3 degrees versus 88 degrees in the 2007 report, which seems counterintuitive based on what is being reported about the potential impact of climate change on airports.
4. The **Downtown Airspace and Development Capacity Study is incomplete**. There is no detailed information for Scenarios 7, 10A, 10B, 10C or 10D or 11. Only Scenarios 4 and 9 were fully analyzed.
    a. **Before deciding on a path forward**, an analysis should be made for each scenario as to how it would affect current and future air service at the Airport.
    b. **Potential loss of airport service is not modeled in the study for domestic and international markets.**
        i. It was also mentioned that International travel only represents 2% of volume in 2018. The Master Plan projects SJC growing to 22.5 million by 2037 from 12.5 million in 2017. *How are we going to get to 22 million passengers, in terms of domestic versus international growth?*
        ii. Will the change to Scenario 4 affect the projections that underlie the Master Plan?
    c. **Scenario 11, extending the runway north, is presented on slide 14 of the May 10th presentation, but no analysis and no other mentions.**
5. *What is the net economic impact for each of the scenarios (including potential tax revenue gains minus airport losses)?* The numbers just don't add up.

[1] Presumably the $940,000 contract does not include staff time dedicated to the process.

Table 1 Total Economic Impact Summary (2038)

Total Economic Impact Summary (2038) Gain/Loss[5]		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Aviation Impact	-$26M to – $203M[6]	$0[7]
	Real Estate Impact	$747M[8]	$438M[9]
	Net Impact	**$544M - $721M**	**$438M**

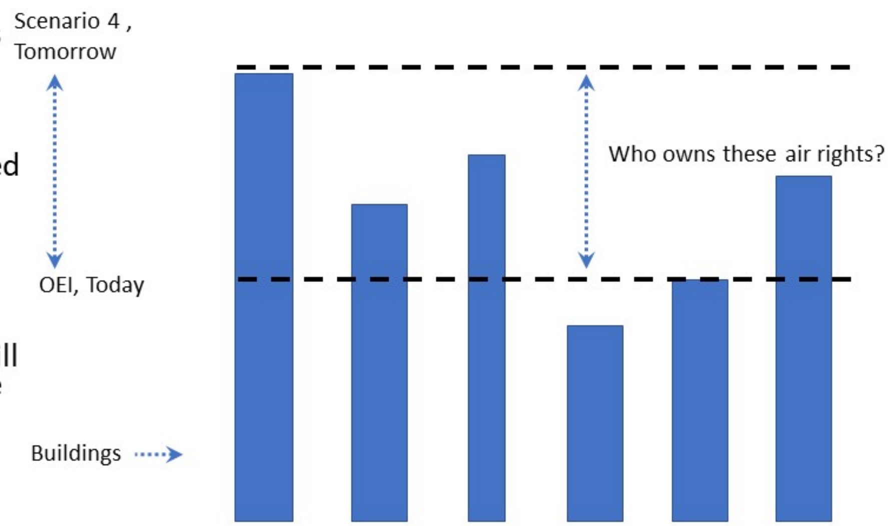
6. **Adobe's building, which is higher than it should be, cost American Airlines $1M alone for its flight to Tokyo-Narita according to page 2 of this 2006 memo.** This is greater than the suggested Community Fund requirement of 804k in 2024.
7. From page 10 of the November 2018 presentation it appears that the same density was used as today (e.g. same parking, FAR requirements), "Test case height limits established by airspace protection scenarios, though no denser than limits established by the General Plan (3-30 stories and 30 FAR for Downtown." Even though Director Aitken suggested so in the 1/14/18 meeting**, the analysis DID NOT look at opportunities to be more efficient from a density standpoint**; ideas such as;
    a. Creating a car-free area in the Diridon area (e.g. putting cars at the edge, with personal and shared electric shuttles for last-mile transport).
    b. Building above rails, freeway and roads, both to better utilize property, as well as to connect divided neighborhoods, while accruing other benefits such as the attenuation of transportation noise.
8. With the assumed number of residents per household at 1.43, compared to the existing 2.4 to 2.9 residents per household in the 95126 and 95110 ZIP codes, respectively*, where are the families going to live?* ***The implication is that the models probably mean displacement of existing families.***
9. *Per slide 34 of the Nov 2018 presentation, the modeled park fees are $14,600. Should these be $11,300, since it is in the Downtown Core Area Incentive area for 12+ story buildings?*
10. *How will Scenario impact SJC's ability to sign long-term leases with our Airline partners?*
11. *Do the proposed changes meet our more than 30 FAA Grant Assurances to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft?*
12. *Whatever happened to the FAA Rulemaking where they were studying incorporating OEI into their review process (page 2 of the memo)?* They were studying 5 cities and there was going to be an eventual NPRM (which was opened in 2014 & still appears to be open*). Could a potential FAA rulemaking overrule whatever the City of San Jose decides?*
13. *How will this rule impact the SJC passengers?*
14. *What will be the impact of noise on the residents of taller buildings?*
15. *What are the potential legal ramifications of making any change to existing airspace protections?*
    a. *From a noise perspective?*
    b. *From an airline's perspective?*

c. *Who owns the air rights above OEI and what are the implications of transferring them to private developers?*

Air Rights Ownership Questions

Questions

1. Who currently owns the air rights above today's OEI limits? Is it a public entity?
2. If it is the public, then how are those rights valued and transferred to the property owner, if restrictions are changed?
3. Not all property owners in the affected area will be able to build beyond current OEI (e.g. older buildings, etc.), so the benefits will inure to new developments & the aggregate benefit to the city may not be as great as modeled. How does the city guarantee enough buildings are built to ensure a positive return?



* Page 3-3 of this document https://www.sanjoseca.gov/DocumentCenter/View/1616 seems to imply that the city owns the air right easement, "the City of San José holds an (n)avigation easement over a portion of the Station Area which sets forth specific height limitations that generally correspond with, or are slightly more restrictive than, current FAA criteria."

2

Ken Pyle, The Winchester Urban Village

Why the Rush to Adopt Scenario 4?

Jan 29, 2019 Airline Leases, Airport, Diridon Station Area, Downtown San Jose, FAA

[Note: This author appreciates the efforts and insight of airport staff, committee members, and airport commissioners in studying various One Engine Inoperative (OEI) scenarios. These were the comments intended to be said at the January 28, 2019, CED meeting, but not well articulated once in front of the microphone. To some extent, the following represents some of the highlights of the 4/24/19 memo approved by the Airport Commission. Please refer to that memo for more detail]

The City of San Jose Councilmembers are about to address what might be the most important land-use/airport-use decision they will ever make; a decision that will have ramifications for generations to come. To be clear, if the recommended option, *So, why the rush to change building downtown and Diridon Station Area (DSA) heights, given there are no developments requesting the added height and that the community vision process for DSA has not yet begun?*

As we look at how we can achieve greater building heights and continued airport growth, we should be looking holistically at how to maximize the public value from seemingly disparate activities of Diridon Station Area placemaking, the EIR for the Airport Master Plan and the ongoing Airline Lease negotiations. The outcome of the process will have an impact that lasts for generations; well beyond the 2038 projections given in the November 2018 presentation.

The OEI study and other related activities that are about to occur.

2

2018 vote.

First and foremost, the information provided to the Airport Commission in preparation for the January 14th meeting represents an incohesive and, incomplete report (e.g. data was spread over multiple presentations from different points in time) and there were many data points that don't tie together; especially as it relates to potential economic value. Simply, the information has not been well communicated.[1]

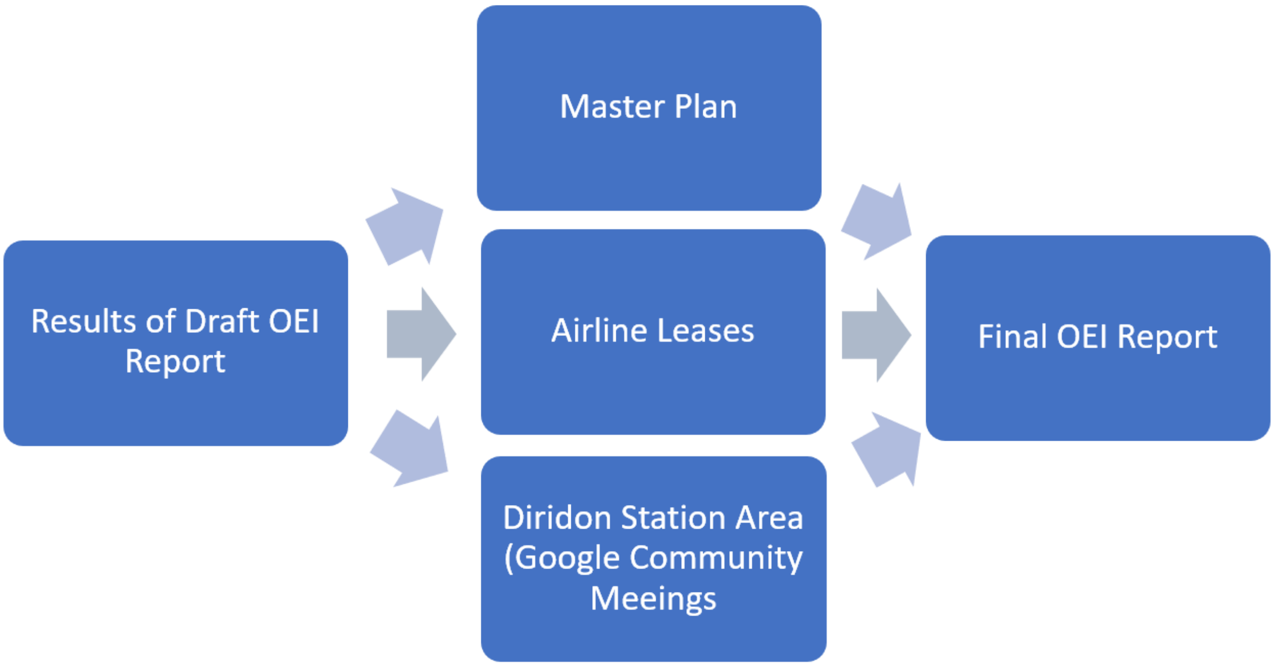
The process seems rushed in the sense that there are several factors (Airport Master Plan, Airline Lease Negotiations and Diridon Station Area Community Meetings) that could affect the modeled scenarios. As an example of an assumption that could easily change, after the upcoming community meetings (aka the Google Village meetings), is the number of residences per home.

The model assumes 1.43 residents per dwelling, which is fewer than the 2.4 and 2.9 people per home that currently reside in the 95126 and 95110 ZIP codes, respectively. The implication is what has been modeled would not be a place for families and could be an indicator of displacement of existing families.

Similarly, it seems like we are missing an opportunity to integrate the airport into the larger urban fabric, as is being done by leading international airports that have a strategic vision that maximizes the value of the real estate for the airport and community. Max Hirsh (PhD, Harvard), a professor at the University of Hong Kong, suggests airports can be part of the larger community and can diversify their income at the same time.

> "If you superimposed the average airport over a map of the city that it serves, you'd find that it's about the same size as the entire downtown core.…The world's leading airports view these real estate holdings as a critical source of non-aeronautical revenue. They've transformed that land into a variety of profitable commercial developments, including hotels, office parks, and shopping centers. Still, others have built concert arenas, university campuses and tourist attractions."

to a process where the OEI study would be influenced by factors that have yet to be determined is depicted below.



An improved OEI process that incorporates related activities

The results of the draft report would inform the Airport Master Plan (e.g. impact on passenger growth, land-use decisions, etc.) the current lease negotiations and the upcoming Diridon Station Area community meetings.

Front loading the planning process like this would add time in the beginning because it would involve more stakeholders and provide the opportunity to test assumptions prior to committing to a long-term change. In the long-term, this would probably save time, as all the stakeholders would have an opportunity to participate in the process.

I voted for Scenario 10b because it was the best option, given the data we were provided. But, if we keep refining our assumptions, as described above, an even better scenario, that creates a greater net public good, could appear. Stay tuned to this blog for another idea that this author doesn't believe has been fully studied, as it didn't appear as a scenario in the materials provided by the Airport.

reminded the author of the root cause of the Challenger accident of poor communication between the engineers and management. To quote from an author who analyzed the communications breakdown that led to that tragic event, "The main problem here is that those engineers did not clearly explain the effects so management thought it was no big deal and they passed it."

[Note: Although he is an SJC Airport Commissioner representing District 1, the views expressed here are the author's own.]

Edit Share 2 Comments Like

MORE IN THE WINCHESTER URBAN VILLAGE

Who Will Benefit the Most from Raising OEI Limits?

At the 02/11/19 Airport Commission meeting, this author raised the question of whether

Why are the Temperature Assumptions Lower in 2018 than 2007?

A recent article from San Jose Inside suggests that San Jose should prepare for warmer

2 COMMENTS

Ken Pyle Feb 7, 2019

See this op-ed in the San Jose Insider for a video and article about the kind of holistic vision that is needed for the airport and surrounding area

http://www.sanjoseinside.com/2019/02/01/op-ed-we-need-a-cohesive-vision-for-silicon-valleys-airport/

Reply Like

Ken Pyle > Ken Pyle Feb 8, 2019

And more thoughts as to concerns about the process, gaps in information and my conclusions if Scenario 4 is chosen are at this link:

https://winchesterurbanvillage.files.wordpress.com/2019/02/oei-process-concerns-bullets-190208.pdf

2

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Peninsula Moves!

Week In Transit: APPLE, MOVIES, MEXICAN FOOD AND BOARD WEEK

By Dan Lieberman, @LiebermanTweets Apple @ San Jose: The nerds that run our world

E.M.Smith
Musings from the Chiefio

Today It Rained – A Curious Thing With Thermometers

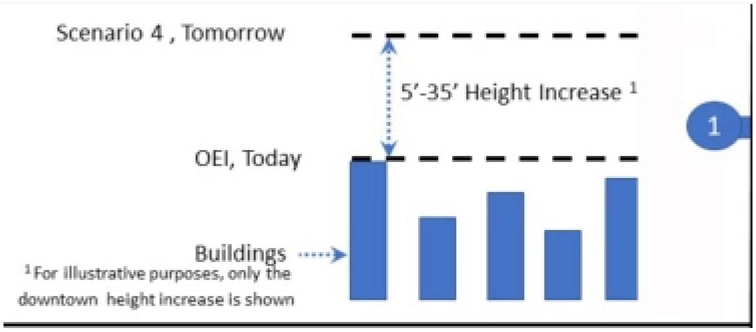
A very curious thing. Today it rained in San Jose, California. For many years now, wher

Ken Pyle, The Winchester Urban Village

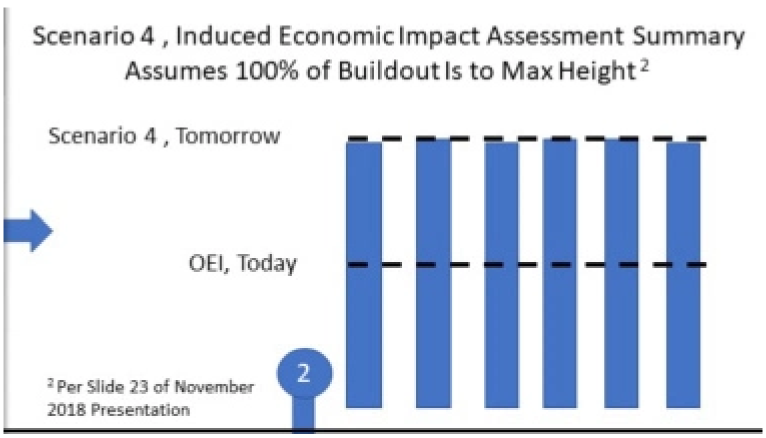
Who Will Benefit the Most from Raising OEI Limits?

2d ago Building Heights, Downtown San Jose, Economic Impact, OEI, One Engine Inoperative

At the 02/11/19 Airport Commission meeting, this author raised the question of whether the economic gains touted by the Norman Y. Mineta San Jose International Airport/City of San Jose (Airport) One Engine Inoperative (OEI) study will be as great as expected, as heard in the above video?[1]



As a brief background, the Airport is recommending a 5' to 35' increase in downtown building heights (less than a 15% increase of today's limits) and 70' to 150' in the Diridon Station Area, while the Airport Commission voted for an alternative Scenario (10B), which would allow taller buildings in the Diridon Station Area (30'-55'), while keeping the same OEI safety limits in the straight out (downtown) path.



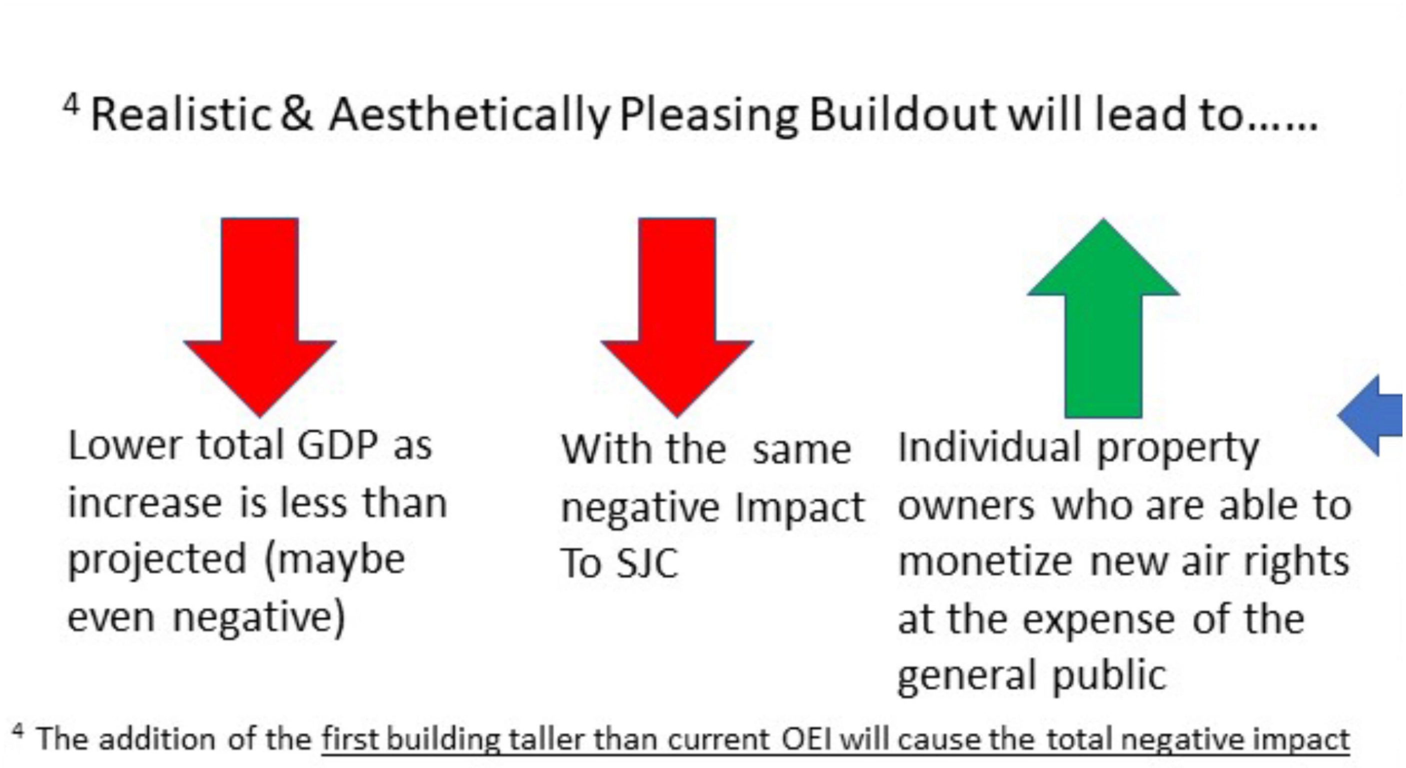
The Airport's model assumes all the buildings are built to maximum height and would result in a Total Economic Impact of between $747M for Scenario 4 and $438M for Scenario 10B. The economic impact does not seem to include the economic losses to the airport, which depending upon load factor, is estimated to be between $26 to $203M. These loss estimates do not include dropped routes or routes that are no longer viable for airlines.

A 100% buildout is not realistic from an economic or aesthetic viewpoint. The economic value drops by a greater amount with Scenario 4, as compared to Scenario 10B, as the economic losses to the airport begin once the first building penetrates the existing OEI limits (see Appendix A, below). In Southflow situations, airlines will have to shed passengers or cargo.

This won't be so critical for an air carrier with many flights from SJC that has multiple options, but for those carriers flying long-haul flights that have fewer alternatives (e.g. being able to put passengers on alternative flights), their solution might be to drop the flight. In 2006, American Airlines raised this concern with their once-profitable flight to Tokyo-Narita, when they discovered that the Adobe building was in its OEI path. https://drive.google.com/file/d/1KwfvIQRutK3g3Yp-8JYxWi-j6GNDsjLv/view

> American Airlines informed the City on 4/12/06, soon after it received staff's downtown building data, that the existence of the Adobe Phase I Tower does not provide sufficient emergency clearance for southerly departures of the B-777 flight to Narita. American must immediately institute weight restrictions on such departures (i.e., not operate with a full load of cargo, passengers, or fuel) unless and until it can redesign its emergency "one-engine out" procedures to avoid the building. This process is underway. American has informally indicated that if modified emergency procedures cannot be implemented, the potential economic loss from weight restrictions on !hat one flight is estimated to be approximately $1 million annually."

American Airlines dropped that flight in 2006. ANA picked up that flight using the more fuel-efficient 787 series jet. This is consistent with the trend identified in an



One thing that is clear is that property owners/developers who have the ability to build above current OEI will capture additional value from the air rights above their property.

The next question, for another article, is who owns those air rights?

[1] $940,000 was spent on this study, which is still a series of presentations and memos and not integrated into a single report.

Appendix A – Different Economic Impacts Based on % Buildout

1

100% Buildout (assumed in the 2018 OEI Study)

Total Economic Impact Summary (2038) Gain/Loss[1]		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Aviation Impact	-$26M to – $203M[2]	$0[3]
	Real Estate Impact	$747M[4]	$438M[5]
	Net Impact	**$544M - $721M**	**$438M**

50% Buildout

Total Economic Impact Summary (2038) Gain/Loss		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Aviation Impact	-$26M to – $203M	$0
	Real Estate Impact	$374M[6]	$219M
	Net Impact	**$171M - $348M**	**$219M**

10% Buildout (e.g. First Few Buildings)

Total Economic Impact Summary (2038) Gain/Loss		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Aviation Impact	-$26M to – $203M	$0
	Real Estate Impact	$75M[7]	$44M
	Net Impact	**-$128M - $49M**	**$44M**

[1] This is provided on page 23 of the December 2018 presentation and is cumulative over the period ending in 2038.

[2] Page 30 of the November 2018 presentation. Impact to the airport is directly related to Load Factor. The baseline Load Factor results in a $26M negative impact, while it increases to $203M as the Load Factor goes to 95%

[3] ibid

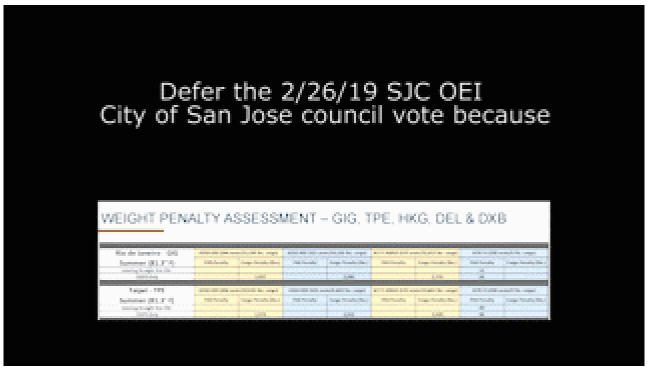
[4] Page 23 of December 2018 presentation.

[5] ibid

Ken Pyle, The Winchester Urban Village

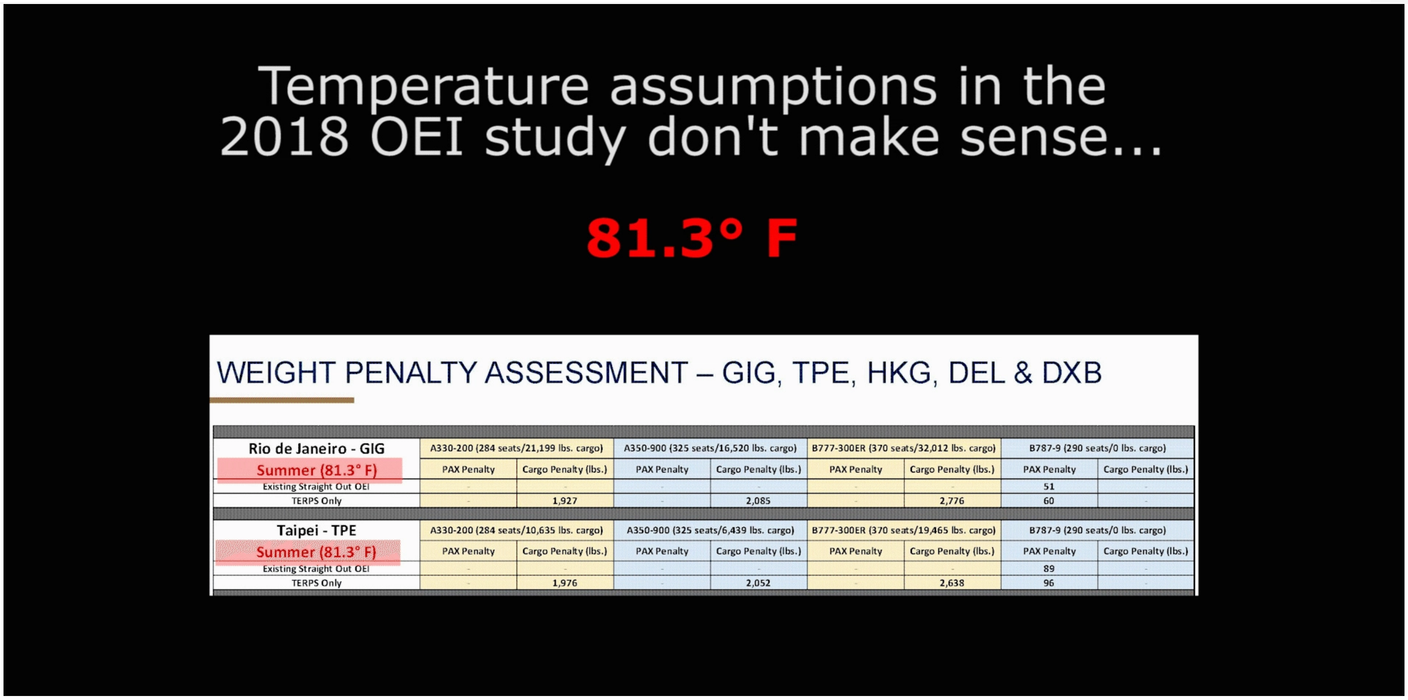
Why are the Temperature Assumptions Lower in 2018 than 2007?

2d ago Climate Change, OEI, One Engine Inoperative, Temperature



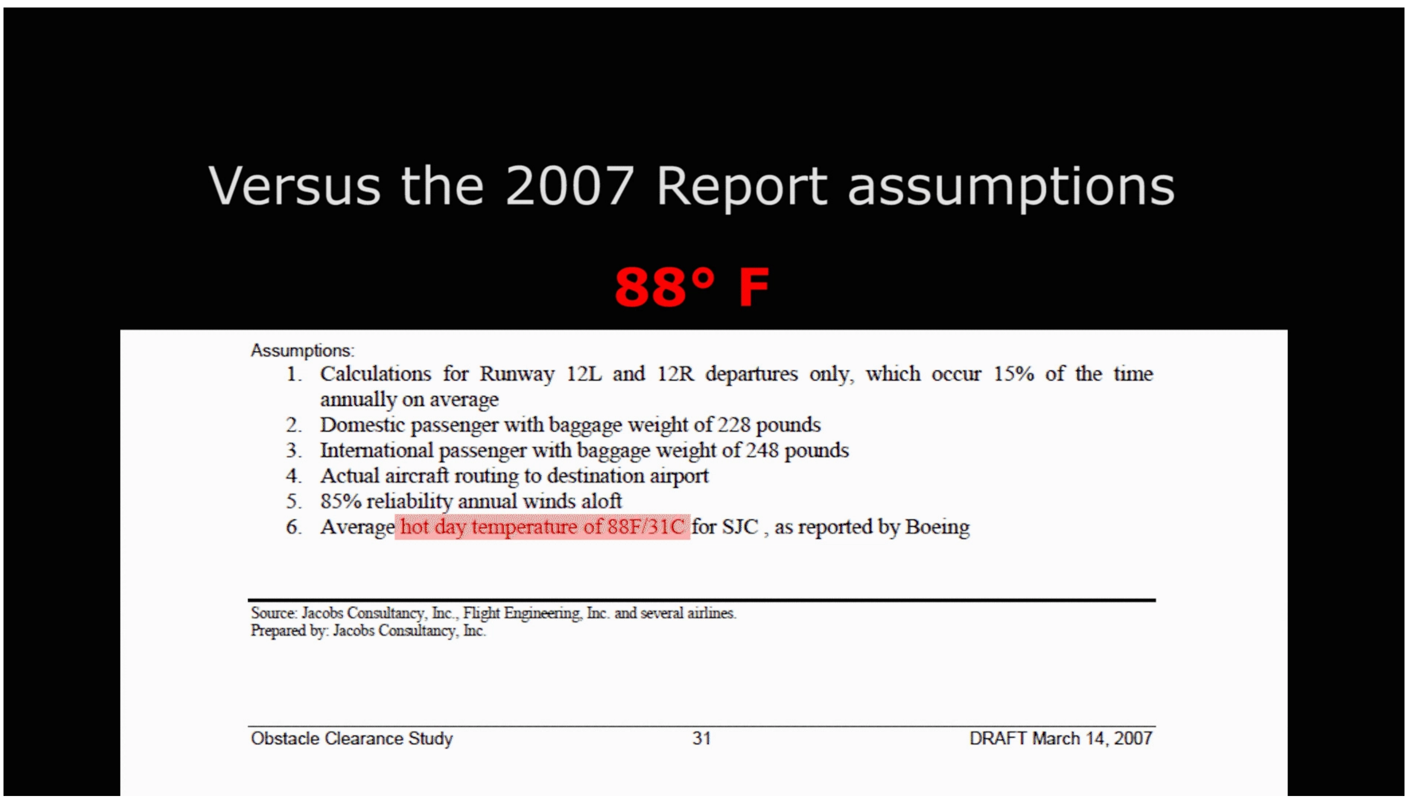
A recent article from San Jose Inside suggests that San Jose should prepare for warmer temperatures. This advice is consistent with the City of San Jose's Climate Smart San Jose "plan to reduce air pollution, save water, and create a stronger and healthier community."

Why then did the consultant that was hired by the Airport to perform the 2018 One Engine Inoperative study use temperatures (81.3° F) that were almost 7 degrees cooler as compared to what was assumed in the 2007 study (88°)?



Rio de Janeiro - GIG	A330-200 (284 seats/21,199 lbs. cargo)		A350-900 (325 seats/16,520 lbs. cargo)		B777-300ER (370 seats/32,012 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
Summer (81.3° F)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	51	-
TERPS Only	-	1,927	-	2,085	-	2,776	60	-

Taipei - TPE	A330-200 (284 seats/10,635 lbs. cargo)		A350-900 (325 seats/6,439 lbs. cargo)		B777-300ER (370 seats/19,465 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
Summer (81.3° F)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	89	-
TERPS Only	-	1,976	-	2,052	-	2,638	96	-



Assumptions:

1. Calculations for Runway 12L and 12R departures only, which occur 15% of the time annually on average
2. Domestic passenger with baggage weight of 228 pounds
3. International passenger with baggage weight of 248 pounds
4. Actual aircraft routing to destination airport
5. 85% reliability annual winds aloft
6. Average hot day temperature of 88F/31C for SJC , as reported by Boeing

Source: Jacobs Consultancy, Inc., Flight Engineering, Inc. and several airlines.
Prepared by: Jacobs Consultancy, Inc.

Obstacle Clearance Study 31 DRAFT March 14, 2007

This is important, as the higher the temperatures, the more weight (in the form of passengers or cargo) that has to be removed from an airplane to ensure safe operation in the event of a loss of an engine. The change in temperature was the major assumption difference between the 2007 study and the 2018 study.

1

the difference between serving transcontinental/transoceanic flights versus regional destinations, as indicated on SJC's website:

> "Airlines will not fly routes that are not economically practical due to OEI-required weight penalties, and SJC would therefore risk losing existing or potential future air service, particularly to long-haul destinations. This could eventually result in SJC becoming a 'regional' airport primarily providing direct flights only to cities along the West Coast and in the western half of the United States. SJC would no longer be able to serve nonstop flights to the East Coast, Hawaii, or overseas to Asia or Europe." [PDF]

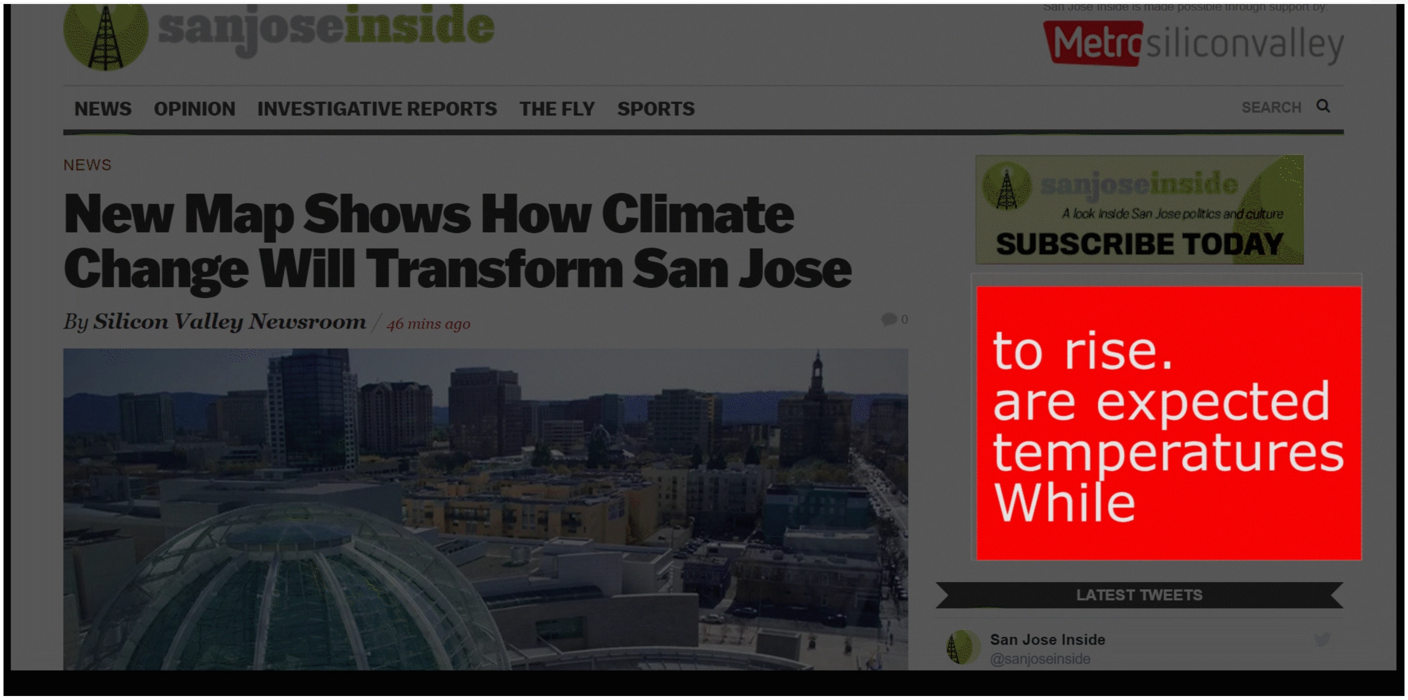
Speaking at the January 28th, 2019 Community Economic Development meeting (YouTube), the Airport's consultant to the study suggested that he had been conservative in 2007.

> "I was typically using 95% reliability for some of the studies back in that 2007 timeframe and invariably I got responses that, that was too conservative and too high. The reason I was using 95% reliability when most of the airlines were using 85% reliability is that if it was a day time operation, the percentages for a 24-hour period, so if the airline is operating mainly passenger flights, not cargo during daylight hours, it would tend to be a little more conservative to use 95%. But, I have really switched to using what the airlines use which is 85% surface temperatures and in-route winds for these type of route analyses."

This raises several questions:

1. Who was telling him he was being conservative?
2. Does each airline use the 85% temperature and reliability numbers? Do some airlines use 90% or 95%?
3. What about the impact of climate change regarding future temperature assumptions?

1



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MORE IN THE WINCHESTER URBAN VILLAGE

Why the Rush to Adopt Scenario 4?

[Note: This author appreciates the efforts and insight of airport staff, committee members, and airport commissioners in studying var

Who Will Benefit the Most from Raising OEI Limits?

At the 02/11/19 Airport Commission meeting, this author raised the question of whether

NO COMMENTS - add the first!

To: City Council – San Jose

From: The Sunnyvale-Cupertino Airplane Noise Group

Date: Feb 25, 2019

RE: San Jose City Council Meeting Feb 26, 2019

Comment regarding Agenda Item 6.2 - (File #18-1944)

Actions Related to the Downtown Airspace and Development Capacity Study –
Study regarding increased building height envelope in San Jose downtown and Diridon

---

Below is a statement from the Sunnyvale-Cupertino Airplane Noise Group.

Request (File 18-1944): Any action that would result in taller building heights in downtown San Jose or Diridon area should be delayed until the FAA and an experienced aviation consultant have completed a supplemental report confirming no potential current or future impact to the San Jose Airport south flow trigger, and no impact to SJC arrivals. (Current trigger > 5 knots south/east wind speed).

Our group understands that San Jose recently commissioned a study to determine the feasibility of taller building heights in the downtown San Jose and Diridon areas. This study focused on departing flights only, and did not consider any impact on arrivals. As you know, normal flow arrivals fly directly over downtown San Jose, and these arrivals are partly impacted by the current building heights. Decisions regarding taller building heights will have repercussions for decades to come, and these important decisions should not be based on a clearly incomplete study that is missing a major piece of analysis. Without a proper study regarding the arrival flight paths, it is unclear whether the frequency of SJC normal flow or south flow operations (reverse flow) will be impacted in any way by the proposed taller building envelope. Any unintended impact could have major consequences to the airport, the city of San Jose, and surrounding communities.

San Jose Airport typically operates under normal flow operations, where arrivals are flying over downtown San Jose. In contrast, when the wind direction changes to South or East and the wind speed is greater than 5 knots, the direction of operation changes to south flow operations (often called reverse flow). An increase in south flow operations would not only impact the quality of life for your neighbors in Sunnyvale, Cupertino, Mountain View, and Palo Alto - An unintentional increase in south flow operations would have a detrimental impact to airline profitability, airport operations, and FAA safety. Yet an analysis of SJC arrivals was never conducted regarding increased building heights. Normal flow is the preferred path for safety reasons, airline financial benefits, and efficiency. For this reason, a study regarding SJC arrivals and any impact on south flow operations is warranted, and is in the airport's and San Jose's best interest.

Based on an FAA meeting in March 2017 at Congressman Ro Khanna's office, we already know that the south flow trigger is impacted partly due to the existing tall buildings in downtown San Jose. An excerpt from that meeting "*San Jose's runway is too short. Part of the reason that it is too short is the buildings in downtown which make a piece of that end of the runway unusable (planes can't drop down until they are past those buildings).*" It is unclear whether the proposed taller building envelope will have a downward pressure on the current south flow trigger, causing an increase in south flow operations over Sunnyvale and Cupertino – Potentially exacerbating an already contentious airplane noise situation.

We request that any San Jose vote that would ultimately result in taller buildings in downtown and/or the Diridon area be temporarily postponed until a supplemental aviation study is commissioned by San Jose, and the FAA is consulted to confirm any potential impact to the SJC south flow trigger. It is possible that the proposed building height changes will have no impact on the trigger. However, this assumption should be confirmed in writing by the FAA and an aviation expert prior to any approval.

To summarize, any San Jose approvals that would result in taller building heights should be delayed until the FAA and an experienced aviation consultant have completed a supplemental report confirming no impact to arrivals and the current south flow trigger (Current trigger > 5 knots south/east wind speed). The current aviation study is incomplete, and further analysis of the arrival flight path over downtown San Jose needs to be completed in order to make a fully informed, proper decision regarding building heights.

Thank you for your help regarding this matter.

Sincerely,

Tony Guan

Jennifer Tasseff

And members of the Sunnyvale-Cupertino Airplane Noise Group
Over 500 members strong

Below is supplemental information and diagrams that were compiled by the Sunnyvale-Cupertino Airplane Noise Group, and which may be helpful in understanding the issue. [Continued]

Supplemental Materials regarding taller building heights in San Jose Downtown and Diridon Area (Document prepared by the Sunnyvale-Cupertino Airplane Noise Group)

Background Information:

Due to FAA flight path changes, tens of thousands of residents in Sunnyvale, Cupertino, and Mountain View are now detrimentally impacted by loud airplane noise during south flow operations. Complaint numbers at San Jose Airport have skyrocketed due to increased airplane noise during south flow operations over these cities. Could taller San Jose buildings indirectly increase the frequency of south flow operations, by forcing the FAA to reduce the south flow wind speed trigger from 5 knots to a lower wind speed threshold? The answer is uncertain, and requires further study.

Excerpts from the March 22, 2017 FAA meeting conducted at Ro Khanna's office:

Original Question submitted during meeting Mar 22, 2017:

> "*As many citizens have noted, San Francisco Airport has a waiver from the 5-knot wind standard, allowing that airport to direct aircraft to land with up to a 10-knot tailwind. What would it take to get San Jose Airport that kind of waiver? If south flow were used only at wind speeds above 10 knots, it would be used much less often and the noise over these neighborhoods would drop.*
>
> *Answer: FAA Flight Standards Program Manager Chris Harris explained that this approach cannot be used at San Jose Airport for two reasons:*
>
> *1. the usable runway for landing is too short for planes to land safely with that strong of a tailwind (SFO's runways are substantially longer), and*
>
> *2. San Jose Airport is used by many general aviation aircraft (small propeller planes) which could not land safely at those wind speeds under any conditions*."

Additional clarification regarding the tall building heights in downtown San Jose, and how these tall buildings currently impact the ability to raise the wind speed trigger for south flow from 5 knots to 10 knots. This information has also been confirmed through supplemental conversations with FAA personnel.

> Response from Director Moylan based on additional info:
>
> "*At the March 2017 meeting that I organized, FAA said that there were two reasons why San Jose Airport would not be granted a waiver of the 5-knot standard for landing with a tailwind. The first is the length of the runway, because it takes more runway to land with the wind at your back. San Jose's runway is too short. Part of the reason that it is too short is the buildings in downtown which make a piece of that end of the runway unusable (planes can't drop down until they are past those buildings). But that was not the whole cause of the runway being too short. It was too short anyway. The other reason is that small planes aren't safe to land in a tailwind no matter how much runway you have. San Francisco can get a waiver because it has only large jets and a long runway. We have small planes and a short runway*."

Commissioned study by San Jose included no analysis regarding possible impact to the south flow trigger:

The studies commissioned by San Jose considered the financial implications of taller buildings for the city at large, the SJ airport, and the airlines. The study also considered various FAA rules and regulations, including OEI (one engine inoperable), FAR Part 77, etc.

In contrast, there was no clear analysis to determine whether taller buildings would impact SJC arrivals and the south flow trigger in any way. The commissioned report specified financial and FAA impacts based directly on DEPARTURE flight paths in relation to building heights. No consideration was given to arrival flight paths. The south flow trigger is partly impacted by the current building heights in downtown San Jose (based on an FAA meeting March 2017).

A supplemental study or consultation with the FAA may be necessary to confirm no impact to the south flow trigger from the proposed taller building envelope. This analysis may require analysis of the arrival flight path during normal-flow operations.

Recommendations under Scenario 4 TERPS include minimal increases in height – Could minimal height increases have impact on the south flow trigger?

Without an analysis by the FAA, the answer is unclear.

Yes, in some areas the recommendations under Scenario 4 call for minimal height adjustments, especially over downtown San Jose. Proposed height adjustments over downtown San Jose under Scenario 4 TERPS are between 5 and 35 feet; Increased heights in the Diridon area are significantly larger deltas (70 – 150 feet).

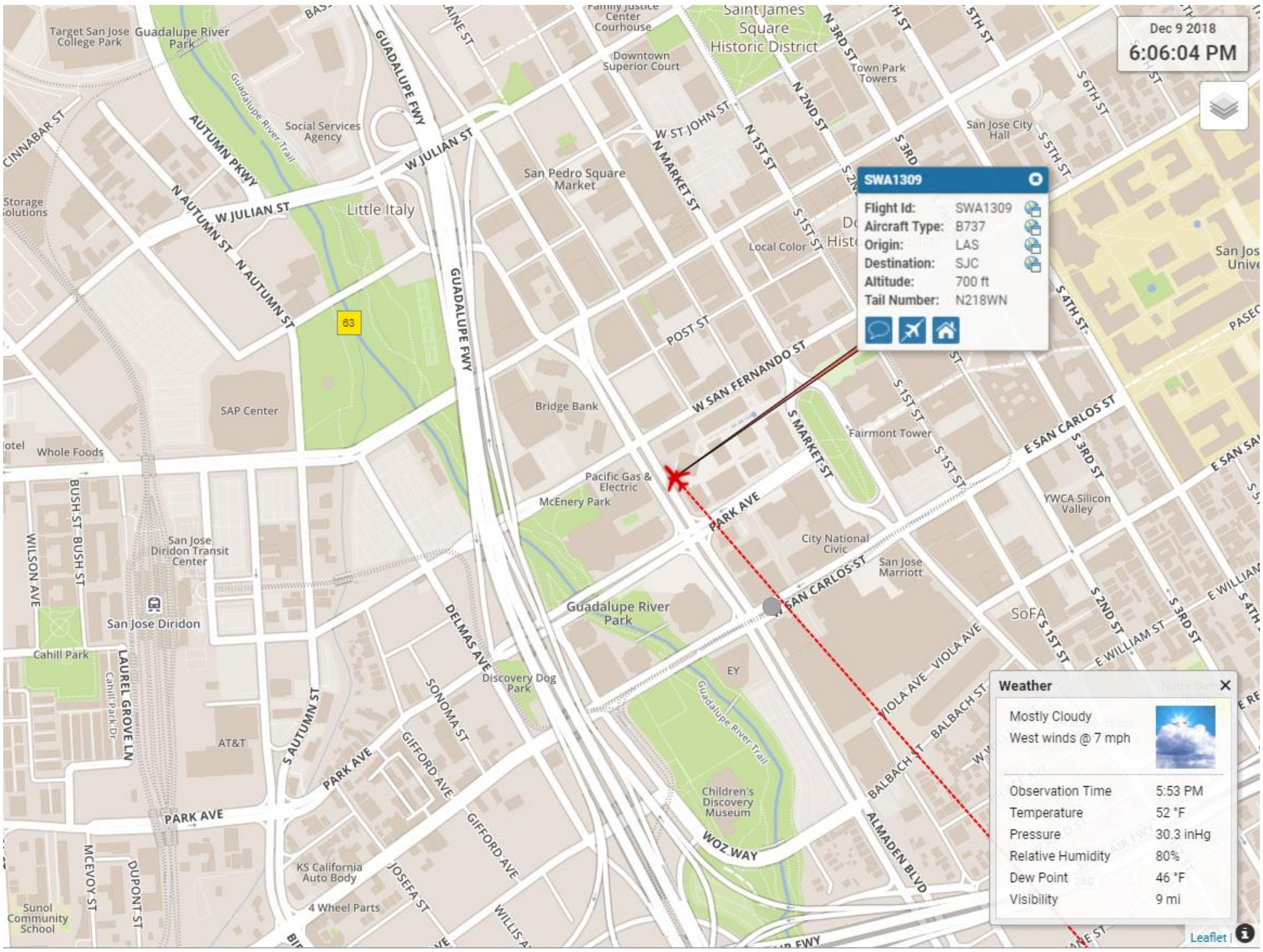
Based on San Jose Web tracker & FAA flight plates, the normal-flow arriving flights use a “straight in” flight pattern for each of the two runways 30L and 30R (during North flow). In many cases (based on San Jose web tracker altitude information), these arriving flights appear to be flying less than 500 feet above the high points of the San Jose downtown buildings.

For example, the Adobe tower at the corner of Park Ave and San Fernando Ave has a recorded height of 260 feet (per Wikipedia). Arriving flights routinely fly over this corner (per web tracker) at approx. 700-foot altitude. Although Web tracker may have some slight discrepancies in the altitudes, these normal-flow arrivals do appear to be flying very close to the tops of the current buildings. (See sample flight pictures next 2 pages.)

This might imply that even small height increases in buildings directly under the two arrival normal-flow flight paths could indirectly force the FAA to lower the south flow trigger criteria, especially if these changes result in the need for a steeper descent slope or closer proximity to building roof tops & other associated obstacles. A 35-foot change might be considered significant if arriving flights are indeed flying closer than 500 feet from the tops of the downtown buildings, which is what SJC flight tracker altitudes seem to indicate.

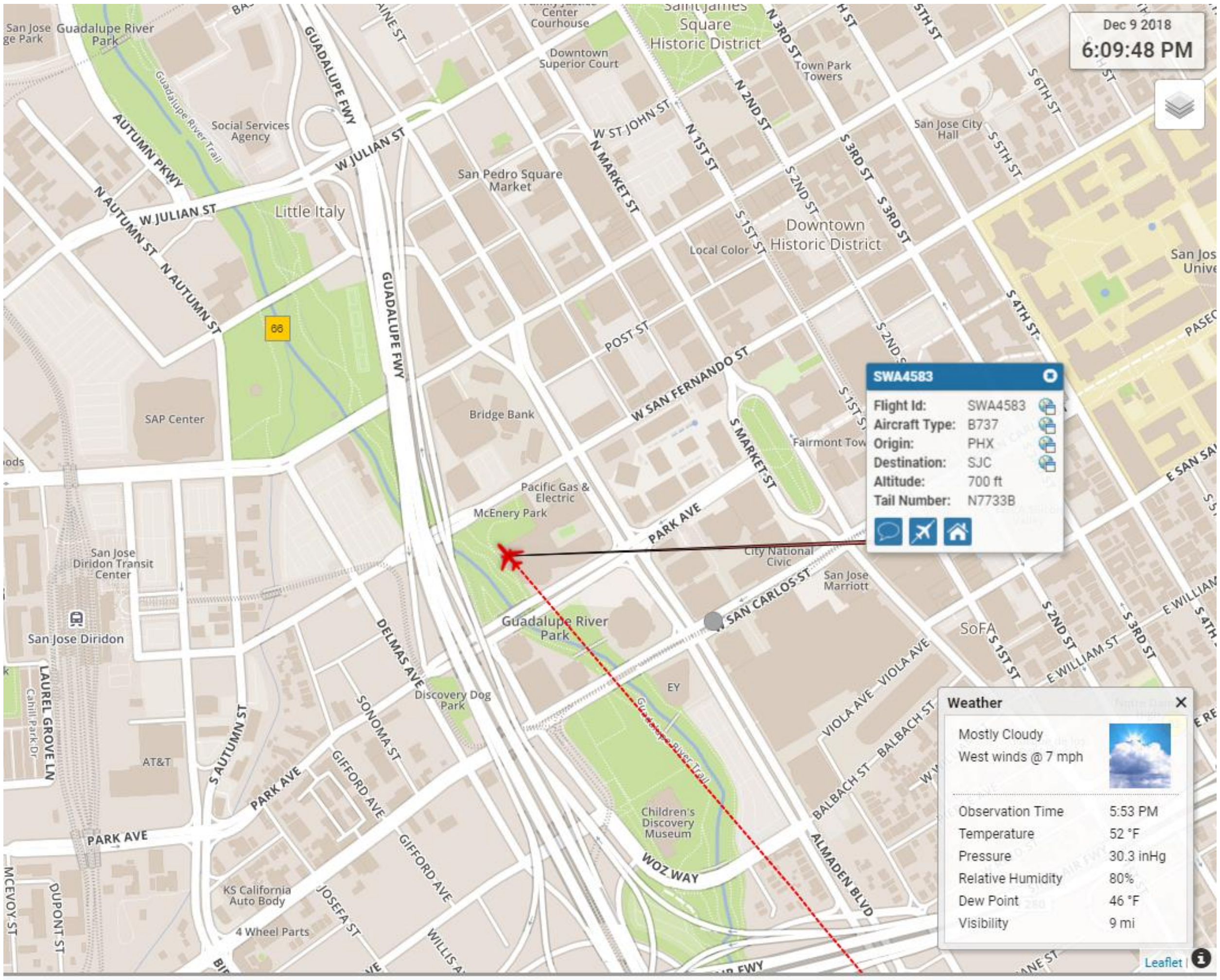
Only analysis by the FAA or an experienced aviation consultant can confirm whether the proposed small adjustments to height will impact the south flow trigger.

Sample flight flying right next to the Adobe tower at an altitude of 700 feet. The Adobe tower is 260 feet, so height delta is approx. 440 feet between the plane and the top of the building. (Approach to runway 30R)



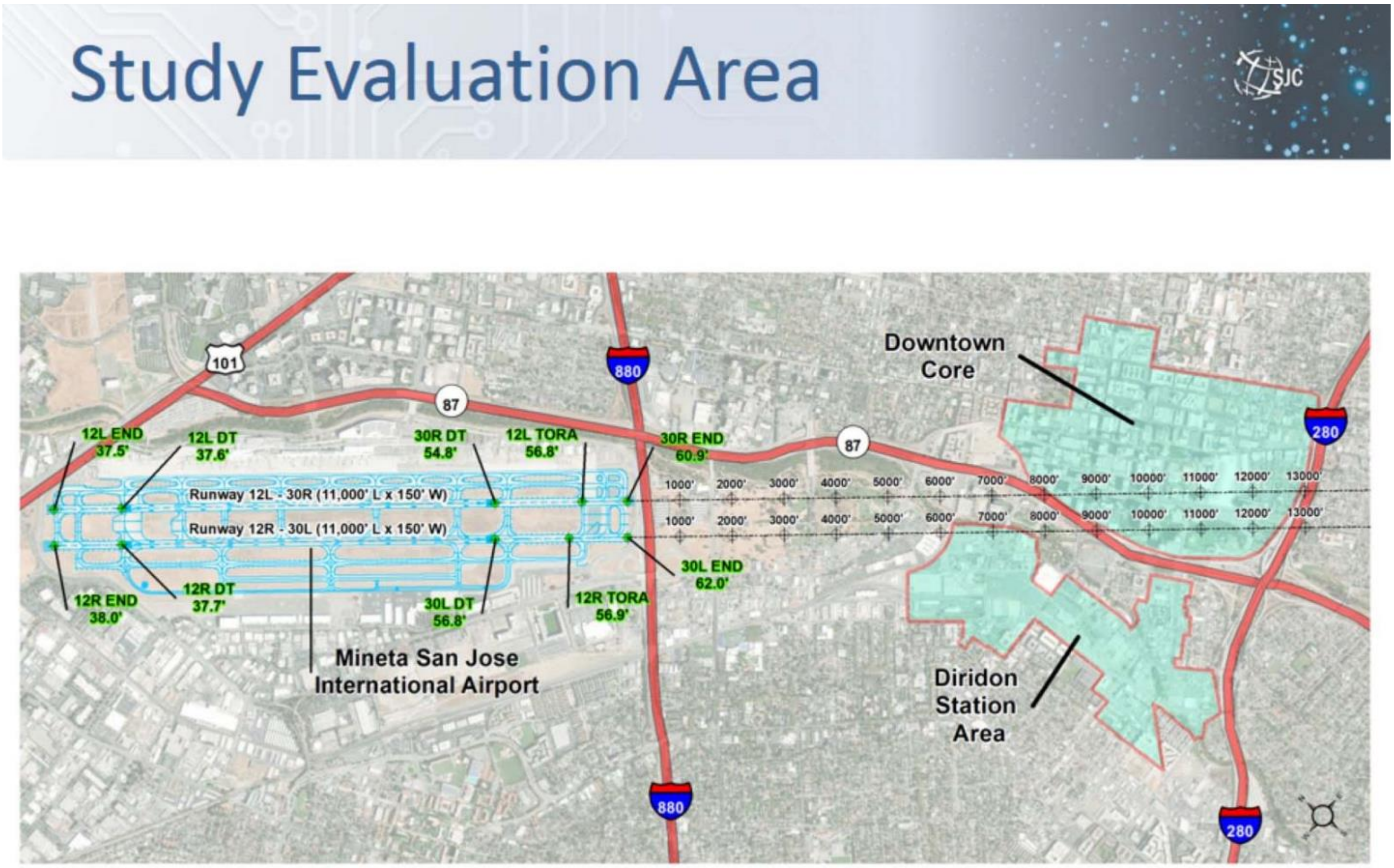
DOCUMENT CONTINUED

The two approach flight paths straddle the Adobe towers on each side (Approach to runway 30L). Flight at 700 foot altitude over Adobe Tower, which is 260 feet building height. Delta 440 feet (700 – 260).



CONTINUED

Proposed increases in building heights include taller buildings directly below the two normal-flow arrival flight paths (30L and 30R).



The two normal-flow arrival flight paths correspond to the two black lines extending beyond each of the two SJC runways, and showing the distance in feet from the end of each runway (30R and 30L).

The arrival flight paths extend directly into the downtown core, and into a small section of the Diridon evaluation area.

CONTINUED

SJC Airport, the airlines, and FAA benefit from limited south flow operations at SJC:

An unintentional increase in south flow operations would not be favorable for the FAA, the airlines, nor San Jose Airport. It appears that normal flow is the preferred path for safety reasons, airline financial benefits, and efficiency.

During the San Jose Airport Ad Hoc Committee meetings on south flow arrivals, FAA staff presented that a south flow arrival approach is a more complicated procedure than north flow given its proximity to other flight procedures for SFO traffic, and as such, it is a less preferred procedure when compared with north flow. The preferred approach is north flow, where planes approach SJC from the south flying north, as there is less air traffic from other airports.

Additionally, the south flow flight path is a longer flight path than the normal flow path. For this reason, it is likely not the preferred flight path for the airlines. The south flow arrival approach is longer, often resulting in as much as 30- 50 miles additional flying distance. Longer flight distances increase airline fuel costs, cut into airline profits, and can impact arrival times. Increases in airline fuel costs and/or impacts to arrival times associated with an increase in south flow operations, could indirectly factor into an airport's ability to attract or retain desired air service, therefore potentially impacting the profitability of the airport.

Finally, an unintended increase in south flow operations would further impact cities like Sunnyvale, Cupertino, Mountain View, and Palo Alto and would exacerbate an already contentious airplane noise problem.

Future Airline Technology and its possible impact to south flow operations:

For fuel efficiency purposes, newer airlines are generally being engineered with shallower descent profiles.

General questions that we may wish to pose to the FAA:

- Does the FAA anticipate that future aircraft designs and potential shallower descents would place downward pressure on the south flow trigger, thereby potentially increasing the frequency of south flow flights?
- For the following question assume that the FAA has confirmed no current impact to the south flow trigger based on the proposed taller building envelope in San Jose:
  - Assuming this is the case, then could the proposed taller San Jose buildings in conjunction with a trend toward airline shallower descents cause potential FUTURE impact on the south flow trigger? In other words, is there a synergistic effect between the proposed taller buildings and shallower descent rates that could require a lowering of the south flow trigger wind speed in the future?

Could the proposed building height increases impact any possible improvement currently being considered for the south flow trigger?

Perhaps.

We understand that the FAA has been working on its' response to the San Jose Airport Adhoc Committee recommendations and questions. It is expected that an FAA response will be available soon after the government shut down ends.

One of the requests in the adhoc report includes a question regarding the south flow trigger, and whether it is feasible for the FAA to slightly increase the south flow wind speed threshold (i.e. from the current 5 knot threshold to a wind speed threshold of 6 or 7 knots). An FAA response is pending.

It is likely that an increase in the proposed building height envelope in certain areas of downtown San Jose and the Diridon area directly below the normal-flow arrival flight path might impact any ability to raise the south flow wind speed trigger in the future. Already the FAA states that the trigger is partially impacted by current tall buildings in downtown SJ.

For this reason, we would recommend no adjustments to the previous building height envelope for areas directly below the normal-flow arrival flight path. In other words, current city codes regarding maximum building heights directly below the "straight in" normal flow arrival flight path would remain unchanged; In contrast, newly proposed height increases for areas a specified horizontal distance AWAY from the normal flow arrival flight path would be fine to implement – assuming the FAA has no objection and no impact to the south flow trigger is identified for these new locations.

Weblink meeting packets for San Jose discussions regarding proposed increased SJ building heights- SJ Airport Commission, CED Committee, and SJ City Council:

San Jose City Council Feb 26, 2019 Meeting link for Agenda Item 6.2 - (File #18-1944)
Actions Related to the Downtown Airspace and Development Capacity Study
https://sanjose.legistar.com/LegislationDetail.aspx?ID=3859245&GUID=62B21903-3F67-4DDF-A072-C8C46B9DF1CB&Options=&Search=

Meeting Link to Community and Economic Development Committee (meeting Jan 28, 2019):
https://sanjose.legistar.com/LegislationDetail.aspx?ID=3829565&GUID=7C96ACD3-C53B-4A18-BE6E-61826B93289D&Options=&Search=

Meeting Link for Jan 14, 2019 San Jose Airport Commission meeting:
https://www.flysanjose.com/node/5086

Meeting Link for Jan 24, 2019 San Jose Commission meeting:
https://www.flysanjose.com/node/5136

OEI Slide presentation on Jan 14, 2019:
https://www.flysanjose.com/sites/default/files/commission/1%20%2014%2019%20Airport%20Commission%20OEI%20Presentation.pdf

END OF SUPPLEMENTAL DOCUMENT

Regarding Council meeting 2/26/19
Agenda #6.2 Increased building height proposal
Request supplemental study to be completed

Public message from the Save My Sunny Skies Airplane Noise group

(Sunnyvale & Cupertino residents)

Due to recent FAA flight path changes, the cities of Sunnyvale and Cupertino are now heavily impacted by airplane noise during San Jose Airport reverse flow, also called south flow operations.

Now San Jose is considering taller buildings in downtown and Diridon.

What is NOT clear is whether these taller buildings could indirectly impact the frequency of south flow operations over our cities – In other words, resulting in MORE south flow operations.

The San Jose building height study considered departure flights, but never studied arrivals. Yet normal flow arrivals fly directly over downtown San Jose. And based on a 2017 FAA Congressional meeting, we already know that these arrivals are partly impacted by the existing tall downtown buildings.

We ask that ANY San Jose vote that will ultimately result in taller buildings in downtown or Diridon be postponed until a supplemental aviation study is commissioned by San Jose, and the FAA is consulted to confirm no possible increase in south flow traffic. For example, no possible lowering of the south flow wind speed trigger.

Again, any San Jose approvals should be delayed until the FAA and an aviation consultant have completed a report confirming no possible increase in the frequency of south flow operations.

Decisions regarding building heights will have repercussions for decades, yet decisions are being based on an incomplete study that missed any analysis regarding arriving flights.

A formal letter from our group was submitted under public comment.

The current aviation study is incomplete, and further analysis is necessary.

Thank you for your time.

Save My Sunny Skies Airplane Noise group
c/o Mary Smith - Save My Sunny Skies Member

SILICON VALLEY LEADERSHIP GROUP

2001 Gateway Place, Suite 101E
San Jose, California 95110
(408)501-7864 svlg.org

February 26, 2019

Mayor Sam Liccardo
San Jose City Council
200 E. Santa Clara Street
San José, CA 95113

RE: Support for Scenario #4 - One-Engine Inoperative (OEI) change as recommended by the Downtown Airspace and Development Capacity Study

Dear Mayor Liccardo and San Jose City Council,

On behalf of the Silicon Valley Leadership Group, we express our support for Scenario #4 as found in the Downtown Airspace and Development Capacity Study. The Leadership Group was proud to play a role in this study and urges the San Jose City Council to accept Scenario #4 to increase the OEI flight surface and allow for greater density in downtown San Jose and the Diridon Station Area with no negative impact on flight safety.

The Silicon Valley Leadership Group was founded in 1978 by David Packard, Co-Founder of Hewlett Packard. Today, the Leadership Group is driven by more than 350 CEOs/Senior Executives to proactively tackle issues to improve our communities and strengthen our economy, with a focus on education, energy, the environment, health care, housing, tax policy, tech & innovation policy, and transportation.

Additional density makes sense for downtown San Jose. For the past four decades, the Leadership Group has led the way in securing billions of dollars for transportation and traffic relief purposes. Billions of these dollars have been wisely invested directly into Diridon Station while supporting the many transit and transportation options serving San Jose. By approving Scenario #4, the City of San Jose will be able to leverage these dollars by allowing for greater densities in the Diridon Station Area. This increase in density will allow for greater investment, more jobs, more housing, more transit ridership and more office space for this critical area, all while maintaining important safety standards.

Further, we are supportive of the potential "Community Air Service Support Fund". Although Scenario #4 will affect only a small percentage of flights, those airlines that are affected will likely see some financial impact. Accordingly, our members support moving forward with the new flight surface and are willing to explore the potential of the support fund to mitigate any negative financial impacts to those airlines affected. Through this fund, we will be able to create win-win scenarios with the airlines that serve San Jose's Airport and bring continued success and growth for SJC.

The Silicon Valley Leadership Group is proud to support Scenario #4 which will bring much needed density to the Diridon Station Area. We urge the San Jose City Council to support Scenario #4 from the Downtown Airspace and Development Capacity Study.

Sincerely,

[redacted]

Carl Guardino
President & CEO
Silicon Valley Leadership Group

[redacted]

Matthew Quevedo
Director
Transportation, Housing and Community Development
Silicon Valley Leadership Group

February 25, 2019

To: San José Mayor & City Council Members

Cc: Office of the City Clerk

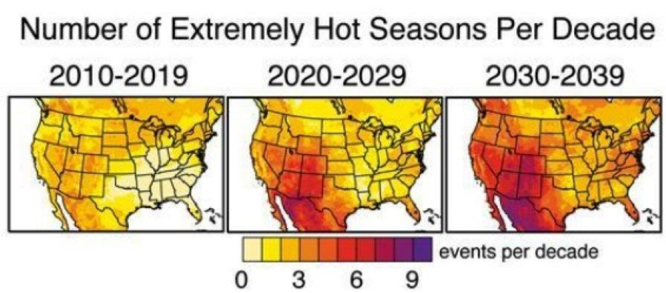
From: Bill Souders

Re: **Public Comment on the OEI Decision Regarding Building Heights in the Station Area**

First of all, I would like to thank Councilman Peralez for his time at the SPOTLIGHT event at Café Stritch the other night. As always, I appreciate him being available for questions and comments. I also appreciate the time that his staff spent on the OEI Steering Committee on District 3's behalf.

As I mentioned in my remarks during the meeting, I have reservations about the City Council rushing to a decision before more thorough analysis can be done. Below are my areas of concern. I question these baseline assumptions in what has been described as "extraordinarily technical" analysis:

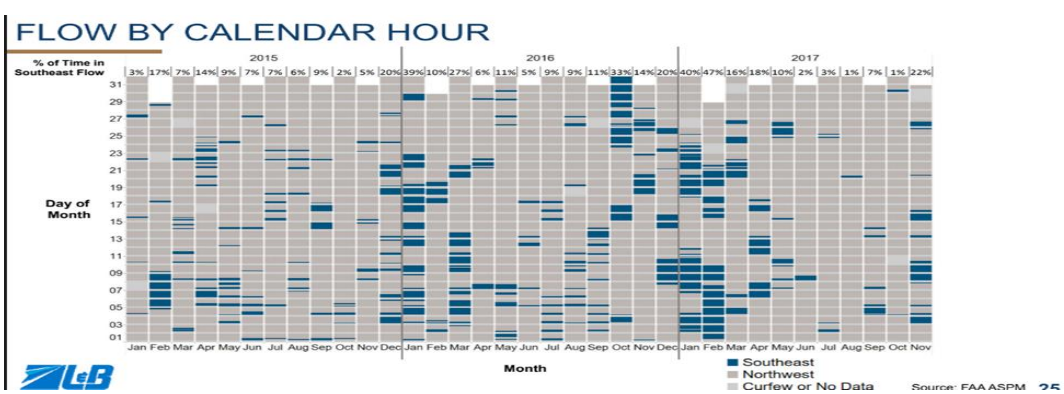
- LOWERING the estimated average temperature for the calculations, namely, changing the original 2007 average estimate of 88° F down to 81° F in this report. I honestly cannot think of any logical reason to lower the forecasted temperature for your calculations given all of the dire predictions that are now being published.



By 2039, most of the US could experience at least four seasons equally as intense as the hottest season ever recorded from 1951-1999, according to Stanford University climate scientists. In most of Utah, Colorado, Arizona and New Mexico, the number of extremely hot seasons could be as high as seven.

Credit: Noah Diffenbaugh, Stanford University

- Similarly, the presentation by City Staff seems to conclude that WEATHER PATTERNS in the summer are not likely to EVER change and become more like the winter patterns over the next few decades, which would then require more Southeast Flow take-offs in the heat. I'm just not sure that is a safe bet.



- The FEASIBILITY of garnering a community-funded Air Service Support Fund is as of yet untested. The Staff presentation is already forecasting the need to cover $1.5M in overweight penalties assuming NO adverse change in weather conditions. What are the implications if that funding cannot be raised to adequate levels? And WHO pays?
- Staff is forecasting net new annual property tax revenue to the City of San Jose of $5.5 M once the construction of all 8.6 million square feet is complete under scenario #4. It does not state anywhere (that I could find) how much annual property tax revenue would be generated if scenarios in #10 were chosen. It is very unclear, based on the table below, exactly what the forecasted ECONOMIC DOWNSIDE would be given that the scenario 10 alternatives would still be adding significant height above the current restrictions (it seems to be adding at least half of the ADDITIONAL height of scenario 4?). I recognize that this tax revenue is a miniscule portion of City budget, but that was the point that was highlighted by the Office of Economic Development in their report.

Scenario	Additional Height Downtown Core	Additional Height Diridon Station Area
Scenario 4: No OEI	5' - 35'	70'-150'
Scenario 7: Straight-out OEI protection with no OEI west corridor	0'	70'-150'
Scenario 9: No OEI protection plus increased FAA/TERPS surfaces	35'-100'	80'-220'
Scenario 10: Straight-out OEI projection with alternative west corridor protection		
Option A (Increase of 25')	0'	15'-25'
Option B (Increase of 50')	0'	30'-55'
Option C (Increase of 75')	0'	45'-85'
Option D (Increase of 103')	0'	65'-115'

- Everyone involved in the report keeps saying that this is not a SAFETY issue, and I concur. The continued reference to the safety concern in more of a red herring, honestly.

  This is, however, a TRANSPORTATION & ECONOMIC OPTIMIZATION challenge. What scenarios have been analyzed that really scrutinize what level of REDUCTIONS in Airport business, especially the very desirable long-haul business, would suddenly make the height increases counterproductive? Basically, what are we truly risking with this irreversible limitation to our International Airport growth opportunities? This analysis does not appear to have been done and, to me, that is precisely the information necessary to make these trade-off decisions.

- The three CONCLUSIONS from the staff report below just do not seem to be CONCLUSIVE. In fact, they seem to make huge, and questionable, ASSUMPTIONS about the potential risks of building TOO HIGH, which could choke off our ONE & ONLY transportation success story, an expanded and thriving international airport (with a high-speed connection to our world class transit center someday?).

> OEI Strategy recommendation will increase allowable building heights to TERPS with the following considerations:
>
> - It will be challenging to serve the Bejing market and challenges will exist if there is a desire to serve select international markets in the future.
> - Recommend that a community-funded support program be developed for sustainable long-haul international flights to offset any airline/aircraft OEI mitigation measures required.
> - Recommend construction crane policy to deter crane penetrations into the TERPS during construction.

I am all for density and I am very excited about the possibilities of creating a world-class, transit-oriented downtown core that San José can finally be proud of. Having a robust international airport, basically in walking distance from downtown, is something that makes our city stand out among other most other large cities in the world. Let's not squander this distinction. I believe that we and our (true) partners can be much more clever in providing appropriate density in this tract of land that is particularly crucial to our future as a HOLISTIC transportation hub! This is especially true as our dreams of High Speed Rail seem to be slipping away.

Thank you for your consideration. All I can ask is that the City Council please make sure that you are truly comfortable that the long-term implications of this decision are fully considered.

Respectfully,

Bill Souders

Downtown Homeowner and "Density Pioneer"

SANTA CLARA COUNTY
Association of REALTORS®
ESTABLISHED 1896

February 25, 2019

To: Honorable Mayor Sam Liccardo
Honorable Vice Mayor Jones
Honorable City Councilmembers:
Davis, Khamis, Diep, Arenas, Foley, Carrasco, Jimenez, Peralez, and Esparza

From: Santa Clara County Association of REALTORS®

Re: Council Agenda Item 6.2 Actions Related to the Downtown Airspace and Development Capacity Study.

Hon. Members of the San Jose City Council,

It is on behalf of our 6,500 members that I write in support of item 6.2 on the agenda for February 26th, 2019. It is SCCAOR's position to support accepting the recommendations of the Airport Commission and direct staff to begin work on an ordinance per Scenario 10B.

It has been well noted that we are in a housing crisis and doing everything possible to increase density is crucial to increasing our supply in a timely manner.

It is commendable that so much due diligence has been done to ensure safety and the ability to maximize both economic development and potential future housing developments.

It is further recognized that Scenario 10B results in the most ideal preservation of existing flight routes and allows for further expansion while simultaneously eliminating additional costs to the city in the form of a "Community Air Service Fund" thus also being a fiscally thoughtful option.

We have a fiduciary responsibility to craft creative solutions to the housing crisis, and if we can't build out, we must build up.

Regards,

[redacted]

Gustavo Gonzalez

President, Santa Clara County Association of REALTORS®

From: ACSATM, Inc. < >
Sent: Tuesday, February 26, 2019 10:46 AM
To: Connolly, Dan
Subject: ATTN City Council : *Hawaiian Airlines Voices Concern over Airspace Capacity Study - Elimination of OEI (Email 1 of 2)

Dear Council Members,

You may not be seeing any of the feed back from airlines emailing or contacting the airport administration.
By telephone Hawaiian Airlines asked me to forward the emails below for your review. They also provided me with
their responses in October to the Airspace Capacity Study. Director Aitken denied me access, as well as a council member who asked to see the actual airline responses, on the grounds that the airline responses are a "Trade Secret". Hawaiian airlines made it very clear to me on the telephone that their response was not a "Trade Secret".

They provided it to me so it could be provided to you.

Sincerely,

Dan Connolly, A Concerned Citizen

-----Original Message-----
From: Lee, Hoon, HALMEC Chairman/SBR-1 Rep < >
To: Dan Connely <
Sent: Mon, Feb 25, 2019 6:58 pm
Subject: Fwd: City of San Jose - Downtown Development Memorandum

Straight from our COO...

Hoon Lee

Master Executive Council Chairman

Hawaiian Airlines ALPA Seniority Block 1 Representative

Begin forwarded message:

From: "Snook, Jon (COO)" < >
Date: February 25, 2019 at 4:00:19 PM HST
To: "
Subject: FW: City of San Jose - Downtown Development Memorandum

Hoon

In October last year we were approached by SJC and asked to evaluate the options……we told them options 4 and 9 were the worst ………..so the City Council voted for option 4!!!

I have attached an email from our Corporate Real Estate team sent last week filing our strong objection to their position.

We will push back hard on this and welcome ALPA support.

Thx

Jon

From: Richardson, Sarah
Sent: Wednesday, February 20, 2019 11:40 AM
To: J
Cc: Sloat, Kalani <
Subject: FW: City of San Jose - Downtown Development Memorandum

Aloha, John.

"Scenario 4" impacts our cargo capacity in every market out of SJC in the summer. This was our second least acceptable option.

FAA OE studies do not consider One Engine Inoperative performance, and other factors that we are required to consider for every departure, and they routinely allow buildings to penetrate "protected" surfaces around airports that are intended to limit vertical development.

Below is our POC who participated in the discussion with the airport.

Kalani Sloat – Manager, Flight Operations

Let me know if you have additional questions.

Mahalo,

Sarah A. Richardson – Senior Manager- Airport Affairs, Corporate Real Estate

Sincerely,

Dan L. Connolly

From: Ken Pyle < >
Sent: Wednesday, February 27, 2019 9:51 PM
To: City Clerk; District1; District2; District3; District4; District5; District 6; District7; District8; District9; District 10
Cc: Greenlee, Raymond; Hendrix, Catherine; Connolly, Dan; Bill Souders
Subject: Scenario 11 - Runway Extension - Please add this to the public record for 18-1944

Honorable Mayor and Councilmembers,

First, thank you for your informed and lively OEI discussion last night. It made for an educational and occasionally entertaining way to spend an evening in an Atlanta hotel room (yes, I flew from Silicon Valley's airport, SJC).

Director Aitken mentioned there were 10 scenarios studied. According to the May 2018 presentation, there was a Scenario 11, which apparently was about the idea of extending runways. Unfortunately, there is only one slide that alludes to that scenario and it provides no detail as to what was discussed.

The attached PDF represents our rough view of what an extension might look like, the economics, and examples of similar extensions at other airports.

We would like to understand whether this is a feasible approach to achieving greater heights in downtown San Jose while maintaining SJC's status as an international airport.

Please add this to the public record for 18-1944 *Actions Related to the Downtown Airspace and Development Capacity Study.*

Thank you,

Dan Connolly
Ray Greenlee
Kathy Hendrix
Ken Pyle
Bill Souders

What About Extending Runway 12R/30L North?

Could an extra 36 feet in building height in both the downtown and the Diridon Station Areas be gained without changing current One Engine Inoperative procedures Norman Y. Mineta, San Jose International Airport?

By extending runway 12R/30L over De La Cruz Boulevard into the current FAA VOR antenna field, it looks like the runway could begin 1,360 feet to the north of its current start point. At a 37.5:1 (1-foot elevation for every 37.5 feet in the horizontal direction), this would yield the 36 feet gain, across the board with current OEI.

In the documentation provided by the Airport, the only reference to extending the runway was provided in this slide in a May 2018 presentation. There was no explanation of what had been examined in this so-called Scenario.

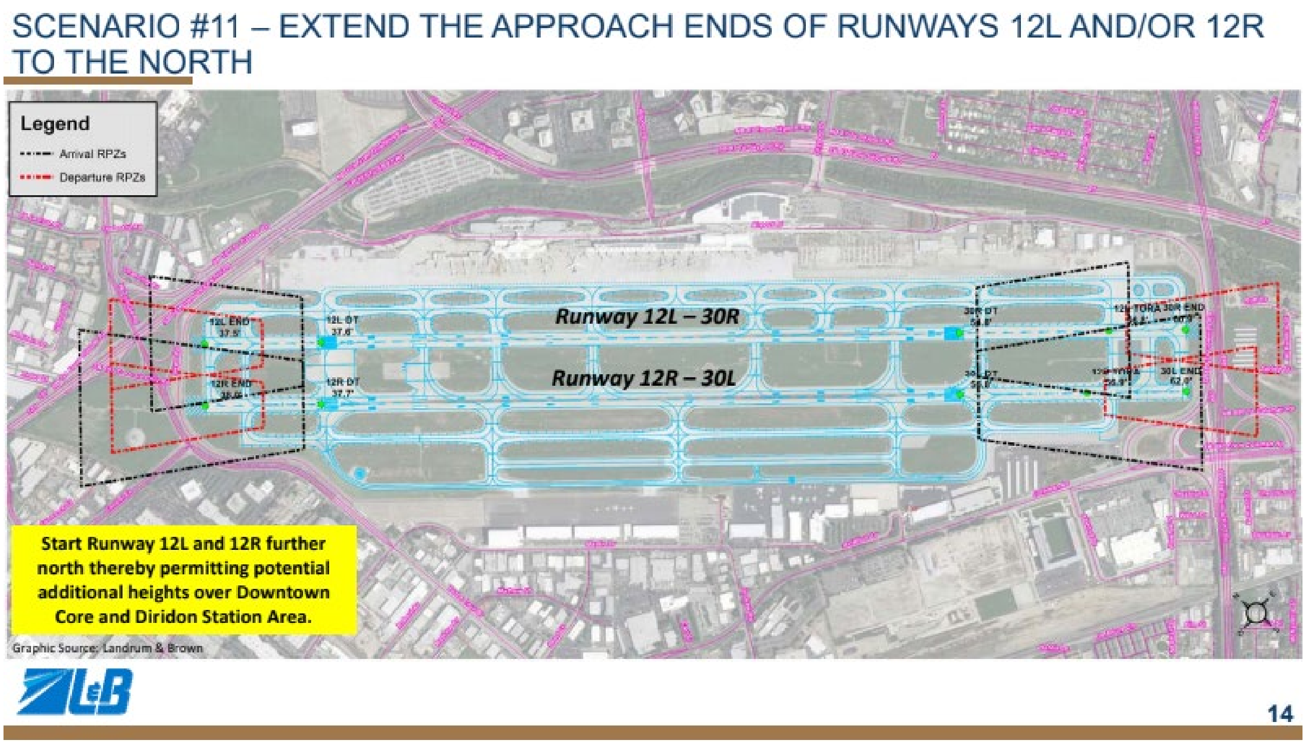


Figure 1, From May 2018 OEI Presentation

Perhaps, the slide that should have been created is below, which depicts a runway and taxiway extending over De La Cruz Avenue to the field where the FAA's antenna field is. At some point in the not-too-distant future, the FAA plans on decommissioning that obsolete radio facility, freeing up the land for other uses (within bounds of airspace restrictions), such as a runway extension.

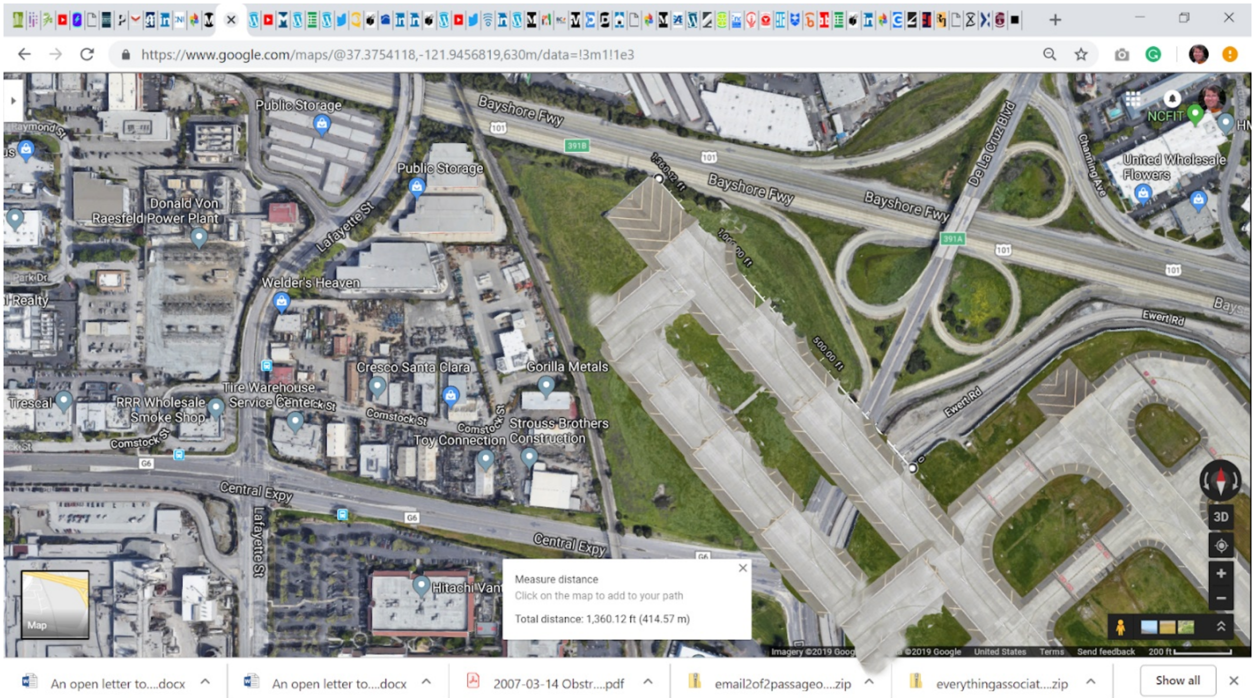


Figure 2, Rough Sketch of Runway Extension over De La Cruz

Would extending the runway necessitate an extension beyond the freeway, etc.?

Hopefully not, as the extended part of the runway (on the north side of De La Cruz) would only be used for take-offs. Page 3-13 of the Comprehensive Land Use Plan for Santa Clara County indicates that there must be a runway protection zone.[1]

> "At this airport the RPZ [Runway Protection Zone] as adopted by the airport and the FAA, begins 200 feet out from the runway's displaced landing thresholds (not the pavement ends). It is a trapezoidal area centered on the extended runway centerline. The size is related to the expected aircraft use and the visibility minimums for that particular runway."

There is no reason that a longer runway would need to change the displaced landing thresholds.

Would the Investment Be Worth It?

The question is how much would it cost to extend the runway and taxiway over De La Cruz? The documentation provided by the airport doesn't show any analysis of estimated costs to extend the runway, so we don't know if this idea was dismissed from a cost-benefit or a technical standpoint.

Although it didn't make the cost-benefit analysis cut in the study, a net gain of 35 feet would provide greater benefit from a downtown height perspective than any of the scenarios, including

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[1] See https://www.sccgov.org/sites/dpd/DocsForms/Documents/ALUC_SJC_CLUP.pdf and Appendix A for a map showing the runway protection zones.

the Airport's recommended Scenario 4. Taken by itself, there would be some gain in the Diridon Station Area as well. If combined with a Scenario 10b, it would allow building heights of 69 to 93 feet taller than today in the Diridon Station Area, which starts to approach height increases suggested by Scenario 4.

If combined with Scenarios 10b it's reasonable to assume gains for a runway extension to be somewhere between the $438M to $747M of Scenario 10b and Scenario 4, respectively. As pointed out here, the net gains for Scenario 4 would be $26 to $203 lower due to negative economic impact to the airport, which wouldn't occur with a combined runway extension/Scenario 10b.

But there would be a big upfront construction investment. How much would that cost? That's a good question and something that should have been addressed by the OEI study.

In the absence of data from the 2018 OEI study, Maui's airport can be a proxy as it faces a similar dilemma in terms of departures and is planning a runway extension:[2]

> "The runway extension, projected to cost $96 million and built by 2021, would allow planes such as the Boeing 737-800 and 777-200 to take off at maximum weight for cities such as Chicago, Dallas and Denver, the plan said. Currently, those flights have to take off with reduced fuel that requires a stop in Honolulu to refuel before heading to the Mainland."

This 1,500-foot runway extension runs into a road and they are looking at building a tunnel for the road, but they don't provide an estimate for that cost. Using Caltrans estimates of $500/square foot, the cost of a 150'x1,500' underpass would be approximately $112.5M.[3] Assuming costs similar to the Maui example of $96M for extending the runway 1,500', the total cost would be $208M ($112M+96M).

Rounding up to 250M for engineering costs, etc. and applying a cost of financing of 6% over 30 years, would result in a payment of $1.8M per month.[4] Assuming the Airport bore all this cost (no FAA Grants, no value capture from increased heights downtown) and assuming a continued growth to 21.8M passengers (approximate passenger projection by 2038), then the cost per passenger would be approximately $1, which, when added to existing costs, would still be less than SFO and continue to be competitive with OAK's rates.

Although the above back-of-the-envelope financial analysis assumes that SJC shoulders all the costs, it doesn't include the gains from being able to continue to market SJC as the international airport in the heart of Silicon Valley.

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[2] See http://www.mauinews.com/news/local-news/2017/02/a-longer-main-runway-is-part-of-master-plan-for-kahului-airport/

[3] Costs of Caltrans bridge http://www.dot.ca.gov/hq/esc/estimates/COMP_BR_COSTS_2016-eng.pdf Here is the cost of a couple of different underpasses in southern California http://media.metro.net/projects_studies/regionalrail/PS2415-3420_AlternativesDevelopmentReport_2016-0126.pdf

[4] This website used for calcuations http://www.municapital.com/payment-calculator.html

Appendix A – SJC Runway Protection Zones

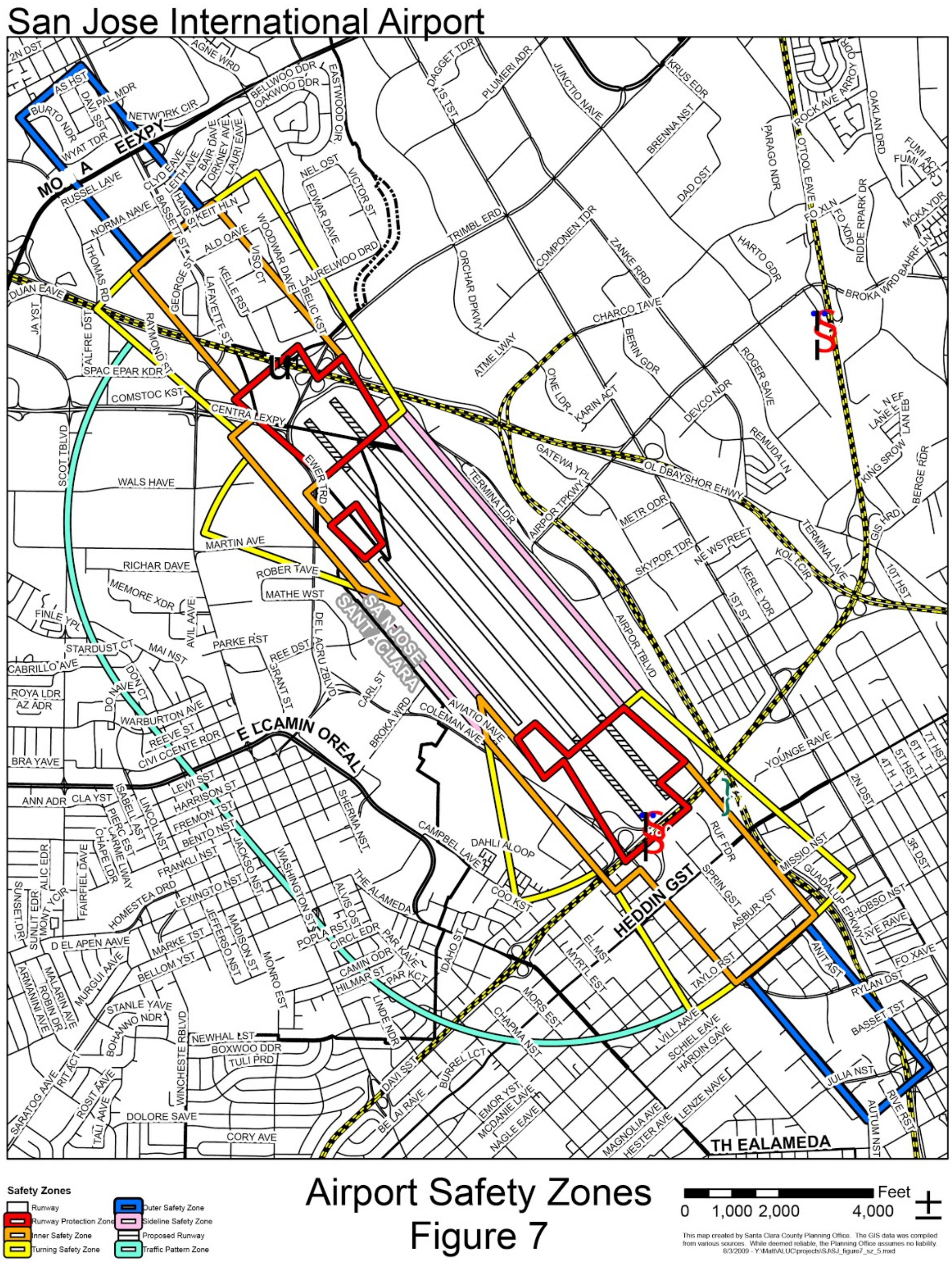


Figure 3, From the Comprehensive Land Use Plan for Santa Clara County

Appendix B – Examples of Airports With Runways Over Roads

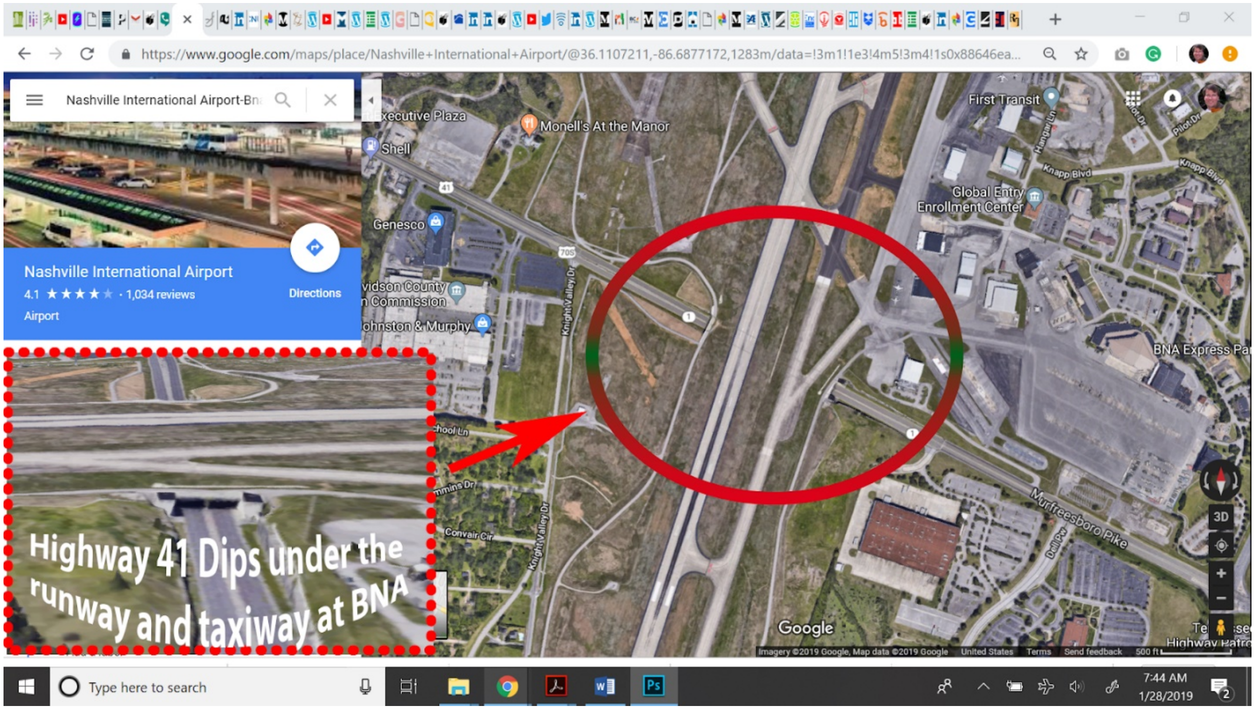


Figure 4, Nashville, BNA

Figure 5, Atlanta, ATL

From: juliematsu@aol.com []
Sent: Tuesday, February 26, 2019 6:05 PM
To: The Office of Mayor Sam Liccardo <TheOfficeofMayorSamLiccardo@sanjoseca.gov>; D1@sanjoseca.gov; D2@sanjoseca.gov; D3@sanjoseca.gov; D4@sanjoseca.gov; D5@sanjoseca.gov; D6@sanjoseca.gov; D7 <d7@sanjoseca.gov>; D8@sanjoseca.gov; D9@sanjoseca.gov; D10@sanjoseca.gov
Subject: Agenda Item 6.2 OEI - Airport Commissioner Recommendation for Scenario 4

Dear Mayor and City Councilmembers:
I am unable to attend the City Council Meeting continuation this evening to speak in support of Airport staff recommendation regarding Item 6.2 on the Agenda. Please refer to my letter attached.
Thank you in advance for your consideration of my comments.

Warmest regards,
Julie Matsushima
Airport Commissioner
OEI Steering Committee Participa

Julie Riera Matsushima

Date: February 26, 2019

Memo to: Mayor Sam Liccardo

and

City Councilmembers

Memo from: Julie Riera Matsushima

SJC Airport Commissioner

OEI Steering Committee Participant

Subject: Agenda Item 6.2

AIRPORT (OEI) STUDY

Recommendation: Scenario 4

I have been a life-long resident of San Jose and presently reside in the downtown core. I have resided in downtown for the past eight years.

I have actively served, and continue to serve, on the Airport Commission as a member, and past Chair, since 2013. I recently was selected by Airport Director, John Aiken, to serve on the OEI Steering Committee representing the Airport Commission as a D-3 Resident.

That said, I attended and participated actively in all eight meetings of the Steering Committee and attended all subsequent Community outreach meetings. My personal conclusion and recommendation are based on the consultant's information presented in detail and discussed at the Steering Committee meetings.

Some of my fellow Airport Commissioners, who object to my appointment on the Steering Committee, have come to a different conclusion based solely on the summary report of the Committee's work. Their conclusion is NOT based on the comprehensive materials, negotiations and discussions that led us to the recommendation of the Committee supporting Scenario 4.

May I point out that they were not in attendance at those meetings.

Therefore, I urge you to support the Airport Staff and Steering Committee Scenario 4 which is a balanced approach that would support continued development of downtown and growth in air service at San Jose International Airport.

Thank you.

Appendix D – City of San José Council Meeting (March 12, 2019)

Appendix D consists of background information presented at the City of San José City Council Meeting held on March 12, 2019. Information provided is a compilation of City Council meeting agendas, presentations, technical memorandums from the consultant team, memorandums from City Council members, letters from the public and final meeting minutes for each session.

City Council Meeting
Amended Agenda

Tuesday, March 12, 2019

SAM LICCARDO, MAYOR
CHAPPIE JONES, VICE MAYOR, DISTRICT 1
SERGIO JIMENEZ, DISTRICT 2
RAUL PERALEZ, DISTRICT 3
LAN DIEP, DISTRICT 4
MAGDALENA CARRASCO, DISTRICT 5
DEV DAVIS, DISTRICT 6
MAYA ESPARZA, DISTRICT 7
SYLVIA ARENAS, DISTRICT 8
PAM FOLEY, DISTRICT 9
JOHNNY KHAMIS, DISTRICT 10

6.2 19-055 **Actions Related to the Downtown Airspace and Development Capacity Study.**

Recommendation: As recommended by the Community and Economic Development Committee on January 28, 2019:

(a) Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.

(b) Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.

(c) Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:

(1) Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.

(2) Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.

(3) Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.

(4) Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.

(5) Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

(d) Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

CEQA: Not a Project, File No. PP17-008, General Procedure & Policy Making resulting in no changes to the physical environment and File No. PP17-001, Feasibility and Planning Studies with no commitment to future actions. (Airport)
[Community and Economic Development Committee referral 1/28/19 - Item (d)5]
[Continued from 2/26/19 - Item 6.2 (18-1944)]

Attachments
Memorandum
Presentation
Supplemental Memorandum, 3/8/2019
3/6/19 Real Estate Impacts Assessment Summary
Presentation
Memorandum from Mayor, Jones, Peralez, Carrasco, 3/8/2019
Memorandum from Councilmember Jimenez, 3/11/2019
2/19/19 Airport Case Studies Memo
2/19/19 Existing Conditions Assessment Memo
2/19/19 Project Steering Committee Presentations
2/19/19 Airspace Scenarios and Aircraft Performance Assessmen
1/28/19 CED Presentation
CED Supplemental Memorandum, 1/28/2019
Letters from the Public 1
Letters from the Public 2
Letters from the Public 3
Letters from the Public 4

7. ENVIRONMENTAL & UTILITY SERVICES

8. PUBLIC SAFETY

9. REDEVELOPMENT – SUCCESSOR AGENCY

- Open Forum

Members of the Public are invited to speak on any item that does not appear on today's Agenda and that is within the subject matter jurisdiction of the City Council.

10. LAND USE

CITY OF
SAN JOSE
CAPITAL OF SILICON VALLEY

COUNCIL AGENDA: 2/26/2019
ITEM: 6.2
FILE NO: 18-1944

Memorandum

TO: HONORABLE MAYOR AND CITY COUNCIL

FROM: Toni J. Taber, CMC
City Clerk

SUBJECT: **SEE BELOW**

DATE: February 26, 2019

SUBJECT: Actions Related to the Downtown Airspace and Development Capacity Study.

RECOMMENDATION:
As recommended by the Community and Economic Development Committee on January 28, 2019:

(a) Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.

(b) Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.

(c) Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:

(1) Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.

(2) Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.

(3) Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.

(4) Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.

(5) Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

(d) Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and

conduct outreach with the downtown development community to provide information and guidance on development height restrictions.
CEQA: Not a Project, File No. PP17-008, General Procedure & Policy Making resulting in no changes to the physical environment and File No. PP17-001, Feasibility and Planning Studies with no commitment to future actions. (Airport)
[Community and Economic Development Committee referral 1/28/19 - Item (d)5]

CITY OF
SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: COMMUNITY & ECONOMIC DEVELOPMENT COMMITTEE

FROM: Kim Walesh
John Aitken
Rosalynn Hughey

SUBJECT: SEE BELOW

DATE: January 14, 2019

Approved D. DSyL

Date 1/18/19

COUNCIL DISTRICT: 3 & 6

SUBJECT: DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY REPORT FINDINGS AND RECOMMENDATIONS

RECOMMENDATION

1. Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.
2. Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.
3. Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:
    a. Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.
    b. Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.
    c. Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including

accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.

d. Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.

e. Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

4. Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

OUTCOME

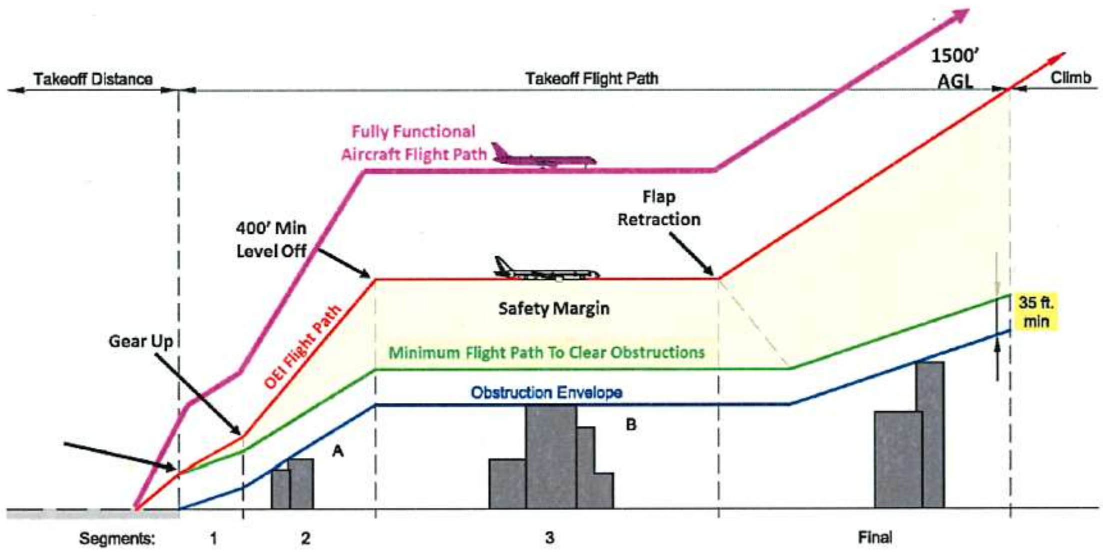
City Council approval of the above recommendations would allow maximum safe development heights and provide increased economic benefits in the Downtown, including the Diridon Station Area.

BACKGROUND

Two of the City's primary economic priorities are the continued development of Downtown and growth in air service at Mineta San Jose International Airport (Airport). The Airport and Downtown are within two miles of each other and the primary aircraft approach and departure paths for the Airport are directly over Downtown, which places limitations on Downtown building heights.

The Federal Aviation Administration (FAA) protects airspace around airports through the application of Federal Aviation Regulations (FAR) Part 77 and Terminal Instrument Procedures (TERPS). These regulations define various airspace "surfaces" or slopes which radiate out from an airport's runway and mandate an FAA obstruction evaluation of any proposed structure that exceeds one or more of these surfaces. In San Jose, as in most local land use jurisdictions, proposed structures subject to FAA review are typically required to obtain a "determination of no hazard" clearance from the FAA prior to, or as a condition of, City development permit approval.

While FAA applies Part 77 and TERPS to safely operate the airspace around an airport, it does not consider airline emergency procedures as part of the review. Under Part 25 of the Federal Aviation Regulations, airlines are required to have emergency flight procedures in place for every departure in the event of an engine power loss during take-off. These emergency flight procedures are known as "one-engine inoperative (OEI)" procedures and are designed so that an aircraft can gain sufficient altitude immediately upon takeoff even if an engine loses power, follow a prescribed flight path over any obstacles and surrounding terrain, and safely circle back to the airport for an emergency landing. Each airline develops its own OEI procedures based on guidelines set forth by the FAA and the International Civil Aviation Organization (ICAO). The diagram below illustrates the requirements in these guidelines.



Protecting for OEI emergency procedures can limit maximum building heights around an airport more severely than the FAA evaluations conducted under FAR Part 77 and TERPS. The FAA believes that airlines can mitigate OEI airspace obstructions by revising their emergency procedures or by reducing takeoff weight to improve climb performance to safely clear obstructions. However, implementing takeoff weight restrictions by reducing passengers, cargo, or fuel can impact the economic viability of airline service. Even small weight penalties can affect the feasibility of airline service to a destination, most notably transcontinental and transoceanic destinations typically serviced by large, heavy aircraft. Therefore, obstructions within the surrounding airspace can be a factor in an airport's ability to attract or retain desired air service.

The City's 2007 Airport Obstruction Study mapped out airline OEI protection surfaces and associated building elevation limits around the Airport. The 2007 study identified two OEI corridors used by the airlines: one over the Downtown core (east of Highway 87 and referred to as the "straight out corridor") and one over the Diridon area (west of Highway 87 and referred to as the "west corridor"). Airlines determine which corridor they will use – straight out or west corridor – depending on the aircraft being flown, the aircraft's destination, and the airline's pilot training program. Those airlines using the west corridor in their OEI procedures do so to avoid the existing high-rise buildings in the Downtown core. Since the OEI west corridor requires a shallower aircraft climb rate due to the turning maneuver, OEI building height limits in the Diridon area are more restrictive than in the Downtown core. Toward the southern end of Downtown, the FAA TERPS surfaces become more restrictive than the OEI procedure surfaces. To date, with developer cooperation, all approved high-rise building projects in the Downtown core and Diridon Station area have been consistent with the OEI surfaces.

In June 2017, City Council directed staff to update the 2007 study and include an economic analysis to identify the trade-offs between maintaining OEI protection surfaces and potential increased building heights under a no-OEI protection or alternative policy. Pursuant to that direction, the Office of Economic Development and the Airport Department have conducted the Downtown Airspace and Development Capacity Study. Landrum & Brown, a national aviation planning/engineering consultant with extensive experience working for the City on OEI and other airport technical issues, was contracted to perform the technical work on the study, with assistance from the economic analysis firm of Jones, Lang, & LaSalle. A project Steering Committee, comprised of stakeholder representatives including the San Jose Downtown Association, SPUR, Silicon Valley Organization, Silicon Valley Leadership Group, Santa Clara & San Benito Counties Building and Construction Trades Council, Santa Clara County Residents for Responsible Development, and Airport Commission was convened to provide review and input on the technical analysis and resulting strategy. City staff participation on the Steering Committee included representatives from the Mayor's Office, Councilmember Peralez's Office, Planning, Building and Code Enforcement Department, Office of Economic Development, and the Airport Department. The project Steering Committee met eight (8) times over the course of the study to review extensive technical materials and provide input and comments during the process.

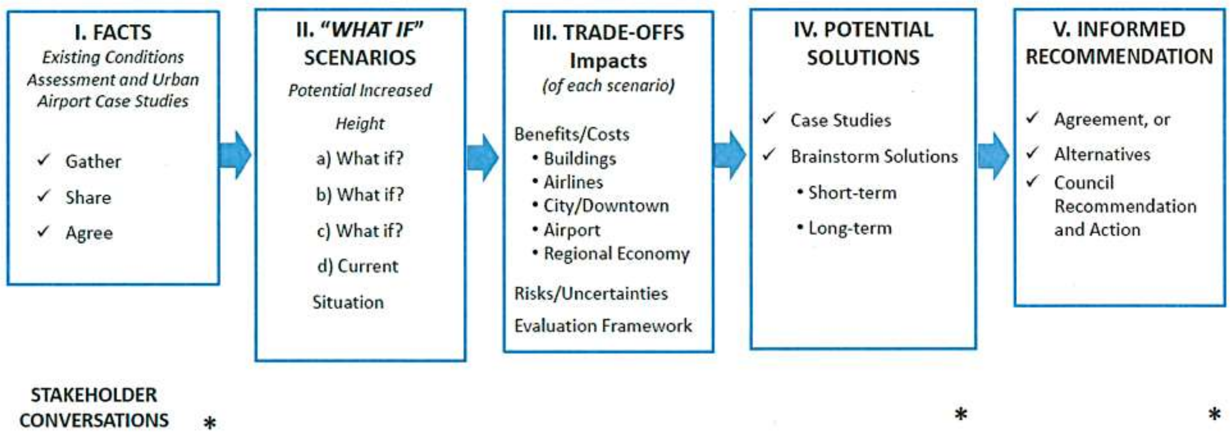
Additionally, three larger downtown stakeholder information meetings were held during the study, once at the initial launch of the study, once to report on study progress and initial findings, and once to present a proposed strategy. The stakeholder meetings were well attended and served as opportunities for the development community to ask questions and provide input to the study.

ANALYSIS

The Downtown Airspace and Development Capacity Study consisted of three major tasks:

- Task 1 Existing Condition Assessment
- Task 2 OEI Feasibility Studies and Impact
- Task 3 Economic Analysis

The collaborative framework outlined below, developed with the project Steering Committee, augmented the project's technical scope:



Task 1: Existing Condition Assessments

Landrum & Brown evaluated and updated the City's Downtown and Diridon Station area obstruction data, existing airline OEI procedures, critical aircraft for SJC current and anticipated air service, and the FAA's 30+ TERPS arrival, departure, and circling procedures to the south of the Airport.

In addition, a weather analysis over the last 15 years was completed, which confirmed that the Airport is in south flow operations (departures to the south) an average of 13% of the time, most often during winter months and morning hours. All-day south flow operations occurred an average of 17 days annually. It is during south flow that airlines need to depart over Downtown.

Task 2: Feasibility Study and Impact

Ten conceptual airspace protection scenarios were formulated to test various alternative combinations of OEI and FAA/TERPS airspace surface protections on maximum building heights. With input from the project Steering Committee, four of the ten scenarios were selected for detailed analysis:

- Scenario 4: No OEI protection (FAA/TERPS only)
- Scenario 7: Straight-out OEI protection with no OEI west corridor protection
- Scenario 9: No OEI protection plus potential elevation increase to some FAA/TERPS surface projections
- Scenario 10 (A–D): Straight-out OEI protection with four alternative OEI west corridor surface protections

The following table displays the range of increased maximum building heights for each scenario compared to existing OEI protection conditions:

Scenario	**Additional Height Downtown Core**	**Additional Height Diridon Station Area**
Scenario 4: No OEI	5' - 35'	70'-150'
Scenario 7: Straight-out OEI protection with no OEI west corridor	0'	70'-150'
Scenario 9: No OEI protection plus increased FAA/TERPS surfaces	35'-100'	80'-220'
Scenario 10: Straight-out OEI projection with alternative west corridor protection		
Option A (Increase of 25')	0'	15'-25'
Option B (Increase of 50')	0'	30'-55'
Option C (Increase of 75')	0'	45'-85'
Option D (Increase of 103')	0'	65'-115'

After determining the potential building height increases in the study areas, a technical analysis was conducted to assess the aircraft performance impact (weight penalties) under each scenario using various combinations of aircraft types, destinations, and seasonal temperatures. The following charts illustrate the passenger (PAX) and cargo penalties for specific aircrafts serving selected existing non-stop markets and impacts under each scenario in the summer and winter months.

Transcontinental – New York Market – Assessment of Potential Weight Penalties

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Hawaii – Honolulu Market – Assessment of Potential Weight Penalties

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Europe - Frankfurt Market - Assessment of Potential Weight Penalties

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	21,580	-	4,400
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	15,338	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	10,000	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	9,349	-	-
	Opt 10C: 129' - 240' AGL	-	14,096	-	-
	Opt 10D: 146' - 260' AGL	-	19,282	-	2,027
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	29	26,198	-	11,735

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	2	22,911	-	7,811
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	16,407	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,217	-	-
	Opt 10B: 115' - 224' AGL	-	9,353	-	-
	Opt 10C: 129' - 240' AGL	-	14,270	-	-
	Opt 10D: 146' - 260' AGL	-	19,612	-	3,876
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	41	23,514	-	15,397

Asia – Beijing Market - Assessment of Potential Weight Penalties

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

After much discussion with the project Steering Committee, Scenario 4 was selected as the most promising alternative to the existing OEI protection practice. Scenario 4 demonstrates that the transcontinental market (represented by New York), European market (represented by Frankfurt), and Hawaiian market (represented by Honolulu) would have minimal weight penalties, if any. The Asian market (represented by Beijing) would have passenger and/or cargo penalties under south flow conditions (13% of annual operations). The Steering Committee noted that if air service demand to Asia could be built up to support the transition of service from a smaller 787 aircraft to a larger 777, no passenger penalties would be incurred.

The Steering Committee discussed the possibility of creating a "Community Air Service Support Fund" that could compensate an airline for OEI-related weight penalties when incurred, if needed to keep the flight viable. Federal regulations prohibit the City from funding this type of effort, but other airport service support funds, generated by a private sector partner, such as a Chamber of Commerce, may be feasible.

The airline service analysis conducted for the existing destinations, was expanded to potential future markets. Boston, Miami, and Anchorage were analyzed as additional domestic non-stop destinations, and the charts below show that 737-800 service to these cities would not sustain any significate weight penalties under Scenario 4. It is important to note that Jet Blue Airlines currently serves Boston with an A320.

Additional Domestic Markets - Assessment of Potential Weight Penalties

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Boston - BOS Summer (81.3° F)		**A320 (150 seats/0 lbs. cargo)**		**B737-800 (175 seats/0 lbs. cargo)**	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-
Miami - MIA Summer (81.3° F)		**A320 (150 seats/0 lbs. cargo)**		**B737-800 (175 seats/0 lbs. cargo)**	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

For international air service markets, Rio de Janeiro (6,575 miles), Taipei (6,499 miles), Hong Kong (6,957 miles), Delhi (7,731 miles), and Dubai (8,120 miles) were analyzed, using aircraft typical on such international routes. The analysis indicated that the maximum route distance that could be served from San Jose under Scenario 4 is approximately 6,500 miles, as illustrated in the charts below. The implication of this is that very long haul international destinations may not be able to be served directly from San José and would need to make at least one stop.

Long Range Markets Stress Test - Assessment of Potential Weight Penalties

Rio de Janeiro - GIG Summer (81.3° F) 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144

Taipei - TPE Summer (81.3° F) 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							89	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	

Hong Kong - HKG Summer (81.3° F) 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	

Delhi - DEL Summer (81.3° F) 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor								
TERPS Only	55	5,014	77	3,132	72	106	184	

Dubai - DXB Summer (81.3° F) 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor								
TERPS Only	65	3,537	79	2,688	72	1,828	191	

*Existing Straight Out OEI calculations use different cargo capacity numbers than West OEI and TERPS Only.

As a check of the technical analysis described above, Landrum & Brown also reached out to all the airlines serving San Jose to request their independent analysis of how each of the four scenarios would impact their current and future air service markets at the Airport during south flow conditions. 12 airlines responded and provided the following feedback with respect to Scenario 4:

- Alaska, American, Aeromexico, Delta, Southwest, and Volaris reported no weight penalties to any of its destinations below a temperature of 92° F.
- Hawaiian and United reported only minor cargo penalties, and potentially minor passenger penalties and larger cargo penalties depending on destination and aircraft.
- Federal Express reported no significant cargo penalties.
- British Airways reported no weight penalty impacts for its London service.
- ANA reported minor cargo penalty impacts and no passenger penalties for its Tokyo service.
- Hainan reported the most significant impacts for its Beijing service, resulting in a significant reduction in cargo and passenger payload (up to 50+ passengers on the B787-9 when all seats are sold).

Overall, these airline responses are consistent with the consultant's technical analysis.

Task 3: Economic Analysis

The economic impacts to the Downtown Core, Diridon Station area, airlines, and the Airport were calculated based on the net new development that may occur with an increase from OEI-restricted heights to current FAA/TERPS surface heights. In the Downtown core, the findings indicate that there is already significant density available under the OEI height limits, so setting allowable heights up to the FAA/TERPS limits would not have a significant impact for many years (based on historical development trends), although certain development sites might experience incremental gains.

The most significant economic gains resulting from no OEI protection surfaces are expected to occur in the Diridon Station Area. Development capacity in this area under Scenario 4 is estimated at a net building addition of 8.6 million square feet, resulting in net new construction value of $4.4 billion and net new annual property tax revenue to the City of San Jose of $5.5 million once the construction of all 8.6 million square feet is complete. One-time revenue for building fees, development taxes, park impact fees, and school district fees would also be collected. A split of 10% commercial construction and 90% residential construction for this additional development would result in an increase of 4,700 employees and 12,800 residents in the area.

The economic impact on the Airport and the airlines was studied for the year 2024, the estimated time that impacts could occur as new development starts coming on line. In 2024, Scenario 4 would result in potential airline losses of $802,000 in seat revenue and compensation to passengers as compared to a scenario where building heights were limited to the OEI surfaces. These losses could grow to slightly over $1.2 million in 2032 and to $1.5 million by 2038 as the market, costs, and load factors increase over time. The establishment of an ongoing Community Air Service Support Fund by 2024, as a mechanism to support ongoing international air service, particularly to Asia, could serve to offset these airline economic losses.

The economic impacts over time to the Airport Enterprise Fund would be minimal, consisting mainly of lost Passenger Facility Charge (PFC) revenue and terminal concession spending. The positive economic impact of increasing development heights in the Downtown core and Diridon Station Area significantly outweighs aviation-related economic impacts.

SUMMARY

The Downtown Airspace and Development Capacity Study analysis was one of the most extensive studies that the City has conducted on how the Airport and the Downtown core and Diridon Station area can both thrive as economic drivers of San José and the Silicon Valley region. With the dedicated involvement of the project Steering Committee, staff is recommending that the City move forward with the study's Scenario 4 and allow development height to be governed by FAA obstruction evaluation determinations. However, to protect the viability of current and future international air service markets, particularly to Asia, staff also recommends that Council approval of Scenario 4 be accompanied by direction to work with the private sector to establish community-funded Air Service Support Fund. This fund would mitigate the occasional airline economic penalties that would incur during south flow conditions and to support retention and expansion of transoceanic airline service.

In addition, it is recommended that the Council actions include direction to the Administration to implement refinements to the development review process for projects subject to FAA obstruction evaluations.

EVALUATION AND FOLLOW-UP

Airport, Planning, Building, and Code Enforcement and Office of Economic Development staff shall implement the recommendations brought forward in this memorandum upon Council approval and report the relevant impacts of these recommendations back to the appropriate council committee, as necessary.

POLICY ALTERNATIVES

Alternative: Maintain existing OEI airspace protection surfaces above the Downtown Core and Diridon Station Area.
Pros: This alternative would provide the maximum protection of the airspace for Mineta San Jose International Airport.
Cons: Maintaining the existing practice for airspace protection would not provide any opportunities for additional development heights in the Downtown Core or the Diridon Station Area.
Reason for not recommending: Implementing this policy alternative would prevent San Jose from maximizing the development of its urban core, which is a fundamental principal of the Envision 2040 General Plan, without significant gains to airport or airline operations.

PUBLIC OUTREACH

A project Steering Committee, comprised of stakeholder representatives from the San Jose Downtown Association, SPUR, Silicon Valley Organization, Silicon Valley Leadership Group, Santa Clara & San Benito Counties Building and Construction Trades Council, Santa Clara County Residents for Responsible Development, and Airport Commission was convened to provide review and input on the technical analysis and resulting strategy. The project Steering

Committee met eight (8) times over the course of the study to review extensive technical materials and provide guidance and feedback during the process.

In addition to the project Steering Committee, three broader downtown stakeholder informational meetings were held, once at the initial launch of the study, once to report on study progress and initial findings, and once to present a proposed strategy. Staff will present the information in this memorandum to the Delmas Park Neighborhood Association on January 22 and the Team San Jose board of directors on January 23.

This memorandum will be posted to the City of San Jose's website for the January 28, 2019 Community and Economic Development Committee meeting and the February 12, 2019 City Council meeting.

COMMISSION RECOMMENDATION/INPUT

The Airport Commission held a special public meeting on January 14 to receive updates and discuss the Downtown Airspace and Development Capacity Study. The commission will continue its discussion of this study at a second special meeting on January 24.

COORDINATION

This memorandum has been coordinated with the Office of Economic Development, Planning, Building, and Code Enforcement, and the City Attorney's Office.

FISCAL/POLICY ALIGNMENT

The recommendations in this memorandum are consistent with the Envision San José 2040 General Plan amended on February 27, 2018 to continue developing a world-class airport and build national and international connections by attracting new air service to it (Goal IE-4.2).

CEQA

Not a Project, PP17-008, general procedure and policy making resulting in no physical changes to the environment.

/s/
JOHN AITKEN, A.A.E.
Director of Aviation

/s/
KIM WALESH
Deputy City Manager
Director of Economic Development

/s/
ROSALYNN HUGHEY, Director
Planning, Building and Code Enforcement

For questions, please contact John Aitken, Airport Director, at 408-392-3610.

City Council Meeting Synopsis

Tuesday, March 12, 2019

SAM LICCARDO, MAYOR
CHAPPIE JONES, VICE MAYOR, DISTRICT 1
SERGIO JIMENEZ, DISTRICT 2
RAUL PERALEZ, DISTRICT 3
LAN DIEP, DISTRICT 4
MAGDALENA CARRASCO, DISTRICT 5
DEV DAVIS, DISTRICT 6
MAYA ESPARZA, DISTRICT 7
SYLVIA ARENAS, DISTRICT 8
PAM FOLEY, DISTRICT 9
JOHNNY KHAMIS, DISTRICT 10

6.2 19-055 Actions Related to the Downtown Airspace and Development Capacity Study.

Recommendation: As recommended by the Community and Economic Development Committee on January 28, 2019:
(a) Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.
(b) Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.
(c) Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:
(1) Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.
(2) Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.
(3) Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.
(4) Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.
(5) Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.
(d) Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.
CEQA: Not a Project, File No. PP17-008, General Procedure & Policy Making resulting in no changes to the physical environment and File No. PP17-001, Feasibility and Planning Studies with no commitment to future actions. (Airport)
[Community and Economic Development Committee referral 1/28/19 - Item (d)5]
[Continued from 2/26/19 - Item 6.2 (18-1944)]
The motion to limit City Council discussion to five minutes per Councilmember exclusive of questions was approved.
(8-0-3. Noes: Jimenez, Peralez, Diep)

(Item Continued on the Next Page)

6.2 19-055 Actions Related to the Downtown Airspace and Development Capacity (Cont'd)

Actions Related to the Downtown Airspace and Development Capacity Study was approved as recommended, including approval of the Memorandum from Mayor Liccardo, Vice Mayor Jones, and Councilmembers Peralez and Carrasco to:

Accept staff recommendation and direct staff to:

I. Work with the Council Offices to ensure community engagement is integrated into any land use update process related to new height changes.

2. Report back to the Airport Commission and City Council with an update within a year, if needed, on any feedback from the airlines.

This was addended with approval of Memorandum from Councilmember Jimenez to:
Approve the staff recommendation dated February 26, 2019, with the following modifications:

1. Direct staff to return to Council with a study of an Incentive Zoning Policy that will enable residential and commercial developers to voluntarily access additional development capacity above the current allowable heights by providing amenities or investment in the City.
a. Staff should review Incentive Zoning Policies in Mountain View, Seattle, and other cities that allow height and density increases in exchange for additional affordable housing or other community benefits.
b. Review and update relevant residential and/or commercial development feasibility studies, analyzing the impact of upzoning on feasibility of additional development fees.

2. Direct staff to return to Council with an analysis of Incentive Zoning Policies for consideration before directing the Administration to initiate amendments to the General Plan and other key policy documents, as recommended in item (d) in the February 26th staff memo.
(11-0)

7. ENVIRONMENTAL & UTILITY SERVICES

8. PUBLIC SAFETY

9. REDEVELOPMENT – SUCCESSOR AGENCY

• Open Forum

No cards.

SILICON VALLEY'S AIRPORT

SJC

Downtown Airspace and Development Capacity Study

March 12, 2019

Response from ALPA

AIR LINE PILOTS ASSOCIATION INTERNATIONAL

THE WORLD'S LARGEST PILOTS UNION • WWW.ALPA.ORG

535 Herndon Parkway • Herndon, VA 20170 • Phone 703-689-2270 • 888-FLY-ALPA

March 11, 2019

San Jose, CA City Council

San Jose, CA Airport Commission

SJC Airport Director

Sent by email to all recipients

Dear San Jose Officials:

By letter dated February 27, 2019, the Air Line Pilots Association, Int'l (ALPA), which represents more than 61,000 airline pilots who fly for 33 airlines in the U.S. and Canada, made you aware of potential concerns with proposals related to land use and development within the city of San Jose. We requested, and were promptly provided with, access to documents related to these proposals from the office of the SJC Aviation Director, which includes analysis of possible impacts on airline operations.

After reviewing these materials with the aviation safety chairs at each of the ALPA airline pilot groups whose respective companies operate into SJC, it is our view that the land use proposals under consideration will not impact available safety margins for commercial operations. Given that the preponderance of the approximately 12% of the airport's annual operations which are conducted toward the south occur in cooler winter months, the economic impacts on the airlines by the proposals under consideration may be minimal.

We appreciate the opportunity to review and provide comments on the subject development proposals.

Sincerely,

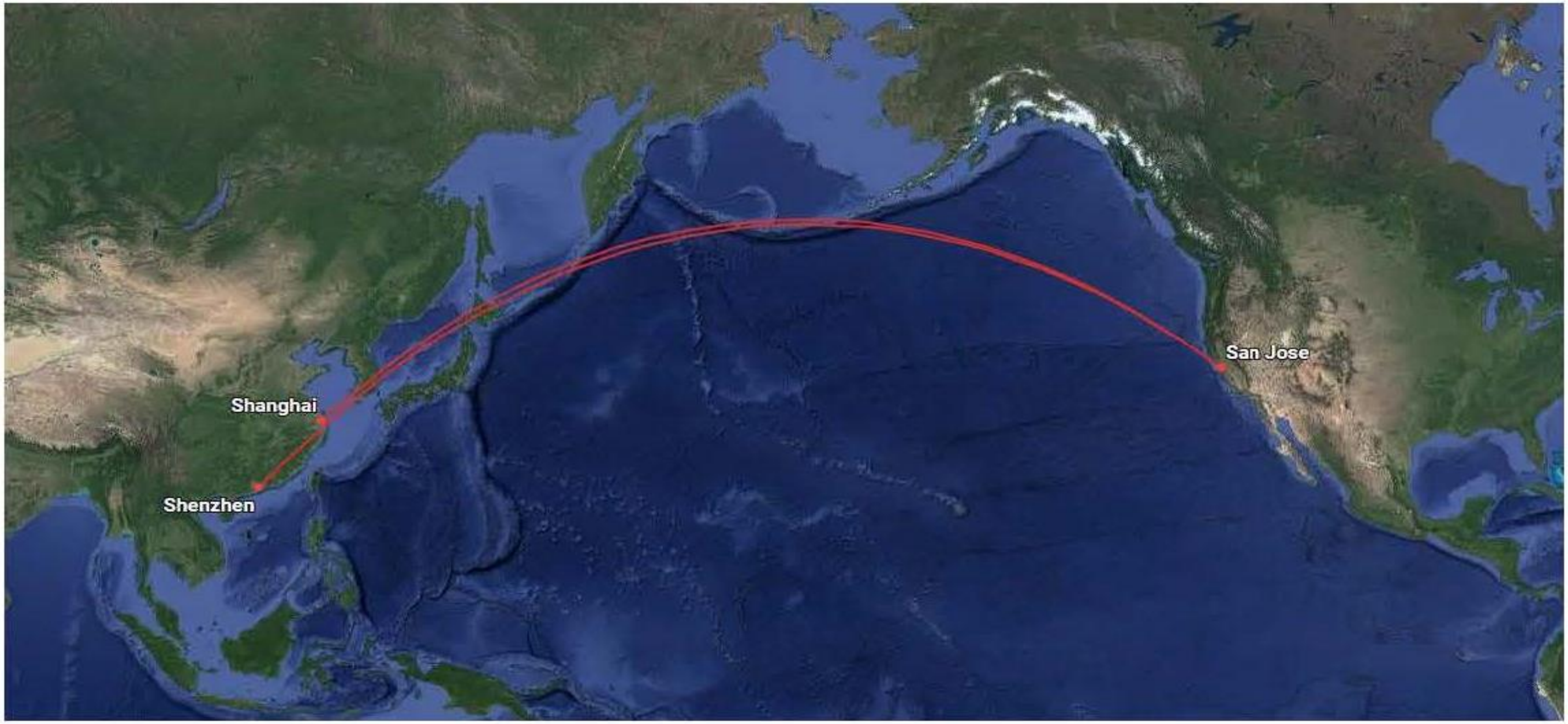
Capt. Steve Jangelis
Aviation Safety Chair
Air Line Pilots Association, Int'l

"After reviewing these materials with the aviation safety chairs at each of the ALPA airline pilot groups whose respective companies operate into SJC, it is our view that the land use proposals under consideration will not impact available safety margins for commercial operations."

Additional Airline Responses

Airline	Response
Alaska	"I am happy to report Alaska Airlines expects there to be no adverse weight impacts to our current SJC RW12L-12R OEI West Corridor procedures at these proposed obstacle heights for the one datapoint location. Takeoff weight provides for a full passenger load for any of our routes or current fleets. Only Scenario 10D height provided a potential cargo loss in a worst case scenario."
American Airlines	"In conclusion, the proposals to build these buildings in the locations indicated southeast of the airport in San Jose may not have much impact to our current service but there could be some impact to any future expanded service to destinations further east such as Boston and Miami and possibly Charlotte. Most of these impacts would be a reduction in the amount of revenue cargo we could legally carry and safely clear the proposed obstacles."
ANA	• We needed to further study to evaluate potential impact to our take-off performance. • As a result, we have concluded that potential impact to passenger would be minimal although there will still be some impact to cargo in Scenario 4. • We would like to pursue practical solutions for such negative impacts, including potential unforeseeable impact, by working together with San Jose City, San Jose Airport and other stakeholders.
JetBlue	"The proposed building is in the splays for 12L & 12R. It is more limiting for 12L and will cost the A320 about 900lbs of lift. The A321 will lose about 1100lbs of lift. Both of these losses can be absorbed for the SJC-JFK and SJC-BOS markets. I looked at 32GR(162), 32RD(200), and 32SB(159) for comparison with today's capability and did not get worse results than with the current obstacle set.

Routes to Shanghai & Shenzhen

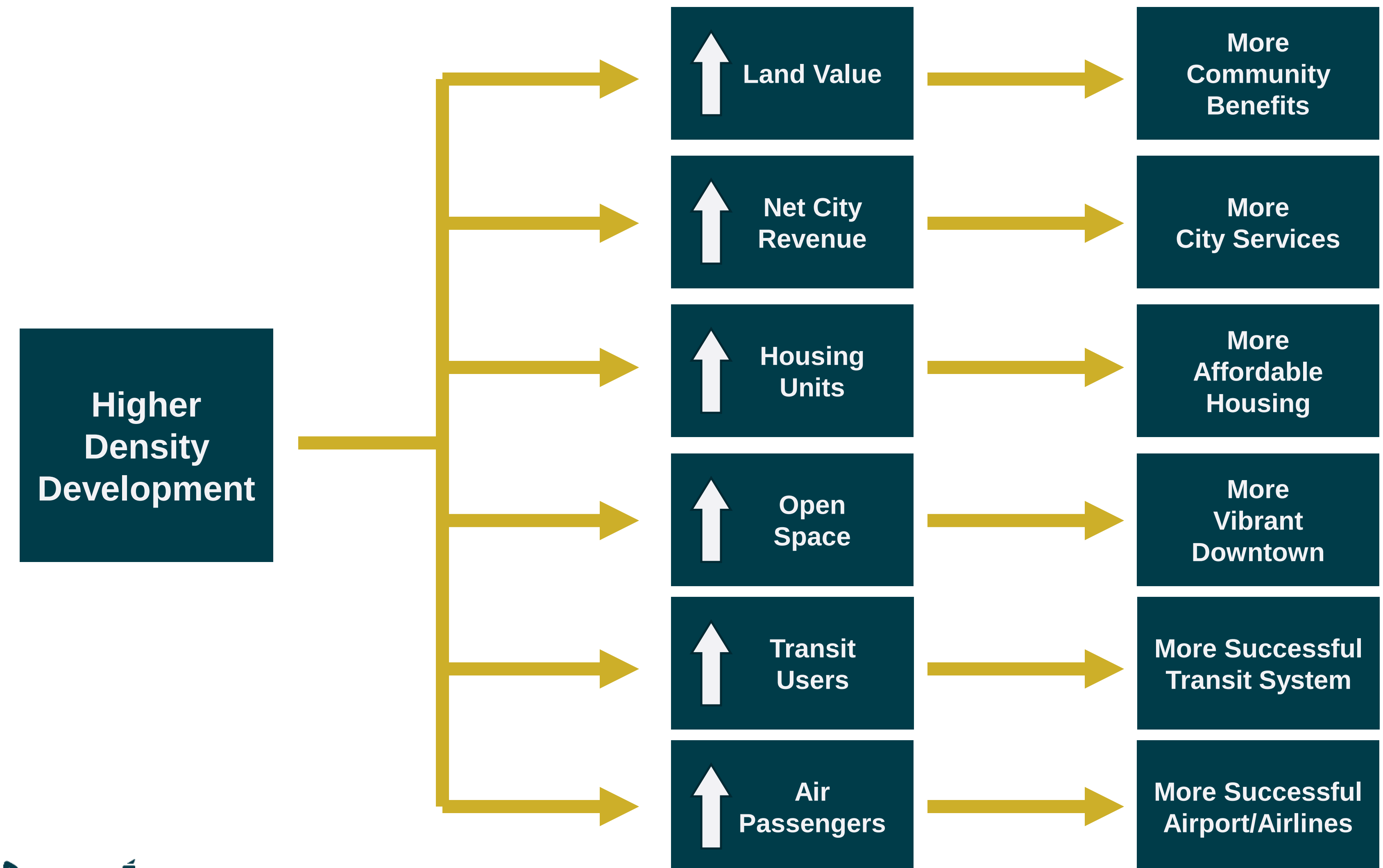


Routes to Shanghai & Shenzhen

Shanghai - PVG Summer (81.3° F) 5,371 miles	A350-900 (334 seats/17,927 lbs cargo)		B787-8 (213 seats/20,788 lbs cargo)		B787-9 (292 seats/11,885 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Scenario 1: West OEI Corridor						
Scenario 1: Existing Straight Out OEI	11	17,927		14,295	31	11,885
Scenario 4: TERPS Only	28	17,927		18,453	46	11,885
Scenario 10B: West OEI Corridor		3,608		250		3,925
Scenario 10D: West OEI Corridor		14,187		8,924	6	11,885

Shenzhen - SZX Summer (81.3° F) 6,034 miles	A350-900 (334 seats/1,758 lbs cargo)		B787-8 (213 seats/7,612 lbs cargo)		B787-9 (292 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Scenario 1: West OEI Corridor					10	
Scenario 1: Existing Straight Out OEI	74	1,758	24	7,612	85	
Scenario 4: TERPS Only	91	1,758	41	7,612	100	
Scenario 10B: West OEI Corridor	7	1,758		239	25	
Scenario 10D: West OEI Corridor	49	1,758	4	7,612	61	

Positive Outcomes Possible with Increased Height



The Situation

- Downtown and Airport are two of San Jose’s economic priorities
- One priority: increase the density of the Downtown Core and the Diridon Station Area
- Another priority: continue developing a world-class airport and build national and international connections by attracting new air service
- Need to balance these two priorities, since taller buildings can impact certain flights to certain markets

Safety Is Top Priority and Not Changing

- FAA protects arriving and departing airspace around airport.
  - Invisible “surfaces” known as Part 77 and FAA/TERPS
  - Protect all aircraft types, all engines under normal operations

- Any proposed structure near this protected airspace requires FAA approval, which is incorporated into the City’s permitting requirements.

- Any potential changes to San Jose building heights do not affect FAA-mandated TERPS procedures or safety.

One-Engine Inoperative (OEI)

- One-engine inoperative (OEI) is a procedure in case one engine on a two-engine commercial aircraft becomes inoperative upon take-off.

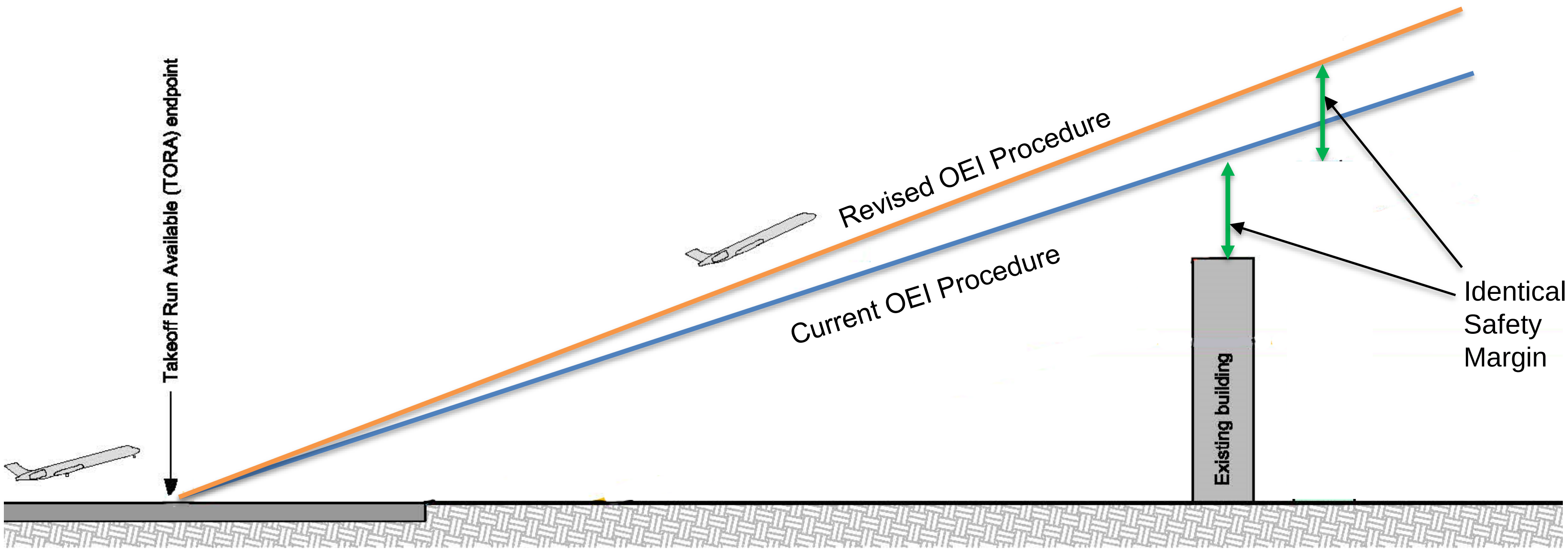
- The FAA requires airlines to develop their own OEI procedures based on their specific aircraft for each departure.

- FAA does not consider OEI procedures to be a factor in height limits because airlines have the option to offload passengers, cargo, and fuel to clear structures safely with OEI.

- A plane that cannot safely climb out of SJC and avoid structures on one engine would NOT be allowed to take-off ***in any scenario***.

- OEI is not a safety issue.

Identical Safety Margin



Note: for Illustrative Purposes Only

Considerations for South Flow Departures

- What is "South Flow"?
  - Aircraft depart to the south during strong winds from the south
  - More typical in winter than summer (associated with cooler temps)
- Weight of the Aircraft
  - Passengers ("Load Factors"), cargo & fuel
- Temperature
  - Aircraft can climb faster in cooler weather
- Aircraft and Configuration
  - Certain aircraft have more power to take-off
  - Seating configuration of the aircraft can mean fewer passengers on the plane

2007 Obstruction Study

In 2007, San José conducted an Obstruction Study that established:

- The Straight Out OEI procedure, based on existing buildings working with developers
- The West Corridor OEI procedure, based on height of SAP Center

Study Evaluation Area

Council Direction to Staff (June 2017)

- Re-evaluate the 2007 Obstruction Study, with a goal of determining if changes can be made to maximize potential development densities Downtown
- Remain consistent with FAA and airline safety requirements
- Develop a collaborative process

Project Steering Committee

Community Representatives

Teresa Alvarado – SPUR

Scott Knies – San Jose Downtown Association

Matt Mahood – Silicon Valley Organization

David Bini – Building & Construction Trades Council

Josue Garcia – Santa Clara County Residents for Responsible Development

Matt Quevedo – Silicon Valley Leadership Group

Julie Matsushima – Airport Commissioner and Downtown Resident

City Staff

John Aitken and Judy Ross – Airport Department

Kim Walesh and Blage Zelalich – City Manager's Office/Office of Economic Development

Rosalynn Hughey – Planning, Building and Code Enforcement

David Hai Tran & Christina Ramos – District 3 Office

Kelly Kline – Mayor's Office

Consultants

Landrum and Brown & Jones, Lang, and LaSalle

Collaborative Process

I. FACTS

Existing Conditions Assessment and Urban Airport Case Studies

- ✓ Gather
- ✓ Share
- ✓ Agree

II. "*WHAT IF*" SCENARIOS

Potential Increased Height

a) What if?

b) What if?

c) What if?

d) Current Situation

III. TRADE-OFFS Impacts

(of each scenario)

Benefits/Costs
- Buildings
- Airlines
- City/Downtown
- Airport
- Regional Economy

Risks/Uncertainties

Evaluation Framework

IV. POTENTIAL SOLUTIONS

- ✓ Case Studies
- ✓ Brainstorm Solutions
  - Short-term
  - Long-term

V. INFORMED RECOMMENDATION

- ✓ Agreement, or
- ✓ Alternatives
- ✓ Council Recommendation and Action

STAKEHOLDER CONVERSATIONS * * *

CED COMMITTEE PRESENTATIONS * *

Today

Airspace Protection Scenarios

- Started by looking at existing conditions and 10 different scenarios

- Steering Committee narrowed the list down to 4 scenarios for more detailed analysis:
  - **Scenario 4**: FAA/TERPS Height
  - **Scenario 7**: Existing Straight-out OEI protection
  - **Scenario 10**: Existing Straight-out OEI protection with West Corridor OEI protection alternatives
  - **Scenario 9**: Increased FAA/TERPS Height

Steering Committee Recommendation

Scenario 4 – FAA/TERPS Height

Steering Committee concluded this option had the right balance of:

- Allowing building heights to increase
- Maintaining key nonstop routes for Mineta San José International Airport

Development Impact of Scenario 4

Downtown Core

- Specific development sites may achieve some additional height: 5'-35'

Diridon Station Area

- Developable heights could increase by 70'-150'
- Up to 8.6M net new square feet of development
- $4.4B in construction value and $5.5M in annual property tax

Performance Mitigations for OEI

Certain long-haul flights become subject to mitigation procedures to protect OEI when a structure is built to FAA/TERPS.

- Day-to-Day Mitigations
  - Off loading of cargo and/or passengers
  - Request another runway (wind, weather, air traffic permitting)
  - Make a refueling stop
- Long-Term Alternatives
  - Change aircraft type
  - Cancel air service if payload loss affects financial viability

Airline Response to Scenario 4

13 airlines currently serving SJC responded for requests for a performance assessment of the various airspace scenarios.

Hainan indicated a potential concern with their existing service to Beijing.

Responded	No Response
Alaska	Air Canada
American	JetBlue
ANA	
British Airways	
Delta	
FedEx	
Frontier	
Hainan	
Hawaiian	
Southwest	
UPS	
United	
Volaris	

Frequency of Asian South Flow Departures

SJC Operations									
	2015		2016		2017		2018		Average
% Airport Ops in South Flow	9.1		15.9		12.9		11.9*		12.6
	# South Flow Dep.	% of Airline's Dep.	# South Flow Dep.	% of Airline's Dep.	# South Flow Dep.	% of Airline's Dep.	# South Flow Dep.	% of Airline's Dep.	% of Airline's Dep.
ANA	30	8.24%	57	15.83%	40	11.11%	23	6.32%	10.38%
Hainan	5	4.10%	30	13.45%	27	11.20%	10	4.81%	8.39%

** Preliminary*

Asian south flow departures represent >0.06% of total SJC commercial departures.

Nonstop Routes: South Flow Feasibility Today (summer)

London	Frankfurt	Tokyo	Beijing	Shanghai
B787-9 B777-300ER	B787-9 B777-300ER	B787-9 B777-300ER	787-9 B777-300ER	B787-9 B777-300ER A330-200 A350-900

Green – No Significant Weight Penalties
Orange – Some Weight Penalties
Red – Significant Weight Penalties

Rio de Janeiro	Taipei	HK/Shenzhen	Delhi	Dubai
B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900

Nonstop Routes: South Flow Feasibility in Scenario 4 (summer)

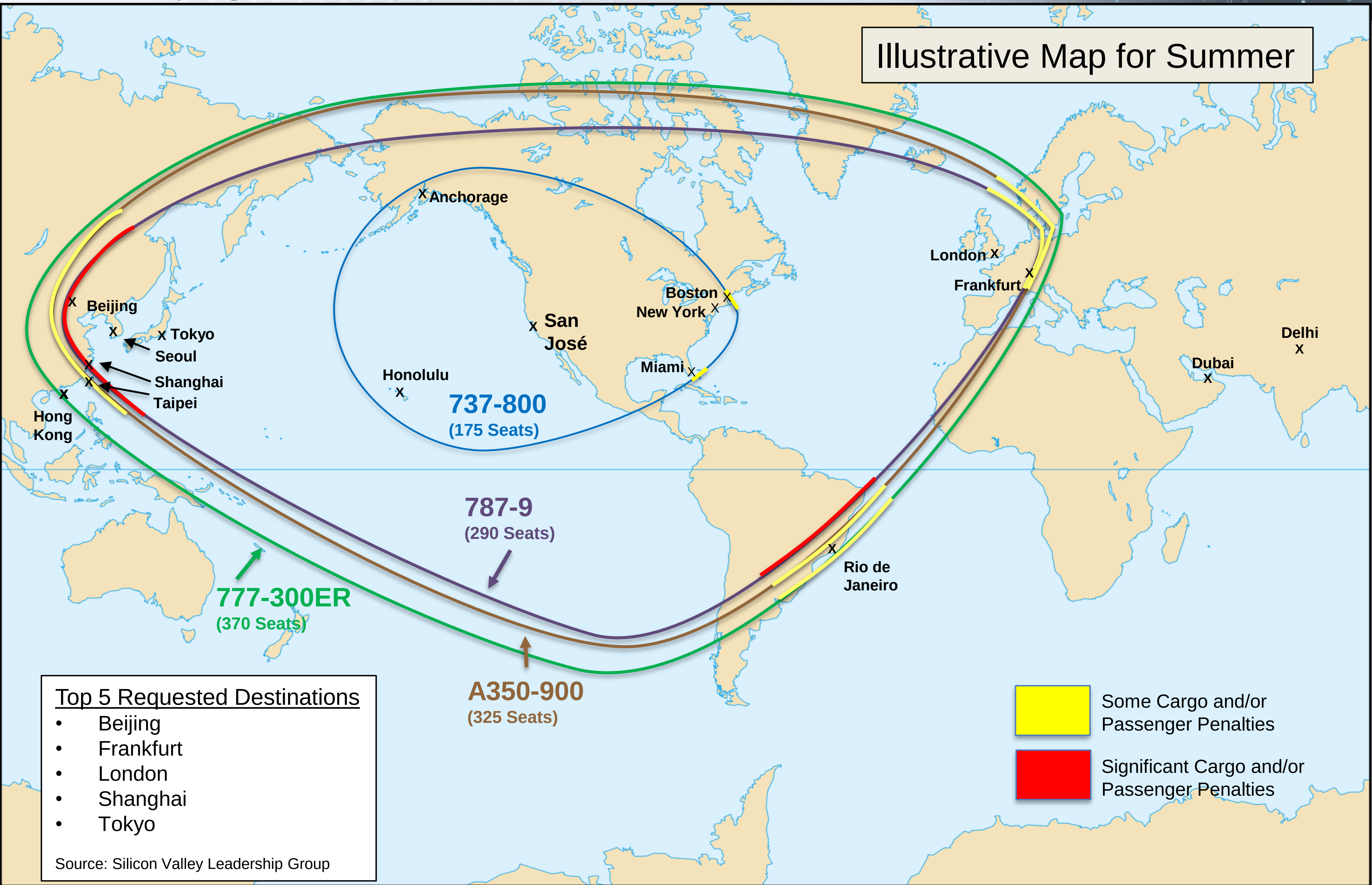
London	Frankfurt	Tokyo	Beijing	Shanghai
B787-9 B777-300ER	B787-9 B777-300ER	B787-9 B777-300ER	787-9 B777-300ER	B787-9 B777-300ER A330-200 A350-900

Green – No Significant Weight Penalties
Orange – Some Weight Penalties
Red – Significant Weight Penalties

Rio de Janeiro	Taipei	HK/Shenzhen	Delhi	Dubai
B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900	B787-9 B777-300ER A330-200 A350-900

Scenario 4 by Plane Type

(Non-Stop Flights from SJC)



Mitigating the Uncertainty

Create a Community Air Service Fund

- Fund could offset losses to airline for certain situations when they need to offload passengers due to OEI procedures
- Creative solution to address the uncertainty for current and future routes that may be impacted by OEI procedures
- Can support market growth for service by larger, more powerful aircraft that do not have weight penalties

Growing Together

- San José is proud to offer nonstop service to Europe and Asia to meet the needs of the South Bay community.
- Majority of SJC traffic is, and will continue to be, within North America and Hawaii.
- Increased development in Downtown has increased opportunity to grow SJC passengers.
- Community Air Service Support Fund could offset the economic uncertainty for select routes.

SILICON VALLEY'S AIRPORT

SJC

Questions?

Appendix D

Public Comments Submitted for the City Council Meeting on March 12, 2019

Note: Please refer to Appendix C for all public comments submitted to the City Council Meeting on February 26, 2019. The public comments presented in Appendix D only reflect new comments that were added to the March 12, 2019 City Council meeting.

Aviation Planning at the Leading Edge

AIR LINE PILOTS ASSOCIATION INTERNATIONAL
THE WORLD'S LARGEST PILOTS UNION • WWW.ALPA.ORG
535 Herndon Parkway • Herndon, VA 20170 • Phone 703-689-2270 • 888-FLY-ALPA

March 11, 2019

San Jose, CA City Council

San Jose, CA Airport Commission

SJC Airport Director

Sent by email to all recipients

Dear San Jose Officials:

By letter dated February 27, 2019, the Air Line Pilots Association, Int'l (ALPA), which represents more than 61,000 airline pilots who fly for 33 airlines in the U.S. and Canada, made you aware of potential concerns with proposals related to land use and development within the city of San Jose. We requested, and were promptly provided with, access to documents related to these proposals from the office of the SJC Aviation Director, which includes analysis of possible impacts on airline operations.

After reviewing these materials with the aviation safety chairs at each of the ALPA airline pilot groups whose respective companies operate into SJC, it is our view that the land use proposals under consideration will not impact available safety margins for commercial operations. Given that the preponderance of the approximately 12% of the airport's annual operations which are conducted toward the south occur in cooler winter months, the economic impacts on the airlines by the proposals under consideration may be minimal.

We appreciate the opportunity to review and provide comments on the subject development proposals.

Sincerely,

[redacted]

Capt. Steve Jangelis
Aviation Safety Chair
Air Line Pilots Association, Int'l

-----Original Message-----
From: ACSATM, Inc. < >
To: cityclerk < >; acsarmored < >
Sent: Fri, Mar 8, 2019 1:42 am
Subject: Public Comment - City Council Agenda 03/12/19 - Downtown Airspace Capacity Study - How OEI Affects other Airports - AAAE.org Member Responses

Recently I posted questions on the American Association of Airline Executives - (AAAE.org) regrading the issues facing our City and Mineta San Jose International Airport. Those questions and a couple of responses are posted below. It is important to note that OEI challenges can affect many airports.

AMERICAN ASSOCIATION OF AIRPORT EXECUTIVES

Questions Posted to AAAE Member Hub:

The City of San Jose is in the process of eliminating OEI (One Engine Inoperative) protected airspace in order to allow building heights increases to as high as FAA TERPS. This change may be approved by San Jose City Council as early as March 12, 2019.

Are there any airports that have (OEI) obstructions in their runway departure paths, that at one time had protected OEI Airspace, and their city eliminated it?

If so, have you suffered any air service issues?
Have you had a reduction in air service to long-haul destinations?
Have you experienced airline weight/passenger penalties and challenges?
Have you seen a loss of air service routes?
Have any air carriers left your airport due to these changes?

If you're familiar with these questions at your airport, has the FAA ever weighed in or questioned the raising of building heights?

Any insight you can provide would be very helpful.

Thank you
Dan L. Connolly

The following was received from an Airport Manager in another state, but is relevant, as that airport cannot attract longer hall service due to natural OEI obstructions at the end of their runway.

Feb 28, 2019 9:52 AM

Chris Pomeroy

Hello Dan.

I cannot answer all you questions but I can provide our experience with the OEI and impacts on our air service.

SUN is a small primary commercial service airport serving the resort community of Sun Valley, Idaho. **We are located in a very constrained mountainous environment and several obstructions (trees) exist on the end of our single runway which penetrate various airspace surfaces, including the OEI.** For the past couple of years we have been working with the landowner and FAA to acquire land on the south end of the runway to gain control of the RPZ and land under the airspace surfaces and get the obstructions removed.

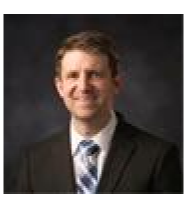
Current air service at SUN is provided by Delta and United via SkyWest, and Alaska Airlines. Due to field elevation and runway length, the impacts of the trees as a penetration to the **OEI for SkyWest in particular is significant resulting in a reduction of departure payload ranging from 2000-3000 pounds on the CRJ700/E-175 regional jets - that's quite an impact** considering the travel habits of our customer carting around, skis, golf clubs, etc... and they are 76 seat aircraft. While no carriers have left the airport due to the impacts, **the penetrations to the OEI have factored into decisions regarding longer haul summer markets. In words, with the obstructions in place considering our field elevation and runway length, those markets or not an option at this time.**

Regarding the FAA, the only likely input you will get from the as part of any airspace evaluation (7460-1) will be focused on Part 77 and TERPS impacts, and not the OEI because the OEI is mainly a surface of concern to operators based on their ops specs and aircraft performance requirements. A handful of years ago the FAA required the OEI to be included on Airport Layout Plans but it was for notification purposes only as the FAA doesn't consider it an airport design standard. I have to admit, from a land use compatibility planning standpoint, the fact your community planners includes the OEI in their land use planning considerations is very unique based on my experience. Very progressive and proactive. **The previous suggestion to get your land use planners and decision makers to understand impacts of encroaching the OEI on your air service is a good one.**

Good luck.

Chris Pomeroy
Airport Manager (SUN)
Friedman Memorial Airport Authority
Hailey, ID

This response came from an aviation planner.



Trent Holder
Posted 7 days ago
Good morning Dan,

Have you coordinated this with your local airlines? **It may be pertinent to discuss this with not only your current carriers but also any potential carriers to ensure you're not closing the door on their entry to serving your airport.** Often airlines will have specific OEI surfaces for their internal operating and emergency procedure development. The old generic 62.5:1 OEI serves more of a starting point for OEI obstruction analysis.

Great questions, I'll be interested to hear what other airports say.

Trent Holder C.M.
Aviation Planner
Hanson Professional Services Inc.
Indianapolis IN

These are just some perspectives from people working in different environments. Here are the take-away points for thought:

1. **Get your decision makers to understand the impacts of encroaching upon the OEI on your air service.**
2. **The penetrations to the OEI have factored into decisions regarding longer haul service, which is not available due to OEI obstructions.**
3. **It may be pertinent to discuss this with not only your current carriers, but also any potential carriers, to ensure you're not closing the door on their entry to serving your airport.**

Again, the Airport Commission's Recommendation of Scenario #10B is the perfect compromise position. I encourage you to REJECT SCENARIO #4, and Approve Scenario #10B. Create a Win, Win, Win, opportunity for everyone.

Sincerely,

Dan L. Connolly

Dan L. Connolly, A Concerned Citizen

Santa Clara, CA 95050-3962
Office

AIR LINE PILOTS ASSOCIATION INTERNATIONAL
THE WORLD'S LARGEST PILOTS UNION • WWW.ALPA.ORG
535 Herndon Parkway • Herndon, VA 20170 • Phone 703-689-2270 • 888-FLY-ALPA

February 27, 2019

San Jose, CA City Council

San Jose, CA Airport Commission

SJC Airport Director

Sent by email to all recipients

Dear San Jose Officials:

The Air Line Pilots Association, Int'l (ALPA), which represents more than 61,000 airline pilots who fly for 33 airlines in the U.S. and Canada, has recently become aware that the city is contemplating a change to policies and regulations that would permit the development of certain areas of the city of San Jose, potentially at the expense of existing aviation safety margins. We are concerned that aviation safety could be impacted by permitting land development in an area that would obstruct airspace which presently allows for an aircraft to safely climb at maximum takeoff weight with one engine inoperative. Experiencing an engine failure during takeoff is an emergency, and such a critical situation that all airline pilots are trained and evaluated on it during every initial and recurrent training session. ALPA is strongly opposed to reducing or eliminating any available margins of safety during normal and emergency situations.

ALPA (www.alpa.org) is the world's largest non-governmental aviation safety organization and has a strong record of safety accomplishments since our founding in 1931. We have the technical and operational expertise and experience to evaluate the impacts on safety from the proposals and are prepared to do so for the SJC proposals expeditiously once we have all pertinent documentation.

Accordingly, we would respectfully request access to all available information concerning the current proposals for land development in San Jose which would have any bearing on aircraft operations at the Norman Y. Mineta San Jose International Airport. Please advise how we may gain access to this documentation. A point of contact in this regard would be greatly appreciated.

Thank you in advance.

Sincerely,

[redacted]

Capt. Steve Jangelis
Aviation Safety Chair
Air Line Pilots Association, Int'l

From: ACSATM, Inc. < >
Sent: Wednesday, March 6, 2019 12:07 PM
To: City Clerk; Taber, Toni
Subject: Public Comment for City Council Agenda 3/12/19 - Downtown Airspace Capacity Study

Dear City Clerk Taber,

Please put this email and the attachments under public comment for this agenda item for the 3/12/19 City Council meeting. Thank you
----

Dear Council Members,

Although I serve as Chair of the San Jose Airport Commission, I am contacting you today as a concerned citizen, so that I can freely express my own thoughts and provide you with information that I believe may be critical to your assessment of the Downtown Airspace Capacity and Building Height Study. The questions I hope you will begin to ask are: ***Is this $940,000 series of presentations an independent unbiased work product? Or has it been tainted from the very start with undue influence in an effort to attain a predetermined outcome?***

The decision you make in this matter will affect San Jose residents, businesses, and Mineta San Jose International Airport for the next 100 Years!

In August 2017, **as Airport Commission Chair, I was asked to make an appointment to the OEI Study Group,** now known as the "Downtown Airspace & Building Height Capacity Study." At the time, I suspected that airlines and pilots may be excluded from this study group. **I attempted to appoint an** Airport Commissioner and **Airline Captain, and my appointment was rejected.**

Some members of City Council have expressed concern over the appearance of a one-sided representation on the Downtown Airspace Capacity & Building Height Study. Personally, and as Chair of the San Jose Airport Commission, **I have expressed concerns over the lack of transparency, incomplete scenario analysis, and that not a single airline pilot or commercial airline was a member of this committee.** Therefore, I am providing you a series of email exchanges from August 2017, that at the time, was also sent to our Mayor and City Manager.

<u>**Duties of the Airport Commission**</u> *(As quoted from the City of San Jose Website)*
"Members of the Airport Commission serve in an advisory capacity to the City Council and to the Director of Aviation on issues relating to the Norman Y. Mineta San José International Airport. The Commission ***investigates, studies and reviews matters relating to the Airport***, and its development as the City Council and the Director of Aviation may require, or as requested by the general public. The Commission has declared a policy of promoting and protecting air transportation to serve the public interest and to integrate the Airport and its related activities into the orderly growth of the community, and to meet the needs of the traveling public without unduly affecting property and persons located near the Airport.

The City Council is the final decision-making body. ***The Commission acts as expert advisors to the City Council."***

According to the City of San Jose Website, "The Airport Commission Acts as expert advisors to the City Council." I can assure you that your Airport Commission members take this duty very seriously. When presented with information, commission members work diligently to gather as much data as possible to provide you with the information you need, as members of San Jose City Council, to make an informed decision on issues involving our airport. Unfortunately, on **two important issues 1) Airport Security and 2) Elimination of OEI Protected Airspace**, it appears it is the desire of staff and some members of Council to silence the ability of the Airport Commission to advise and voice concerns about the two most important issues **SJC has faced in the last decade.**

In August 2017, **the Airport Commission expressed concerns about security vulnerabilities at SJC. Five (5) Airport Commissioners requested a meeting with Mayor** Liccardo over these security issues, and a vote by the Airport Commission requesting a closed-door meeting of the Commission to discuss airport security vulnerabilities.

In that incident, the **Council denied our request, and the Mayor's office did not even respond to our request for a meeting on the subject.**

Also, in August 2017, the following series of email exchanges occurred between City Staff and me, as Chair of the San Jose Airport Commission. This series of email exchanges I believe will be helpful in enlightening you more about the formation of the group now known as the "Downtown Airspace Capacity and Building Height Study." As stated earlier, I provided these emails (at the time) to the City Manager's Office as well as to the Mayor.

As Chair of the Airport Commission, I did not appoint Commission Matsushima (although she is a fine individual) to the Downtown Airspace Capacity Study, nor was she appointed by the Airport Commission, to represent the commission, as is depicted in the make-up of the "Project Steering Committee". As Chair, after being given the opportunity to make an appointment to this group, I appointed Airport Commissioner and Airline Captain Raymond Greenlee. Captain Greenlee has over 35-years of military and commercial airline aviation experience. Unfortunately, his appointment was rejected by Acting Director Aitken, as communicated through the Airport Commission Secretary Jim Webb. *(Please see excerpts from several emails, on behalf of Acting Director Aitken, transmitted by James Webb below.)*

The purpose of the committee, according to the August 16, 2017 email is: **"the *"Airport Height Study" group (which will really look at trying to find a balance between allowing taller building downtown and maintaining an OEI path for aircraft departing the Airport over the downtown."*** The email goes on to say, ***"As I noted in our conversation, the group will have a wide range of perspectives – including the airlines and pilots -"...***

On August 17, 2017, Mr. Webb's email, on behalf Acting Director Aitken states, ...***"the OEI Study group will have members that represent the professional pilot and airline perspectives."***

On August 23, 2017, Mr. Webb's email states,..... ***"I clearly stated both orally and in my written comments, that the group would have access to the perspectives of the airlines and professional pilots."*** Another paragraph down, the email goes on to state...***"Unfortunately, you elected to disregard study group's interest in including a downtown resident and instead substituted your assessment of what perspective you felt the group needed by appointing Commissioner Greenlee, a professional pilot.*** At the bottom of that paragraph, the following is stated, ***"I cannot understand why you are insisting on the appointment of a commissioner whose primary qualification is as a professional pilot when the study group is seeking a downtown resident."***

I provide these emails to you from August 2017, because I suspected, at that time, that airlines and pilots would not be represented on the committee and therefore, refused to back down on my attempt to appoint a professional airline pilot.

We would like to discuss our findings which include:
Impacts to the East Coast (See Google Briefing 11-02-18, page 8 - SJC-EWR 21 PAX "Passenger" Penalty Winter and 41 PAX "Passenger" Penalty Summer), as well as Hawaii, Asia and Europe.

Additional questions you should be asking is: Were ALL possible obstruction points in the Diridon Station area under ALL Scenarios modeled?
How do those obstacle points actually compare to the map (Compare Project CAKE Excel Spreadsheet to the Google Briefing 11-02-18, Page 3 & 12-15) of the Diridon Station Area?

****Note** The San Jose Airport Commission met on 11/05/18 and could have received the same "Google Briefing" however that information was withheld from the Airport Commission. As an Airport Commission, we were NEVER provided the Google Briefing. It was not obtained until one of our members made a "Public Records Request."** The Airport Commission could have begun looking at available information on this topic beginning in November 2018. Instead the **information was withheld until 96 hours prior to the Airport Commission Special Meeting on 1/14/19,** more than two months after the "Google Briefing".

Why, for Scenario #10 (which would leave straight out OEI intact), are there four (4) Adobe Building obstruction points showing? (Adobe is East of Hwy 87 and not in Diridon) Why were only two (2) points within Diridon Station provided for evaluation, when if approved, the entire area will be built to maximum building heights for the selected scenario? One point was the SAP Pavilion (existing), leaving only one other point for airlines to evaluate? Would there be no other airplane obstruction concerns for the Diridon Area?

Were airlines provide with accurate information to respond to in the various Scenarios?
Could Airlines be impacted in a greater way than is being portrayed?

The "Community Air Service Fund" –In my opinion, this is a bait and switch**. This fund will likely NEVER come into existence.** If the fund was able to be established, it is this authors opinion it **COULD NOT BE SUSTAINED with private funding,** requiring San Jose to either fund the measure, in perpetuity, or **create another tax that San Jose residents would have to pay.**

We would strongly suggest that you demand to see the actual airline responses.
We encourage you to get an independent analysis **(second opinion)** by a group not under the influence **of the current study.**

Finally, will you allow the Air Lines Pilots Association International an opportunity to evaluate these proposals, as they have requested, before making a final decision on Scenario #4 or #10B?

Thank you for scrutinizing closely and carefully evaluating the Downtown Airspace Capacity & Building Height Study. Members of our team, that authored Scenario #10B, approved by the Airport Commission, would like to, and are available to, meet with you.

Sincerely,

Dan L. Connolly

Dan L. Connolly, A Concerned Citizen

From: Webb, Jim
Sent: Wednesday, August 23, 2017 1:49 PM
To: Airport Commission 10
Subject: RE: Response to Airport Interim Director Aitken's request to appoint Julie Matsushima to OEI Study Group

Chair Connolly:

I regret that you misunderstood the nature of the request I presented to you and that you mischaracterize some of our oral and written communications.

*I was very clear in my oral and written comments that the OEI study group was interested in having the perspectives of a downtown resident. You noted that there were professional pilots on the Commission asked why the group wanted a downtown resident**. I clearly stated both orally and in my written comments, that the group would have access to the perspectives of the airlines and professional pilots.** The interest was in getting feedback from a downtown resident who knows the downtown and would have to live with the possible changes that could result from trying balance greater building heights with maintaining an OEI path over the downtown.*

The opportunity to even appoint a Commissioner arose because Interim Director Aitken, who is part of the group, thought having Commissioner Matsushima appointed as a Commissioner, instead of as a private citizen, would give the Commission a tie to the study group and require her to report back to the Commission on the group's activities and progress. I pointed out Section 602 of the Commission by-laws to you as the provision that would permit you to make the appointment without having to wait until the next Commission meeting in November. I did ask you to give the matter some thought and I did say that we were recommending the appointment of Commissioner Matsushima. Having already explained that the group wanted a downtown resident, that Commissioner Matsushima met that requirement (I believe she is the only downtown resident on the Commission) and that the group already had access to the pilot perspective, I believed it was clear your choice was to appoint Commissioner Matsushima or not appoint her. You did not ask for further clarification nor did you indicate you might want to consider appointing a Commissioner that was not a downtown resident.

Unfortunately, you elected to disregard study group's interest in including a downtown resident and instead substituted your assessment of what perspective you felt the group needed by appointing Commissioner Greenlee, a professional pilot. *Even as I have clarified there is no "Commission seat" but the opportunity to appoint a downtown resident who happens to be a Commissioner, you have insisted on appointing Commissioner Greenlee. I do not accept your characterization that I "rejected" Commissioner Greenlee's nomination. Commissioner Greenlee (as well as Commissioner Schmidt) is well qualified as a professional pilot but the study group is looking for a downtown resident. I am sure if the group had been seeking the perspective of a professional pilot, you would not have appointed a Commissioner whose primary qualification is that of a downtown resident so* ***I cannot understand why you are insisting on the appointment of a Commissioner whose primary qualification is as a professional pilot when the study group is seeking a downtown resident.***

Based on your decision, I must assume that you have elected not to appoint Commissioner Matsushima and I have informed Mr. Aitken of that decision so that he may inform the study group and the group can consider if they wish to designate Commissioner Matsushima as the downtown resident in her capacity as a private citizen.

Nevertheless, my aforementioned comments notwithstanding, I have passed on your nomination of Commissioner Greenlee to Interim Director Aitken with a request that he ask the group to consider inviting Commissioner Greenlee to participate in its review. As I have noted, there is no "Commission seat" to fill and the study group has secured or will secure airline and professional pilot perspectives so I have no idea if Commissioner Greenlee will be asked to be part of the group. However, at least the group will be aware of your nomination and Commissioner Greenlee's interest in participating should they wish to utilize his experience.

By the way, I am sending this to your City email address only as it is City policy to use official City email addresses when discussing Commission business.

Jim

James Webb, Jr. | Assistant to the Director

Mineta San José International Airport
1701 Airport Blvd. Ste B-1130, San José, CA 95110
flysanjose.com | **facebook** | **twitter** | **linkedin**

Forwarded to: Mayor Sam Liccardo and City Manager Norberto Duenas

-----Original Message-----
From: acsarmored < >
To: sam.liccardo <sam.liccardo@sanjoseca.gov>; norberto.duenas <norberto.duenas@sanjoseca.gov>
Cc: airportcom10 <airportcom10@sanjoseca.gov>
Sent: Sun, Aug 20, 2017 10:27 pm
Subject: Fwd: Response to Airport Interim Director Aitken's request to appoint Julie Matsushima to OEI Study Group

From: >
Sent: Sunday, August 20, 2017 10:22 PM
To: Webb, Jim; Airport Commission 10
Subject: Response to Airport Interim Director Aitken's request to appoint Julie Matsushima to OEI Study Group

Good Morning Mr. Webb,

After reviewing my extensive notes from our telephone call on Wednesday, which you requested, I am perplexed and confused.
During that conversation you referred me to the Airport Commission Bylaws on page 20, Section 602, read that section aloud, and told
me that as Chair of the Airport Commission I had the ability to appoint someone to the OEI Committee. Your written correspondence even referred to and used the
words, "as a Commission appointment".

We discussed three names of possible candidates, and you said, Interim Director Aitken is requesting you appoint Airport Commissioner Julie Matsushima, as
the others do not live downtown. When we ended the call, you said, "give it some thought and let me know your decision, but Interim Director Aitken is recommending you appoint Commissioner Julie Matsushima."

On Thursday morning I responded to your request. After evaluating all of the qualifications of each San Jose Airport Commissioner, I determined, hands down, the absolute best qualified individual representative from our Airport Commission is Commissioner Greenlee.

Later Thursday afternoon, you responded by rejecting Airline Captain Raymond Greenlee, and then informed me that the Airport Commission did not have an appointment to the OEI, contradicting your telephone call the previous evening. You stated that I could either appoint Commissioner Matsushima or you would tell Interim Director Aitken that I was declining to make an appointment. I am certain you are not inferring, as Chair of the Airport Commission, that I am unable to make independent decisions, outside of the desires of airport staff.

It seems very odd that Interim Director Aitken would push so hard for a specific individual for this committee, when that individual has no aviation experience or background, and simply qualifies for the committee because she lives in the downtown area. Can Interim Director Aitken please explain why it is so critically important for him to have this, and only this, commissioner to serve in this capacity? Furthermore, you said that there were four entities that will have committee members on the OEI, and one was the Downtown Association. I am relatively sure that there will be representation from the downtown area associated with the Downtown Association.

Who is in charge of putting together the OEI Committee?
Please provide me with the name, contact information and telephone number for the person in charge of the "One Engine Inoperative" and the downtown building height study committee.

Mr. Webb, I believe in always putting our best foot forward. As Chair of the Airport Commission it is my duty, when a request is made for any appointment to another committee of an Airport Commissioner, to thoroughly evaluate the qualifications of our members, their ability to meet the required time commitments, and take into account their level of expertise regarding the subject matter. In this regard, there is no better qualified candidate on our Airport Commission than former Naval Aviator and 27 year aviation veteran, Airline Captain and Airport Commissioner Raymond Greenlee.

Please inform Interim Director Aitken that, I stand by this decision, and Commissioner Greenlee is my choice to represent the Airport Commission on the "OEI" Committee.

Sincerely,

Dan L. Connolly, Chair
San Jose Airport Commission
855 Civic Center Drive, Unit 8
Santa Clara, CA 95050-3962
408/241-0910 x7100
408/241-2060 fax
408/499-3843 mobile

airportcom10@sanjoseca.gov

-------- Original message --------
From: "Webb, Jim" <JWebb@sjc.org>
Date: 8/18/17 17:08 (GMT-08:00)
To: Airport Commission 10 <AirportCom10@sanjoseca.gov>
Subject: RE: Appointment to OEI Study Group

Chair Connolly:

Please take some additional time to give the situation further thought. However, If I do not hear back from you by close of business Tuesday, August 22, I will assume you are passing on the opportunity to appoint Commissioner Matsushima and will inform Mr. Aitken that the OEI group *can proceed with Commissioner Matsushima's appointment on its own timeline. I do not know what the timeline is for the study group but since there is no Commission "seat" to be filled, I think they should be able to proceed with their appointment whenever they are ready to do so.*

On your questions regarding Commission input in the recruitment and selection process for the next Director, I do not know if the current process is being overseen by a search committee or handled internally. Former Director Kim Becker left in early May and I believe the recruitment and selection process for the next Director is pretty far along at this point. However, I will look into your questions and get back to you at the earliest opportunity.

Jim

James Webb, Jr. | Assistant to the Director
| jwebb@sjc.org

Mineta San José International Airport
1701 Airport Blvd. Ste B-1130, San José, CA 95110
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From: Airport Commission 10
Sent: Friday, August 18, 2017 12:51 PM
To: Webb, Jim <JWebb@sjc.org>
Subject: RE: Appointment to OEI Study Group

Good Afternoon Mr. Webb,

I will need to give some thought to your email before I respond. I am driving across several states and have limited access, so I will get back to you on this issue.

On another note, is there any type of committee evaluating the candidates for Airport Director or is it simply handled internally by the city? The reason I ask is I believe members of our Airport Commission may desire to have input on the national search and selection process. Can you advise on what the procedure is? Has our Airport Commission ever been represented in the process, etc?

Thank you for your help and guidance on this issue.

Sincerely,

Dan L. Connolly, Chair
San Jose Airport Commission

Sent from my Verizon, Samsung Galaxy smartphone

-------- Original message --------
From: "Webb, Jim" <JWebb@sjc.org>
Date: 8/17/17 12:43 (GMT-08:00)
To: Airport Commission 10 <AirportCom10@sanjoseca.gov>
Subject: RE: Appointment to OEI Study Group

Chair Connolly:

I believe there I may have miscommunicated the situation. As I mentioned in our phone conversation and in my email below, the OEI study group will have members that represent the professional pilot and airline perspectives. What they are seeking is a downtown resident perspective. In addition, the group's interest was not for an appointment from the Commission but the appointment of a downtown resident who also happens to be an Airport Commissioner. Accordingly, there is no "Commission seat" to be filled on the study but rather the opportunity to fill a seat for a downtown resident *with someone who is also on the Commission. Thus the only choice for you in this case to appoint Commissioner Matsushima or not appoint her.*

I felt that by having Commissioner Matsushima appointed by the Chair, the Commission would have a direct connection to the study and Commissioner Matsushima could report out to the full Commission on the group's activities and progress. However, if you do not wish to appoint Commissioner Matsushima, the OEI group can simply invite her to serve as a downtown resident and she would not need an official appointment from the Commission to serve nor would she be required to report out to the Commission (though I am sure she would be inclined to share the OEI study group's meeting activities with her Commission colleagues).

Please let me know if you wish to reconsider appointing Commissioner Matsushima or if you prefer to pass on the opportunity to appoint her to the OEI study group and I will convey your decision to Interim Director Aitken, who made the request on behalf of the OEI group.

Jim

James Webb, Jr. | Assistant to the Director
| jwebb@sjc.org

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From: Airport Commission 10
Sent: Thursday, August 17, 2017 11:50 AM
To: Webb, Jim <JWebb@sjc.org>
Cc: Airport Commission 6 <AirportCom6@sanjoseca.gov>
Subject: Fwd: Appointment to OEI Study Group

Good Morning Mr. Webb,

After careful consideration of the unique backgrounds and skill sets of our Airport Commission members with regards to "One Engine Inoperative" and the "Airport Downtown Building Height Study", I have decided to appoint Airport Commissioner and Airline Captain Raymond Greenlee to that committee under Section 602 of our Commission Bylaws.

Please communicate Commissioner Greenlee's appointment to the members of the San Jose Airport Commission.

Thank you for your assistance.

On another note, I will be traveling through next Wednesday, should there be anything you require, please feel free to utilize my mobile telephone number at 408/499-3843. I will also be available through email.

Sincerely,

Dan L. Connolly, Chair
San Jose Airport Commission

Sent from my Verizon, Samsung Galaxy smartphone

-------- Original message --------
From: Airport Commission 6 <AirportCom6@sanjoseca.gov>
Date: 8/16/17 20:21 (GMT-08:00)
To: Airport Commission 10 <AirportCom10@sanjoseca.gov>
Subject: Re: Appointment to OEI Study Group

Chairman Connolly,

I would be pleased and honored to serve on this committee.

Sincerely,
Raymond Greenlee
District Six

Sent from my iPhone

> On Aug 16, 2017, at 18:56, Airport Commission 10 <AirportCom10@sanjoseca.gov> wrote:
>
> Dear Captain Greenlee,
>
> I would appreciate your consideration to serve on the following committee, as a representative of our Airport Commission. Please look this email over along with the attachments as it is all the information I have available from Mr. Webb at this time.
>
> OEI Study Committee: One Engine Inoperative, covering South Flow take off Operations over downtown area. It would look at building heights and see about consideration for raising the height of buildings in the downtown area.
>
> Committee would meet 1-2 times per month for 4 - 6 months.
>
> Includes members from:
> 1) Office of Economic Development
> 2) Downtown Association
> 3) SPUR - S.F. Bay Area Planning & Urban Research Association
> 4) SJC Airport and Commission
>
> Appointment would be made under Section 602 (Page 20) of our Airport Commission Bylaws.
>
> Budget for study $100,000: to come from Airport Renewal and Replacement line item in SJC Budget.
>
> In 2006 there was an older study called the Airport Obstruction Study. That may possibly be dusted off as a starting point for this committee.

>
> You would be required to report out to the Commission as to your committee activities at our regular meetings.
>
> Please consider accepting this appointment and let me know your response as soon as possible.
>
> I will respond back to Mr. Webb tomorrow morning with the Chair's appointment decision for this committee.
>
> Thank you for your consideration in this matter.
>
> Sincerely,
>
> Dan L. Connolly, Chair
> Mineta San Jose Int'l Airport Commission
>
> Sent from my Verizon, Samsung Galaxy smartphone

> -------- Original message --------
> From: "Webb, Jim" <JWebb@sjc.org>
> Date: 8/16/17 17:09 (GMT-08:00)
> To: Airport Commission 10 <AirportCom10@sanjoseca.gov>
> Subject: Appointment to OEI Study Group
>
> Chair Connolly:
>
> Attached is the Mayor's budget message from June that created the "Airport Height Study" group (which will really look at trying to find a balance between allowing taller building downtown and maintaining an OEI path for aircraft departing the Airport over the downtown. The study group is being led by the Office of Economic Development, the Airport, the San Francisco Bay Area Planning Research Association and the Downtown Association. The link to the SPUR website is: http://www.spur.org/
>
> As I noted in our conversation, the group will have a wide range of perspectives – **including the airlines and pilots –** but wants the perspective of a downtown resident. Commissioner Matsushima is uniquely suited to serve as she lives in the downtown and, as an Airport Commissioner, she has a basic understanding of the OEI (one engine inoperative) issue. As I noted, the meetings would take place about once or twice a month for 4 to 6 months. I have spoken to Commissioner Matsushima and she is willing to serve. As a **Commission appointment**, she would need to report out to the Commission.
>
> I appreciate your consideration. Give it some thought and let me know.
>
> Jim
>
> [Mineta San Jose International Airport | Silicon Valley's Airport]<http://www.flysanjose.com/>
>
> James Webb, Jr. | Assistant to the Director

> | jwebb@sjc.org<mailto:jwebb@sjc.org>
> ________________________________
> Mineta San José International Airport
> 1701 Airport Blvd. Ste B-1130, San José, CA 95110
> flysanjose.com<http://www.flysanjose.com/> | facebook<http://www.facebook.com/flysanjose> | twitter<http://www.twitter.com/flysjc> | linkedin<https://www.linkedin.com/company/norman-y.-mineta-san-jose-int'l-airport>
>
>
>
> <Mayor's June Budget message - Airport Height Study .pdf>
> <image001.png>

-

------- Original message --------
From: "Webb, Jim" <JWebb@sjc.org>
Date: 8/16/17 10:51 (GMT-08:00)
To: Airport Commission 10 <AirportCom10@sanjoseca.gov>
Subject: Re: Need to Talk with You

Dan:

I am not in the office this morning but will be in this afternoon. I can call you then. What's the best time this afternoon to reach you?

Jim

Sent from my T-Mobile 4G LTE Device

-------- Original message --------
From: Airport Commission 10 <AirportCom10@sanjoseca.gov>
Date: 8/15/17 8:06 PM (GMT-08:00)
To: "Webb, Jim" <JWebb@sjc.org>
Subject: RE: Need to Talk with You

Good Evening Mr. Webb:

Thank you, I also look forward to working with you during the coming year.

I appreciate the direction of mail to my secure business mailing address. Thank you for your efforts in this manner.

I would be happy to speak with you, would you enlighten me on what OEI stands for with this study group?

I have an 8 AM - 9:45 AM meeting on Wednesday morning and could be available at 10AM. Would that work for you? I will bring my binder with me and you are welcome to utilize my mobile telephone.

I look forward to speaking with you.

Dan

Sent from my Verizon, Samsung Galaxy smartphone

------- Original message --------
From: "Webb, Jim" <JWebb@sjc.org>
Date: 8/15/17 18:28 (GMT-08:00)
To: Airport Commission 10 <AirportCom10@sanjoseca.gov>
Subject: Need to Talk with You

Chair Connolly:

First congratulations on your election as Commission Chair. I look forward to working with you in the year ahead.

Second, I have taken steps to try and ensure that any future mail is sent to your business address. Please let me know if anything arrives at your home address.

Finally, I need to talk with you about the appointment of Julie Matsushima to an OEI study group. What would be the best time for me to call you tomorrow or Thursday afternoon? Would you prefer I call you on your cell or at your office? If possible, please have your Commission reference book handy as I will be referencing it during our discussion.

Thanks.

Jim

James Webb, Jr. | Assistant to the Director
| jwebb@sjc.org

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SENT TO COUNCIL: APR 2 5 2006

by City Manager's Office

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: HONORABLE MAYOR AND CITY COUNCIL

FROM: William F. Sherry, A.A.E.

SUBJECT: ADOBE BUILDING IMPACT ON AIRLINE SERVICE

DATE: 4/24/06

Approved [signature] Date 4/27/06

INFORMATION

The Aviation Department, in concert with Planning, Building and Code Enforcement and the Redevelopment Agency, has initiated an Airport Obstruction Study to determine maximum building heights in the Airport vicinity based on existing development and FAA and airline safety criteria. As part of this study, staff has found that the Adobe Towers on Park Avenue do not appear on the FAA or airline obstruction databases (two documents maintained by Federal Agencies). American Airlines has determined that the Phase I Tower, which faces Park Avenue, is an impediment to the current emergency procedures that the airline has developed for southerly departures of its flight to Narita, Japan.

Background

Federal Aviation Regulations require that project developers notify the Federal Aviation Administration (FAA) of certain proposed construction projects within an extended zone defined by a set of imaginary surfaces (or slopes) that radiate out for several miles from the airport's runways. Upon notification, the FAA conducts an aeronautical study and issues a determination as to whether the proposed structure would be a hazard to air navigation. All existing downtown high-rise structures that have been subject to this FAA review, including the three Adobe buildings within the block bounded by W. San Fernando, S. Almaden, Park, and Guadalupe River, have received a "no hazard" determination subject to specified conditions. Once a no-hazard determination is issued, the project developer is required to make additional notifications to the FAA when actual construction is ready to begin, and upon completion of the highest point of construction.

It is important to note all such notifications are made by the project applicant (developer or its engineering/architectural designer) via filing of prescribed FAA forms which are supposed to provide precise data on the proposed structure's latitude/longitude location, height above ground level, and elevation above sea level. The City has no role in the preparation of these submittals except in cases where the City is the project developer. The City does, however, rely upon FAA no-hazard determinations for development project compliance with General Plan policy to protect the local airspace.

Description of Adobe Problem

It appears that at the time each of the three Adobe buildings was submitted to the FAA for review by HOK Architects (1994, 1996, and 2000), the same set of incorrect location coordinates was used. These coordinates are for the southwest corner of Park & Almaden, across from the actual development site and several hundred feet from the actual site of the two taller Adobe buildings. It's not known what effort, if any, FAA made to confirm location or elevation data it received from the project applicant.

This fundamental data error on the part of the Adobe development appears to have been exacerbated by two further procedural errors. The one official data source for existing high-rise structures is the Airport "Obstruction Chart" which is prepared and periodically updated by the National Oceanic & Atmospheric Administration (NOAA) on contract to FAA. This chart is created through a physical survey of the airport vicinity to identify all potential obstructions. The Obstruction Chart for San José does not identify any structures on the Adobe block, other than a temporary construction crane that appears to coincide with the Phase 2/Tower 2 building. Again, local municipalities are not part of the NOAA update process and are not provided an opportunity to review the survey findings prior to publication.

A secondary data source that the airlines subscribe to is called the "Digital Obstacle File" which is prepared and periodically updated by an entity known as the National Aeronautical Charting Office (NACO). NACO obtains the actual construction notifications made to the FAA by project applicants. It is not known to staff what subsequent construction notifications were filed as part of the Adobe development (as required) because the Digital Obstacle File shows only one building located at the southwest corner of Park & Almaden, the same erroneous location identified in the original Adobe development submittals to FAA. As with the NOAA Obstruction Chart, airports have no involvement with NACO on this database.

These problems were discovered by staff when it recently reviewed the NOAA Obstruction Chart and the NACO Digital Obstacle File to identify the potential critical existing high-rise buildings as part of the ongoing Airport Obstruction Study. Staff has notified the FAA to (1) alert the agency to the omissions and erroneous locations of the Adobe buildings on its databases, (2) urge that NOAA be directed to perform a thorough and more accurate update of the Obstruction Chart as a high priority, and (3) consider involving local agencies in verifying the accuracy of location and elevation data submitted to FAA by project applicants. In addition, staff has notified all airlines flying out of San José to make sure they are aware of the correct coordinates for the buildings. With these notifications, safety of the flying public is assured.

Staff from the Redevelopment Agency and the Office of Economic Development are working to ensure that the appropriate parties at Adobe are informed and made aware of this concern.

Impact on American Airlines

Airlines rely on the NOAA Obstruction Chart and the NACO Digital Obstacle File when calculating their required emergency procedures to clear obstructions when departing with the loss of power in one engine. American Airlines informed the City on 4/12/06, soon after it received staff's downtown building data, that the existence of the Adobe Phase 1 Tower does not provide sufficient emergency clearance for southerly departures of the B-777 flight to Narita. American must immediately institute weight restrictions on such departures (i.e., not operate with a full load of cargo, passengers, or fuel) unless and until it can redesign its emergency "one-engine out" procedures to avoid the building. This process is underway. American has informally indicated that if modified emergency procedures cannot be implemented, the potential economic loss from weight restrictions on that one flight is estimated to be approximately $1 million annually.

Thus far, no other airline has indicated that any current flight operations are impacted by the presence of the Adobe Phase 1 building or any other structure missing from FAA and airline databases.

Next Steps

As staff now has the GIS tools to generate or check location coordinates, and as the FAA now operates a website which posts information on proposed structures submitted for review, the Airport can and does monitor such project submittals and notify the FAA as well as the Planning, Building and Code Enforcement Department when data discrepancies are found. Within the last two months, staff has already identified several project submittals to FAA with erroneous data.

Lastly, as the Airport Obstruction Study progresses, City staff will develop for City Council consideration, recommendations regarding the development review process, to minimize such problems in the future.

WILLIAM F. SHERRY, A.A.E.
Director of Aviation
Airport Department

Please contact William F. Sherry, Director of Aviation, at 501-7669, with any questions.

WFS:CG

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
SILICON VALLEY'S AIRPORT

OEI Briefing
December 17, 2018

Background

- 2006: Last Obstruction Clearance Study, including Federal Aviation Regulation (FAR) Part 77.25 Aeronautical Surfaces, U.S Terminal Instrument Procedures (TERPS), and One-Engine Inoperative Surfaces (OEI); no Council Policy adopted.

Achievements: Since October 31, 2018

- Held two additional project steering committee meetings for a total of eight meetings.
- Reviewed 11 potential airspace protection scenarios considering Part 77, TERPS and OEI, selected four scenarios for additional indepth study, and have completed the in-depth study. Added four scenarios to focus on the Diridon area development.
- Selected four critical aircrafts to study in the scenarios referenced above (Airbus 320, 737-800, 787-9, and 777-200). Since the results of the four scenarios, the Airbus 321 NEO was added for the Hawaii route.
- Held meetings with all airlines and invited their review of the scenarios.
- Engaged in regular coordination with Google and their OEI consultant to review Diridon Area analysis.
- Received JLL economic impact analysis of increased development capacity and its effect on airport economics.

Significant Findings

- Scenario 4 (increasing heights to TERPS) is achievable according to the 13 airlines that responded with the exception of Hainan Airlines who could incur a loss of up to 50 passengers on southflow operations.
- Flights to Asia will be a challenge.
- Additional long range domestic markets (BOS, MIA, ANC) are achievable under Scenario 4.
- Scenario 4 will limit international markets:
    - 787 – 9 can not serve the additional markets without significant penalties
    - Delhi and Dubai will not be a feasible non-stop market
    - Hong Kong, Taipei and Rio de Janeiro are possible non-stop markets with larger (higher seat capacity) aircraft.
- Economic Findings – Scenario 4
    - Net new development capacity in the Diridon Station Area would be approximately 8.6M sqft.
    - No net new increase in aggregate development capacity in the Downtown Core, but small gains to be achieved on discrete parcels.
    - As development occurs, the airlines would be impacted by $802,000 ~~million~~ in 2024.

Proposed OEI Strategy

- OEI Strategy recommendation will increase allowable building heights to TERPS with the following considerations:
    - It will be challenging to serve the Bejing market and challenges will exist if there is a desire to serve select international markets in the future.
    - Recommend that a community-funded support program be developed for sustainable long-haul international flights to offset any airline/aircraft OEI mitigation measures required.
    - Recommend construction crane policy to deter crane penetrations into the TERPS during construction.

Next Steps

- Special Airport Commission meeting on January 14, 2019
- Stakeholder meeting on January 16, 2019
- January 28, 2019 CED Meeting
- February 12, 2019 City Council Meeting

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
SILICON VALLEY'S AIRPORT

OEI Briefing
October 31, 2018

Background

- 2006: last Obstruction Clearance Study, including Federal Aviation Regulation (FAR) Part 77.25 Aeronautical Surfaces, U.S Terminal Instrument Procedures (TERPS), and One-Engine Inoperative Surfaces (OEI); no Council Policy adopted.

Achievements: To October 31, 2018

- Held six project steering committee meetings (SJDA, SPUR, SVO, SVLG, Airport Commission, Building Trades, D3)
- Reviewed eleven potential airspace protection scenarios considering Part 77, TERPS and OEI, selected four scenarios for additional indepth study, and have completed the in-depth study.
- Selected four critical aircrafts to study in the scenarios referenced above (Airbus 320, 737-800, 787-9, and 777-200). Since the results of the four scenarios, the Airbuse 321 Neo was added for the Hawaii route.
- Held meeting with all airlines invited for their review of the four selected scenarios.
- Regular coordination with Google and their OEI consultant, with key meeting on November 2, 2018 to review Diridon Area analysis.

Significant Findings

- All airlines were asked to review the airspace protection scenarios. 10 airlines have completed and submitted their review.
- The four scenarios were:
  - Scenario 1: Existing
  - Scenario 4: No OEI (TERPS Only)
  - Scenario 7: Straight-out OEI
  - Scenario 10: Straight-out OEI with West Cooridor Alternatives
  - Scenario 9: No OEI, Increase FAA height limits
- Scenario 4 appears to provide the greatest opportunity for height to the downtown and Diridon area. However, Asian markets have the most significant impacts.

Next Five Months: November 2018 to March 2019

- Continue to meet with airline representatives.
- November 2, 2018: Meet with Google to provide updated information from airlines.
- Complete economic impact analysis of building heights and airport operations with changes to OEI procedures.
- November 7, 2018: Meet with the project steering committee to review consultant analysis of airline positions and draft economic analysis.
- Continue to Partner with SVO, SPUR and SJDA for stakeholder update meeting.
- December 2018: Draft internal strategy recommendation.
- January 28, 2019: Present strategy recommendation to CEDC.
- Early 2019: Present strategy recommendation for Council consideration.

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
SILICON VALLEY'S AIRPORT

OEI Briefing
August 13, 2018

Background

- 2006: last Obstruction Clearance Study, including Federal Aviation Regulation (FAR) Part 77.25 Aeronautical Surfaces, U.S Terminal Instrument Procedures (TERPS), and One-Engine Inoperative Surfaces (OEI); no Council Policy adopted

Achievements: February to August

- Held five project steering committee meetings (SJDA, SPUR, SVO, SVLG, Airport Commission, Building Trades, D3)
- Reviewed eleven potential airspace protection scenarios considering Part 77, TERPS and OEI and selected four scenarios for additional indepth study.
- Selected four critical aircrafts to study in the scenarios referenced above (Airbus 320, 737-800, 787-9, and 777-200)
- Held meetings with six airlines (five utilizing the West Corridor and Southwest because they make up 47% of overall passengers at SJC) for their review of the four selected scenarios.
- Regular coordination with Google and their OEI consultant, with key meeting on August 17 to review Diridon Area analysis.
- Reviewing consultant Landrum & Brown analysis of four selected scenarios.

Significant Findings

- FAA has completed the Airspace Feasibility Study (Part 77 and TERPS surfaces) on 33 blocks in the Diridon Area and determined that the range of acceptable building heights is approximately 90 to 278 feet AGL (Above Ground Level). See attached map.
- All airlines asked to review the airspace protection scenarios have completed their review.
- Two airlines see opportunity to relax OEI in the West Corridor.

Next Six Months: August to January

- Continue to meet with airline representatives to see if all 15 airlines that utilize SJC would be willing to move/modify their OEI procedures in the West Corridor.
- Meet with the project steering committee on September 7 to review consultant analysis of airspace protection scenarios and airline positions.
- Partner with SVO, SPUR and SJDA for a stakeholder meeting - tentatively scheduled for September 21.
- Provide status update to CEDC on September 24.
- Proceed with an economic impact analysis of building heights and airport operations with changes to OEI procedures, if necessary.
- Develop policy recommendation for Council consideration in late 2018/early 2019.

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
SILICON VALLEY'S AIRPORT

OEI Briefing
February 12, 2018

Background

- OEI: emergency procedure for each airline/aircraft in the rare occasion when an aircraft loses power in an engine during takeoff

- 2006: last Obstruction Clearance Study, including Federal Aviation Regulation (FAR) Part 77.25 Aeronautical Surfaces, U.S Terminal Instrument Procedures (TERPS), and One-Engine Inoperative Surfaces (OEI); no Council Policy adopted

- June 2017 Budget Message: direction to study, through a collaboration process with stakeholders, potential increases to the OEI downtown height limitations that would not threaten air service viability. (Initial $100,000 allocated)

Achievements: August-December

- Formed Steering Committee (SJDA, SPUR, SVO, SVLG, Airport Commission, Building Trades, D3)

- Developed Agreed-On Detailed Project Scope of Work and Collaborative Process
  - Three Tasks: 1-Existing Conditions Assessment, 2-OEI Feasibility Studies and Impact, 3-Economic/Fiscal Analysis

- Selected Consultant (following two proposals), including real estate Sub-Consultant

- Coordinated with Google and their OEI Consultant, agree to accelerate Diridon Area analysis

Next Six Months: February-July

- Complete Task 1: Existing Conditions Assessment (March 8 Steering Committee)

- Mid-Year Action February 13: Allocate Airport Funds for timely completion of 'worst-case','exhaust all options' full Project Scope of Work (additional $417,000; expect $100,000 Google reimbursement

- Goal: By June 26, CED Committee meeting, secure initial insights regarding if/where/how much height limitations could be raised in Diridon Area and Downtown Core

- Develop Policy Recommendation for Council Consideration (for consideration in August)

Downtown Airspace & Development Capacity Study

Possible Questions/Points of Clarification to ask prior to approving Airport Staff's Recommendation of Scenario 4 TERPS Only at the City Council Meeting of March 12, 2019

1. What/Who is Project Spartan as mentioned in the Landrum & Brown Agreement Special Order 4 executed November 7, 2018?
2. Who is the Manager of the Project Spartan Team?
3. Who comprises the Project Spartan Team?
4. Who is the Project Spartan's OEI Consultant?
5. What 4 additional scenarios were added for the Diridon Station area only as outlined in Special Order 4 of the Landrum & Brown Agreement? Are these Scenarios 10A, 10B, 10C and 10D?
6. What role has Project Spartan played in the Downtown Airspace & Development Capacity Study?
7. What direction has been provided to the City of San Jose by the Project Spartan Team?
   "Additional impacts that shall be calculated include employment/jobs, City of San Jose tax revenue and other economic impacts that may be ***directed*** by the Project Spartan Team." – Landrum & Brown Agreement SO4
8. The airlines were told Scenario 4 was the #1 preferred scenario in the October 4, 2018 PowerPoint presentation that contains instructions to the airlines to request their performance data. Did Project Spartan have any input into the selection of Scenario 4 (TERPS only)?
9. Has the Economic Analysis Report prepared by Project Spartan dated September 25, 2018 been shared with all San Jose City Council Members?
10. Has the Project Spartan Analysis Response Memorandum prepared by Landrum & Brown been shared with all San Jose City Council Members?
11. Why were actual airline responses denied to Airport Chairperson Connolly and Council Member Khamis? The Downtown Airspace & Development Capacity Study is the property of the City of San Jose by contract. Why couldn't the confidential or "Trade Secret" information simply be redacted?
12. United Airlines indicated a 21-passenger penalty in the winter and a 41-passenger penalty in the summer and cargo penalties in the B739 flight to Newark in the presentation to Google on November 2, 2018. Currently United Airlines does not fly the B739 to Newark out of SJC. However, this could be representative of what other airline/aircraft could experience on their flights to the east coast. Page 12 bullet 2 of the CED memo dated January 14, 2019 states these weight penalties are "potentially minor". Is a 21 passenger/41 passenger penalty considered minor? How does airport staff define minor?
13. Hawaiian Airlines has expressed that Scenario 4 is the second worst option for them yet page 12 bullet 2 of the CED memo dated January 14, 2019 states Hawaiian will have "potentially minor" penalties. Are we not considering Hawaiian Airlines objection to Scenario 4?
14. There are at least 12 airlines servicing SJC at this time. Why are the economic benefits to Google and the developers more important than the economic benefits of the airlines?
15. Are the economic benefits to the City of San Jose overstated? What guarantees does the City of San Jose have that Google and other developers will actually build out as presented? What guarantee does San Jose have on the projected revenues?
16. What if the first building in the Diridon Station is built to TERPS only and no other buildings are built? Once the first building is built to TERPS in the flight path, do San Jose City Council members realize our Airport will suffer the full effect of projected losses?

17. Are there any airports in the United States, with OBSTRUCTIONS that operate under TERPS only?
18. Has a Community Air Service Support Fund been successful at any other international airport, to mitigate losses due to the loss of OEI airspace?
19. Is the Community Air Service Support Fund sustainable?
20. What type of airport, regional or international, does Silicon Valley need and want? Should a survey be conducted?
21. Has there been any outreach to secondary markets SJC serves such as Santa Cruz County, Monterey County, San Benito County etc. informing them of the changes coming to SJC?
22. Has City Council considered the impacts to members of the flying public and our business community? (i.e. – Passengers bumped from flights, loss of air routes, loss of non- stop flights)
23. Has a written survey been completed, and were written responses received from all of our airlines confirming the following: 1) Airlines understand that if Scenario #4 is approved that all South Flow OEI Airspace will be eliminated, potentially affecting their South Flow departures beginning in 2024? 2) Did our airlines indicate that they have no issues with this OEI change with reference to signing a new 10-Year Lease Agreement?
24. We have been told that OEI is an economic decision because the airlines will not fly when it is not safe to do so. We agree. However, if SJC moves to TERPS only, isn't it true the level of safety or safety margin is compromised as compared to safety offered by OEI surface protections?
25. The Air Line Pilots Association International (ALPA) has offered to do an analysis of the various scenarios at no cost to the City of San Jose. Would this independent analysis be beneficial to SJC and Council Members?
26. The 2007 Obstruction Study uses 88 degrees as the temperature in summer which we have been told is a Boeing temperature a 95% reliability factor. This temperature was lowered to 81.3 degrees in the 2018/2019 Downtown Airspace and Development Capacity Study which we have been told is a Boeing temperature with an 85% reliability factor. With global warming, and the major impact this decision will have on SJC, why wouldn't we want to be 95% confident with the aircraft performance results in the current Study? Should the algorithms be run a second time with the temperature with a 95% reliability rate for comparison?
27. What is not talked about in either the 2007 Obstruction Study or the current Downtown Airspace & Development Capacity Study is the impact on the airlines/airport under TERPS only in Instrument Flight Rules (IFR) conditions (fog/low visibility). What is the impact to air service? Safety?
28. When will the final Downtown Airspace & Development Capacity Study report be finalized? Should this decision to adopt Scenario 4 be deferred until complete information is available?
29. Technology improvements over the last 10 years have been in areas of fuel efficiency not power or thrust. Is it realistic to think airlines will spend the money to retool and bring in 777s to fly out of SJC?
30. Should Scenario 4 prevail, will the Master Plan for SJC and capital plan for SJC be scaled back?
31. At the most recent council meeting, it was suggested that only 0.6% of flights might be affected by new building heights, dependent upon weather conditions. How does this reconcile with the projected economic losses to the Airport of -$26M to $203M, according to the study?

March 7, 2019

SUBJECT: **ANA - All Nippon Airways, Co., Ltd**. –
Expresses Concern over Scenario #4

Dear City Council Members,

Below is an email from ANA – All Nippon Airways regarding their opportunity for a flight from **San Jose to Tokyo, Japan flying the B787-900.**

I am paraphrasing the important points of ANA's – (All Nippon Airways) response to airport administration. Their actual email is below this correspondence.

ANA expresses:

- **Opportunity for non-stop SJC-TKO** (San Jose to Tokyo, Japan)
- Boeing 787-900 data on this flight is important to ANA
- From ANA's Operational and Commercial perspective hopes for **safest logical scenario**
- **Scenario 4** on B787-900 presents **PENALTY of 9,900 lbs – 11,000 lbs**
- **Passenger checked baggage volume is 10,000 lbs on flight**
- **Passenger baggage left behind under scenario #4**

This is simply another reason that you MUST demand to see, un-redacted responses from ALL Airlines and ensure that you are being given credible information. This decision will affect our City and Airport for 100 years into the future. **If you make the wrong decision on Tuesday, your decision cannot be undone.** Once buildings are constructed, we lose the future flight and expansion potential of our airport. **Proceed with Caution.**

Ask yourself this very important question –
What is the RUSH to push Scenario #4 through?

Every day we uncover more and more data that leads us to question the survey results you have been given.

Just some of the impacts under Scenario #4:

- **China – (51 PAX Penalty, 91 PAX Penalty, 41 PAX Penalty, 100 PAX Penalty & 100% Cargo Penalty)**
- **Japan – (Virtually all passenger baggage has to be left behind, 90.9% Cargo Penalty)**
- **Hawaii – (Cargo Penalties)**
- **Newark NJ - (21 PAX Penalty Winter & 41 PAX Penalty Summer)**

What else is being hidden from you?
That is the question you should be asking.

The Recommendation of Scenario #10B, provides:

1. An **increase in building heights** in the Diridon Station area.
2. Increase **tax revenues** for the City of San Jose
3. **Protection of our long-haul** domestic and international **flights**
4. The additional ability to **expand our airport** and bring in **new international flight destinations.**
5. **Protection for** Straight out **OEI** and a modified OEI Plan that can work for the airlines.
6. **No need for a "Community Air Service Fund"** – Which in my opinion will never materialize, and if it did, it would not be sustainable.
7. **Continued airport growth**, utilizing the $2.2 Billion investment (with interest) already made by the City of San Jose to create a world class international airport.

Scenario #10B is a WIN-WIN-WIN for EVERYONE!

- **Developers Win** (More Space to build)
- City of **San Jose Wins** (More Revenues, more housing and a defined skyline)
- **Residents** and Travelers **Win** (Fly SJC)
- Our **Airport and Airlines Win** - (We continue to grow and build out our airport reaching our maximum potential for the 10th Largest City in America).

Please REJECT SCENARIO #4, and vote for a real solution.
Support the Airport Commission's Compromise - Scenario #10B.
A Real Win for San Jose!

Thank you for your consideration.

Sincerely,

Dan L. Connolly

Dan L. Connolly, A Concerned Citizen
[redacted]

See ANA – All Nippon Airways Co, Ltd
Email below

Also, See CHINA Weight Penalty Analysis

---------- Forwarded message ----------
From: MASA IKEDA [redacted]
To: "Ross, Judy" [redacted]
Cc: "SAITO.TOMOMICHI 齊藤 知道" [redacted], "東山 拓雄HIGASHIYAMA.TAKUO" [redacted]>, "皿澤 英明SARAZAWA.HIDEAKI" [redacted]>
Bcc:
Date: Mon, 25 Feb 2019 22:07:15 +0000
Subject: Updates from ANA - B787-900 OEI data

Dear Judy:

Greetings from Masa Ikeda of ANA again.

I am emailing you to follow up your OEI study and presentation to the SJC city council meeting, scheduled for FEB 26th.

I also understand that you kindly took time to meet our SJC Airport Operations Manager, Hide Sarasawa, on Friday, FEB 22nd.

Attached, please find the ANA B787-900 OEI performance data.

- ANA has some chance to operate B787-900 on SJC-TYO route, looking back to our history and also toward future, and therefore providing the B787-900 data is important for us.
- ANA is hoping a safest logical scenario from airline's operational and commercial perspectives.
- For your reference, in scenario 4, our penalty risk with B787-900 is 9,900 to 11,000 lb.
- Our typical passengers' check-in baggage volume per flight is 10,000 lb, meaning we have to fly with leaving passengers baggage behind if this may happen.
- ANA definitely supports the city's development, as well.

Safety is ANA's promise to the public and ANA continues to strive to better serve SJC city and airport.

Your continued support would be greatly appreciated.

Masa Ikeda
ANA - All Nippon Airways Co., Ltd.
[redacted]

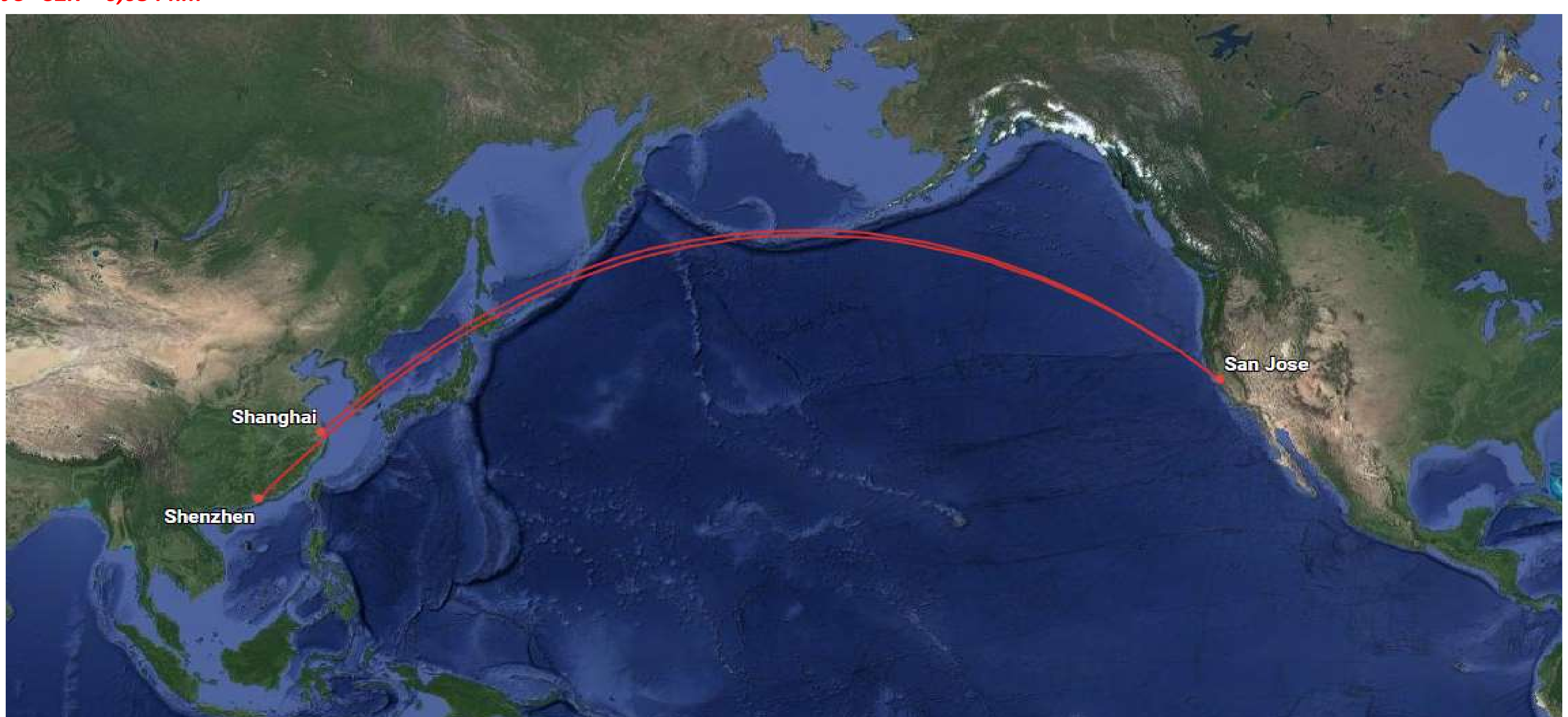
Downtown San Jose Airspace Development Capacity Study (Project DADCS) - International Aircraft Operations Weight Penalty Assessment

Shanghai - PVG Summer (81.3° F)	A350-900 (334 seats/17,927 lbs. cargo)		B787-8 (213 seats/20,788 lbs. cargo)		B787-9 (292 seats/11,885 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1: West OEI Corridor	-	-	-	-	-	-
Scenario 1: Existing Straight Out OEI	11	17,927	-	14,295	31	11,885
Scenario 4: TERPS Only	28	17,927	-	18,453	46	11,885
Scenario 10B: West OEI Corridor	-	3,608	-	250	-	3,925

Shenzhen - SZX Summer (81.3° F)	A350-900 (334 seats/1,758 lbs. cargo)		B787-8 (213 seats/7,612 lbs. cargo)		B787-9 (292 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1: West OEI Corridor	-	-	-	-	10	-
Scenario 1: Existing Straight Out OEI	74	1,758	24	7,612	85	-
Scenario 4: TERPS Only	91	1,758	41	7,612	100	-
Scenario 10B: West OEI Corridor	7	1,758	-	239	25	-

Note: Flight Engineering coordinated directly with Hainan Airlines Flight Engineering staff and were provided with information on the exact seating configurations, engine types, structural maximum takeoff weights (MTOWs), maximum zero fuel weights (MZFWs) and operating empty weights (OEWs) for each of the three aircraft evaluated in this assessment.

Great Circle Distances
SJC - PVG = 5,371 nm
SJC - SZK = 6,034 nm



Analysis Conducted By: Flight Engineering, LLC. **February 22, 2019** **Summary Prepared By: Landrum & Brown Inc.**

March 11, 2019

Mayor and City Council
City of San Jose

Re: Greenbelt Alliance Supports Staff Recommendations on Item 6.2, changing the height limits for San Jose

Dear Mayor and City Council:

Greenbelt Alliance urges the Council to pass the City Staff recommendations for Item 6.2 regarding height limits for San Jose.

Greenbelt Alliance addresses a single challenge: how the Bay Area handles growth. We are the only San Francisco Bay Area organization that holistically addresses land-use issues across our region—from land conservation to smart growth development. Around the Bay Area, our staff and board have worked locally with communities large and small to establish voter-approved urban limit lines and protections for natural and working lands, and to advocate for homes that are affordable across the income spectrum.

We have long been supportive of compact, walkable neighborhoods, and, in San Jose given its low Jobs to Employed Residents ratio, the addition of new job opportunities in the city's developed footprint. Greenbelt Alliance supports the staff recommendations in Item 6.2 that can lead to higher height limits in San Jose. The staff recommendations act as a step to bringing more commercial and residential development to the heart of San Jose. This also supports the growing consensus that San Jose's undeveloped natural and working lands on the city's periphery, like Coyote Valley, are places best retained for green infrastructure value instead of being lost to sprawl.

We look forward to General Plan proposals regarding height limits and will comment on them as they become available.

.

Sincerely,

Brian Schmidt

Brian Schmidt
Program Director
Greenbelt Alliance
415.994.7403

To: City Clerk, Mayor, Council

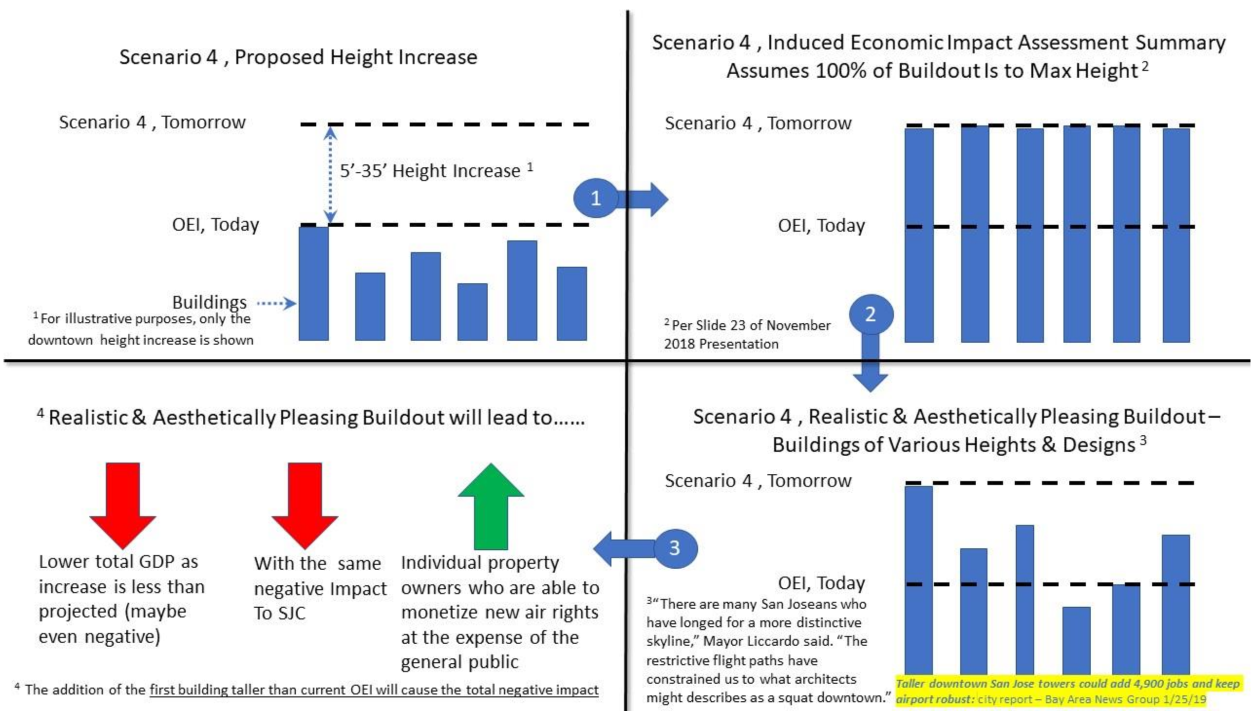
Subject: 3/12 Council Meeting, Agenda Item 6.2, *Actions Related to the Downtown Airspace and Development Capacity Study*

In a high school debate, when a team fails to respond to an argument it is considered dropped and the one making the argument wins the point. Airport Staff has ignored several points that have been brought up by the public and Airport Commissioners in the recent debate about changing the current buffer to allow for One Engine Inoperative over downtown and the Diridon Station Area.

As an example, it was reported at the 2/26/19 City Council meeting that only a small fraction of flights would be impacted by changes to OEI. That may be the case, but ***how does that reconcile with the data from the OEI Study suggesting a cumulative impact of between -$26 million to -$203 million with the implementation of Scenario 4?***

As admitted by Airport staff several times, this negative economic impact begins, when the first building penetrates the existing OEI protection. That the study did not do a sensitivity analysis to understand the impact of build-out versus overall economic impact is a major shortcoming. As noted, in earlier correspondence, the post at this link uses the Study's numbers to demonstrate how lower build out rates can lead to negative economic impact from a Scenario 4 implementation:

https://winchesterurbanvillage.wordpress.com/2019/02/19/who-will-benefit-the-most-from-raising-oei-limits/



This is just one of many questions that have been raised and I encourage the Council to examine the 30+ questions put together by Commissioner Hendrix that have not been addressed.

Process

The Airport Commission and City Council were not given enough time to examine the information, the information that was provided was inadequate and we were often misled in response to our queries. Below is a timeline that explains this provocative statement that I don't make lightly.

Let's start with the January 14th Airport Commission meeting, when we were slated to vote on the Airport's recommendation for Scenario 4. Based on the materials provided to the Commission, we probably would have voted for the Airport Staff's recommendation, but there was a technicality and the vote had to be postponed for a special meeting.

That gave four Commissioners time to dig into the material and compare it to the 2007 *San Jose International Obstruction Clearance Study*. Other than the lower temperatures assumed in 2018 compared to the 2007 study (81.3°F vs. 88°F, 85% versus 95% reliability factor), we couldn't see why the conclusion would be any different today versus then.

https://www.flysanjose.com/sites/default/files/commission/2009%20Fact%20Sheet%20on%20OEI.pdf

Our conclusion, which the majority of the Airport Commission agreed with when we reconvened on 1/24/19, is that if the Council adopts Scenario 4, it **will render SJC as a regional airport, putting flights to Asia, European and some transcontinental flights in financial jeopardy**. This may be OK, but we aren't having that discussion, which is amazing, considering we are reviewing the Airport Master Plan right now. See this link for some thoughts on what is missing from the Airport Master Plan process:

https://winchesterurbanvillage.wordpress.com/2019/01/14/comments-on-sjc-eir-2037-master-plan/

The Commission voted for Scenario 10B and the reasons why are detailed in this document found at this link:

https://drive.google.com/open?id=0Bx53_RYEFZifWm5DXzEyZmlUSzJiaFhnTnp0RXJIQnRQeWtr

Several commissioners argued these and other points about the study and the study process before the Community Economic Development Committee on January 28th and, as a result, CED delayed bringing it to Council until February 26th.

https://winchesterurbanvillage.wordpress.com/2019/01/29/why-the-rush-to-adopt-scenario-4/

Subsequent to the 1/28 meeting, we requested additional documentation to fill in the blanks and found another 30+ documents. Additionally, there have been several Freedom of Information Requests. As we have studied these documents, the process has become as much a concern as the actual result of the impending decision. Some of the concerns include:

- Google was briefed on 11/2/18, a full 60+ days before the Airport Commissioners received materials to prepare for its 1/14/19 vote.
- Who is the group called Project Spartan, which seems to be directing some portion of the study? According to the 2/26/19 Council meeting Project Spartan seems to have some affiliation with Google, and according to the according to the Landrum Brown Agreement SO4 2/26/19,. "Additional impacts that shall be calculated include employment/jobs, City of San Jose tax revenue and other economic impacts that may be directed by the Project Spartan Team."

- The Airport Commission Chair was assured that the airlines and pilots would be directly represented on the committee; they weren't. Hence, the Air Line Pilots Association letter on Feb. 27th stating that they had just become aware of the study and requesting documentation so they could "evaluate the impacts on safety from the proposals and are prepared to do so for the SJC proposals expeditiously once we have all pertinent documentation."
- Repeated requests for information from the Airlines, only to be denied suggesting it was protected under trade secrets. In fact, Hawaiian Air and ANA provided information that seemingly contradicts what was provided as summary information.
- At the 1/14/19 meeting, I specifically asked Director Aitken if the study looked at not only expanding up, but expanding horizontally (e.g. over 87), reducing parking requirements and creating car-free superblocks (dedicating open space to people, instead of cars). Director Aitken reassured us that Google had some creative building designs. While I agree with his assessment about Google's creativity in building design, the reality is that SO4 states that "The City's General Plan including the Diridon Station Area Plan shall be used as a basis of land use and floor area ratio."

Sincerely,

Ken Pyle

Airport Commissioner, District 1 – Views my own

March 9, 2019

To: San José Mayor & City Council Members

Cc: Office of the City Clerk

From: Bill Souders

Re: **Considerations for COMPROMISE on the OEI and Building Heights decision in the Station Area**

I greatly appreciate the openness of most of the Council to consider more carefully what will be a decision with very long term implications. Thank you very much, **Councilmember Jones,** for hitting pause on the process to answer important questions for your constituents.

I don't need to tell you that this decision impacts some of our most valuable community assets, for the entire region. I would like to share some observations for your consideration, as you conduct your final deliberations. There is never perfect information for large, complex, long time-horizon decisions, therefore it is most critical that robust and transparent comparative analysis be applied, even something as simple as weighted pros and cons.

- We ALL agree that SAFETY in not a factor in the decision, therefore no need to discuss this any further.
- The so-called **"what if, what if, what if"** approach by the Steering Committee appears somewhat lacking as several aspects of the report and recommendation seem to ignore viable alternatives for some reason.
    - The "precision" with which advocates for Scenario 4 calculate probabilities: historical load factors **X** existing plane models and configurations **X** historical temperatures (lowered by 7°F) **X** historical pricing **X** the number of historical occurrences of South Flow (<13%) = 0.46% of seats on one airline in the winter, etc., etc., etc.

      This honestly just sounds like someone is trying to make the data fit a predetermined recommendation, especially dangerous in a time of such future uncertainty.

        - **WHAT IF** any of those historical VARIABLES (these are not fixed coefficients!) change significantly in the next 10 years? *The likelihood that they won't change is probably near zero over that timeframe, especially weather!*
        - **WHAT IF** future aircraft designs optimize for fuel efficiency rather than performance? *Per the report, the aircraft most affected by OEI issues at the Airport include the newest aircrafts in the market such as the Boeing 787 and Airbus 320 and 330. Thus, this issue is anticipated to remain with the City for the long term.*
        - **WHAT IF** the historical data do not adequately predict the WORST CASE SCENARIOS in the future (**Councilmember Peralez**'s estimate of 0.06% business risk)? *Per Aitken's comment, he used the 85th percentile on temperature because "that's what our airline partners would prefer that we use, so we did". Why would the airlines PREFER that we soften our calculation of risk? Aiken said earlier that they would always choose to minimize obstacles. This makes no sense!*

- How has the 8.6M sq ft new building potential derived?
  - **WHAT IF** we approve the maximum height but very few buildings actually get built that high for some reason? *The airport would still be negatively impacted with just one tall building, but the economic benefit would not be achieved! **Councilmember Jimenez** raised this specter of increasing risk to the airport since this situation is rather unique; Aiken's answer indicated that we are basically trailblazing the OEI relaxations given the location of our airport to downtown.*
  - **WHAT IF** we instead built up to the heights under Scenario 10C, for example, which seems to come with virtually all of the real estate benefit ($700,000,000 GDP gain by 2038) with little or no projected disruption to airline services, even at a 95% load factor (see below, the comparison of annual offload cost projections between Scenario 4 and 10C in the FIRST YEAR)?

SUMMARY OF 2024 ANNUAL DIRECT IMPACTS
LOAD FACTOR SENSITIVTY TEST

Summary of Losses		Baseline Load Factor	90% Load Factor	95% Load Factor
Scenario 1	Existing airspace protection	$0	$0	$0
Scenario 4	TERPS Only	$1,517,000	$2,716,000	$4,306,000
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	$0	$79,000	$1,439,000
Scenario 10	Existing Conditions: 85' - 166' AGL	$0	$0	$0
	Opt 10A: 100' - 195' AGL	$0	$0	$0
	Opt 10B: 115' - 224' AGL	$0	$0	$0
	Opt 10C: 129' - 240' AGL	$0	$0	$67,000
	Opt 10D: 146' - 260' AGL	$0	$663,000	$2,308,000
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	$9,812,000	$7,510,000	$10,164,000

- **Councilmember Foley** appropriately asked how confident the Steering Committee was that existing airlines would not reduce service, or that future airlines might have issues. She emphasized her concern that the Airport Commission was not given access to the airlines' responses. The answer from Aiken was that, due to trade secrets, the information could not be shared. He then said that even though most airlines had some concerns, they "seemed to indicate" that they are still INTENDING to sign the next 10-year lease. Staff also added that it really wasn't a major issue since there won't be any buildings completed for five years!
  - **WHAT IF** the airlines are taking a cautious, wait-and-see approach for now, but their real reservations will surface during the NEXT 10 year lease renewal cycle? *It's a safe bet that they will be doing their own robust probability analysis and will adjust their long range plans accordingly in five years!*
  - **WHAT IF** we can't secure adequate private sector funding for the as-yet-to-be-defined Air Service Support Fund? *No one can seem to describe how it would work; it's the first of its kind.*
  - **WHAT IF** airlines begin demanding those assurances as part of the next 10-year lease negotiations? *It seems that this could significantly diminish our potential Value Capture through increased building heights if we encounter annual obligations of greater than $4M (see above).*

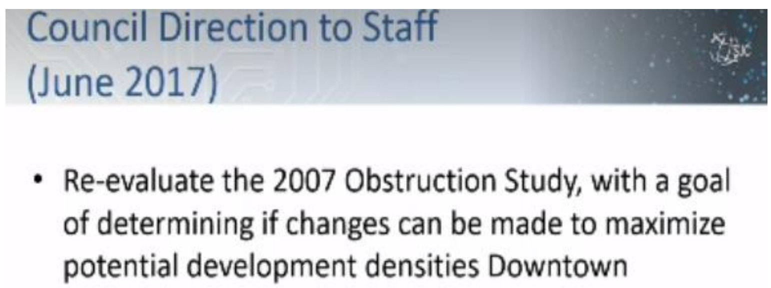
- **Councilmember Khamis**, in both his 1/28/19 Committee Meeting Hearing and again in the 2/26/19 Council Meeting, astutely cautioned about the potential risk our international airport, that we invested so heavily to establish. His question was a good one, **"Why do we have so much undue pressure to go straight to the MAX height?"**

  - **WHAT IF** we were just a bit more cautious with this strategically located 50 acres? *This only represents 0.04% of the total 115,000 acres of San José land area! And, unfortunately, this development alone will not make much of dent in our housing shortage.*

  - **WHAT IF** we accelerate the Urban Villages strategy instead of trying to absolutely MAXIMIZE heights in this potentially iconic, transit-centric showpiece? *That would be a true transit innovation versus risking the viability of our most successful transit decision to date.*

  - **WHAT IF** we instead do an urban design assuming futuristic transit (including to the airport, finally), with riverside open space, an iconic, central landmark, an even more vibrant Sports & Entertainment venue, all in a very walkable/bikeable core? *Or have we already given away too much of our control over land use in the station area?*

- **Councilmember Arenas** boldly challenged the make-up and predisposition of the Steering Committee as appearing to be a Stacked Deck. I agree, and also question the instructions to the committee:



  Clearly this team was assembled to MAXIMIZE development density, rather than to OPTIMIZE Economic Development. Those are not just semantics, it is a very specific PRIORITY, for some reason.

  - **WHAT IF** this Steering Committee actually came back with real scenario-based planning alternatives balancing risk and reward, while accounting for significant unknowns? *We certainly wouldn't be arguing about 0.46% of one airline's seating capacity based on historical trends only! We would hopefully be taking a much more realistic but future-looking approach.*

  - **WHAT IF** we pause long enough to reflect on the weightiness of this decision and try to visualize the next 20, 40, and 60 years? *For some reason, it seems that certain folks feel like we have the GOOGLE GUN TO OUR HEAD, so they are rushing to appease them. Surely, taking just a bit more time for additional analysis wouldn't impact Google's planning timeline.* ***We only get to make this decision once!***

  - **WHAT IF** we let history be our guide, appropriately? *Some have expressed that "we suffered the casualty of a war between RDA and OED 12 years ago" and now it is time for retribution.*

- **WHAT IF** we were able to get a few do-overs? (we won't!)
    - *It seemed like a good idea, in the 1950s & 60s, to duplicate LA sprawl with 1377 annexations…*
    - *It seemed like a good idea, in the late 1950s, for Santa Clara County to opt out of BART in order to build expressways…*
    - *It seemed like a good idea, in the early 1980s, to implement a light rail line…*
    - *It seemed like a good idea, in 2000, to build another mecca for the automobile at Santana Row, with "free" parking but necessitating two major, taxpayer-funded freeway interchange overhauls…*

- **WHAT IF** there is greater business risk than the projected 0.06% to airlines in the future that could make SJC less desirable for international and long-haul destinations?
  Again, **Councilmember Khamis** asks: "Why can't we choose a compromise on heights (Scenarios 10C or D) which are slightly below those in Scenario 4, so we don't slide backwards with the airport?"
    - *It seemed like a good idea, in 2019, to ___________________…*

- And finally,
    - **WHAT IF** "collaboration" with the **SPARTA Project** actually resulted in some form of complicity within a **TROJAN HORSE Project**, with non-disclosed objectives, that will never be discussed in the public forum of a Council Meeting or Committee Meeting?

Thank you for considering alternatives and not just making a motion for a Yea or Nay vote on the most risky recommendation (Scenario 4). Other scenarios (10 B, C, or D) will ALSO increase building height dramatically so let's OPTIMIZE opportunities while MINIMIZING risks. The goal should have never been to MAXIMIZE heights without first doing side by side comparisons of the ASSUMPTIONS and ALTERNATIVES!

Respectfully,

Bill Souders

Downtown Homeowner, SJC Frequent Flier, and "Density Pioneer"

AIR LINE PILOTS ASSOCIATION INTERNATIONAL
THE WORLD'S LARGEST PILOTS UNION • WWW.ALPA.ORG
535 Herndon Parkway • Herndon, VA 20170 • Phone 703-689-2270 • 888-FLY-ALPA

March 11, 2019

San Jose, CA City Council

San Jose, CA Airport Commission

SJC Airport Director

Sent by email to all recipients

Dear San Jose Officials:

By letter dated February 27, 2019, the Air Line Pilots Association, Int'l (ALPA), which represents more than 61,000 airline pilots who fly for 33 airlines in the U.S. and Canada, made you aware of potential concerns with proposals related to land use and development within the city of San Jose. We requested, and were promptly provided with, access to documents related to these proposals from the office of the SJC Aviation Director, which includes analysis of possible impacts on airline operations.

After reviewing these materials with the aviation safety chairs at each of the ALPA airline pilot groups whose respective companies operate into SJC, it is our view that the land use proposals under consideration will not impact available safety margins for commercial operations. Given that the preponderance of the approximately 12% of the airport's annual operations which are conducted toward the south occur in cooler winter months, the economic impacts on the airlines by the proposals under consideration may be minimal.

We appreciate the opportunity to review and provide comments on the subject development proposals.

Sincerely,

Capt. Steve Jangelis
Aviation Safety Chair
Air Line Pilots Association, Int'l

SILICON VALLEY DE-BUG
701 Lenzen Ave. San José, CA. 95126 • info@siliconvalleydebug.org • 408.971.4965

March 11, 2019

SUBJECT: Actions-Related to the Downtown Airspace and Development Capacity Study

Mayor Sam Liccardo
Vice-Mayor Chappie Jones
Councilmember Sergio Jimenez
Councilmember Raul Peralez
Councilmember Lan Diep
Councilmember Magdalena Carrasco
Councilmember Dev Davis
Councilmember Maya Esparza
Councilmember Sylvia Arenas
Councilmember Pam Foley
Councilmember Johnny Khamis

Silicon Valley De-Bug asks you to reject adopting staff recommendations on your forthcoming decision to raise height limits downtown and in the Diridon station area. The expediency of this decision appears to serve and be driven by the economic interests Google and other agencies have in the Diridon station. After the city's own airport commission and individual members have raised serious concerns about incomplete analysis, secrecy, and exclusion in this process the city's decision to move ahead quickly only casts more doubt. This is a disturbing pattern for the city of San Jose to continue, further deteriorating any confidence that city representatives act in the best interests of San Jose residents. Policies that affect our daily lives should not be driven by corporate interests prioritizing economic measures over FAA safety measures and approved general plan process.

Including public engagement after you vote, as laid out in the memo signed by the Mayor and other councilmembers defeats the purpose of meaningful community engagement, and is another troubling pattern the city is also repeating: exclusion by design. As San Jose residents, we also want a prosperous future for the city and we want to help drive those decisions, not be repeatedly shut out by business interests.

Respectfully,
Cecilia Chavez
Charisse Domingo
Fernando Perez
Glen Maxwell
Liz Gonzalez
Theotis Golden
Silicon Valley De-Bug

To: City Clerk, Mayor, City Council March 10th, 2019

From: Dan Connolly, Catherine Hendrix, Ray Greenlee, Ken Pyle (Airport Commissioners, D10, 9, 6 & 1)

Subject: 3/12 Council Meeting, Agenda Item 6.2, *Actions Related to the Downtown Airspace and Development Capacity Study*

Table 2 from the March 8th, 2019 Memorandum from Airport Director John Aitken has inconsistent data and prompts several questions, many of which have been asked by the Airport Commission in writing, but that have never been addressed.

HONORABLE MAYOR AND CITY COUNCIL
March 8, 2019
Subject: Downtown Airspace and Development Capacity Study Report
Page 8

Table 2 – Development Impacts of Various Airspace Protection Scenarios

	Scenario 4	Scenario 10B	Scenario 10D
Height Increase: Downtown Core	5' to 35'	None	None
Height Increase: Diridon Station Area	70' to 150'	30' to 56'	62' to 118'
Net New Square Footage Diridon Station Area*	9.5M	3.3M	7.3M
Potential New Jobs	30,600	10,200	22,800
Potential New Housing Units	2,800	1,000	2,200

*Assumes buildout at 65% commercial and 35% residential ratio, comparable to the current Diridon Station Area Plan.

1. First, the Net New Square Footage for the Diridon Station Area is given as 9.5M square feet. This is a new figure, as Page 5 of the November 2018 presentation indicated 8.6M net new square feet. Additionally, what was presented to the Airport Commission was a 10% commercial and 90% residential mix, instead of the 65/35 given above. ***Why the difference in net new square feet between what was presented on 3/8/19 (9.5M) and 11/5/18 (8.6M)?***
2. The existing Diridon Station Area Plan assumes 5.37M square feet of commercial industrial, retail and/or restaurant, along with 2,588 residential and 900 hotel rooms, while *existing building height limits are between 85 to 166 above ground level.* [1] ***Why doesn't Scenario 10B have at least 5.37M square feet?***
3. Another huge inconsistency is the difference between Scenario 4 and Scenario 10B in terms of the number of Net New Square Feet for the Diridon Station Area; 9.5M versus 3.3M square feet. ***Why isn't this difference more on the order of 9.5M for Scenario 4 versus 6.67M for Scenario 10B, since Scenario 10B is between 70 to 74% the height of Scenario 10B?***

The following table provides the logic as to why Table 2 from Airport Director Aitken's memo do not make sense.

	Scenario 4	Scenario 10B	Scenario 10D
Existing Height Limits (AGL)	85' to 166' AGL	85' to 166' AGL	85' to 166' AGL
Height Increase	70' to 150'	30' to 56'	62' to 118'
Proposed Height Limits (AGL)	155' to 316'	115' to 222'	147' to 284'
% of Scenario 4	100%	74% to 70%	94% to 90%
Potential New Jobs	30,600	22,644 to 21,420	28,764 to 27,540
Potential New Housing Units	2,800	2,072 to 1,960	2,632 to 2,520

Table 1 – Number of Square Feet, Jobs & Housing based on linear relationship between heights

[1] See https://www.diridonsj.org/diridon-stationarea-plan

From: Bill Souders <
Sent: Tuesday, March 12, 2019 10:26 AM
To: Bill Souders; The Office of Mayor Sam Liccardo; Tran, David; Ramos, Christina M; Connolly, Dan; ken.pyle@viodi.com; Greenlee, Raymond; Hendrix, Catherine; District1; District2; District3; District4; District5; District 6; District7; District8; District9; District 10; City Clerk
Cc: ; Emily DeRuy; Ramona Giwargis; Jennifer Wadsworth
Subject: URGENT: Remember - COMPROMISE is COURAGEOUS!

Mayor & City Council Members:

COMPROMISE is COURAGEOUS, and in this case, it's also SMART! Please think VERY CAREFULLY before voting to add UNNECESSARY risk to our extremely unique, center-of-the-city, long-haul, INTERNATIONAL AIRPORT.

As many Councilmembers have already pointed out, there are other alternatives which actually OPTIMIZE benefit versus risk. Even just a slight pause, to regroup and reassess the Scenario 4 recommendation given the new feedback and great questions, seems quite prudent for SUCH an important decision. Additionally, looking at the timelines for ALL of the OTHER complex station area planning efforts underway, with SO MANY stakeholders (including outside of San José), why must we finalize this decision right NOW? Let's not push aside the UNCERTAINTY that must be addressed regarding both weather patterns and the "fund" that is presented simultaneously as both the economic "safety net" and "a concept only!" that may never materialize.

Refusing to take the time to do a more thorough and unbiased analysis of weighted pros & cons of ASSUMPTIONS and ALTERNATIVES could be construed as irresponsible, illogical, or even suspicious.

We are better than that! Thank you for your COURAGE!

Respectfully,

Bill Souders

Downtown Homeowner, SJC Frequent Flier, and "Density Pioneer"

From: Bill Souders < >
Sent: Monday, March 11, 2019 1:06 AM
To: ; mayoremail@sanjoseca.gov; Tran, David <david.tran@sanjoseca.gov>; Ramos, Christina M <christina.m.ramos@sanjoseca.gov>; ACSATM, Inc. < >;; District1@SanJoseca.gov; District2@SanJoseca.gov; District3@SanJoseca.gov; District4@SanJoseca.gov; District5@SanJoseca.gov; District6@SanJoseca.gov; District7@SanJoseca.gov; District8@SanJoseca.gov; District9@SanJoseca.gov; District10@SanJoseca.gov; cityclerk@sanjoseca.gov
Cc: Emily DeRuy < Ramona Giwargis < >
Subject: URGENT PUBLIC COMMENT: OEI COMPROMISE Considerations [6.2 19-055 Actions Related to the Downtown Airspace and Development Capacity Study.]
Importance: High

PLEASE SUBMIT INTO THE PUBLIC RECORD.

Councilmembers Jones, Khamis, Foley, Esparza, Arenas, Jimenez: I greatly appreciate each of you really drilling in on the motivations, the logic, and the single recommendation to build as high as possible in both the Council meeting and the Community & Economic Development Committee. This decision will have implications for generations. I hope you find my lines of inquiry (my WHAT IFs) useful as you ponder your decisions. I strongly believe that there is a better alternative (compromise) than the “go-for-broke” Scenario 4.

I will not be available for the meeting on Tuesday, unfortunately, but I am happy to answer any clarifying questions as necessary.

Good luck, Bill

Live as if you were to die tomorrow.
Learn as if you were to live forever.
--Mahatma Gandhi, 10/02/1869 - 01/30/1948

March 12, 2019

The Honorable Sam Liccardo
200 E. Santa Clara Street, 18th Floor
San Jose, CA 95113

Re: APPROVE SCENARIO 4 City Council Agenda Item 6.2: Changing the Height Limits for San Jose

Honorable Mayor Sam Liccardo and Councilmembers:

I am writing on behalf of the Santa Clara Valley Open Space Authority (Authority) to encourage the Council's approval of the staff's recommendation (Scenario 4) for increasing heights limits in the areas of the Diridon Station Area and Downtown Core. The Authority is a public land conservation agency and special district created in 1993 to balance growth in the Silicon Valley through the permanent protection of open space, wildlife habitat, water resources and working lands.

The Authority supports the Mayor and City Council's leadership on multiple public policy fronts to create an environmentally and economically sustainable city and region through climate-smart land use policy decisions. According to Stephen Levy of the Center for Continuing Study of the California Economy, "San Jose is poised for substantial future job growth (200,000+) as a result of announced plans, a surge in land purchases, expansions in air travel and related jobs, and the development of a new high amenity Diridon station complex. Raising height limits would allow even more jobs."

We support the City's policies and actions to increase infill development for jobs and housing in the Downtown Core which reinforces efforts to protect from development the irreplaceable natural green infrastructure of the Coyote Valley. By increasing height and density of development downtown, close to transit, and by encouraging bicycle and pedestrian use, the City furthers key strategies included in its adopted Climate Smart San Jose (CSSJ) plan instead of contributing to continued suburban sprawl. Implementing Scenario 4 will reduce Vehicle Miles Traveled (VMT) and GHG by decreasing the number of auto trips to and from outlying areas, with attendant environmental, health, and economic benefits. The Authority is also working with the City on a Phase 2 Climate Smart San Jose element to evaluate the contributions that natural and working lands within the City's sphere of influence bring to the implementation of the goals of CSSJ through carbon sequestration and avoided vehicle miles traveled (VMT). The proposed increase in height limits, as recommended in Scenario 4, can be a significant catalyst to achieving both climate-smart infill and community conservation goals.

Thank you for the opportunity to comment.

Sincerely Yours,

Andrea Mackenzie
General Manager

Cc: Board of Directors, Santa Clara Valley Open Space Authority

33 Las Colinas Lane
San Jose, CA 95119

openspaceauthority.org

To: City Clerk, Mayor, City Council

March 10th, 2019

Subject: 3/12 Council Meeting, Agenda Item 6.2, *Actions Related to the Downtown Airspace and Development Capacity Study*

This letter is in response to the March 8th, 2019 memorandum from Mayor Sam Liccardo, Vice Mayor Chappie Jones, Councilmember Raul Peralez and Councilmember Magdalena Carrasco, as well as comments made at various public meetings since the 1/14/19 Airport Commission.

Their memorandum is encouraging in that it seems to suggest that the city should retain flexibility and be able to make a mid-course correction in the next year, if further study suggests that Scenario 4 does not meet the expectations anticipated in draft OEI study.

With that said, please consider the following before voting for Scenario 4 on Tuesday:

What Does SJC Want to Be When It Grows Up?

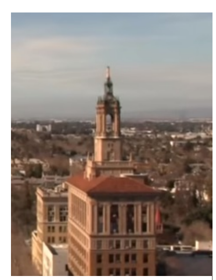
What is the bigger vision for the airport? This question is more than whether SJC becomes a regional or continues to grow as an International airport serving markets in Asia (where 15 of the top fastest growing airports are located).[1] That is, we are missing an opportunity to integrate the airport into the larger urban fabric, as is being done by leading international airports that have a strategic vision that maximizes the value of the real estate for the airport and community.

Max Hirsh (PhD, Harvard), a professor at the University of Hong Kong, suggests airports can be part of the larger community and can diversify their income at the same time.[2]

> *"If you superimposed the average airport over a map of the city that it serves, you'd find that it's about the same size as the entire downtown core….The world's leading airports view these real estate holdings as a critical source of non-aeronautical revenue. They've transformed that land into a variety of profitable commercial developments, including hotels, office parks, and shopping centers. Still, others have built concert arenas, university campuses, and tourist attractions."*

Please see this link for more details
https://winchesterurbanvillage.wordpress.com/2019/01/14/comments-on-sjc-eir-2037-master-plan/

What Is the Overall Economic Impact – Especially When It's Spires Instead of Affordable Housing?



A Famous Spire

The study suggests a total economic impact for Scenario 4 of between -$26M to -$203M depending upon load factor. As has been mentioned in earlier correspondence the studay considers a 100% buildout of the Downtown and Diridon Station Area.

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[1] According to this March 7th, 2019 San Jose Inside column http://www.sanjoseinside.com/2019/03/08/adobes-proposed-north-tower-panned-as-flat-bulky-boxy/

[2] See https://airporturbanism.com/articles/how-can-airports-develop-their-landside-real-estate

What was not done in the study was a sensitivity analysis to understand the potential financial impact with a lower percentage buildout and/or different temperature assumptions (again, the 2007 report assumed 88°F versus 81.3°F for the 2018 study). Appendix A is a rough estimate of the economic impact, based varying the amount of new space that is constructed above current OEI. A similar analysis should be done where temperature is the variable.

Further, what wasn't considered, but which could be significant, is what if the space above ***current OEI is used for decorative purposes*** and not for additional housing or commercial space? What is really a concern is that some are already calling to penetrate the current OEI spaces with decorative additions to structures.[3]

> "To break up the blocky skyline, design reviewers recommended taking advantage of increased height limits to create an "articulated roofline" or amenity space."

Although decorative additions might improve the look of the skyline, they would not add to the economic benefit, but would trigger all the negative effects. And, these could be added conceivably to existing buildings, meaning they could have an impact sooner than 5-years. Assistant Director of Aviation, Judy Ross points out that once the first obstruction pierces current OEI, all the negative impacts will occur (as documented in this video by from the 1/28/19 CED meeting).

Please see the following link, if the above video is not viewable - https://youtu.be/ieFLtaK9Ct8?t=1390

Questions About Square Footage and Net Jobs

In several of the presentations to Council it has been mentioned the 30,000 jobs will be created. This appears to be the total potential, which includes a reported 20,000 jobs based on current conditions.[4] The **incremental number of jobs based on Scenario 4 would be between 4,700 to 4,873 and 1,600 to 2,400** based on Scenario 4 and Scenario 10b, respectively.[5]

Table 3, Incremental Commercial & Residential Square Footage, summarizes a combination of data from the November 2018 presentation, as well calculated data based on assumptions from that presentation and/or other data sources. As reference, the 2014 Diridon Station Area Plan approved by the City

[3] See this March 8th, 2019 San Jose Inside article http://www.sanjoseinside.com/2019/03/08/adobes-proposed-north-tower-panned-as-flat-bulky-boxy/

[4] According to this 11/28/18 San Jose Mercury article https://www.mercurynews.com/2018/11/28/google-village-could-bring-24000-jobs-to-downtown-san-jose-study/

[5] See page 23 and page 8 of the 12/18 and the 11/18 presentations, respectively.

Council assumed a build out of 5.37M square feet of commercial industrial, retail and/or restaurant, along with 2,588 residential and 900 hotel rooms.[6]

How is it that the net additional square feet could more than double (5.37M to 13.97M square feet) without doubling the height of the buildings?

Table 1 Incremental Commercial & Residential Square Footage

		Airspace Scenario 4	**Airspace Scenario 10B**
Incremental Commercial & Residential Square Footage	Net New Square Feet[7]	8,600,000 square feet	3,100,000
	Net New Commercial[8]	869,500 square feet	296,000
	Net New Residential[9]	7,730,500 square feet	2,804,000

> *What is the baseline square footage that is assumed for the Diridon Station Area and for the Downtown area? Is it the same square footage (5.37M) as what is assumed in the 2014 Diridon Station Area Plan?*

The number of net residential units in the Diridon Station Area would increase by 9,095 units in Scenario 4 and 3,299 for Scenario 10B, respectively. In both cases, these numbers are additive to and significantly larger than the estimated 2,588 residences that were assumed in the 2014 Diridon Station Area Plan[10].

Another implication in the assumptions is that these domiciles, on average, would not house families with children, as the number of residents per household is assumed to be 1.43, compared to the existing 2.4 to 2.9 residents per household in the 95126 and 95110 ZIP codes, respectively.[11] At 596 square feet per resident, the average dwelling size would be 850 square feet. [12]

[6] See https://www.diridonsj.org/diridon-stationarea-plan
[7] Page 5 of the November 2018 presentation.
[8] Calculated based on the number of projected additional employees (4,700 for Scenario 4 or 1,600 for Scenario 10B as per page 8 of the November 2018 presentation) and assumes 1 employee per 185 square feet per page 33 of the November 2018 presentation.
[9] Calculated by subtracting the commercial space from the net new space.
[10] 2,588 being the potential number of units that could be developed as indicated in the 2014 Diridon Station Area Plan.
[11] City-data/census data for the 95126 and 95110 ZIP codes can be found at: http://www.city-data.com/zips/95126.html and http://www.city-data.com/zips/95110.html. As another point of reference, according to the City-Data.com site, the average California household size is 3.0.
[12] The 1.43 people per unit figure is consistent with the 1.51 people per unit that the typical downtown residential unit has according to SJ Economy http://sjeconomy.com/downtown-progress-report-mid-year-2018/

Density Doesn't Always Have to Mean Taller

Hotel over Street in San Diego

Some of the most desirable cities in the world are those that design for people and not cars. Removing and reducing parking from the core of a downtown and building over roads provide ways is an effective alternative to increasing heights. By closing off its central core during the Christmas 2018 Madrid found that retail sales increased by 9.5%, according to a recent Forbes article.[13]

As referenced in earlier submittals, these sorts of alternatives, where the existing space is used more efficiently were not explored in the 2018 study.

What are the Legal Ramifications of Adopting Scenario 4?

There was no legal opinion provided as part of the study. This question has been out there since Airport Director Aitken mentioned issues in Las Vegas at the Airport Commission's 1/14/19 meeting. It wasn't clear what those issues are based on his explanation from that meeting, but it raises the question of what potential legal ramifications the City of San Jose might face. For instance, What, if any, legal ramifications are there if:

1. The council effectively increases height limits based on a vote on 3/12/19, but then reduces them later, if it is found that the heights need to be lower to minimize overall negative economic impact? Will property owners start making development plans that will have to be scaled back?
2. Noise considerations. A group of citizens from the Sunnyvale-Cupertino expressed concern that raising building heights could potentially increase the amount of south flow traffic. The report did not address this question.

Lastly, we appreciate the efforts of airport staff, council staff and council in the many hours spent studying this complex issue. We wish the best for the airport and the city.

Sincerely,

Dan Connolly, Airport Commissioner, District 10

Ray Greenlee, Airport Commissioner, District 6

Cathy Hendrix, Airport Commissioner, District 9

Ken Pyle, Airport Commissioner, District 1

[13] https://www.forbes.com/sites/carltonreid/2019/03/08/closing-central-madrid-to-cars-resulted-in-9-5-boost-to-retail-spending-finds-bank-analysis/

Appendix A – Economic Impacts Based on Different Buildouts

100% Buildout (assumed in the 2018 OEI Study)

Total Economic Impact Summary (2038) Gain/Loss[1]		Airspace Scenario 4	Airspace Scenario 10B
	Aviation Impact	-$26M to – $203M[2]	$0[3]
	Real Estate Impact	$747M[4]	$438M[5]
	Net Impact	**$544M - $721M**	**$438M**

50% Buildout

Total Economic Impact Summary (2038) Gain/Loss		Airspace Scenario 4	Airspace Scenario 10B
	Aviation Impact	-$26M to – $203M	$0
	Real Estate Impact	$374M[6]	$219M
	Net Impact	**$171M - $348M**	**$219M**

10% Buildout (e.g. First Few Buildings)

Total Economic Impact Summary (2038) Gain/Loss		Airspace Scenario 4	Airspace Scenario 10B
	Aviation Impact	-$26M to – $203M	$0
	Real Estate Impact	$75M[7]	$44M
	Net Impact	**-$128M - $49M**	**$44M**

From: Ken Pyle [mailto:]
Sent: Tuesday, March 12, 2019 11:52 AM
To: Bill Souders < >; The Office of Mayor Sam Liccardo <TheOfficeofMayorSamLiccardo@sanjoseca.gov>; Tran, David <david.tran@sanjoseca.gov>; Ramos, Christina M <christina.m.ramos@sanjoseca.gov>; Connolly, Dan < >;; Greenlee, Raymond < >; Hendrix, Catherine < >; District1 <district1@sanjoseca.gov>; District2 <District2@sanjoseca.gov>; District3 <district3@sanjoseca.gov>; District4 <District4@sanjoseca.gov>; District5 <District5@sanjoseca.gov>; District 6 <district6@sanjoseca.gov>; District7 <District7@sanjoseca.gov>; District8 <district8@sanjoseca.gov>; District9 <district9@sanjoseca.gov>; District 10 <District10@sanjoseca.gov>; City Clerk <city.clerk@sanjoseca.gov>
Subject: URGENT: A Brief Video Explanation of Why the Data in Table 2 Is Wrong

Please view this brief video explaining the latest concerns regarding the error in the data in the 3/8/19 memo from Airport Director Aitken.

This may have to serve as my 2-minute public comments, as I am not certain whether I will be able to attend today's council meeting.

Respectfully,

Ken Pyle, D1 Airport Commissioner (Views are my own)

https://youtu.be/36TQ0Y1BN-Q

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Ken Pyle
Managing Editor

WORKING PARTNERSHIPS USA

3/11/2019

The Honorable Mayor Sam Liccardo and Members of the City Council
San Jose City Hall
200 E. Santa Clara
San Jose, CA 95113

RE: Actions Related to the Downtown Airspace and Development Capacity Study.

Dear Mayor and Council:

On behalf of Working Partnerships USA, I would like to express our support for the memo by Councilmember Sergio Jimenez proposing the adoption of the staff's recommendations around the Downtown Airspace Policy and calling for developing an Incentive Zoning Policy for areas impacted by these changes. By developing an Incentive Zoning Policy, we can ensure that the benefits of the proposed upzoning of Diridon Station and the Downtown Core does not only benefit developers, landowners and corporations like Google but ultimately benefits the City's residents by generating community benefits like producing and preserving affordable housing and addressing displacement.

We also support the memo by Mayor Liccardo, Vice Mayor Jones and Councilmembers Carrasco and Peralez encouraging additional outreach to stakeholders and land use changes are considered.

While we believe increased development Downtown and surrounding Diridon Station presents an opportunity to pursue goals on affordable housing, creating good jobs, and adding transit ridership we also believe the City has a duty to do everything within its power to ensure such development is done without promoting further displacement. Too many working families are seeing their housing costs rise and have to make tough choices of whether to leave San Jose or reach for other unhealthy coping mechanisms, from living in overcrowded conditions, to sleeping in vehicles to skipping meals or delaying medical attention. We believe we can achieve development goals while advancing a suite of policies and investments to strengthen and protect working families and communities of color, particularly as the proposed Google project and other development in Diridon and the Downtown Core moves forward. Pursuing an Incentive Zoning Policy in tandem with upzoning detailed under the staff recommendations could be an important step towards embedding the concept of development without displacement as part of the City's decision-making.

To date in the Diridon Station Area and Downtown Core, the City's planning has restricted private development from building above heights that align with One Engine Inoperative rules, maintaining this airspace for the goal of promoting public safety and supporting operations of the San Jose International Airport. Now that the City has conducted the necessary research to determine we can safely increase maximum building heights with minimal impact to airport operations, the staff is proposing zoning and planning changes to allow private developers to build projects that potentially reach into what was formerly public airspace. This transfer of these rights from the public to private landowners will not only allow developers to build higher and denser than before but it will also increase the value of the land in this area significantly, regardless whether landowners choose to build, because of the new development capacity allowed by the new policy.

In some corners of the Diridon Station Area, maximum allowable heights will more than double, increasing by over 150 feet. The decision by the City Council to make changes to the General Plan, the Diridon Station Area Plan and any other land use policies or documents will generate significant additional financial value for land owners and developers in these areas. This is particularly true for Google, which could see the value of their land greatly increase in value.

Currently the City of San Jose has no public policy tools to capture this increase in land value. The City of San Jose did agree to a non-binding Memorandum of Understanding with Google which included principles outlining the City's intention to develop a Community Benefits Plan in exchange for upzoning such as this proposed new Airspace Policy, and other policy decisions that may benefit Google as a developer. Additionally, during the December 4th, 2018 Google land sale vote, Council voted to direct staff to study an incentive policy for commercial and residential developers looking to take advantage of increased heights under a future proposed Airspace Policy. Unfortunately, the staff recommendations for today's vote do not reflect this Council directive.

The City has still not analyzed what value will accrue to developers from such upzoning, nor has it developed a workplan for capturing a portion of this value for the public through community benefits. Such policy would be particularly important in the case of developments where the City does not intend to individually negotiate a development agreement like the Google development. The City project land use changes implementing the Airspace Policy could generate roughly 9 million additional feet across residential and commercial development, so a potential Incentive Zoning Policy could generate significant community benefits.

As we think about value capture for upzoning, its also important to think about the implication of upzoning to our most vulnerable communities. As an increasing number of potential developments downtown and at Diridon Station have emerged, many members of the community have raised their fears around how developments like the Google mega-campus could lead to rising residential rents, displacement and gentrification with significant impacts on working families, communities of color and ultimately the culture and diversity of San Jose. Evidence from economic and social science literature suggests that while upzoning in low income urban neighborhoods may help cities increase property values and meet economic development goals, it can also inadvertently lead to rising residential and commercial rents, displacement and gentrification with potential disparate impacts on people of color.[1] For instance Tom Angotti and Sylvia Morse in their book "Zoned Out" examine 76 rezonings in New York City between the years 2003 and 2007 and found in areas with higher concentrations of African American and Hispanic residents saw higher rents, a reduction in affordable housing units an increase in white residents and a noticeable reduction in the neighborhood's minority populations after upzoning.[2]

According to the University of California Berkeley's Urban Displacement Project, the Census Tracts covered by changes to Airspace Policy are predominantly low income (with a median income below 80 percent of area median income) and experiencing On-going Gentrification and Displacement, measured by a loss of low income families and naturally occurring affordable housing despite stable or growing population.[3] Additionally, according to analysis presented to the Station Area Advisory Group in August 2018 on existing conditions

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[1] Freemark, Yonah. (2019). Upzoning Chicago: Impacts of a Zoning Reform on Property Values and Housing Construction. Urban Affairs Review; Angotti, Tom & Morse, Sylvia (2016). Zoned Out! Race, Displacement and City Planning in New York City; Pough, Bradley (2014) Neighborhood Upzoning and Racial Displacement. University of Penn Journal of Law and Social Change. Neighborhood Upzoning and Racial Displacement.

[2] Angotti, Tom et al (2016)

[3] Urban Displacement Project. SF Map, as accessed 3/11/2019: http://www.urbandisplacement.org/map/sf

surrounding Diridon Station, the one-mile radius surrounding the Station Area (which includes the area impacted by the FAA/TERPS Airspace proposal) is home to a disproportionate number of black (4.46%) and Latino (47.35%) residents compared to Citywide.[4] Residents in this area also include disproportionate numbers of residents living in rental housing (67%), living in poverty (18.1%), and without a high school degree compared to Citywide. Certainly these are areas that are likely to continue to face displacement pressures as development continues.

We believe Councilmember Jimenez's proposal represents an important step towards supporting development downtown and also ensuring developer who benefit from upzoning are incentivized to make significant contributions towards addressing the unintended impacts of development by investing in preserving and producing affordable housing for low and moderate income families to help prevent displacement.

Cities like Seattle, Washington and Santa Monica and Mountain View here in California have developed their own approaches to capture the increased land values that come from allowing greater density and heights through Incentive Zoning Policies. Seattle's Incentive Zoning Policy provides a good starting point for San Jose to consider. It allows developers to add additional floors above maximum allowable heights for a contribution of $24.43 per every added square foot of floor area for low (60% AMI) and moderate (80% AMI) income housing and an additional $3.25 for childcare facilities for commercial developers and $18.57 per a square foot added floor area for residential developers toward affordable housing benefiting low and moderate income households. It also includes benefits around transit, open space and design. San Jose should design a policy that builds off this example and prioritizes investments that help families most at risk of displacement.

Before the City of San Jose implements the new Airspace Policy through any planning or zoning changes, staff should report back to Council on a proposal for an Incentive Zoning Policy. It will be important to develop a plan to consider an incentive program before granting this additional development capacity to landowners through General Plan amendments, changes to the Diridon Station Area Plan or any other policy documents. We hope such a policy could help to generate revenue to build or preserve affordable housing to help thousands of vulnerable residents benefit from rent-restricted housing rather than face increased displacement pressure as part of a larger suite of initiatives to address displacement as commercial and residential development ramps up in this area.

Sincerely,

[redacted]

Jeffrey Buchanan, Director of Public Policy

Working Partnerships USA

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[4] SAAG. Diridon Station Area Existing Conditions. April 2018: https://static1.squarespace.com/static/5c38bcfdcc8fedd5ba4ecc1d/t/5c462981f950b7a96faa45e1/1548102025059/Diridon%2BStation%2BArea%2BExisting%2BConditions%2B-%2BApril%2B6%2C%2B2018.pdf

From: Kirk Vartan < >
Sent: Tuesday, March 12, 2019 12:51 PM
To: District1; District2; District3; District4; District5; District 6; District7; District8; District9; District 10; City Clerk; The Office of Mayor Sam Liccardo; Hendrix, Catherine; Greenlee, Raymond; Connolly, Dan; Ken Pyle
Subject: 6.2 on Tuesday, 3/12 Agenda - Airport OEI - Please delay this vote

Mayor and Council,

I ask you to please put on hold for 3-6 months the urge to approve Scenario 4 for the Airport OEI policy. While it may seem very tempting to raise the potential heights for downtown, especially Diridon Station area, it seems to me that you are not being providing complete nor accurate information.

I am not an expert in the airport or the rules and regulations, but I am a data guy. And I have spoken to a member of your Airport Commission, and Ken Pyle has done a lot of research and work. He is also a very data centric person. All of his comments have references and are supported by fact.

And the fact is: a majority your Airport Commission has many unanswered questions and concerns.

The airport is a regional asset to the area, and I see no reason to rush a decision like this tonight. Take the time to answer the questions and satisfy the Commissioners you appointed to advise you on issues like this. A decision like this will affect the airport for decades. Your *very informed* Commissioners are telling you there is a problem…please listen!!!

Thank you,

Kirk Vartan
San Jose

March 11, 2019

Mayor and City Council
City of San Jose

Re: Greenbelt Alliance Supports Staff Recommendations on Item 6.2, changing the height limits for San Jose

Dear Mayor and City Council:

Greenbelt Alliance urges the Council to pass the City Staff recommendations for Item 6.2 regarding height limits for San Jose.

Greenbelt Alliance addresses a single challenge: how the Bay Area handles growth. We are the only San Francisco Bay Area organization that holistically addresses land-use issues across our region—from land conservation to smart growth development. Around the Bay Area, our staff and board have worked locally with communities large and small to establish voter-approved urban limit lines and protections for natural and working lands, and to advocate for homes that are affordable across the income spectrum.

We have long been supportive of compact, walkable neighborhoods, and, in San Jose given its low Jobs to Employed Residents ratio, the addition of new job opportunities in the city's developed footprint. Greenbelt Alliance supports the staff recommendations in Item 6.2 that can lead to higher height limits in San Jose. The staff recommendations act as a step to bringing more commercial and residential development to the heart of San Jose. This also supports the growing consensus that San Jose's undeveloped natural and working lands on the city's periphery, like Coyote Valley, are places best retained for green infrastructure value instead of being lost to sprawl.

We look forward to General Plan proposals regarding height limits and will comment on them as they become available.

.

Sincerely,

[redacted]

Brian Schmidt
Program Director
Greenbelt Alliance
[redacted]

Appendix E – Community and Economic Development Meeting (January 28, 2019)

Appendix E consists of background information presented at the Community and Economic Development (CED) meeting on January 28, 2019.

Note: Please refer to Appendix I for presentations presented in the various Steering Committee meetings.

City of San José
200 East Santa Clara Street
San Jose, CA 95113

City of San José

Agenda

Community & Economic Development Committee (CED)

Committee Members
Johnny Khamis, Chair
Pam Foley, Vice Chair
Lan Diep, Member
Raul Peralez, Member
Maya Esparza, Member

Committee Staff
Kim Walesh, City Manager's Office
Ed Moran, City Attorney's Office
Kelly Kline, Mayor's Office
Louis Osemwegie, Clerk's Office

Monday, January 28, 2019 **1:30 PM** **Wing Rooms W118 - W120**

(a) Call to Order and Roll Call

(b) Review of Work Plan

Items recommended to be added, dropped, or deferred are usually approved under Orders of the Day unless the Council directs otherwise.

(c) Consent Calendar

(d) Reports to Committee

1. CC 18-414 Verbal Report on Economic Development Activities

Recommendation: Provide a brief summary of recent announcements, significant accomplishments, and upcoming events related to economic development. (Economic Development)

5. CC 18-419 One Engine Inoperative Airport

Recommendation:

1. Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) obstruction evaluation determinations on a project-by-project basis as maximum building height limits in the Downtown Core and Diridon Station Area.
2. Direct the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Support Fund" to financially mitigate air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.
3. Direct the Administration to consider potential refinements to the development review process for projects subject to an FAA obstruction evaluation determination including:

a. Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.

b. Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.

c. Requiring that when the FAA requires a completed construction survey as part of an obstruction evaluation determination, that such survey be prepared by a licensed civil engineer for the highest-points of the structure, including accessory extensions thereof, and be completed prior to City issuance of an occupancy certification.

d. Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.

e. Developing a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

4. Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions. (Airport)

Attachments Memorandum
Presentation
Supplemental Memorandum, 1/28/2019
Letters from the Public

• Open Forum

Members of the Public are invited to speak on any item that does not appear on today's Agenda and that is within the subject matter jurisdiction of the City Council.

• Adjournment

Thank you for taking the time to attend today's meeting. For Committee meeting schedules, Agendas, Staff Reports, other associated documents and Committee contact information, please visit http://www.sanjoseca.gov/index.aspx?NID=399. Click on the link for the Committee in which you are interested. Committee Meetings are televised live and rebroadcast on Channel 26.

To arrange an accommodation under the American with Disabilities Act to participate in this public meeting, please call (408) 535-8150 at least three business days before the meeting.

All public records relating to an open session item on this agenda, which are not exempt from disclosure pursuant to the California Public Records Act, that are distributed to a majority of the legislative body will be available for public inspection at the Office of the City Clerk, 200 East Santa Clara Street, 14th Floor, San Jose, California, 95113, at the same time that the public records are distributed or made available to the legislative body.

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: COMMUNITY & ECONOMIC DEVELOPMENT COMMITTEE

FROM: John Aitken

SUBJECT: SEE BELOW

DATE: January 28, 2019

Approved /s/ Kim Walesh Date January 28, 2019

SUPPLEMENTAL

SUBJECT: RECOMMENDATIONS FROM THE AIRPORT COMMISSION REGARDING ONE-ENGINE INOPERATIVE PROTECTION

REASON FOR SUPPLEMENTAL

The purpose of this supplemental memo is to provide the Airport Director's response to some of the issues outlined in the attached Airport Commission recommendation for Scenario 10b on the Downtown Airspace and Development Capacity Study. The Commission adopted their recommendation on January 24, 2019 by a vote of 5 to 3.

STAFF RESPONSE

Staff recognizes the Airport Commission's concern that Scenario 4 has the potential to economically impact flights to certain transoceanic markets during times when the Airport is in south flow operations and as a result, voted to recommend Scenario 10b instead.

Staff continues to recommend Scenario 4 as the best option to the existing airspace protection policy. In Scenario 4, the Hawaiian markets (represented by Honolulu) have minimal weight penalties. The transcontinental market (represented by New York) demonstrates some cargo penalties on A320-200 aircraft, however, no penalties for the 737-800 aircraft. The European markets (represented by Frankfurt) does experience cargo penalties with the 787-900 but the 777-300ER has minimal cargo penalties. For the Hawaiian, transcontinental, and European markets, Scenario 4 has zero to minimal passenger penalties.

The project Steering Committee discussed at-length the potential weight penalties that would exist under Scenario 4, particularly for the Asian market and concluded that the best-balanced approach to mitigate any potential weight penalties would be the creation of a Community Air Service Support Fund as outlined in the original staff memo to the Committee.

Of the nearly 60,000 commercial passenger air carrier operations from San Jose's airport that occurred in 2017, only about 2 percent of those flights were to transoceanic locations. Only a select few of those transoceanic flights would be economically impacted by a change to Scenario 4 when the Airport is in south flow operations. The Airport is in south flow operations 13% of the time, annually.

Scenario 4 has the potential to add up to 8.6 million square feet of net new development, if building heights are maximized in the Diridon Station Area. If Scenario 4 is implemented, San Jose's total gross domestic product is projected to increase by $747 million and result in the potential addition of 4,900 jobs to the region by 2038. Under these projections, these economic gains would be partially off-set by regional economic losses of 26 jobs and $2.1 million in regional gross domestic product related to lost aviation-related activities. By contrast, these gains under Scenario 10b would be a projected $438 million increase to San Jose's gross domestic product and the addition of 2,400 jobs to the region by 2038. No aviation-related losses are forecast for Scenario 10b.

The Airport Commission cited safety as another reason for recommending Scenario 10b. While airline one-engine inoperative (OEI) procedures are created to ensure the safety of an aircraft in the event of a single engine failure, the current discussion around Scenario 4 and Scenario 10b is an economic one, not one that compromises safety. In both scenarios, the required safety margin between an aircraft and a building is preserved and remains unchanged. Scenario 10b does not have a larger safety margin than Scenario 4. As the Airport Commission memorandum noted, airlines have a variety of options available to them to preserve OEI procedures, including requesting another runway, off-loading passengers and cargo, making a fueling stop, changing the aircraft, and changing their OEI procedure. Aircraft operators utilize these options to maintain the safe operation of their aircraft. Aircraft safety is not compromised or diminished in any of the scenarios considered in the Downtown Airspace and Development Capacity Study.

The project Steering Committee met eight times over the course of the study to review extensive technical materials and provide input and comments during the process, all the while balancing the study's goals of continuing to grow Airport operations and maximizing development capacity in the city's urban core. The project Steering Committee also held three stakeholder meetings to present and discuss study findings. The Airport Commission received an update on the progress of the Downtown Airspace and Development Capacity Study at their August 13, 2018 meeting, including the project Steering Committee's recommendation to narrow the project scope of work to the four scenarios that were explored in the most recent documents. Similarly, the Community and Economic Development Committee received an update of the scenarios that the project Steering Committee was going to explore at its September 24, 2018 meeting. Scenario 4 is the collective recommendation from staff and the Project Steering committee.

/s/
JOHN AITKEN
Director of Aviation

For questions, please contact Judy Ross, Assistant Director of Aviation, at (408) 392-3611.

TO: SAN JOSE AIRPORT COMMISSION
JOHN AIKEN, A.A.E., DIRECTOR

FROM: AIRPORT COMMISSIONERS
Ken Pyle – District 1
Raymond Greenlee – District 6
Catherine Hendrix – District 9
Dan Connolly (Chair) – District 10

SUBJECT: MINETA SAN JOSE AIRPORT COMMISSION'S RESPONSE TO THE DOWTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY REPORT FINDINGS AND RECOMMENDATIONS MEMORANDUM DATED JANUARY 10, 2019

DATE: JANUARY 24, 2019

<u>RECOMMENDATION</u>

Recommend to the City Council approval of:

1. **Scenario 10B** as identified in the Downtown Airspace and Development Capacity Study which would affirm the City's development policy to use Federal Aviation Administration (FAA) Terminal Instrument Procedures (TERPS) and retains One Engine Inoperable (OEI) protection for departure safety.

   a. **Scenario 10B** provides OEI protection for safety. Mineta San Jose International Airport (Airport) must have OEI protection preserving the ability for disabled aircraft to enter the airspace over the existing West Corridor (Diridon Station area) or proceed straight out in the event of an engine failure on departure.
   b. **Scenario 10B** allows for modest increases in safe building heights in the Diridon Station Area.
   c. **Scenario 10B** offers economic benefits of increased development of the Downtown and Diridon Station areas.
   d. **Scenario 10B** preserves the current, transcontinental and transoceanic (European and Asia service) and allows for future air service expansion in these rapidly growing markets.
   e. **Scenario 10B** allows the Airport to preserve the classification of a medium-hub airport, providing domestic origin-destination service with increasing levels of international air service.
   f. **Scenario 10B** mitigates and eliminates negative air service impacts (weight penalties) as identified in the Downtown Airspace and Development Capacity Study.
   g. **Scenario 10B** eliminates the need for City of San Jose staff to explore the feasibility of establishing a "Community Air Service Fund" designed to subsidize airlines for financial or adverse air service impacts (weight penalties) suffered during south-flow departures for some flights.
   h. The Airport Commission supports the consideration of refinements to the development review process for future development to be built in the Downtown and Diridon Station areas to ensure aviation safety as outlined on Page 1 and 2 of Director Aitken's A.A.E. January 10, 2019 memorandum. **Attachment A.**
   i. **Scenario 10B** allows the airport to offer economically viable service to China, Far East Asia and Europe now and in the future during south flow operations. **While OEI is designated as an economic issue for airlines, the Airport Commissioners believe strongly that OEI airspace must be preserved and safeguarded to protect human life.** If or when an OEI event occurs, during a South Flow takeoff, the City of San Jose must provide the pilots flying that plane, the passengers on board, and the

residents in that flight path the safety cushion provided by unencumbered airspace. According to Boeing, "Pilot error is the leading cause of commercial airline accidents, with close to 80% percent of accidents caused by pilot error."[1]

OUTCOME

City Council approval of **Scenario 10B,** as identified in the Downtown Airspace and Development Capacity Study, would allow for maximum safe development building heights and their associated economic benefits that could be realized in the Downtown and Diridon Station areas.

BACKGROUND

As stated in Director Aitkin's A.A.E January 10, 2019 memorandum to the Airport Commission, in June 2017, City Council directed staff to update the 2007 Obstruction Clearance Study to include an economic analysis to identify tradeoffs between maintaining current OEI protection surfaces and potential increased building heights under a no-OEI protection or alternative policy.

A Steering Committee was formed but the members of the committee did not contain any airlines, pilots or individuals with practical operational experience flying into or out of the Airport nor did it include a representative from the County of Santa Clara Airport Land Use Commission which was established under Article 3.5 Airport Land Use Commission Section 21670 Creation; Membership; Selection of California Public Utilities Code. The Airport Land Use Commission is an important body that promotes the overall goals and objectives of California's airport noise standards and prevents the creation of new noise and safety problems.

E. Ronald Blake, a pilot, serves as a Commissioner for both the Airport Commission and he sits on the County of Santa Clara Airport Land Use Commission. E. Ronald Blake was not selected as a stakeholder nor invited to participate on the Steering Committee. Dan Connolly, Chairperson of the Airport Commission, recommended Commissioner Raymond Greenlee to participate in the Steering Committee. Captain Greenlee has over 35 years of civilian and military flying experience with an extensive background in operations, training and flight standards. The Chairperson's recommendation was not accepted by Airport Staff and Staff appointed Airport Commissioner Julie Matsushima to the Steering Committee for her experience as an Airport Commissioner and to ascertain her perspective as a Downtown resident.

The Steering Committee selected four of the ten conceptual airspace protection scenarios for detailed analysis which was conducted by Landrum & Brown, a national aviation planning/engineering consultant who has done previous work at the Airport:

- Scenario 4: No OEI protection (FAA/TERPS only)
- Scenario 7: Straight-out OEI Protection with no OEI West Corridor/Diridon Station Protection
- Scenario 9: No OEI protections plus potential elevation increase to some FAA/TERPS procedures

[1] BBC Travel May 22, 2013 http://www.bbc.com/travel/story/20130521-how-human-error-can-cause-a-plane-crash

- Scenario 10 (A-D) Straight-out OEI protection with four alternative OEI West Corridor/Diridon station surface protections

  Note: Existing Conditions: Building Heights 85' – 166' Above Ground Level
  1. Scenario Option 10A: Building Heights 100' – 195' Above Ground Level
  2. **Scenario Option 10B**: Building Heights 115' – 224' Above Ground Level
  3. Scenario Option 10C: Building Heights 129' – 240' Above Ground Level
  4. Scenario Option 10D: Building Heights 146' – 260' Above Ground Level

Generally speaking, the hotter the weather, the lighter the aircraft needs to be to safely depart the Airport. This is especially critical during south flow operations should an engine fail. Also, more aviation fuel is required to take off in the winter than the summer making the aircraft heavier. Additionally, due to increased headwinds during the winter months, departing aircraft are required to add additional fuel when flying to Pacific destinations. Higher temperatures from climate change will only make this problem worse, as evidenced by a study in the journal *Climate Change*.

> "The authors estimate that if globe-warming emission continue unabated, fuel capacities and payload weights will have to be reduced by as much as 4 percent on the hottest days for some aircraft. If the world somehow manages to sharply reduce carbon emissions soon, such reductions may amount to as little as 0.5 percent, they say. Either figure is significant in an industry that operates on thin profit margins. For an average aircraft operating today, a 4 percent weight reduction would mean roughly 12 or 13 fewer passengers on an average 160-seat aircraft. This does not count the major logistical and economic effects of delays and cancellations that can instantly ripple from one air hub to another, said Horton."[2]

While an engine failure is exceptionally rare, pilots train for an engine out scenario as a standard component of flight simulator training. The most common reasons for engine failure are foreign object ingestion (including birds), mechanical component failure, or bad fuel.

Planning for an engine out prior to take off is mandatory to avoid obstacles (such as cranes and tall buildings) in the event of an engine failure on departure. When an engine fails during takeoff two scenarios may occur, often together: 1) the aircraft may not lift off until it is close to the departure end of the runway; and 2) the aircraft may climb at a minimum rate. Therefore, for safety, procedures must be in place to avoid obstacles in the event of an engine failure considering applicable aircraft performance operating limitations.

The Airport Commission received an update on the Downtown Airspace and Development Capacity Study Report at its Special Airport Commission meeting on January 14, 2019. A copy of the final Downtown Airspace and Development Capacity Study Report was requested but, per the Assistant Director of Aviation July Ross, the final report is not available at this time.

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[2] "Surging heat may limit aircraft takeoffs globally", EurekAlert, 7-13-2017, https://www.eurekalert.org/pub_releases/2017-07/teia-sh071217.php

The Director of Aviation, John Aitken, A.A.E is recommending to the Community & Economic Development Committee and City Council the selection of Scenario 4 - No OEI protection (FAA/TERPS only). This shortsighted recommendation puts draconian restrictions on the Airport and may prevent the Airport from continuing some critical long-haul service, transcontinental and transoceanic (European and Asian service) and stifles the opportunity for increased international service in the future. ***Under Scenario 4, the Airport likely will never be a transoceanic, international airport.*** The Airport's existing classification as a medium-hub airport may be reduced to a regional airport and likely restricts the ability of providing air service to Asia, the fastest growing market. The Airport's passengers will be forced to utilize Oakland and San Francisco Airports to get to certain destinations.

ANALYSIS

The mission of the Mineta San Jose International Airport is to connect, serve and inspire. The vision of the Airport is to transform how Silicon Valley travels. In our opinion, Scenario 4 voids the Airports mission and vision statements while **Scenario 10B** supports both the mission and vision of the Airport and provides the City benefits of increased building heights in the Diridon Station area.

1. Before the City Council considers adopting Scenario 4, City Council should be provided with a copy of the final Downtown Airspace and Development Capacity Study Report so an informed decision can be made.

a. The Downtown Airspace and Development Capacity Study to the Airport Commission dated January 10, 2019 outlined the following airline solutions to the problem of increased building heights in the OEI areas (Page 6).

Airline Response to Obstacles

- Request another runway (wind, weather, air traffic permitting)
- Off-load passengers and/or cargo (weight penalty)
- Make a refueling stop
- Cancel current day's flight
- Change aircraft
- Change OEI procedure
- Cancel air service if payload loss affects financial viability

Pragmatically, all of these options increase airline costs or decrease profitability and in many instances may effectively eliminate the financial viability of transcontinental and transoceanic service.

b. Aircraft gross weight limitations during south flow departures under Scenario 4 will make many current and future flights economically nonviable. Additionally, the study used Boeing temperature numbers that are 85% reliable. Airport temperatures are often quite higher than those stated in the OEI presentation. Additionally, as seen in Figures 1 and 2 below, there are discrepancies between the December 2018 presentation and the January 10th, 2019 Memorandum regarding the Weight Penalty Assessment. As an example of one inconsistency, using a B777-300ER from Taipei, which was a former commercial route from SJC, the December 2018 presentation suggests a cargo penalty of 2,638 pounds, while the January 10, 2019 suggests an 18,742-pound penalty.

Figure 1, Weight Penalty Assessment from December 2018 Presentation

WEIGHT PENALTY ASSESSMENT – GIG, TPE, HKG, DEL & DXB

Rio de Janeiro - GIG Summer (81.3° F)	A330-200 (284 seats/21,199 lbs. cargo)		A350-900 (325 seats/16,520 lbs. cargo)		B777-300ER (370 seats/32,012 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	51	-
TERPS Only	-	1,927	-	2,085	-	2,776	60	-

Taipei - TPE Summer (81.3° F)	A330-200 (284 seats/10,635 lbs. cargo)		A350-900 (325 seats/6,439 lbs. cargo)		B777-300ER (370 seats/19,465 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	89	-
TERPS Only	-	1,976	-	2,052	-	2,638	96	-

Hong Kong - HKG Summer (81.3° F)	A330-200 (284 seats/743 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/5,348 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	15	-	-	-	128	-
TERPS Only	5	743	23	-	-	2,543	134	-

Delhi - DEL Summer (81.3° F)	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	48	-	69	-	62	-	178	-
TERPS Only	55	-	77	-	72	-	184	-

Dubai - DXB Summer (81.3° F)	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	57	-	71	-	62	-	184	-
TERPS Only	65	-	79	-	72	-	191	-

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Figure 2, Weight Penalty Chart from the January 10, 2019 Memorandum

Rio de Janeiro - GIG Summer (81.3° F) 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144

Taipei - TPE Summer (81.3° F) 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							9	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	

Hong Kong - HKG Summer (81.3° F) 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	

Delhi - DEL Summer (81.3° F) 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor							103	
TERPS Only	55	5,014	77	3,132	72	106	184	

Dubai - DXB Summer (81.3° F) 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor							107	
TERPS Only	65	3,537	79	2,688	72	1,828	191	

* Existing Straight Out OEI Corridor calculations uses different cargo capacity numbers than the West OEI and TERPS Only.

c. The Downtown Airspace and Development Capacity Study is incomplete. There is no detailed information for Scenarios 7, 10A, 10B, 10C or 10D. Only Scenarios 4 and 9 were fully analyzed. **Before deciding on a path forward**, an analysis should be made for each scenario as to how it would affect current and future air service at the Airport. **Potential loss of airport service is not modeled in the study for domestic and international markets.**

2. The following table shows significant financial penalties to airlines suffering weight penalties realized under Scenario 4. Some flights could be deemed unprofitable which creates the need for Staff to explore the feasibility of establishing an ongoing "Community Air Service Fund" to offset any adverse

air service impacts to the airlines. Under Scenario 4 (TERPS Only) the amount of loss is staggering at any load factor while **Scenario 10B** (With TERPS and OEI surface protections) results in no financial loss. Therefore, there is no need to establish a "Community Air Service Fund" under **Scenario 10B.**

SUMMARY OF 20-YEAR CUMULATIVE DIRECT IMPACTS
LOAD FACTOR SENSITIVTY TEST

Cumulative Summary of Losses		Baseline Load Factor	85% Load Factor	90% Load Factor	95% Load Factor
Scenario 1	Existing airspace protection	$0	$0	$0	$0
Scenario 4	TERPS Only	$26,034,000	$89,217,000	$148,827,000	$203,596,000
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	$0	$2,031,000	$47,238,000	$101,472,000
Scenario 10	Existing Conditions: 85' - 166' AGL	$0	$0	$0	$0
	Opt 10A: 100' - 195' AGL	$0	$0	$0	$0
	Opt 10B: 115' - 224' AGL	$0	$0	$0	$0
	Opt 10C: 129' - 240' AGL	$0	$0	$2,255,000	$49,906,000
	Opt 10D: 146' - 260' AGL	$0	$19,636,000	$76,975,000	$131,655,000
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	$211,596,000	$285,294,000	$385,051,000	$455,005,000

Draft 30

Source: November 13, 2018 Steering Committee Report

3. The City of San Jose stands to realize significant economic benefits under the selection of Scenario 4, but at the cost of crippling the Airport. Economic benefits can be realized under **Scenario 10B** without restricting the Airport's current or future air service. Scenario 4 allows for an increase in buildings heights from 5' to 35' in the Downtown Core and 70' to 150' in the Diridon Station area. According to the December 2018 presentation, these building height increases produce the largest gross economic benefit to the City of San Jose of $747,000,000, but, as seen in Table 1, below, the net benefit will not be as great. **Scenario 10B** does not allow for building height increases in the Downtown core but does allow for an increase in building heights from 30' to 55' (115' to 224' AGL) in the Diridon Station area and significant economic gains of $438,000,000.

   The Airport Commission has specific questions in the following categories pertaining to economic impact, employment projections, incremental commercial and residential square footage, incremental commercial and residential units, incremental valuation based on building heights, tax revenue, one-time park revenues and airport service impacts.

   <u>Economic Impact</u>

   Table 1, Total Economic Impact Summary (2038), summarizes the potential positive and negative impacts for both Aviation and Real Estate as found in the November 2018 and December 2018 presentations. It is unclear whether these impacts include the costs of a "Community Air Service Fund". It is important to note that although a "Community Air Service Fund" would be separate from the airport, it still represents an opportunity cost in that these funds could be providing some other community benefit.

The estimates for this fund ranges from $800,000 in 2024 to $1.2M in 2032 to $1.8M in 2038.[3] This figure does not seem to be included in the total impact and on a cumulative basis would add another $10+M in negative impact to Scenario 4. To be clear, the necessary subsidy amount could be much greater than suggested and up to **$18M per year per flight, as shown in the section Aircraft Technology, Selection and Fuel Economy**.[4]

Table 1 Total Economic Impact Summary (2038)

Total Economic Impact Summary (2038) Gain/Loss[5]		Airspace Scenario 4	Airspace Scenario 10B
	Aviation Impact	-$26M to – $203M[6]	$0[7]
	Real Estate Impact	$747M[8]	$438M[9]
	Net Impact	**$544M - $721M**	**$438M**

Employment Projections

The employment projections are provided in the November 2018 and December 2018 presentations, as well as the January 10th, 2019 memo. As seen in Table 2, Employment Projections, there are discrepancies between the November and December 2018 presentations. For Scenario 4, the difference is less than 4% (173/4,700) and is insignificant, while the 50% (800/1,600) difference for **Scenario 10B** is significant.

Why is there a significant difference in the number of jobs between the November and December presentations for Scenario 10B?

Table 2 Employment Projections

Employment		Airspace Scenario 4	Airspace Scenario 10B
	Page 23 of 12/18 presentation	4,873[10]	2,400[11]
	Page 8 of 11/18 presentation	4,700	1,600

[3] Page 11 of the January 10, 2019 Memorandum
[4] See the section "Aircraft Technology, Selection and Fuel Economy", below, which discusses the extra fuel costs for flying a larger B777 series aircraft as a substitute for a more fuel efficient B787 series aircraft.
[5] This is provided on page 23 of the December 2018 presentation and is cumulative over the period ending in 2038.
[6] Page 30 of the November 2018 presentation. Impact to the airport is directly related to Load Factor. The baseline Load Factor results in a $26M negative impact, while it increases to $203M as the Load Factor goes to 95%
[7] ibid
[8] Page 23 of December 2018 presentation.
[9] ibid
[10] This is figure is net of the 27 aviation job losses. Page 11 of the January 10th, 2019 memo suggests a potential increase in employment of 4,700 and residences of 12,800 for Scenario 4.
[11] ibid

Incremental Commercial and Incremental Square Footage

Table 3, Incremental Commercial & Residential Square Footage, summarizes a combination of data from the November 2018 presentation, as well calculated data based on assumptions from that presentation and/or other data sources. As reference, the 2014 Diridon Station Area Plan approved by the City Council assumed a build out of 5.37M square feet of commercial industrial, retail and/or restaurant, along with 2,588 residential and 900 hotel rooms.[12]

How is it that the net additional square feet could more than double (5.37M to 13.97M square feet) without doubling the height of the buildings?

Table 3 Incremental Commercial & Residential Square Footage

Incremental Commercial & Residential Square Footage		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Net New Square Feet[13]	8,600,000 square feet	3,100,000
	Net New Commercial[14]	869,500 square feet	296,000
	Net New Residential[15]	7,730,500 square feet	2,804,000

Table 3 above provides the incremental square footage by apparently raising building heights. This raises several questions, including:

What is the baseline square footage that is assumed for the Diridon Station Area and for the Downtown area? Is it the same square footage (5.37M) as what is assumed in the 2014 Diridon Station Area Plan?

All the scenarios seem to assume that all the area/buildings are built to the maximum height. Is that a realistic assumption?

How much surface area (acres/square miles) is assumed for the Diridon Station Area and in the downtown area? Is it the 240-acres outlined in the 2014 Diridon Station Area Plan?

Did the analysis look at opportunities to be more efficient from a density standpoint? Ideas such as;

a. *Creating a car-free area in the Diridon area (e.g. putting cars at the edge, with personal and shared electric shuttles for last-mile transport).*
b. *Building above rails, freeway and roads, both to better utilize property, as well as to connect divided neighborhoods, while accruing other benefits such as the attenuation of transportation noise.*

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[12] See https://www.diridonsj.org/diridon-stationarea-plan
[13] Page 5 of the November 2018 presentation.
[14] Calculated based on the number of projected additional employees (4,700 for Scenario 4 or 1,600 for Scenario 10B as per page 8 of the November 2018 presentation) and assumes 1 employee per 185 square feet per page 33 of the November 2018 presentation.
[15] Calculated by subtracting the commercial space from the net new space.

Incremental Commercial & Residential Units

The number of net residential units in the Diridon Station Area would increase by 9,095 units in Scenario 4 and 3,299 for Scenario 10B, respectively. In both cases, these numbers are additive to and significantly larger than the estimated 2,588 residences that were assumed in the 2014 Diridon Station Area Plan[16].

Another implication in the assumptions is that these domiciles, on average, would not house families with children, as the number of residents per household is assumed to be 1.43, compared to the existing 2.4 to 2.9 residents per household in the 95126 and 95110 ZIP codes, respectively.[17] At 596 square feet per resident, the average dwelling size would be 850 square feet.[18]

> *Does the 596 square feet per resident, include "overhead" for things such as stairwells/elevators, common space, hallways, etc.?*[19]

Multiplying the average construction cost per dwelling of $534.31 per square foot, yields a construction cost of $454k per dwelling.[20] As noted on page 33 of the November 2018 presentation, construction costs do not include land costs, so the price offered to the homeowner would have to be even higher than projected in Table 4, Incremental Commercial & Residential Units.

> *Do the construction costs include the various taxes (e.g. New Construction Residential Taxes) and fees or would those be additive to the total price?*

> *Are there other costs that would have to be included to get to a market price?*

The estimated housing cost, based solely on the cost of construction, will not be affordable for Low Income and, once other costs are factored, residents at Area Median Income levels.

> *An important question regarding affordability is what year is the $534.31 construction cost figure assumed?*

> *Is the $534.31 per square foot construction cost measured in 2019 or 2038 dollars?*

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[16] 2,588 being the potential number of units that could be developed as indicated in the 2014 Diridon Station Area Plan.

[17] City-data/census data for the 95126 and 95110 ZIP codes can be found at: http://www.city-data.com/zips/95126.html and http://www.city-data.com/zips/95110.html. As another point of reference, according to the City-Data.com site, the average California household size is 3.0.

[18] The 1.43 people per unit figure is consistent with the 1.51 people per unit that the typical downtown residential unit has according to SJ Economy http://sjeconomy.com/downtown-progress-report-mid-year-2018/

[19] If it does, then the effective living space per unit would be reduced by the amount of overhead.

[20] To see the calculations for this, please refer to the worksheet "New Commercial & DU Avg Cost" at https://sanjoseca-my.sharepoint.com/:x:/g/personal/airportcom1_sanjoseca_gov/EfVJmH19pM1PhOZBmLGjF4sBfz4KkgBQe6qI3Ul7ewk-_w?e=QgI3or

The footnote on page 33 of the November 2018 presentation suggests a 3% inflation rate is assumed for construction costs. If $534.51 is 2019 figure, then the cost of construction in 2038 would be $936.92. If the $534.31 figure refers to the cost of construction in 2038, then that translates into $304.71 per square foot in 2019 dollars.

Another concern about the construction costs per dwelling is whether the projects are even feasible. The April 20th 2018 *Report on the Cost of Development in San Jose* Memorandum suggested that projects in Downtown San Jose with similar assumptions and a construction cost of $622,000 per dwelling unit would be unlikely to be developed.[21] Granted, the $454k estimate is significantly lower than in that report, but it is important to know what assumptions are different between that report and this study to understand feasibility.

Table 4 Incremental Commercial & Residential Units

Incremental Commercial & Residential Units		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Additional Residents[22]	12,800	4,700
	Additional Number of Residential Units	9,095	3,299
	Number of Residents/Residence	1.43	
	Average Residential Size	850 square feet	
	Average Construction Cost of Residential Unit	$454k	

Incremental Valuation Based on Building Height Increases

Table 5, Incremental Valuation Based on Building Height Increases, provides the total valuations based on what was provided in the November 2018 presentation as the final numbers and then calculated based on the value per square feet and the projected amount of square feet. It is important to note that these numbers represent the ultimate build-out and assumes it would get there as "a straight-line increase in office and residential development based on historical absorption/delivery pace."[23]

Table 5 Incremental Valuation Based on Building Height Increases

Valuation		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Commercial Valuation[24]	$ 274,577,000	$ 134,709,600
	Residential Valuation[25]	$4,112,252,685	$1,410,658,660
	Total Valuation (calculated)	$4,386,829,685	$1,554,368,160
	Valuation[26] (11/18 presentation)	$4,380,000,000	$1,590,000,000

[21] Please see page 22 of the April 20th, 2018 memo from Kim Walesh and Rosalynn Hughey https://sanjoseca-my.sharepoint.com/:b:/g/personal/airportcom1_sanjoseca_gov/EfoOhN9ehO9BsxNj6jGDzGQBlO1TqYPQSJSzSoDt8NA9Cw?e=qhDaSL

[22] The calculated number of residents based on 596 rentable square feet per new resident is 12,971 and 4,705, respectively.

[23] Page 35 of the November 2018 presentation.

[24] Calculated based on $303.40 per square feet as assumed on page 33 of the November 2018 presentation. Note, doesn't count cost of land, but does assume $40,000 per parking space.

[25] Calculated based on $534.51 per square feet as assumed on page 33 of the November 2018 presentation. Note, does not include cost of land, but does include cost of parking spaces.

[26] These are the estimates provided on page 6 of the November 2018 presentation.

Tax Revenue

What is important is how the above valuations translates into revenue for the City. Rows 1 and 2 in Table 6, Annual Incremental Tax Revenues, represents numbers that were provided in the November 2018 presentation.[27] The third row assumes that the tax revenue given in the table on page 35 is additive year-to-year and increases as the Diridon Station Area is constructed. The final row bases the annual incremental taxes based on a 1% property tax and that the City receives 9% of that total. Of course, this assumes a completely built-out configuration which could be decades from now and does not include sales and other taxes.[28]

This raises several questions including:

Why the large discrepancies between the estimated annual tax revenues?

What is the baseline annual tax revenue that is expected (e.g. the original Diridon Station Area plan)?

Table 6 Annual Incremental Tax Revenues

Incremental Tax Revenues		**Airspace Scenario 4**	**Airspace Scenario 10B**
	Based on Page 6 of Nov 2018 Presentation, [29]	$5,550,000	$2,020,000
	Based on Page 35 of Nov 2018 Presentation	$450,600 starting in year 15 & $450,600 in year 20	450,600 in year 15 dropping to $19,200 in Year 20
	Based on Page 35 of Nov 2018 Presentation, but cumulative	$450,600 starting in year 15 & $2,703,600 in year 20	450,600 starting in year 15 & $2,003,200 in year 20
	Based on Property Tax of Valuation	$3,942,000	$1,431,000

4. **Airport Service Markets Not Modeled**

The potential **negative Net Impact** on the airport could be much greater for Scenario 4, as hinted at on page 22 of the December 2018 presentation,

"Potential losses of airport service markets are not modeled."

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[27] These calculations are in the Worksheets titled "Annual Taxes" and Annual Taxes Based on Construct" found here https://sanjoseca-my.sharepoint.com/:x:/g/personal/airportcom1_sanjoseca_gov/EfVJmH19pM1PhOZBmLGjF4sBfz4KkgBQe6qI3Ul7ewk-_w?e=plsCsI

[28] Based on March 2012 memo from the office of the mayor http://www.sanjoseca.gov/DocumentCenter/View/3162

[29] According to page 6 of the November 2018 presentation. Note, it doesn't indicate at what year these dollar amounts will be achieved. It also doesn't indicate whether these figures include the Local Sales Tax estimates provided on page 23, which estimates $110,000, $206,800 & $253,000 for years 2032, 2036 and 2038, respectively, for scenario 4 and $110,000, $206,800 & $226,800 for those years respectively, for scenario 10B.

The implication is that if an international airline does not see the Airport as sustainable, they will not provide service at the Airport.

If Scenario 4 (TERPS Only) is selected, the Airport may never capture the Asian Market because it may not be able to accommodate air service to China. Buildings will be too high in the Diridon Station area during south flow rendering the flights unsafe unless weight penalties are incurred.

According to a recent article in *"The Telegraph"* dated April 11, 2018, Oliver Smith, Digital Travel Editor, reports that in less than two decades, China has grown to be the world's most powerful market with 136.9 million overseas visits in 2016 and this number continues to increase according to The China Outbound Tourism Research Institute (COTRI). Chinese tourists overseas spent $261.1 billion dollars in 2016. **By 2030 1.8 billion people from China are predicted to travel, accounting for a quarter of international tourism**. Destinations include Thailand, Japan, South Korea, Singapore, the United States and Italy. This is a growing market the Airport will not be able to serve.

5. **The Santa Clara County Airport Land Use Commission**

The Santa Clara County Airport Land Use Commission was not made a partner in the Downtown Airspace and Development Capacity Study. The following description was copied from the Santa Clara County Airport Land Use Commission's website:

The Airport Land-Use Commission (ALUC) was established to provide for appropriate development of areas surrounding public airports in Santa Clara County. **It is intended to minimize the public's exposure to excessive noise and safety hazards, and to ensure that the approaches to airports are kept clear of structures that could pose an aviation safety hazard.**

The Airport Commission recommends involving the Santa Clara County Airport Land Use Commission in further discussions surrounding the Downtown Airspace and Development Capacity Study as this study may lead to land use decisions that will severely impact the Airport.

6. **Commitments to Partners**

In the Spring/Summer of 2019 the Airport will be asking current and future airlines to sign the revised AIRLINE-AIRPORT LEASE AND OPERATING AGREEMENT FOR NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT for a term of 10 years with two, five-year options.

Per Article 8 of this Agreement entitled Operation and Maintenance of the Airport, Section 8.02.2

> "City shall, to the extent it is legally able so to do, use reasonable efforts to keep the Airport and its aerial approaches free from ground obstruction for the safe and proper use thereof by Airline."

If Scenario 4 is selected this could be seen as a direct violation of the Agreement. In addition, the airlines may decide they cannot accept the restrictions provided under Scenario 4 and could decline to sign the Agreement.

The Airport has a robust capital program and considerable capital investments have been made to the Airport. Because of these investments, the Airport's runways can handle long-haul flights and aircraft for many international destinations. Terminal B and a new parking garage were built and improvements to roadways were made. These capital investments were made with the goal of creating a world class international airport. If Scenario 4 is selected, these investments could be underutilized, and future capital investments could be deemed unnecessary or scaled back.

Many projects at the Airport are funded with FAA Grants. As a condition of the FAA grant, Airport Sponsors must meet over 30 FAA Grant Assurances. FAA Assurance for Airport Sponsors dated March 2014 outlines the grant requirements. If Scenario 4 is selected it is possible that FAA Grants could be at risk. The text of FAA Assurance 21 is stated below:

> "FAA Assurance 21 Compatible Land Use. **It will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft.** In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which Federal funds have been expended."

7. **Aircraft Technology, Selection and Fuel Economy**

In the March 14, 2007 Obstacle Clearance Study conducted 12-years ago, Section #5.3 on Page #32 states:

> "While aircraft performance has improved over the years, further technology improvements may not solve this problem. Such aircraft performance improvements have enabled two-engine to serve markets previously served by only four-engine aircraft. Also, given increases in fuel prices, aircraft manufacturers are focusing on fuel efficiency rather than takeoff performance. The aircraft most affected by these OEI Issues are amount the newest aircraft (such as the Boeing 777, Airbus A320 and A330) as well as some of the oldest aircraft (such as the MD-80)."

The above statement was indeed prophetic, as it accurately predicted the aircraft in use today. The majority of overseas flights utilize newer more fuel-efficient aircraft, sacrificing added takeoff performance for lower operating cost. Opening new or operating existing overseas markets require that airlines be nimble and cost efficient with the equipment they purchase, as well as realistically predict the number of passengers and cargo they will fly. In the past year, international flights from the Airport have utilized primarily the B787-8/9 Dreamliner and the A330-200.

An underlying assumption being made is that these international carriers can simply bring in larger aircraft such as the B777-300 series to meet new OEI requirements, if Scenario #4 is chosen by the City. This assumption is not realistic. Currently no Boeing 777's fly out of San Jose, and if there were sufficient bookings of passengers, bringing existing flights to an over capacity situation, the airlines would have already committed those resources.

Cost Estimate Example: For an airline to move from a B787-900 ($281.5M) to a B777-300ER ($361.5M) there is an $80M increase in equipment costs. Due to the stage length of China and further Asian routes from SJC, each single daily operation **requires two aircraft and the additional equipment cost of $160M.** A B777 uses approximately **735 ADDITIONAL** gallons of fuel **per hour**. A 10-hour flight would cost approximately an additional $38,000 per trip. If the carrier operated five days per week (round trip), the airline could have roughly **$1.5 Million dollars PER MONTH** in additional fuel expense for that route. Looking at current and historic passenger loads, it is unrealistic to believe international air routes would be economically feasible, if they had to utilize larger equipment in order to fly out of the Airport.[30]

8. **Customer Inconvenience**

The selection of Scenario 4 (TERPS Only) does not consider the severe inconvenience to customers who utilize the Airport and the potential for increased noise in the Downtown and Diridon Station areas. To reduce weight an airline may reduce the amount of fuel, eliminate cargo and/or remove passengers. If passengers are removed from a flight the general feeling is passengers are made whole by the airlines if they are compensated with a meal voucher and a hotel room. This treatment of the Airport's passengers is unacceptable and a total disregard to the traveling public. Additionally, there will be an increase in noise from Scenario 4 to residents and commercial interests in the Downtown and Diridon Station areas.

9. **Legal Ramifications**

Before any changes are made to existing air space configurations, the Airport Commission is interested in the potential legal ramifications of making any change to existing airspace protections.

SUMMARY

The Airport Commission acknowledges two of the City of San Jose's top economic priorities are the continued development of Downtown and growth in air service at the Airport. The Airport Commission believes a compromise is necessary to satisfy these two important priorities.

Scenario 10B allows the Airport to preserve the classification of a medium-hub airport, providing domestic origin-destination service with increasing levels of international air service.

Scenario 10B eliminates the need to explore the feasibility of establishing a "Community Air Service Fund" as identified in Scenario 4 as a financial solution to subsidize airlines penalized when they cannot operate at full weight capacity out of the Airport during some south-flow operations.

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[30] See Fuel Expense Worksheet at https://sanjoseca-my.sharepoint.com/:x:/g/personal/airportcom1_sanjoseca_gov/EfVJmH19pM1PhOZBmLGjF4sB-jqRMcbqM43ZVLHByPzSgA?e=NonNYL

The Airport Commission urges City Council to fully consider the negative impacts to the Airport if Scenario 4 (No OEI) is selected as the preferred option. If the Airport's airspace is not protected, long-haul flights such as transcontinental, transoceanic, and other international service will negatively impact or possibly prevent flights to Europe and Asia and constrain nonstop flights to the East coast and Hawaii. Scenario 4, if implemented will serve as a significant disincentive for airlines to start new airline service or continue some existing service.

The Airport Commission recommends **Scenario 10B,** as this option provides a reasonable compromise protecting the downtown airspace and maintaining airline safety procedures for aircraft departures. This compromise directly benefits the Airport while allowing for increased development capacity in the Diridon Station area. **Scenario 10B** also allows the airport to retain and continue to attract air service while allowing for safe increase in building heights and supports development and provides reasonable economic benefits desired by the City of San Jose.

AIRPORT COMMISSION AGENDA:
01/14/19

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: AIRPORT COMMISSION

FROM: John Aitken, A.A.E.

SUBJECT: DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY REPORT FINDINGS AND **RECOMMENDATIONS**

DATE: January 10, 2019

RECOMMENDATION

Recommend to the City Council approval of:

1. Acceptance of a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) Terminal Instrument Procedures (TERPS) surfaces to determine maximum building heights in the Downtown Core and Diridon Station.
2. Direction to the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Fund" to financially mitigate any adverse air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.
3. Direction to the Administration to consider potential refinements to the development review process for projects subject to a FAA TERPS airspace determination including:
   a. Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.
   b. Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other

accessory structure.

c. Require that a construction survey prepared by a licensed civil engineer be submitted by applicants to the FAA upon completion of the high-point of the structure and accessory extensions thereof, prior to City issuance of an occupancy certification.

d. Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.
e. Develop a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.

4. Direction to the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

OUTCOME

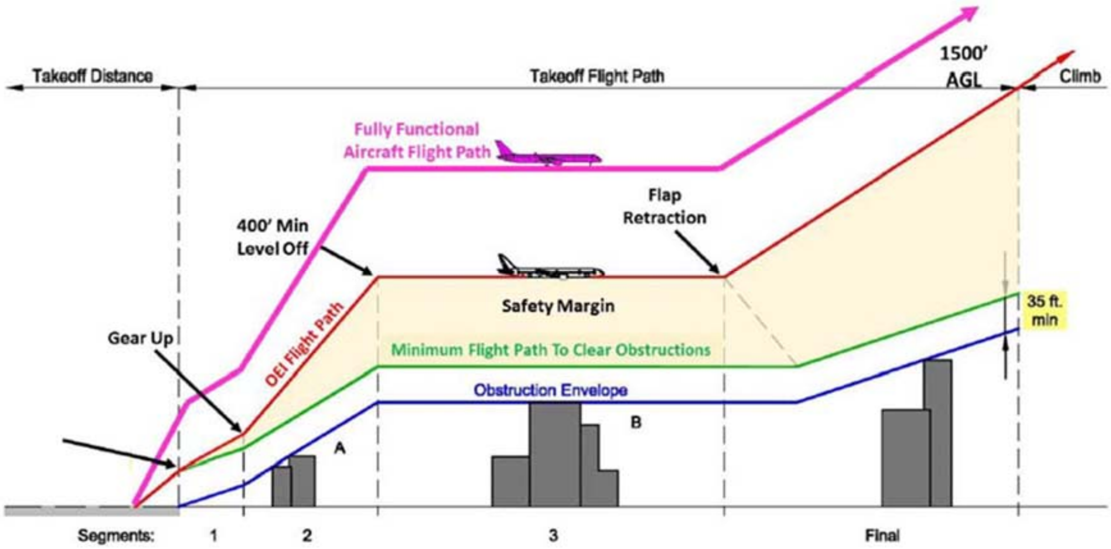
City Council approval of the above recommendations would allow for maximum safe development heights and associated economic benefits in the Downtown and Diridon Station areas.

BACKGROUND

Two of the City's primary economic priorities are the continued development of Downtown and growth in air service at Mineta San Jose International Airport (Airport). The Airport and Downtown are within two miles of each other and the primary aircraft approach and departure paths for the Airport are directly over Downtown, which places limitations on Downtown building heights.

The Federal Aviation Administration (FAA) protects airspace around airports through the application of Federal Aviation Regulations (FAR) Part 77 and Terminal Instrument Procedures (TERPS). These regulations define various airspace "surfaces" or slopes which radiate out from an airport's runway and mandate FAA review of any proposed structure which exceeds one or more of these surfaces. In San Jose, as in most local land use jurisdictions, proposed structures subject to FAA review are typically required to obtain a "determination of no hazard" clearance from the FAA prior to, or as a condition of, City development permit approval.

While FAA applies Part 77 and TERPS to safely operate the airspace around an airport, it does not consider airline emergency procedures as part of the review. Under Part 25 of the Federal Aviation Regulations, airlines are required to have emergency flight procedures in place for every departure in the event of an engine power loss during take-off. These emergency flight procedures are known as "one-engine inoperative (OEI)" procedures and are designed so that an aircraft can gain sufficient altitude immediately upon takeoff even if an engine loses power, follow a prescribed flight path over any obstacles and surrounding terrain, and safely circle back to the airport for an emergency landing. Each airline develops its own OEI procedures based on guidelines set forth by the FAA and the International Civil Aviation Organization (ICAO). The diagram below illustrates the requirements in these guidelines.



Protecting for OEI emergency procedures can limit maximum building heights around an airport more severely that the FAA evaluations conducted under FAR Part 77 and TERPs. The FAA believes that airlines can mitigate OEI airspace obstructions by revising their emergency procedures or by reducing takeoff weight to improve climb performance to safely clear obstructions. However, implementing takeoff weight restrictions by reducing passengers, cargo, or fuel can impact the economic viability of airline service. Even small weight penalties can affect the feasibility of airline service to a destination, most notably transcontinental and transoceanic destinations typically serviced by large, heavy aircraft. Therefore, obstructions within the surrounding airspace can be a factor in an airport's ability to attract or retain desired air service.

The City's 2007 Airport Obstruction Study mapped out airline OEI protection surfaces and associated building elevation limits around the Airport (note: aircraft depart to the south under certain weather conditions that occur approximately 13% of the time annually). The 2007 study identified two OEI corridors used by the airlines: one over the Downtown core (east of Highway 87 and referred to as the straight out corridor) and one over the Diridon area (west of Highway 87 and referred to the west corridor). Airlines determine which corridor they will use – straight out or west corridor– depending on the aircraft being flown, the aircraft's destination, and the airline's pilot training program. Those airlines using the west corridor in their OEI procedures do so to avoid the existing high-rise buildings in the Downtown core. Since the OEI west corridor requires a shallower aircraft climb rate due to the turning maneuver, OEI building height limits in the Diridon area are more restrictive that in the Downtown core. Toward the southern end of Downtown, the FAA TERPS surfaces become more restrictive than the OEI procedure surfaces.

Beginning in 2007, the Administration has successfully implemented an informal OEI protection practice through the development review process by attempting to limit proposed maximum building heights to the elevations mapped out in the study. To date, with developer cooperation, all approved high-rise building projects in the Downtown core and Diridon area have been consistent with the OEI surfaces.

In June 2017, City Council directed staff to update the 2007 study and include an economic analysis to identify the trade-offs between maintaining OEI protection surfaces and potential increased building heights under a no-OEI protection or alternative policy. Pursuant to that direction, the Office of Economic Development and the Airport Department have conducted the Downtown Airspace and Development Capacity Study. Landrum & Brown, a national aviation planning/engineering consultant with extensive experience working for the City on OEI and other airport technical issues, was contracted to perform the technical work on the study, with assistance from the economic analysis firm of Jones, Lang, & LaSalle. A project Steering Committee, comprised of the downtown stakeholder representatives including the San Jose Downtown Association, SPUR, Silicon Valley Organization, Silicon Valley Leadership Group, Santa Clara & San Benito Counties Building and Construction Trades Council, and Airport Commission was convened to provide review and input on the technical analysis and resulting strategy. City staff participation on the Steering Committee included representatives from the Mayor's Office, Councilmember Peralez's Office, Planning, Building and Code Enforcement Department, Office of Economic Development, and the Airport Department. The project Steering Committee met eight (8) times over the course of the study to review extensive technical materials and provide input and comments during the study process.

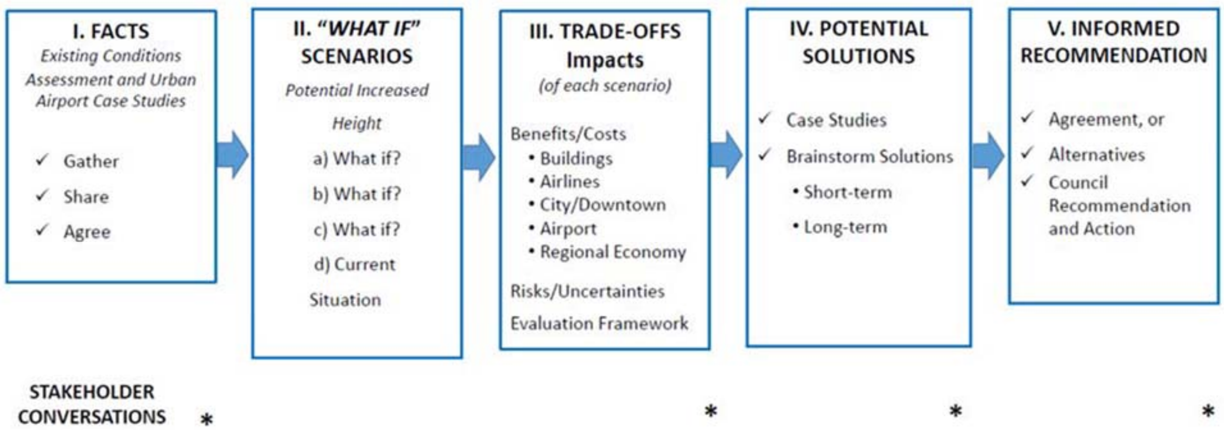
Separately, in addition to the project Steering Committee, three broader downtown stakeholder information meetings were held during the study, once at the initial launch of the study, once to report on study progress and initial findings, and once to present a proposed strategy. The stakeholder meetings were well attended and served as opportunities for the development community to ask questions and provide input into the study.

ANALYSIS

The Downtown Airspace and Development Capacity Study consisted of three major tasks:

- Task 1 Existing Condition Assessment
- Task 2 OEI Feasibility Studies and Impact
- Task 3 Economic Analysis

The technical scope was augmented by the following collaborative framework developed with the project Steering Committee:



Task 1:

The technical consultant evaluated and updated the City's Downtown and Diridon Station area obstruction data, existing airline OEI procedures, critical aircraft for SJC current and anticipated air service, and the FAA's 30+ TERPS arrival, departure, and circling procedures to the south of the Airport.

In addition, a weather analysis over the last 15 years was completed, which confirmed that the Airport in south flow operations (departures to the south) an average of 13% of the time on an annual basis, most likely to occur during winter months and morning hours. All-day southflow operations occurred an average of 17 days annually.

Task 2:

Ten conceptual airspace protection "scenarios" were formulated to test various alternative combinations of OEI and FAA/TERPS airspace surface protections on maximum building heights. With input from the project Steering Committee, four of the ten scenarios were selected for detailed analysis:

- Scenario 4: No OEI protection (FAA/TERPS only)
- Scenario 7: Straight-out OEI protection with no OEI west corridor protection
- Scenario 9: No OEI protection plus potential elevation increase to some FAA/TERPS procedures
- Scenario 10 (A–D): Straight-out OEI protection with four alternative OEI west corridor surface protections

The following table displays the range of increased maximum building heights for each scenario compared to OEI protection conditions:

Scenario	Additional Height Downtown Core	Additional Height Diridon Area
No OEI (Scenario 4)	5' - 35'	70' to 150'
Straight-out OEI protection with no OEI west corridor (Scenario 7)	0'	70'-150'
No OEI protection plus increased FAA/TERPS surfaces (Scenario 9)	35'-100'	80'-220'
Straight-out OEI projection with alternative west corridor protection (Scenario 10)		
Option A	0'	15'-25'
Option B	0'	30'-55'
Option C	0'	45'-85'
Option D	0'	65'-115'

After determining the potential building height increases in the study areas, a technical analysis was then conducted to assess the aircraft performance impact (weight penalties) under each scenario using various combinations of aircraft types, destinations, and seasonal temperatures. The following set of charts illustrates the ability of specific aircraft to serve selected existing non-stop markets in the summer and winter months.

After much discussion with the project Steering Committee, Scenario 4 was selected as the most promising option to the an OEI protection policy. Scenario 4 demonstrates that the transcontinental market (represented by New York), Europe markets (represented by Frankfurt), and Hawaiian markets (represented by Honolulu) would have minimal weight penalties, if any. The Asian market (represented by Beijing) would have passenger and/or cargo penalties under south flow conditions (13% of annual operations). The Steering Committee discussed the possibility of creating a "Community Fund" that could compensate an airline for OEI-related weight penalties when incurred. The City itself is prohibited by federal regulations from using Airport funds to fund such Community Fund, but other airport proprietors have offered a similar air service fund by a separate agency, such as a Chamber of Commerce.

Transcontinental – New York Market – Assessment of Potential Weight Penalties

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Hawaii – Honolulu Market – Assessment of Potential Weight Penalties

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Europe - Frankfurt Market - Assessment of Potential Weight Penalties

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	21,580	-	4,400
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	15,338	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	10,000	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	9,349	-	-
	Opt 10C: 129' - 240' AGL	-	14,096	-	-
	Opt 10D: 146' - 260' AGL	-	19,282	-	2,027
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	29	26,198	-	11,735

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	2	22,911	-	7,811
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	16,407	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,217	-	-
	Opt 10B: 115' - 224' AGL	-	9,353	-	-
	Opt 10C: 129' - 240' AGL	-	14,270	-	-
	Opt 10D: 146' - 260' AGL	-	19,612	-	3,876
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	41	23,514	-	15,397

Asia – Beijing Market - Assessment of Potential Weight Penalties

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

The airline service analysis conducted for the selected existing destinations, as illustrated above, was expanded to consider potential SJC markets that could be served in the future. For domestic markets, Boston, Miami, and Anchorage were analyzed, and the charts below show that 737-800 service to these destinations would not sustain any significate weight penalty under Scenario 4.

Additional Domestic Markets - Assessment of Potential Weight Penalties

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-

Boston - BOS Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-

Miami - MIA Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

For international air service markets, Rio de Janeiro (6,575 miles), Taipei (6,499 miles), Hong Kong (6,957 miles), Delhi (7,731 miles), and Dubai (8,120 miles) were analyzed, using aircraft typical on such international routes. The analysis indicated that the maximum route distance that could possibly be served from SJC under Scenario 4 is approximately 6,500 miles, as illustrated in the charts below.

Long Range Markets Stress Test - Assessment of Potential Weight Penalties

Rio de Janeiro - GIG **Summer (81.3° F)** 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144

Taipei - TPE **Summer (81.3° F)** 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							89	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	

Hong Kong - HKG **Summer (81.3° F)** 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	

Delhi - DEL **Summer (81.3° F)** 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor							103	
TERPS Only	55	5,014	77	3,132	72	106	184	

Dubai - DXB **Summer (81.3° F)** 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor							107	
TERPS Only	65	3,537	79	2,688	72	1,828	191	

* Existing Straight Out OEI Corridor calculations uses different cargo capacity numbers than the West OEI and TERPS Only.

As a reality check for the technical analysis described above, the study consultant also reached out to all the airlines serving SJC to request their independent analysis of how each of the four scenarios would impact their current and future air service markets at SJC during south flow conditions. Out of 18 airlines, 13 airlines responded, highlighted as follows for Scenario 4:

- Alaska, American, Aeromexico, Delta, Southwest, and Volaris reported no weight penalties to any of its destinations below a temperature of 92º F.
- Hawaiian and United reported only minor cargo penalties, and potentially minor passenger penalties and larger cargo penalties depending on specific destination and aircraft.
- Federal Express reported no significant cargo penalties.
- British Airways reported no weight penalty impacts on its London service.
- ANA reported minor cargo penalty impacts and no passenger penalties for its Tokyo service.
- Hainan reported the most significant impacts for its Beijing service, resulting in a significant reduction in cargo and passenger payload (up to 50+ passengers for B787-900).

Overall, these airline responses are consistent with the consultant's technical analysis.

<u>Task 3</u>

The economic impacts to the Downtown Core, Diridon Station area, airlines, and SJC were calculated based on the net new development that may be able to occur between OEI-restricted heights and the current FAA/TERPS surface heights. For the Downtown Core area, the findings indicate that there is already significant density available under the OEI height limits, so setting allowable heights up to the FAA/TERPS limits would not have a significant aggregate beneficial impact for a long period of time, although certain specific development sites might experience small gains.

The most significant net new economic gains from no OEI protection are expected to occur in the Diridon Station area. Development capacity in this area under Scenario 4 is estimated at a net building addition of 8.6 million square feet, resulting in net new construction value and taxes of $4.4 million and $5.5 million, respectively. In addition, there would be net increases in new employees (4,700) and new residents (12,800) as well as one-time fees collected for building, development, park impact, and school district purposes.

The economic impacts for SJC and the airlines was studied for the year 2024, the estimated time that impacts would occur as new development is built. In 2024, Scenario 4 would result in potential airline losses of $802,000 in seat revenue and compensation to passengers as compared to a scenario where building heights were limited to the OEI surfaces. These losses could grow to slightly over $1.2 million in 2032 and to $1.5 million by 2038 as the market, costs, and load factors increase over time. The potential establishment of an ongoing Community Fund by 2024, and a funding mechanism to support ongoing international air service, particularly to Asia, could serve to offset these airline economic losses.

The economic impacts over time to the Airport Enterprise Fund would be minimal, consisting mainly of lost PFC revenue and terminal concession spending. The aviation-related impacts are significantly outweighed by the Downtown Core and Diridon Station area real estate impacts with continuing increases in construction and other local taxes throughout the years.

Summary

The Downtown Airspace and Development Capacity Study analysis was one of the most extensive studies that the City has conducted on how the Airport and the Downtown Core and Diridon area can all thrive as economic drivers of the greater community. With the dedicated involvement of the project Steering Committee, staff is recommending that the City move forward with the study's Scenario 4 and allow development height to be governed by FAA TERPS surfaces.
However, to protect the viability of current and future international air service markets, particularly to Asia, staff also recommends that Council approval of Scenario 4 be accompanied by efforts to work with the development community to establish a Community Air Service Support Fund to mitigate the occasional airline economic penalties during south flow conditions and to support retention and expansion of transoceanic airline service.

In addition, it is recommended that the Council actions include direction to the Administration to implement refinements to the development review process for projects subject to the FAA TERPS surface elevations, and implement a construction crane policy that addresses the prolonged usage of very tall construction cranes that airlines must account for in their departure weight calculations.

SILICON VALLEY'S AIRPORT

SJC

Downtown Airspace and Development Capacity Study

Community and Economic Development Committee

January 28, 2019

The Challenge

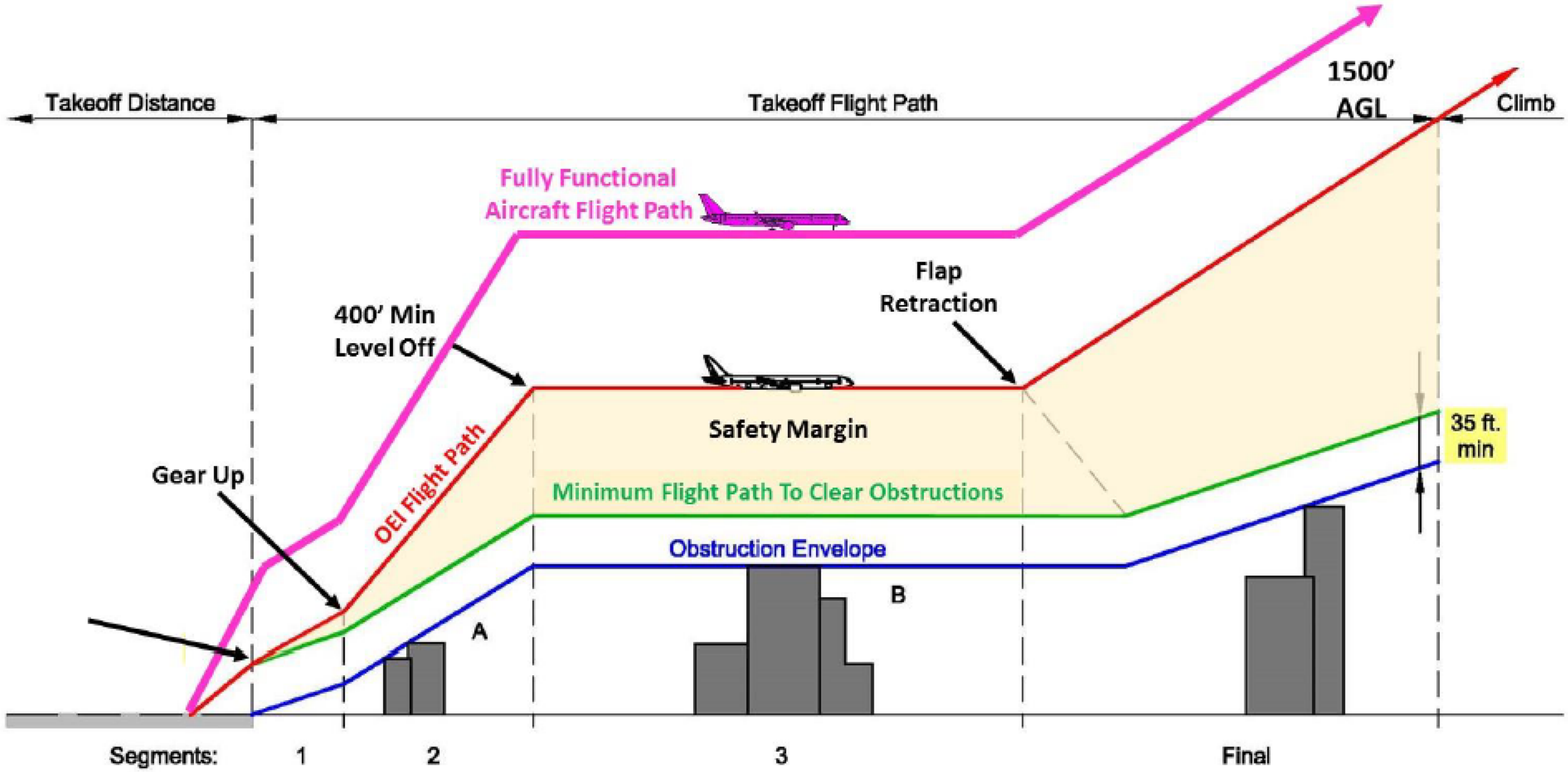
- Downtown and Airport are two of San Jose's economic priorities

- FAA protects airspace invisible "surfaces" known as Part 77 and FAA/TERPS

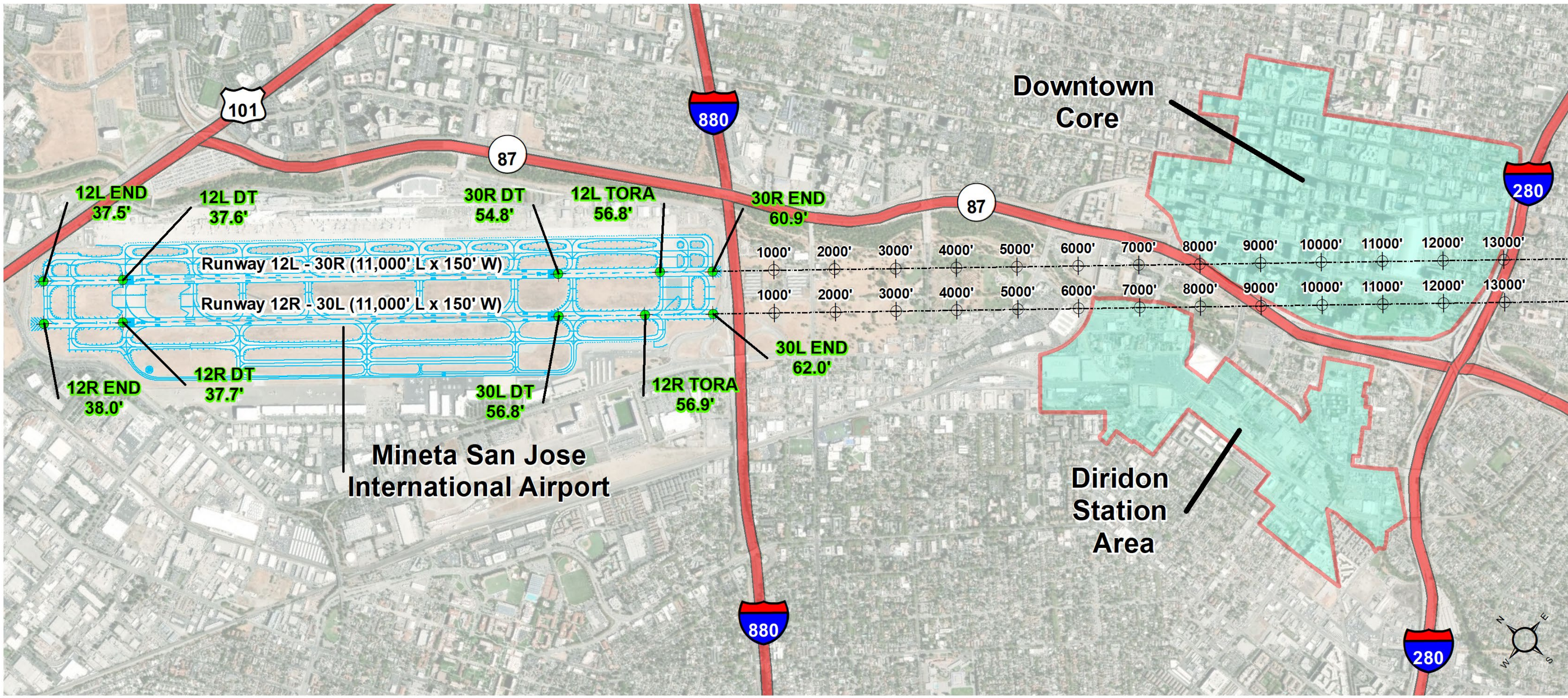
- Part 77 and FAA/TERPs do not consider specific airline emergency procedures known as one-engine inoperative (OEI)

- OEI study last conducted in 2007, established Straight-out and West Corridor OEI protection

What is One Engine Inoperative?



Study Evaluation Area



Project Steering Committee

<u>Community Representatives</u>

Teresa Alvarado – SPUR

Scott Knies – San Jose Downtown Association

Matt Mahood – Silicon Valley Organization

David Bini – Santa Clara & San Benito Counties Building & Construction Trades Council

Josue Garcia – Santa Clara County Residents for Responsible Development

Matt Quevedo – Silicon Valley Leadership Group

Julie Matsushima – Airport Commissioner and Downtown Resident

<u>City Staff</u>

John Aitken and Judy Ross – Airport Department

Kim Walesh and Blage Zelalich – City Manager's Office/Office of Economic Development

Rosalynn Hughey – Planning, Building and Code Enforcement

David Hai Tran & Christina Ramos– District 3 Office

Kelly Kline – Mayor's Office

<u>Consultants</u>

Landrum and Brown and Jones, Lang, and LaSalle

Collaborative Process

I. FACTS

Existing Conditions Assessment and Urban Airport Case Studies

- ✓ Gather
- ✓ Share
- ✓ Agree

II. "*WHAT IF*" SCENARIOS

Potential Increased Height

a) What if?

b) What if?

c) What if?

d) Current Situation

III. TRADE-OFFS Impacts

(of each scenario)

Benefits/Costs

- Buildings
- Airlines
- City/Downtown
- Airport
- Regional Economy

Risks/Uncertainties

Evaluation Framework

IV. POTENTIAL SOLUTIONS

- ✓ Case Studies
- ✓ Brainstorm Solutions
  - Short-term
  - Long-term

V. INFORMED RECOMMENDATION

- ✓ Agreement, or
- ✓ Alternatives
- ✓ Council Recommendation and Action

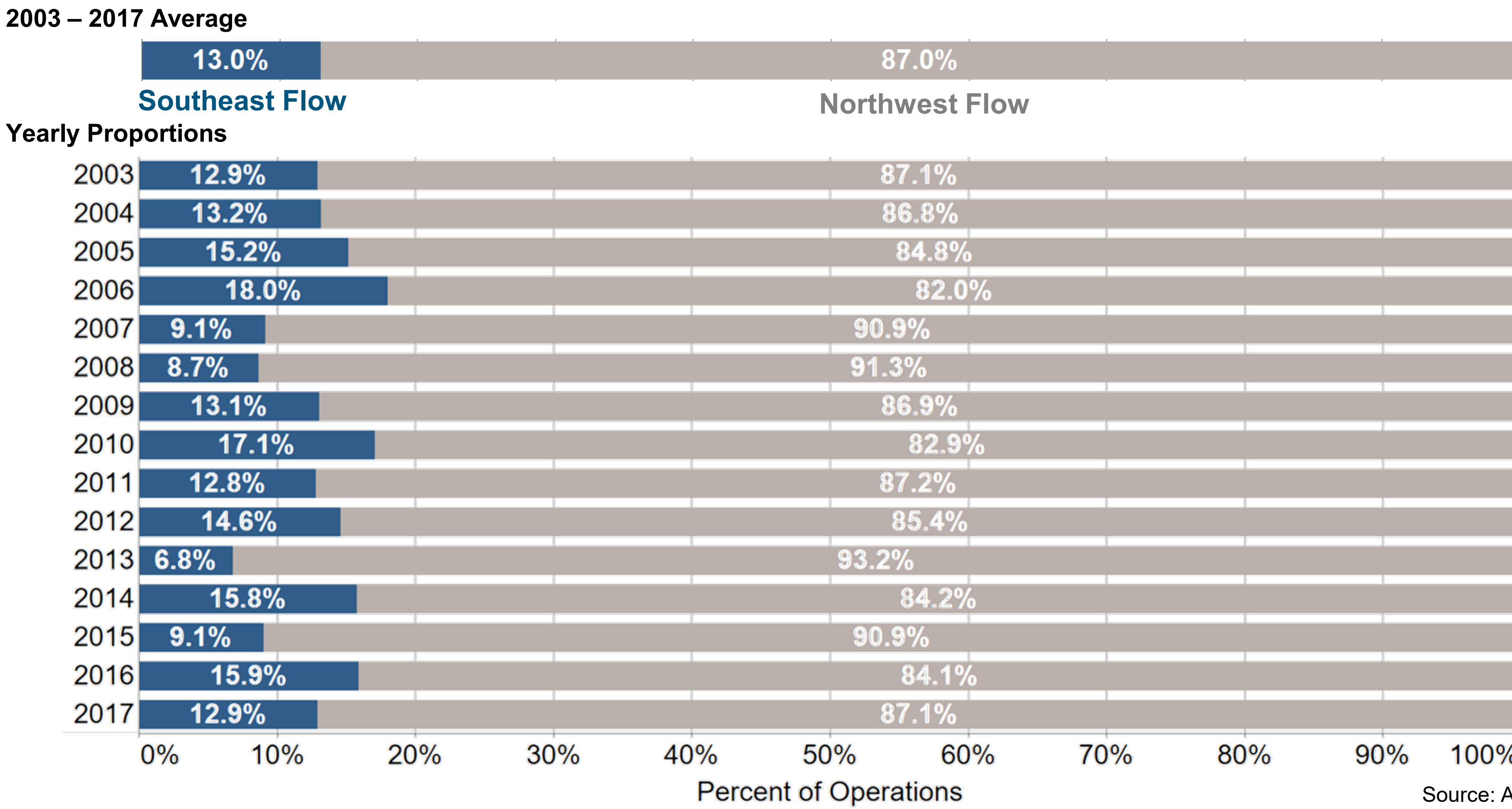
STAKEHOLDER CONVERSATIONS *

*

*

Today

South Flow Departures



Source: ANOMS

“What If” Scenario Assessment

Airspace Protection Scenarios

Four Airspace Scenarios

- **Scenario 4**: No OEI protection, FAA/TERPS only
- **Scenario 7**: Straight-out OEI protection only
- **Scenario 10**: Straight-out OEI with West OEI Corridor alternatives
- **Scenario 9**: No OEI, increased FAA/TERPS Height Only

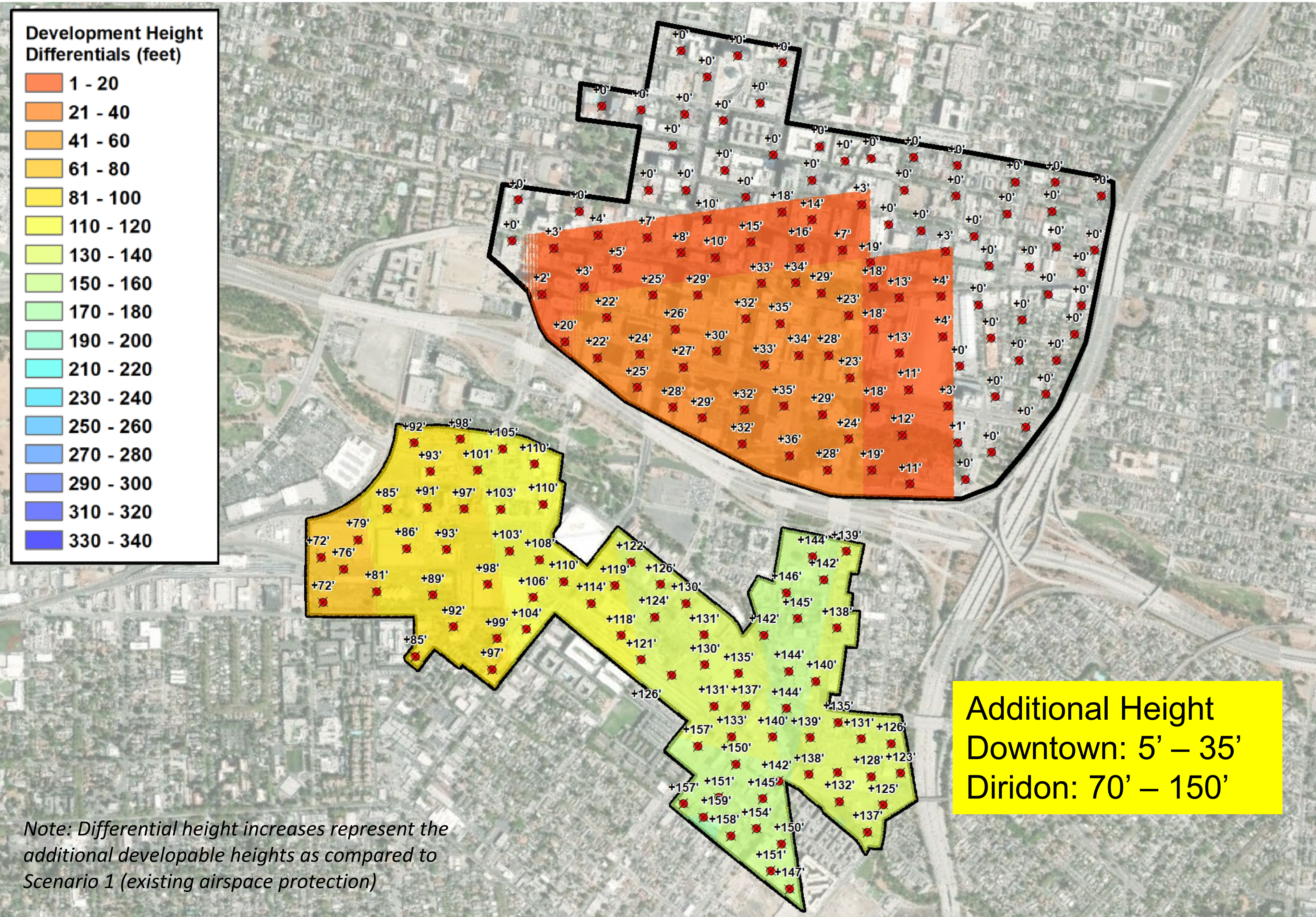
Selected Aircrafts

- Boeing 737-800
- Airbus 321-NEO (Original was Airbus 320-200)
- Boeing 787-9
- Boeing 777-300ER

Airline Response to Obstacles

- Request another runway (wind, weather, air traffic permitting)
- Off-load passengers and/or cargo (weight penalty)
- Make a refueling stop
- Cancel current day's flight
- Change aircraft
- Change OEI procedure
- Cancel air service if payload loss affects financial viability

SCENARIO 4 – NO OEI – FAA/TERPS ONLY



Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

Transcontinental Weight Penalty Assessment

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Hawaii Weight Penalty Assessment

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Notes:

1. **HNL is fuel capacity limited in Feb to 173 PAX and no cargo (i.e., not a takeoff weight limitation) for the B737-800.**

Europe Weight Penalty Assessment

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	21,580	-	4,400
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	15,338	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	10,000	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	9,349	-	-
	Opt 10C: 129' - 240' AGL	-	14,096	-	-
	Opt 10D: 146' - 260' AGL	-	19,282	-	2,027
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	29	26,198	-	11,735

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	2	22,911	-	7,811
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	16,407	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,217	-	-
	Opt 10B: 115' - 224' AGL	-	9,353	-	-
	Opt 10C: 129' - 240' AGL	-	14,270	-	-
	Opt 10D: 146' - 260' AGL	-	19,612	-	3,876
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	41	23,514	-	15,397

Asia Weight Penalty Assessment

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

Weight Penalty Assessment Additional Domestic Markets

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-

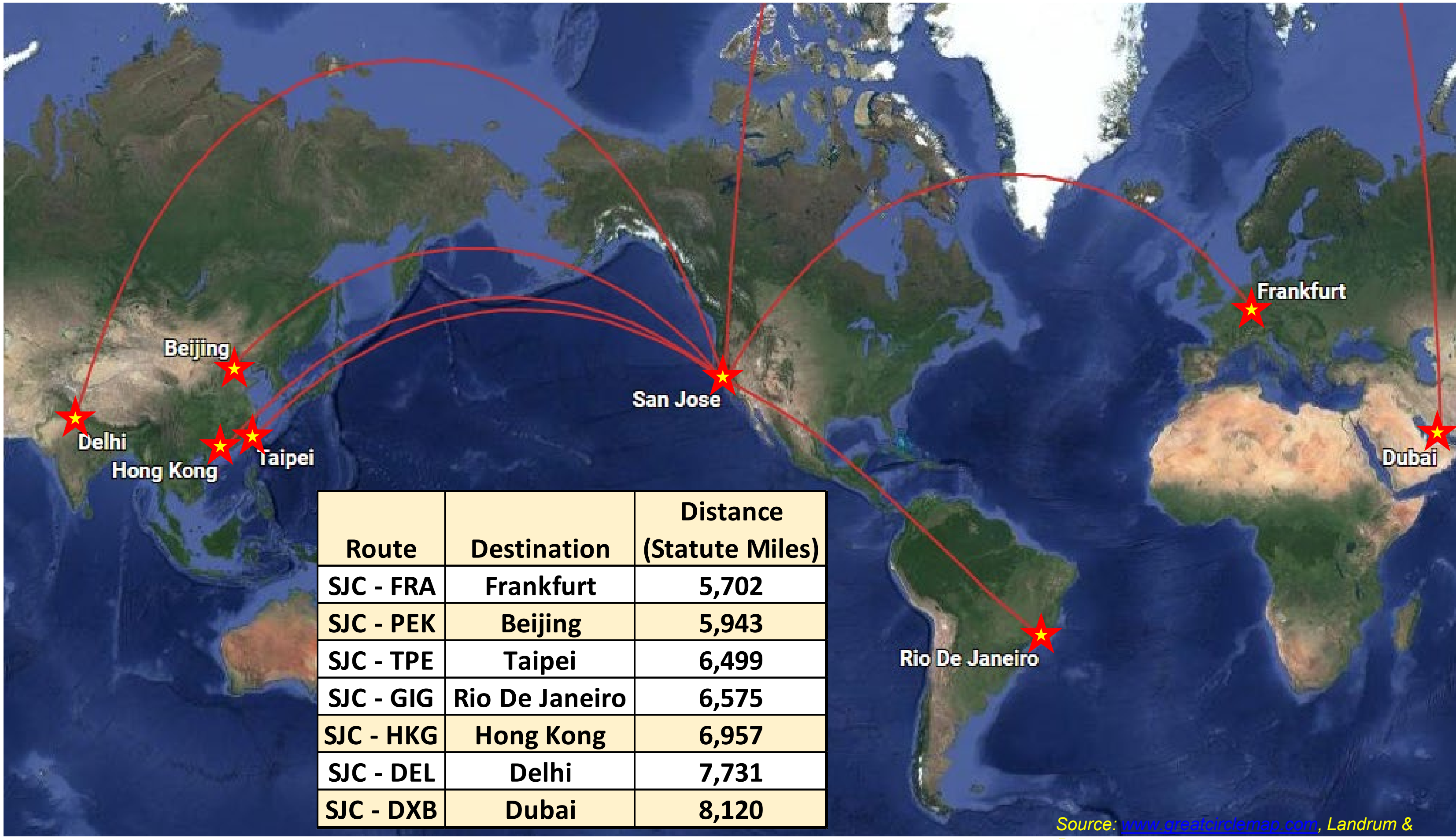
Boston - BOS Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-

Miami - MIA Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

Note - 1 and 3 Pax penalties as being due to Max Structural Takeoff Weight limits (and not related to the obstacles or runway length.)

Assessment of Existing Straight-Out OEI vs TERPS only for Additional Markets

Aircraft Evaluated:
A330-200
A350-900
B777-300
B787-9



Route	Destination	Distance (Statute Miles)
SJC - FRA	Frankfurt	5,702
SJC - PEK	Beijing	5,943
SJC - TPE	Taipei	6,499
SJC - GIG	Rio De Janeiro	6,575
SJC - HKG	Hong Kong	6,957
SJC - DEL	Delhi	7,731
SJC - DXB	Dubai	8,120

Source: www.greatcirclemap.com, Landrum & Brown

WEIGHT PENALTY ASSESSMENT GIG, TPE, HKG, DEL & DXB

Rio de Janeiro - GIG Summer (81.3° F) 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144

Taipei - TPE Summer (81.3° F) 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							89	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	

Hong Kong - HKG Summer (81.3° F) 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	

Delhi - DEL Summer (81.3° F) 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor							103	
TERPS Only	55	5,014	77	3,132	72	106	184	

Dubai - DXB Summer (81.3° F) 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor							107	
TERPS Only	65	3,537	79	2,688	72	1,828	191	

*Existing Straight Out OEI calculations use different cargo capacity numbers than West OEI and TERPS Only.

Airline Responses

The following airlines participated in the aircraft performance assessment for the various airspace scenarios presented.

Responded	No Response
AeroMexico	Air Canada/Jazz
Air China	California Pacific
Alaska	Frontier
American	Lufthansa
ANA	UPS
British Airways	Jet Blue
Delta	
FedEx	
Hainan Airways	
Hawaiian	
Southwest	
United	
Volaris	

Airline Aircraft Performance Analysis Results

- ANA
  - Evaluated B787-8 (max 169 PAX configuration)
  - No PAX penalty impacts in Scenarios 1, 4, 7 and 10, however cargo impact.
  - Scenario 9 results in PAX penalties between 30-37 PAX in summer temperatures (92º F), including additional cargo penalties.

- British Airways
  - Scenarios 4 and 7 have no impact to current operations.
  - Scenario 9 results in greatest impact when operating on Runways 12L/12R.
  - Scenario 10 has no impact on 12L when departing straight-out, however a payload and engine impact for 12R when making a right course correction.

- Hainan Airways
  - For B787-8/9, Scenario 4 obstacles result in significant reduction in cargo and PAX payload (50+ PAX for a maximum capacity B787-9) due to loss of the West Corridor.

Airline Aircraft Performance Analysis Results

- Alaska, American, Aeromexico, Delta, Southwest, and Volaris
  - No penalties for operations below 92º F.
- Hawaiian (Aircraft - A321 NEO)
  - HNL, OGG, or KOA has no passenger penalties, some cargo penalties.
  - LIH has minimal passenger penalties and some cargo penalties.
- Federal Express
  - Cargo penalties in most scenarios; however, will cube out before weight out.
- United
  - Significant PAX and cargo penalties for B737-900ER operation in Scenarios 1, 4, 7 and 9.
  - Minor PAX and cargo penalties in Scenario 4 for B737-800, moderate PAX and cargo penalties in Scenario 9 for B737-800.

Annual Direct Airline Impacts During Southflow Operations

- Scenario 4 results in a potential airline loss of $802,000 the first year buildings are constructed to FAA/TERPS.

- Impact is primarily to Asian markets.

- Potential loss could grow to approximately $1.2 M in 2032 and $1.5 M in 2038 as market, costs, and load factors grow over time.

- Community Air Service Support Fund mechanism to offset these potential Airline economic losses.

Development Impact

Downtown Core

- Significant density already available.
- Any increase in height restrictions due to adjustments in air space protection scenarios will not have an aggregate impact until far into the future.
- Specific development sites may achieve some additional height – 5’-35’.

Diridon Station Area

- Increase in height restrictions could result in 8.6M net new square footage of development.
- Analysis focused on underutilized and vacant APNs larger than .2 acres.
- Upon complete buildout, $4.4B in construction value and $5.5M in annual property tax to CSJ.

Recommendations

1. Accept a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4.

2. Direct the Administration to explore the feasibility of establishing a community-funded Air Service Support Fund.

3. Direct the Administration to consider potential refinements to the development review process.

4. Direct the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations.

SILICON VALLEY'S AIRPORT

SJC

Downtown Airspace and Development Capacity Study

QUESTIONS & DISCUSSION

Appendix E

Public Comments Submitted for the Community and Economic Development Meeting on January 28, 2019

Note: Please refer to Appendix C and D for all public comments submitted to the City Council Meeting's on February 26, 2019 and March 12, 2019.

Aviation Planning at the Leading Edge

Statement from the Sunnyvale-Cupertino Airplane Noise group

Presented during public comment at San Jose Community & Economic Development Committee meeting on Jan 28, 2019

Agenda Item #5 - One Engine Inoperative Airport (CC18-419)

Public comment recorded in video beginning at 2:12:27 to 2:14:33

Group comment presented by Jennifer (Member Sunnyvale-Cupertino Airplane Noise Group)

I am here representing the Sunnyvale-Cupertino Airplane Noise Group.

Due to recent FAA flight path changes, the cities of Sunnyvale and Cupertino are now heavily impacted by airplane noise during San Jose Airport reverse flow, also called south flow operations.

Now San Jose is considering taller buildings in downtown and Diridon.

What is NOT clear is whether these taller buildings could indirectly impact the frequency of south flow operations over our cities – In other words, resulting in MORE south flow operations.

The San Jose building height study considered departure flights, but never studied arrivals. Yet normal flow arrivals fly directly over downtown San Jose. And based on a 2017 FAA Congressional meeting, we already know that these arrivals are partly impacted by the existing tall downtown buildings.

We ask that ANY San Jose vote that will ultimately result in taller buildings in downtown or Diridon be postponed until a supplemental aviation study is commissioned by San Jose, and the FAA is consulted to confirm no possible increase in south flow traffic. For example, no possible lowering of the south flow wind speed trigger.

Again, any San Jose approvals should be delayed until the FAA and an aviation consultant have completed a report confirming no possible increase in the frequency of south flow operations.

Decisions regarding building heights will have repercussions for decades, yet decisions are being based on an incomplete study that missed any analysis regarding arriving flights.

A formal letter from our group was submitted under public comment.

The current aviation study is incomplete, and further analysis is necessary.

Thank you for your time.

Appendix F – Special Airport Commission Meeting (January 14, 2019)

Appendix F consists of background information presented at the Airport Commission Meeting on January 14, 2019.

City of San José
Airport Commission

District 1— Ken Pyle
District 3— Julie Riera Matsushima
District 5— E. Ronald Blake
District 7— Allison Stember
District 9— Catherine Hendrix
Citywide— Joe Head (Vice-Chair)

Thomas Cruz —District 2
Mark Schmidt —District 4
Raymond Greenlee —District 6
Vacant —District 8
Dan Connolly (Chair) —District 10

SPECIAL MEETING AGENDA

5:00 p.m.

January 14, 2019

Beechcraft Conference Room
Airport Administration Offices
Mineta San José International Airport
1701 Airport Boulevard, Suite B-1130

I. Call to Order & Orders of the Day

II. Public Record

None

III. Public Comment *(Members of the Public are invited to speak on any item that does not appear on today's Agenda and that is within the subject matter jurisdiction of the Commission. Meeting attendees are usually given two (2) minutes to speak on any discussion item and/or during open forum; the time limit is in the discretion of the Chair of the meeting and may be limited when appropriate. Speakers using a translator will be given twice the time allotted to ensure non-English speakers receive the same opportunity to directly address the Committee, Board or Commission.)*

IV. General Business

A. Update on the Airline-Airport Lease
B. Special Report on the One Engine Inoperative (OEI) study

V. Adjournment

The City of San José is committed to open and honest government and strives to consistently meet the community's expectations by providing excellent service, in a positive and timely manner, and in the full view of the public.

You may speak to the Commission about any discussion item that is on the agenda, and you may also speak during Public Comments on items that are not on the agenda and are within the subject matter jurisdiction of the Commission. Please be advised that, by law, the Commission is unable to discuss or take action on issues presented during Public Comments. Pursuant to Government Code Section 54954.2, no matter shall be acted upon by the Commission unless listed on the agenda, which has been posted not less than 72 hours prior to meeting.

Agendas, Staff Reports, and some associated documents for the Commission items may be viewed on the Internet at http://flysanjose.com/airport-commission.

All public records relating to an open session item on this agenda, which are not exempt from disclosure pursuant to the California Public Records Act, that are distributed to a majority of the legislative body will be available for public inspection at the office and address listed below, at the same time that the public records are distributed or made available to the legislative body. Any draft resolutions or other items posted on the Internet site or distributed in advance of the commission meeting may not be the final documents approved by the commission. Contact the person listed below for the final document.

On occasion the Commission may consider agenda items out of order.

The Airport Commission meets the second Monday of one calendar month each quarter at 6:00 p.m., with special meetings as necessary. If you have any questions, please direct them to the Commission staff. Thank you for taking the time to attend today's meeting. We look forward to seeing you at future meetings.

To request an accommodation or alternative format under the Americans with Disabilities Act for City-sponsored meetings, events or printed materials, please call (408) 535-1260 as soon as possible, but at least three business days before the meeting.

Please direct correspondence and questions to:

City of San José
Attn: Matthew Kazmierczak
1701 Airport Boulevard – Suite B-1130
San José, California 95110
Tel: (408) 392-3640
Email: mkazmierczak@sjc.org

AIRPORT COMMISSION AGENDA:
01/14/19

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: **AIRPORT COMMISSION**

FROM: John Aitken, A.A.E.

SUBJECT: **DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY REPORT FINDINGS AND RECOMMENDATIONS**

DATE: January 10, 2019

RECOMMENDATION

Recommend to the City Council approval of:

1. Acceptance of a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) Terminal Instrument Procedures (TERPS) surfaces to determine maximum building heights in the Downtown Core and Diridon Station.
2. Direction to the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Fund" to financially mitigate any adverse air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.
3. Direction to the Administration to consider potential refinements to the development review process for projects subject to a FAA TERPS airspace determination including:
    a. Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.
    b. Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.
    c. Require that a construction survey prepared by a licensed civil engineer be submitted by applicants to the FAA upon completion of the high-point of the structure and accessory extensions thereof, prior to City issuance of an occupancy certification.

   d. Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.
   e. Develop a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.
4. Direction to the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

OUTCOME

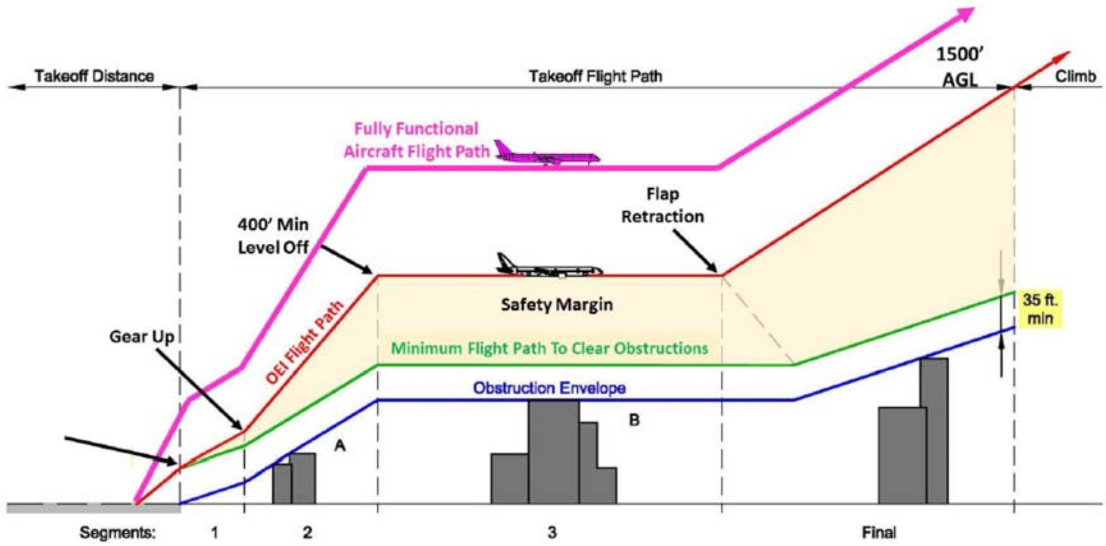
City Council approval of the above recommendations would allow for maximum safe development heights and associated economic benefits in the Downtown and Diridon Station areas.

BACKGROUND

Two of the City's primary economic priorities are the continued development of Downtown and growth in air service at Mineta San Jose International Airport (Airport). The Airport and Downtown are within two miles of each other and the primary aircraft approach and departure paths for the Airport are directly over Downtown, which places limitations on Downtown building heights.

The Federal Aviation Administration (FAA) protects airspace around airports through the application of Federal Aviation Regulations (FAR) Part 77 and Terminal Instrument Procedures (TERPS). These regulations define various airspace "surfaces" or slopes which radiate out from an airport's runway and mandate FAA review of any proposed structure which exceeds one or more of these surfaces. In San Jose, as in most local land use jurisdictions, proposed structures subject to FAA review are typically required to obtain a "determination of no hazard" clearance from the FAA prior to, or as a condition of, City development permit approval.

While FAA applies Part 77 and TERPS to safely operate the airspace around an airport, it does not consider airline emergency procedures as part of the review. Under Part 25 of the Federal Aviation Regulations, airlines are required to have emergency flight procedures in place for every departure in the event of an engine power loss during take-off. These emergency flight procedures are known as "one-engine inoperative (OEI)" procedures and are designed so that an aircraft can gain sufficient altitude immediately upon takeoff even if an engine loses power, follow a prescribed flight path over any obstacles and surrounding terrain, and safely circle back to the airport for an emergency landing. Each airline develops its own OEI procedures based on guidelines set forth by the FAA and the International Civil Aviation Organization (ICAO). The diagram below illustrates the requirements in these guidelines.



Protecting for OEI emergency procedures can limit maximum building heights around an airport more severely that the FAA evaluations conducted under FAR Part 77 and TERPs. The FAA believes that airlines can mitigate OEI airspace obstructions by revising their emergency procedures or by reducing takeoff weight to improve climb performance to safely clear obstructions. However, implementing takeoff weight restrictions by reducing passengers, cargo, or fuel can impact the economic viability of airline service. Even small weight penalties can affect the feasibility of airline service to a destination, most notably transcontinental and transoceanic destinations typically serviced by large, heavy aircraft. Therefore, obstructions within the surrounding airspace can be a factor in an airport's ability to attract or retain desired air service.

The City's 2007 Airport Obstruction Study mapped out airline OEI protection surfaces and associated building elevation limits around the Airport (note: aircraft depart to the south under certain weather conditions that occur approximately 13% of the time annually). The 2007 study identified two OEI corridors used by the airlines: one over the Downtown core (east of Highway 87 and referred to as the straight out corridor) and one over the Diridon area (west of Highway 87 and referred to the west corridor). Airlines determine which corridor they will use – straight out or west corridor– depending on the aircraft being flown, the aircraft's destination, and the airline's pilot training program. Those airlines using the west corridor in their OEI procedures do so to avoid the existing high-rise buildings in the Downtown core. Since the OEI west corridor requires a shallower aircraft climb rate due to the turning maneuver, OEI building height limits in the Diridon area are more restrictive that in the Downtown core. Toward the southern end of Downtown, the FAA TERPS surfaces become more restrictive than the OEI procedure surfaces.

Beginning in 2007, the Administration has successfully implemented an informal OEI protection practice through the development review process by attempting to limit proposed maximum building heights to the elevations mapped out in the study. To date, with developer cooperation, all approved high-rise building projects in the Downtown core and Diridon area have been consistent with the OEI surfaces.

In June 2017, City Council directed staff to update the 2007 study and include an economic analysis to identify the trade-offs between maintaining OEI protection surfaces and potential increased building heights under a no-OEI protection or alternative policy. Pursuant to that direction, the Office of Economic Development and the Airport Department have conducted the Downtown Airspace and Development Capacity Study. Landrum & Brown, a national aviation planning/engineering consultant with extensive experience working for the City on OEI and other airport technical issues, was contracted to perform the technical work on the study, with assistance from the economic analysis firm of Jones, Lang, & LaSalle. A project Steering Committee, comprised of the downtown stakeholder representatives including the San Jose Downtown Association, SPUR, Silicon Valley Organization, Silicon Valley Leadership Group, Santa Clara & San Benito Counties Building and Construction Trades Council, and Airport Commission was convened to provide review and input on the technical analysis and resulting strategy. City staff participation on the Steering Committee included representatives from the Mayor's Office, Councilmember Peralez's Office, Planning, Building and Code Enforcement Department, Office of Economic Development, and the Airport Department. The project Steering Committee met eight (8) times over the course of the study to review extensive technical materials and provide input and comments during the study process.

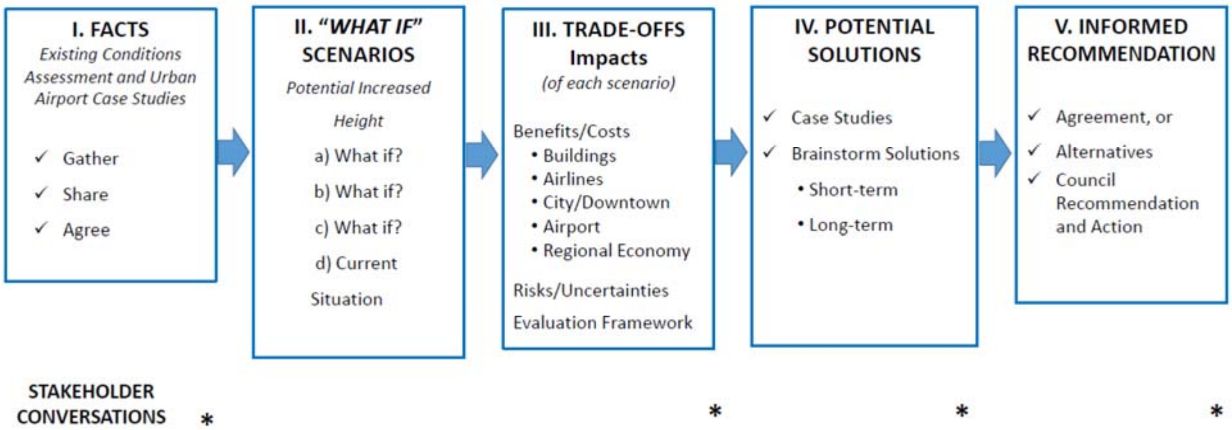
Separately, in addition to the project Steering Committee, three broader downtown stakeholder information meetings were held during the study, once at the initial launch of the study, once to report on study progress and initial findings, and once to present a proposed strategy. The stakeholder meetings were well attended and served as opportunities for the development community to ask questions and provide input into the study.

ANALYSIS

The Downtown Airspace and Development Capacity Study consisted of three major tasks:

- Task 1 Existing Condition Assessment
- Task 2 OEI Feasibility Studies and Impact
- Task 3 Economic Analysis

The technical scope was augmented by the following collaborative framework developed with the project Steering Committee:



<u>Task 1:</u>

The technical consultant evaluated and updated the City's Downtown and Diridon Station area obstruction data, existing airline OEI procedures, critical aircraft for SJC current and anticipated air service, and the FAA's 30+ TERPS arrival, departure, and circling procedures to the south of the Airport.

In addition, a weather analysis over the last 15 years was completed, which confirmed that the Airport in south flow operations (departures to the south) an average of 13% of the time on an annual basis, most likely to occur during winter months and morning hours. All-day southflow operations occurred an average of 17 days annually.

<u>Task 2:</u>

Ten conceptual airspace protection "scenarios" were formulated to test various alternative combinations of OEI and FAA/TERPS airspace surface protections on maximum building heights. With input from the project Steering Committee, four of the ten scenarios were selected for detailed analysis:

- Scenario 4: No OEI protection (FAA/TERPS only)
- Scenario 7: Straight-out OEI protection with no OEI west corridor protection
- Scenario 9: No OEI protection plus potential elevation increase to some FAA/TERPS procedures
- Scenario 10 (A–D): Straight-out OEI protection with four alternative OEI west corridor surface protections

The following table displays the range of increased maximum building heights for each scenario compared to OEI protection conditions:

Scenario	Additional Height Downtown Core	Additional Height Diridon Area
No OEI (Scenario 4)	5' - 35'	70' to 150'
Straight-out OEI protection with no OEI west corridor (Scenario 7)	0'	70'-150'
No OEI protection plus increased FAA/TERPS surfaces (Scenario 9)	35'-100'	80'-220'
Straight-out OEI projection with alternative west corridor protection (Scenario 10)		
Option A	0'	15'-25'
Option B	0'	30'-55'
Option C	0'	45'-85'
Option D	0'	65'-115'

After determining the potential building height increases in the study areas, a technical analysis was then conducted to assess the aircraft performance impact (weight penalties) under each scenario using various combinations of aircraft types, destinations, and seasonal temperatures. The following set of charts illustrates the ability of specific aircraft to serve selected existing non-stop markets in the summer and winter months.

After much discussion with the project Steering Committee, Scenario 4 was selected as the most promising option to the an OEI protection policy. Scenario 4 demonstrates that the transcontinental market (represented by New York), Europe markets (represented by Frankfurt), and Hawaiian markets (represented by Honolulu) would have minimal weight penalties, if any. The Asian market (represented by Beijing) would have passenger and/or cargo penalties under south flow conditions (13% of annual operations). The Steering Committee discussed the possibility of creating a “Community Fund” that could compensate an airline for OEI-related weight penalties when incurred. The City itself is prohibited by federal regulations from using Airport funds to fund such Community Fund, but other airport proprietors have offered a similar air service fund by a separate agency, such as a Chamber of Commerce.

Transcontinental – New York Market – Assessment of Potential Weight Penalties

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Hawaii – Honolulu Market – Assessment of Potential Weight Penalties

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Europe - Frankfurt Market - Assessment of Potential Weight Penalties

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	21,580	-	4,400
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	15,338	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	10,000	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	9,349	-	-
	Opt 10C: 129' - 240' AGL	-	14,096	-	-
	Opt 10D: 146' - 260' AGL	-	19,282	-	2,027
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	29	26,198	-	11,735

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	2	22,911	-	7,811
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	16,407	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,217	-	-
	Opt 10B: 115' - 224' AGL	-	9,353	-	-
	Opt 10C: 129' - 240' AGL	-	14,270	-	-
	Opt 10D: 146' - 260' AGL	-	19,612	-	3,876
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	41	23,514	-	15,397

Asia – Beijing Market - Assessment of Potential Weight Penalties

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

The airline service analysis conducted for the selected existing destinations, as illustrated above, was expanded to consider potential SJC markets that could be served in the future. For domestic markets, Boston, Miami, and Anchorage were analyzed, and the charts below show that 737-800 service to these destinations would not sustain any significate weight penalty under Scenario 4.

Additional Domestic Markets - Assessment of Potential Weight Penalties

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-

Boston - BOS Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-

Miami - MIA Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

For international air service markets, Rio de Janeiro (6,575 miles), Taipei (6,499 miles), Hong Kong (6,957 miles), Delhi (7,731 miles), and Dubai (8,120 miles) were analyzed, using aircraft typical on such international routes. The analysis indicated that the maximum route distance that could possibly be served from SJC under Scenario 4 is approximately 6,500 miles, as illustrated in the charts below.

Long Range Markets Stress Test - Assessment of Potential Weight Penalties

Rio de Janeiro - GIG **Summer (81.3° F)** 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144

Taipei - TPE **Summer (81.3° F)** 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							89	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	

Hong Kong - HKG **Summer (81.3° F)** 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	

Delhi - DEL **Summer (81.3° F)** 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor							103	
TERPS Only	55	5,014	77	3,132	72	106	184	

Dubai - DXB **Summer (81.3° F)** 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor							107	
TERPS Only	65	3,537	79	2,688	72	1,828	191	

* Existing Straight Out OEI Corridor calculations uses different cargo capacity numbers than the West OEI and TERPS Only.

As a reality check for the technical analysis described above, the study consultant also reached out to all the airlines serving SJC to request their independent analysis of how each of the four scenarios would impact their current and future air service markets at SJC during south flow conditions. Out of 18 airlines, 13 airlines responded, highlighted as follows for Scenario 4:

- Alaska, American, Aeromexico, Delta, Southwest, and Volaris reported no weight penalties to any of its destinations below a temperature of 92º F.
- Hawaiian and United reported only minor cargo penalties, and potentially minor passenger penalties and larger cargo penalties depending on specific destination and aircraft.
- Federal Express reported no significant cargo penalties.
- British Airways reported no weight penalty impacts on its London service.
- ANA reported minor cargo penalty impacts and no passenger penalties for its Tokyo service.
- Hainan reported the most significant impacts for its Beijing service, resulting in a significant reduction in cargo and passenger payload (up to 50+ passengers for B787-900).

Overall, these airline responses are consistent with the consultant's technical analysis.

<u>Task 3</u>

The economic impacts to the Downtown Core, Diridon Station area, airlines, and SJC were calculated based on the net new development that may be able to occur between OEI-restricted heights and the current FAA/TERPS surface heights. For the Downtown Core area, the findings indicate that there is already significant density available under the OEI height limits, so setting allowable heights up to the FAA/TERPS limits would not have a significant aggregate beneficial impact for a long period of time, although certain specific development sites might experience small gains.

The most significant net new economic gains from no OEI protection are expected to occur in the Diridon Station area. Development capacity in this area under Scenario 4 is estimated at a net building addition of 8.6 million square feet, resulting in net new construction value and taxes of $4.4 million and $5.5 million, respectively. In addition, there would be net increases in new employees (4,700) and new residents (12,800) as well as one-time fees collected for building, development, park impact, and school district purposes.

The economic impacts for SJC and the airlines was studied for the year 2024, the estimated time that impacts would occur as new development is built. In 2024, Scenario 4 would result in potential airline losses of $802,000 in seat revenue and compensation to passengers as compared to a scenario where building heights were limited to the OEI surfaces. These losses could grow to slightly over $1.2 million in 2032 and to $1.5 million by 2038 as the market, costs, and load factors increase over time. The potential establishment of an ongoing Community Fund by 2024, and a funding mechanism to support ongoing international air service, particularly to Asia, could serve to offset these airline economic losses.

The economic impacts over time to the Airport Enterprise Fund would be minimal, consisting mainly of lost PFC revenue and terminal concession spending. The aviation-related impacts are significantly outweighed by the Downtown Core and Diridon Station area real estate impacts with continuing increases in construction and other local taxes throughout the years.

Summary

The Downtown Airspace and Development Capacity Study analysis was one of the most extensive studies that the City has conducted on how the Airport and the Downtown Core and Diridon area can all thrive as economic drivers of the greater community. With the dedicated involvement of the project Steering Committee, staff is recommending that the City move forward with the study's Scenario 4 and allow development height to be governed by FAA TERPS surfaces. However, to protect the viability of current and future international air service markets, particularly to Asia, staff also recommends that Council approval of Scenario 4 be accompanied by efforts to work with the development community to establish a Community Air Service Support Fund to mitigate the occasional airline economic penalties during south flow conditions and to support retention and expansion of transoceanic airline service.

In addition, it is recommended that the Council actions include direction to the Administration to implement refinements to the development review process for projects subject to the FAA TERPS surface elevations, and implement a construction crane policy that addresses the prolonged usage of very tall construction cranes that airlines must account for in their departure weight calculations.

SILICON VALLEY'S AIRPORT

SJC

Downtown Airspace and Development Capacity Study

Airport Commission

January 14, 2019

The Challenge

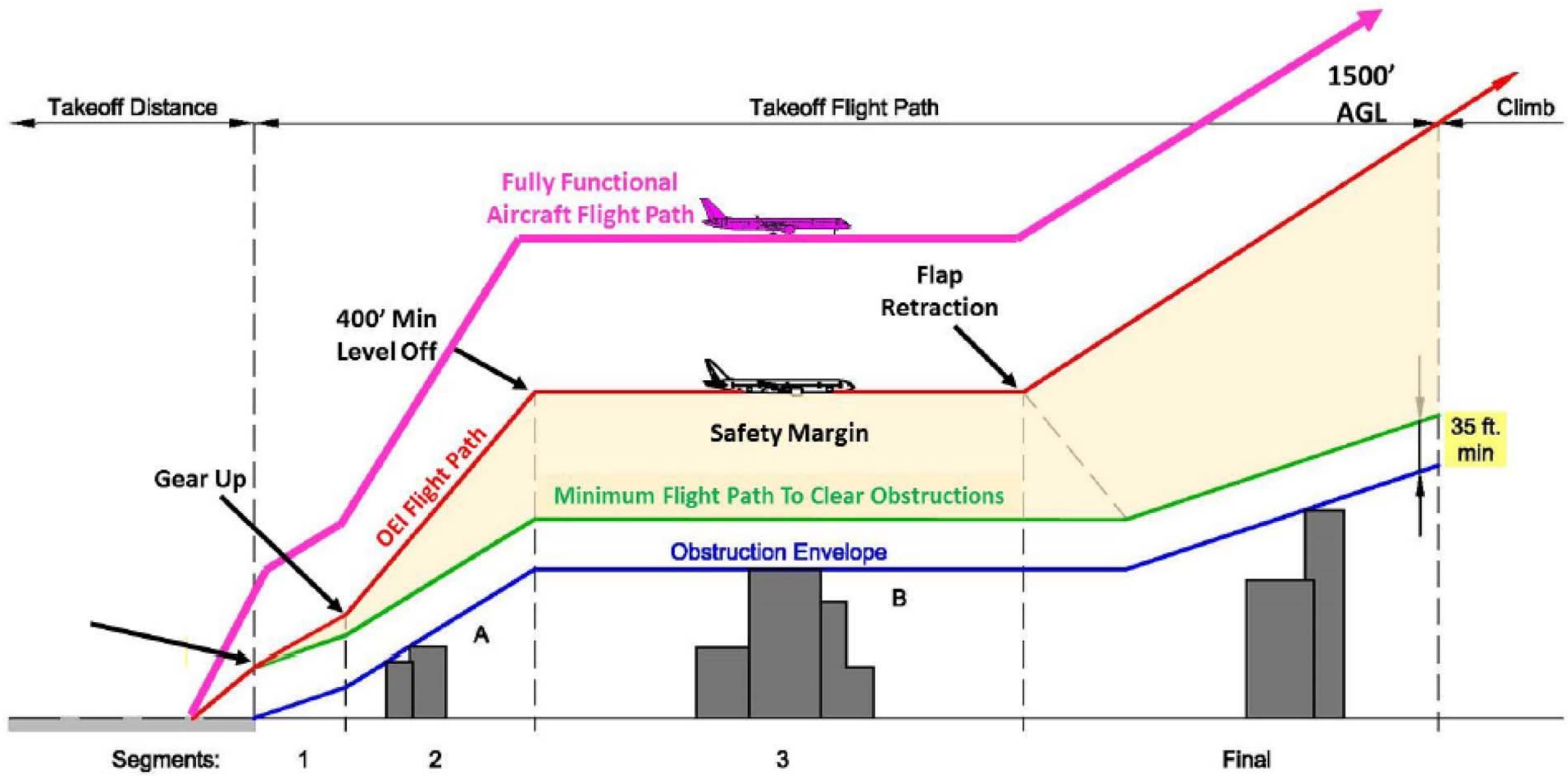
- Downtown and Airport are two of San Jose's economic priorities
- FAA protection of airspace invisible "surfaces" (via "FAR Part 77" and "TERPs")
- FAR Part 77 and TERPs do not consider specific airline emergency procedures known as one-engine inoperative (OEI)
- OEI study last conducted in 2007, establishing straight out and west corridor OEI protections

Airspace Surfaces

- OEI Surfaces – Runway 12L/12R
  - FAA AC 120-91 Obstacle Accountability Area
  - ICAO OEI Surface
  - West OEI Corridor
- Initial TERPS Surfaces – Runways 12L/12R
  - TERPS Initial Climb Area Departure Surface
  - TERPS ILS Final and Missed Approach Surfaces
- Part 77 Approach, Transitional and Horizontal Surfaces

Study Evaluation Area

What is One Engine Inoperative



Airline Response to Obstacles

- Request another runway (wind, weather, air traffic permitting)
- Off-load passengers and/or cargo (weight penalty)
- Make a refueling stop
- Cancel current day's flight
- Change aircraft
- Change OEI procedure
- Cancel air service if payload loss affects financial viability

Project Steering Committee

Community Representatives

Teresa Alvarado – SPUR

Scott Knies – San Jose Downtown Association

Matt Mahood – Silicon Valley Organization

David Bini – Santa Clara & San Benito Counties Building & Construction Trades Council

Josue Garcia – Santa Clara County Residents for Responsible Development

Matt Quevedo – Silicon Valley Leadership Group

Julie Matsushima – Airport Commissioner and Downtown Resident

City Staff

John Aitken and Judy Ross – Airport Department

Kim Walesh and Blage Zelalich – City Manager's Office/Office of Economic Development

Rosalynn Hughey – Planning, Building and Code Enforcement

David Hai Tran & Christina Ramos– District 3 Office

Kelly Kline – Mayor's Office

Consultants

Landrum and Brown and Jones, Lang, and LaSalle

Collaborative Process

I. FACTS
Existing Conditions Assessment and Urban Airport Case Studies

- ✓ Gather
- ✓ Share
- ✓ Agree

II. "*WHAT IF*" SCENARIOS
Potential Increased Height

a) What if?
b) What if?
c) What if?
d) Current Situation

III. TRADE-OFFS Impacts
(of each scenario)

Benefits/Costs
- Buildings
- Airlines
- City/Downtown
- Airport
- Regional Economy

Risks/Uncertainties

Evaluation Framework

IV. POTENTIAL SOLUTIONS

- ✓ Case Studies
- ✓ Brainstorm Solutions
  - Short-term
  - Long-term

V. INFORMED RECOMMENDATION

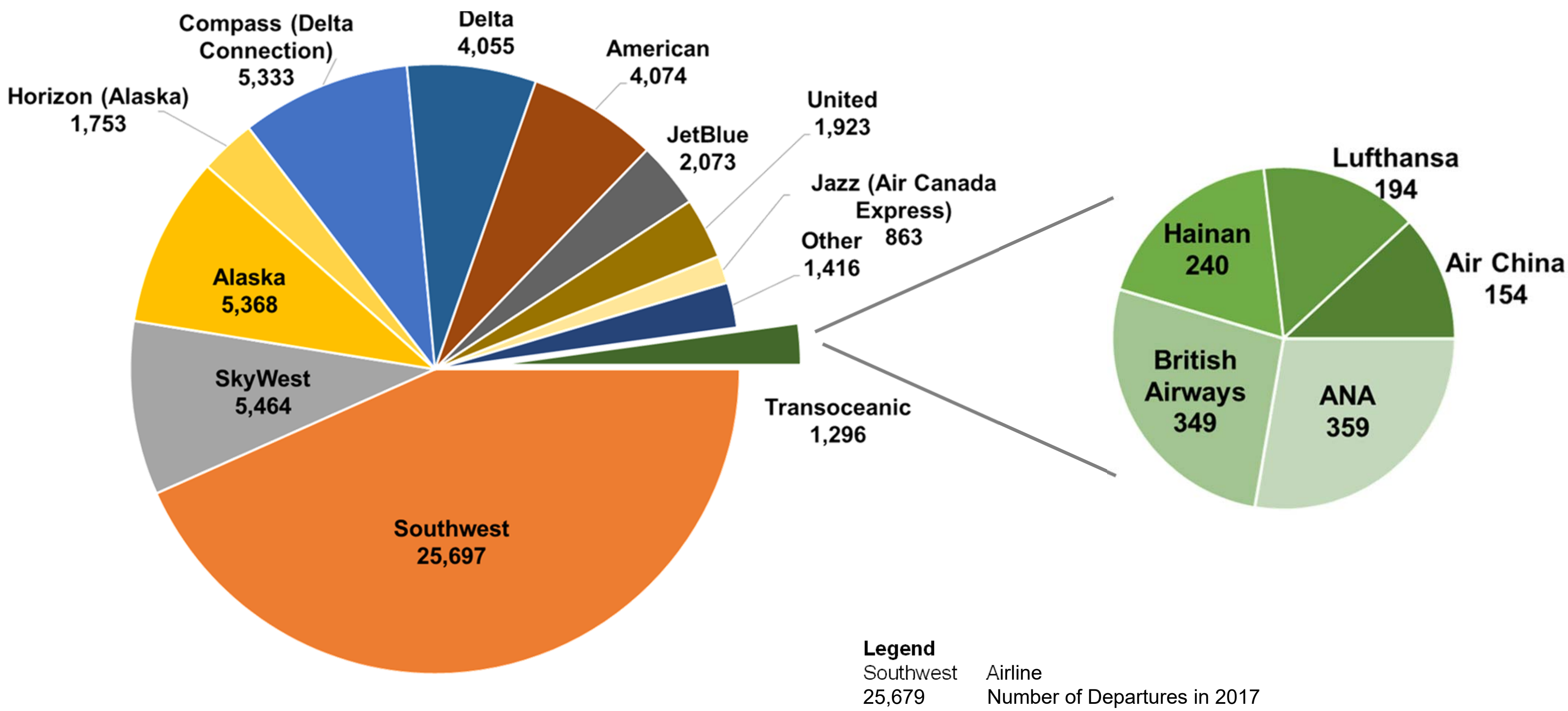
- ✓ Agreement, or
- ✓ Alternatives
- ✓ Council Recommendation and Action

STAKEHOLDER CONVERSATIONS * * * *

Progress to Date

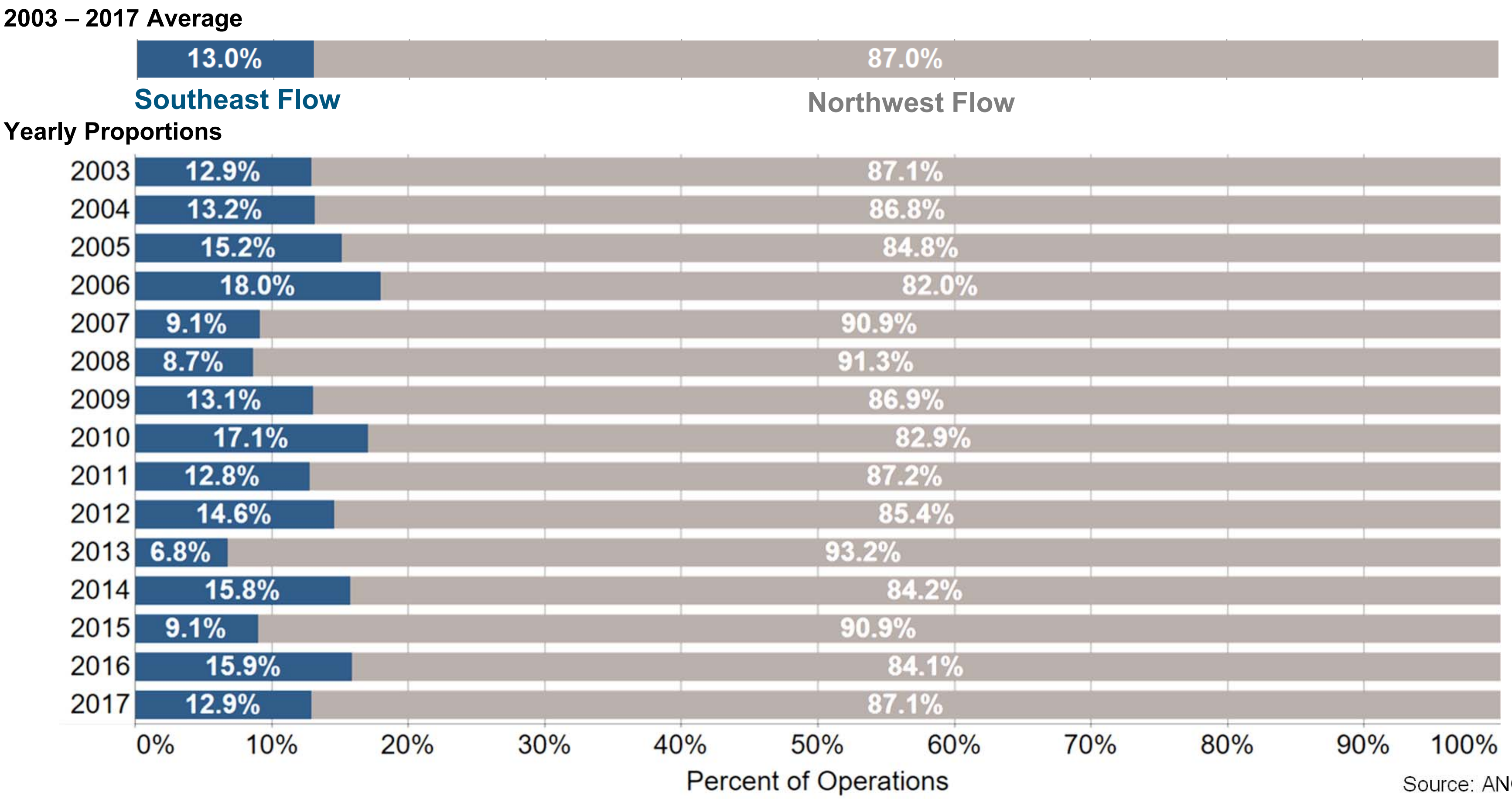
Airline Market Share – Passenger

Passenger airline market share in 2017



Source: ANOMS

Yearly Operations by Flow



Source: ANOMS

“What If” Scenario Assessment

Airspace Protection Scenarios

Four Airspace Scenarios

- **Scenario 4**: No OEI protection, TERPS only
- **Scenario 7**: Straight-out OEI protection only
- **Scenario 10**: Straight-out OEI with West OEI Corridor alternatives
- **Scenario 9**: No OEI, increased FAA height limits

Selected Aircrafts

- Boeing 737-800
- Airbus 321-NEO (Original was Airbus 320-200)
- Boeing 787-9
- Boeing 777-300ER

Current OEI Heights to TERPS Heights

Scenario	Additional Height Downtown Core	Additional Height Diridon Station Area
Scenario 4 – No OEI, TERPs Only	5' - 35'	70’ to 150’
Scenario 10 Options - Straight-out OEI projection with West Corridor Alternatives		
Option A	0'	15'-25'
Option B	0'	30'-55'
Option C	0'	45'-85'
Option D	0'	65'-115'
Scenario 7 - Straight-out OEI protection without the OEI west corridor	0'	70'-150'
Scenario 9 - No OEI protection with increase FAA height limits	35'-100'	80'-220'

AIRCRAFT PERFORMANCE CITY PAIR ASSESSMENT

Aircraft Performance Assumptions
City Pair Assessment

AIRCRAFT FLEET EVALUATION

Aircraft	Engine	Maximum Takeoff Weight (MTOW) (lbs.)	Seats
A320-200	CFM56-5B4	171,960	150
B737-800	CFM56-7B26	174,200	175
B787-9	GENX-1B74-7	560,000	290
B777-300ER	GE90-115BL	775,000	370

SEASONAL TEMPERATURES

Aircraft Type	Temperature (°F)	Notes
Winter		
A320-200 & B737-800	63°F	Early morning and evening departures
B787-9 & B777-300ER	68°F	Morning and afternoon departures
Summer		
A320-200 & B737-800	81.3°F	Boeing 85% reliability temperature
B787-9 & B777-300ER	81.3°F	Boeing 85% reliability temperature

CITY PAIR ASSESSMENT

Origin	Destination	Distance (Statue Miles)
Domestic		
SJC	JFK	2,569
SJC	HNL	2,417
International		
SJC	FRA	5,703
SJC	PEK	5,942

JFK: John F. Kennedy International Airport (New York)
HNL: Honolulu International Airport (Hawaii)
FRA: Frankfurt International Airport (Germany)
PEK: Beijing International Airport (China)

Transcontinental Weight Penalty Assessment

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Hawaii Weight Penalty Assessment

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	**2,537**	**3**	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	**593**	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	**3,565**	**1**	**1,599**

Note:
HNL is fuel capacity limited in Feb to 173 PAX and no cargo (i.e., not a takeoff weight limitation) for the B737-800.

Europe Weight Penalty Assessment

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	**21,580**	-	**4,400**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	**15,338**	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	**10,000**	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	**9,349**	-	-
	Opt 10C: 129' - 240' AGL	-	**14,096**	-	-
	Opt 10D: 146' - 260' AGL	-	**19,282**	-	**2,027**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**29**	**26,198**	-	**11,735**

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	**2**	**22,911**	-	**7,811**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	**16,407**	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	**4,217**	-	-
	Opt 10B: 115' - 224' AGL	-	**9,353**	-	-
	Opt 10C: 129' - 240' AGL	-	**14,270**	-	-
	Opt 10D: 146' - 260' AGL	-	**19,612**	-	**3,876**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**41**	**23,514**	-	**15,397**

Asia Weight Penalty Assessment

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

Airline Responses

The following airlines participated in the aircraft performance assessment for the various airspace scenarios presented.

Responded	No Response
AeroMexico	Air Canda/Jazz
Air China	California Pacific
Alaska	Frontier
American	Lufthansa
ANA	UPS
British Airways	
Delta	
FedEx	
Hainan Airways	
Hawaiian	
Southwest	
United	
Volaris	

Respondent Analysis Results (1 of 3)

- ANA
  - Evaluated B787-8 (max 169 PAX configuration)
  - No PAX penalty impacts in Scenarios 1,4,7 and 10, however cargo impact.
  - Scenario 9 results in PAX penalties between 30-37 PAX in Summer temperatures (92º F), including additional cargo penalties
- Hainan Airways
  - For B787-8/9, Scenario 4 obstacles results in significant reduction in cargo and PAX payload (50+ PAX for B787-9) due to loss of the West Corridor

Respondent Analysis Results (2 of 3)

- British Airways
  - Scenarios 4 and 7 have no impact at all to current operations
  - Scenario 9 results in greatest impact when operating on Runways 12L/12R
  - Scenario 10 has no impact on 12L when departing straight-out, however a payload and engine impact for 12R when making a right course correction
- Alaska, American, Aeromexico, Delta, and Southwest, Volaris
  - No penalties for operations below 92º F.
- United
  - Significant PAX and cargo penalties for B737-900ER operation in Scenarios 1, 4, 7 and 9
  - Minor PAX and cargo penalties in Scenario 4 for B737-800; moderate PAX and cargo penalties in Scenario 9 for B737-800

Respondent Analysis Results (3 of 3)

- Hawaiian (Aircraft - A321 NEO)
  - HNL, OGG, or KOA has no passenger penalties, some cargo penalties.
  - LIH has minimal passenger penalties and some cargo penalties.
- Federal Express
  - Cargo Penalties in most scenarios; however, will cube out before weight out.

Weight Penalty Assessment Additional Domestic Markets

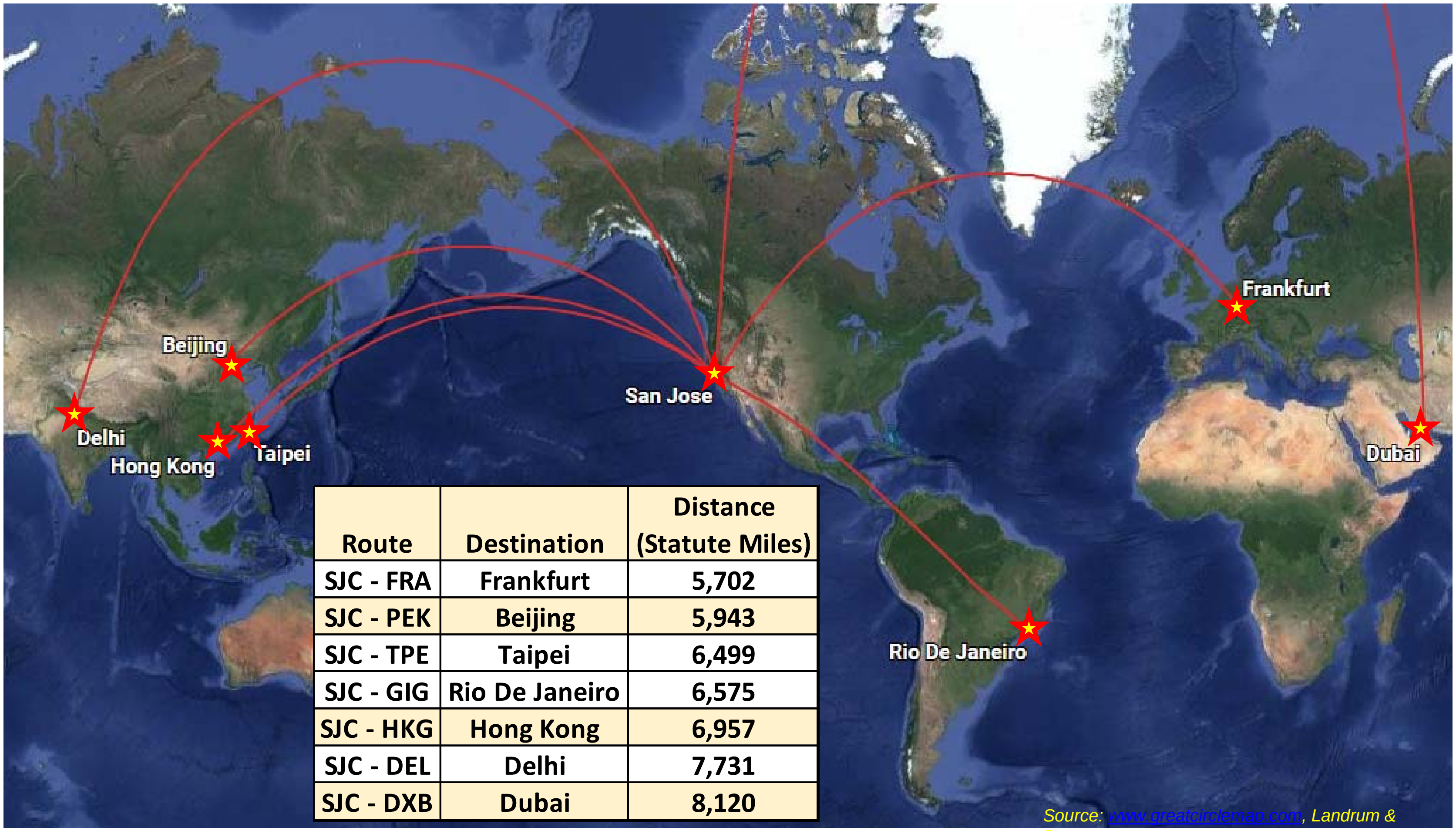
Anchorage - ANC Summer (81.3° F)		**A320 (150 seats/1,379 lbs. cargo)**		**B737-800 (175 seats/7,100 lbs. cargo)**	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-

Boston - BOS Summer (81.3° F)		**A320 (150 seats/0 lbs. cargo)**		**B737-800 (175 seats/0 lbs. cargo)**	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-

Miami - MIA Summer (81.3° F)		**A320 (150 seats/0 lbs. cargo)**		**B737-800 (175 seats/0 lbs. cargo)**	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

Note - 1 and 3 Pax penalties as being due to Max Structural Takeoff Weight limits (and not related to the obstacles or runway length.)

Weight Penalties Assessment for Additional International Markets



Route	Destination	Distance (Statute Miles)
SJC - FRA	Frankfurt	5,702
SJC - PEK	Beijing	5,943
SJC - TPE	Taipei	6,499
SJC - GIG	Rio De Janeiro	6,575
SJC - HKG	Hong Kong	6,957
SJC - DEL	Delhi	7,731
SJC - DXB	Dubai	8,120

Source: www.greatcirclemap.com, Landrum & Brown

Aircraft Evaluated: A330-200, A350-900, B777-300, B787-9

Weight Penalty Assessment
Additional International Markets

Rio de Janeiro - GIG Summer (81.3° F) 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,144

Taipei - TPE Summer (81.3° F) 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							89	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	

Hong Kong - HKG Summer (81.3° F) 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	

Delhi - DEL Summer (81.3° F) 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor							103	
TERPS Only	55	5,014	77	3,132	72	106	184	

Dubai - DXB Summer (81.3° F) 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor							107	
TERPS Only	65	3,537	79	2,688	72	1,828	191	

*Existing Straight Out OEI calculations use different cargo capacity numbers than West OEI and TERPS Only.

Economic Impact Assessment

Density Increase in the Downtown Core and Diridon Station Area

Downtown Core

- Significant density is currently available for the Downtown Core study area and will not have an aggregate impact for a long period of time.
- Although discrete development sites may still experience small gains in the Downtown Core.

Diridon Station Area

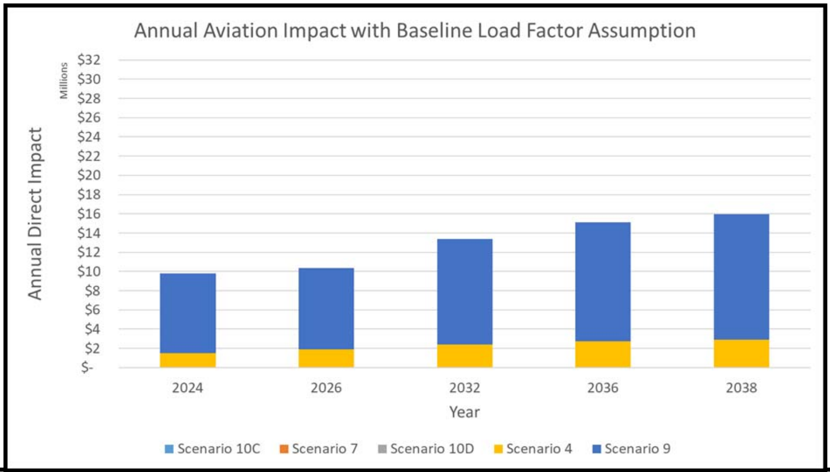
Scenario	Net New Square Feet
4: No OEI	8,600,000
7: Straight-Out OEI	8,500,000
9: No OEI, incr. height limits	10,000,000
10A: Straight-Out OEI w/ West OEI Alts.	1,100,000
10B: Straight-Out OEI w/ West OEI Alts.	3,100,000
10C: Straight-Out OEI w/ West OEI Alts.	4,900,000
10D: Straight-Out OEI w/ West OEI Alts.	6,800,000

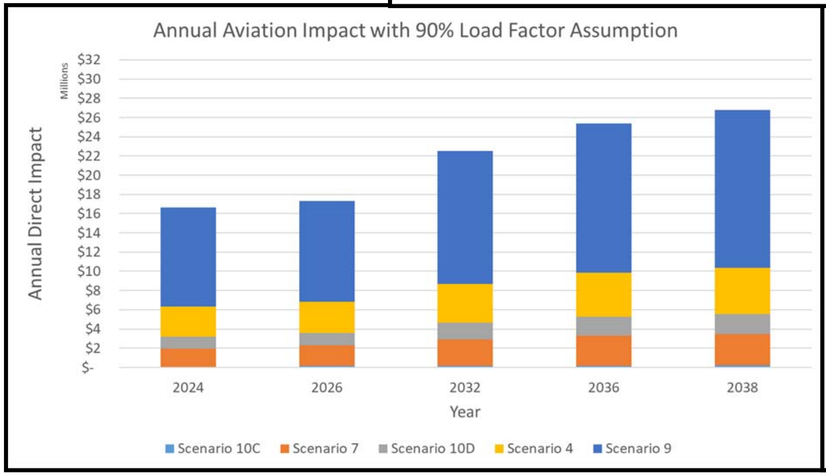
Summary Of Year 2024 Annual Direct Impacts

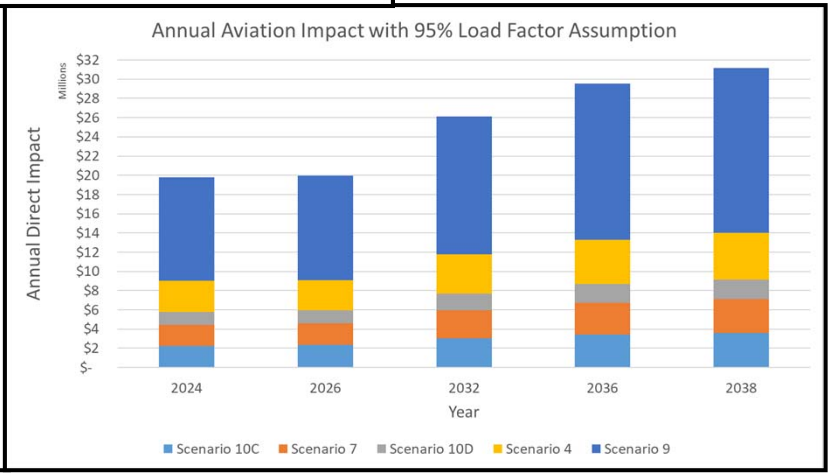
HISTORICAL LOAD FACTORS

Summary of Loses		Airline Revenue	PFC Revenue	Terminal Concession Spending (Airport Share)	Terminal Concession Spending (Concession Share)	Indirect Other Airline Impacts
Scenario 1	Existing airspace protection	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 4	TERPS Only	**$802,000**	**$10,000**	**$5,000**	**$31,000**	**$669,000**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 10	Existing Conditions: 85' - 166' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10A: 100' - 195' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10B: 115' - 224' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10C: 129' - 240' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10D: 146' - 260' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**$5,566,000**	**$57,000**	**$32,000**	**$191,000**	**$3,966,000**

Summary of 20-year Direct Impacts with Load Factor Sensitivity Test







Induced Economic Impact Assessment

Induced Economic Impact Assessment Summary

Airspace Scenario	Aviation Impact		Real Estate Impact	
	Employment	GDP Gain/Loss	Employment	GDP Gain/Loss
10A	-	-	1,000	$184,000,000
10B	-	-	2,400	$438,000,000
10C	-	-	4,300	$700,000,000
4, 7, 10D	-27	-$2,000,000	4,900	$747,000,000

Estimated City of San Jose Portion of Sales Tax

Airspace	2024		2026		2032		2036		2038	
Scenario	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate
4	$2,100	-	$2,600	-	$3,200	$110,000	$3,500	$206,800	$3,700	$253,400
7	-	-	-	-	-	$110,000	-	$206,800	-	$253,400
9	$13,700	-	$14,200	-	$17,800	$110,000	$19,600	$206,800	$20,500	$253,400
10A	-	-	-	-	-	$110,000	-	$57,700	-	$57,700
10B	-	-	-	-	-	$110,000	-	$141,100	-	$137,400
10C	-	-	-	-	-	$110,000	-	$206,800	-	$226,800
10D	-	-	-	-	-	$110,000	-	$206,800	-	$253,400

Approval of Propose Recommendation to City Council

Recommend to the City Council approval of:

1. Acceptance of a completed Downtown Airspace and Development Capacity Study, with selection of Scenario 4, which would affirm the City's development policy to use Federal Aviation Administration (FAA) Terminal Instrument Procedures (TERPS) surfaces to determine maximum building heights in the Downtown Core and Diridon Station .
2. Direction to the Administration and City Attorney's Office to explore, and report back to Council on, the feasibility of establishing a "Community Air Service Fund" to financially mitigate any adverse air service impacts that might arise from implementation of Scenario 4 of the Downtown Airspace and Development Capacity Study.
3. Direction to the Administration to consider potential refinements to the development review process for projects subject to a FAA TERPS airspace determination including:
    a. Requiring applicants to have the technical data on the FAA submittal forms be prepared by a licensed civil engineer and that the forms identify the location and elevation of the highest points of the proposed building, including any mechanical rooms, screens, antennas, or other accessory structure.
    b. Requiring applicants to also identify the location and elevation of the highest points of the proposed building and accessory extensions thereof, on their City development permit application plans, including any mechanical rooms, screens, antennas, or other accessory structure.
    c. Require that a construction survey prepared by a licensed civil engineer be submitted by applicants to the FAA upon completion of the high-point of the structure and accessory extensions thereof, prior to City issuance of an occupancy certification.
    d. Requiring a development permit amendment application for any proposed modification or addition to an existing or approved building that would create a new and/or relocated roof-top high point.
    e. Develop a construction crane policy in the Downtown Core and Diridon Station area to minimize impacts on airline service during construction.
4. Direction to the Administration to initiate amendments, as determined applicable, to the General Plan and other key policy documents to incorporate the above recommendations and conduct outreach with the downtown development community to provide information and guidance on development height restrictions.

MINETA SAN JOSE INTERNATIONAL AIRPORT

Minutes of the Special Airport Commission Meeting

MONDAY	SAN JOSE, CALIFORNIA	January 14, 2019

CALL TO ORDER

The Airport Commission of the Mineta San José International Airport (SJC) met for a special session on Monday, January 14, 2019, at 5:00 p.m. in the Beechcraft Conference Room at 1701 Airport Boulevard, Suite B1130, San Jose, CA 95110.

ATTENDEES

COMMISSIONERS

Dan Connolly, Chair	- Present
Joe Head, Vice-Chair	- Present at 5:24
Julie Matsushima	- Present
Thomas Cruz	- Absent (Unexcused)
Raymond Greenlee	- Present
Ron Blake	- Present
Catherine Hendrix	- Present
Ken Pyle	- Present
Mark Schmidt	- Absent (Unexcused)
Allison Stember	- Present

AIRPORT STAFF PRESENT

John Aitken
Judy Ross
Bob Lockhart
Mark Kiehl
Rosemary Barnes
Scott Wintner
Janelle Adams
Curt Eikerman

COMMISSION SECRETARY/ MANAGER OF STRATEGY & POLICY

Matthew Kazmierczak - Present

COUNCIL LIAISON

Raul Peralez - Absent
Mindy Nguyen -Present

1. CALL TO ORDER & ORDERS OF THE DAY

The meeting was called to order at 6:00 p.m. with seven Commissioners in attendance and three absent. ***Absent Commissioners: Cruz, Schmidt, Head (5:24pm)***

2. PUBLIC RECORD

None.

3. PUBLIC COMMENT

Jennifer Tasseff and Robert Holbrook spoke on Item 4b.

4. GENERAL BUSINESS

a. Update on the Airline-Airport Lease

Airport Director, John Aitken provided an update on the key changes to the upcoming airline lease.

b. Special Report on the One Engine Inoperative (OEI)

John Aitken presented a PowerPoint on the current challenges on the OEI study and different scenarios and obstacles the airlines could face. The presentation included the responses from airlines and their evaluation of each scenario. Commissioners responded to the report and shared their opinions.

5. ADJOURNMENT

An additional special meeting will be held on Thursday, January 24, 2019 at 6:00pm, allowing Commissioners time to review the material and take action on the OEI study. Meeting was adjourned 6:56 pm.

ATTEST:

Dan Connolly
Chairperson

Matthew Kazmierczak
Commission Secretary

Appendix G – Special Airport Commission Meeting (January 24, 2019)

Appendix G consists of background information presented at the Airport Commission Meeting on January 24, 2019.

Note: Please refer to Appendix F to view the materials presented at the January 14, 2019 Special Airport Commission meeting.

City of San José
Airport Commission

District 1— Ken Pyle
District 3— Julie Riera Matsushima
District 5— E. Ronald Blake
District 7— Allison Stember
District 9— Catherine Hendrix
Citywide— Joe Head (Vice-Chair)

Thomas Cruz —District 2
Mark Schmidt —District 4
Raymond Greenlee —District 6
Vacant —District 8
Dan Connolly (Chair) —District 10

SPECIAL MEETING AGENDA

6:00 p.m.

January 24, 2019

Boeing/McDonnellConference Room
Airport Administration Offices
Mineta San José International Airport
1701 Airport Boulevard, Suite B-1130

I. Call to Order & Orders of the Day

NOTICE OF PARTICIPATION OF COMMISSION MEMBER BY TELEPHONE FOR THIS AIRPORT COMMISSION MEETING

Commission Member Catherine Hendrix intends to participate via telephone from the following location:

Tillamook County Library
1716 3rd Street
Tillamook, OR 97141

II. Public Record

None

III. Public Comment *(Members of the Public are invited to speak on any item that does not appear on today's Agenda and that is within the subject matter jurisdiction of the Commission. Meeting attendees are usually given two (2) minutes to speak on any discussion item and/or during open forum; the time limit is in the discretion of the Chair of the meeting and may be limited when appropriate. Speakers using a translator will be given twice the time allotted to ensure non-English speakers receive the same opportunity to directly address the Committee, Board or Commission.)*

IV. General Business – For Discussion and Action

A. One Engine Inoperative (OEI) study
Recommendation: Approve staff recommendation outlined in the 1/10/2019 memo to the Airport Commission from Director Aitken.

V. Adjournment

The City of San José is committed to open and honest government and strives to consistently meet the community's expectations by providing excellent service, in a positive and timely manner, and in the full view of the public.

You may speak to the Commission about any discussion item that is on the agenda, and you may also speak during Public Comments on items that are not on the agenda and are within the subject matter jurisdiction of the Commission. Please be advised that, by law, the Commission is unable to discuss or take action on issues presented during Public Comments. Pursuant to Government Code Section 54954.2, no matter shall be acted upon by the Commission unless listed on the agenda, which has been posted not less than 72 hours prior to meeting.

Agendas, Staff Reports, and some associated documents for the Commission items may be viewed on the Internet at http://flysanjose.com/airport-commission.

All public records relating to an open session item on this agenda, which are not exempt from disclosure pursuant to the California Public Records Act, that are distributed to a majority of the legislative body will be available for public inspection at the office and address listed below, at the same time that the public records are distributed or made available to the legislative body. Any draft resolutions or other items posted on the Internet site or distributed in advance of the commission meeting may not be the final documents approved by the commission. Contact the person listed below for the final document.

On occasion the Commission may consider agenda items out of order.

The Airport Commission meets the second Monday of one calendar month each quarter at 6:00 p.m., with special meetings as necessary. If you have any questions, please direct them to the Commission staff. Thank you for taking the time to attend today's meeting. We look forward to seeing you at future meetings.

To request an accommodation or alternative format under the Americans with Disabilities Act for City-sponsored meetings, events or printed materials, please call (408) 535-1260 as soon as possible, but at least three business days before the meeting.

Please direct correspondence and questions to:

City of San José
Attn: Matthew Kazmierczak
1701 Airport Boulevard – Suite B-1130
San José, California 95110
Tel: (408) 392-3640
Email: mkazmierczak@sjc.org

MINETA SAN JOSE INTERNATIONAL AIRPORT

Minutes of the Special Airport Commission Meeting

MONDAY	SAN JOSE, CALIFORNIA	January 24, 2019

CALL TO ORDER

The Airport Commission of the Mineta San José International Airport (SJC) met for a special session on Thursday, January 24, 2019, at 6:00 p.m. in the Boeing/McDonnell Douglas Conference Rooms at 1701 Airport Boulevard, Suite B1130, San Jose, CA 95110.

ATTENDEES

COMMISSIONERS

Dan Connolly, Chair	- Present
Joe Head, Vice-Chair	- Present 6:00-8:02pm
Julie Matsushima	- Present
Thomas Cruz	- Present at 6:07pm
Raymond Greenlee	- Present
Ron Blake	- Absent (Excused)
Catherine Hendrix	- Present via telephone
Ken Pyle	- Present
Mark Schmidt	- Present at 7:46pm
Allison Stember	- Present

AIRPORT STAFF PRESENT

Judy Ross
Bob Lockhart
Ryan Sheelen
Mark Kiehl
Rosemary Barnes
Scott Wintner
Janelle Adams
Curt Eikerman
Cary Greene

COMMISSION SECRETARY/ MANAGER OF STRATEGY & POLICY

Matthew Kazmierczak - Present

COUNCIL LIAISON

Raul Peralez - Absent

1. CALL TO ORDER & ORDERS OF THE DAY

The meeting was called to order at 6:00 p.m. with seven Commissioners in attendance and three absent. ***Absent Commissioners: Cruz (6:07), Schmidt (7:46), Blake (excused)***

2. PUBLIC RECORD

The Sunnyvale/Cupertino Airplane Noise Group provided a statement via email.

Document Filed: Public Record 1/24/19

3. PUBLIC COMMENT

Walter Windus, Santa Clara County Land Use Commission, spoke regarding OEI.

4. GENERAL BUSINESS

a. One Engine Inoperative (OEI) Study

Commissioners had the opportunity to ask questions and discuss the Airport's City Council Memo. Chair Connolly presented a document on behalf of four Commissioners outlining their suggestions.

Document Filed: Recommendation from Select Commissioners

Action: Upon motion by Commissioner Greenlee, seconded by Commissioner Cruz, the motion to end discussion on the motion to approve scenario 4 passed, 7-0-1, 2 absent.

Action: Upon motion by Commissioner Greenlee, seconded by Commissioner Matsushima, the motion to approve scenario 4 to CED and City Council supporting staff recommendation fails, 3 aye (Stember, Matsushima, Head)- 0 abstain- 5 nay (Connolly, Cruz, Greenlee, Hendrix, Pyle), 2 absent.

Action: Upon motion by Commissioner Greenlee, seconded by Commissioner Schmidt, the motion to end discussion on the motion to recommend scenario 10b to the City Council and adopt the recommendation by four commissioners passed, 9-0-0, 1 absent.

Action: Upon motion by Commissioner Greenlee, seconded by Commissioner Cruz, the motion to recommend scenario 10b to City Council and adopt the recommendation by four commissioners passed, 5 aye (Connolly, Cruz, Greenlee, Hendrix, Pyle) 1 abstention (Schmidt) -3 nay (Stember, Matsushima, Head), 1 absent.

Action: Upon motion by Commissioner Greenlee, seconded by Commissioner Hendrix, the motion to authorize Commission Chair Connolly to present scenario 10b to CED and City Council passes, 6 aye (Connolly, Cruz, Greenlee, Hendrix, Pyle, Schmidt) 0 abstain -3 nay (Stember, Matsushima, Head), 1 absent.

5. ADJOURNMENT

The next scheduled meeting will be on Monday, February 11, 2019 at 6:00pm. Meeting was adjourned 8:06 pm.

ATTEST:

Dan Connolly
Chairperson

Matthew Kazmierczak
Commission Secretary

Appendix G

Public Comments Submitted for the Airport Commission Meeting on January 24, 2019

Note: Please refer to Appendix C and D for all public comments submitted to the City Council Meeting on February 26, 2019 and March 12, 2019. The public comments presented in Appendix G only reflect new comments that were presented in the January 24, 2019 Airport Commission Meeting.

To: San Jose Airport Commissioners

From: The Sunnyvale-Cupertino Airplane Noise Group

Date: Jan 24, 2019

RE: Special Meeting Jan 24, 2019

Comment regarding Agenda Item IV
One Engine Inoperative (OEI) study & the corresponding recommendation as outlined in the 1/10/2019 memo to the Airport Commission from Director Aitken

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Below is a statement from the Sunnyvale-Cupertino Airplane Noise Group.

Our group understands that San Jose recently commissioned a study to determine the feasibility of taller building heights in the downtown San Jose and Diridon areas. This study focused on departing flights only, and did not consider any impact on arrivals. As you know, normal flow arrivals fly directly over downtown San Jose, and these arrivals are partly impacted by the current building heights. Decisions regarding building heights will have repercussions for decades to come, and these important decisions should not be based on a clearly incomplete study that is missing a major piece of analysis. Without a proper study regarding the arrival flight paths, it is unclear whether the frequency of SJC normal flow or south flow operations (reverse flow) will be impacted in any way, and any unintended impact could have major consequences to the airport and surrounding communities.

San Jose Airport typically operates under normal flow operations, where arrivals are flying over downtown San Jose. In contrast, when the wind direction changes to South or East and the wind speed is greater than 5 knots, the direction of operation changes to south flow operations (often called reverse flow). An increase in south flow operations would not only impact the quality of life for your neighbors in Sunnyvale, Cupertino, Mountain View, and Palo Alto - An unintentional increase in south flow operations would have a detrimental impact to airline profitability, airport operations, and FAA safety. Yet an analysis of SJC arrivals was never conducted regarding increased building heights. Normal flow is the preferred path for safety reasons, airline financial benefits, and efficiency. For this reason, a study regarding SJC arrivals and any impact on south flow operations is warranted, and is in the airport's best interest.

Based on an FAA meeting in March 2017 at Congressman Ro Khanna's office, we already know that the south flow trigger is impacted partly due to the existing tall buildings in downtown San Jose. An excerpt from that meeting "*San Jose's runway is too short. Part of the reason that it is too short is the buildings in downtown which make a piece of that end of the runway unusable (planes can't drop down until they are past those buildings).*" It is unclear whether the proposed taller building envelope will have a downward pressure on the current south flow trigger, causing an increase in south flow operations over Sunnyvale and Cupertino – Potentially exacerbating an already contentious airplane noise situation.

We request that any San Jose or Commission vote that would ultimately result in taller buildings in downtown and the Diridon area be temporarily postponed until a supplemental aviation study is commissioned by San Jose, and the FAA is consulted to confirm any potential impact to the SJC south flow trigger. It is possible that the proposed building height changes will have no impact on the trigger. However, this assumption should be confirmed in writing by the FAA and an aviation expert prior to any approval.

To summarize, any San Jose approvals should be delayed until the FAA and an experienced aviation consultant have completed a supplemental report confirming no impact to arrivals and the current south flow trigger (Current trigger > 5 knots south/east wind speed). The current aviation study is incomplete, and further analysis of the arrival flight path over downtown San Jose needs to be completed in order to make a fully informed, proper decision regarding building heights.

Thank you for your help regarding this matter.

Sincerely,

Tony Guan
guanxiaohua@gmail.com
(408)357-0816

Jennifer Tasseff
Jtsunnyvale1@yahoo.com
(408)737-8258

And members of the Sunnyvale-Cupertino Airplane Noise Group
Over 500 members strong

Below is supplemental information and diagrams that were compiled by the Sunnyvale-Cupertino Airplane Noise Group, and which may be helpful in understanding the issue.
[Continued]

Appendix H – Stakeholder Meeting Presentations

Appendix H consists of various presentations that were presented to the local business community and arranged by SVO, SPUR and the San José Downtown Association.

SILICON VALLEY'S AIRPORT

SJC

Downtown Airspace and Development Capacity Study

September 13, 2018 Stakeholders Meeting

The Challenge

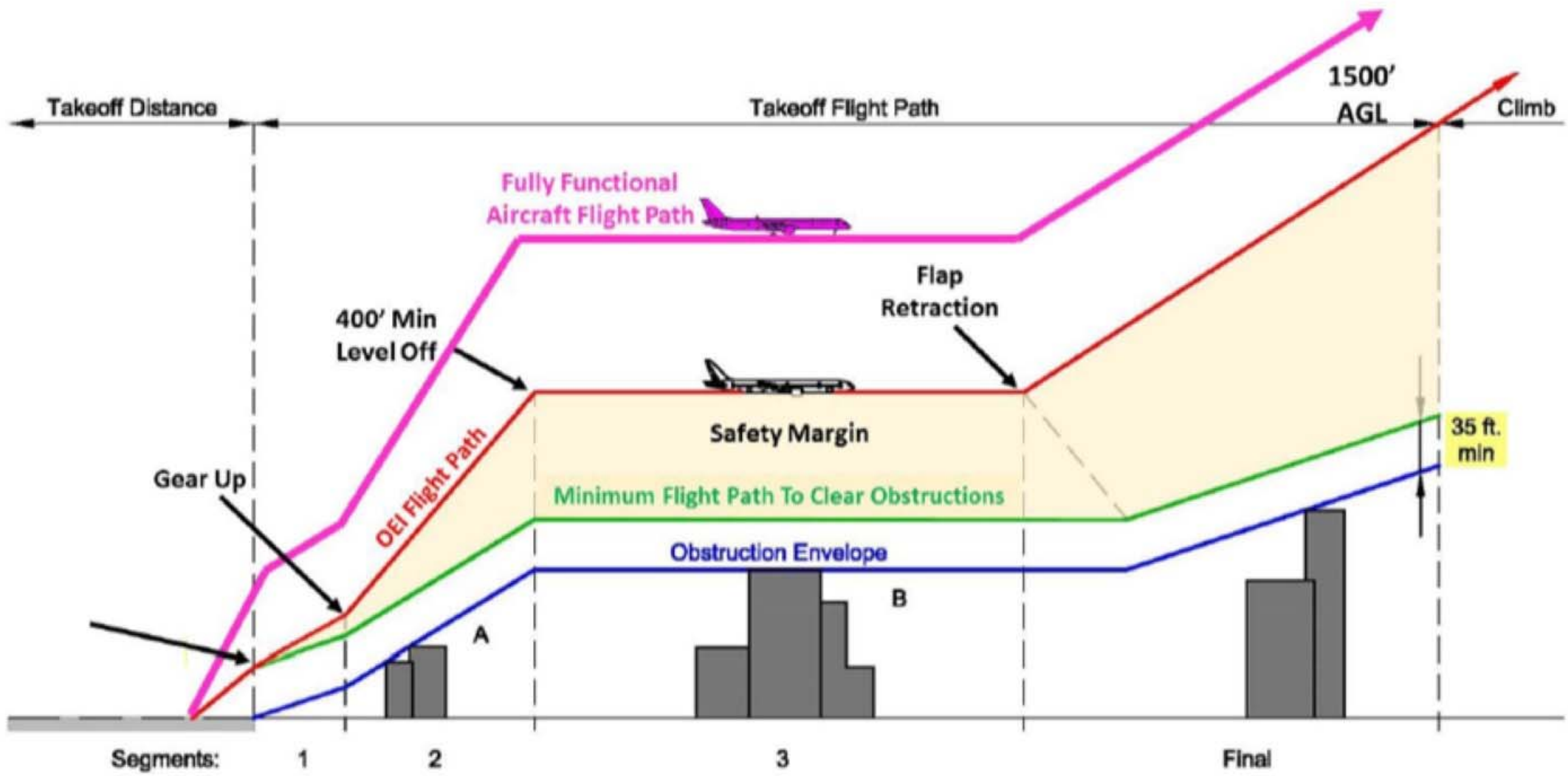
- Downtown and Airport are two of San Jose's economic priorities
- FAA protection of airspace invisible "surfaces" (via "FAR Part 77" and "TERPs")
- FAR Part 77 and TERPs do not consider specific airline emergency procedures known as one-engine inoperative (OEI)
- OEI study last conducted in 2008, establishing straight out and west corridor OEI protections

Airspace Surfaces

- OEI Surfaces – Runway 12L/12R
  - FAA AC 120-91 Obstacle Accountability Area
  - ICAO OEI Surface
  - West OEI Corridor
- Initial TERPS Surfaces – Runways 12L/12R
  - TERPS Initial Climb Area Departure Surface
  - TERPS ILS Final and Missed Approach Surfaces
- Part 77 Approach, Transitional and Horizontal Surfaces

Study Evaluation Area

What is One Engine Inoperative



Airline Response to Obstacles

- Request another runway (wind, weather, air traffic permitting)
- Off-load passengers and/or cargo (weight penalty)
- Make a refueling stop
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Landrum and Brown and Jones, Lang, and LaSalle

Collaborative Process

I. FACTS

Existing Conditions Assessment and Urban Airport Case Studies

- ✓ Gather
- ✓ Share
- ✓ Agree

II. "*WHAT IF*" SCENARIOS

Potential Increased Height

a) What if?

b) What if?

c) What if?

d) Current Situation

III. TRADE-OFFS Impacts

(of each scenario)

Benefits/Costs

- Buildings
- Airlines
- City/Downtown
- Airport
- Regional Economy

Risks/Uncertainties

Evaluation Framework

IV. POTENTIAL SOLUTIONS

- ✓ Case Studies
- ✓ Brainstorm Solutions
  - Short-term
  - Long-term

V. INFORMED RECOMMENDATION

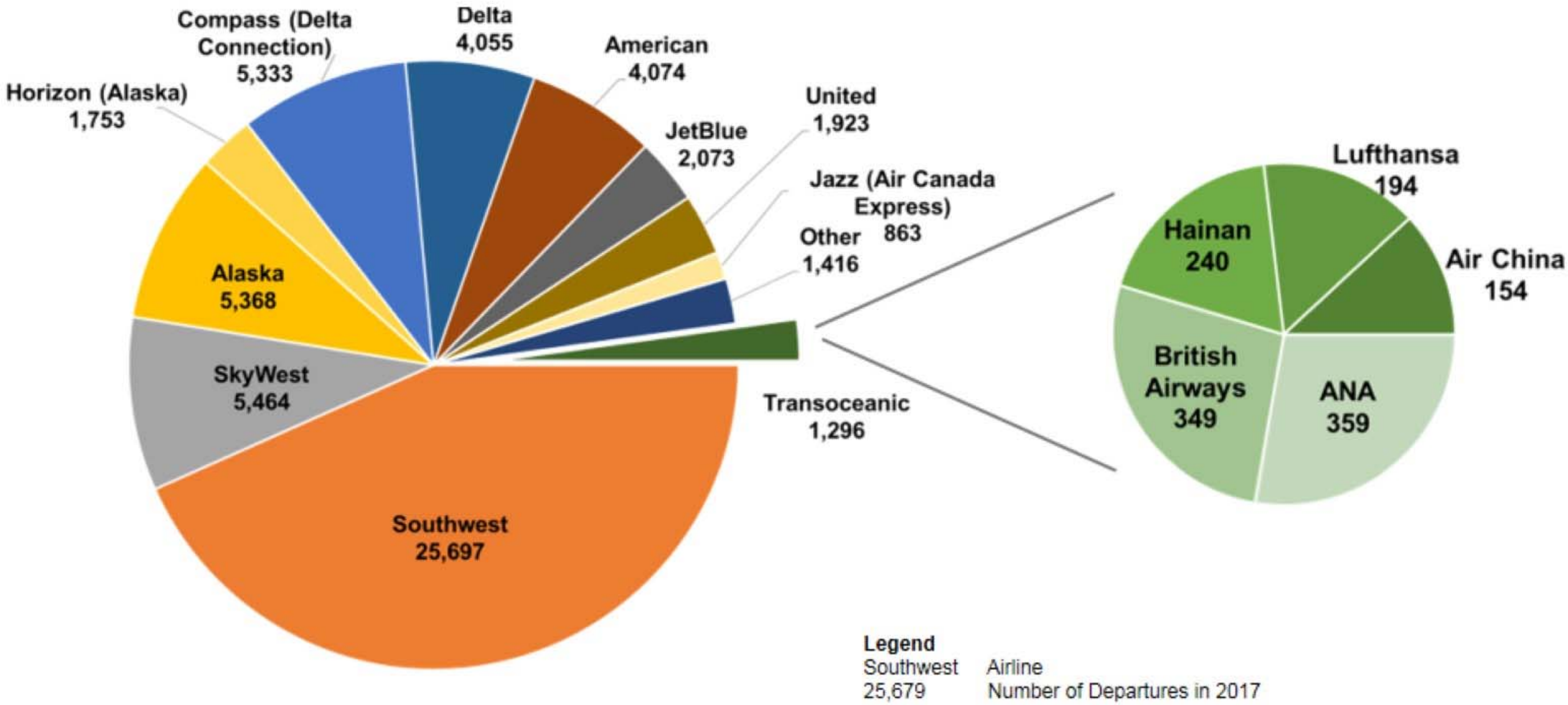
- ✓ Agreement, or
- ✓ Alternatives
- ✓ Council Recommendation and Action

STAKEHOLDER CONVERSATIONS * * * *

Progress to Date

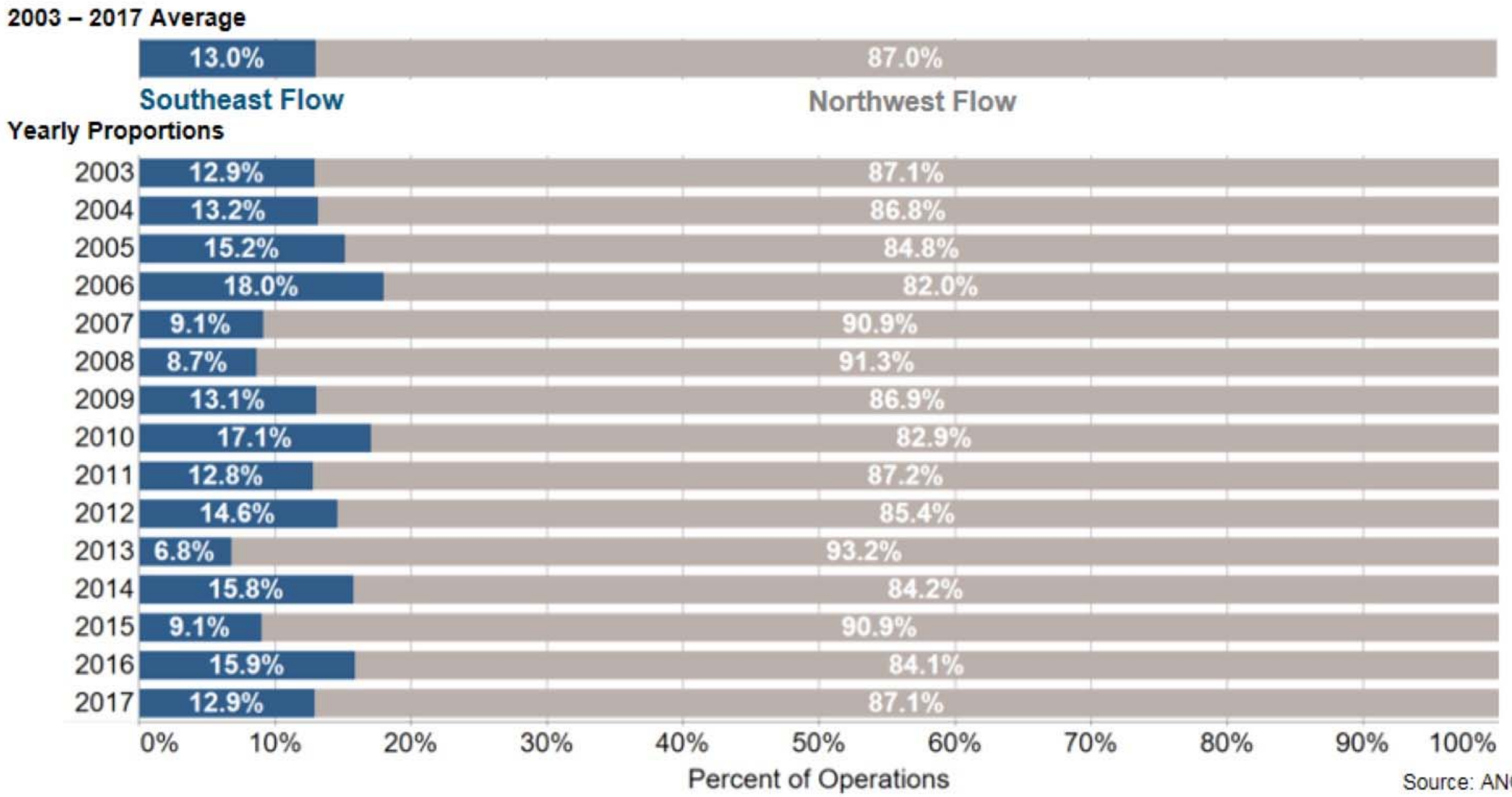
Airline Market Share – passenger

Passenger airline market share in 2017



Source: ANOMS

Yearly Operations by Flow



Source: ANOMS

“What If” Scenario Assessment

Airspace Protection Scenarios

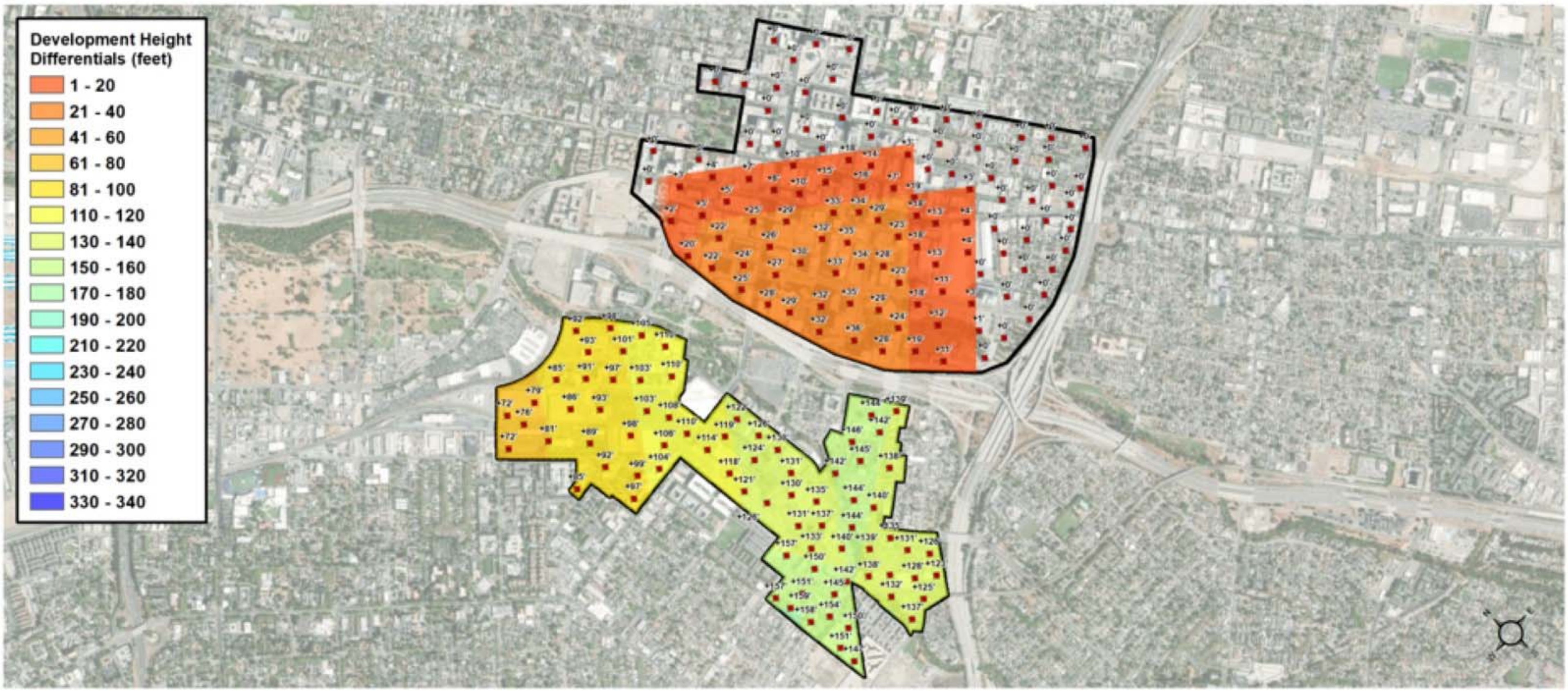
Four Airspace Scenarios

- **Scenario 4**: No OEI protection, TERPS only
- **Scenario 7**: Straight-out OEI protection only
- **Scenario 10**: Straight-out OEI with West OEI Corridor alternatives
- **Scenario 9**: No OEI, increased FAA height limits

Selected Aircrafts

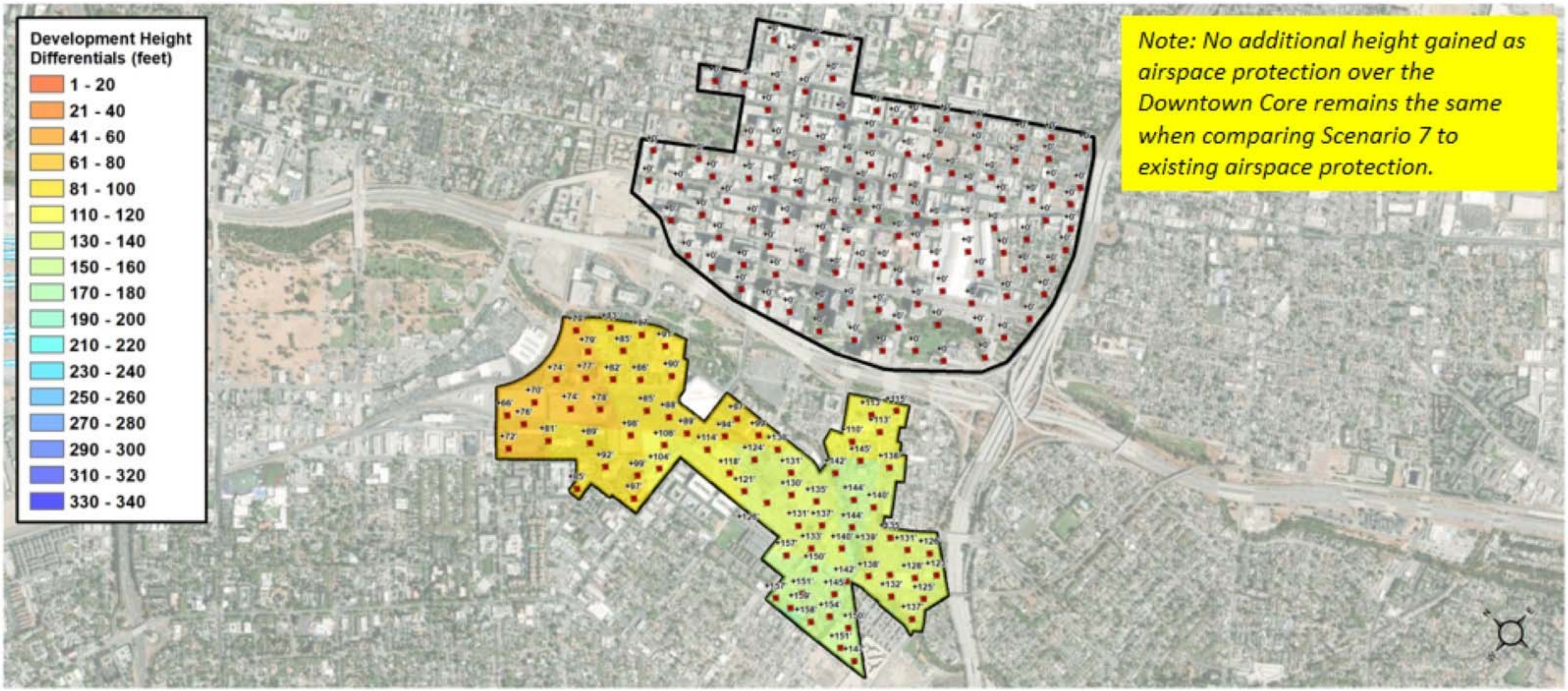
- Boeing 373-800
- Airbus 320-200
- Boeing 787-9
- Boeing 777-300ER

Scenario 4 – NO OEI – TERPS Only



Differential height increases represent the additional developable heights as compared to existing airspace protection.

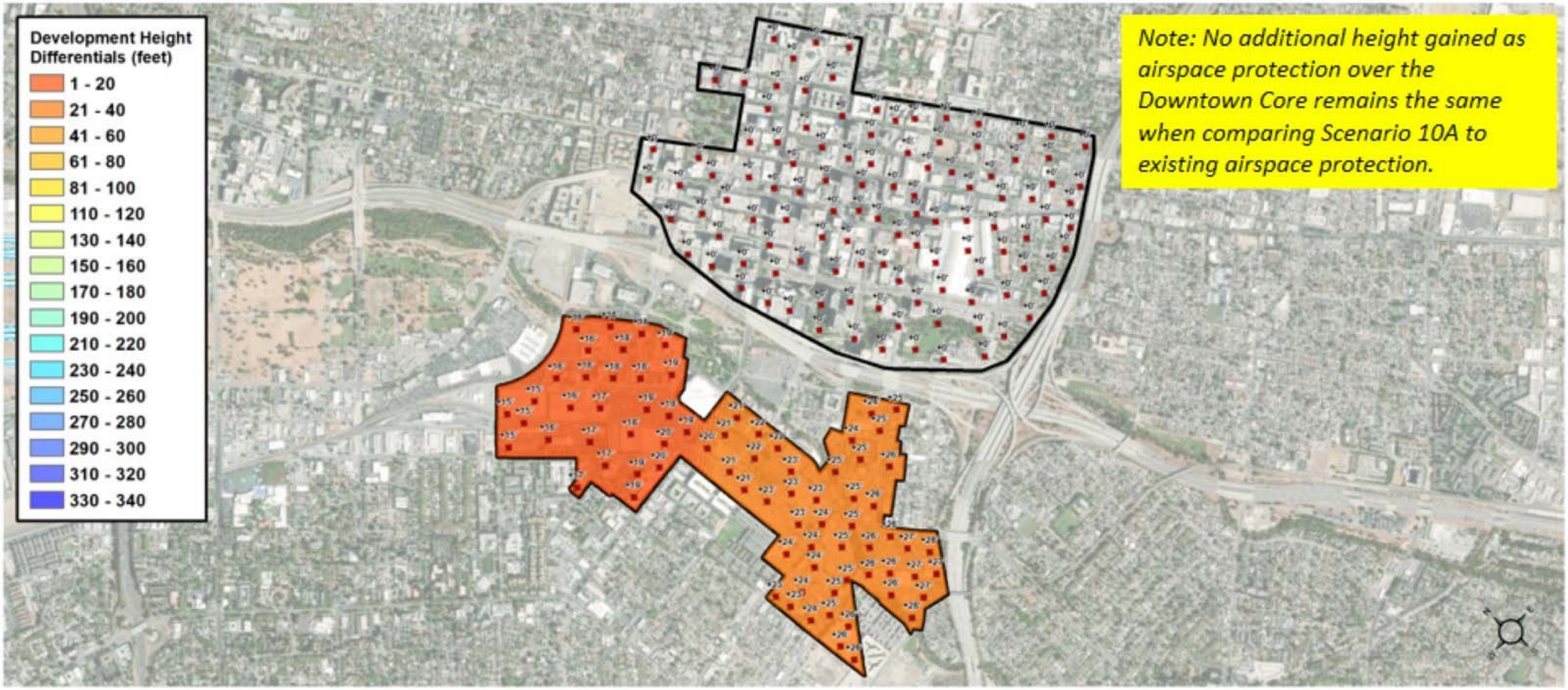
Scenario 7 - Straight-out OEI



Scenario 10A – Straight-out OEI

West Corridor Alternatives

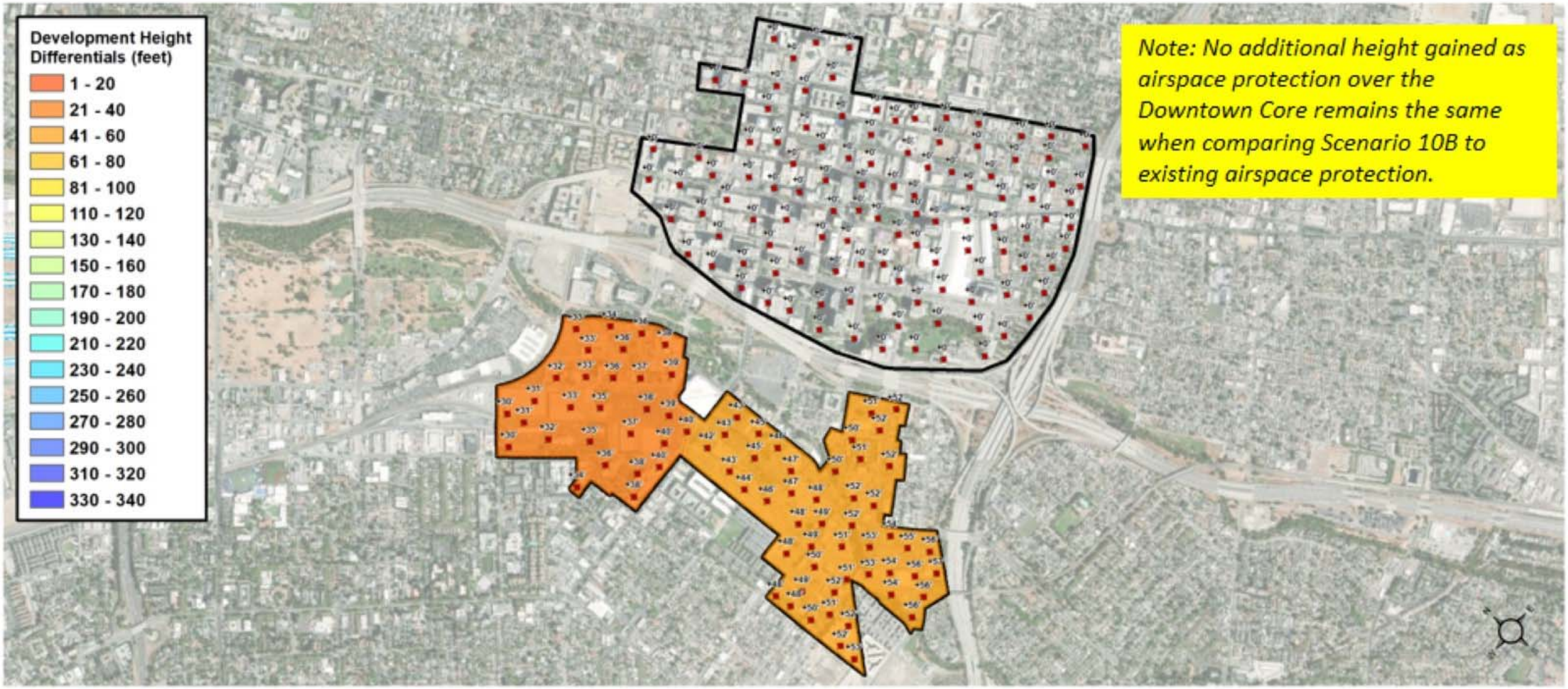
100' to 195' AGL (53.3:1 surface slope)



SCENARIO 10B – Straight-Out OEI

West Corridor Alternatives

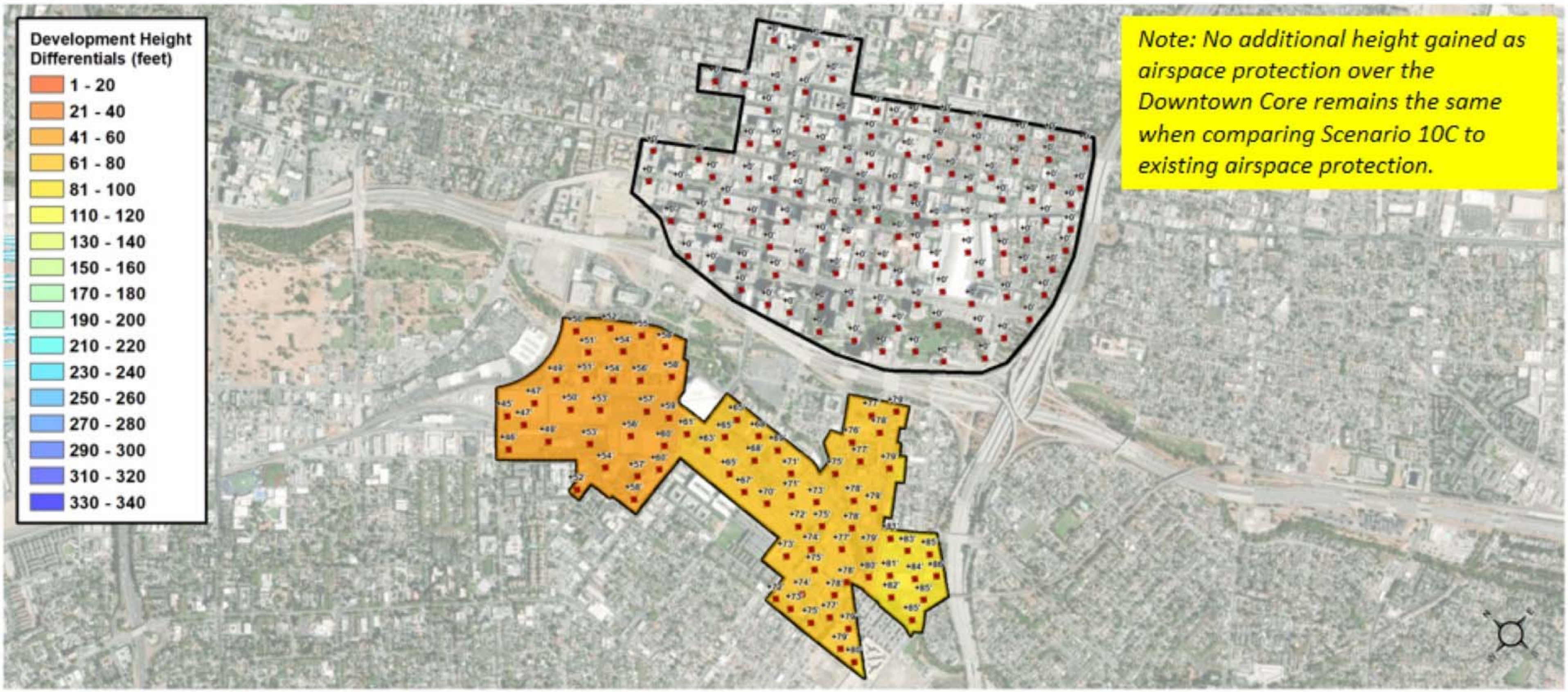
115' to 224' AGL (47.5:1 surface slope)



Scenario 10C – Straight-Out OEI

West Corridor Alternatives

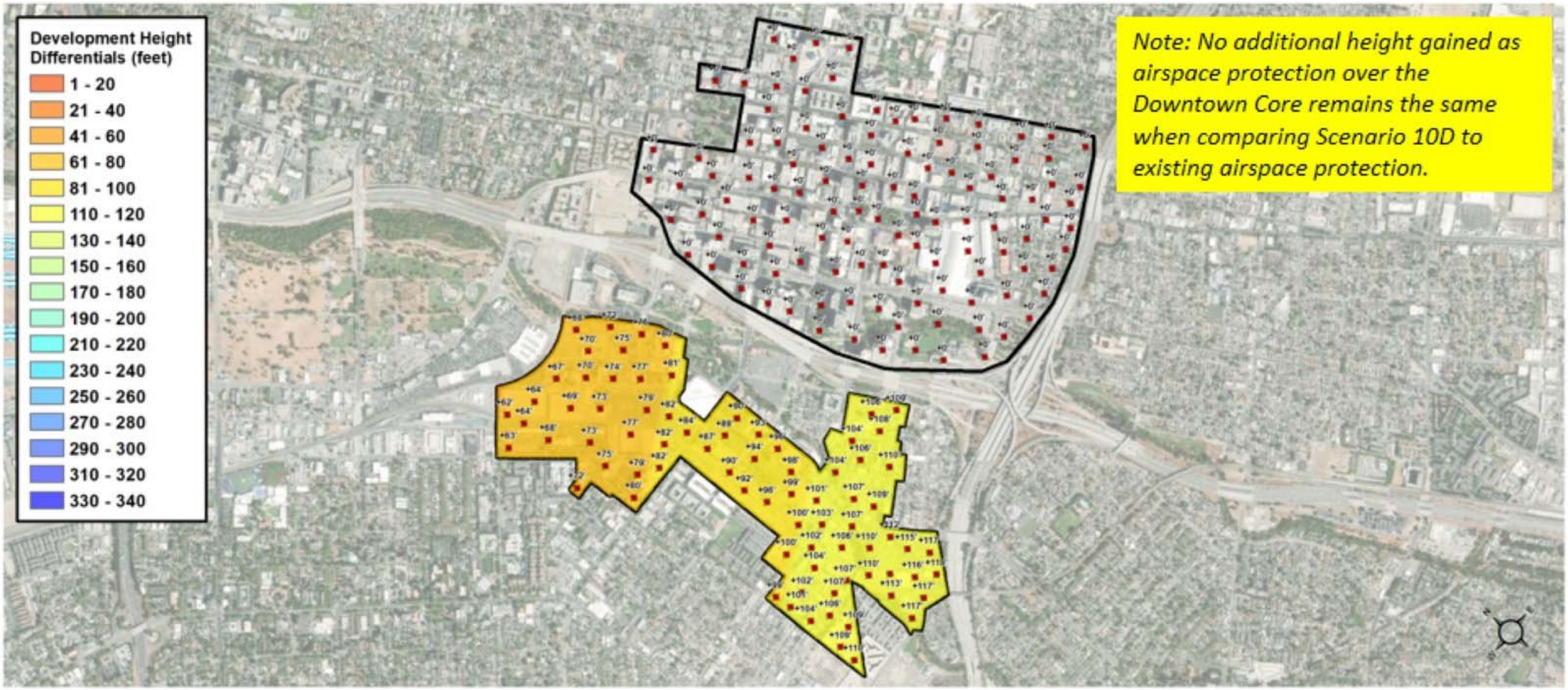
129’ to 240’ AGL (42.8:1 surface slope)



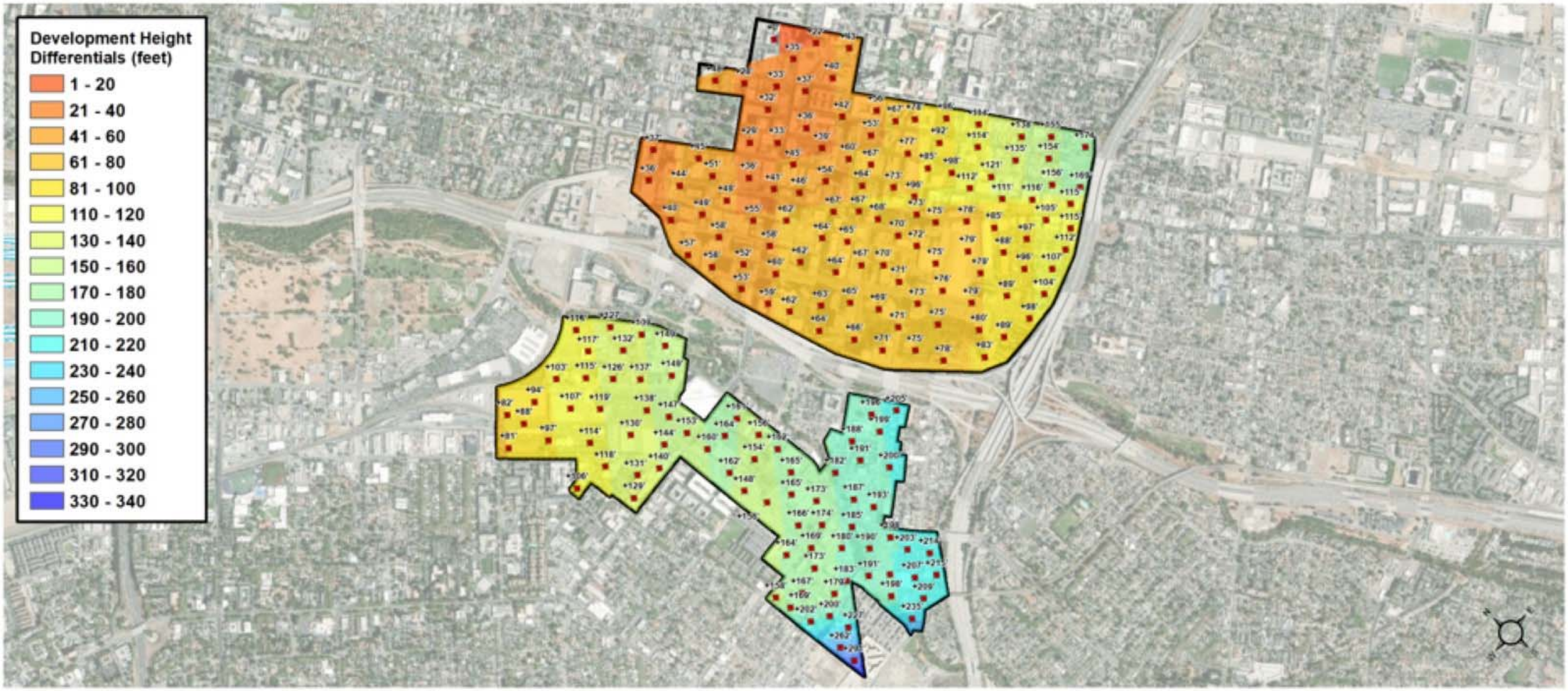
SCENARIO 10D – Straight-Out OEI

West Corridor Alternatives

146' to 260' AGL (38.5:1 surface slope)



Scenario 9 – NO OEI
Increased FAA Height Limits



AIRCRAFT PERFORMANCE
CITY PAIR ASSESSMENT

Aircraft Performance Assumptions City Pair Assessment

AIRCRAFT FLEET EVALUATION

Aircraft	Engine	Maximum Takeoff Weight (MTOW) (lbs.)	Seats
A320-200	CFM56-5B4	171,960	150
B737-800	CFM56-7B26	174,200	175
B787-9	GENX-1B74-7	560,000	290
B777-300ER	GE90-115BL	775,000	370

SEASONAL TEMPERATURES

Aircraft Type	Temperature (°F)	Notes
Winter		
A320-200 & B737-800	63°F	Early morning and evening departures
B787-9 & B777-300ER	68°F	Morning and afternoon departures
Summer		
A320-200 & B737-800	81.3°F	Boeing 85% reliability temperature
B787-9 & B777-300ER	81.3°F	Boeing 85% reliability temperature

CITY PAIR ASSESSMENT

Origin	Destination	Distance (Statue Miles)
	Domestic	
SJC	JFK	2,569
SJC	HNL	2,417
	International	
SJC	FRA	5,703
SJC	PEK	5,942

JFK: John F. Kennedy International Airport (New York)
HNL: Honolulu International Airport (Hawaii)
FRA: Frankfurt International Airport (Germany)
PEK: Beijing International Airport (China)

Transcontinental Weight Penalty Assessment

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Hawaii Weight Penalty Assessment

Hawaii - HNL Winter (63° F)		A320-200 (124 seats[1]/No Cargo)		B737-800 (173 seats[2]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	14	-	3	-

Hawaii - HNL Summer (81.3° F)		A320-200 (150 seats/No Cargo)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	8	-	-	-
Scenario 4	TERPS Only	25	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	16	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	8	-	-	-
	Opt 10A: 100' - 195' AGL	8	-	-	-
	Opt 10B: 115' - 224' AGL	8	-	-	-
	Opt 10C: 129' - 240' AGL	9	-	-	-
	Opt 10D: 146' - 260' AGL	18	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	36	-	1	1,599

1. HNL is fuel capacity limited in Feb because of winter winds to 124 PAX and no cargo (i.e., not a takeoff weight limitation).

2. HNL is fuel capacity limited in Feb to 173 PAX a no cargo (i.e., not a takeoff weight limitation).

Asia Weight Penalty Assessment

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

Europe Weight Penalty Assessment

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	21,580	-	4,400
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	15,338	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	10,000	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	9,349	-	-
	Opt 10C: 129' - 240' AGL	-	14,096	-	-
	Opt 10D: 146' - 260' AGL	-	19,282	-	2,027
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	29	26,198	-	11,735

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	2	22,911	-	7,811
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	16,407	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,217	-	-
	Opt 10B: 115' - 224' AGL	-	9,353	-	-
	Opt 10C: 129' - 240' AGL	-	14,270	-	-
	Opt 10D: 146' - 260' AGL	-	19,612	-	3,876
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	41	23,514	-	15,397

AIRLINE AIRCRAFT PERFORMANCE ASSESSMENT

Airline Responses

The following airlines participated in the aircraft performance assessment for the various airspace scenarios presented:

- Southwest Airlines
- Alaska Airlines
- American Airlines
- British Airways
- Hainan Airways

Airline Responses

Alaska, American and Southwest

- No penalties in any scenario for Alaska and American
- Very high temperatures (91.4 F – 96.8F) before any payload penalties for Southwest

British Airways

- Scenarios 4 and 7 have no impact to current operations
- Scenario 9 has greatest payload impact on both runways

Hainan Airways

- Payload penalties in Scenario 4 (Only Analyzed)
- Currently using the west corridor with no penalties

Next Steps

- City Council Committee update – September 24
- Complete Case Studies
  - Miami International Airport (MIA)
  - Washington Reagan National Airport (DCA)
  - Las Vegas McCarran International Airport (LAS)
- Meet with Remaining Airlines
- Economic Impact Analysis
- Potential Solutions
- Informed Recommendation to City Council

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January 16, 2019

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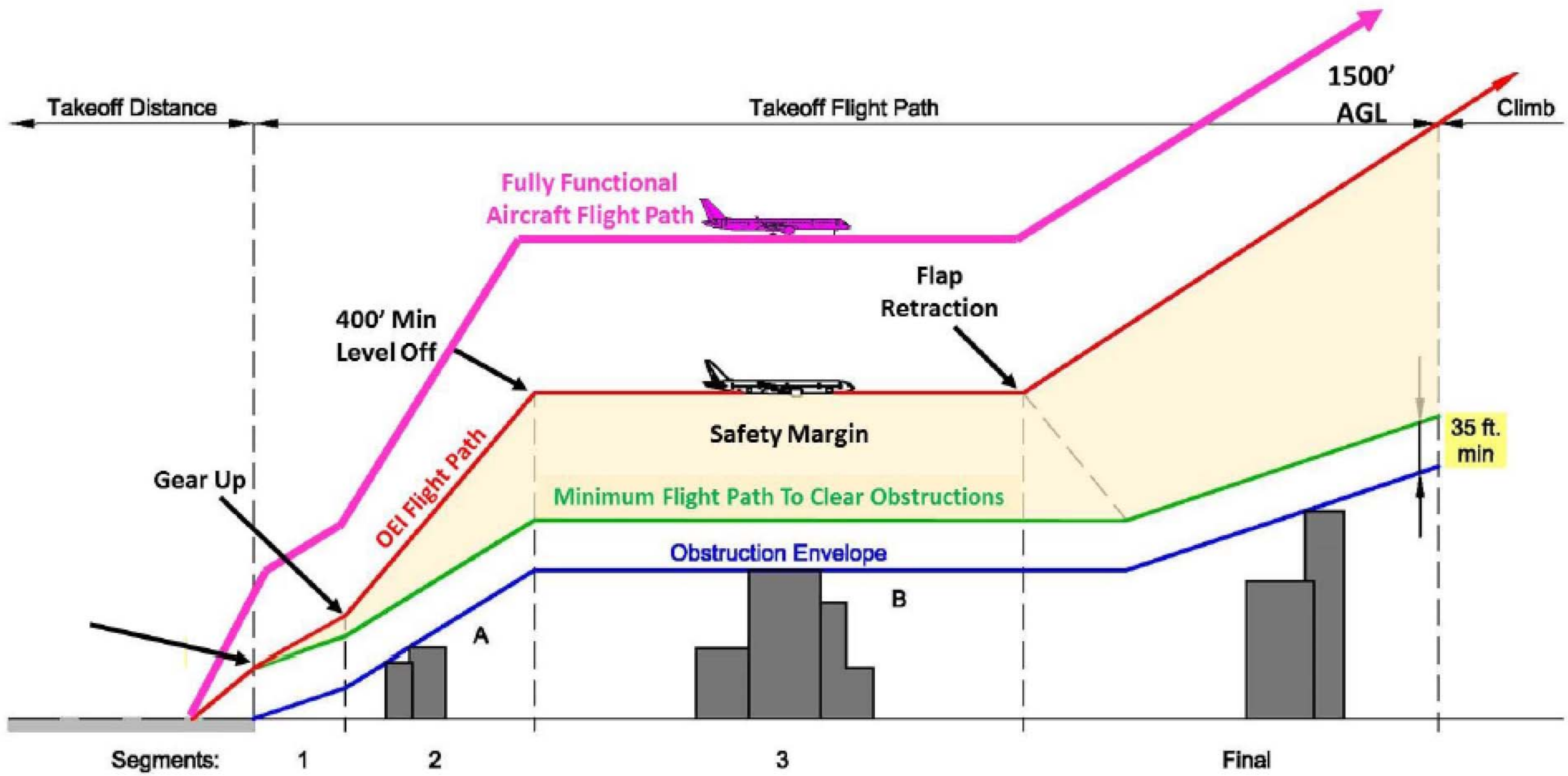

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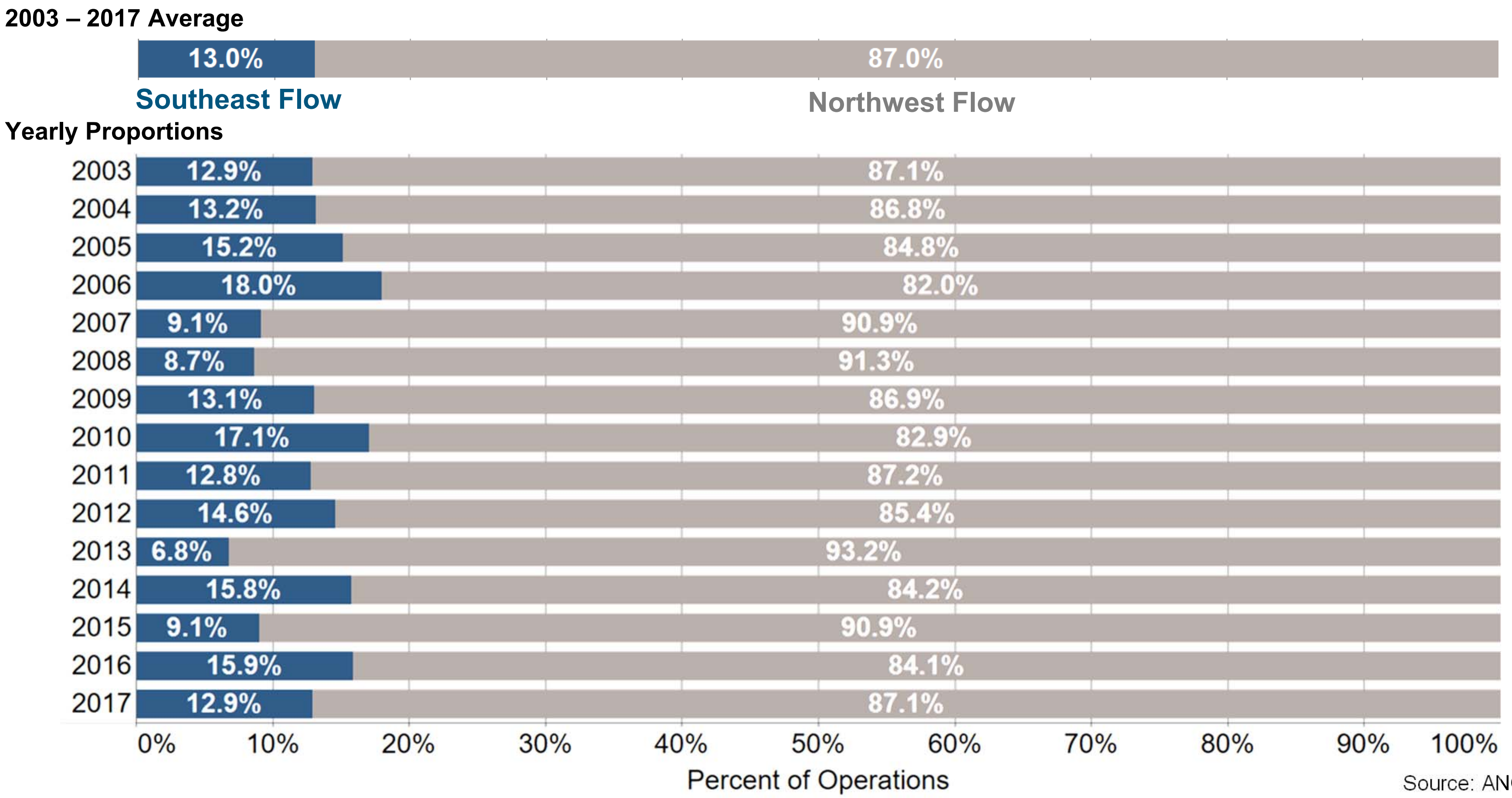

Source: ANOMS

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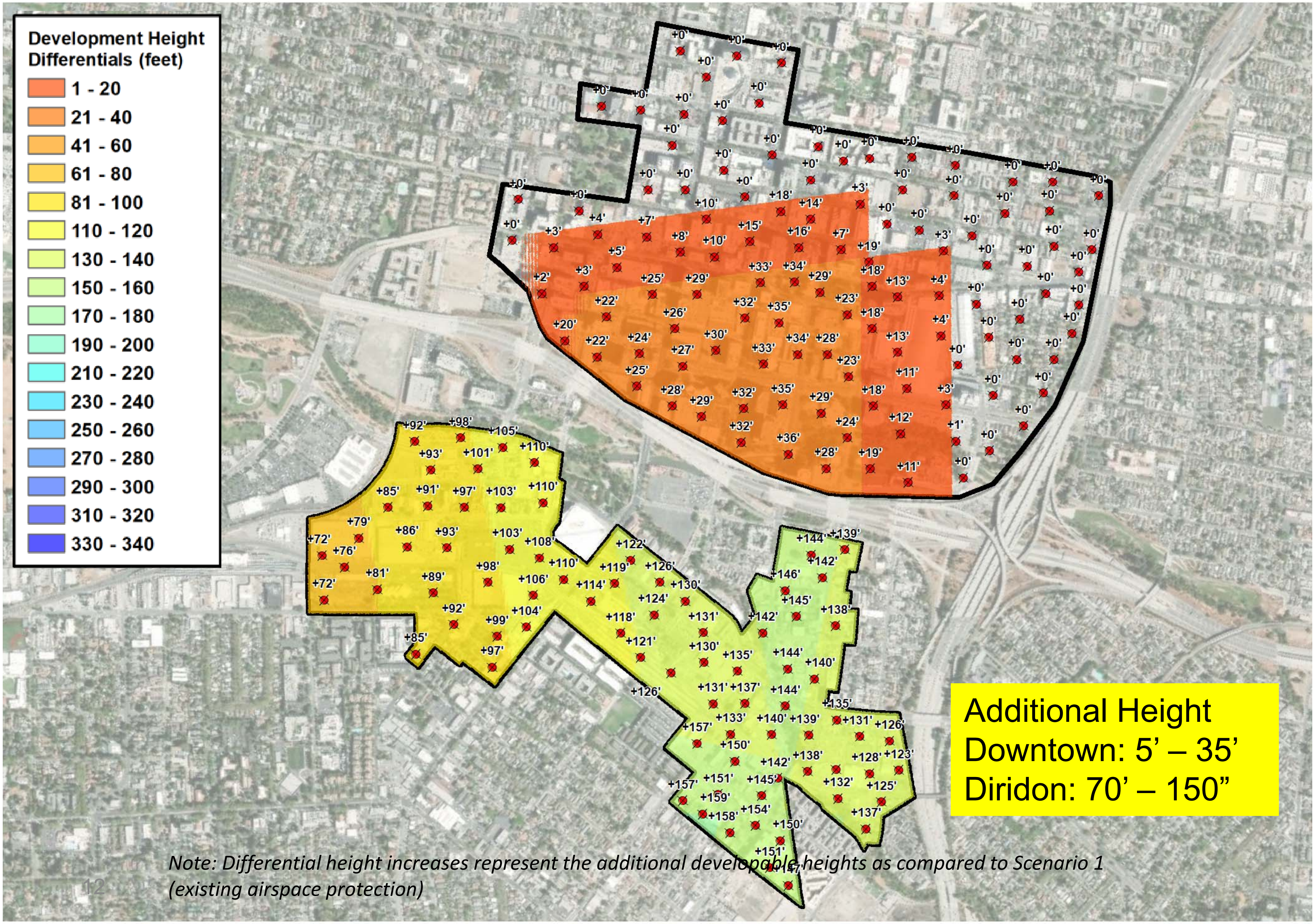
- **Scenario 10**: Straight-out OEI with West OEI Corridor alternatives
- **Scenario 9**: No OEI, increased FAA height limits

Selected Aircrafts

- Boeing 737-800
- Airbus 321-NEO (Original was Airbus 320-200)
- Boeing 787-9
- Boeing 777-300ER

SCENARIO 4 – NO OEI – TERPS ONLY



Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

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		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	**1,067**	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	**106**	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**8**	**2,384**	-	**583**

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	**3**	**2,384**	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	**1,378**	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**13**	**2,384**	**3**	**860**

Hawaii Weight Penalty Assessment

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Notes:

1. **HNL is fuel capacity limited in Feb to 173 PAX and no cargo (i.e., not a takeoff weight limitation) for the B737-800.**

Europe Weight Penalty Assessment

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	**21,580**	-	**4,400**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	**15,338**	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	**10,000**	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	**9,349**	-	-
	Opt 10C: 129' - 240' AGL	-	**14,096**	-	-
	Opt 10D: 146' - 260' AGL	-	**19,282**	-	**2,027**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**29**	**26,198**	-	**11,735**

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	**2**	**22,911**	-	**7,811**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	**16,407**	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	**4,217**	-	-
	Opt 10B: 115' - 224' AGL	-	**9,353**	-	-
	Opt 10C: 129' - 240' AGL	-	**14,270**	-	-
	Opt 10D: 146' - 260' AGL	-	**19,612**	-	**3,876**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**41**	**23,514**	-	**15,397**

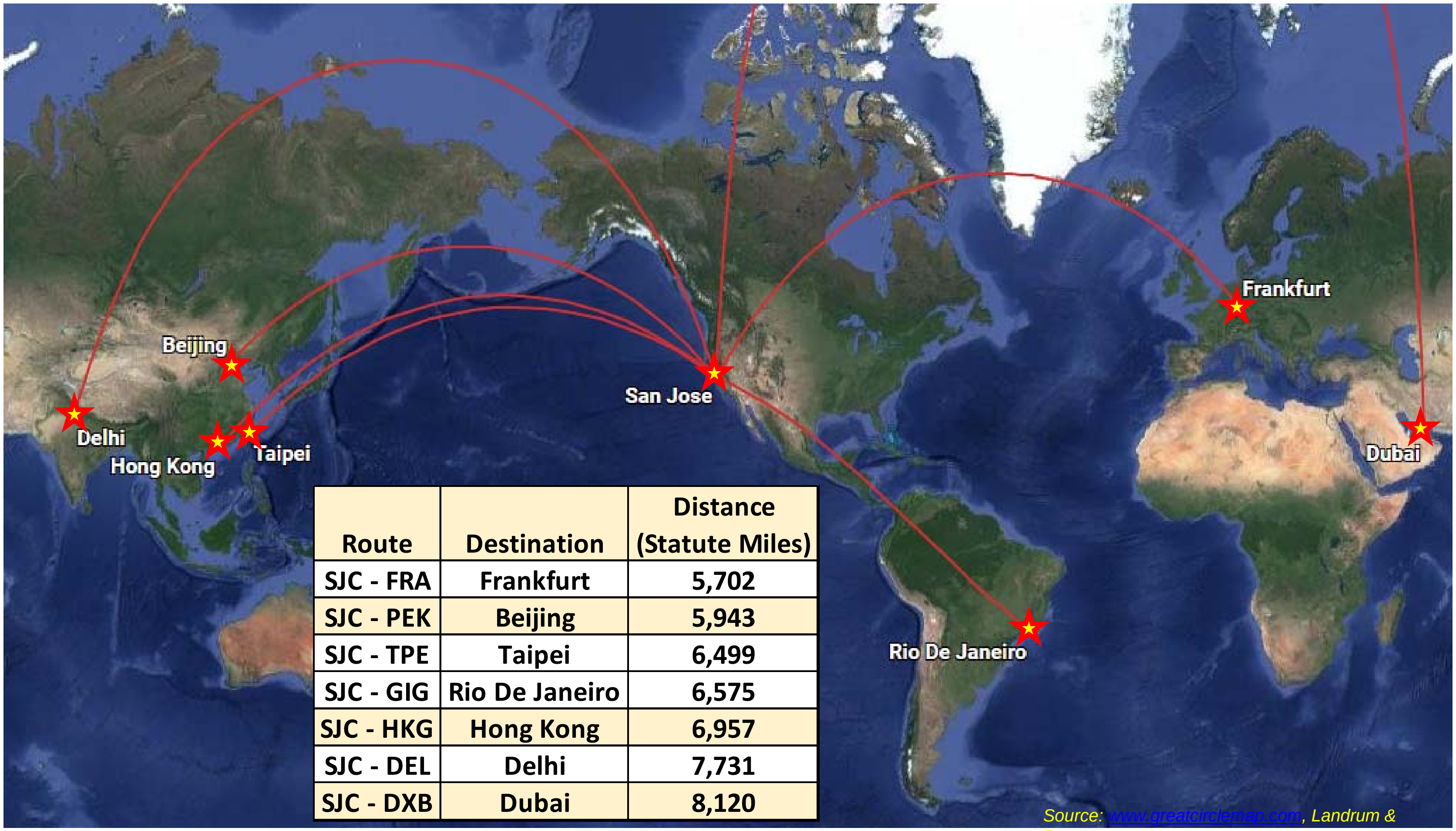
Asia Weight Penalty Assessment

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Beijing - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

Assessment of Existing Straight-Out OEI vs TERPS only for Additional Markets

Aircraft Evaluated:
A330-200
A350-900
B777-300
B787-9



Route	Destination	Distance (Statute Miles)
SJC - FRA	Frankfurt	5,702
SJC - PEK	Beijing	5,943
SJC - TPE	Taipei	6,499
SJC - GIG	Rio De Janeiro	6,575
SJC - HKG	Hong Kong	6,957
SJC - DEL	Delhi	7,731
SJC - DXB	Dubai	8,120

Source: www.greatcirclemap.com, Landrum & Brown

WEIGHT PENALTY ASSESSMENT
GIG, TPE, HKG, DEL & DXB

Rio de Janeiro - GIG Summer (81.3° F) 6,575 miles	A330-200 (284 seats/39,344 lbs cargo)		A350-900 (325 seats/37,963 lbs cargo)		B777-300ER (370 seats/48,211 lbs cargo)		B787-9 (290 seats/7,144 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							51	
West OEI Corridor								
TERPS Only		20,072		23,528		18,975	60	7,1[illegible]4

Taipei - TPE Summer (81.3° F) 6,499 miles	A330-200 (284 seats/28,577 lbs cargo)		A350-900 (325 seats/27,582 lbs cargo)		B777-300ER (370 seats/35,569 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*							89	
West OEI Corridor							12	
TERPS Only		1,976		23,195		18,742	96	

Hong Kong - HKG Summer (81.3° F) 6,957 miles	A330-200 (284 seats/18,283 lbs cargo)		A350-900 (325 seats/17,182 lbs cargo)		B777-300ER (370 seats/20,785 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*			15				128	
West OEI Corridor							51	
TERPS Only	5	18,283	23	17,182		17,980	134	

Delhi - DEL Summer (81.3° F) 7,731 miles	A330-200 (284 seats/5,014 lbs cargo)		A350-900 (325 seats/3,132 lbs cargo)		B777-300ER (370 seats/106 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	48		69		62		178	
West OEI Corridor							103	
TERPS Only	55	5,014	77	3,132	72	106	184	

Dubai - DXB Summer (81.3° F) 8,120 miles	A330-200 (284 seats/3,537 lbs cargo)		A350-900 (325 seats/2,688 lbs cargo)		B777-300ER (370 seats/1,828 lbs cargo)		B787-9 (290 seats/0 lbs cargo)	
	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)	PAX Penalty	Cargo Penalty (lbs)
Existing Straight Out OEI*	57		71		62		184	
West OEI Corridor							107	
TERPS Only	65	3,537	79	2,688	72	1,828	191	

*Existing Straight Out OEI calculations use different cargo capacity numbers than West OEI and TERPS Only.

Airline Responses

The following airlines participated in the aircraft performance assessment for the various airspace scenarios presented.

Responded	No Response
AeroMexico	Air Canda/Jazz
Air China	California Pacific
Alaska	Frontier
American	Lufthansa
ANA	UPS
British Airways	Jet Blue
Delta	
FedEx	
Hainan Airways	
Hawaiian	
Southwest	
United	
Volaris	

Airline Aircraft Performance Analysis Results (1 of 3)

- ANA
  - Evaluated B787-8 (max 169 PAX configuration)
  - No PAX penalty impacts in Scenarios 1, 4, 7 and 10, however cargo impact.
  - Scenario 9 results in PAX penalties between 30-37 PAX in summer temperatures (92º F), including additional cargo penalties.
- Hainan Airways
  - For B787-8/9, Scenario 4 obstacles results in significant reduction in cargo and PAX payload (50+ PAX for B787-9) due to loss of the West Corridor.

Airline Aircraft Performance Analysis Results (2 of 3)

- British Airways
  - Scenarios 4 and 7 have no impact at all to current operations.
  - Scenario 9 results in greatest impact when operating on Runways 12L/12R.
  - Scenario 10 has no impact on 12L when departing straight-out, however a payload and engine impact for 12R when making a right course correction.
- Alaska, American, Aeromexico, Delta, Southwest, and Volaris
  - No penalties for operations below 92º F.
- United
  - Significant PAX and cargo penalties for B737-900ER operation in Scenarios 1, 4, 7 and 9
  - Minor PAX and cargo penalties in Scenario 4 for B737-800, moderate PAX and cargo penalties in Scenario 9 for B737-800

Airline Aircraft Performance Analysis Results (3 of 3)

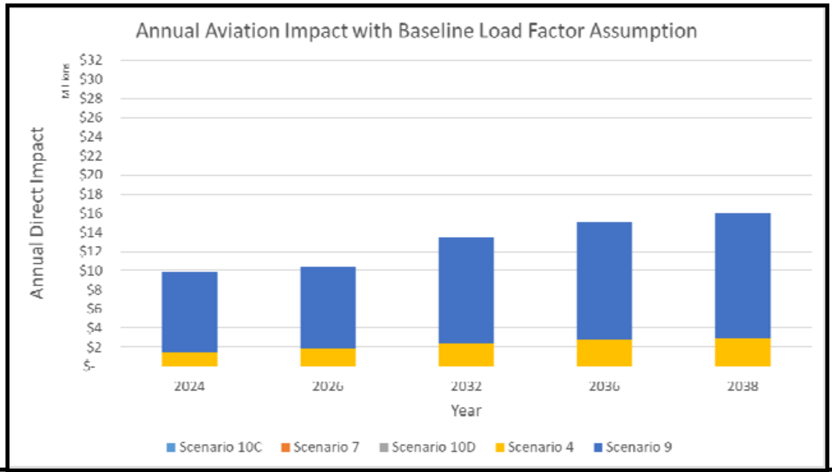
- Hawaiian (Aircraft - A321 NEO)
  - HNL, OGG, or KOA has no passenger penalties, some cargo penalties.
  - LIH has minimal passenger penalties and some cargo penalties.
- Federal Express
  - Cargo Penalties in most scenarios; however, will cube out before weight out.

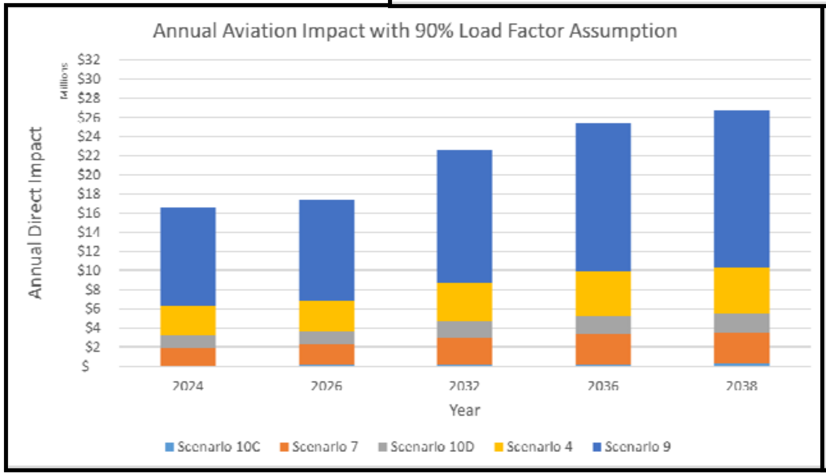
Summary Of Year 2024 Annual Direct Impacts

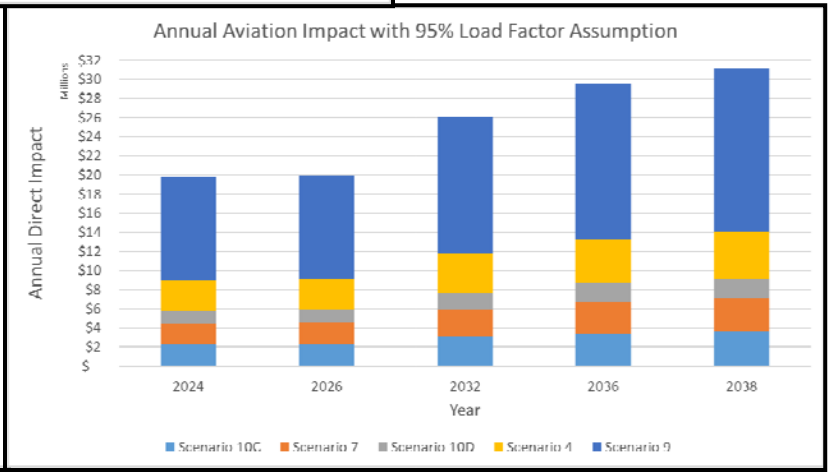
HISTORICAL LOAD FACTORS

Summary of Loses		Airline Revenue	PFC Revenue	Terminal Concession Spending (Airport Share)	Terminal Concession Spending (Concession Share)	Indirect Other Airline Impacts
Scenario 1	Existing airspace protection	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 4	TERPS Only	**$802,000**	**$10,000**	**$5,000**	**$31,000**	**$669,000**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 10	Existing Conditions: 85' - 166' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10A: 100' - 195' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10B: 115' - 224' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10C: 129' - 240' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10D: 146' - 260' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**$5,566,000**	**$57,000**	**$32,000**	**$191,000**	**$3,966,000**

Summary of 20-year Direct Impacts with Load Factor Sensitivity Test







Induced Economic Impact Assessment

Induced Economic Impact Assessment Summary

Airspace Scenario	Aviation Impact		Real Estate Impact	
	Employment	GDP Gain/Loss	Employment	GDP Gain/Loss
10A	-	-	1,000	$184,000,000
10B	-	-	2,400	$438,000,000
10C	-	-	4,300	$700,000,000
4, 7, 10D	-27	-$2,000,000	4,900	$747,000,000

Estimated City of San Jose Portion of Sales Tax

Airspace	2024		2026		2032		2036		2038	
Scenario	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate
4	$2,100	-	$2,600	-	$3,200	$110,000	$3,500	$206,800	$3,700	$253,400
7	-	-	-	-	-	$110,000	-	$206,800	-	$253,400
9	$13,700	-	$14,200	-	$17,800	$110,000	$19,600	$206,800	$20,500	$253,400
10A	-	-	-	-	-	$110,000	-	$57,700	-	$57,700
10B	-	-	-	-	-	$110,000	-	$141,100	-	$137,400
10C	-	-	-	-	-	$110,000	-	$206,800	-	$226,800
10D	-	-	-	-	-	$110,000	-	$206,800	-	$253,400

Existing Density and Net Increases for Downtown Sites

Address			Scenario 4		Scenario 9	
	Parcel Area	Existing Potential Density (SF)	Net New SF	% Increase	Net New SF	% Increase
66 N Market St (Approximate)	170,017	2,441,000	0*	0%	300,000	12%
345 S 2nd Street & 300 S 1st Street†	123,173	2,232,000	*Not Impacted*	*Not Impacted*	782,000	35%
282 S Market St	65,781	1,090,000	52,000	5%	363,000	33%
333 W San Fernando St	62,242	910,000	101,000	11%	202,000	22%
60 S Almaden Ave	61,874	966,000	107,000	11%	215,000	22%
174 S 2nd St	58,456	981,000	*Not Impacted*	*Not Impacted*	187,000	19%
115 Terraine St	55,200	653,000	44,000	7%	174,000	27%
8 E San Fernando St	43,513	754,000	36,000	5%	144,000	19%
Museum Place	107,815	988,203 (planned)	100,000	10%	250,000	25%

** An increase of zero square feet means either 1) the height limits imposed by the San Jose General Plan are below either the existing or the altered airspace protection scenarios or 2) an average of at least 14 feet must be achieved for each new floor, and the height increase afforded by a scenario does not meet this minimum.*

† Some parcels included in this test case site do fall under Scenario 4; however the majority do not, and therefore the development site as configured/tested assumes no height gain realized from Scenario 4.

Net New Density Increase in Diridon Station Area

Scenario	Net New Square Feet
4: No OEI	8,600,000
7: Straight-Out OEI	8,500,000
9: No OEI, incr. height limits	10,000,000
10A: Straight-Out OEI w/ West OEI Alts.	1,100,000
10B: Straight-Out OEI w/ West OEI Alts.	3,100,000
10C: Straight-Out OEI w/ West OEI Alts.	4,900,000
10D: Straight-Out OEI w/ West OEI Alts.	6,800,000

Note: Includes both office and residential development.

Questions

Thank you

Appendix I – Steering Committee Presentations

Appendix I consists of various presentations that were presented to the Project Steering Committee.

DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

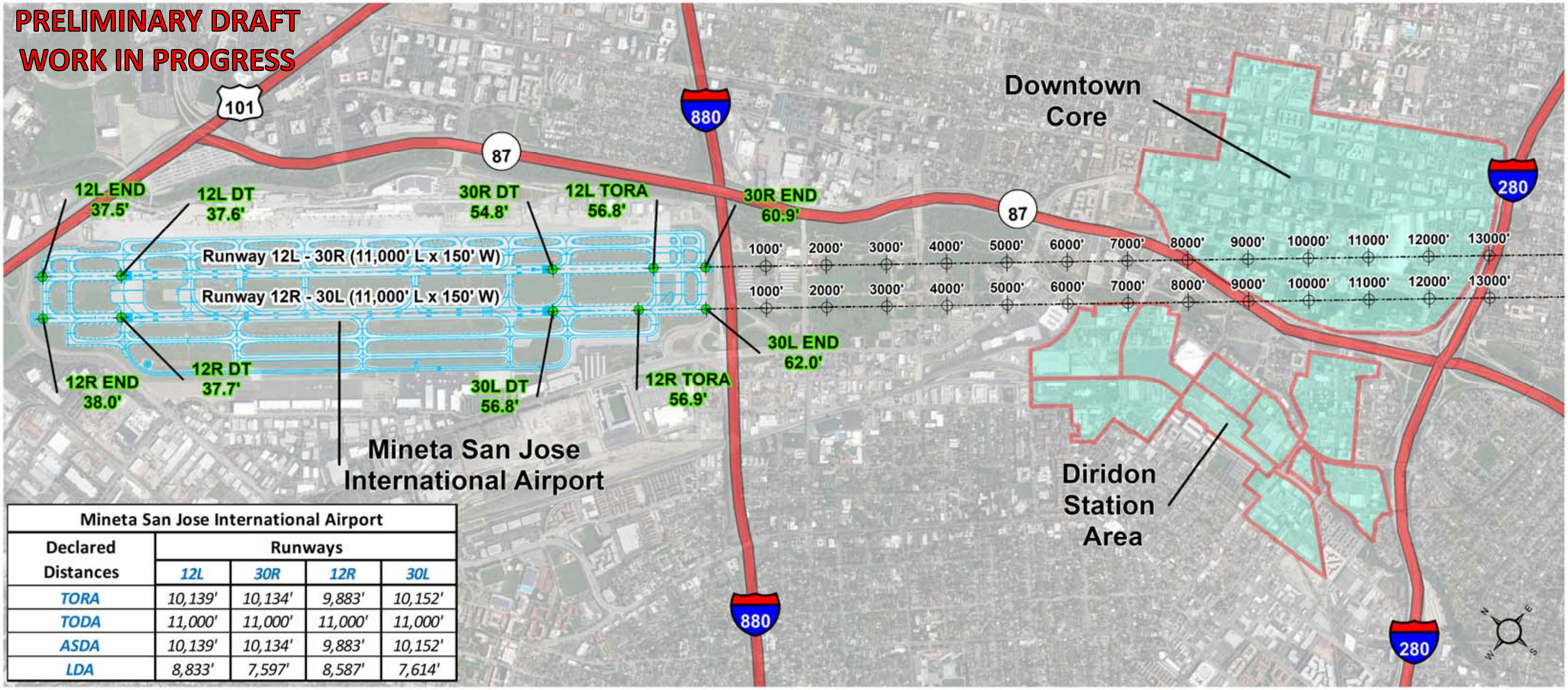
EXISTING CONDITIONS ASSESSMENT

March 8, 2018

AGENDA

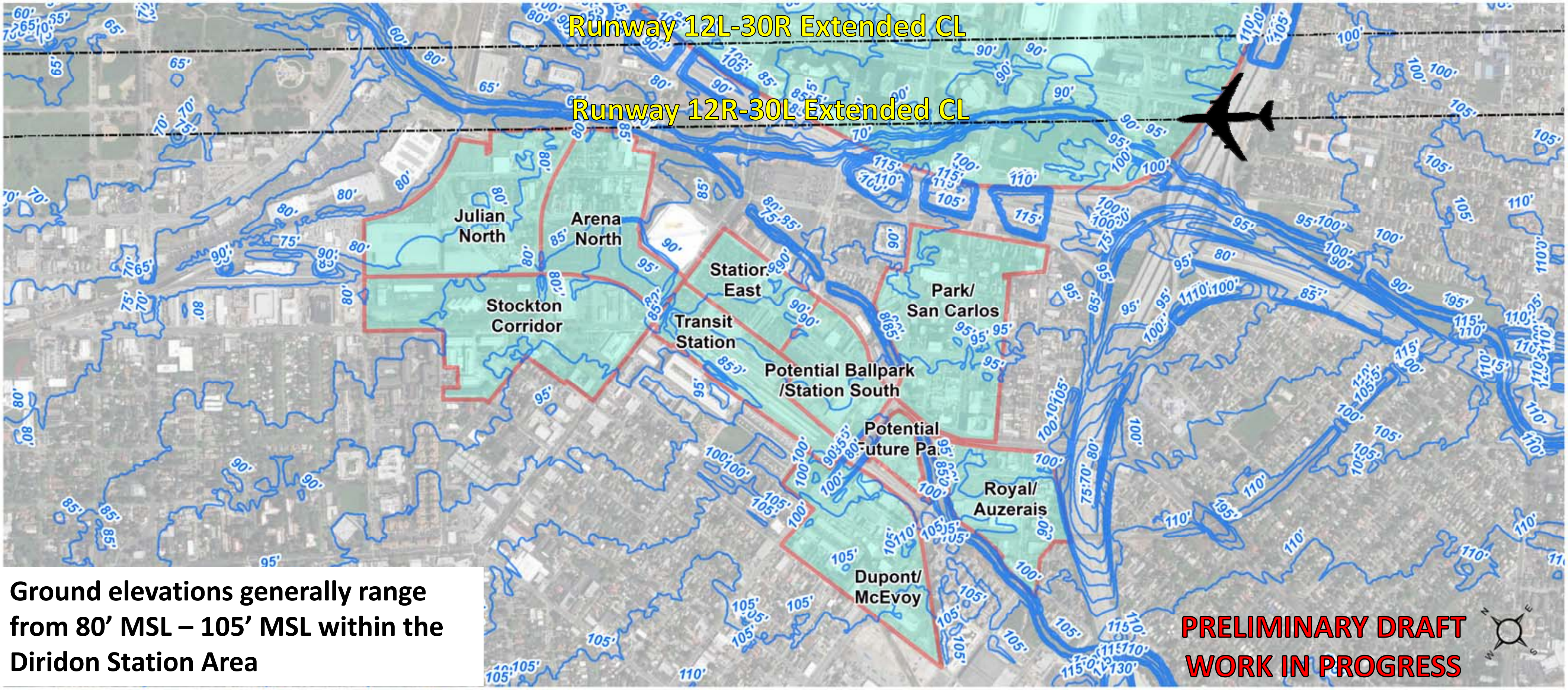
- Introduction
- One-Engine Inoperative (OEI) Overview
- SJC Aircraft Fleet and Markets
- Airspace Protection Surface Analysis
- Next Steps

EXISTING AIRPORT LAYOUT & STUDY EVALUTION AREA



Mineta San Jose International Airport				
Declared Distances	Runways			
	12L	30R	12R	30L
TORA	10,139'	10,134'	9,883'	10,152'
TODA	11,000'	11,000'	11,000'	11,000'
ASDA	10,139'	10,134'	9,883'	10,152'
LDA	8,833'	7,597'	8,587'	7,614'

DIRIDON STATION GROUND ELEVATIONS (MSL)



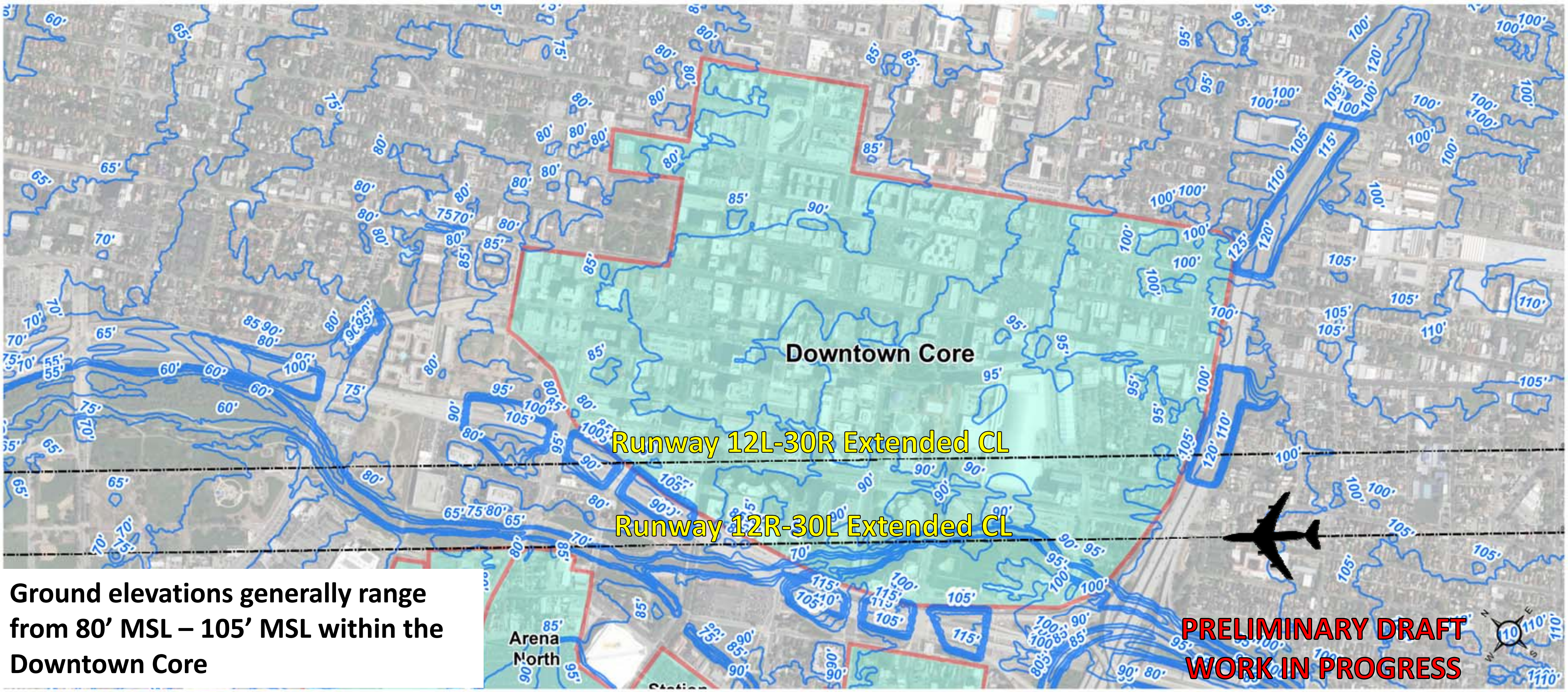
Ground elevations generally range from 80' MSL – 105' MSL within the Diridon Station Area

Source: USGS 1/3 arc-second Contour Downloadable Data Collection, 2014

Ground contour data obtained from USGC "The National Map" Staged Products Directory:

https://prd-tnm.s3.amazonaws.com/index.html?prefix=StagedProducts/Contours/Shape/

DOWNTOWN CORE GROUND ELEVATIONS (MSL)



Ground elevations generally range from 80' MSL – 105' MSL within the Downtown Core

Source: USGS 1/3 arc-second Contour Downloadable Data Collection, 2014

Ground contour data obtained from USGC "The National Map" Staged Products Directory:

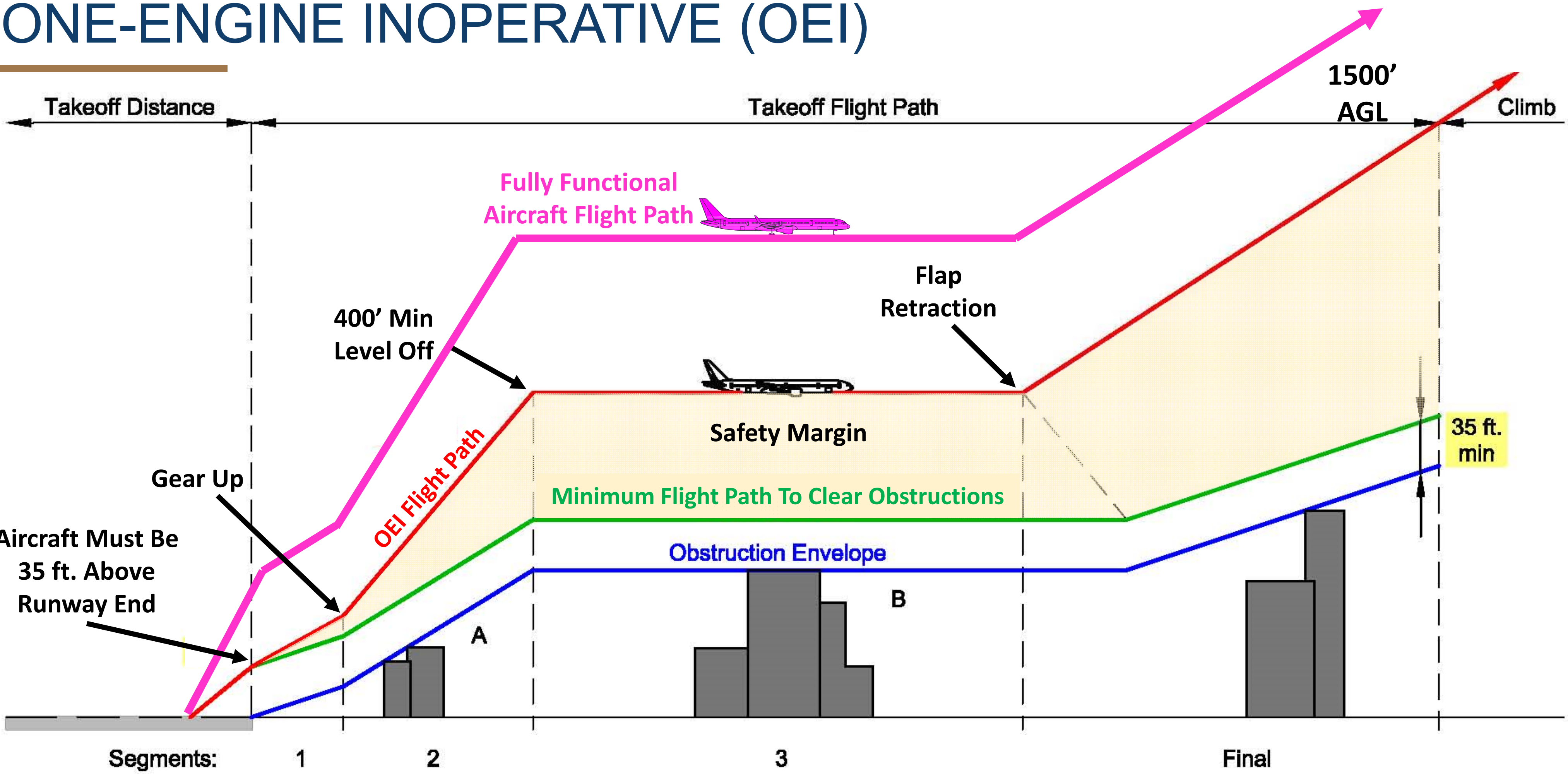
https://prd-tnm.s3.amazonaws.com/index.html?prefix=StagedProducts/Contours/Shape/

One-Engine Inoperative (OEI) Overview

ONE-ENGINE INOPERATIVE(OEI)

- Every air carrier departure must be able to clear obstacles with one engine inoperative
- Emergency procedure may or may not follow standard departure flight paths
- Not an FAA obstruction evaluation criteria
- Takes aircraft performance, weather, obstructions, and runway geometry into account
- Specific to each airline and runway end

ONE-ENGINE INOPERATIVE (OEI)



ENGINE OUT PROCEDURES

- Federal regulations dictate aircraft performance requirements
- Balances allowable passenger/cargo load and safety margins
- Provides escape routing
- Developed by the individual air carrier operators

ENGINE OUT PROCEDURE GUIDELINES

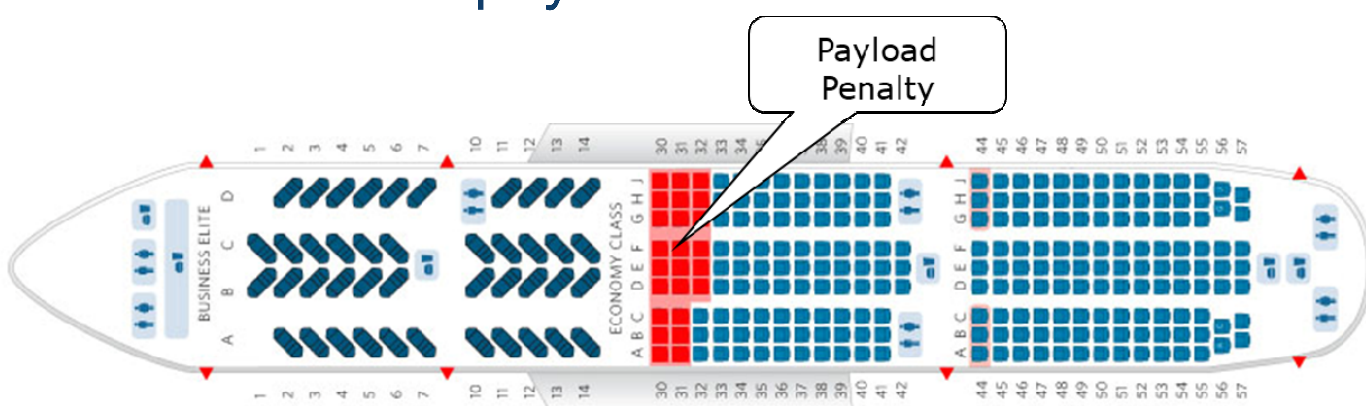
- Engine out procedure regulatory guidelines
  - FAA AC 120-91, Airport Obstacle Analysis
  - ICAO Annex 6, Operation of Aircraft
  - Airline variations of FAA and ICAO standards
  - Code of Federal Regulations Sections 25.109, 25.115, 25.121, 121.177, 121.189, 135.367, 135.379 and 135.398
- Applies to air carrier, commuter, and large cargo aircraft operators

ENGINE OUT PROCEDURE GUIDELINES

- Consider that an engine out or failure can occur at any point along the departure flight track
- Develop routing should an aircraft experience engine failure during its take-off
- Identify airspace obstacles located off of each runway which will negatively impact their operations and determine the maximum allowable take-off weight for that runway

AIRLINE RESPONSES TO OEI OBSTACLES

- Request another runway (wind, weather, air traffic permitting)
- Off-load passengers and/or cargo (weight penalty)
- Make a refueling stop
- Cancelling current day's flight
- Change aircraft
- Change OEI procedure
- Cancel air service if payload loss affects financial viability



SJC Aircraft Fleet and Markets

EXISTING FLEET AND MARKETS

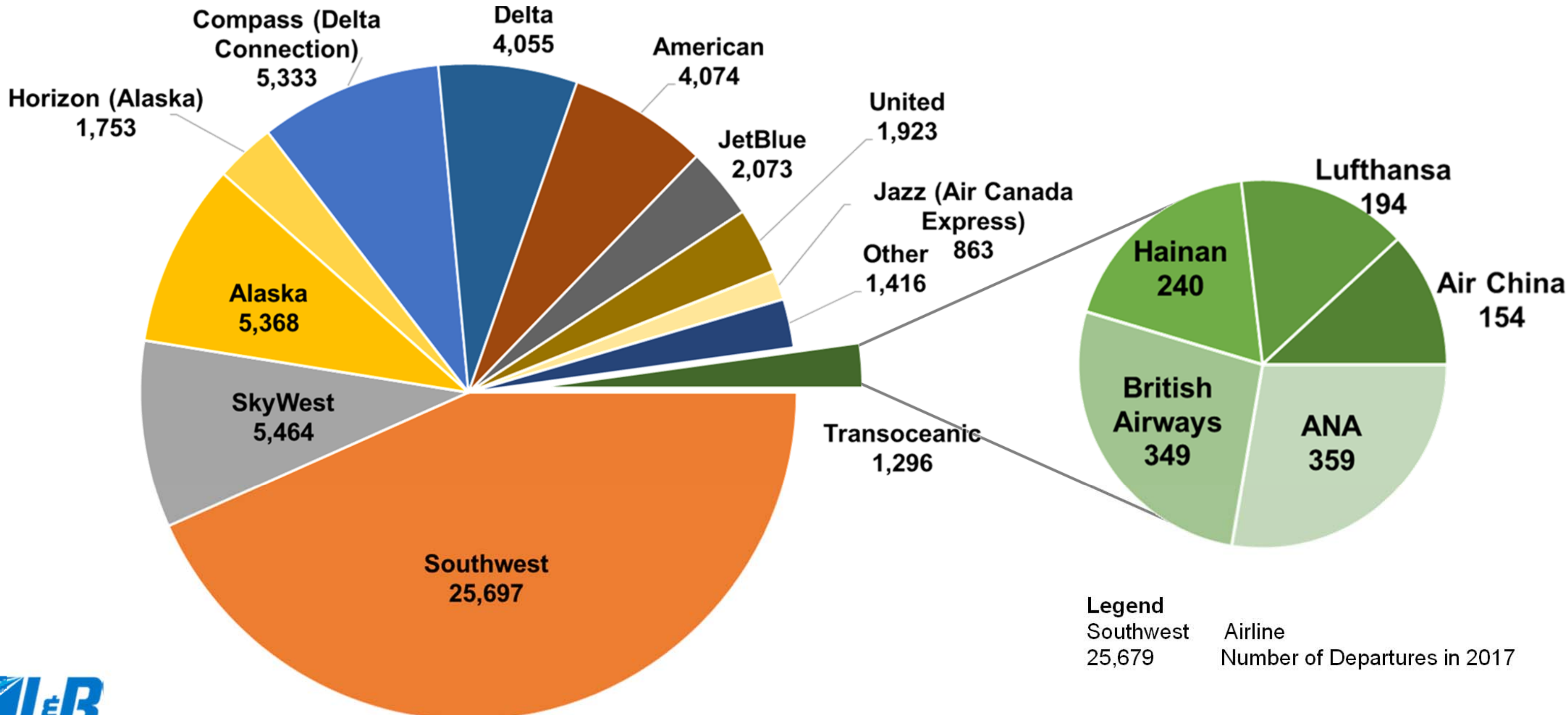
- Review aircraft operations information since 2003
- Frequency of southeast runway flow (Runways 12L/12R)

DATA SOURCES

- Runway Use Information:
  Federal Aviation Administration (FAA) Airport System Performance Metrics (ASPM) (2003 – 2017)
- Runway Use and Aircraft Fleet Information:
  Airport Noise Monitoring System (ANOMS) operations data (2003 – 2017)

AIRLINE MARKET SHARE – PASSENGER

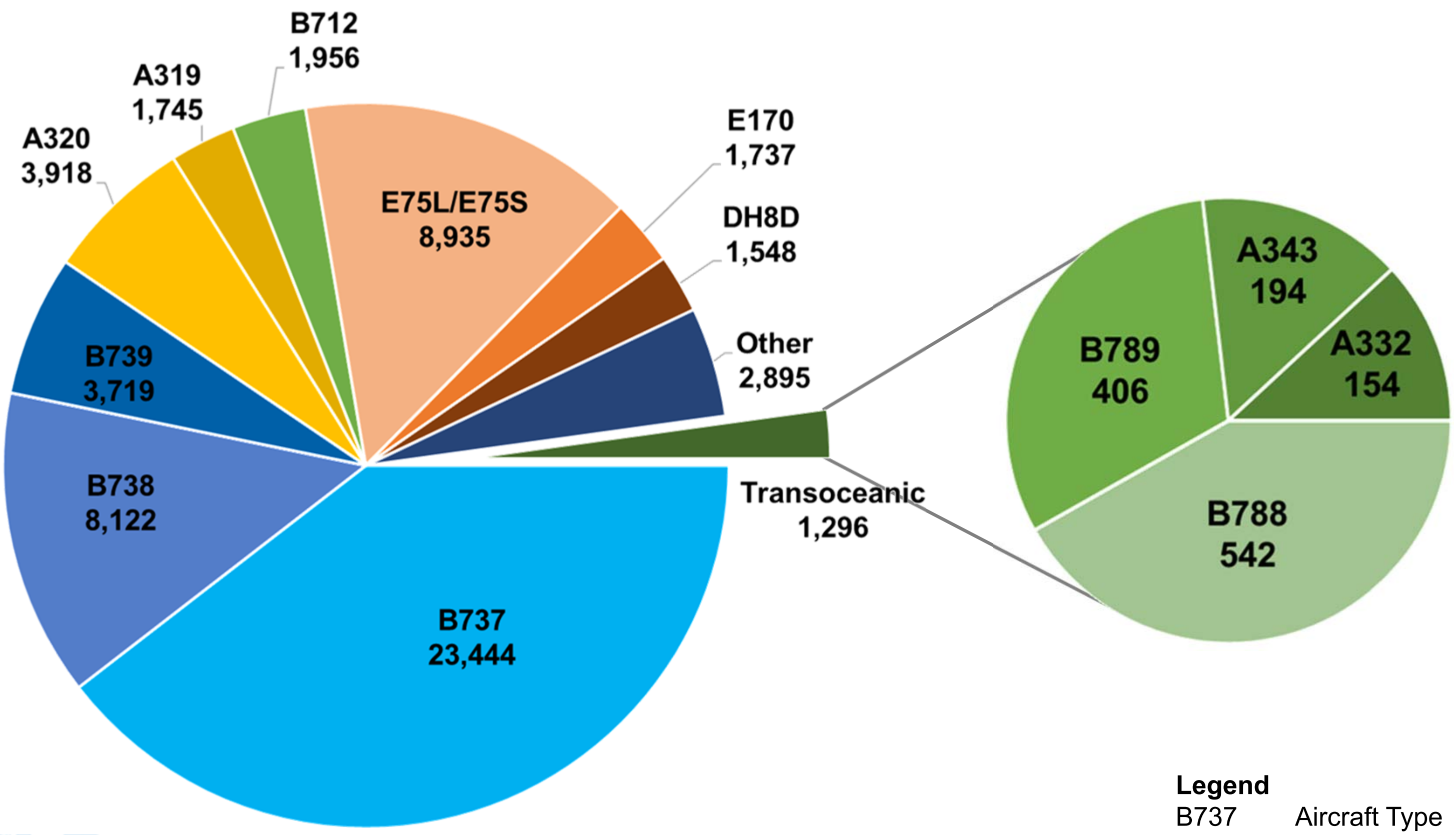
- Passenger airline market share in 2017



Source: ANOMS

AIRCRAFT PROFILE – PASSENGER

Aircraft types operating at SJC in 2017



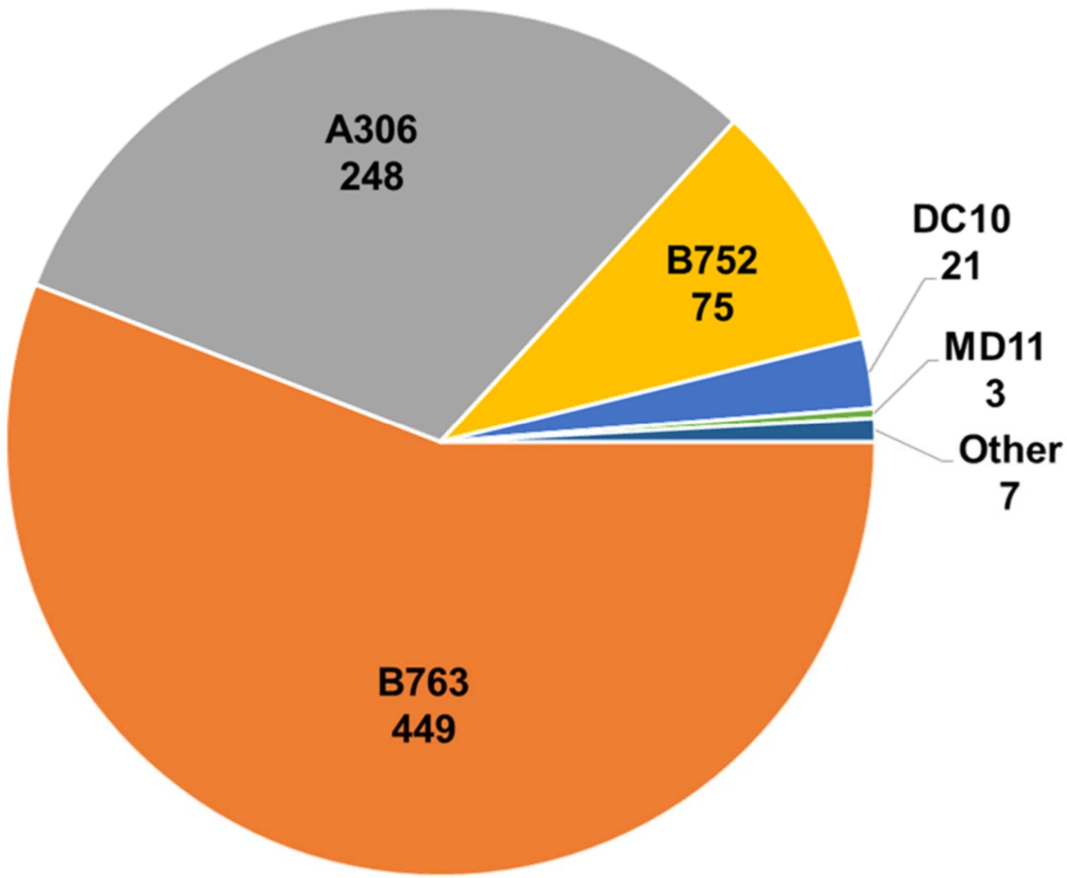
Aircraft Type Abbreviations	
A319	Airbus A319
A320	Airbus A320
A332	Airbus A330-200
A343	Airbus A340-300
B712	Boeing 717-200
B737	Boeing 737-700
B738	Boeing 737-800
B739	Boeing 737-900
B788	Boeing 787-8
B789	Boeing 787-9
DH8D	Bombardier Dash 8
E170	Embraer 170
E75L/E75S	Embraer 175

Legend
B737 Aircraft Type
23,444 Number of Departures in 2017

Source: ANOMS

AIRCRAFT PROFILE – CARGO

Aircraft types operating at SJC in 2017



Aircraft Type Abbreviations

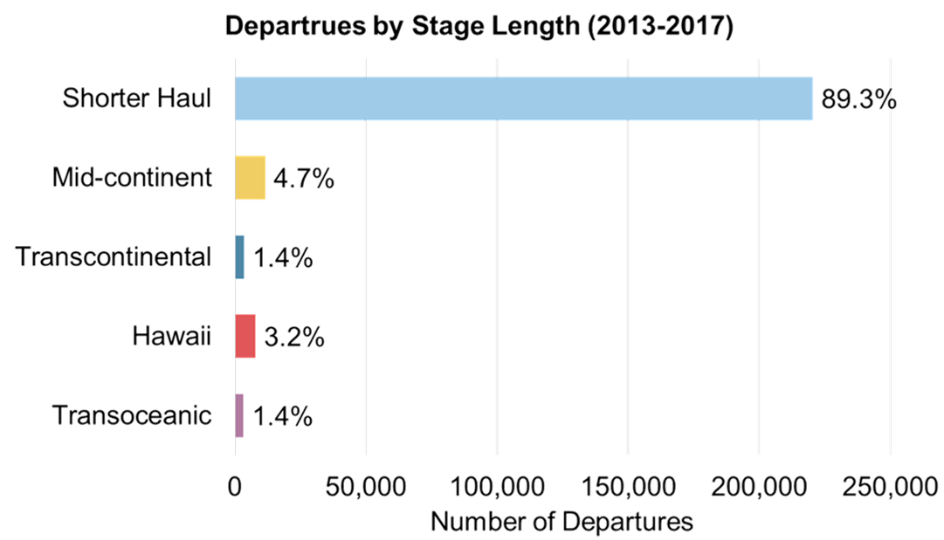
A306	Airbus A300-600
B752	Boeing 757-200
B763	Boeing 767-300
DC10	McDonnell Douglas DC-10
MD11	McDonnell Douglas MD-11

Legend
B763 Aircraft Type
449 Number of Departures in 2017

Source: ANOMS

STAGE LENGTH CATEGORIES

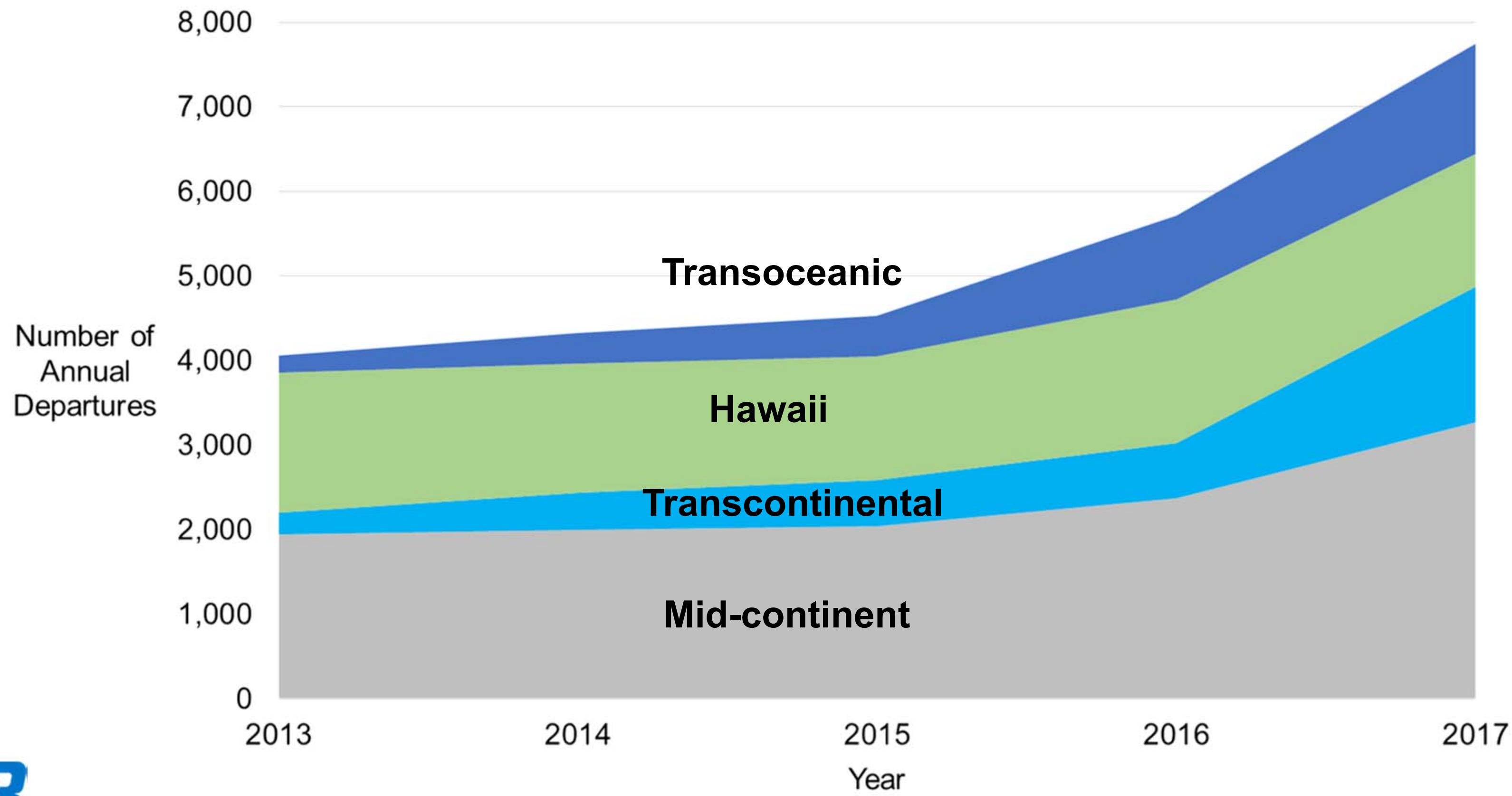
- Stage lengths grouped by nautical miles (nm)
  - Up to 1500nm: “Shorter” haul
  - 1500-2000nm: Mid-continent
    - e.g. Chicago, Atlanta
  - 2000-2500nm: Transcontinental
    - e.g. New York, Boston
  - 2000-2500nm: Hawaii
    - Honolulu, Kahului, Lihue, Kona
  - 4000nm+: Transoceanic
    - Europe (London, Frankfurt)
    - Asia (Tokyo, Beijing, Shanghai)



Source: ANOMS

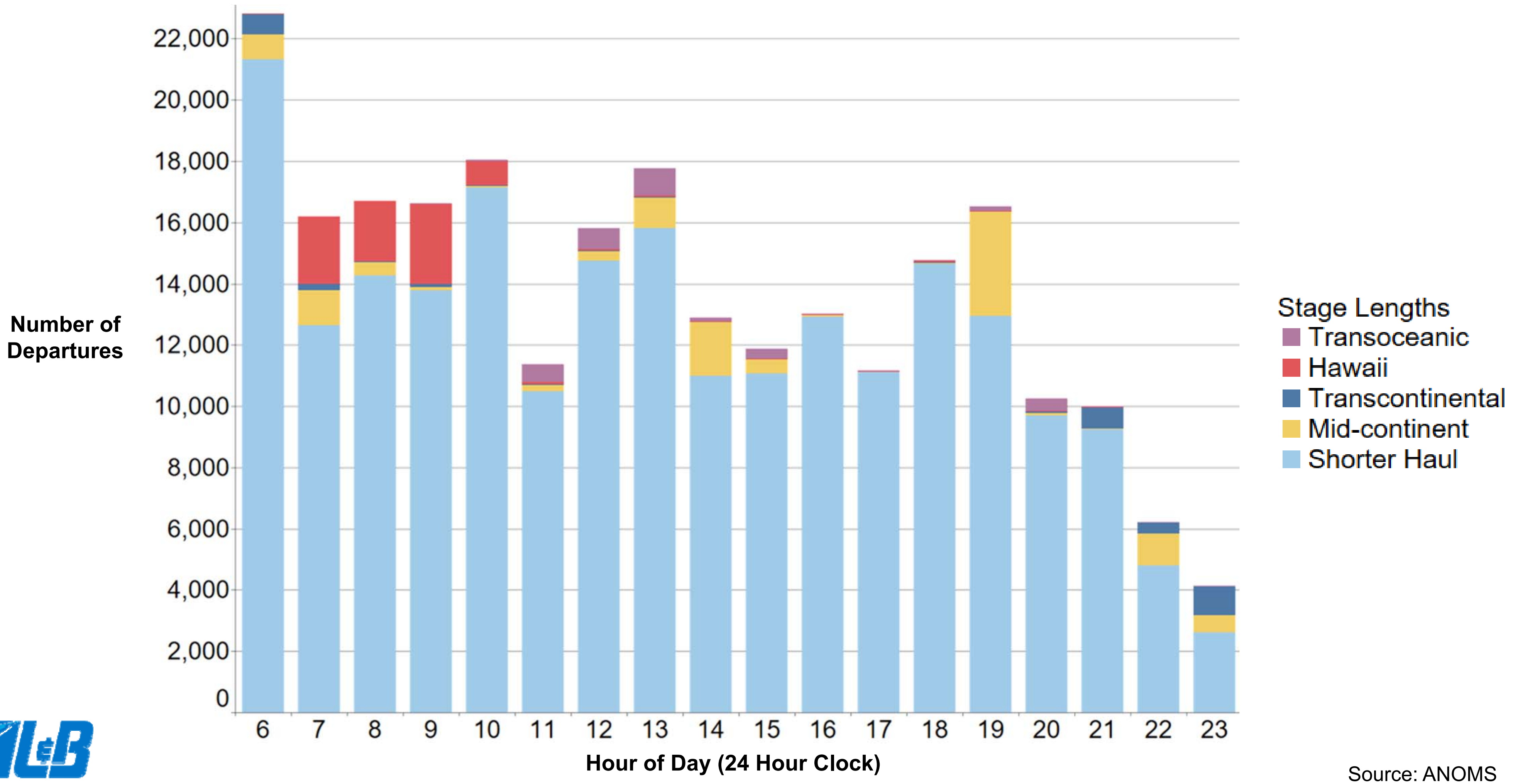
LONG HAUL DEPARTURE TREND

Significant increase in the number of long haul flights since 2013



Source: ANOMS

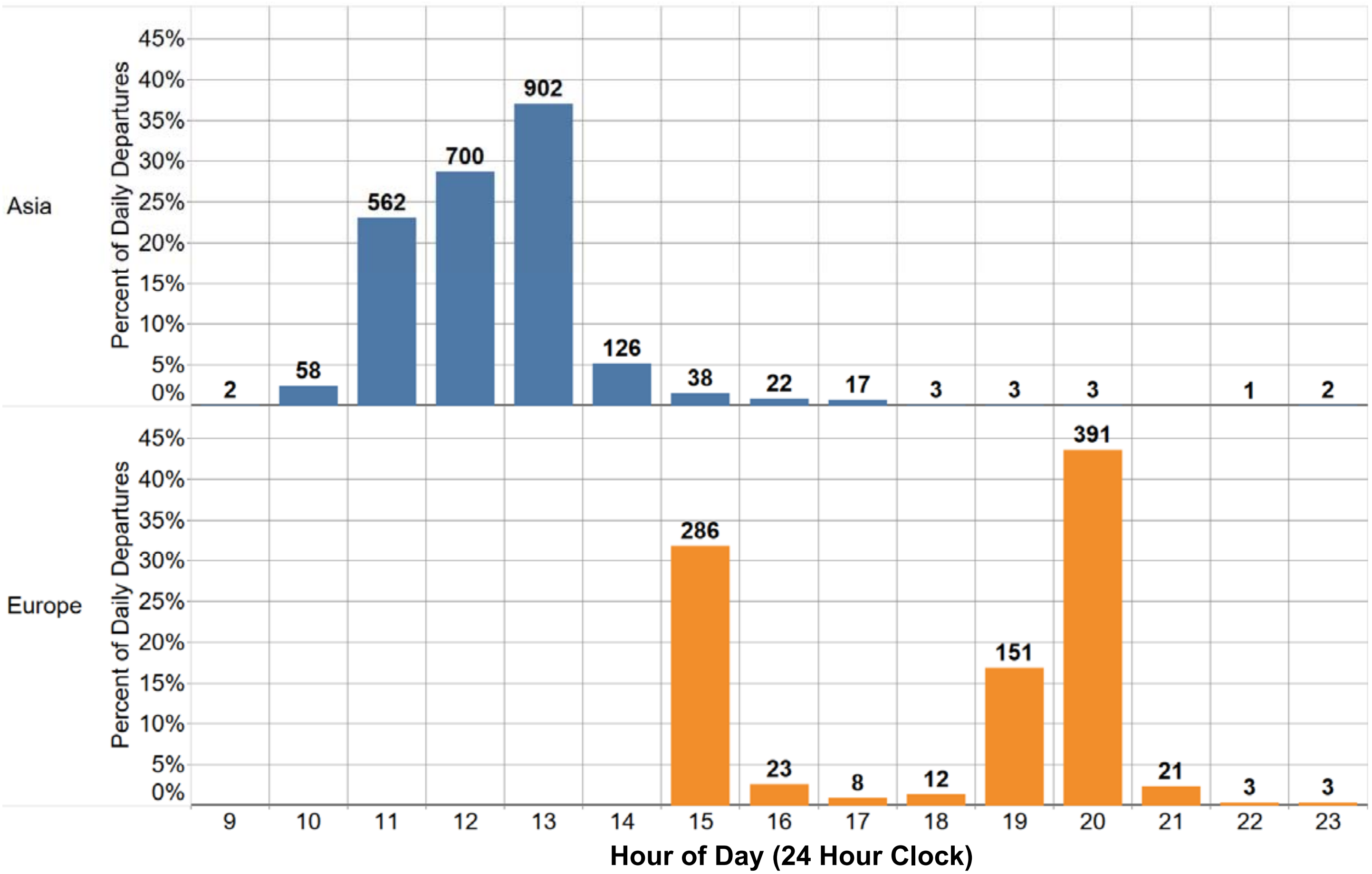
HOURLY DEPARTURES BY STAGE LENGTH (2013 TO 2017)



Source: ANOMS

DEPARTURE PATTERN BY STAGE LENGTH

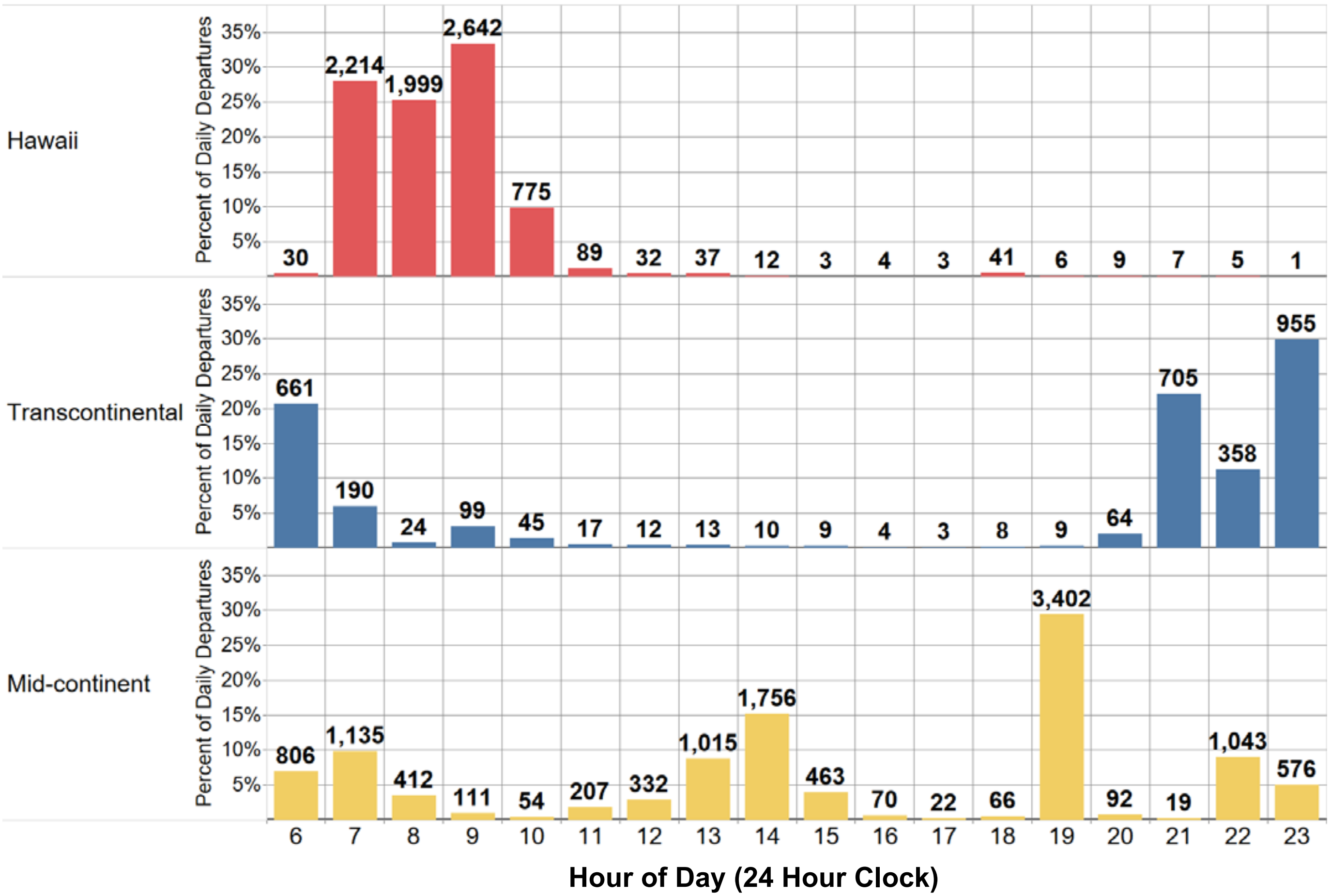
Transoceanic peak departure hours (2013 to 2017)



Source: ANOMS

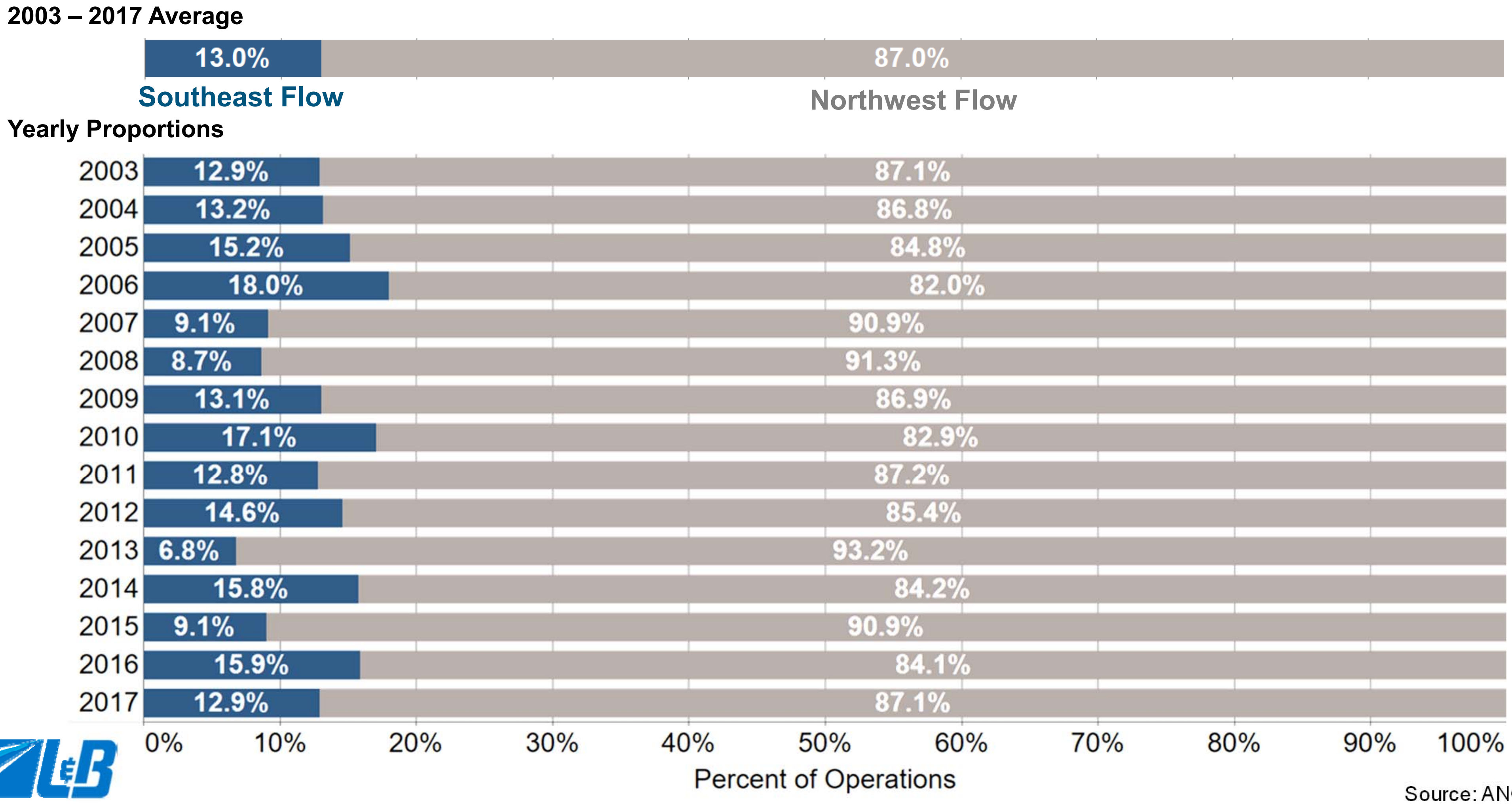
DEPARTURE PATTERN BY STAGE LENGTH

Hawaii, Transcontinental, and Mid-continent peak departure hours (2013 to 2017)



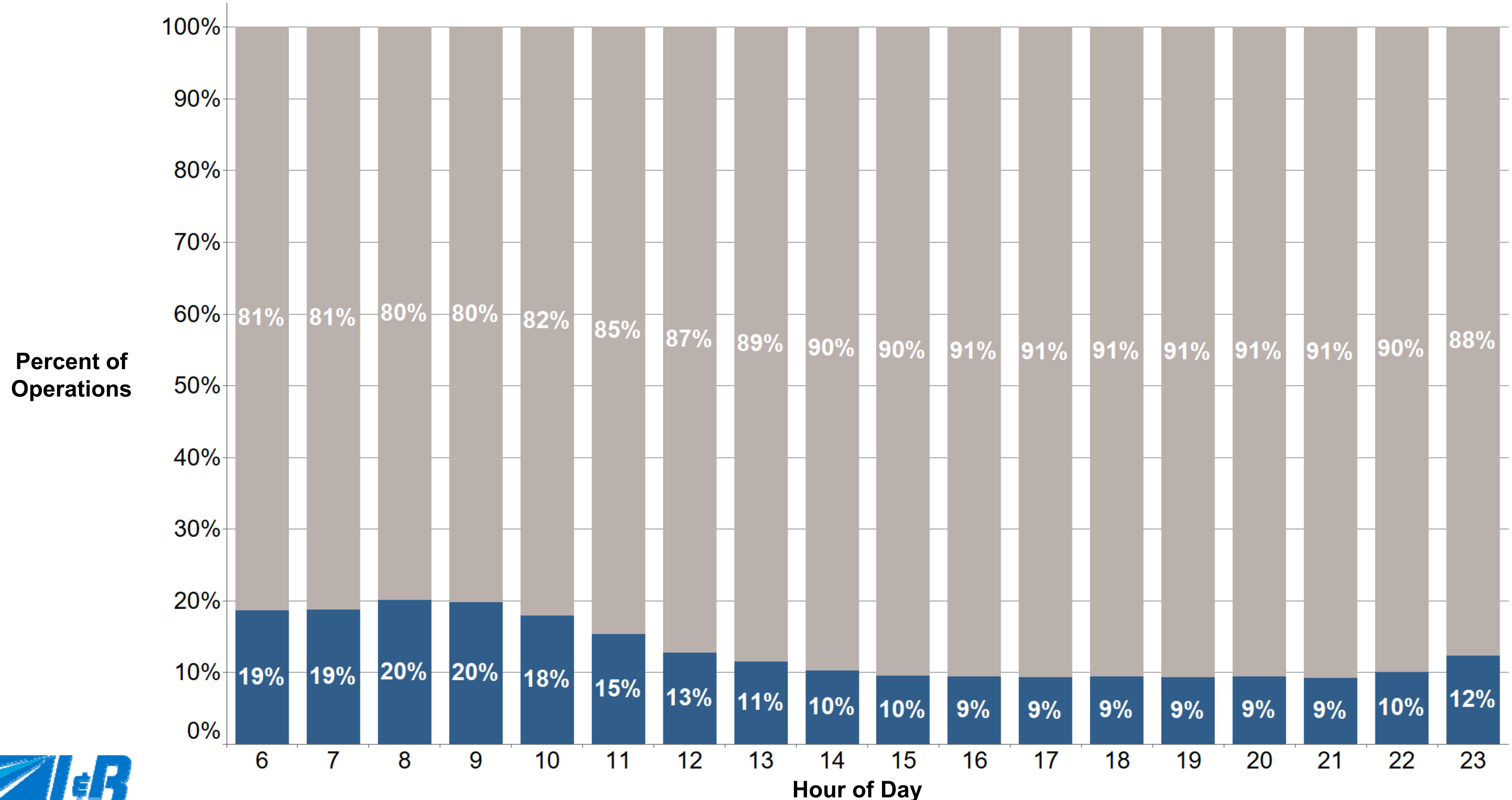
Source: ANOMS

YEARLY OPERATIONS BY FLOW



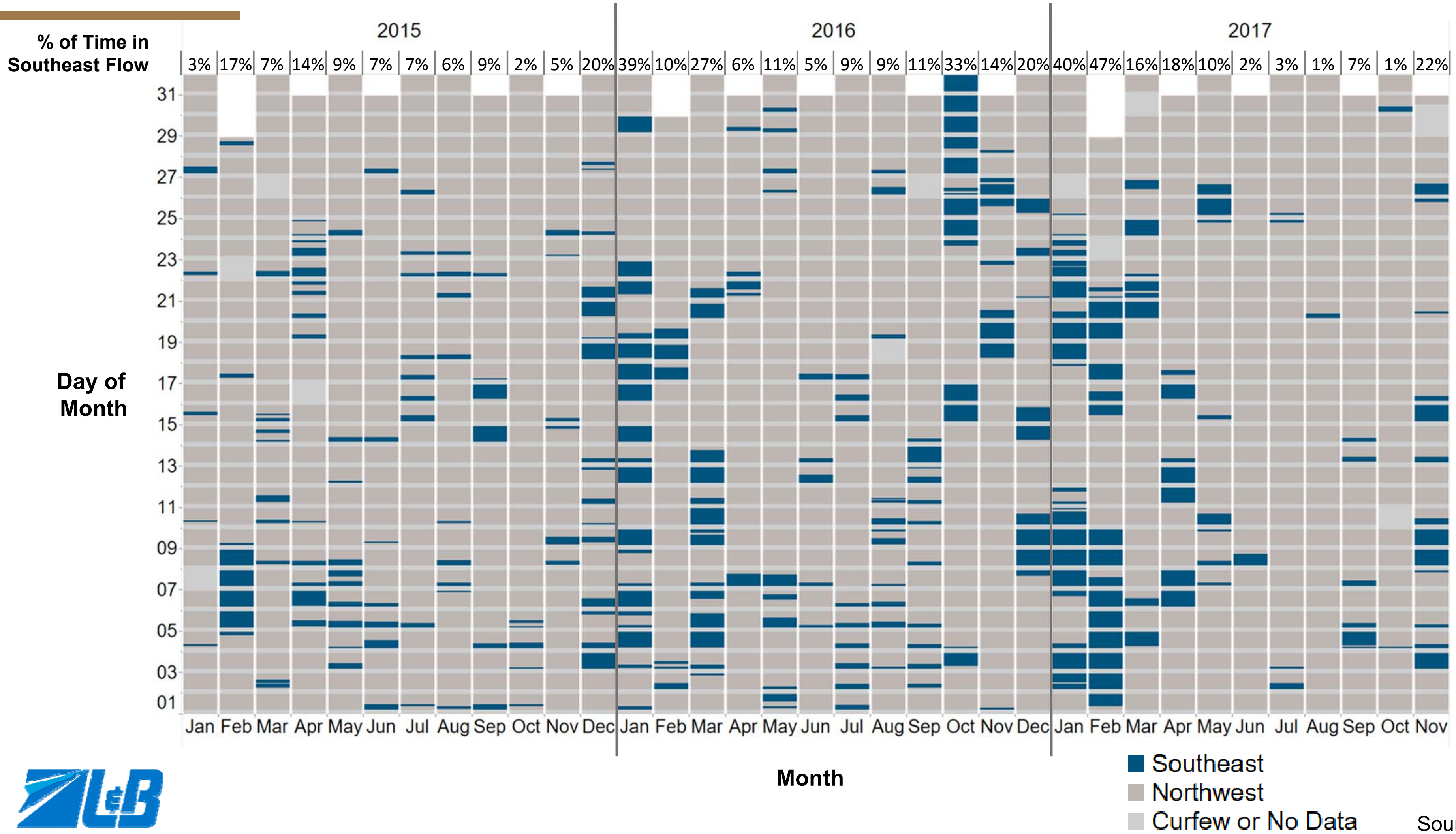
Source: ANOMS

SOUTHEAST FLOW BY HOUR OF DAY (2003 – 2017)



Source: ANOMS

FLOW BY CALENDAR HOUR



Source: FAA ASPM

SOUTHEAST FLOW

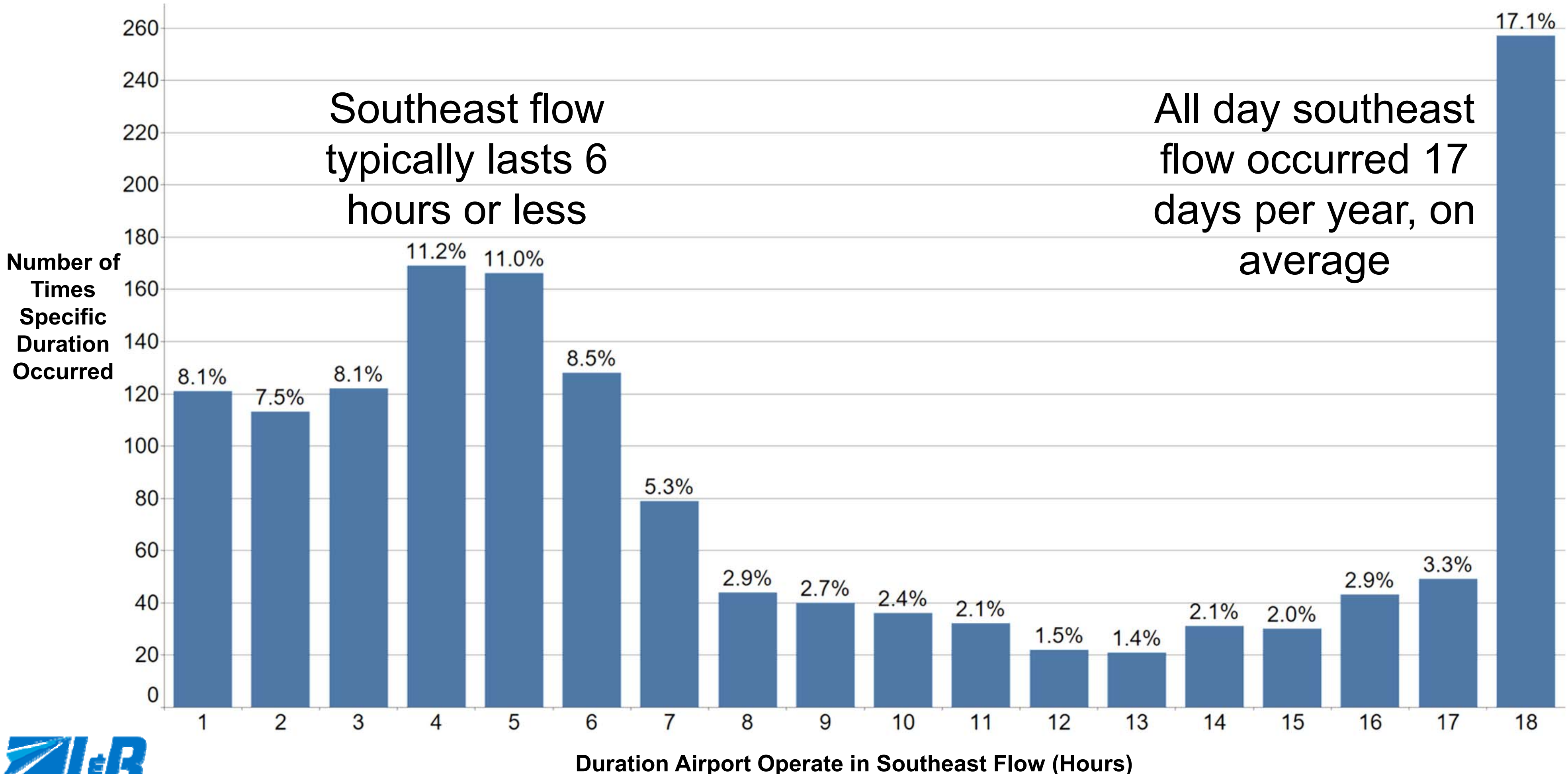
- During winter season, airfield operated in southeast flow for multiple days at a time
- On average, there are about 100 days in each year when Southeast flow occurs

Year	Number of Days When Southeast Flow Occurred
2003*	37
2004	101
2005	112
2006	129
2007	89
2008	72
2009	100
2010	127
2011	110
2012	110
2013	66
2014	119
2015	98
2016	119
2017**	87

Note:
*2013 only includes data for August - December
**2017 only includes data for January - November

Source: FAA ASPM

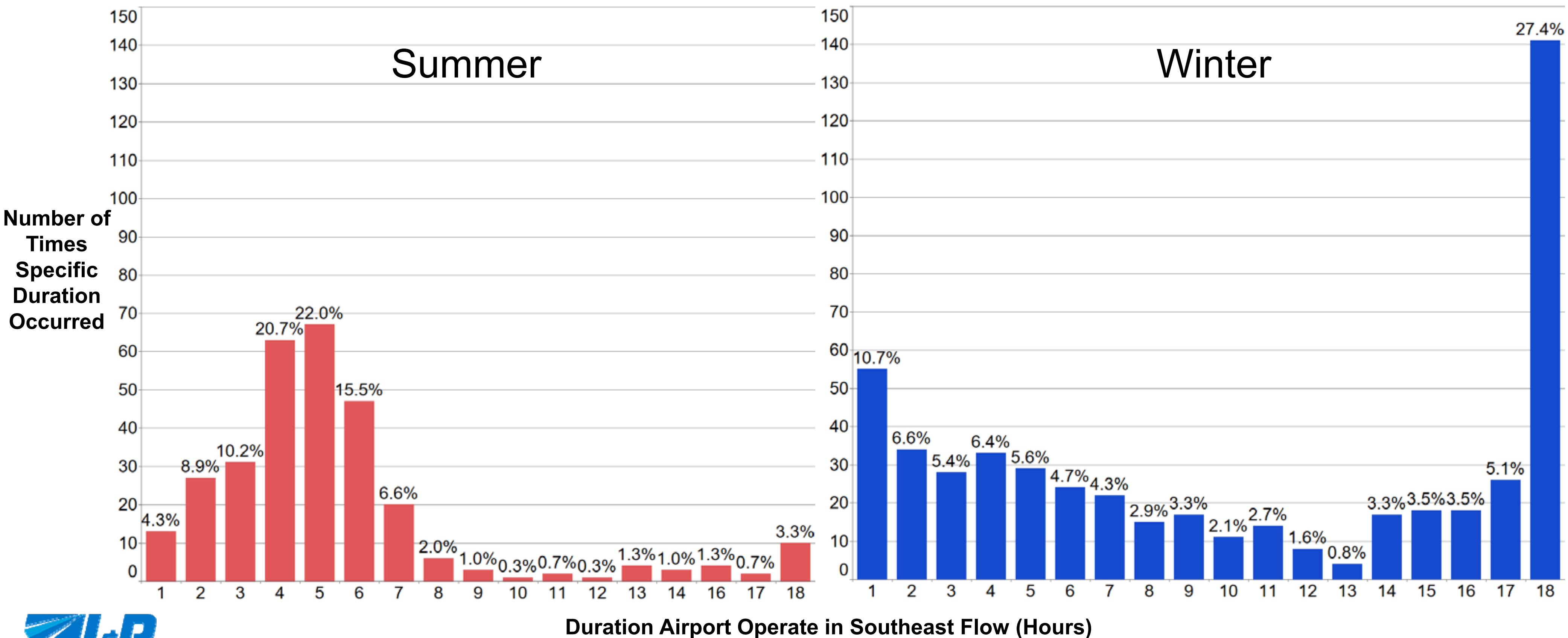
AVERAGE DURATION OF SOUTHEAST FLOW (2003 – 2017)



Source: FAA ASPM

SEASONAL DURATION OF SOUTHEAST FLOW (2003 – 2017)

Typically shorter durations during summer and longer duration during winter



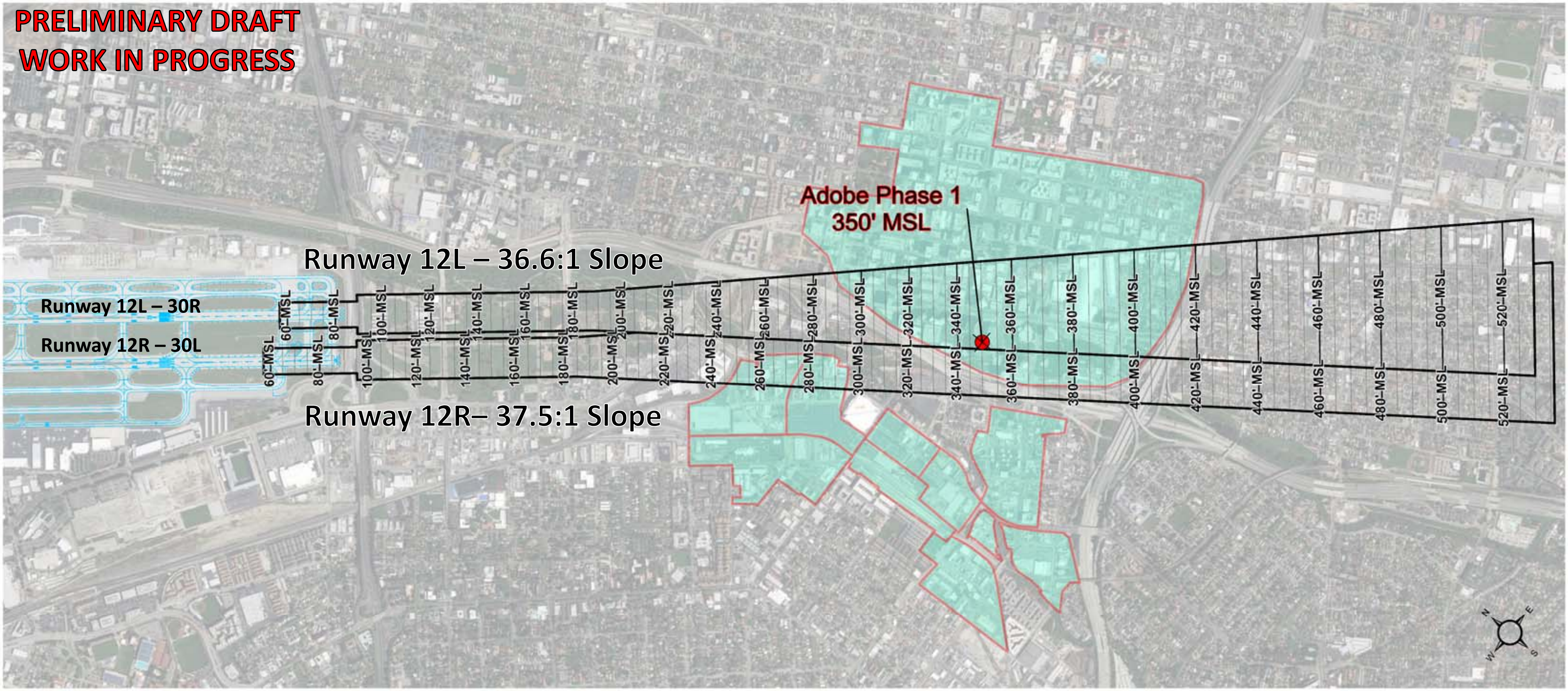
Source: FAA ASPM (June – August, December – February)

Airspace Protection Surface Analysis

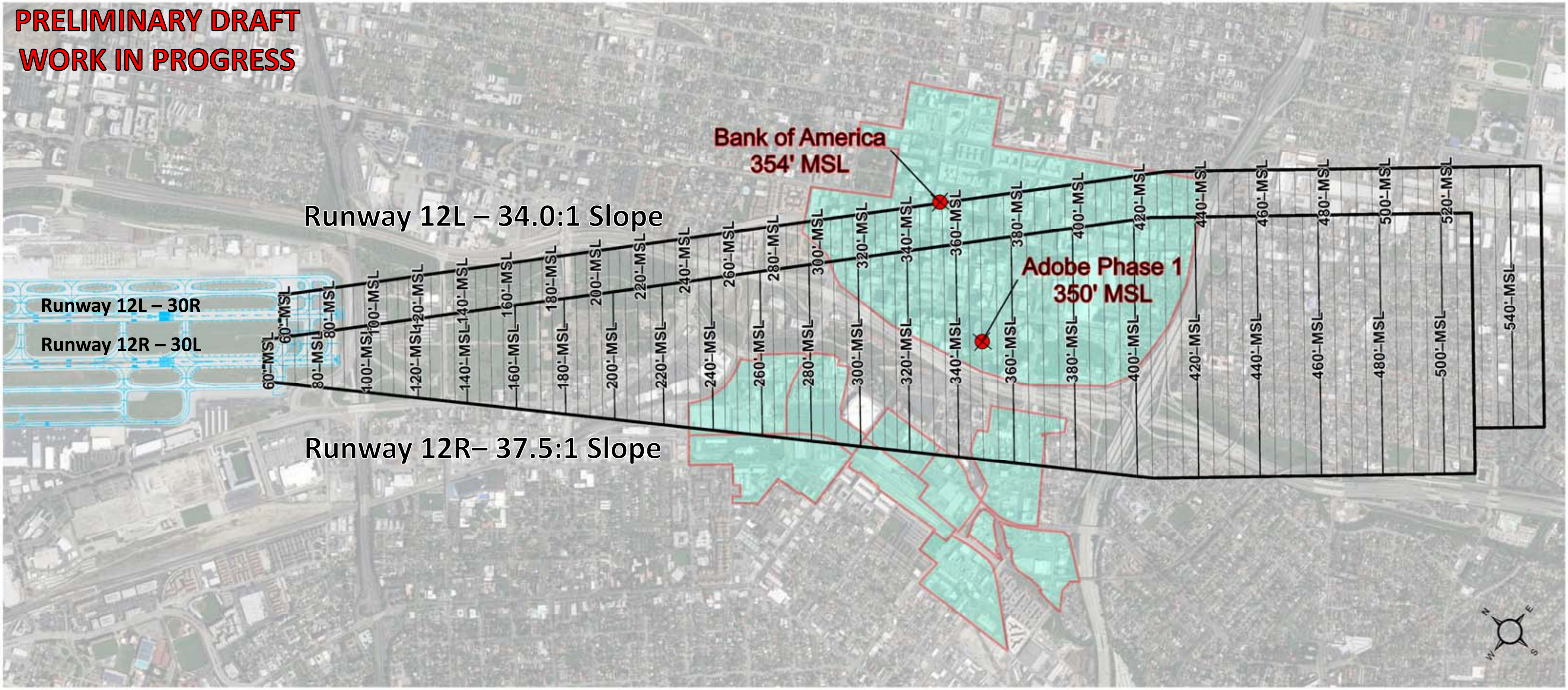
AIRSPACE SURFACES – WORK IN PROGRESS

- OEI Surfaces – Runway 12L/12R
  - FAA AC 120-91 Obstacle Accountability Area
  - ICAO OEI Surface
  - West OEI Corridor
- Initial TERPS Surfaces – Runways 12L/12R
  - TERPS Initial Climb Area Departure Surface
  - TERPS ILS Final and Missed Approach Surfaces
- Part 77 Approach, Transitional and Horizontal Surfaces

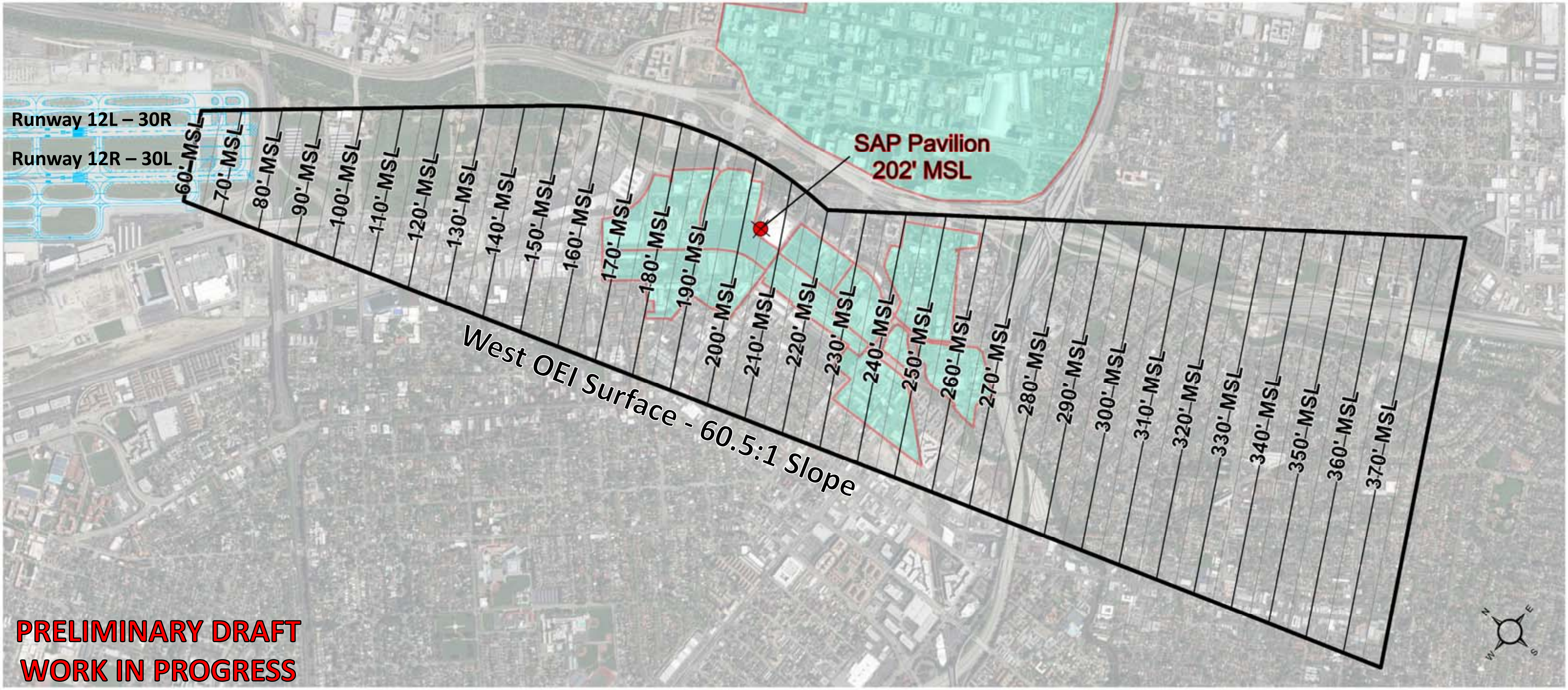
FAA AC 120-91 OEI SURFACE – RUNWAY 12L & 12R



ICAO OEI SURFACE –RUNWAY 12L & 12R COMPOSITE



WEST OEI CORRIDOR



AIRLINES OEI PROCEDURE FOR SOUTHEAST FLOW

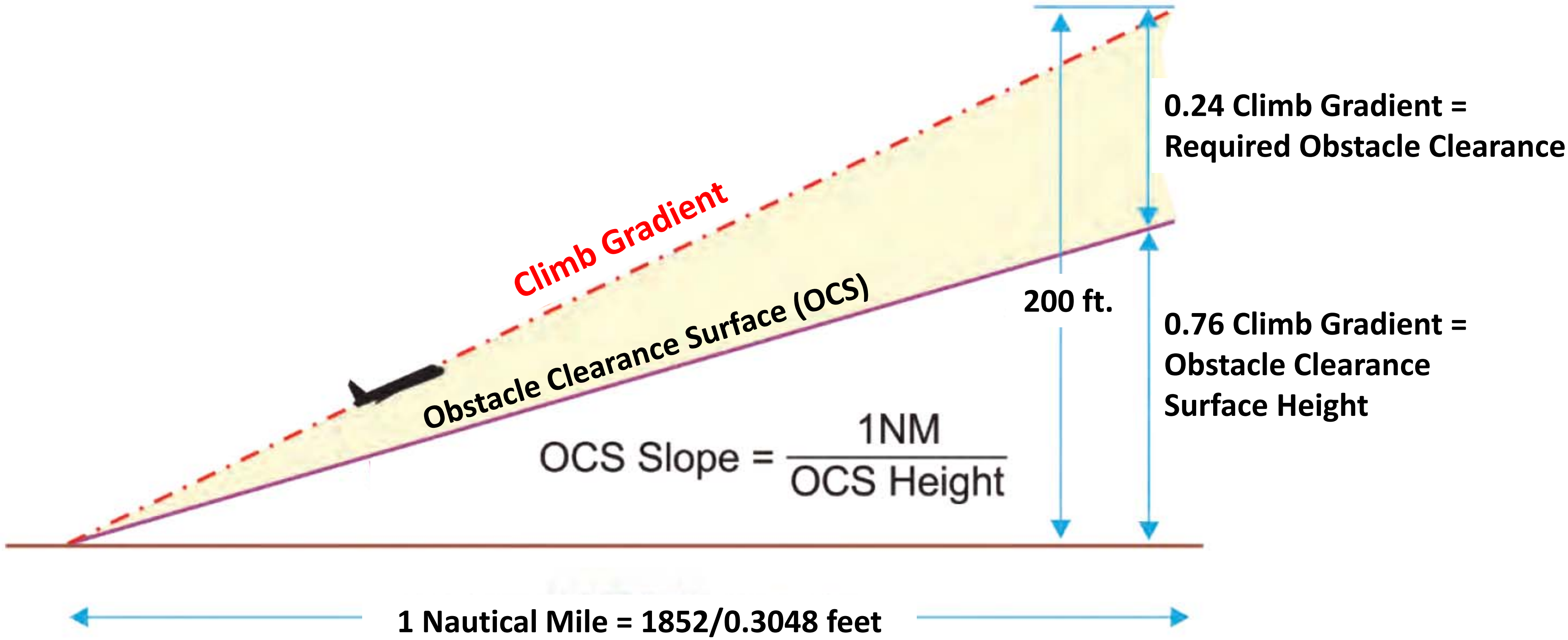
Current Airline	***OEI Procedure (12L & 12R)***
Alaska	West Turn (AC 120-91 w/course correction)
Aero Mexico	East Turn for 12L, West Turn for 12R (ICAO w/ course correction)
Air China	West Turn (ICAO w/ course correction)
American	West Turn (AC 120-91 w/course correction)
British Airways	Straight Out (ICAO) and West Turn (ICAO w/ course correction**)
Hainan	Straight Out for 12L (ICAO), West Turn for 12R (ICAO w/ course correction)
Hawaiian	West Turn (AC 120-91 w/course correction)
Air Canada	Straight Out (ICAO)
ANA	Straight Out (ICAO)
Lufthansa	Straight Out (ICAO)
Volaris	Straight Out (ICAO)
Fedex	Straight Out (ICAO)
UPS	Straight Out (ICAO)
Delta	Straight Out (AC 120-91)
JetBlue	Straight Out (AC 120-91)
Southwest	Straight Out (AC 120-91)
United	Straight Out (AC 120-91)
Frontier	TBD

** updated August 2017*
***BA utilizes the West Corridor in specific engine-out scenarios.*

WHAT IS TERPS?

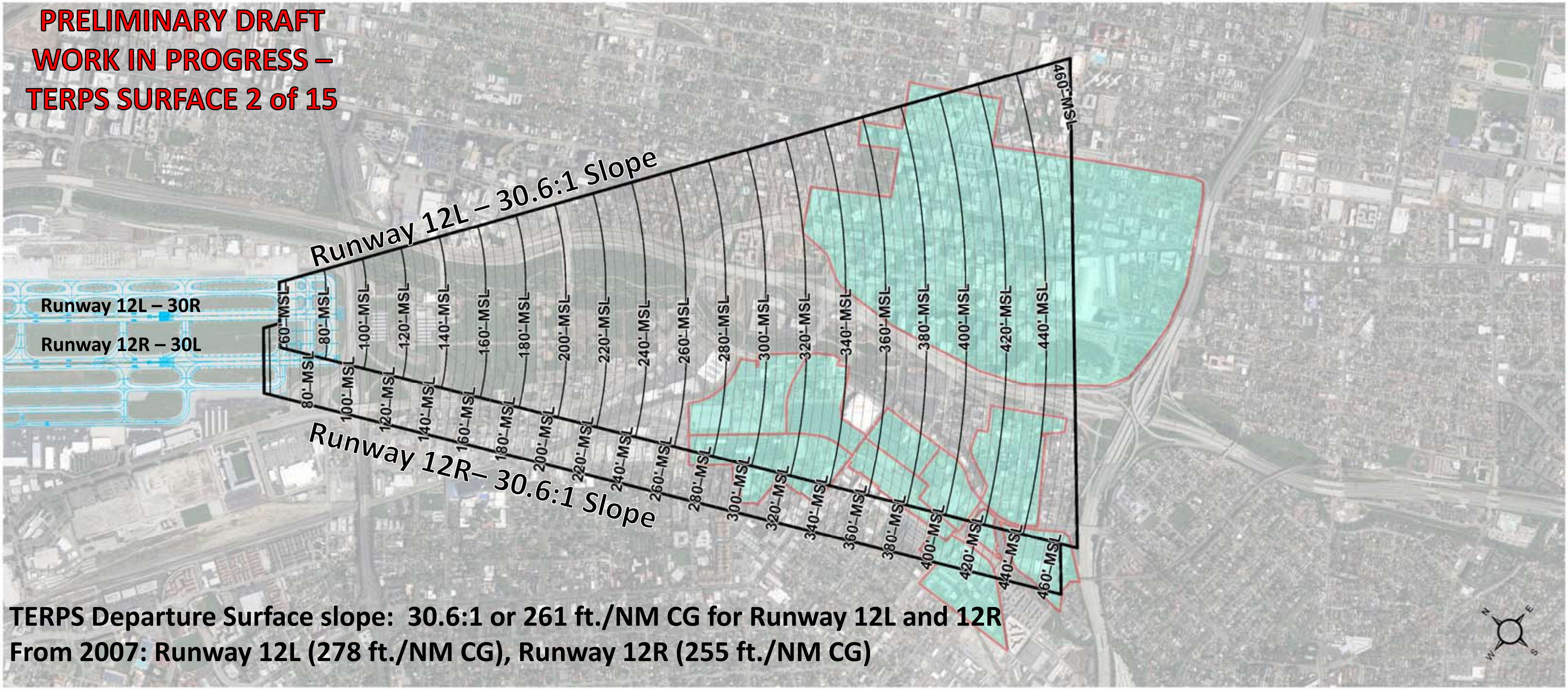
- United States Terminal Standard for Terminal Instrument Procedures (TERPS) provides standards for designing and evaluating instrument flight procedures
- Used for standard aircraft operations assuming all engines are operating
- Protects the approach and departure airspace at airport from incompatible obstacles
- FAA use TERPS for 7460 obstacle evaluation process
- Multiple TERPS procedures (15 at SJC)

TERPS DEPARTURE SURFACE OCS CRITERIA



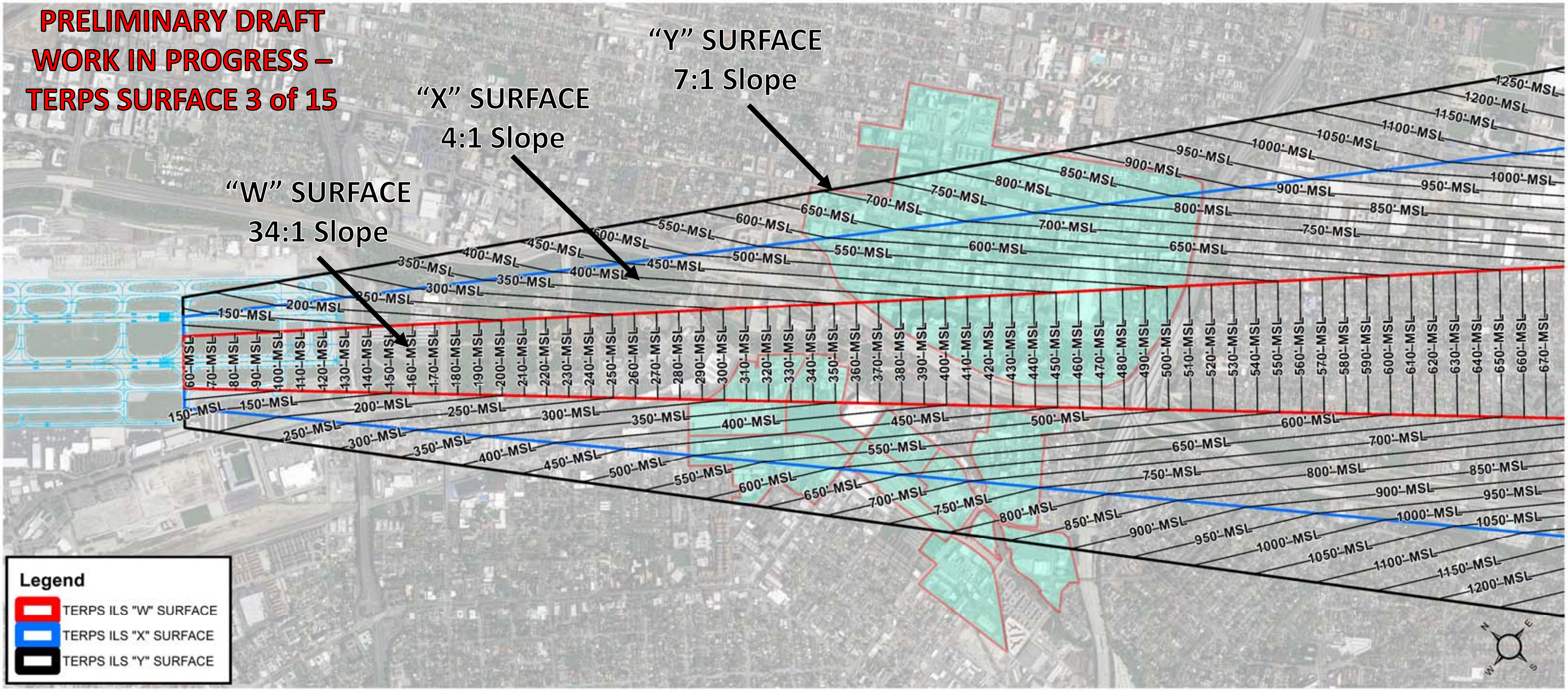
Source: United States Standard for Terminal Instrument Procedures (TERPS), Order 8260.3C – Chapter 2. General Criteria

TERPS DEPARTURE SURFACE – RUNWAY 12L & 12R



The 2018 TERPS 12L departure procedure is approximately 25 feet lower in overall elevation as compared to the 2007 departure procedure.
The 2018 TERPS 12R departure procedure is approximately 10 feet higher in overall elevation as compared to the 2007 departure procedure.

TERPS ILS CAT I/II – FINAL SEGMENT – RUNWAY 30L



NEXT STEPS TO BE COMPLETED BEFORE APRIL MEETING

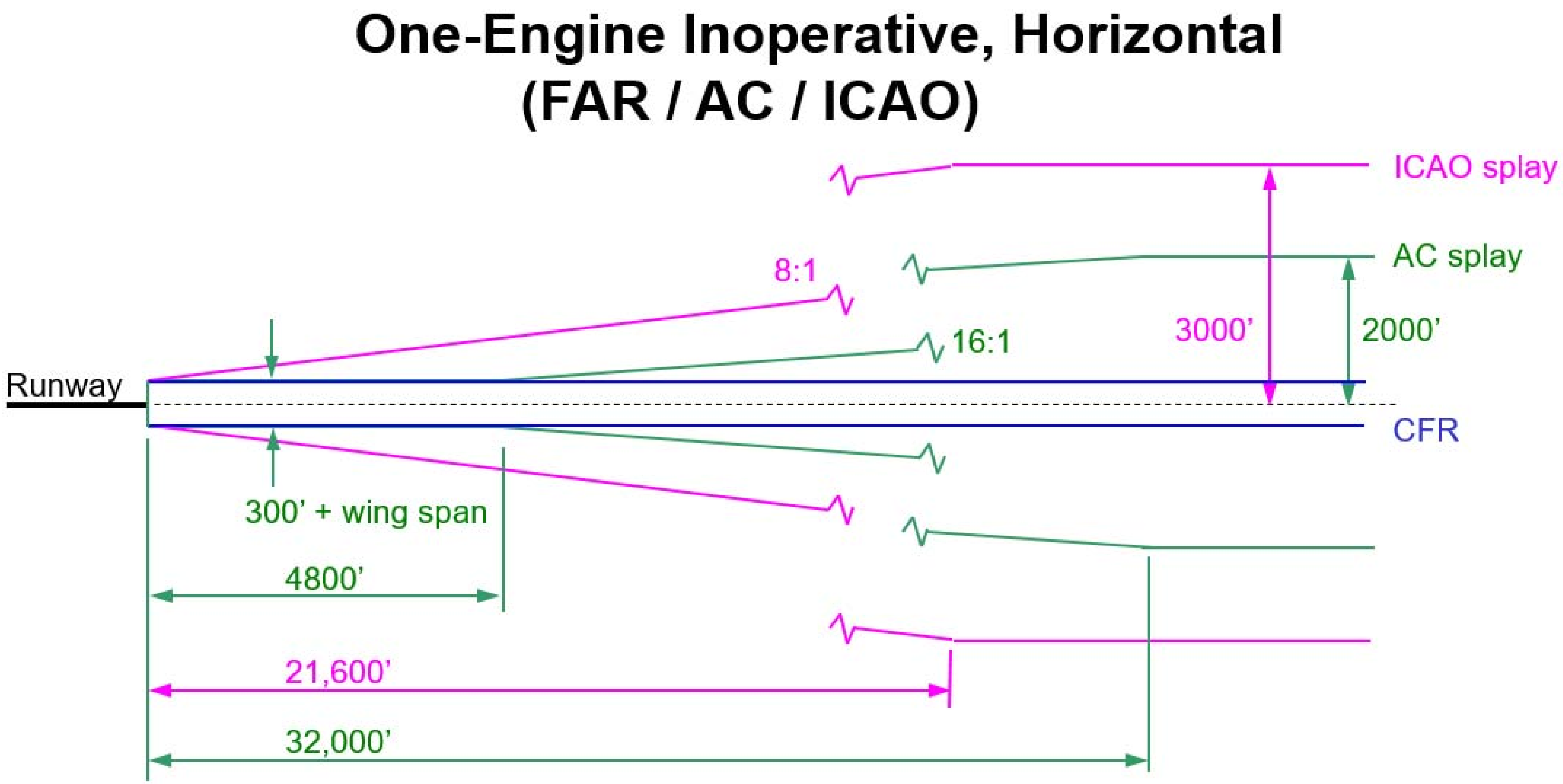
- Complete the analysis of all 15 TERPS surfaces
- Begin composite of TERPS surfaces
- Complete the analysis of the OEI surfaces
- Begin composite of OEI and TERPS surfaces
- Allowable height assessment for Downtown and Diridon Station development
- Potential OEI case studies
- Economic analysis data collection

POTENTIAL OEI CASE STUDIES

- Miami International Airport
- Las Vegas McCarran International Airport
- Phoenix Sky Harbor International Airport
- Boston Logan International Airport
- Fort Lauderdale Hollywood International Airport
- San Francisco International Airport

BACKGROUND SLIDES

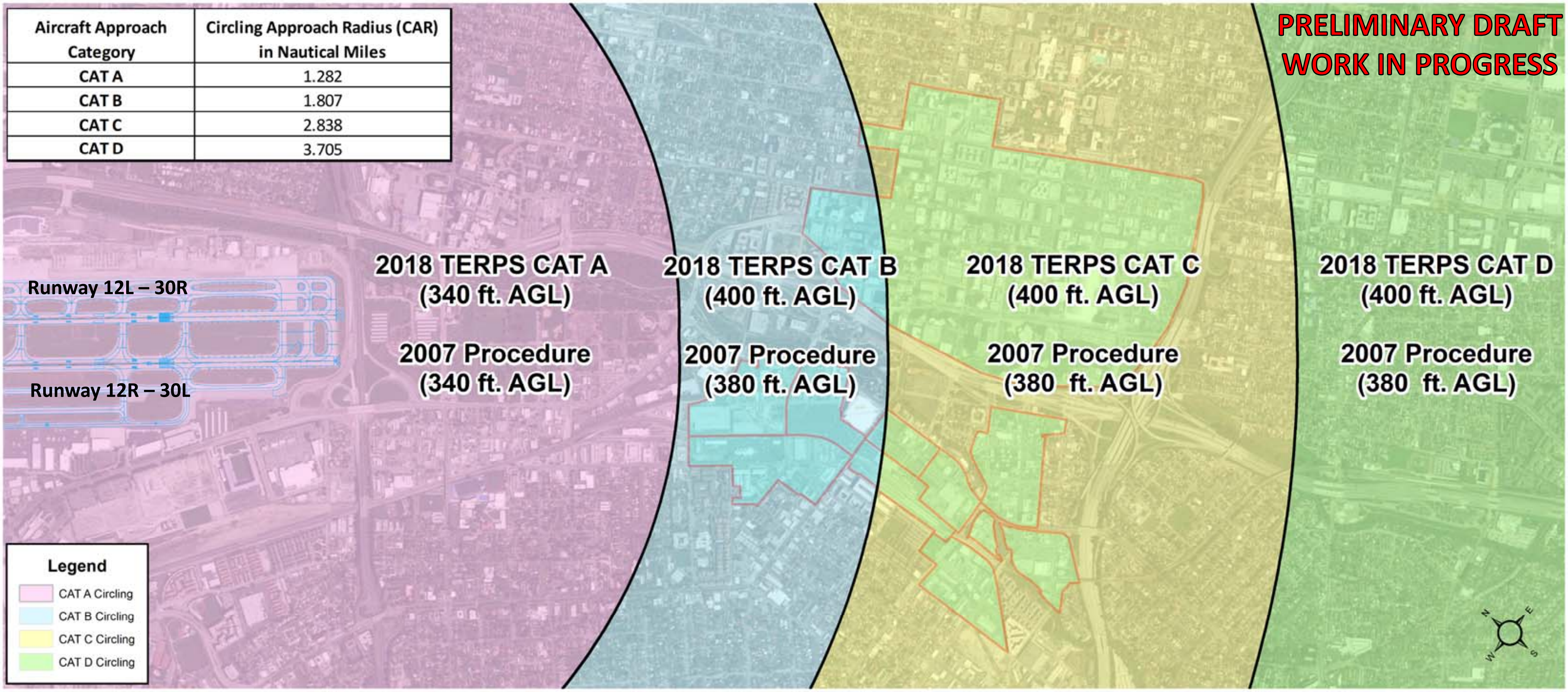
ONE-ENGINE INOPERATIVE(OEI)



Source: Airport Obstacle Analysis – FAA AFS-400 – August 3, 2006

TERPS NON-PRECISION APPROACH CIRCLING MINIMUMS

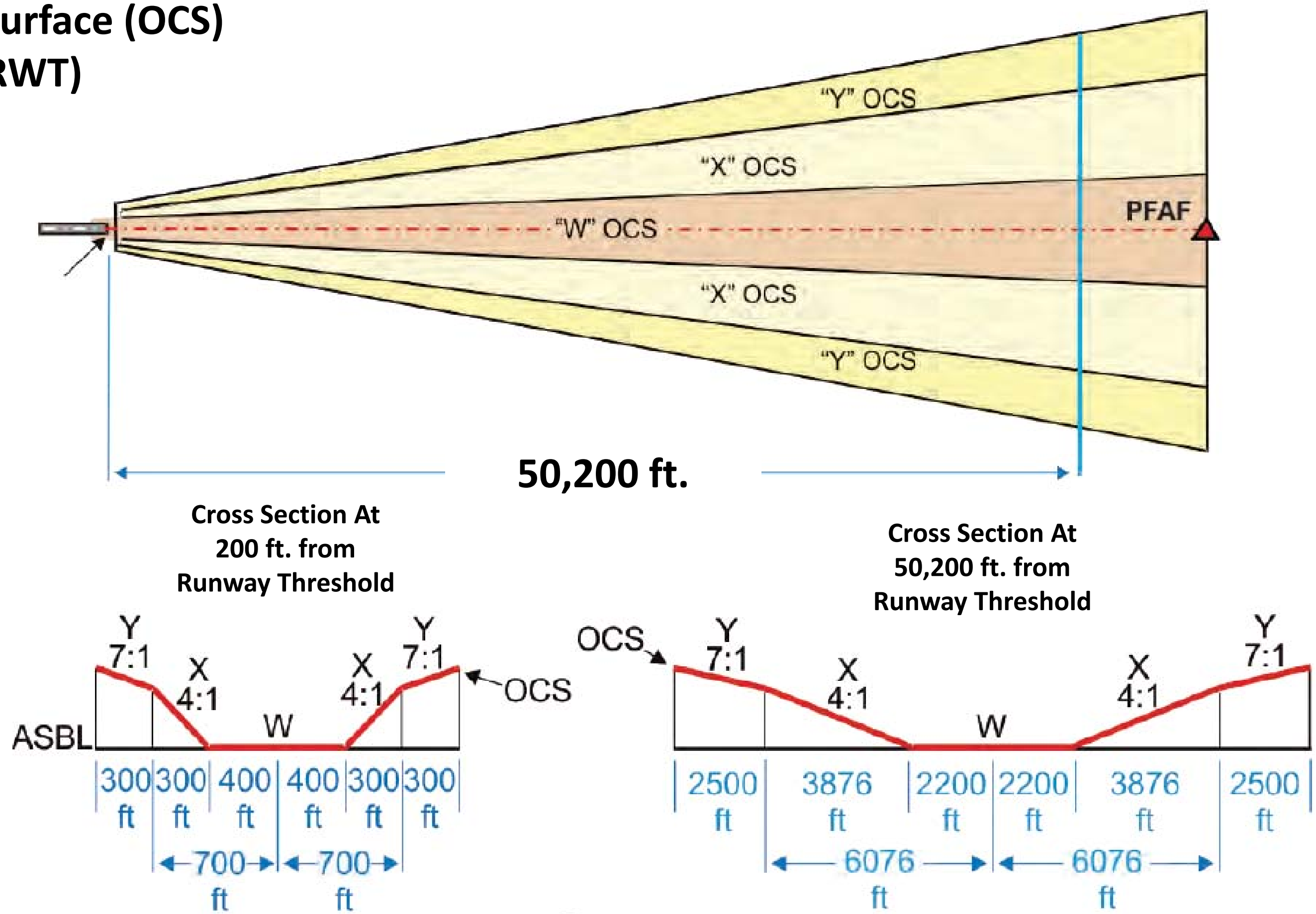
Aircraft Approach Category	Circling Approach Radius (CAR) in Nautical Miles
CAT A	1.282
CAT B	1.807
CAT C	2.838
CAT D	3.705



The 2018 CAT B, C and D circling minimums have increased 20 feet as compared to the 2007 circling minimums.

TERPS ILS CAT I/II – FINAL SEGMENT – RUNWAY 30L

Obstacle Clearance Surface (OCS)
Runway Threshold (RWT)



Source: United States Standard for Terminal Instrument Procedures (TERPS), Order 8260.3D – Chapter 10. Precision Approach and LDA with Glide Slope

LONG HAUL AIRCRAFT COMPOSITION

- Transoceanic

Aircraft	Airlines	Destinations	Number of Departures in 2017
B788	ANA, Hainan	Tokyo, Beijing	542
B789	British Airways, Hainan	London, Beijing	406
A343	Lufthansa	Frankfurt	194
A332	Air China	Shanghai	154

- Transcontinental

Aircraft	Airlines	Destinations	Number of Departures in 2017
B737/738	Alaska, United, Southwest	Newark, Baltimore	794
A320	JetBlue	New York, Boston	516
B739	Alaska, United	Newark	136
A321	JetBlue	New York	124

- Hawaii

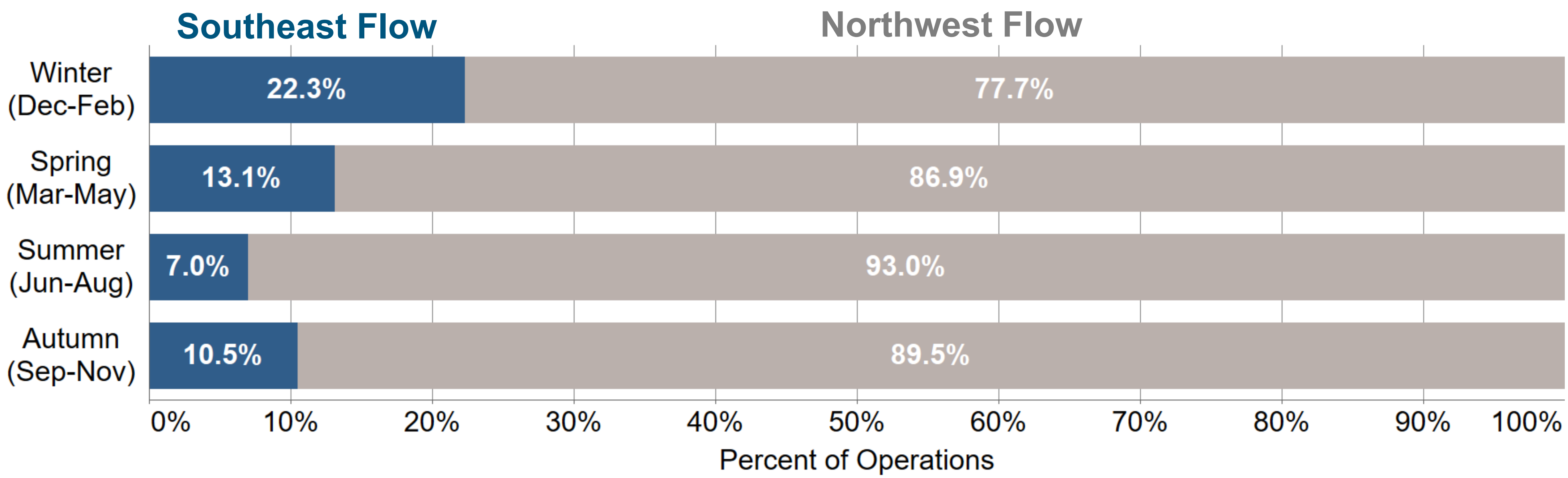
Aircraft	Airlines	Destinations	Number of Departures in 2017
B738	Alaska	Honolulu, Kahului, Lihue, Kona	700
B763	Hawaiian	Honolulu, Kahului	647
B739	Alaska	Honolulu, Kona	219

Source: ANOMS

WIDE-BODY AIRCRAFT SEAT COUNT

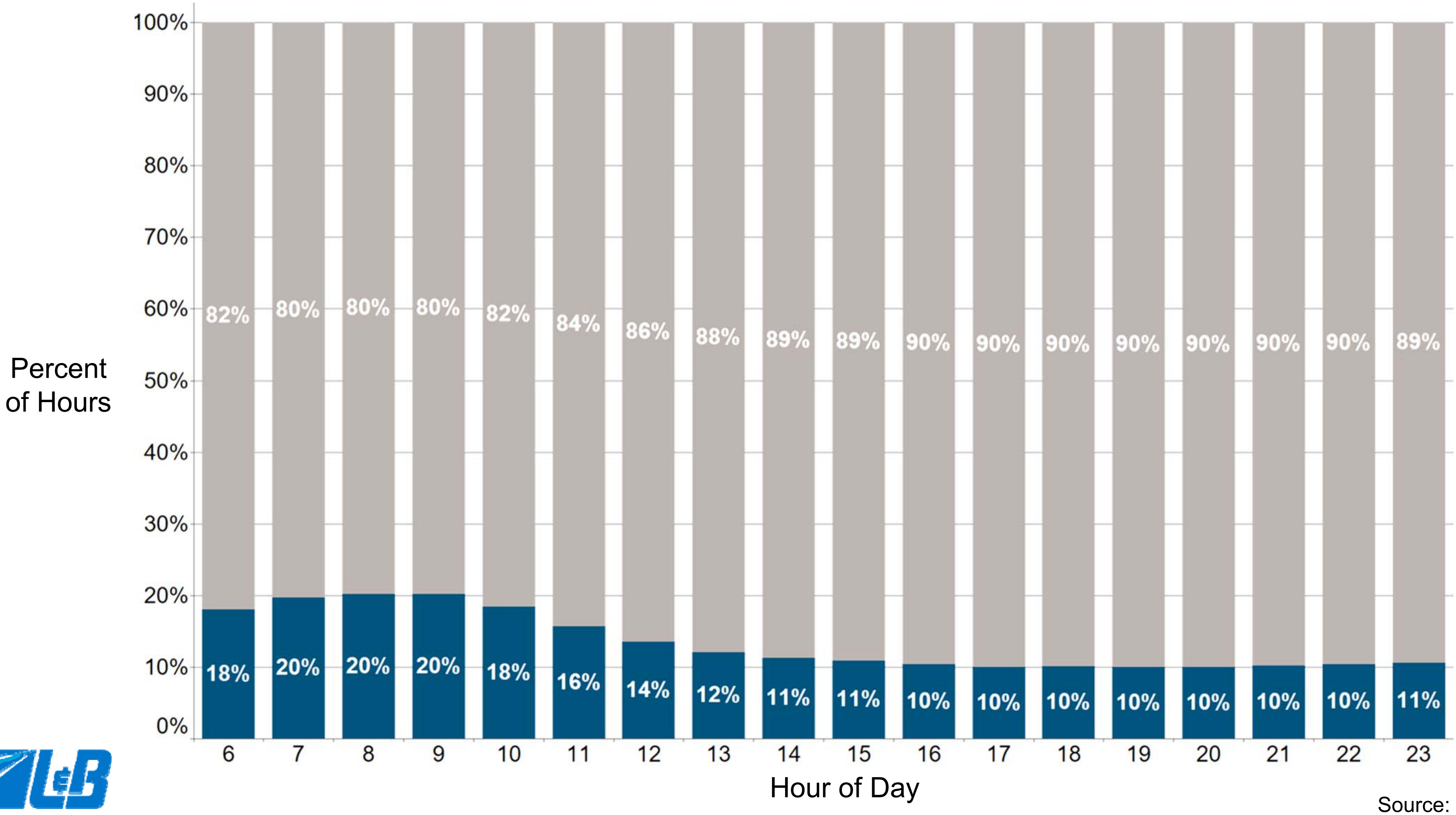
Source: ANOMS

SEASONAL OPERATIONS BY FLOW (2003 – 2017)



Source: ANOMS

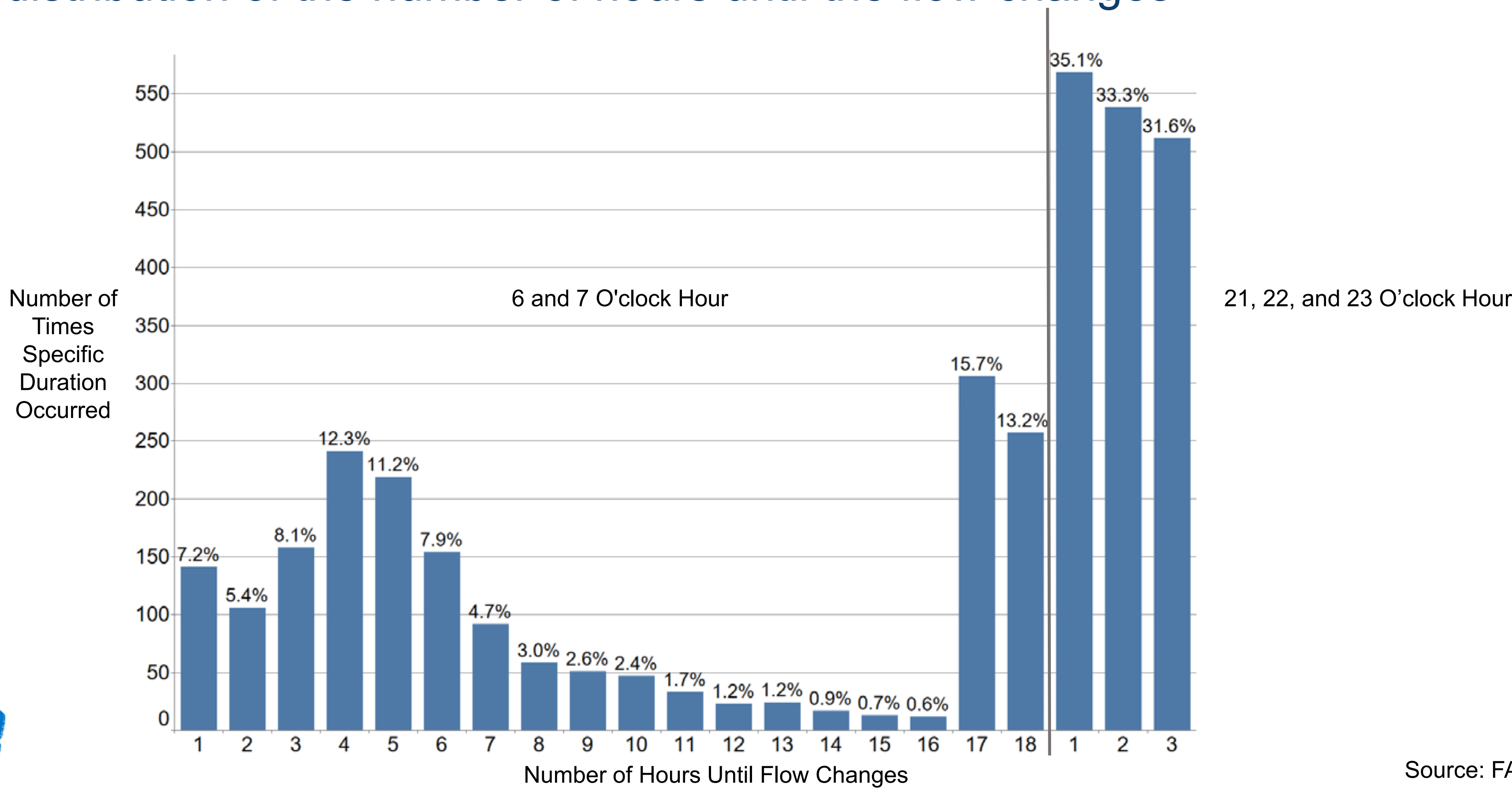
SOUTHEAST FLOW BY HOUR OF DAY (2003 – 2017)



Source: FAA ASPM

EXPECTED FLOW DURATION (2003 – 2017)

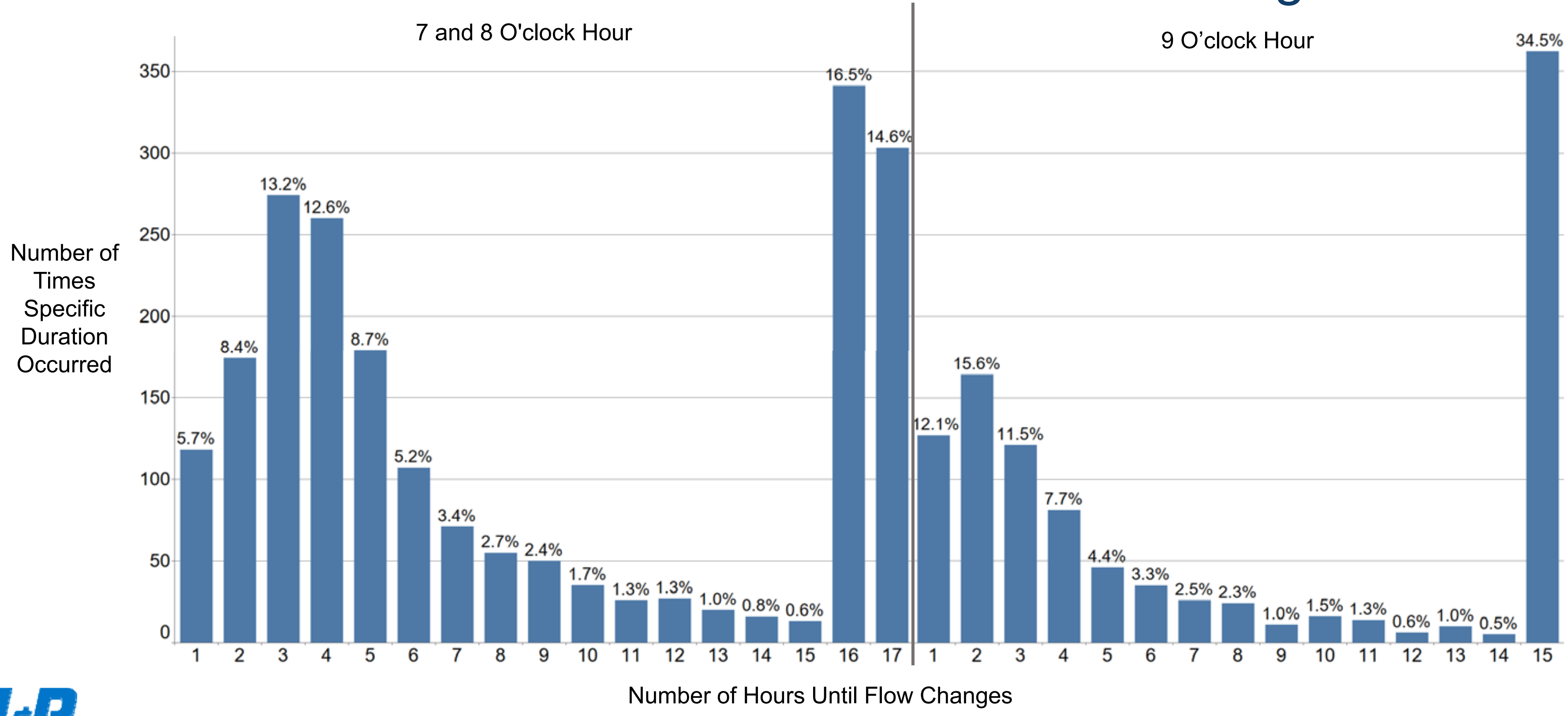
For the Transcontinental departure peak (6, 7, 21, 22, and 23 o'clock hours), the distribution of the number of hours until the flow changes



Source: FAA ASPM

EXPECTED FLOW DURATION (2003 – 2017)

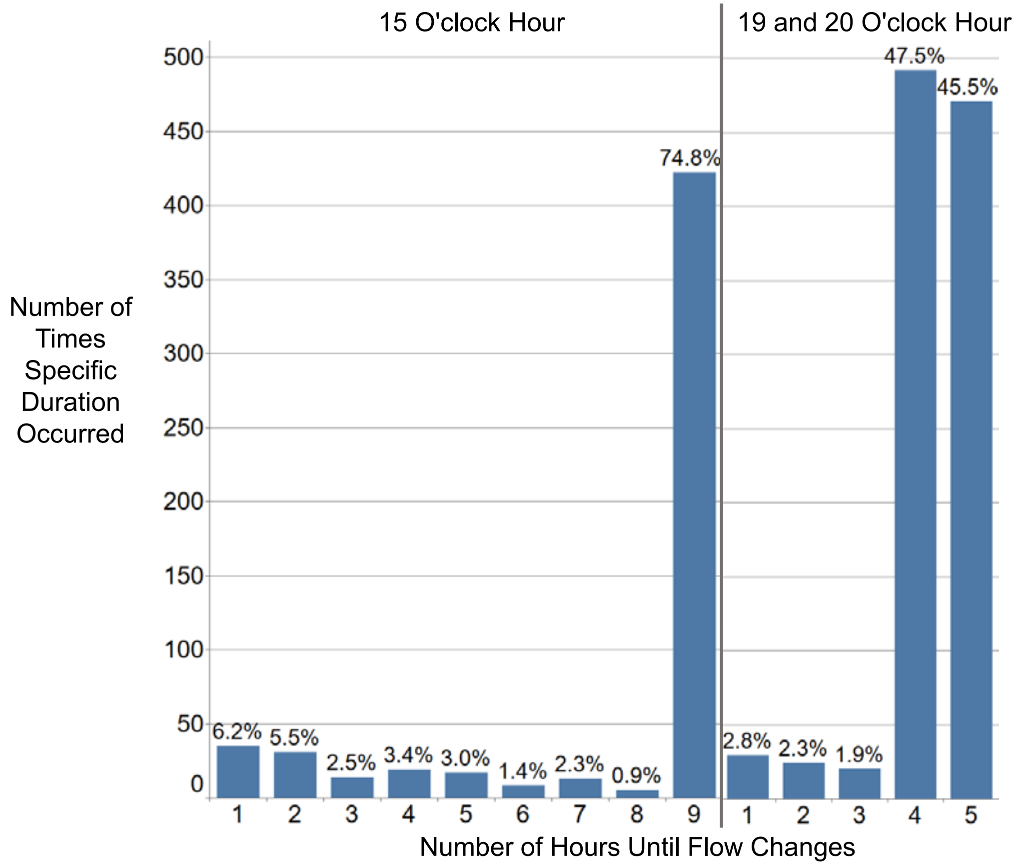
For the Hawaii departure peak (7, 8, and 9 o'clock hours), the distribution of the number of hours until the flow changes



Source: FAA ASPM

EXPECTED FLOW DURATION (2003 – 2017)

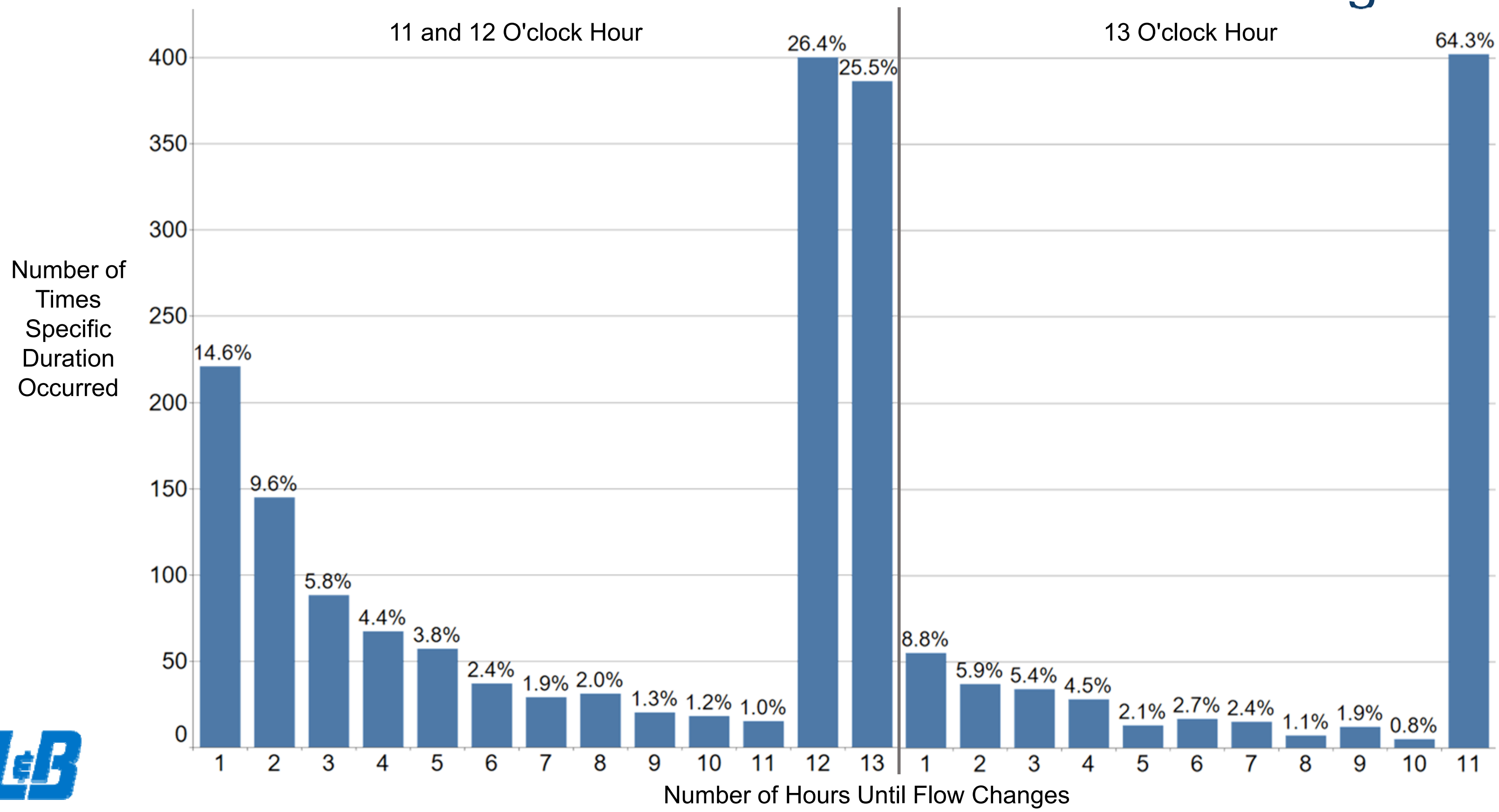
For the Europe departure peak (15, 19, and 20 o'clock hours), the distribution of the number of hours until the flow changes



Source: FAA ASPM

EXPECTED FLOW DURATION (2003 – 2017)

For the Asian departure peak (11, 12, and 13 o'clock hours), the distribution of the number of hours until the flow changes



Source: FAA ASPM

WHAT ENGINE OUT PROCEDURES **ARE NOT**

- EOPs are not TERPS criteria
- EOPs do not provide take-off data
- EOPs do not provide standard ATC departure
- EOPs are not developed or flight checked
- EOPs are not promulgated under CFR Part 97
- EOPs are not “approved” by the FAA, they are “accepted”

Source: Airport Obstacle Analysis – FAA AFS-400 – August 3, 2006

EOP VERTICAL & HORIZONTAL CLEARANCE

- Vertical Clearance Requirements For Two-Engine Turbojet Aircraft
  - CFR Part 25: Min Gross Flight Path: 2.4%
  - CFR Part 25: Min Net Flight Path: 2.4% - 0.8%=1.6% (62.5:1 Slope)
  - CFR Part 121.189.D(2): Net flight path must clear all obstacles vertically by 35 feet
- Horizontal Requirements
  - FAA AC 120-91 (many major US carriers)
    - Incorporates best industry practices to provide an operationally realistic horizontal clearance plane
    - 16:1 ‘splay’ reaching maximum +/- 2,000’
- ICAO Annex 6 (some major US carriers and international)
  - 8:1 ‘splay’ reaching maximum +/- 3,000’

Source: Airport Obstacle Analysis – FAA AFS-400 – August 3, 2006

TYPICAL OEI QUESTIONS

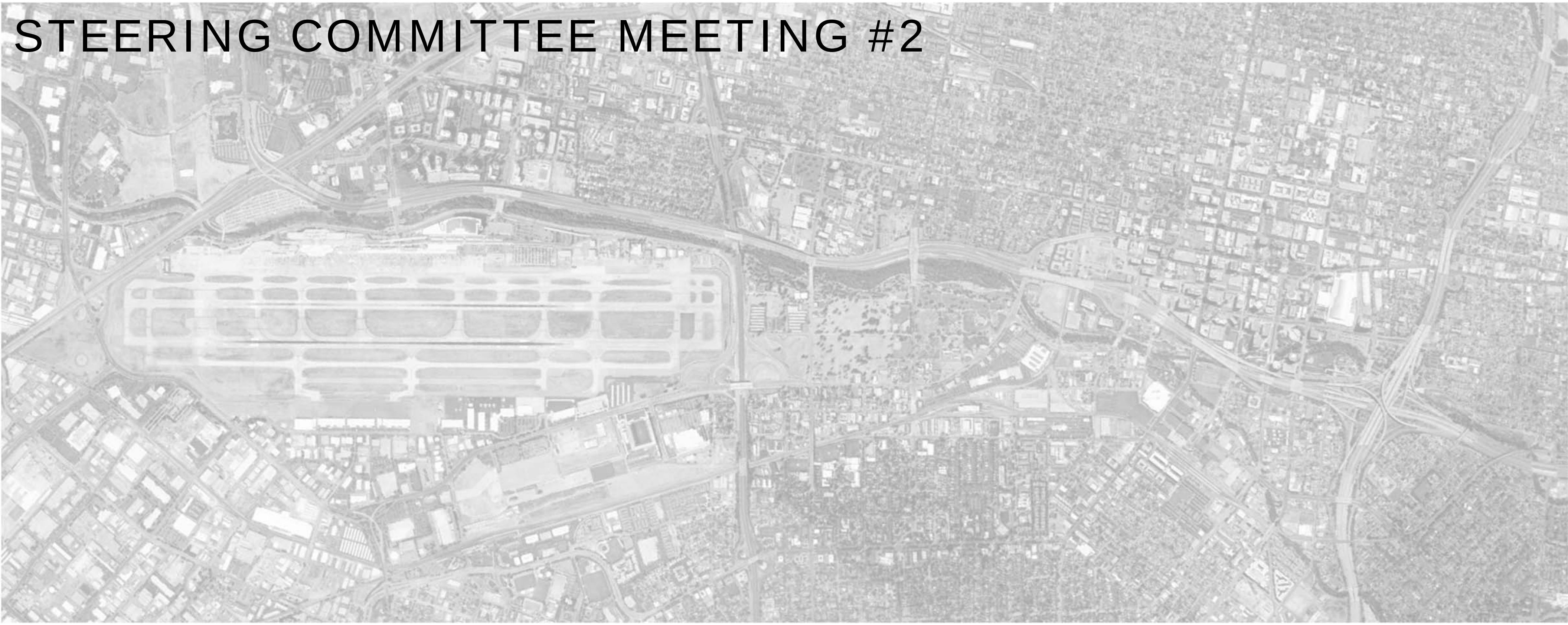
- How does it affect the air service capability of my airport?
- Is it a safety or economic issue?
- Is it all or some aircraft?
  - New vs. old aircraft
  - Variety of engines types available for an aircraft model
  - International vs. domestic
- Is there precedent to protect for OEI?

AIRSPACE OBSTACLE ANALYSIS AT SJC

- Previous airspace obstruction study for SJC and downtown San Jose was completed in 2008
- Established the West OEI corridor protection surface
- Composite airspace height map was developed consisting of controlling Part 77, OEI and TERPS areas south of SJC including downtown

DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

STEERING COMMITTEE MEETING #2

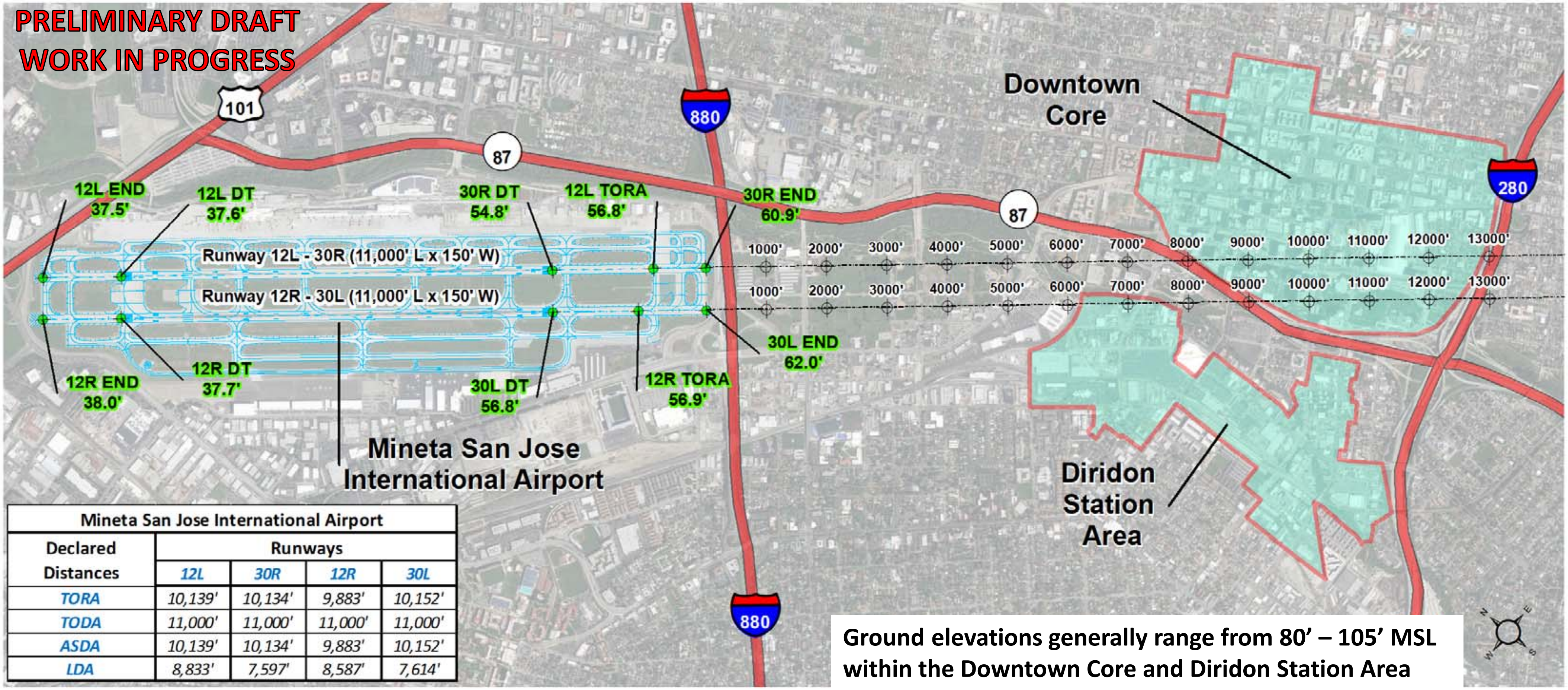


April 19, 2018

AGENDA

- Introduction
- Case Studies
  - Miami International Airport (MIA)
  - Ronal Reagan Washington National Airport (DCA)
  - Las Vegas McCarran International Airport (LAS)
- Composite Airspace Surfaces (Preliminary)
- Next Steps

EXISTING AIRPORT LAYOUT & STUDY EVALUTION AREA



Mineta San Jose International Airport				
Declared Distances	Runways			
	12L	30R	12R	30L
TORA	10,139'	10,134'	9,883'	10,152'
TODA	11,000'	11,000'	11,000'	11,000'
ASDA	10,139'	10,134'	9,883'	10,152'
LDA	8,833'	7,597'	8,587'	7,614'

Ground elevations generally range from 80' – 105' MSL within the Downtown Core and Diridon Station Area

Graphic Source: Landrum & Brown
Aerial Image Source: Bing

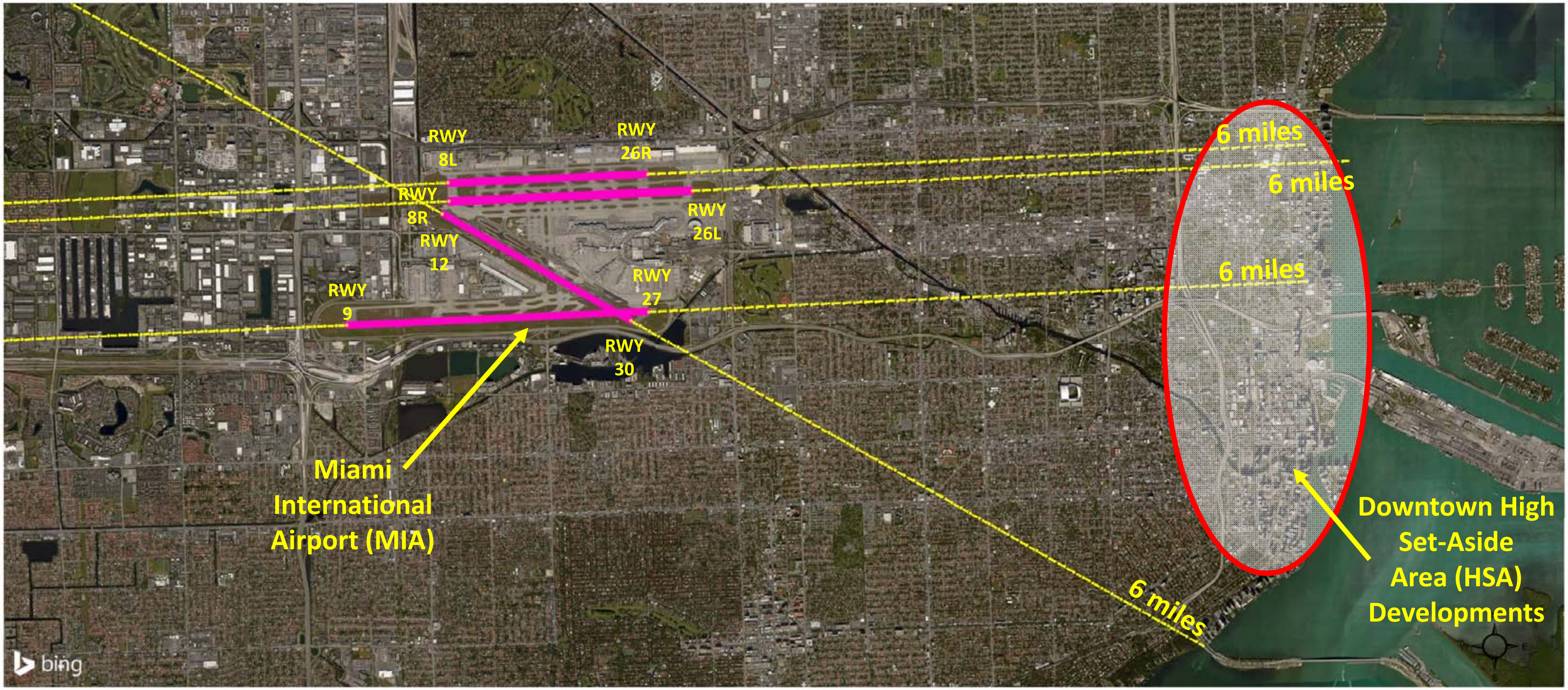
CASE STUDIES

- Staff from the following airports were interviewed as part of the case studies:
  - Miami International Airport (MIA)
  - Washington Reagan National Airport (DCA)
  - Las Vegas McCarran International Airport (LAS)
- Best practices for the protection of airspace
- Best practices for accommodating community development

MIAMI INTERNATIONAL AIRPORT (MIA) CASE STUDY

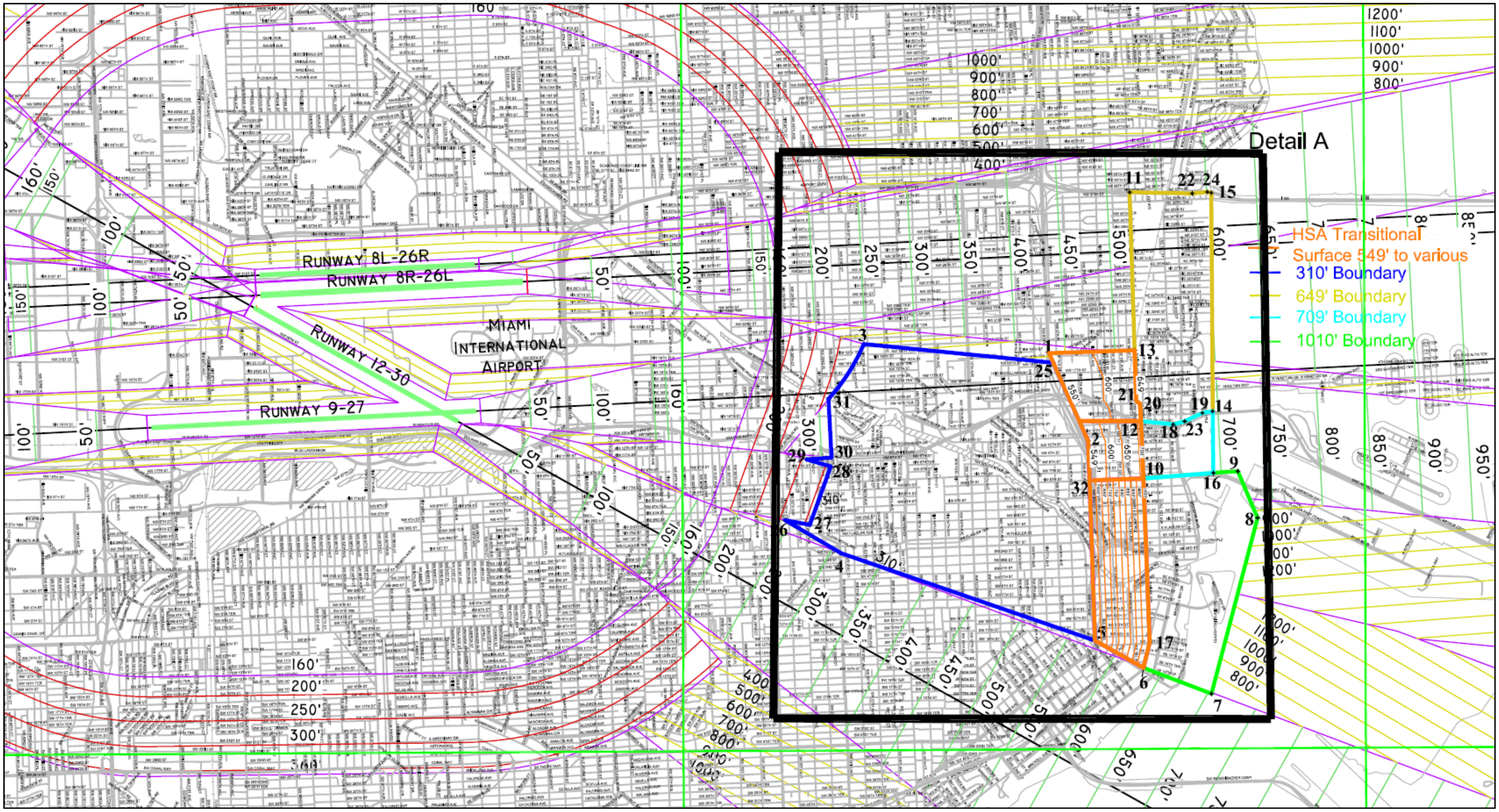
Similarities	Airport works with developers identifying available heights Development community and airport rely on one another Protects for OEI
Differences	High-rise development is 6 miles from runways and off runway centerlines Ordinance-based Primarily Part 77 and OEI surfaces for arrivals and departures Straight-out OEI on all runways at 65:1 slopes for first 10,000 feet
Best Practices	Identified "High Structure Set-Aside" (HSA) area HSA based on TERPS and OEI criteria Airport worked with development community, airlines, and FAA to create HSA

MIA CASE STUDY – AIRPORT OVERVIEW



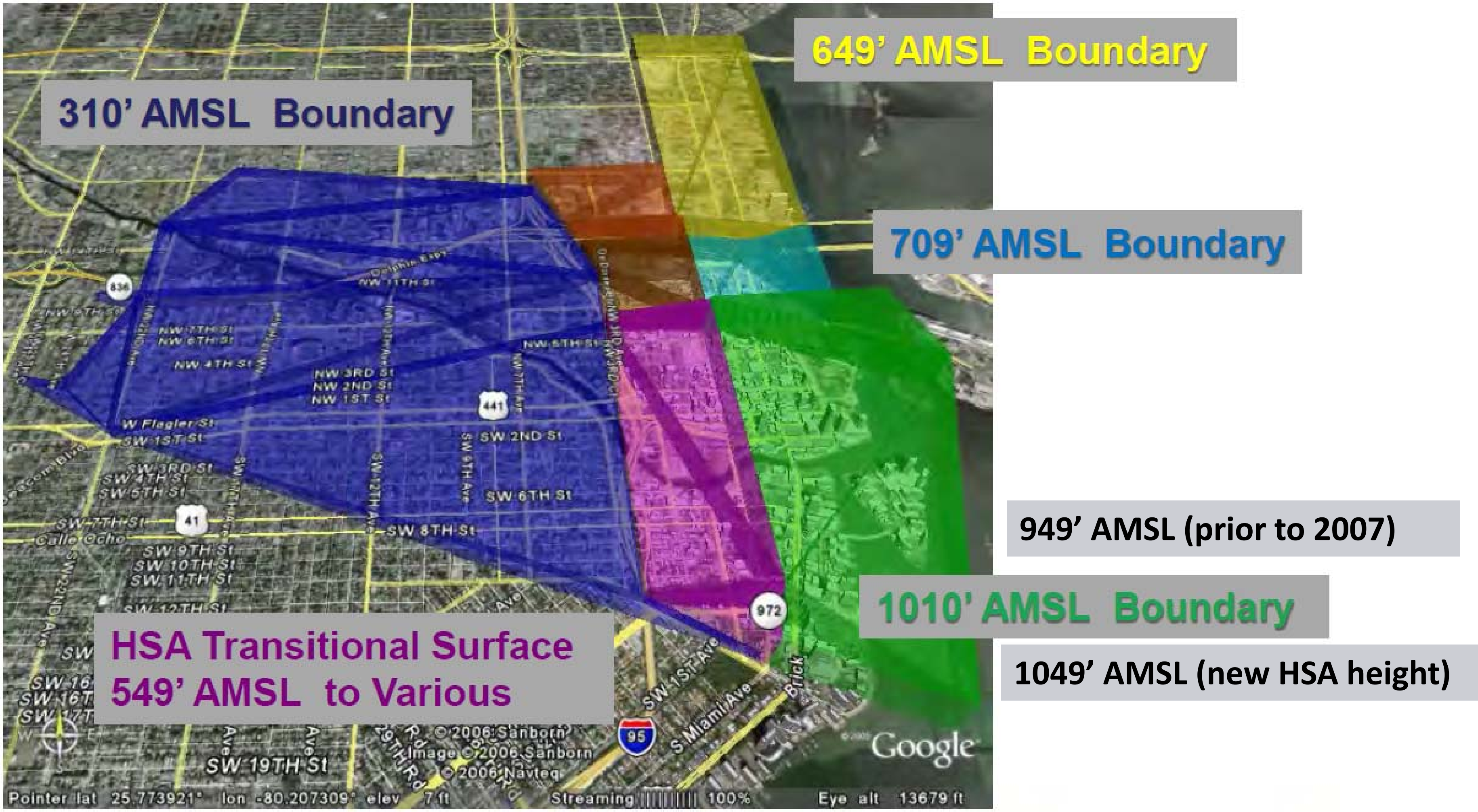
Graphic Source: Landrum & Brown
Aerial Image Source: Bing

MIA CASE STUDY - HEIGHT ZONING MAP



Graphic Source: Miami International Airport – Height Zoning Map – September 2006

MIA CASE STUDY – HSA DISTRICT ELEVATIONS

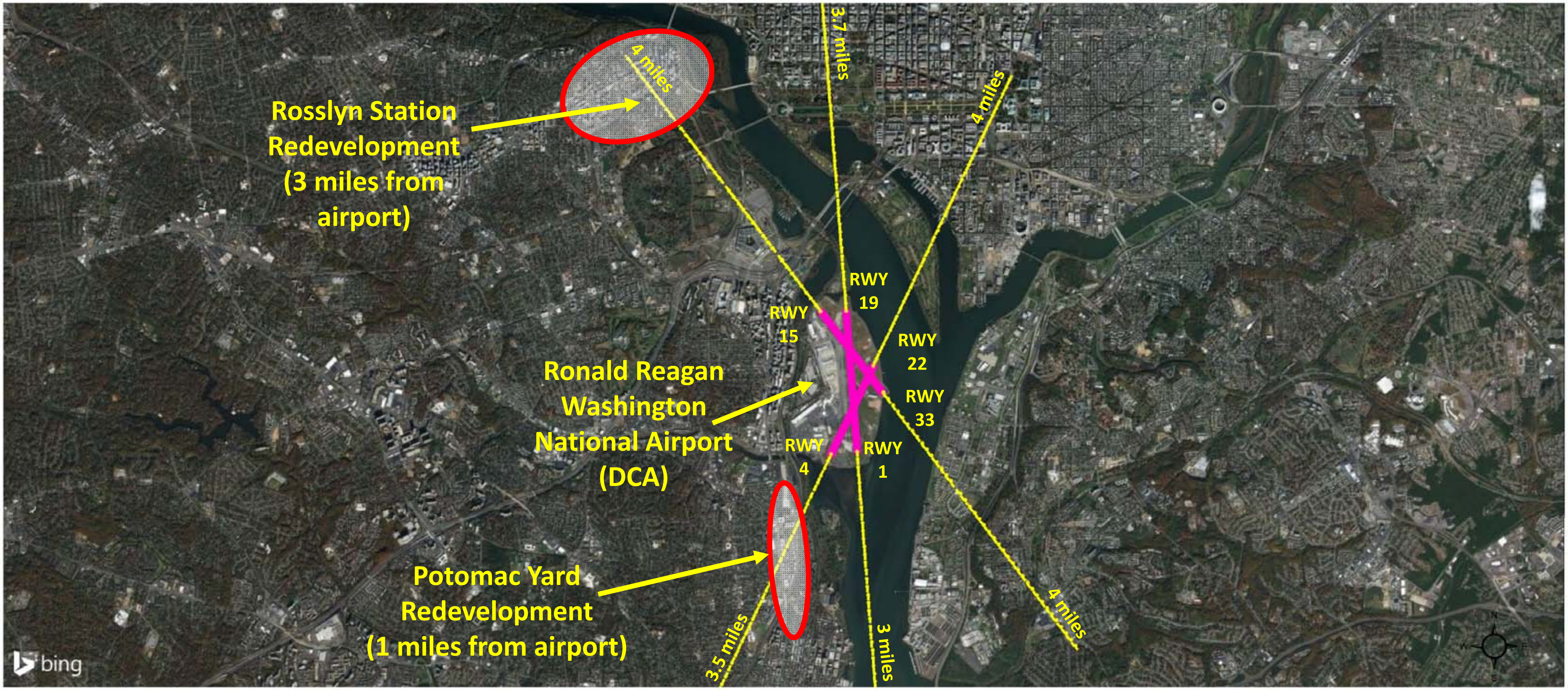


Graphic Source: Miami Airport – Airspace Solutions & Protection in the City of Miami “Changes in Zoning Surfaces and UAV Restrictions” Presentation. Jose A. Ramos, December 16, 2015

RONALD REAGAN WASHINGTON NATIONAL AIRPORT (DCA) CASE STUDY

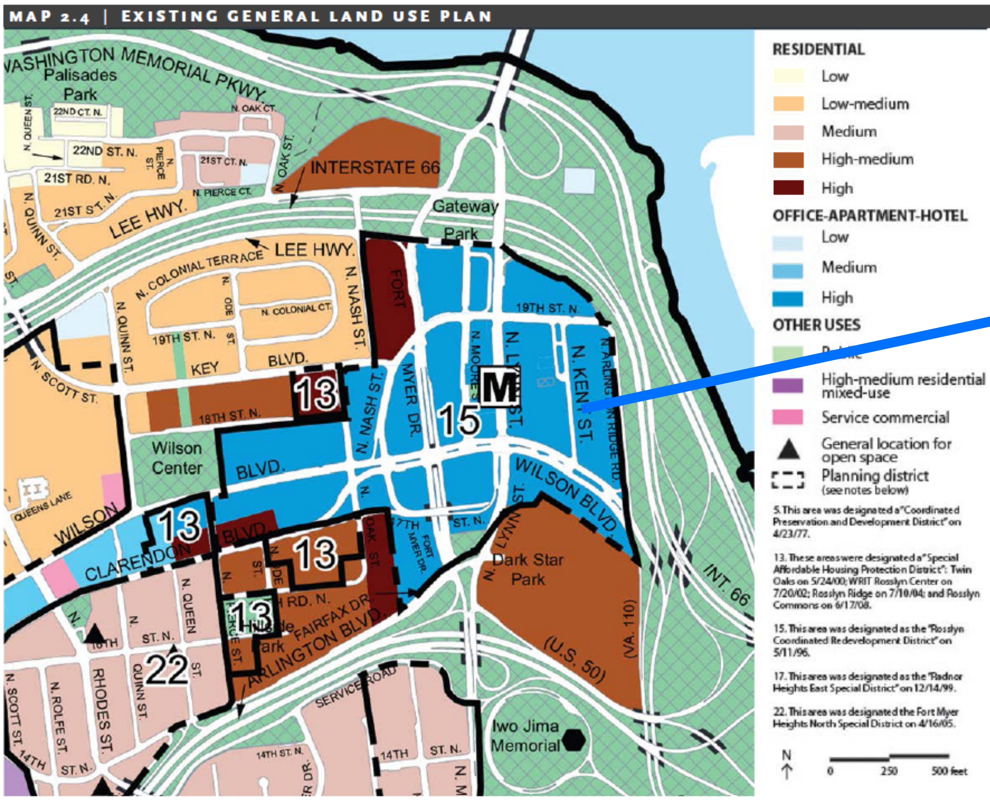
Similarities	Airport works with developers identifying available heights Use of TERPS and OEI composite airspace height mapping Rosslyn high-rise development area 3.0 miles from runway along flight path Potomac Yard redevelopment area 1.0 miles from runway along flight path Policy-based
Differences	Unique OEI corridors based on restricted airspace
Best Practices	Redevelopment plans integrating airspace protection surfaces FAA, Airport and development community coordination to adjust procedures

DCA CASE STUDY – AIRPORT OVERVIEW



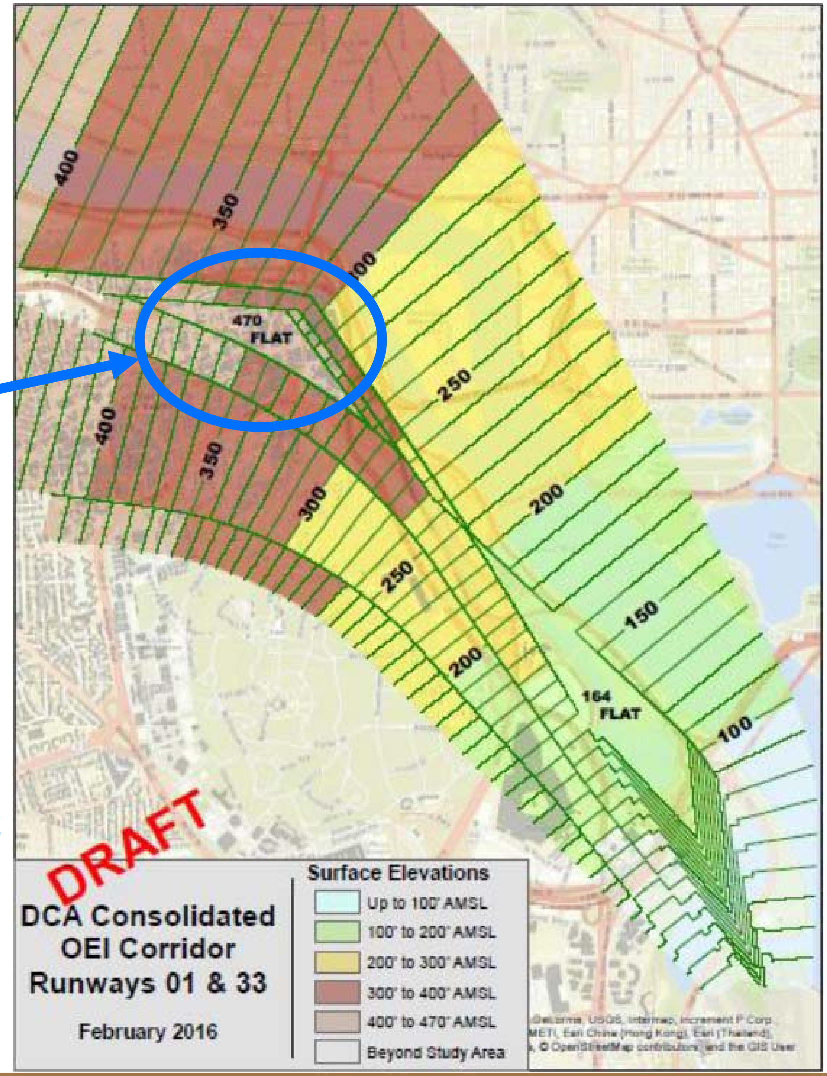
Graphic Source: Landrum & Brown
Aerial Image Source: Bing

DCA CASE STUDY – ROSSLYN STATION REDEVELOPMENT



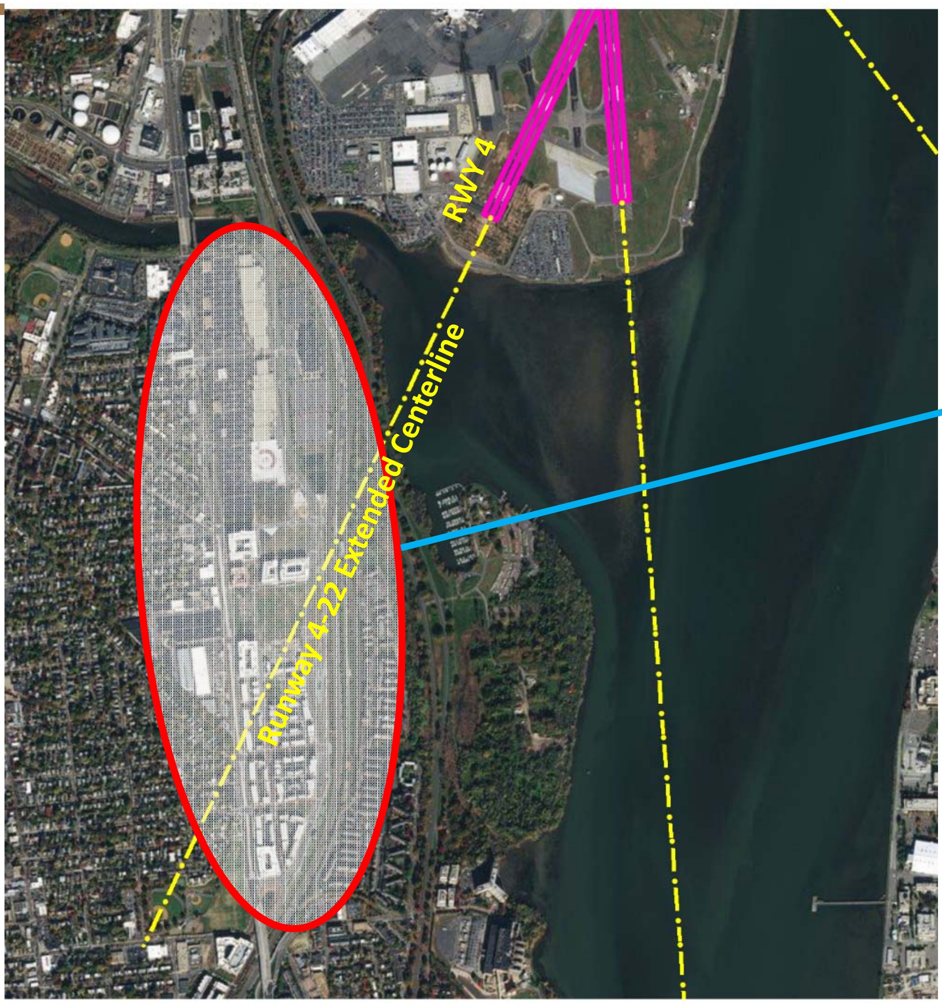
The RCRD (#15) is comprised almost entirely of the "High" Office-Apartment-Hotel and the "High" Residential land use designations.

Graphic Source: http://arlingtonva.s3.amazonaws.com/wp-content/uploads/sites/31/2015/12/151208_RosslynSectorPlan-HI.pdf



Graphic Source: Metropolitan Washington Airports Authority

DCA CASE STUDY – POTOMAC COURTYARD REDEVELOPMENT



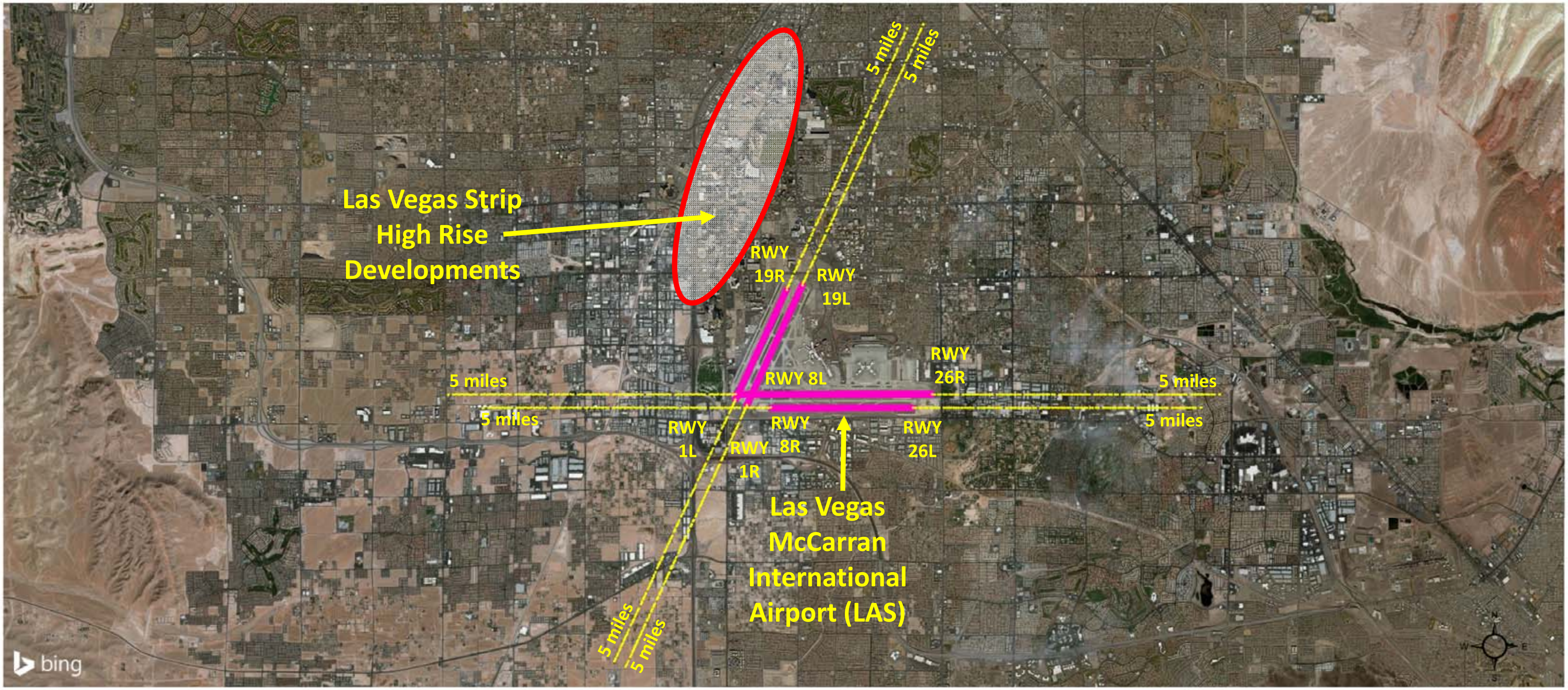
Graphic Source: Landrum & Brown
Aerial Image Source: Bing

Graphic Source: https://www.alexandriava.gov/uploadedFiles/F

LAS VEGAS MCCARRAN INTERNATIONAL AIRPORT (LAS) CASE STUDY

Similarities	Development community and airport rely on one another Protects for OEI Airlines use straight-out and course corrections for OEI procedures
Differences	High-rise development is generally off runway centerline (about 0.5 to 1.2 miles) Airport Directors Permit needed for development No height mapping provided – rely on FAA determinations and airline input on OEI
Best Practices	Airport works to be a good neighbor to development community High-rise design adapted to airspace surfaces or runway protection zones Works with airlines to determine if project would have OEI impacts Maintaining air service capability and runway capacity is a priority

LAS CASE STUDY – AIRPORT OVERVIEW



Graphic Source: Landrum & Brown
Aerial Image Source: Bing

LAS CASE STUDY – BUILDING DESIGN EXAMPLES

Hard Rock Cafe

Image Source http://hospitalitybusinessnews.com/wp-content/uploads/2015/05/hard-rock-las-vegas.jpg

The Stratosphere Hotel and Casino

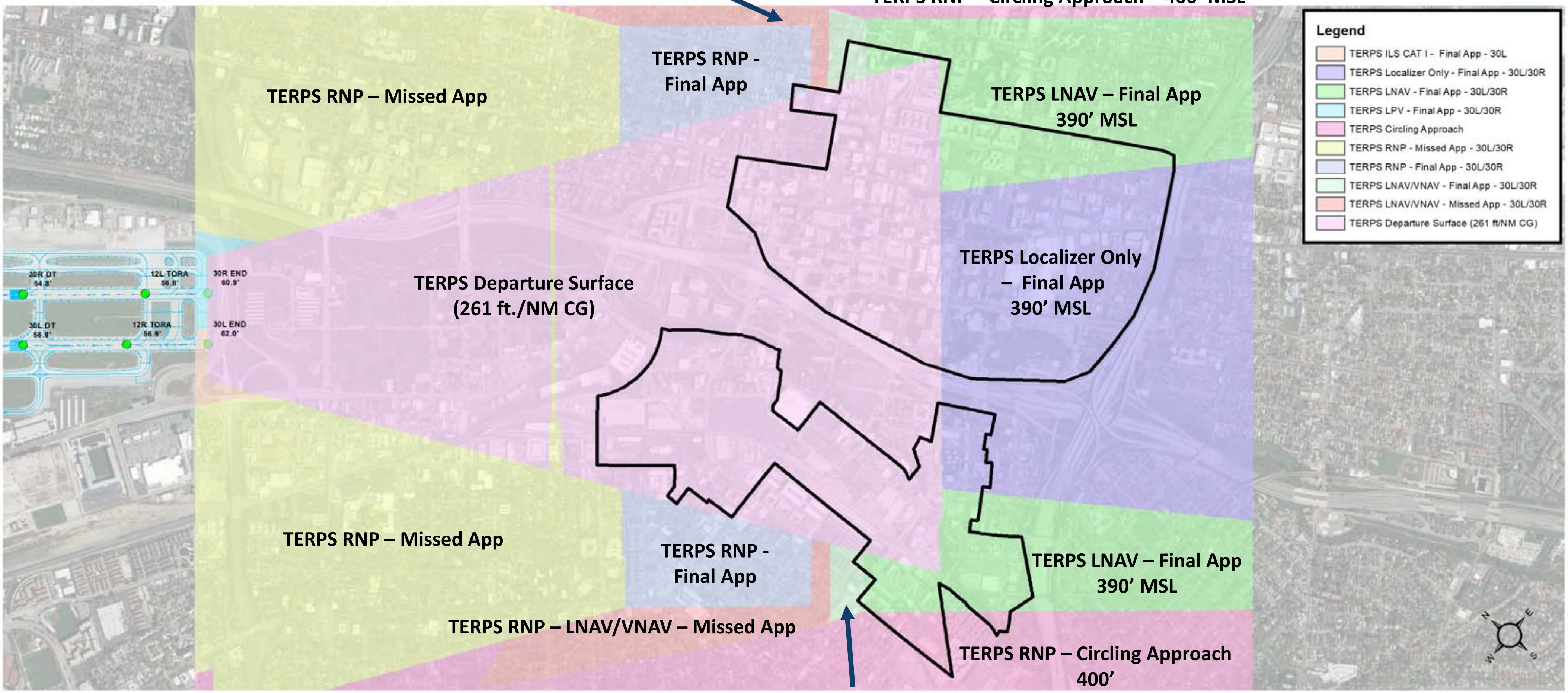
Image Source https://www.casino.org/news/stratosphere-las-vegas-strip-owner-county-disagree

Composite Airspace Surfaces (Preliminary)

TERPS SURFACE ASSESSMENT

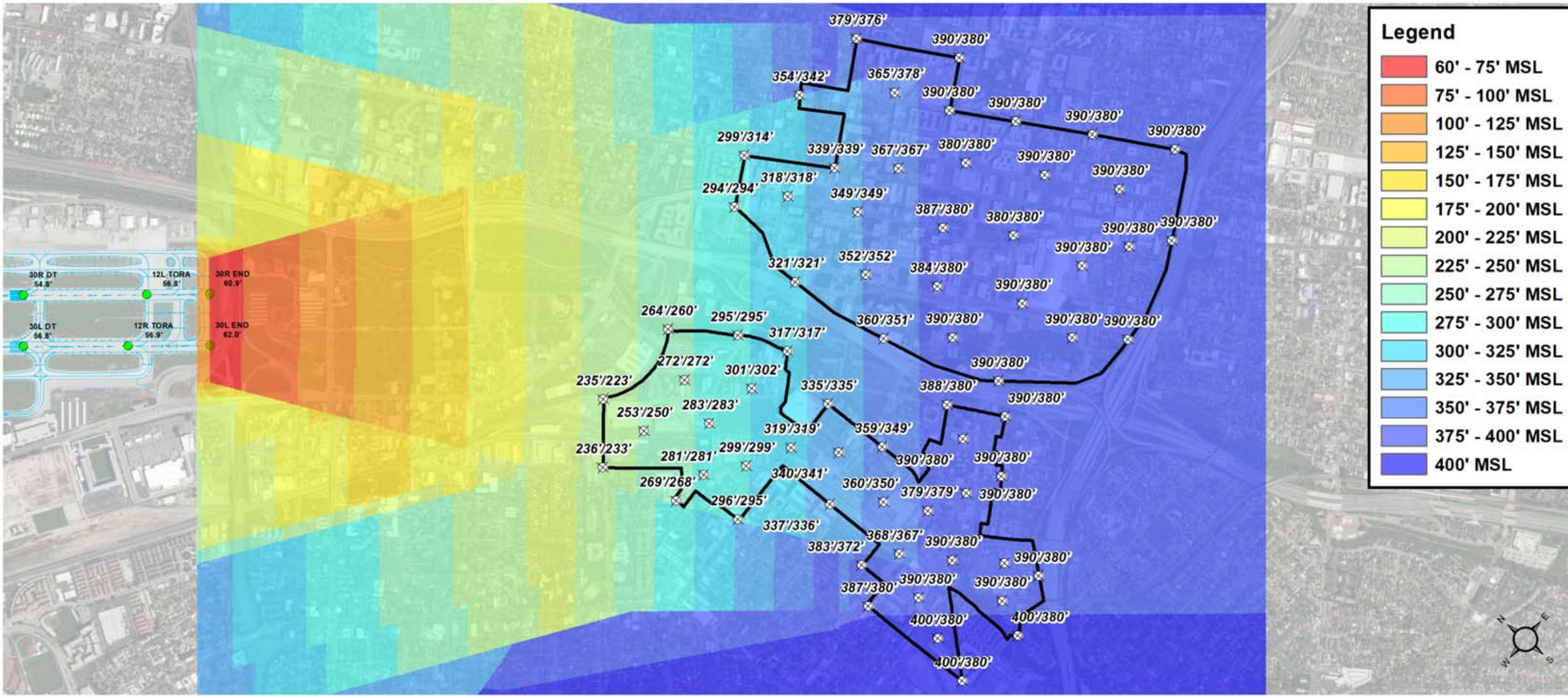
- Various TERPS surfaces were evaluated and constructed based on review of current published arrival and departure procedures at SJC
  - ILS Instrument Approach (CAT I & II)
  - Localizer Only (LOC)
  - Lateral Navigation (LNAV)
  - Lateral Navigation/Vertical Navigation (LNAV-VNAV)
  - Required Navigation Performance (RNP)
  - Instrument Departure Procedures
- Identification of lowest controlling TERPS and OEI surfaces over the Downtown Core and Diridon Station Area developments

TERPS COMPOSITE - LOWEST CONTROLLING SURFACES



Graphic Source: Landrum & Brown
Aerial Image Source: Bing

TERPS COMPOSITE – ELEVATION PROFILE



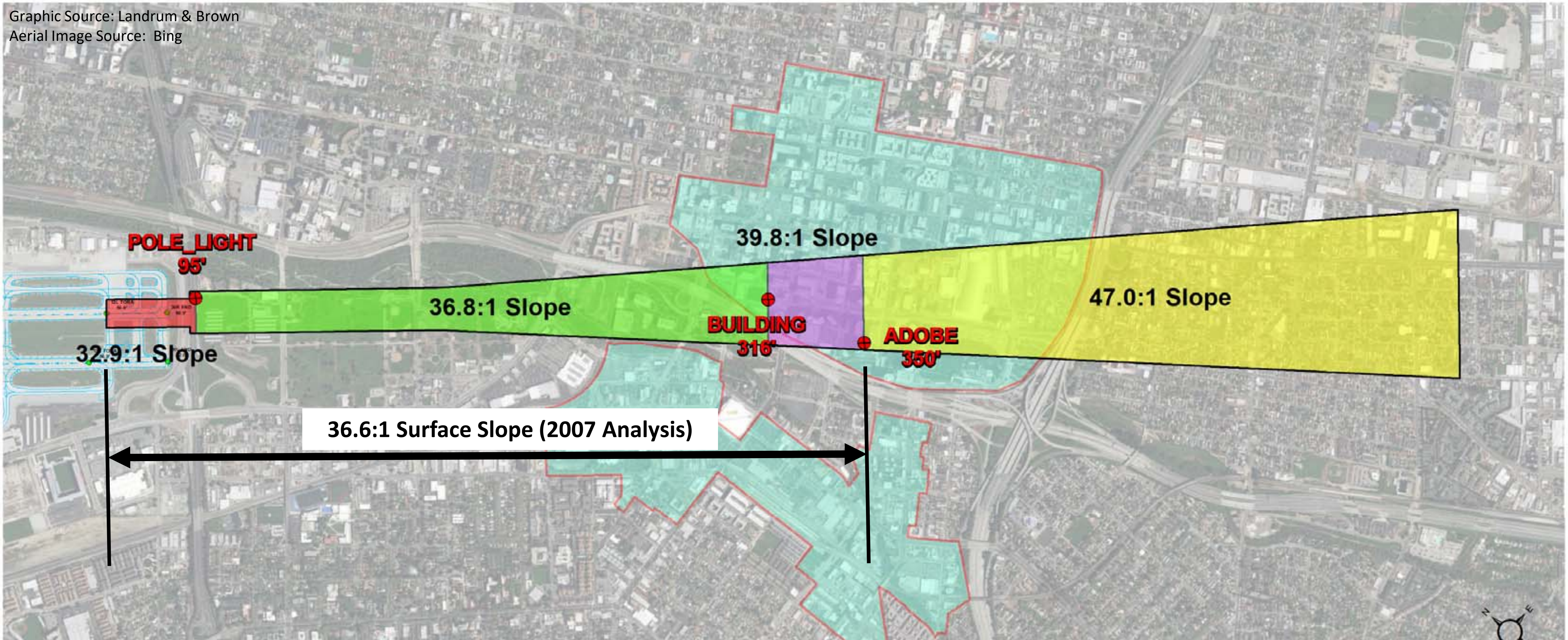
Graphic Source: Landrum & Brown
Aerial Image Source: Bing

Random Spot Elevation Comparison:
000' (2018 TERPS COMPOSITE)/000' (2007 TERPS COMPOSITE)

OEI SURFACES

- Conducted an obstacle analysis using the recently approved Airport obstacle data set
- Compared new obstacles against existing OEI surface slopes
- Identified penetrations of critical man-made obstacles
- Recommended OEI surface slopes to clear critical obstacles

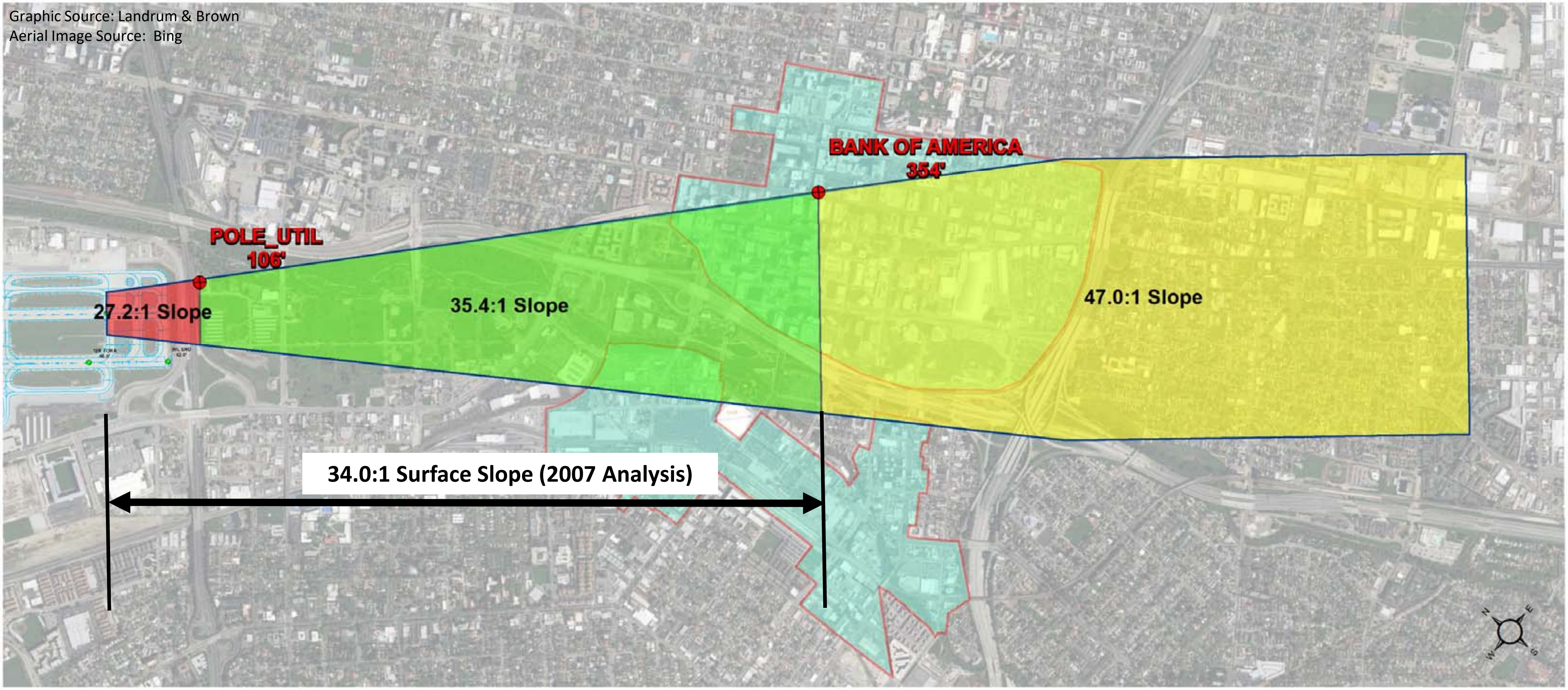
OEI SURFACE – AC 120-91 RUNWAY 12L



Note: The 316 foot MSL controlling obstacle is the Axis residential high-rise building located at 38 North Almaden Blvd.

Note: The Adobe building was the original controlling obstacle for the AC 120-91 Runway 12L surface in 2007. Changes to the slope of the surface beyond Adobe remain consistent with 2007 analysis as there are no other controlling obstacles over the Downtown Core.

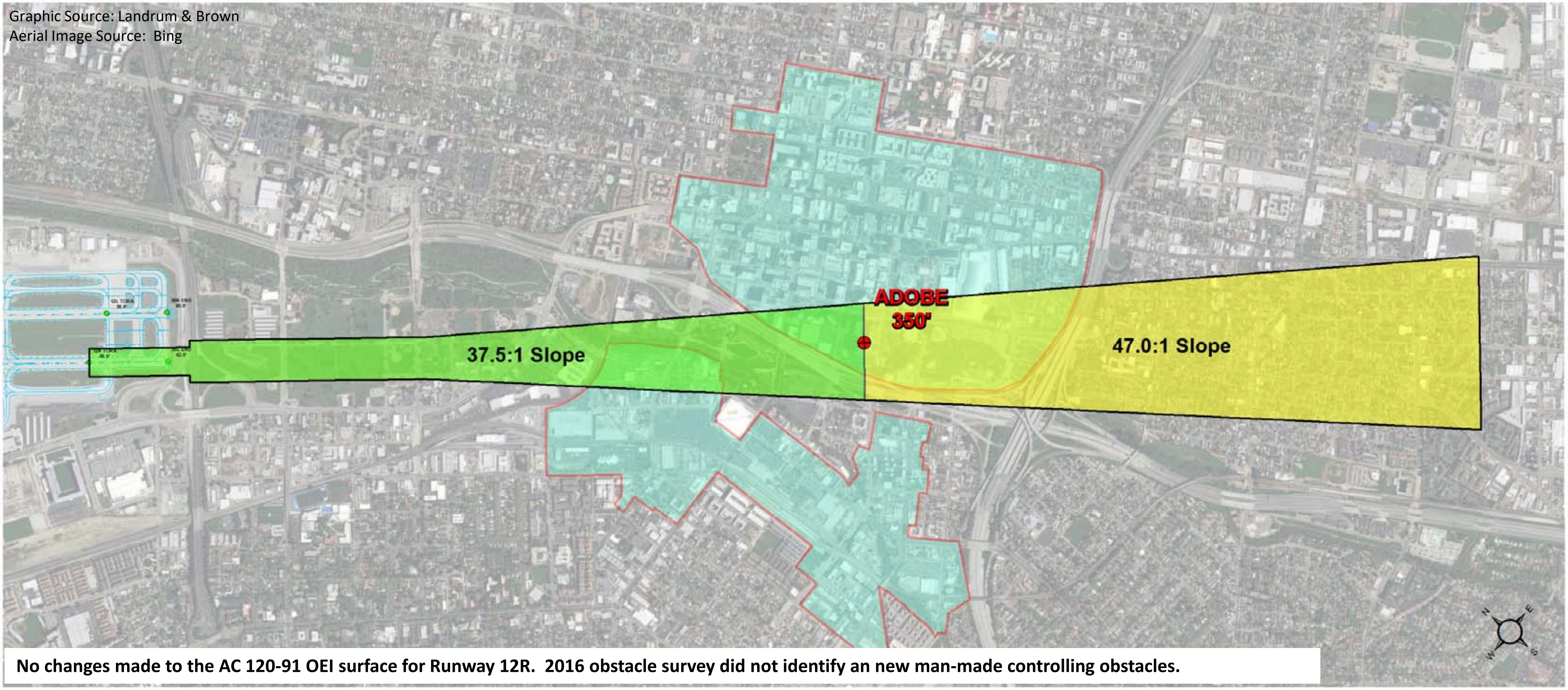
OEI SURFACE – ICAO OEI RUNWAY 12L



Note: The Bank of America building was the original controlling obstacle for the ICAO OEI Runway 12L surface in 2007. Changes to the slope of the surface beyond Bank of America remain consistent with 2007 analysis as there are no other controlling obstacles over the Downtown Core.

OEI SURFACE – AC 120-91 RUNWAY 12R

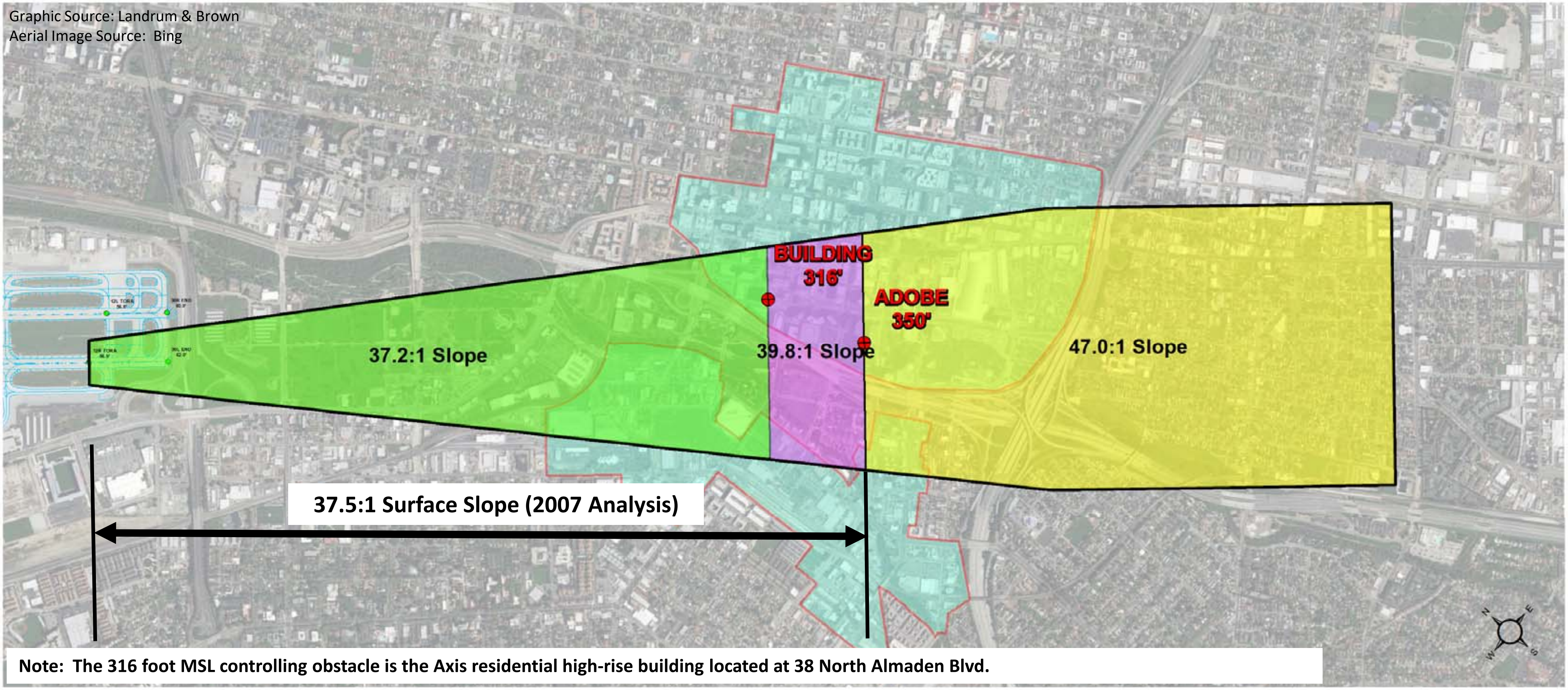
Graphic Source: Landrum & Brown
Aerial Image Source: Bing



No changes made to the AC 120-91 OEI surface for Runway 12R. 2016 obstacle survey did not identify an new man-made controlling obstacles.

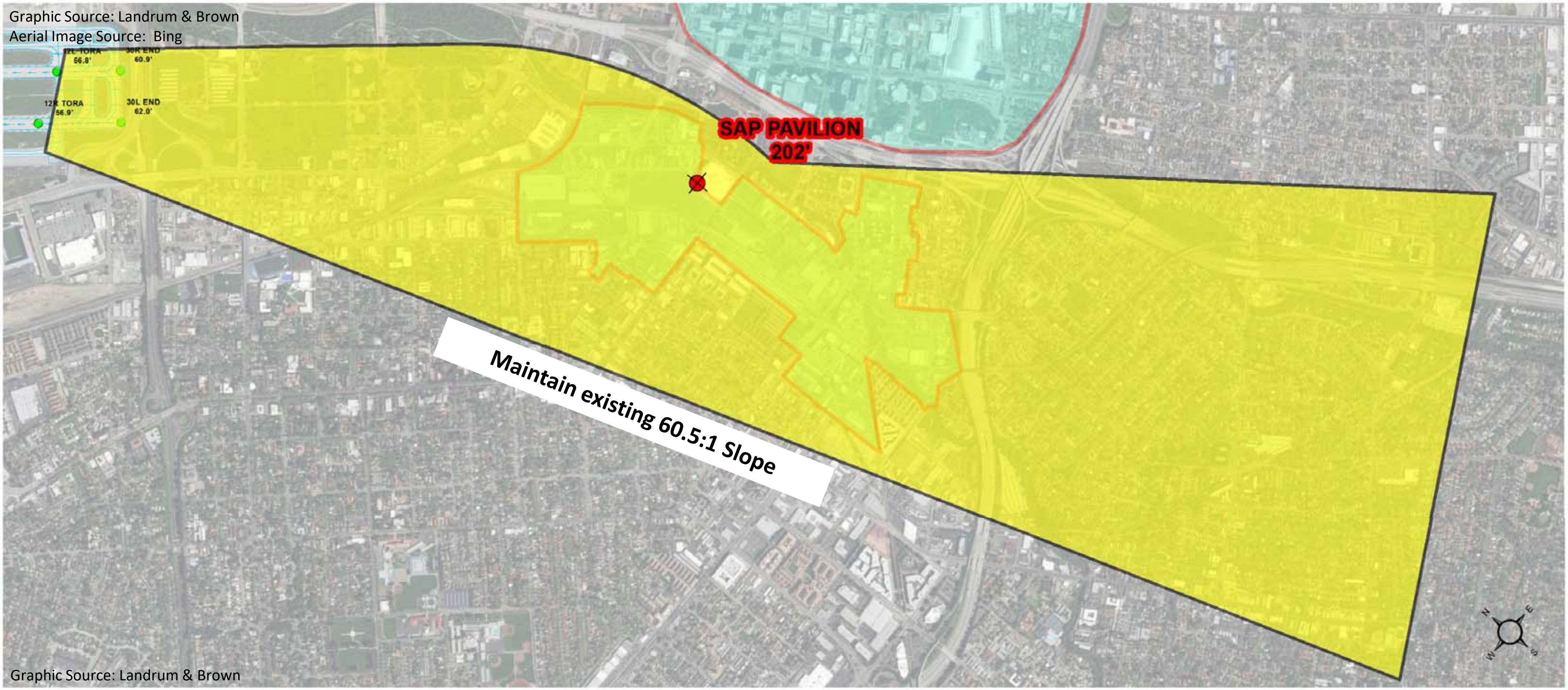
Note: The Adobe building was the original controlling obstacle for the AC 120-91 Runway 12R surface in 2007. Changes to the slope of the surface beyond Adobe remain consistent with 2007 analysis as there are no other controlling obstacles over the Downtown Core.

OEI SURFACE – ICAO OEI RUNWAY 12R



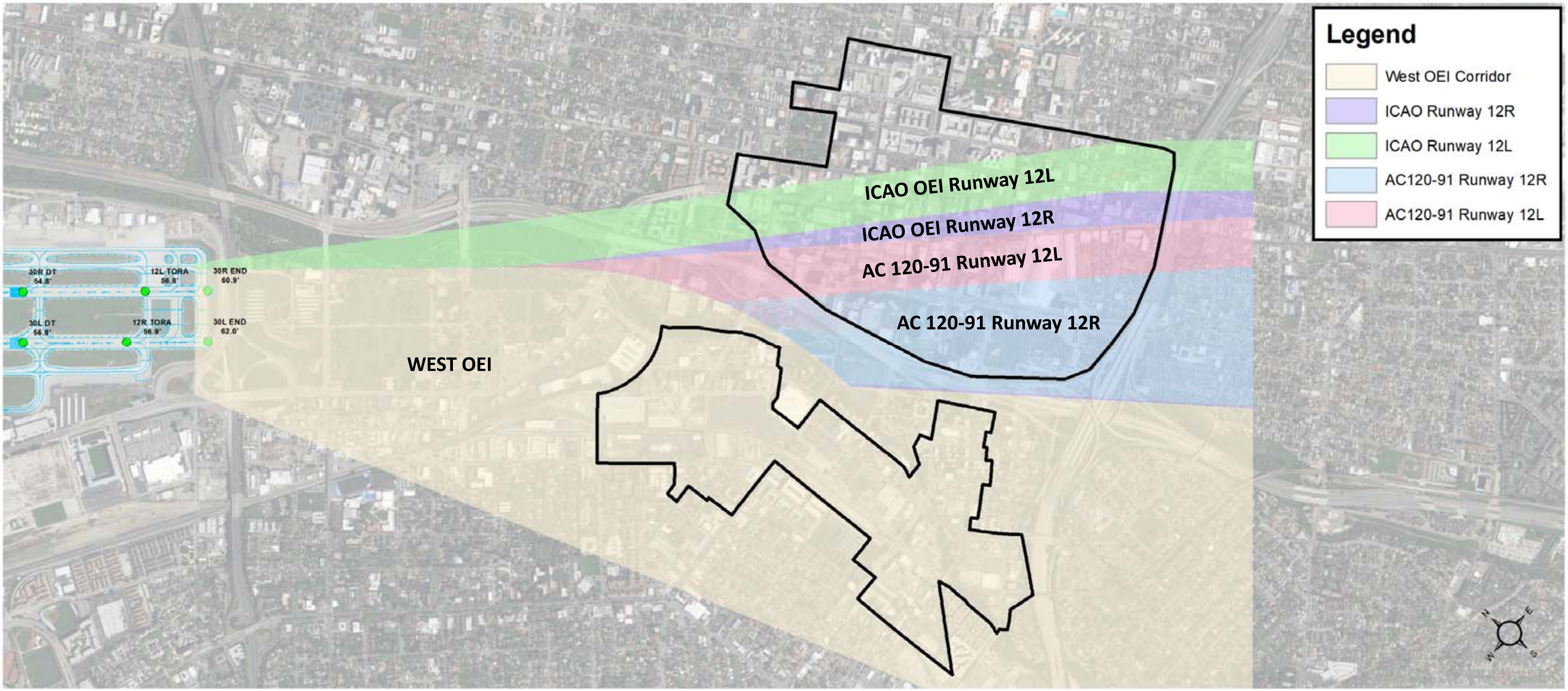
Note: The Adobe building was the original controlling obstacle for the ICAO OEI Runway 12R surface in 2007. Changes to the slope of the surface beyond Adobe remain consistent with 2007 analysis as there are no other controlling obstacles over the Downtown Core.

OEI SURFACE – WEST OEI CORRIDOR



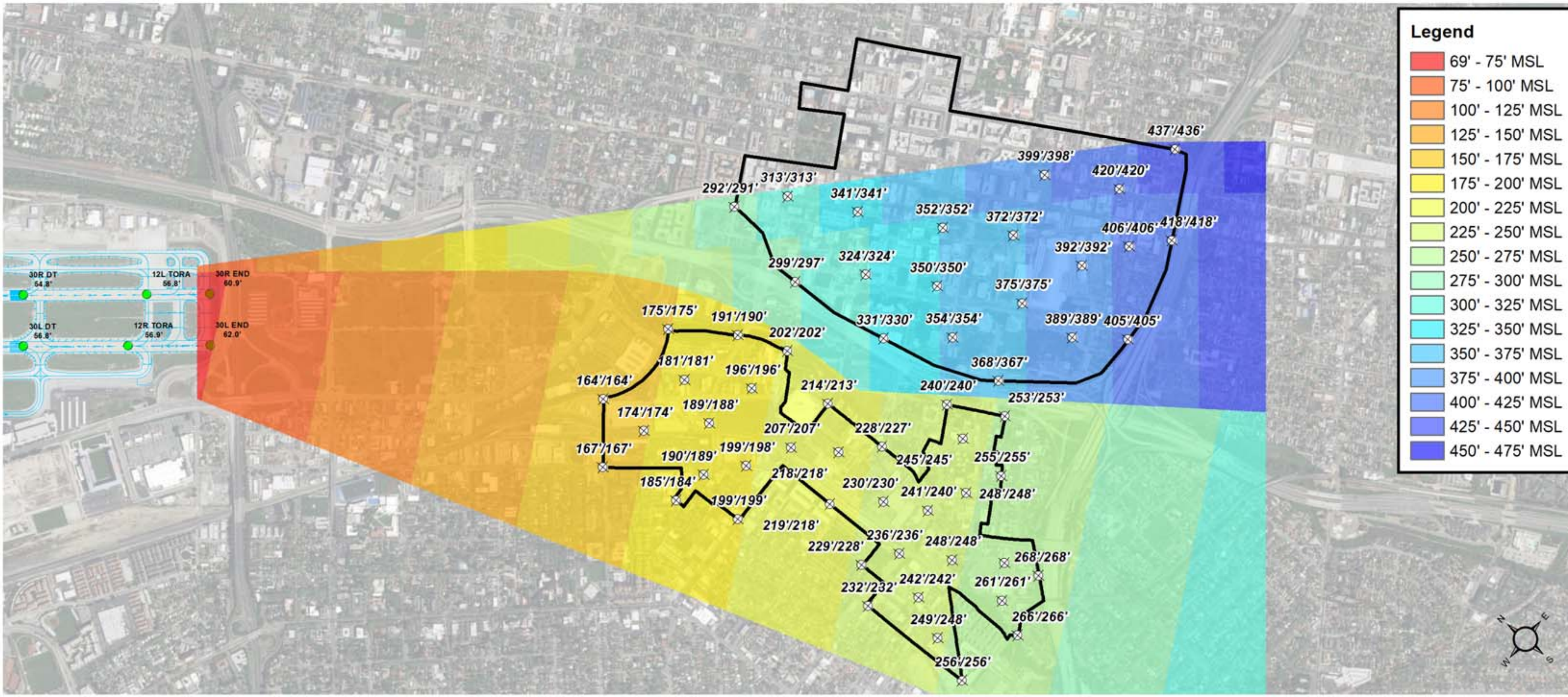
Note: The SAP Pavilion building was the original controlling obstacle for the West OEI Corridor surface in 2007.

OEI COMPOSITE - LOWEST CONTROLLING SURFACES



Graphic Source: Landrum & Brown
Aerial Image Source: Bing

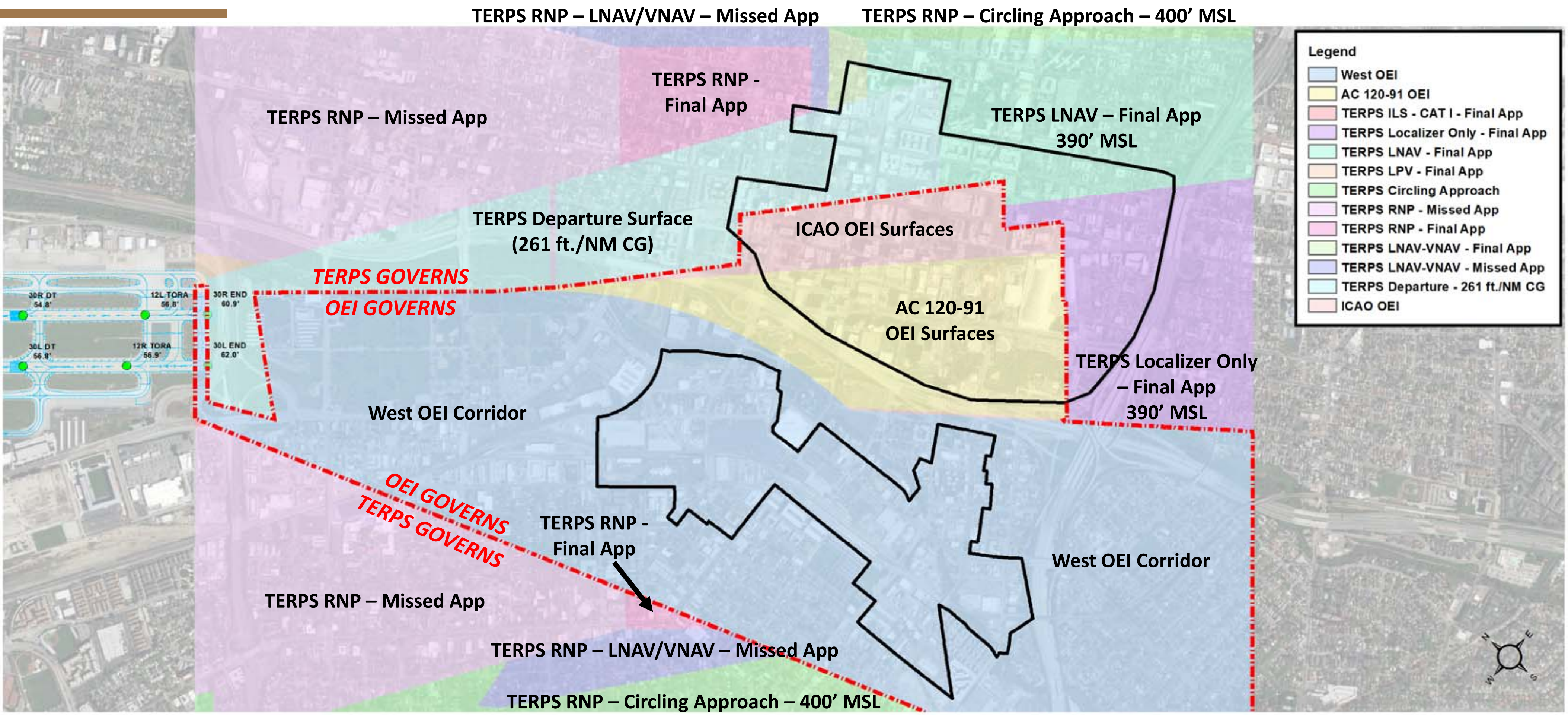
OEI COMPOSITE - LOWEST CONTROLLING SURFACES - ELEVATION



Graphic Source: Landrum & Brown
Aerial Image Source: Bing

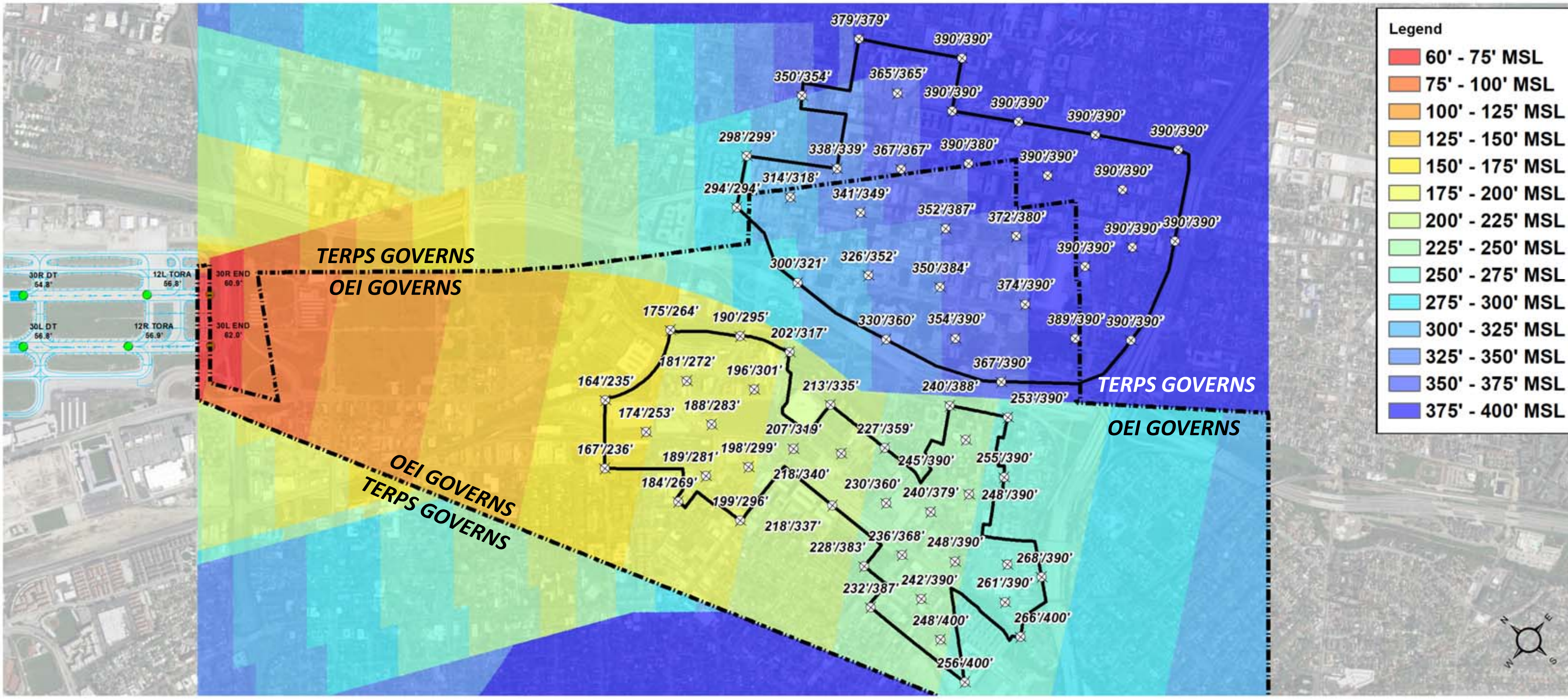
Random Spot Elevation Comparison:
000' (2018 OEI)/000' (2007 OEI)

TERPS/OEI COMPOSITE - LOWEST CONTROLLING SURFACES



Graphic Source: Landrum & Brown
Aerial Image Source: Bing

TERPS/OEI COMPOSITE – ELEVATION PROFILE



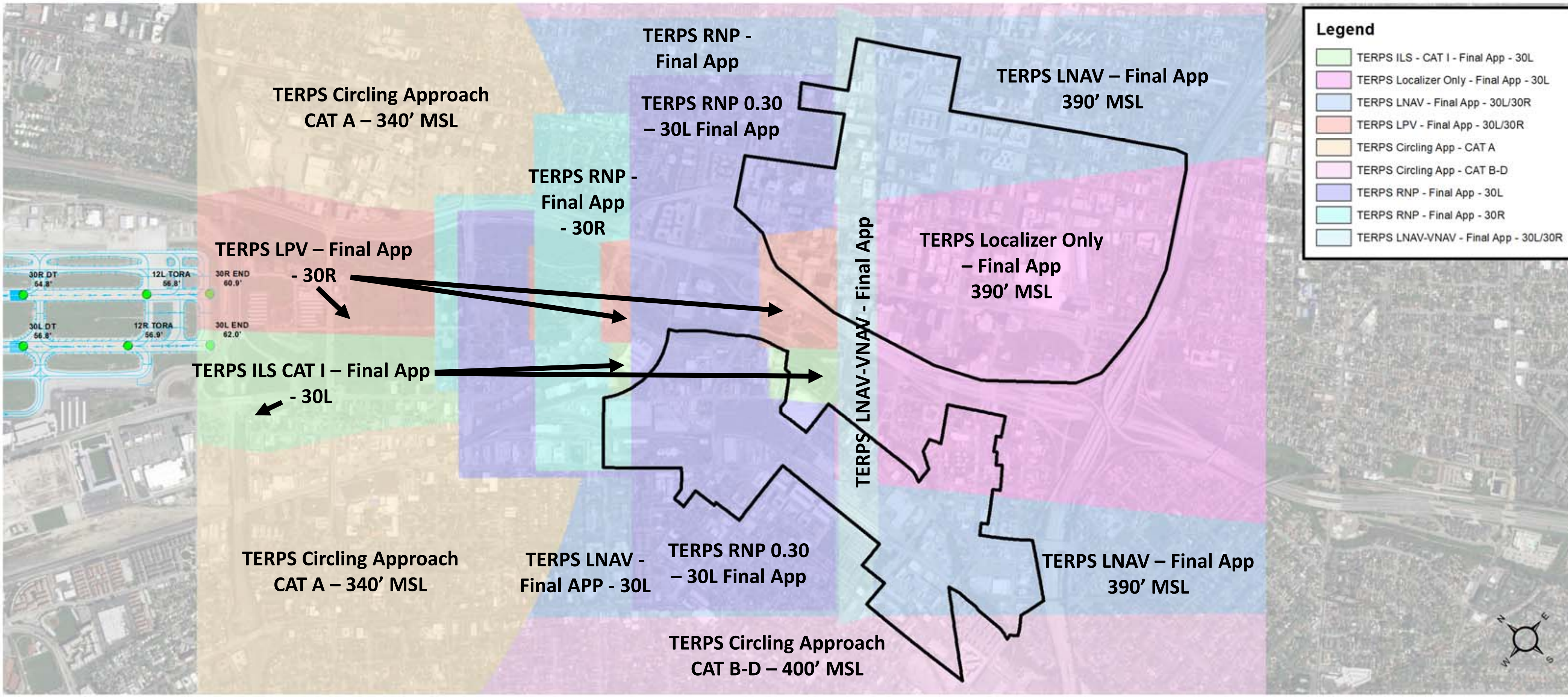
Graphic Source: Landrum & Brown

Random Spot Elevation Comparison:
000' (2018 TERPS/OEI COMPOSITE)/000' (2018 TERPS COMPOSITE)

NEXT STEPS

- Critical Aircraft Discussion
- Framework for Scenario Review
- Building Heights
- Relationship between OAK, SFO and SJC

TERPS ARRIVALS COMPOSITE - LOWEST CONTROLLING SURFACES

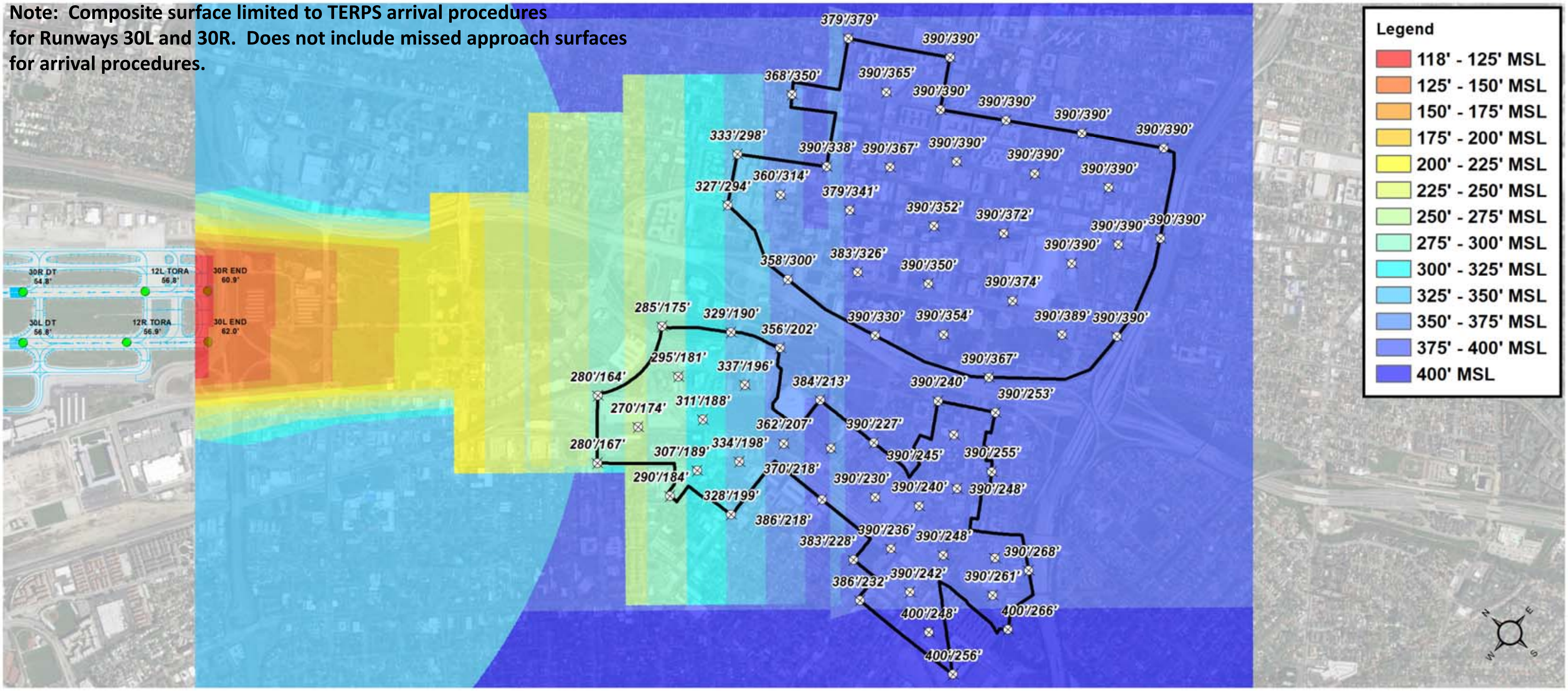


Graphic Source: Landrum & Brown
Aerial Image Source: Bing

Note: Composite surface limited to TERPS arrival procedures for Runways 30L and 30R. Does not include missed approach surfaces for arrival procedures.

TERPS ARRIVALS COMPOSITE – ELEVATION PROFILE

Note: Composite surface limited to TERPS arrival procedures for Runways 30L and 30R. Does not include missed approach surfaces for arrival procedures.

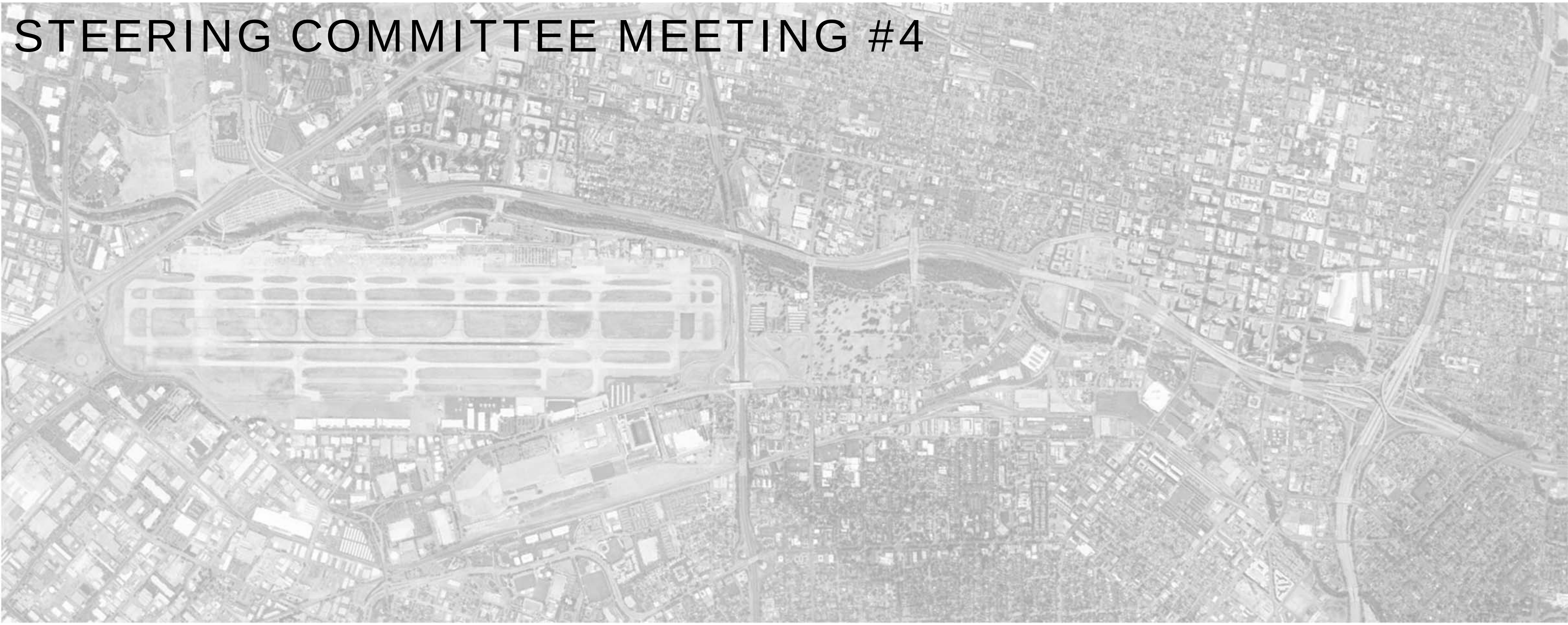


Graphic Source: Landrum & Brown
Aerial Image Source: Bing

Random Spot Elevation Comparison:
000' (2018 TERPS ARRIVALS)/000' (2018 (TERPS/OEI COMPOSITE)

DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

STEERING COMMITTEE MEETING #4



May 10, 2018

AGENDA

- Introduction
- Potential Airspace Protection Scenarios
- Next Steps

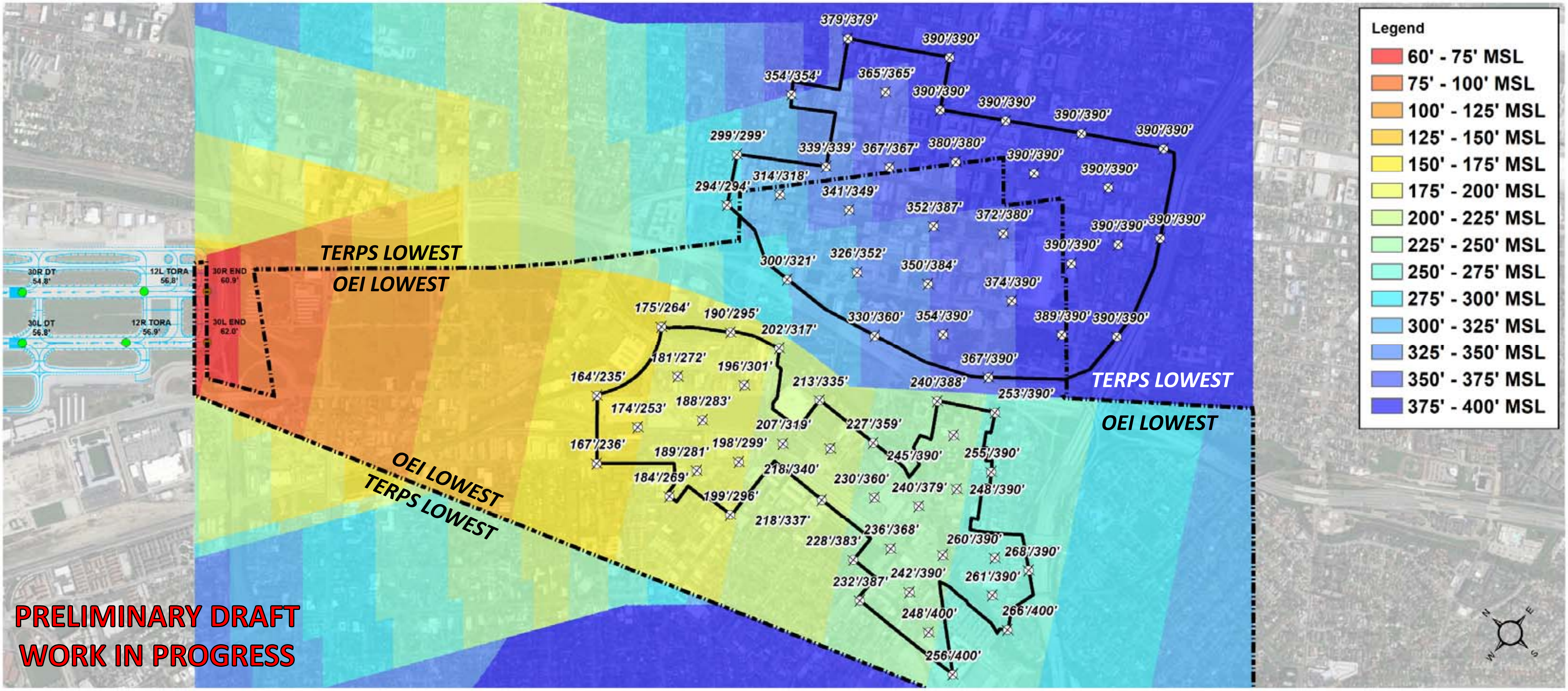
POTENTIAL AIRSPACE PROTECTION SCENARIOS (1 OF 2)

1. Existing airspace protection
2. West OEI Corridor with increased surface slopes
3. East OEI Corridor with a TERPS only scenario over Diridon Station Area
4. Straight-out OEI surface protection without West OEI Corridor
5. West OEI Corridor surface protection without Straight-out OEI
6. West OEI Corridor with greater than 15 degree turn

POTENTIAL AIRSPACE PROTECTION SCENARIOS (2 OF 2)

7. TERPS only
8. TERPS only with increased TERPS departure climb gradients
9. TERPS only with increased TERPS departure climb gradients and approach procedure minima
10. Defined development heights
11. Extend the approach ends of Runways 12L and/or 12R to the north

SCENARIO #1 – EXISTING AIRSPACE PROTECTION

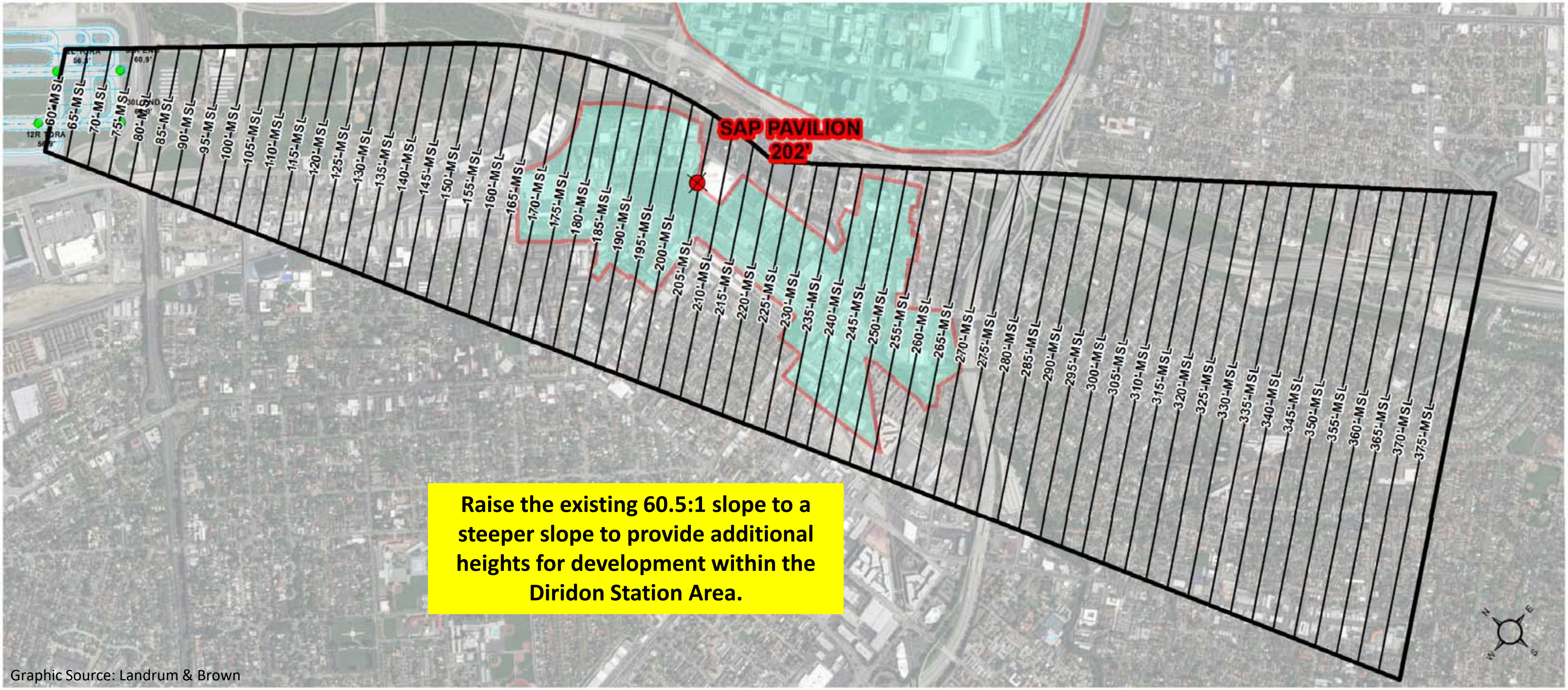


Graphic Source: Landrum & Brown

Random Spot Elevation Comparison:

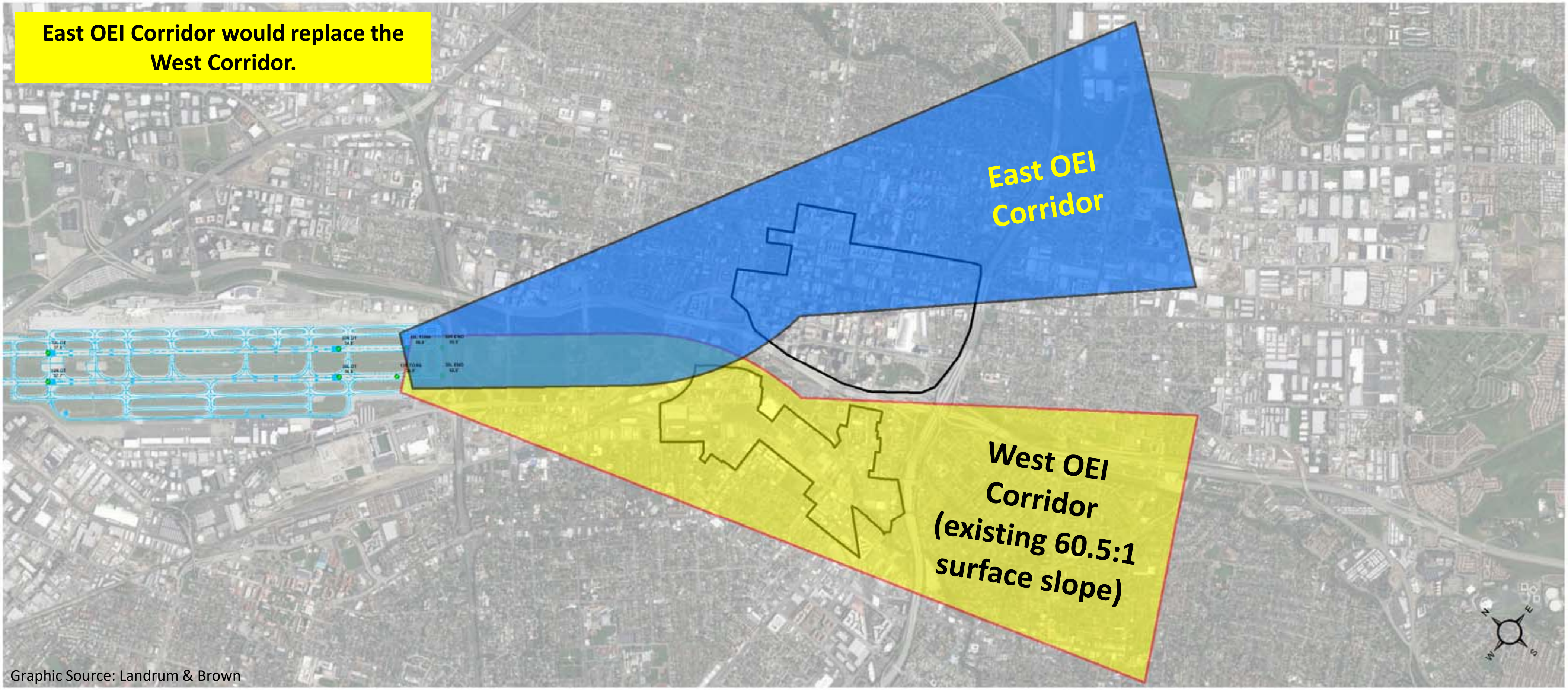
000' (2018 TERPS/OEI COMPOSITE)/000' (2018 TERPS COMPOSITE)

SCENARIO #2 – WEST OEI CORRIDOR WITH INCREASED SURFACE SLOPES

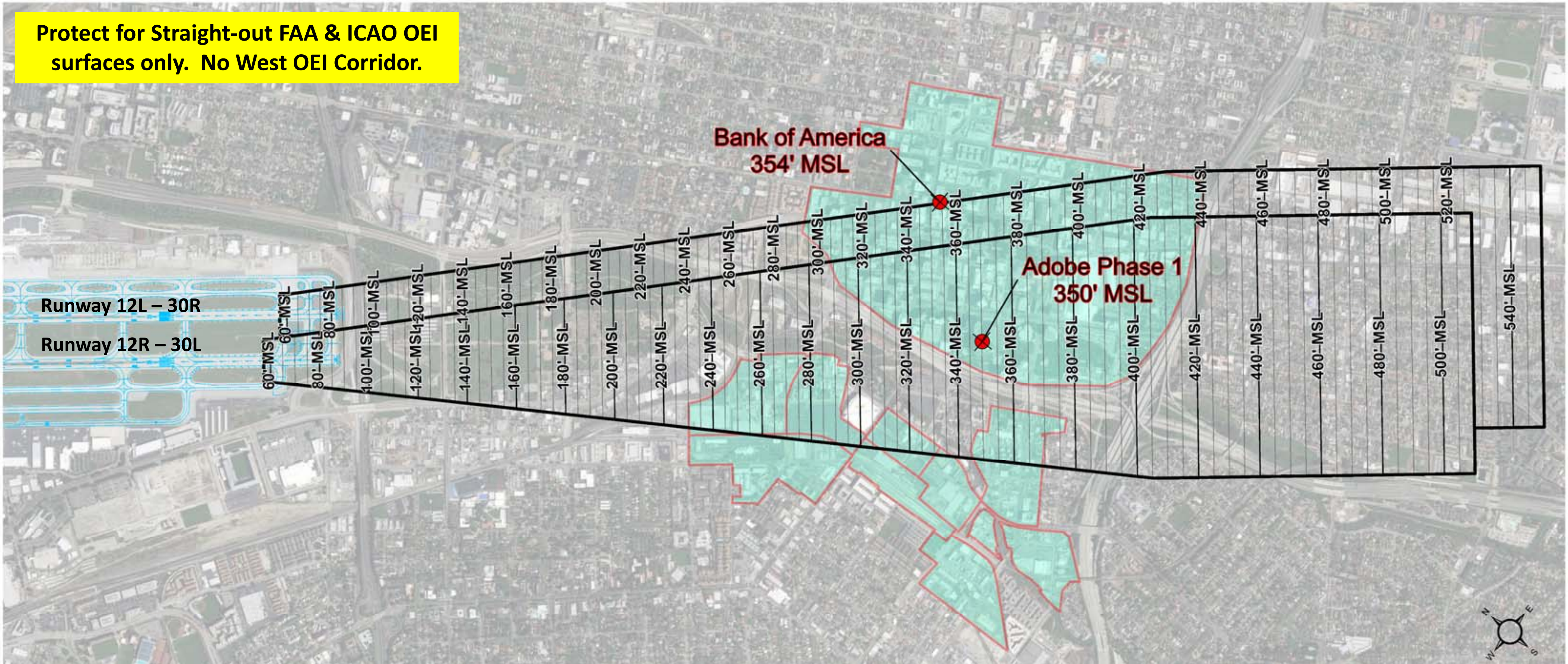


Note: The SAP Pavilion building was the original controlling obstacle for the West OEI Corridor surface in 2007.

SCENARIO #3 – EAST OEI CORRIDOR WITH TERPS ONLY SCENARIOS OVER DIRIDON STATION AREA

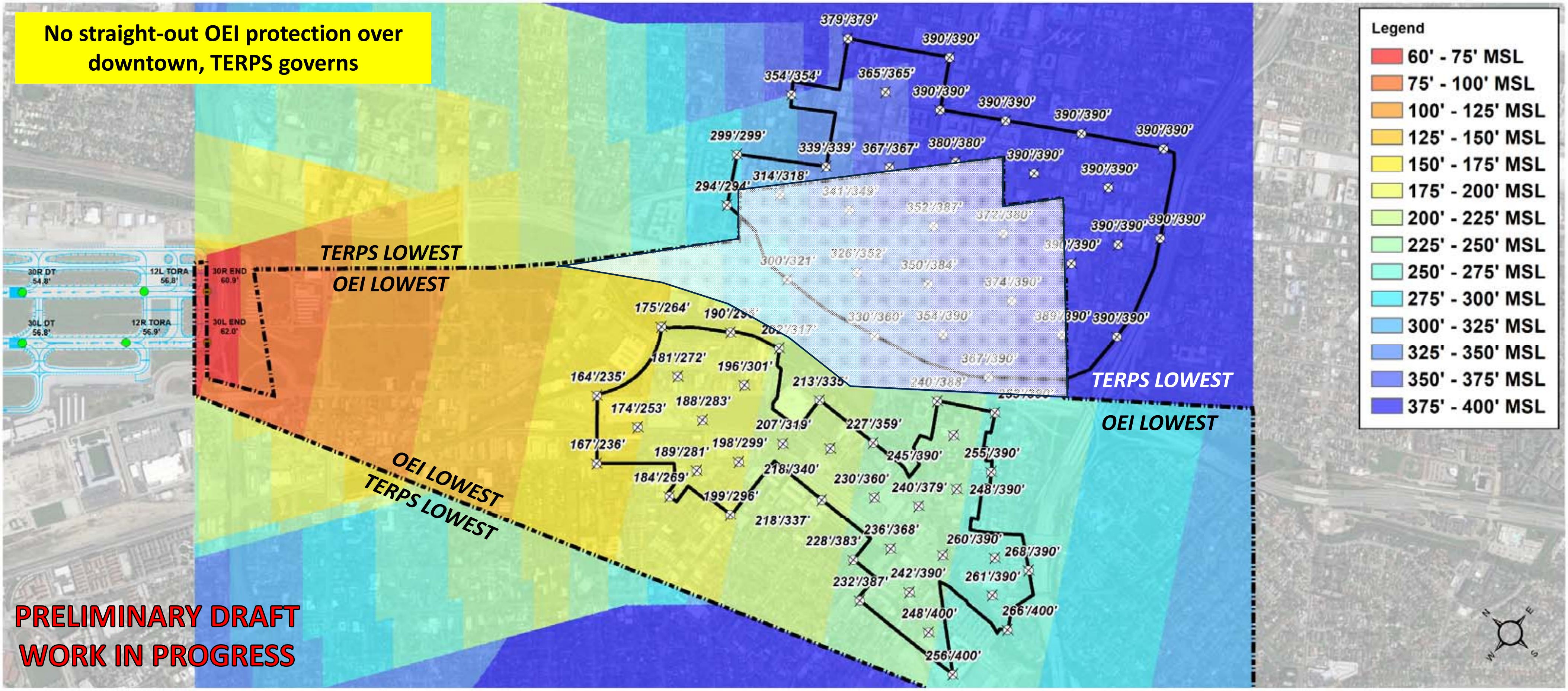


SCENARIO #4 – STRAIGHT-OUT OEI SURFACE PROTECTION WITHOUT WEST OEI CORRIDOR



Graphic Source: Landrum & Brown

SCENARIO #5 - WEST OEI CORRIDOR SURFACE PROTECTION WITHOUT STRAIGHT-OUT OEI

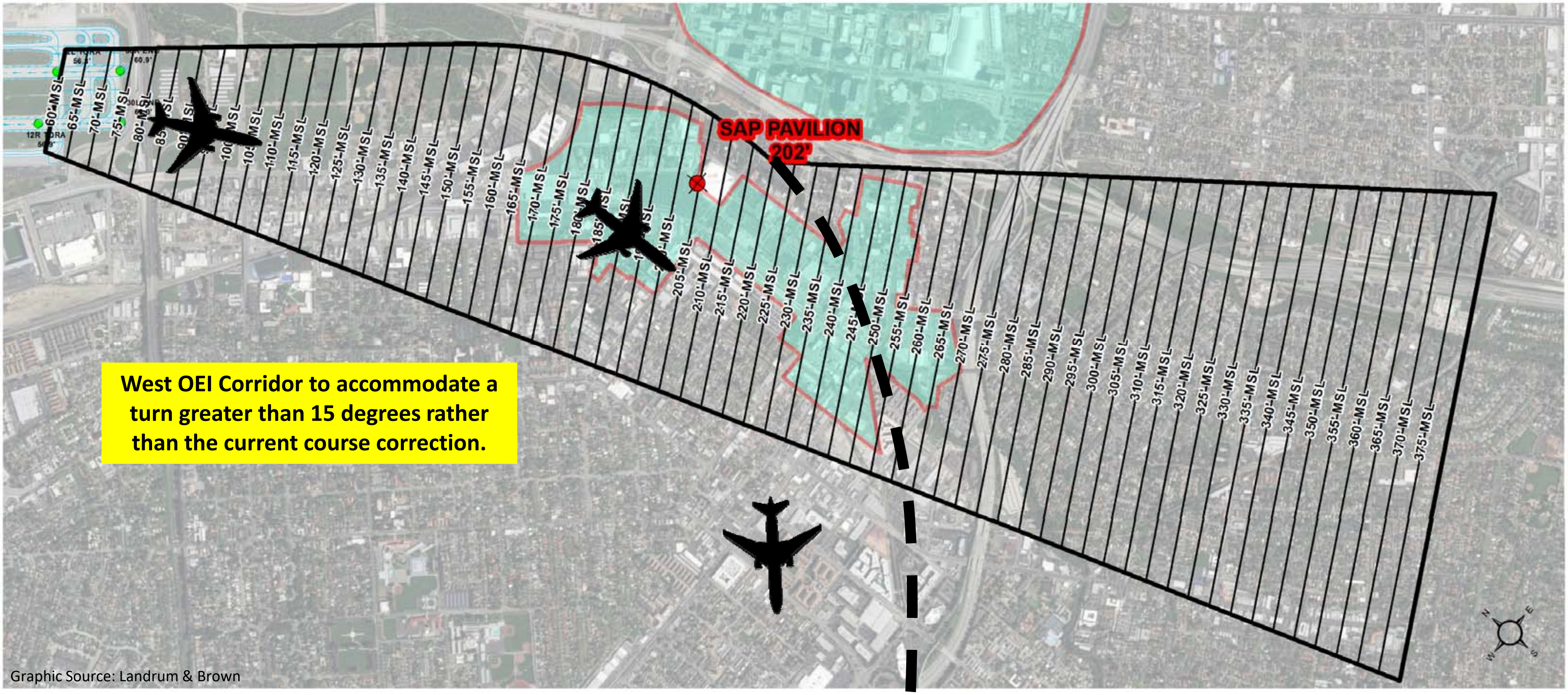


Graphic Source: Landrum & Brown

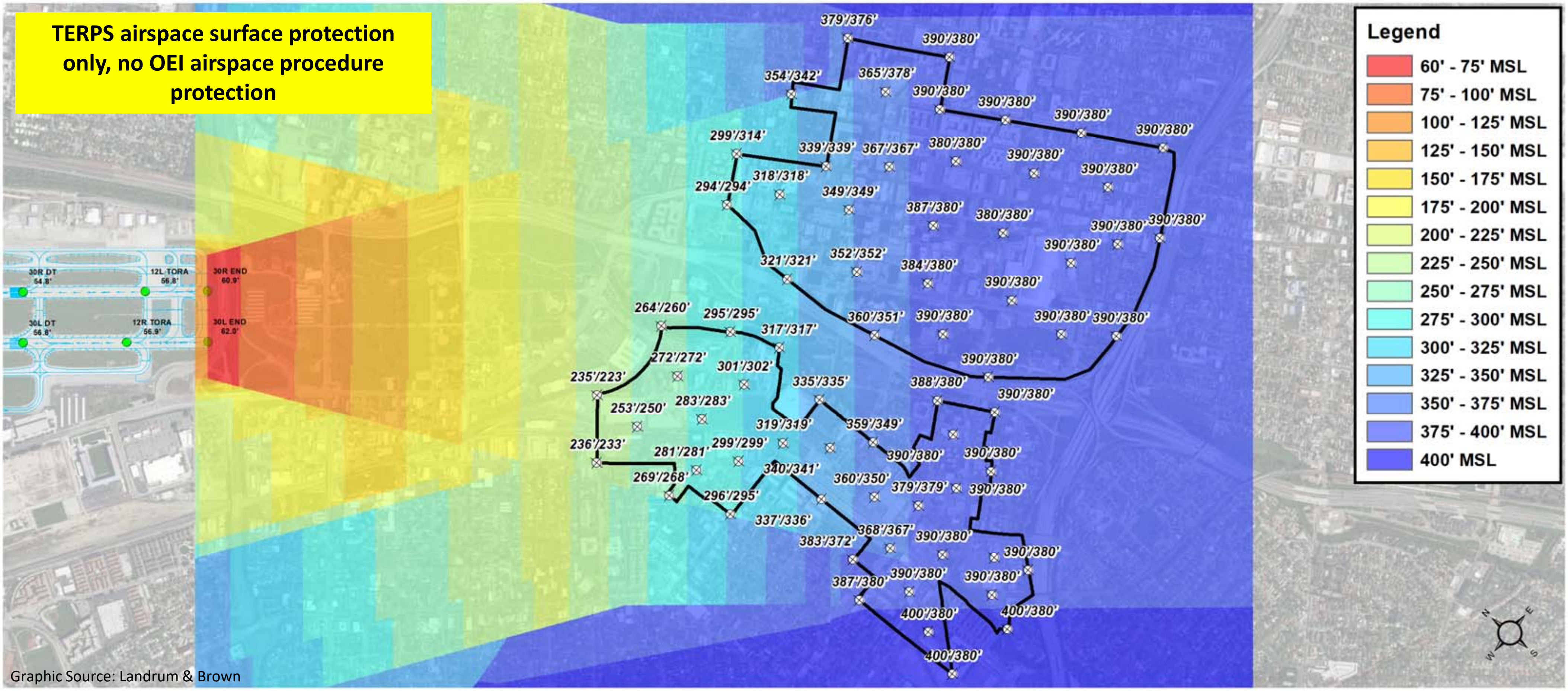
Random Spot Elevation Comparison:

000' (2018 TERPS/OEI COMPOSITE)/000' (2018 TERPS COMPOSITE)

SCENARIO #6 – WEST OEI CORRIDOR WITH GREATER THAN 15 DEGREE TURN



SCENARIO #7 – TERPS ONLY



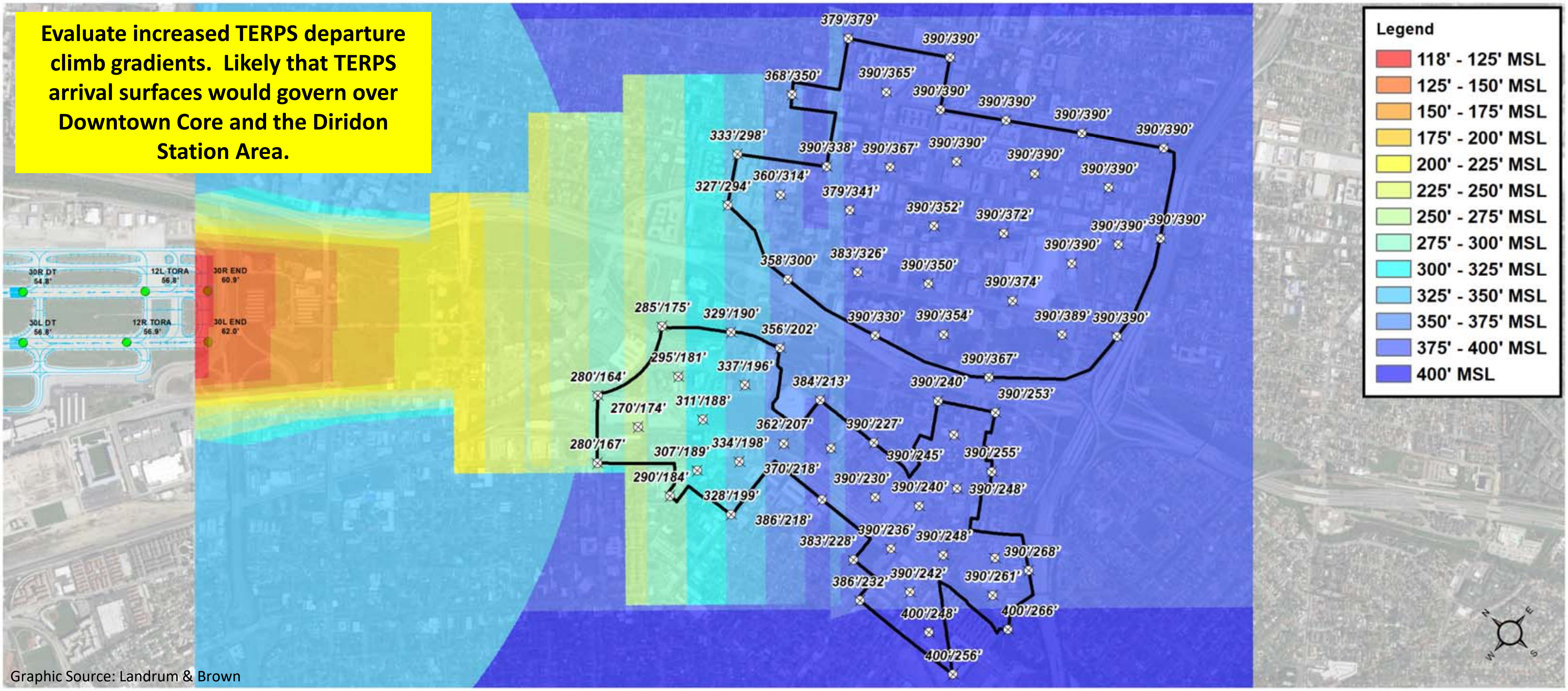
Graphic Source: Landrum & Brown

Random Spot Elevation Comparison:

000' (2018 TERPS COMPOSITE)/000' (2007 TERPS COMPOSITE)

SCENARIO #8 – TERPS ONLY WITH INCREASED TERPS DEPARTURE CLIMB GRADIENTS

Evaluate increased TERPS departure climb gradients. Likely that TERPS arrival surfaces would govern over Downtown Core and the Diridon Station Area.



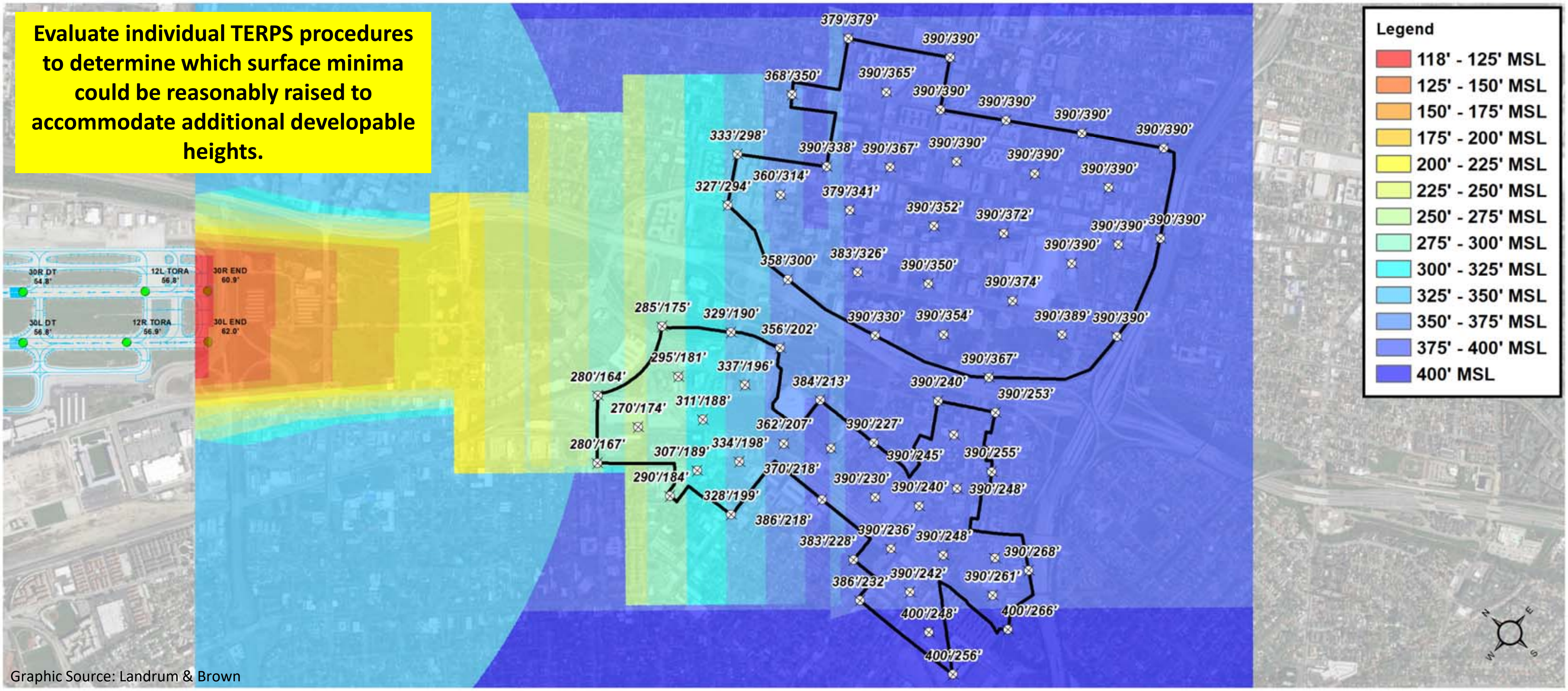
Graphic Source: Landrum & Brown

Random Spot Elevation Comparison:

000' (2018 TERPS ARRIVALS)/000' (2018 (TERPS/OEI COMPOSITE)

SCENARIO #9 – TERPS ONLY WITH INCREASED TERPS DEPARTURE CLIMB GRADIENTS AND APPROACH PROCEDURE MINIMA

Evaluate individual TERPS procedures to determine which surface minima could be reasonably raised to accommodate additional developable heights.

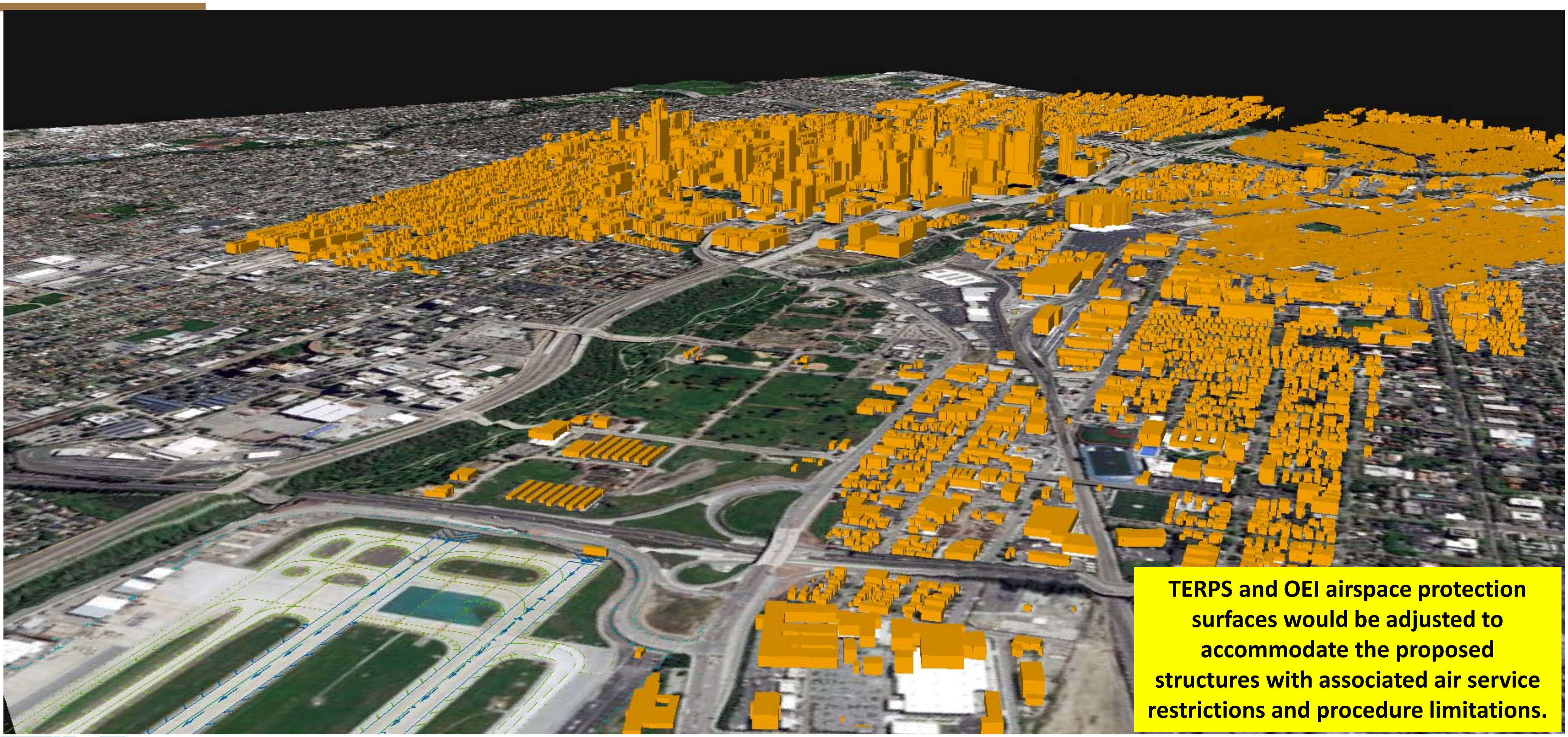


Graphic Source: Landrum & Brown

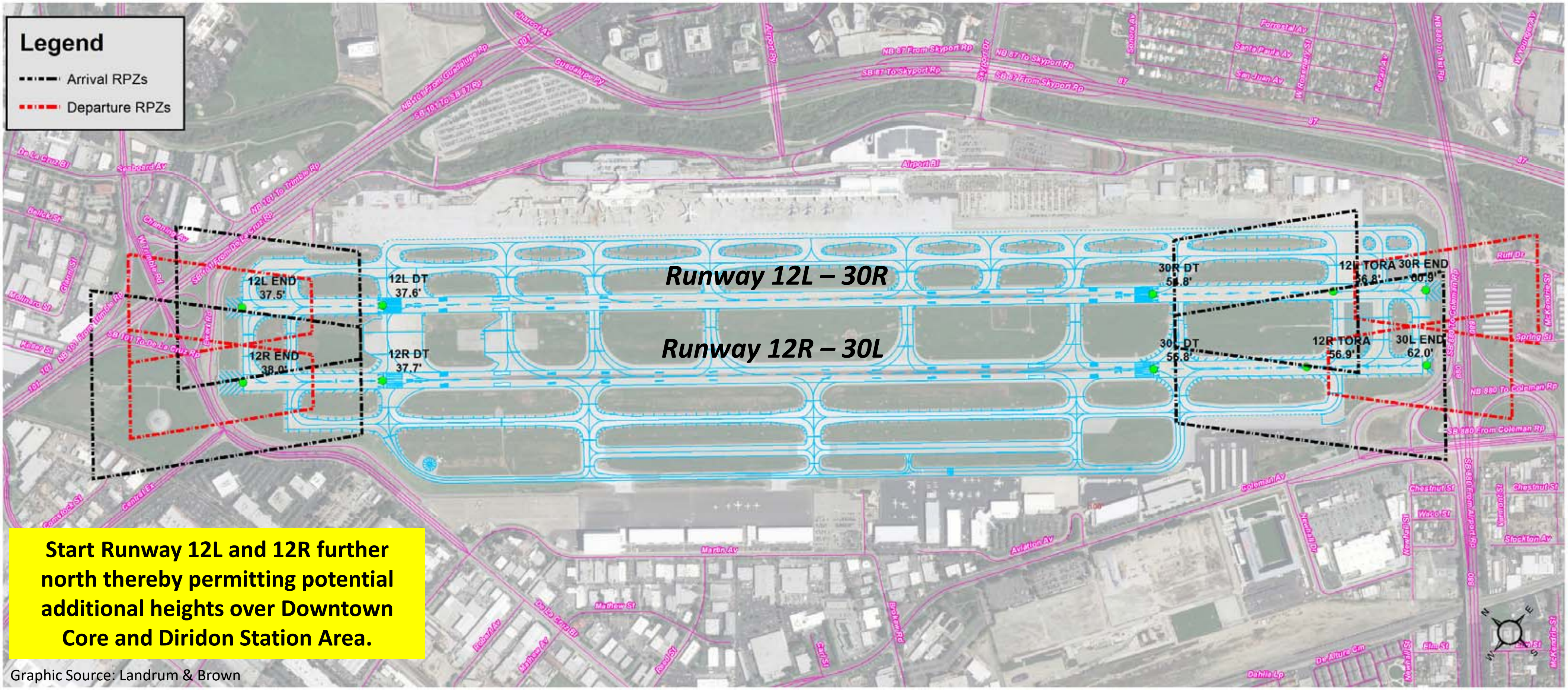
Random Spot Elevation Comparison:

000' (2018 TERPS ARRIVALS)/000' (2018 (TERPS/OEI COMPOSITE)

SCENARIO #10 – DEFINED DEVELOPMENT HEIGHTS



SCENARIO #11 – EXTEND THE APPROACH ENDS OF RUNWAYS 12L AND/OR 12R TO THE NORTH



Start Runway 12L and 12R further north thereby permitting potential additional heights over Downtown Core and Diridon Station Area.

Graphic Source: Landrum & Brown

AIRSPACE SCENARIO SUMMARY MATRIX

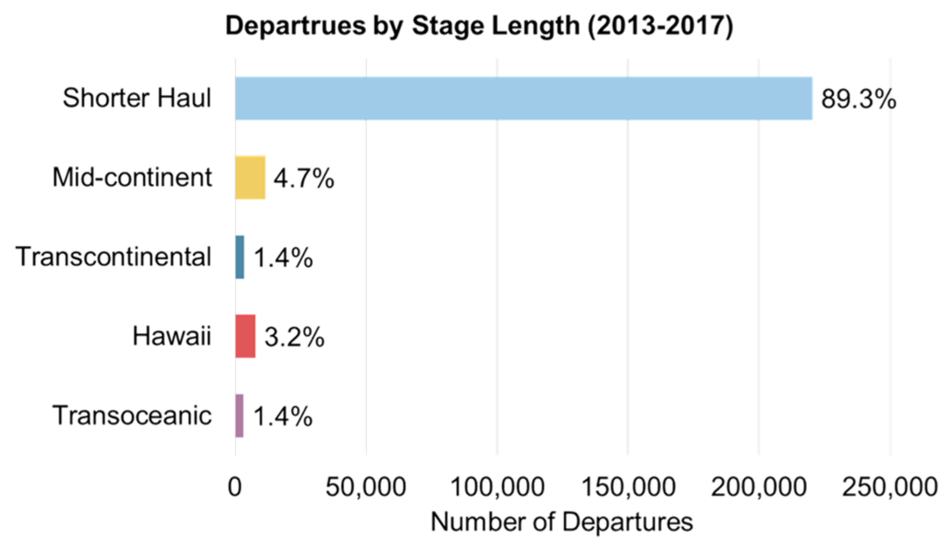
- Review of selected evaluation criteria to rank each of the eleven proposed scenarios
- Evaluation criteria include the following metrics:
  - Potential gain in building heights (Downtown Core)
  - Potential gain in building heights (Diridon Station Area)
  - Potential loss of air service
  - Timeframe for action
  - Degree of difficulty

NEXT STEPS

- Aircraft selection and decision-making framework (May 24, 2018)
- Scenario Analysis and Development (June – August)
- Email correspondence
  - Technical memorandums
    - Draft Existing Conditions
    - Draft Case Studies
    - Draft Relationships between SJC, SFO, and OAK
- Timing of stakeholder meeting

STAGE LENGTH CATEGORIES

- Stage lengths grouped by nautical miles (nm)
  - Up to 1500nm: “Shorter” haul
  - 1500-2000nm: Mid-continent
    - e.g. Chicago, Atlanta
  - 2000-2500nm: Transcontinental
    - e.g. New York, Boston
  - 2000-2500nm: Hawaii
    - Honolulu, Kahului, Lihue, Kona
  - 4000nm+: Transoceanic
    - Europe (London, Frankfurt)
    - Asia (Tokyo, Beijing, Shanghai)



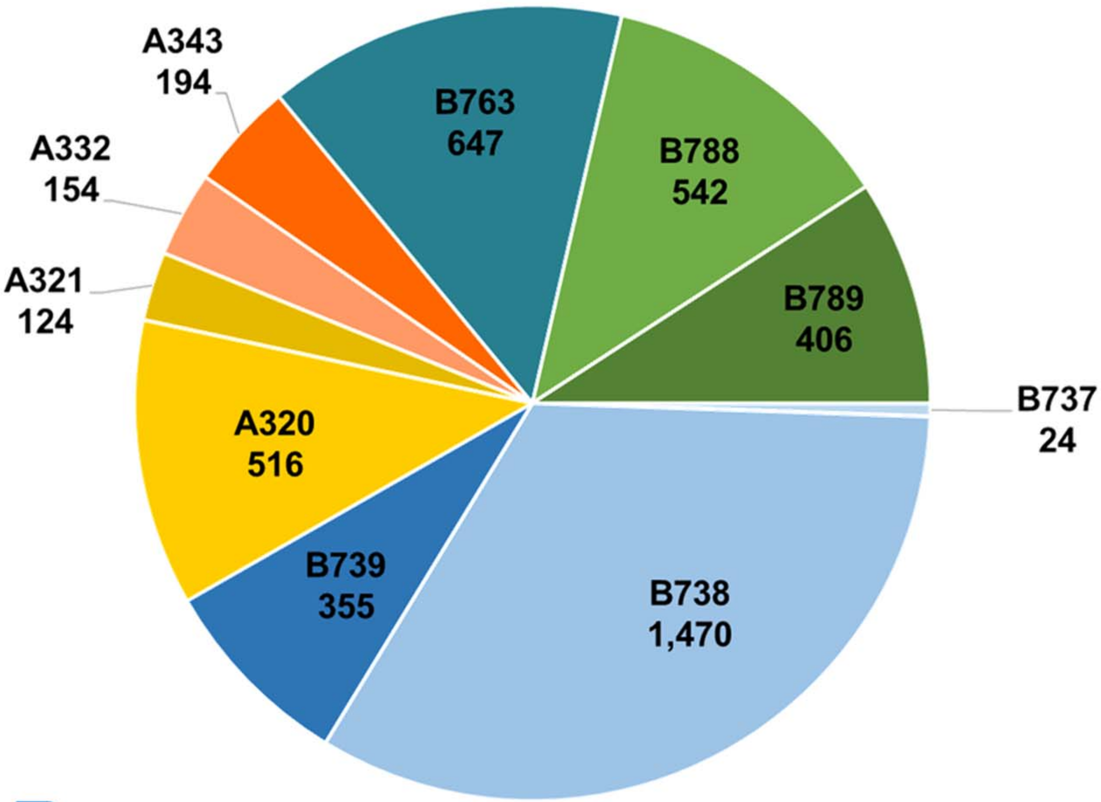
Source: ANOMS

AIRCRAFT EVALUATION FOR SELECTED SCENARIOS

- As part of the three (3) preferred scenarios, three aircraft types will be chosen for evaluation
- Evaluation of aircraft performance as it pertains to changes in OEI/TERPS procedures
- Payload/range impacts will be identified

AIRCRAFT PROFILE – PASSENGER FLIGHTS IN 2017

Aircraft types operating on Hawaii, Transcontinental, and Transoceanic Routes



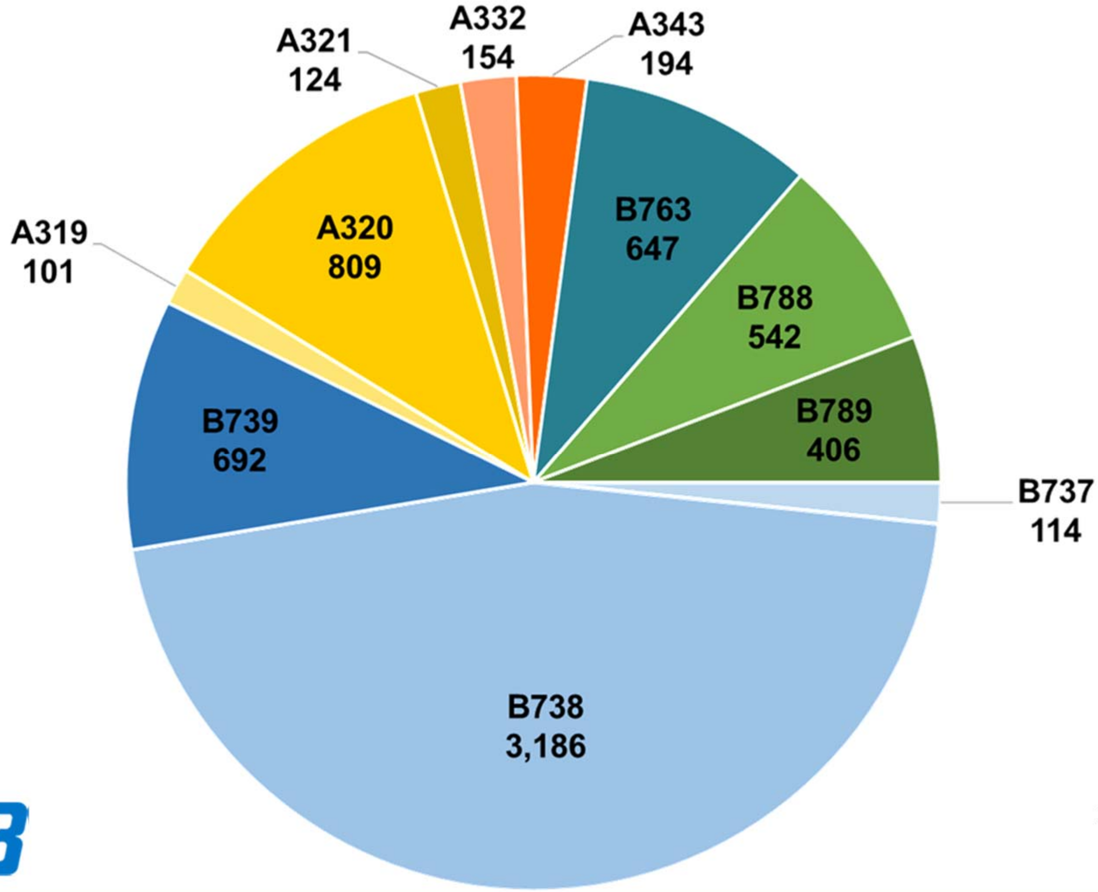
Aircraft Type Abbreviations	
A320	Airbus A320
A321	Airbus A321
A332	Airbus A330-200
A343	Airbus A340-300
B737	Boeing 737-700
B738	Boeing 737-800
B739	Boeing 737-900
B763	Boeing 767-300
B788	Boeing 787-8
B789	Boeing 787-9

Legend
B738 Aircraft Type
1,470 Number of Departures in 2017

Source: ANOMS

AIRCRAFT PROFILE – PASSENGER FLIGHTS IN 2017

Aircraft types operating on Mid-continent, Hawaii, Transcontinental, and Transoceanic Routes



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B788	Boeing 787-8
B789	Boeing 787-9

Legend

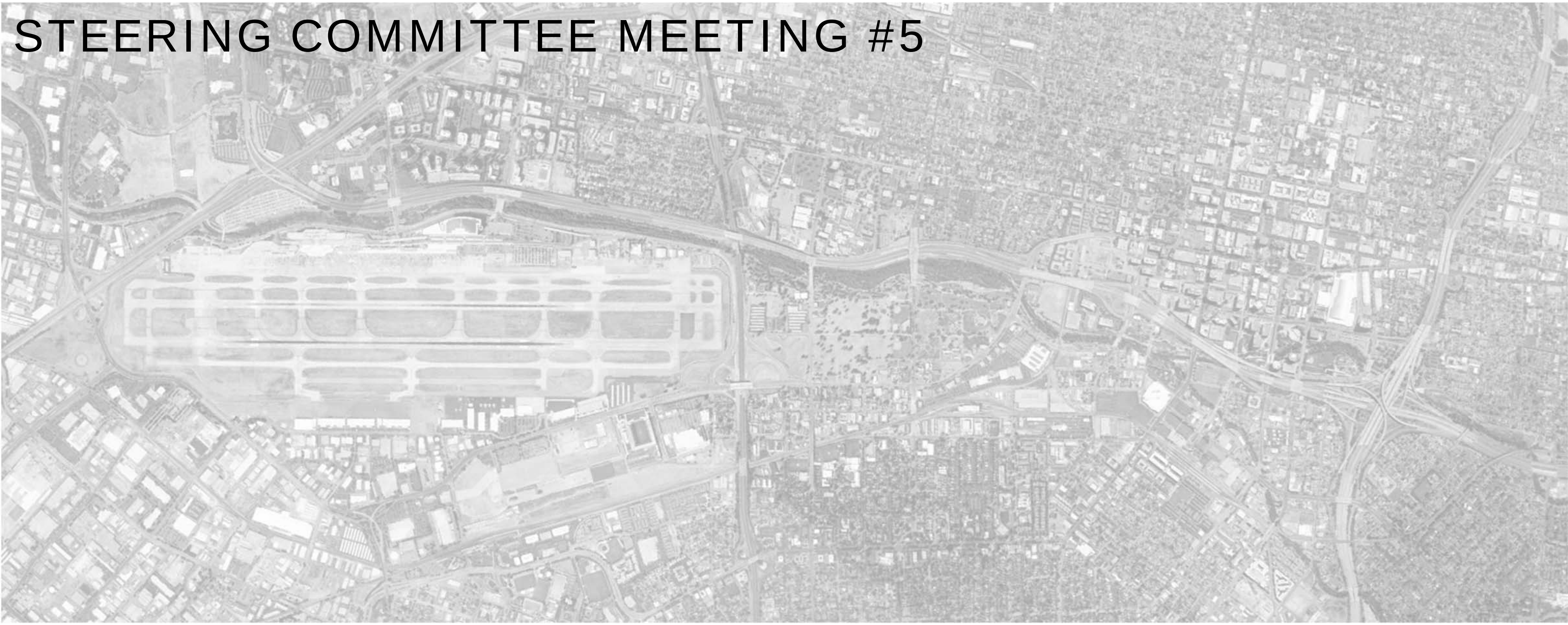
B738 Aircraft Type

3,186 Number of Departures in 2017

Source: ANOMS

DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

STEERING COMMITTEE MEETING #5



May 24, 2018

AGENDA

- Introduction
- Critical aircraft selection
- Establish decision making criteria
- Next steps

AIRCRAFT EVALUATION FOR SELECTED SCENARIOS

- As part of the three (3) preferred scenarios, three aircraft types will be chosen for evaluation
- Evaluation of aircraft performance as it pertains to changes in OEI/TERPS procedures
- Payload/range impacts will be identified

WORLDWIDE WIDE-BODY FLEET

Aircraft Model	Number of Aircraft			
	In-Service	Orders	Total	% of Total
Airbus A300	211	0	211	3%
Airbus A310	37	0	37	1%
Airbus A330	**1,214**	**225**	**1,439**	**20%**
Airbus A340	176	0	176	2%
Airbus A350	**92**	**718**	**810**	**11%**
Airbus A380	212	71	283	4%
Boeing 747	489	19	508	7%
Boeing 767	744	65	809	11%
Boeing 777	**1,387**	**391**	**1,778**	**24%**
Boeing 787	**554**	**556**	**1,110**	**15%**
Boeing MD-11	120	0	120	2%
Ilyushin Il-96	4	0	4	0%
McDonnell Douglas DC-10	43	0	43	1%
Grand Total	**5,283**	**2,045**	**7,328**	**100%**

Notes: Data is updated through August 2017. Includes freighter and passenger aircraft.
Source: FlightGlobal, World Airliner Census, 2017.

WEST COAST SCHEDULED WIDE-BODY OPERATIONS (2018)

2018 Scheduled Aircraft (Departures)								
Airport	**B777**	**B747**	**B787**	**A330**	**A340**	**A350**	**A380**	**Total (Airport)**
LAX	18,369	3,287	13,736	6,662	3,221	2,647	5,947	**53,869**
SFO	12,860	1,413	5,245	2,340	887	1,456	1,197	**25,398**
OAK	122	0	975	212	0	0	0	**1,309**
SJC	0	0	910	135	189	0	0	**1,234**
SAN	218	146	365	365	261	0	0	**1,355**
SEA	2,255	506	1,436	1,683	0	89	0	**5,969**
Total (Aircraft)	**33,824**	**5,352**	**22,667**	**11,397**	**4,558**	**4,192**	**7,144**	**89,134**
% of Total (Aircraft)	**38%**	**6%**	**25%**	**13%**	**5%**	**5%**	**8%**	**100%**

Note: Data is updated through August 2017.
Source: Airbus's & Boeing's Orders and Deliveries.

WIDE-BODY AIRCRAFT SEAT COUNT

Aircraft	Aircraft Seat Count (Typical)
A330-200	247
A330-300	277
A330-800	287
A330-900	287
A340-200	261
A340-300	277
A340-500	293
A340-600	326
A350-900	325
A350-1000	366
A380-800	544

Source: Airbus

Aircraft	Aircraft Seat Count (Typical)
B747-400	416
B747-8	410
B777-200	317
B777-300	396
B777-8X	350-375
B777-9X	400-425
B787-8	242
B787-9	290
B787-10	330

Source: Boeing

LONG HAUL AIRCRAFT COMPOSITION (SJC)

- Transoceanic

Aircraft	Airlines	Destinations	Number of Departures in 2017
B788	ANA, Hainan	Tokyo, Beijing	542
B789	British Airways, Hainan	London, Beijing	406
A343	Lufthansa	Frankfurt	194
A332	Air China	Shanghai	154

- Transcontinental

Aircraft	Airlines	Destinations	Number of Departures in 2017
B738	Alaska, United, Southwest	Newark, Baltimore	794
A320	JetBlue	New York, Boston	516
B739	Alaska, United	Newark	136
A321	JetBlue	New York	124

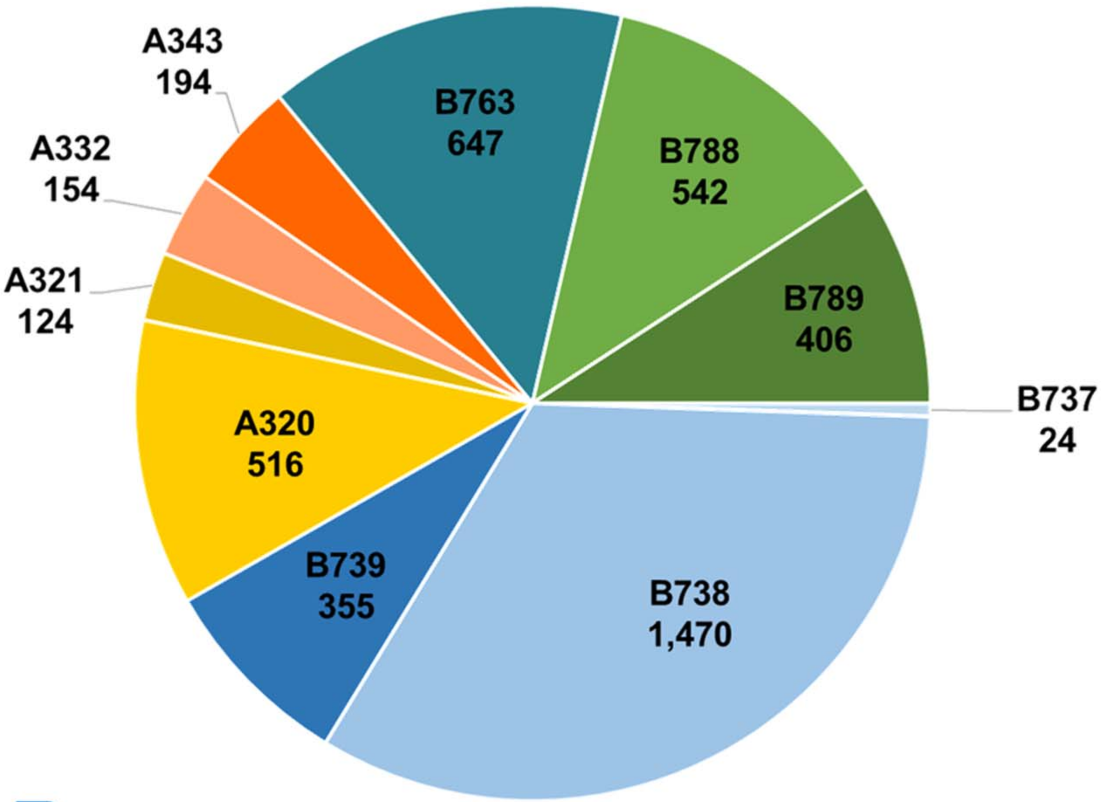
- Hawaii

Aircraft	Airlines	Destinations	Number of Departures in 2017
B738	Alaska	Honolulu, Kahului, Lihue, Kona	700
B763	Hawaiian	Honolulu, Kahului	647
B739	Alaska	Honolulu, Kona	219

Source: ANOMS

AIRCRAFT PROFILE – PASSENGER FLIGHTS IN 2017

Aircraft types operating on Hawaii, Transcontinental, and Transoceanic Routes



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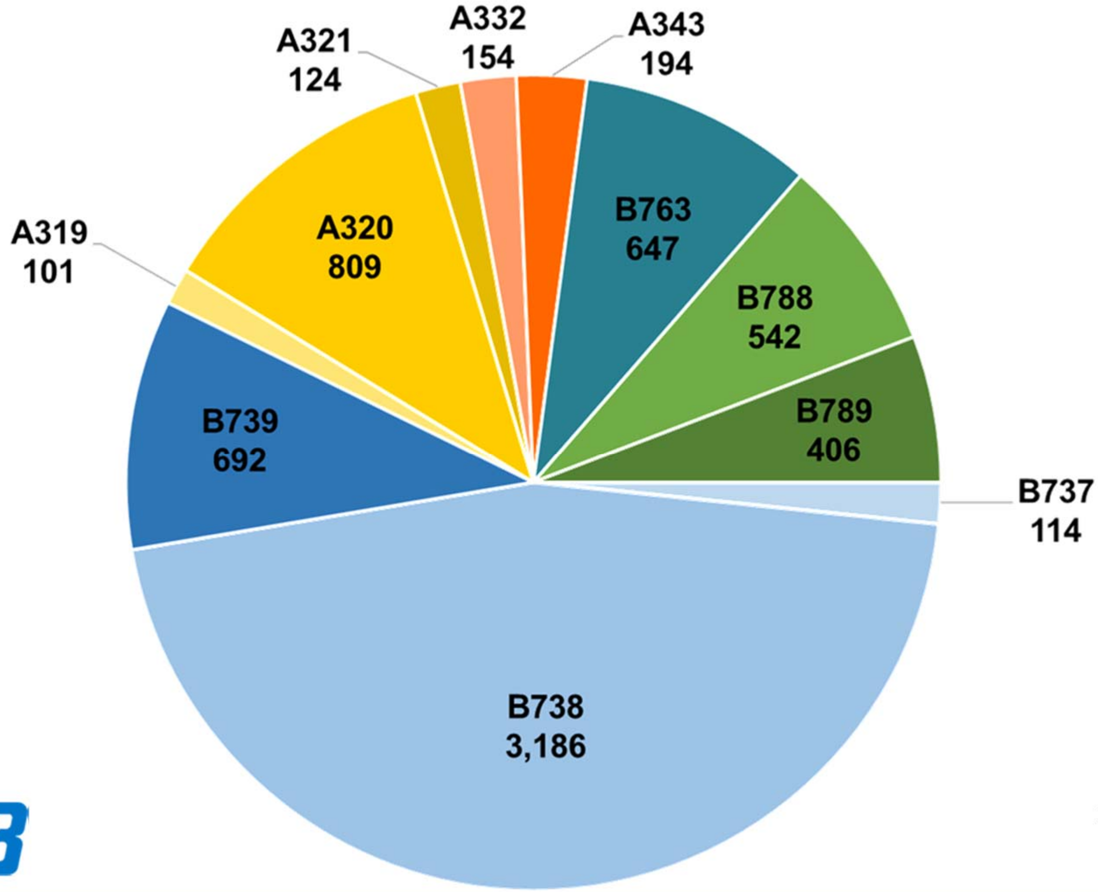
Legend
B738 Aircraft Type
1,470 Number of Departures in 2017

Source: ANOMS

AIRCRAFT PROFILE – PASSENGER FLIGHTS IN 2017

Aircraft types operating on Mid-continent, Hawaii, Transcontinental, and Transoceanic Routes



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B763	Boeing 767-300
B788	Boeing 787-8
B789	Boeing 787-9

Legend

B738 Aircraft Type
3,186 Number of Departures in 2017

Source: ANOMS

POTENTIAL AIRCRAFT FOR SCENARIO EVALUATION

- Wide-body Aircraft
  - A330-200
  - A350-900
  - B777-200ER/300ER
  - B787-8/9
- Narrow-body Aircraft
  - A320-200
  - A321-200
  - B737-800/900

AIRCRAFT SELECTION – WIDE-BODY

A330

- Currently operating at SJC and serving Asia

A350

- Likely replacement by Lufthansa for the A340
- New entrant carrier in negotiations to add A350 service at SJC

B777

- Previously operated at SJC to Asia (Tokyo) and is likely to return in the near future
- When a route is successful and air carriers want to increase seats they will upguage to B777

B787

- Currently operating at SJC and serving Asia and Europe

AIRCRAFT SELECTION – NARROW-BODY

A320

- Currently the narrow-body aircraft with the longest transcontinental flight distance operating at SJC (Boston non-stop)
- Second most heavily used aircraft for transcontinental operations

A321

- Highest seating capacity long-haul narrow-body aircraft
- Currently serves New York
- Likely to be Hawaiian Airlines preferred aircraft for service to Hawaii

B737-800

- Most heavily used aircraft at SJC for transcontinental operations

B737-900

- Used for transcontinental markets with need for higher seat capacity routes
- Southwest will be certified for Hawaii service by end of the calendar year (B737-800 or -900 aircraft service)

ESTABLISH DECISION MAKING CRITERIA

1. Tolerance for air service loss
2. Tolerance for aircraft weight penalties
3. Gain in building heights
4. Airline buy-in
5. Other agency buy-in (FAA)
6. Timeframe for decision
7. Comparative economic impact – gain or loss to airport vs gain or loss of potential development
8. Other evaluation criteria that come from the project Steering Committee

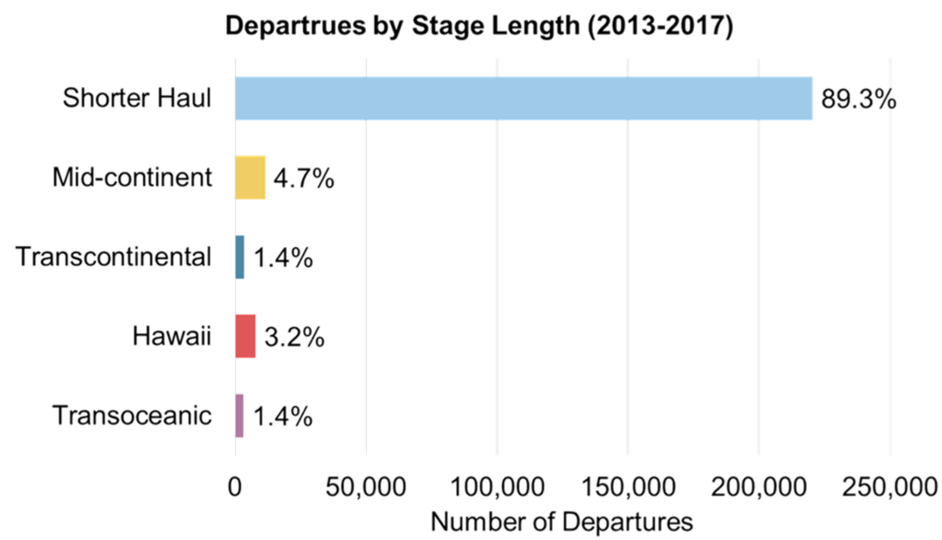
NEXT STEPS

- Scenario analysis and development (June – August)
- Email correspondence
  - Technical memorandums
    - Draft existing conditions
    - Draft case studies
    - Draft relationships between SJC, SFO, and OAK
- Timing of stakeholder meeting (September 2018)

APPENDIX

STAGE LENGTH CATEGORIES

- Stage lengths grouped by nautical miles (nm)
  - Up to 1500nm: “Shorter” haul
  - 1500-2000nm: Mid-continent
    - e.g. Chicago, Atlanta
  - 2000-2500nm: Transcontinental
    - e.g. New York, Boston
  - 2000-2500nm: Hawaii
    - Honolulu, Kahului, Lihue, Kona
  - 4000nm+: Transoceanic
    - Europe (London, Frankfurt)
    - Asia (Tokyo, Beijing, Shanghai)



Source: ANOMS

WIDE-BODY FLEET MIX ASSESSMENT

- Assessment of wide-body aircraft operations operating at west coast airports including
  - Mineta San Jose International Airport (SJC)
  - Los Angeles International Airport (LAX)
  - Oakland International Airport (OAK)
  - San Diego International Airport (SAN)
  - Seattle Tacoma International Airport (SEA)
  - San Francisco International Airport (SFO)
- 2017 operation data was gathered from aircraft manufacturer as well as OAG data sources

WIDE-BODY FLEET MIX ASSESSMENT

- Summary of operations for the following aircraft are provided:
  - Airbus A330
  - Airbus A340
  - Airbus A350
  - Airbus A380
  - Boeing 747
  - Boeing 777
  - Boeing 787

WORLDWIDE WIDE-BODY FLEET CENSUS

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Airbus A300	211	0	**211**	4.0%	0.0%	**2.9%**
Airbus A310	37	0	**37**	0.7%	0.0%	**0.5%**
Airbus A330-200	560	23	**583**	10.6%	1.1%	**8.0%**
Airbus A330-300	654	41	**695**	12.4%	2.0%	**9.5%**
Airbus A330neo	0	161	**161**	0.0%	7.9%	**2.2%**
Airbus A340-200	1	0	**1**	0.0%	0.0%	**0.0%**
Airbus A340-300	104	0	**104**	2.0%	0.0%	**1.4%**
Airbus A340-500	4	0	**4**	0.1%	0.0%	**0.1%**
Airbus A340-600	67	0	**67**	1.3%	0.0%	**0.9%**
Airbus A350-800	0	8	**8**	0.0%	0.4%	**0.1%**
Airbus A350-900	92	504	**596**	1.7%	24.6%	**8.1%**
Airbus A350-1000	0	206	**206**	0.0%	10.1%	**2.8%**
Airbus A380	212	71	**283**	4.0%	3.5%	**3.9%**
Boeing 747-200	8	0	**8**	0.2%	0.0%	**0.1%**
Boeing 747-300	5	0	**5**	0.1%	0.0%	**0.1%**
Boeing 747-400	370	0	**370**	7.0%	0.0%	**5.0%**
Boeing 747-8	106	19	**125**	2.0%	0.9%	**1.7%**
Boeing 747SP	0	0	**0**	0.0%	0.0%	**0.0%**
Boeing 767-200	77	0	**77**	1.5%	0.0%	**1.1%**
Boeing 767-300	630	65	**695**	11.9%	3.2%	**9.5%**
Boeing 767-400	37	0	**37**	0.7%	0.0%	**0.5%**

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Boeing 777-200/200ER	416	0	**416**	7.9%	0.0%	**5.7%**
Boeing 777-200LR	55	0	**55**	1.0%	0.0%	**0.8%**
Boeing 777-300	49	0	**49**	0.9%	0.0%	**0.7%**
Boeing 777-300ER	739	64	**803**	14.0%	3.1%	**11.0%**
Boeing 777-8X	0	53	**53**	0.0%	2.6%	**0.7%**
Boeing 777-9X	0	243	**243**	0.0%	11.9%	**3.3%**
Boeing 777F	128	31	**159**	2.4%	1.5%	**2.2%**
Boeing 787-8	331	69	**400**	6.3%	3.4%	**5.5%**
Boeing 787-9	223	363	**586**	4.2%	17.8%	**8.0%**
Boeing 787-10	0	124	**124**	0.0%	6.1%	**1.7%**
Boeing MD-11	120	0	**120**	2.3%	0.0%	**1.6%**
Ilyushin Il-96	4	0	**4**	0.1%	0.0%	**0.1%**
McDonnell Douglas DC-10	43	0	**43**	0.8%	0.0%	**0.6%**
Grand Total	**5,283**	**2,045**	**7,328**	**100.0%**	**100.0%**	**100.0%**

Notes: Data is updated through August 2017. Includes freighter and passenger aircraft.
Source: FlightGlobal, World Airliner Census, 2017.

AIRBUS A330

AIRBUS A330 FLEET DETAILS

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Airbus A330-200	560	23	**583**	46.1%	10.2%	**40.5%**
Airbus A330-300	654	41	**695**	53.9%	18.2%	**48.3%**
Airbus A330neo	0	161	**161**	0.0%	71.6%	**11.2%**
Grand Total	**1,214**	**225**	**1,439**	**100.0%**	**100.0%**	**100.0%**

Note: Data is updated through August 2017.
Source: Airbus's Orders and Deliveries.

AIRBUS A330 OPERATORS (1 OF 3)

Airline	In Fleet				On Order			
	A330-200	A330-300	A330-900	Total	A330-200	A330-300	A330-900	Total
Aercap	11	15		**26**				**0**
Aercap Ireland		5		**5**				**0**
Aer Lingus	3	9		**12**				**0**
Aeroflot Russian Airlines		11		**11**				**0**
Aerolineas Argentinas	4			**4**				**0**
Afriqiyah Airways	4	2		**6**				**0**
Air Algerie	8			**8**				**0**
Airasia X		20		**20**			66	**66**
Aircalin	2			**2**			2	**2**
Air Canada		8		**8**				**0**
Air Caraibes		3		**3**				**0**
Aircastle Advisor Llc	7			**7**				**0**
Air China	30	26		**56**				**0**
Air France	8			**8**				**0**
Air Inter		4		**4**				**0**
Air Mauritius	2			**2**				**0**
Air Senegal				**0**			2	**2**
Altavair Ltd		3		**3**				**0**
Arkia				**0**			2	**2**
Asiana Airlines		6		**6**				**0**
Austrian Airlines	3			**3**				**0**
Avianca	10			**10**				**0**
Awas	5	7		**12**				**0**
Bmi	1			**1**				**0**
Capital Airlines	2	2		**4**				**0**
Casc				**0**		13		**13**
Cathay Dragon		5		**5**				**0**
Cathay Pacific		49		**49**				**0**
Cebu Pacific Air		2		**2**				**0**
China Airlines		14		**14**				**0**
China Eastern Airlines	33	28		**61**				**0**
China Southern Airlines	16	32		**48**				**0**
Corsair	2			**2**				**0**

Source: Airbus's Orders and Deliveries.

AIRBUS A330 OPERATORS (2 OF 3)

Airline	In Fleet				On Order			
	A330-200	A330-300	A330-900	Total	A330-200	A330-300	A330-900	Total
Delta Air Lines		10		**10**			25	**25**
Egyptair	7	4		**11**		1		**1**
Emirates	28			**28**				**0**
Etihad Airways	14	6		**20**				**0**
Eva Air	3			**3**				**0**
Fiji Airways	3			**3**				**0**
Finnair		8		**8**				**0**
Garuda Indonesia	3	17		**20**			14	**14**
Gecas	21	12		**33**				**0**
Groupe Dubreuil		1		**1**				**0**
Grupo Marsans	4			**4**				**0**
Gulf Air	6			**6**				**0**
Hainan Airlines	3	10		**13**				**0**
Hawaiian Airlines	19			**19**				**0**
Hifly X Ireland				**0**	2			**2**
Hong Kong Airlines	9	9		**18**		9		**9**
Hong Kong International Aviation Le		4		**4**		4		**4**
Iag				**0**	3			**3**
Iberia	14	8		**22**				**0**
Ilfc	68	30		**98**				**0**
Intrepid Aviation Group	4	16		**20**				**0**
Iran Air				**0**	8		28	**36**
Jet Airways	10			**10**	5			**5**
Kingfisher Airlines	5			**5**				**0**
Klm Royal Dutch Airlines	7	1		**8**				**0**
Korean Air	8	22		**30**				**0**
Latam Airlines Brasil	15			**15**				**0**
Libyan Airlines	4			**4**				**0**
Lion Air		6		**6**				**0**
Ltu		5		**5**				**0**
Lufthansa		19		**19**				**0**
Malaysia Airlines		25		**25**				**0**
Middle East Airlines	5			**5**				**0**

Source: Airbus's Orders and Deliveries.

AIRBUS A330 OPERATORS (3 OF 3)

Airline	In Fleet				On Order			
	A330-200	A330-300	A330-900	Total	A330-200	A330-300	A330-900	Total
Mng Airlines				**0**				**0**
Monarch Airlines	2			**2**				**0**
Mytravel Airways	4	3		**7**				**0**
Northwest Airlines	11	21		**32**				**0**
Oman Air	2	6		**8**				**0**
Pembroke Aircraft Leasing 4 Ltd		2		**2**				**0**
Philippine Airlines		23		**23**				**0**
Qantas Airways	10	10		**20**				**0**
Qatar Airways	13	13		**26**				**0**
Rwandair	1	1		**2**				**0**
Sabena	3			**3**				**0**
Saudia		12		**12**				**0**
Scandinavian Airlines		8		**8**		1		**1**
Shenzhen Airlines		3		**3**				**0**
Sichuan Airlines	2	2		**4**				**0**
South African Airways		5		**5**				**0**
Srilankan Airlines	6	5		**11**				**0**
Swiss		16		**16**				**0**
Swissair	4			**4**				**0**
Synergy Aerospace Corporation	6			**6**				**0**
Tap Air Portugal	5			**5**			10	**10**
Thai Airways International		27		**27**				**0**
Tianjin Airlines	4			**4**				**0**
Tibet Airlines	5			**5**				**0**
Transasia Airways		2		**2**				**0**
Tunisair	2			**2**				**0**
Turkish Airlines	6	30		**36**				**0**
Us Airways	15	9		**24**				**0**
Virgin Atlantic		6		**6**				**0**
Waha Capital		2		**2**				**0**

Source: Airbus's Orders and Deliveries.

AIRBUS A330 WEST COAST DEPARTURES

Origin	Scheduled Departures	
	2017	2018
LAX	6,271	6,662
SFO	2,180	2,340
OAK	535	212
SJC	155	135
SAN	365	365
SEA	2,358	1,683
Total	**11,864**	**11,397**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A330 WEST COAST OPERATIONS - SJC

Destination		Scheduled Departures	
		2017	2018
PVG	Shanghai Pudong International Apt	154	135
HNL	Honolulu	1	0
SJC Total		**155**	**135**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A330 WEST COAST OPERATIONS – LAX/SFO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
HNL	Honolulu	1,096	1,041
OGG	Kahului	371	365
NAN	Nadi	361	365
ARN	Stockholm Arlanda Apt	336	329
DUB	Dublin	248	314
KEF	Reykjavik Keflavik International Apt	270	276
JFK	New York J F Kennedy International Apt	256	177
SVO	Moscow Sheremetyevo International Apt	198	145
NKG	Nanjing	156	156
MAD	Madrid Adolfo Suarez-Barajas Apt	98	209
PHL	Philadelphia International Apt	0	278
HGH	Hangzhou	114	156
TNA	Jinan	114	155
HND	Tokyo Intl (Haneda)	64	185
DUS	Duesseldorf International Airport	231	0
KOA	Kona	44	124
MAN	Manchester (GB)	77	75
ATL	Atlanta Hartsfield-jackson Intl Apt	58	90
CDG	Paris Charles de Gaulle Apt	44	82
BCN	Barcelona Apt	43	61
AMS	Amsterdam	0	59
TXL	Berlin Tegel Apt	58	0
YYZ	Toronto Lester B Pearson Intl	12	0
BOG	Bogota	3	2
LGW	London Gatwick Apt	2	0
LAX Total		**6,271**	**6,662**

Destination		Scheduled Departures 2017	Scheduled Departures 2018
HNL	Honolulu	366	365
OGG	Kahului	365	365
DUB	Dublin	339	347
KEF	Reykjavik Keflavik International Apt	261	259
PHL	Philadelphia International Apt	68	357
TAO	Qingdao	156	154
MAN	Manchester (GB)	128	127
NAN	Nadi	74	110
DUS	Duesseldorf International Airport	164	0
HEL	Helsinki-Vantaa	52	83
CDG	Paris Charles de Gaulle Apt	41	34
TXL	Berlin Tegel Apt	69	0
MAD	Madrid Adolfo Suarez-Barajas Apt	0	68
WUH	Wuhan	0	57
ATL	Atlanta Hartsfield-jackson Intl Apt	53	0
CLT	Charlotte	17	7
DTW	Detroit Metropolitan Wayne County	22	1
JFK	New York J F Kennedy International Apt	0	6
PVG	Shanghai Pudong International Apt	4	0
MSP	Minneapolis/St Paul International Apt	1	0
SFO Total		**2,180**	**2,340**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A330 WEST COAST OPERATIONS – OAK/SAN/SEA

OAKLAND

Destination		Scheduled Departures 2017	Scheduled Departures 2018
HNL	Honolulu	289	93
BCN	Barcelona Apt	82	97
OGG	Kahului	164	9
TER	Terceira	0	13
OAK Total		**535**	**212**

SAN DIEGO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
HNL	Honolulu	365	365
SAN Total		**365**	**365**

SEATTLE

Destination		Scheduled Departures 2017	Scheduled Departures 2018
AMS	Amsterdam	572	386
HNL	Honolulu	386	375
OGG	Kahului	365	366
CDG	Paris Charles de Gaulle Apt	335	97
PEK	Beijing Capital Intl Apt	291	101
HKG	Hong Kong International Apt	323	63
DUB	Dublin	0	119
ICN	Seoul Incheon International Airport	58	11
CGN	Cologne/Bonn Apt	22	38
FRA	Frankfurt International Apt	0	60
MAN	Manchester (GB)	0	34
LHR	London Heathrow Apt	0	28
NRT	Tokyo Narita Intl	1	4
ATL	Atlanta Hartsfield-jackson Intl Apt	2	1
DTW	Detroit Metropolitan Wayne County	1	0
LAS	Las Vegas McCarran International Apt	1	0
MSP	Minneapolis/St Paul International Apt	1	0
SEA Total		**2,358**	**1,683**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A340

AIRBUS A340 FLEET DETAILS

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Airbus A340-200	1	0	**1**	0.6%	0.0%	**0.6%**
Airbus A340-300	104	0	**104**	59.1%	0.0%	**59.1%**
Airbus A340-500	4	0	**4**	2.3%	0.0%	**2.3%**
Airbus A340-600	67	0	**67**	38.1%	0.0%	**38.1%**
Grand Total	**176**	**0**	**176**	**100.0%**	**0.0%**	**100.0%**

Note: Data is updated through August 2017.
Source: Airbus's Orders and Deliveries.

AIRBUS A340 OPERATORS

Airline	In Fleet			On Order		
	A340-200/300	A340-500/600	Total	A340-200/300	A340-500/600	Total
Air Canada	8	2	**10**			**0**
Air China	3		**3**			**0**
Air China Southwest Company	3		**3**			**0**
Air France	14		**14**			**0**
Air Mauritius	5		**5**			**0**
Air Tahiti Nui	4		**4**			**0**
Arik Air		2	**2**			**0**
Austrian Airlines	4		**4**			**0**
Cathay Pacific	11		**11**			**0**
China Airlines	6		**6**			**0**
China Eastern Airlines	5	5	**10**			**0**
Egyptair	3		**3**			**0**
Emirates		10	**10**			**0**
Etihad Airways		11	**11**			**0**
Finnair	4		**4**			**0**
Gulf Air	6		**6**			**0**
Iberia	18	16	**34**			**0**
Ilfc	16	13	**29**			**0**
Kuwait Airways	4		**4**			**0**
Latam Airlines Group	4		**4**			**0**
Lufthansa	35	24	**59**			**0**
Olympic Airlines	4		**4**			**0**
Philippine Airlines	8		**8**			**0**
Qatar Airways		4	**4**			**0**
Sabena	5		**5**			**0**
Scandinavian Airlines	7		**7**			**0**
Singapore Airlines	17	5	**22**			**0**
South African Airways	6	6	**12**			**0**
Srilankan Airlines	3		**3**			**0**
Swiss	9		**9**			**0**
Tap Air Portugal	4		**4**			**0**
Thai Airways International		10	**10**			**0**
Turkish Airlines	7		**7**			**0**
U.T.A.	7		**7**			**0**
Virgin Atlantic	7	14	**21**			**0**

Source: Airbus's Orders and Deliveries.

AIRBUS A340 WEST COAST DEPARTURES

Origin	Scheduled Departures	
	2017	2018
LAX	3,281	3,221
SFO	1,128	887
OAK	13	0
SJC	196	189
SAN	30	261
SEA	24	0
Total	**4,672**	**4,558**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A340 WEST COAST OPERATIONS

LOS ANGELES

Destination		Scheduled Departures 2017	Scheduled Departures 2018
PPT	Tahiti	532	510
CDG	Paris Charles de Gaulle Apt	236	270
MUC	Munich International Airport	352	143
FRA	Frankfurt International Apt	0	217
MNL	Manila Ninoy Aquino International Apt	34	55
CEB	Cebu	63	0
MAD	Madrid Adolfo Suarez-Barajas Apt	44	0
ARN	Stockholm Arlanda Apt	2	8
LHR	London Heathrow Apt	1	0
LAX Total		**3,281**	**3,221**

OAK

Destination		Scheduled Departures 2017	Scheduled Departures 2018
TER	Terceira	13	0
OAK Total		**13**	**0**

SAN DIEGO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
FRA	Frankfurt International Apt	0	200
ZRH	Zurich Airport	30	61
SAN Total		**30**	**261**

SEATTLE

Destination		Scheduled Departures 2017	Scheduled Departures 2018
LHR	London Heathrow Apt	24	0
SEA Total		**24**	**0**

SAN JOSE

Destination		Scheduled Departures 2017	Scheduled Departures 2018
FRA	Frankfurt International Apt	196	189
SJC Total		**196**	**189**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A350

AIRBUS A350 FLEET DETAILS

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Airbus A350-800	0	8	**8**	0.0%	1.1%	**1.0%**
Airbus A350-900	92	504	**596**	100.0%	70.2%	**73.6%**
Airbus A350-1000	0	206	**206**	0.0%	28.7%	**25.4%**
Grand Total	**92**	**718**	**810**	**100.0%**	**100.0%**	**100.0%**

Note: Data is updated through August 2017.
Source: Airbus's Orders and Deliveries.

AIRBUS A350 OPERATORS

Airline	In Fleet			On Order		
	A350-900	A350-1000	Total	A350-900	A350-1000	Total
Aercap	17		**17**	3		**3**
Aer Lingus			**0**	9		**9**
Aeroflot Russian Airlines			**0**	14		**14**
Afriqiyah Airways			**0**	10		**10**
Airasia X			**0**	10		**10**
Air Caraibes			**0**		3	**3**
Air China			**0**	10		**10**
Air France			**0**	21		**21**
Air Mauritius			**0**	4		**4**
Alafco	6		**6**	6		**6**
Asiana Airlines	5		**5**	16	9	**25**
British Airways			**0**		18	**18**
Cathay Pacific	20		**20**	6	20	**26**
China Airlines	12		**12**	2		**2**
China Eastern Airlines			**0**	20		**20**
China Southern Airlines			**0**	20		**20**
Delta Air Lines	9		**9**	16		**16**
Ethiopian Airlines	6		**6**	16		**16**
Etihad Airways			**0**	40	22	**62**
Finnair	11		**11**	8		**8**
Groupe Dubreuil	1		**1**			**0**

Airline	In Fleet			On Order		
	A350-900	A350-1000	Total	A350-900	A350-1000	Total
Hong Kong Airlines			**0**	15		**15**
Iberia			**0**	16		**16**
Iran Air			**0**		16	**16**
Japan Airlines			**0**	18	13	**31**
Klm Royal Dutch Airlines			**0**	7		**7**
Kuwait Airways			**0**	10		**10**
Latam Airlines Group	8		**8**	7	12	**19**
Libyan Airlines			**0**	6		**6**
Lufthansa	8		**8**	17		**17**
Philippine Airlines			**0**	6		**6**
Qatar Airways	23	1	**24**	16	36	**52**
Scandinavian Airlines			**0**	8		**8**
Singapore Airlines	21		**21**	46		**46**
Srilankan Airlines			**0**	4		**4**
Thai Airways International	3		**3**	1		**1**
United Airlines			**0**	45		**45**
Vietnam Airlines	8		**8**	2		**2**
Virgin Atlantic			**0**		8	**8**
Yemenia - Yemen Airways			**0**	10		**10**

Source: Airbus's Orders and Deliveries.

AIRBUS A350 WEST COAST DEPARTURES

Origin	Scheduled Departures	
	2017	2018
LAX	2,025	2,647
SFO	856	1,456
OAK	0	0
SJC	0	0
SAN	0	0
SEA	0	89
Total	**2,881**	**4,192**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A350 WEST COAST OPERATIONS – LAX/SEA/SFO

LOS ANGELES

Destination		Scheduled Departures 2017	Scheduled Departures 2018
HKG	Hong Kong International Apt	8	359
PVG	Shanghai Pudong International Apt	0	166
ICN	Seoul Incheon International Airport	0	104
LAX Total		**2,025**	**2,647**

SEATTLE

Destination		Scheduled Departures 2017	Scheduled Departures 2018
ICN	Seoul Incheon International Airport	0	89
SEA Total		**0**	**89**

SAN FRANCISCO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
SIN	Singapore Changi Apt	365	365
HKG	Hong Kong International Apt	57	500
ICN	Seoul Incheon International Airport	140	365
TPE	Taipei Taiwan Taoyuan International Apt	294	35
ORY	Paris Orly Apt	0	101
PPT	Tahiti	0	90
SFO Total		**856**	**1,456**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A380

AIRBUS A380 FLEET DETAILS

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Airbus A380	212	71	**283**	100.0%	100.0%	**100.0%**
Grand Total	**212**	**71**	**283**	**100.0%**	**100.0%**	**100.0%**

Note: Data is updated through August 2017.
Source: Airbus's Orders and Deliveries.

AIRBUS A380 OPERATORS

Airline	In Fleet		On Order	
	A380	Total	A380	Total
Air Accord		**0**	3	**3**
Air France	10	**10**		**0**
All Nippon Airways		**0**	3	**3**
Amedeo		**0**	20	**20**
Asiana Airlines	6	**6**		**0**
British Airways	12	**12**		**0**
China Southern Airlines	5	**5**		**0**
Emirates	103	**103**	59	**59**
Etihad Airways	10	**10**		**0**
Korean Air	10	**10**		**0**
Lufthansa	14	**14**		**0**
Malaysia Airlines	6	**6**		**0**
Qantas Airways	12	**12**	8	**8**
Qatar Airways	10	**10**		**0**
Singapore Airlines	22	**22**	2	**2**
Thai Airways International	6	**6**		**0**

Source: Airbus's Orders and Deliveries.

AIRBUS A380 WEST COAST DEPARTURES

Origin	Scheduled Departures	
	2017	2018
LAX	6,223	5,947
SFO	1,266	1,197
OAK	0	0
SJC	0	0
SAN	0	0
SEA	0	0
Total	**7,489**	**7,144**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

AIRBUS A380 WEST COAST OPERATIONS

LOS ANGELES

Destination		Scheduled Departures 2017	Scheduled Departures 2018
ICN	Seoul Incheon International Airport	1,435	1,300
LHR	London Heathrow Apt	619	530
DXB	Dubai International	402	351
CAN	Guangzhou	365	363
CDG	Paris Charles de Gaulle Apt	352	364
MEL	Melbourne Airport	361	336
SYD	Sydney Kingsford Smith Apt	310	323
FRA	Frankfurt International Apt	362	146
MUC	Munich International Airport	0	216
LAX Total		**6,223**	**5,947**

SAN FRANCISCO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
DXB	Dubai International	365	365
FRA	Frankfurt International Apt	358	300
LHR	London Heathrow Apt	327	281
CDG	Paris Charles de Gaulle Apt	216	189
MUC	Munich International Airport	0	62
SFO Total		**1,266**	**1,197**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 747

BOEING 747 FLEET DETAILS

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Boeing 747-200	8	0	**8**	1.6%	0.0%	**1.6%**
Boeing 747-300	5	0	**5**	1.0%	0.0%	**1.0%**
Boeing 747-400	370	0	**370**	75.7%	0.0%	**72.8%**
Boeing 747-8	106	19	**125**	21.7%	100.0%	**24.6%**
Boeing 747SP	0	0	**0**	0.0%	0.0%	**0.0%**
Grand Total	**489**	**19**	**508**	**100.0%**	**100.0%**	**100.0%**

Note: Data is updated through August 2017.
Source: Boeing's Orders and Deliveries.

BOEING 747 OPERATORS

Airline	In Fleet							On Order						
	747-100	747-200	747-300	747-400	747-8	747-SP	Total	747-100	747-200	747-300	747-400	747-8	747-SP	Total
Air Canada	5	2		3			**10**							**0**
Air China		1		14	7		**22**							**0**
Air France	16	13		12			**41**							**0**
Air India		11	2	6			**19**							**0**
Air New Zealand		5		4			**9**							**0**
Alitalia	2	14					**16**							**0**
American Airlines	16						**16**							**0**
Asiana Airlines				8			**8**							**0**
British Airways	18	18		57			**93**							**0**
Cathay Pacific Airways		8	6	17			**31**							**0**
China Airlines		4		17		4	**25**							**0**
Delta Air Lines	5						**5**							**0**
EgyptAir			2				**2**							**0**
EL AL Israel Airlines		6		4			**10**							**0**
EVA Air				15			**15**							**0**
Garuda Indonesia		6		2			**8**							**0**
GECAS				1			**1**							**0**
Japan Airlines	20	24	13	42			**99**							**0**
KLM Royal Dutch Airlines		17	3	22			**42**							**0**
Korean Air		6	3	28	10	2	**49**							**0**
Kuwait Airways		4		1			**5**							**0**
Lufthansa	3	21		32	19		**75**							**0**
Malaysia Airlines			1	21			**22**							**0**
Pakistan International Airline		2					**2**							**0**
Philippine Airlines		4		4			**8**							**0**
Saudi Arabian Airlines	8		10	5		2	**25**							**0**
Singapore Airlines		19	14	42			**75**							**0**
Thai Airways International		6	2	18			**26**							**0**
United Airlines	22	2		44			**68**							**0**

Source: Boeing's Orders and Deliveries.

BOEING 747 WEST COAST DEPARTURES

Origin	Scheduled Departures 2017	Scheduled Departures 2018
LAX	3,584	3,287
SFO	3,314	1,413
OAK	0	0
SJC	0	0
SAN	143	146
SEA	581	506
Total	**7,622**	**5,352**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 747 WEST COAST OPERATIONS – LAX/SAN/SEA

LOS ANGELES

Destination		Scheduled Departures 2017	Scheduled Departures 2018
AMS	Amsterdam	497	365
BNE	Brisbane	354	266
JFK	New York J F Kennedy International Apt	351	237
LHR	London Heathrow Apt	107	193
FRA	Frankfurt International Apt	144	144
SYD	Sydney Kingsford Smith Apt	66	57
ICN	Seoul Incheon International Airport	22	7
MEL	Melbourne Airport	22	0
MDT	Harrisburg International Apt	2	0
DTW	Detroit Metropolitan Wayne County	1	0
PEK	Beijing Capital Intl Apt	1	0
LAX Total		**3,584**	**3,287**

SEATTLE

Destination		Scheduled Departures 2017	Scheduled Departures 2018
FRA	Frankfurt International Apt	348	290
LHR	London Heathrow Apt	191	216
TPE	Taipei Taiwan Taoyuan International Apt	40	0
BIF	El Paso Biggs Aaf	1	0
NRT	Tokyo Narita Intl	1	0
SEA Total		**581**	**506**

SAN DIEGO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
LHR	London Heathrow Apt	143	146
SAN Total		**143**	**146**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 747 WEST COAST OPERATIONS - SFO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
PEK	Beijing Capital Intl Apt	613	365
LHR	London Heathrow Apt	519	366
ICN	Seoul Incheon International Airport	540	154
SYD	Sydney Kingsford Smith Apt	306	311
FRA	Frankfurt International Apt	468	0
AMS	Amsterdam	147	217
PVG	Shanghai Pudong International Apt	210	0
TPE	Taipei Taiwan Taoyuan International Apt	210	0
NRT	Tokyo Narita Intl	164	0
HKG	Hong Kong International Apt	83	0
GRK	Killeen/Fort Hood Regional/R. Gray AAF	9	0
AEX	Alexandria International Apt	6	0
VCV	Victorville	6	0
HNL	Honolulu	5	0
BIF	El Paso Biggs Aaf	4	0
RIV	Riverside March JARB	4	0
SVN	Savannah Hunter Aaf	3	0

Destination		Scheduled Departures 2017	Scheduled Departures 2018
AUS	Austin-Bergstrom International Apt	2	0
EIL	Fairbanks Eielson AFB	2	0
HHN	Frankfurt Hahn Airport	2	0
EDF	Anchorage Elmendorf AFB	1	0
HOP	Hopkinsville	1	0
LAX	Los Angeles International Apt	1	0
LSV	Las Vegas Nellis AFB	1	0
MIB	Minot AFB	1	0
NGU	Norfolk NS (Chambers Field)	1	0
OKC	Oklahoma City Will Rogers Apt	1	0
SEA	Seattle-Tacoma International Apt	1	0
SLN	Salina	1	0
SSC	Sumter Shaw AFB	1	0
TCM	Tacoma McChord Field	1	0
SFO Total		**3,314**	**1,413**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 777

BOEING 777 FLEET DETAILS

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Boeing 777-200/200ER	416	0	**416**	30.0%	0.0%	**23.4%**
Boeing 777-200LR	55	0	**55**	4.0%	0.0%	**3.1%**
Boeing 777-300	49	0	**49**	3.5%	0.0%	**2.8%**
Boeing 777-300ER	739	64	**803**	53.3%	16.4%	**45.2%**
Boeing 777-8X	0	53	**53**	0.0%	13.6%	**3.0%**
Boeing 777-9X	0	243	**243**	0.0%	62.1%	**13.7%**
Boeing 777F	128	31	**159**	9.2%	7.9%	**8.9%**
Grand Total	**1,387**	**391**	**1,778**	**100.0%**	**100.0%**	**100.0%**

Note: Data is updated through August 2017.
Source: Boeing's Orders and Deliveries.

BOEING 777 OPERATORS (1 OF 2)

	In Fleet							On Order						
Airline	**777-300ER**	**777-300**	**777-200LR**	**777-200**	**777-200ER**	**777X**	**Total**	**777-300ER**	**777-300**	**777-200LR**	**777-200**	**777-200ER**	**777X**	**Total**
Aeroflot - Russian Airlines	16						**16**	6						**6**
Air Austral			1				**1**							**0**
Air Canada	17		6				**23**							**0**
Air China	26			10			**36**							**0**
Air France	36				18		**54**							**0**
Air France-KLM Group	1						**1**							**0**
Air India	15		8				**23**							**0**
Air New Zealand	5				4		**9**							**0**
Alitalia					6		**6**							**0**
All Nippon Airways	22	7		16	12		**57**						1	**1**
Altavair LLC	1						**1**							**0**
American Airlines	20				47		**67**							**0**
ANA Holdings							**0**	6					19	**25**
Asiana Airlines					10		**10**							**0**
Austrain Airlines					1		**1**							**0**
Biman Bangladesh Airlines	4						**4**							**0**
British Airways	6			5	44		**55**							**0**
Cathay Pacific Airways	49	12		5			**66**						21	**21**
Ceiba Intercontinental			1				**1**							**0**
China Airlines	6						**6**							**0**
China Eastern Airlines	20						**20**							**0**
China Southern Airlines	10			4	2		**16**							**0**
Delta Air Lines			10		8		**18**							**0**
Dream Aviation Ltd.					1		**1**							**0**
EgyptAir					5		**5**							**0**
EL AL Israel Airlines					6		**6**							**0**
Emirates	108		10	3	6		**127**	12					150	**162**
Ethiopian Airlines			6				**6**							**0**
Etihad Airways	18						**18**						25	**25**
EVA Air	20						**20**							**0**
Garuda Indonesia	10						**10**							**0**

Source: Boeing's Orders and Deliveries.

BOEING 777 OPERATORS (2 OF 2)

	In Fleet							On Order						
Airline	777-300ER	777-300	777-200LR	777-200	777-200ER	777X	Total	777-300ER	777-300	777-200LR	777-200	777-200ER	777X	Total
GECAS	49				4		**53**							**0**
Intrepid Aviation	4						**4**							**0**
Japan Airlines	13	7		15	11		**46**							**0**
Jet Airways	10						**10**							**0**
Kenya Airways	1				4		**5**							**0**
KLM Royal Dutch Airlines	9				6		**15**							**0**
Korean Air	20	4			18		**42**	3						**3**
Kuwait Airways	10				2		**12**							**0**
LATAM Airlines Brasil	10						**10**							**0**
Lauda Air					3		**3**							**0**
Lufthansa							**0**						20	**20**
Malaysia Airlines					15		**15**							**0**
Mid East Jet					1		**1**							**0**
Pakistan International Airline	3		2		3		**8**	5						**5**
Philippine Airlines	4						**4**							**0**
Qatar Airways	41		9				**50**	7					60	**67**
Republic of Iraq			1				**1**							**0**
Saudi Arabian Airlines	20				23		**43**							**0**
Singapore Airlines	27	12			46		**85**						20	**20**
Swiss International Air Lines	10						**10**							**0**
TAAG	5				3		**8**							**0**
Thai Airways International	6	6		8	6		**26**							**0**
Turkish Airlines	30						**30**							**0**
Turkmenistan Airlines			3				**3**							**0**
United Airlines	17			22	58		**97**	1						**1**
Vietnam Airlines					4		**4**							**0**
Virgin Australia	4						**4**							**0**

Source: Boeing's Orders and Deliveries.

BOEING 777 WEST COAST DEPARTURES

Origin	Scheduled Departures 2017	Scheduled Departures 2018
LAX	19,812	18,369
SFO	11,282	12,860
OAK	143	122
SJC	0	0
SAN	216	218
SEA	1,929	2,255
Total	**33,382**	**33,824**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 777 WEST COAST OPERATIONS - LAX

Destination		Scheduled Departures 2017	Scheduled Departures 2018
TPE	Taipei Taiwan Taoyuan International Apt	1,804	1,529
HKG	Hong Kong International Apt	1,673	1,450
NRT	Tokyo Narita Intl	1,435	1,505
LHR	London Heathrow Apt	1,136	1,078
PVG	Shanghai Pudong International Apt	1,087	896
SYD	Sydney Kingsford Smith Apt	999	703
HND	Tokyo Intl (Haneda)	982	552
AKL	Auckland International Apt	724	722
PEK	Beijing Capital Intl Apt	561	723
MNL	Manila Ninoy Aquino International Apt	475	640
EWR	Newark Liberty International Apt	414	505
ICN	Seoul Incheon International Airport	435	414
CDG	Paris Charles de Gaulle Apt	404	429
DOH	Doha	365	365
ZRH	Zurich Airport	365	365
IST	Istanbul Ataturk Airport	359	365
GTP	Grants Pass	333	365
AUH	Abu Dhabi International Apt	365	291
HNL	Honolulu	382	267
BNE	Brisbane	324	311
DEN	Denver Intl Apt	318	317
ATL	Atlanta Hartsfield-jackson Intl Apt	364	232
MIA	Miami International Apt	302	247
FCO	Rome Fiumicino Apt	199	239
MEL	Melbourne Airport	188	248
TLV	Tel Aviv-yafo Ben Gurion International	203	209

Destination		Scheduled Departures 2017	Scheduled Departures 2018
SVO	Moscow Sheremetyevo International Apt	167	217
JED	Jeddah	153	186
AMS	Amsterdam	63	272
VIE	Vienna International	153	181
PPT	Tahiti	156	156
CAN	Guangzhou	153	150
GRU	Sao Paulo Guarulhos Intl Apt	224	0
DFW	Dallas Dallas/Fort Worth Intl Apt	212	10
ORD	Chicago O'Hare International Apt	118	0
IAH	Houston George Bush Intercont.	1	116
RAR	Rarotonga Island	52	47
DXB	Dubai International	83	14
RUH	Riyadh King Khalid Intl	37	0
YYZ	Toronto Lester B Pearson Intl	6	30
MEX	Mexico City Juarez Intl	8	0
IAD	Washington Dulles International Apt	4	1
JFK	New York J F Kennedy International Apt	4	1
MED	Madinah	1	1
OKC	Oklahoma City Will Rogers Apt	0	2
PHX	Phoenix Sky Harbor Intl Apt	2	0
DTW	Detroit Metropolitan Wayne County	1	0
MDT	Harrisburg International Apt	1	0
LAX Total		**19,812**	**18,369**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 777 WEST COAST OPERATIONS - SFO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
HKG	Hong Kong International Apt	1,484	1,452
TPE	Taipei Taiwan Taoyuan International Apt	1,078	1,743
HNL	Honolulu	850	932
EWR	Newark Liberty International Apt	688	775
NRT	Tokyo Narita Intl	566	730
LHR	London Heathrow Apt	429	726
ICN	Seoul Incheon International Airport	571	469
AKL	Auckland International Apt	516	508
PVG	Shanghai Pudong International Apt	425	512
ORD	Chicago O'Hare International Apt	672	260
HND	Tokyo Intl (Haneda)	432	426
CDG	Paris Charles de Gaulle Apt	291	527
DEL	Delhi	313	434
IST	Istanbul Ataturk Airport	355	365
MNL	Manila Ninoy Aquino International Apt	354	364
ZRH	Zurich Airport	281	365
BOS	Boston Edward L Logan Intl Apt	425	205
DEN	Denver Intl Apt	291	305
FRA	Frankfurt International Apt	78	513

Destination		Scheduled Departures 2017	Scheduled Departures 2018
IAD	Washington Dulles International Apt	311	260
PEK	Beijing Capital Intl Apt	149	365
CAN	Guangzhou	196	247
WUH	Wuhan	120	99
OGG	Kahului	134	22
TLV	Tel Aviv-yafo Ben Gurion International	0	151
AUH	Abu Dhabi International Apt	147	0
AMS	Amsterdam	70	0
IAH	Houston George Bush Intercont.	0	53
KIX	Osaka Kansai International Airport	47	0
YYZ	Toronto Lester B Pearson Intl	0	39
LAS	Las Vegas McCarran International Apt	6	6
KOA	Kona	0	4
LAX	Los Angeles International Apt	1	1
OKC	Oklahoma City Will Rogers Apt	2	0
COS	Colorado Springs Municipal	0	1
CVS	Clovis Cannon AFB	0	1
SFO Total		**11,282**	**12,860**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 777 WEST COAST OPERATIONS – OAK/SAN/SEA

OAKLAND

Destination		Scheduled Departures 2017	Scheduled Departures 2018
LGW	London Gatwick Apt	143	122
OAK Total		**143**	**122**

SAN DIEGO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
LHR	London Heathrow Apt	216	216
CDG	Paris Charles de Gaulle Apt	0	2
SAN Total		**216**	**218**

SEATTLE

Destination		Scheduled Departures 2017	Scheduled Departures 2018
ICN	Seoul Incheon International Airport	577	576
DXB	Dubai International	506	365
TPE	Taipei Taiwan Taoyuan International Apt	455	370
LHR	London Heathrow Apt	390	364
CDG	Paris Charles de Gaulle Apt	0	327
HKG	Hong Kong International Apt	0	243
AMS	Amsterdam	0	8
ATL	Atlanta Hartsfield-jackson Intl Apt	1	1
PVG	Shanghai Pudong International Apt	0	1
SEA Total		**1,929**	**2,255**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 787

BOEING 787 FLEET DETAILS

Aircraft Model	Number of Aircraft			Percent of Fleet		
	In-Service	Orders	Total	In-Service	Orders	Total
Boeing 787-8	331	69	**400**	59.7%	12.4%	**36.0%**
Boeing 787-9	223	363	**586**	40.3%	65.3%	**52.8%**
Boeing 787-10	0	124	**124**	0.0%	22.3%	**11.2%**
Grand Total	**554**	**556**	**1,110**	**100.0%**	**100.0%**	**100.0%**

Note: Data is updated through August 2017.
Source: Boeing's Orders and Deliveries.

BOEING 787 OPERATORS

Airline	In Fleet				On Order			
	787-8	787-9	787-10	Total	787-8	787-9	787-10	Total
Aeroflot - Russian Airlines				**0**	18	4		**22**
Air Austral	2			**2**				**0**
Air Canada	8	25		**33**		4		**4**
Air China		14		**14**		1		**1**
Air France-KLM Group		6		**6**		11	8	**19**
Air India	27			**27**				**0**
Air New Zealand		11		**11**		1		**1**
American Airlines	20	15		**35**		32		**32**
Biman Bangladesh Airlines				**0**	4			**4**
British Airways	9	17		**26**	3	1	12	**16**
China Southern Airlines	10	1		**11**				**0**
EL AL Israel Airlines		1		**1**	2	3		**5**
Ethiopian Airlines	16			**16**				**0**
Etihad Airways		20		**20**		21	30	**51**
EVA Air				**0**			18	**18**
GECAS				**0**		6	4	**10**
Japan Airlines	25	11		**36**	4	9		**13**
Jet Airways				**0**		10		**10**
Kenya Airways	9			**9**				**0**
Korean Air	1	5		**6**		5		**5**
LATAM Airlines Group	10	8		**18**		8		**8**
Qatar Airways	30			**30**		30		**30**
Republic of Iraq				**0**	10			**10**
Saudi Arabian Airlines		8		**8**				**0**
Singapore Airlines			2	**2**			47	**47**
Turkish Airlines				**0**		25		**25**
United Airlines	12	25		**37**			14	**14**
Vietnam Airlines		8		**8**				**0**

Source: Boeing's Orders and Deliveries.

BOEING 787 WEST COAST DEPARTURES

Origin	Scheduled Departures	
	2017	2018
LAX	9,940	13,736
SFO	4,624	5,245
OAK	556	975
SJC	963	910
SAN	365	365
SEA	1,060	1,436
Total	**17,508**	**22,667**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 787 WEST COAST OPERATIONS - LAX

Destination		Scheduled Departures 2017	Scheduled Departures 2018
LHR	London Heathrow Apt	1,213	1,548
PVG	Shanghai Pudong International Apt	672	729
PEK	Beijing Capital Intl Apt	513	678
SYD	Sydney Kingsford Smith Apt	429	730
NRT	Tokyo Narita Intl	451	685
MEL	Melbourne Airport	380	604
YYZ	Toronto Lester B Pearson Intl	273	539
LGW	London Gatwick Apt	333	470
KIX	Osaka Kansai International Airport	365	365
DFW	Dallas Dallas/Fort Worth Intl Apt	312	388
BOG	Bogota	299	363
LIM	Lima	287	261
AKL	Auckland International Apt	304	146
SIN	Singapore Changi Apt	66	365
WAW	Warsaw Frederic Chopin	152	256
HND	Tokyo Intl (Haneda)	46	358
CDG	Paris Charles de Gaulle Apt	150	239
GRU	Sao Paulo Guarulhos Intl Apt	56	319
DUB	Dublin	177	177
SCL	Santiago (CL)	160	171
CPH	Copenhagen Kastrup Apt	142	146
ARN	Stockholm Arlanda Apt	138	146
IAH	Houston George Bush Intercont.	1	280
BCN	Barcelona Apt	79	198
XMN	Xiamen	87	154
OSL	Oslo Gardermoen Airport	102	117

Destination		Scheduled Departures 2017	Scheduled Departures 2018
CTU	Chengdu	84	128
CSX	Changsha	104	104
ORD	Chicago O'Hare International Apt	184	3
CKG	Chongqing	82	104
FCO	Rome Fiumicino Apt	15	151
TAO	Qingdao	9	157
BNE	Brisbane	0	145
SZX	Shenzhen	11	133
JFK	New York J F Kennedy International Apt	4	122
MXP	Milan Malpensa Apt	0	115
MEX	Mexico City Juarez Intl	113	0
DEN	Denver Intl Apt	103	0
MAD	Madrid Adolfo Suarez-Barajas Apt	0	88
SFO	San Francisco	25	2
PPT	Tahiti	0	23
EZE	Buenos Aires Ministro Pistarini	0	6
RAR	Rarotonga Island	0	5
EWR	Newark Liberty International Apt	2	0
LAX Total		**9,940**	**13,736**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 787 WEST COAST OPERATIONS - SFO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
LHR	London Heathrow Apt	562	681
PVG	Shanghai Pudong International Apt	455	582
SIN	Singapore Changi Apt	365	365
SYD	Sydney Kingsford Smith Apt	365	365
YYZ	Toronto Lester B Pearson Intl	145	457
HND	Tokyo Intl (Haneda)	295	304
KIX	Osaka Kansai International Airport	276	319
TLV	Tel Aviv-yafo Ben Gurion International	364	224
ICN	Seoul Incheon International Airport	63	472
AMS	Amsterdam	241	262
IAH	Houston George Bush Intercont.	456	30
CDG	Paris Charles de Gaulle Apt	321	149
CTU	Chengdu	168	155
MUC	Munich International Airport	103	176
DEN	Denver Intl Apt	120	48
DFW	Dallas Dallas/Fort Worth Intl Apt	0	165
IAD	Washington Dulles International Apt	16	149
ZRH	Zurich Airport	0	142
HGH	Hangzhou	123	0
FRA	Frankfurt International Apt	0	104
XIY	Xi'an Xianyang Apt	75	0
MEL	Melbourne Airport	0	67
CAN	Guangzhou	48	0
WUH	Wuhan	36	0
LAX	Los Angeles International Apt	27	2
PPT	Tahiti	0	27
SFO Total		**4,624**	**5,245**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

BOEING 787 WEST COAST OPERATIONS – OAK/SAN/SEA/SJC

OAKLAND

Destination		Scheduled Departures 2017	Scheduled Departures 2018
LGW	London Gatwick Apt	222	267
BCN	Barcelona Apt	70	225
ARN	Stockholm Arlanda Apt	142	117
CDG	Paris Charles de Gaulle Apt	0	151
CPH	Copenhagen Kastrup Apt	61	61
OSL	Oslo Gardermoen Airport	61	61
FCO	Rome Fiumicino Apt	0	93
OAK Total		**556**	**975**

SEATTLE

Destination		Scheduled Departures 2017	Scheduled Departures 2018
NRT	Tokyo Narita Intl	365	365
LHR	London Heathrow Apt	237	333
PVG	Shanghai Pudong International Apt	201	156
PEK	Beijing Capital Intl Apt	60	239
LGW	London Gatwick Apt	61	209
SZX	Shenzhen	136	134
SEA Total		**1,060**	**1,436**

SAN DIEGO

Destination		Scheduled Departures 2017	Scheduled Departures 2018
NRT	Tokyo Narita Intl	365	365
SAN Total		**365**	**365**

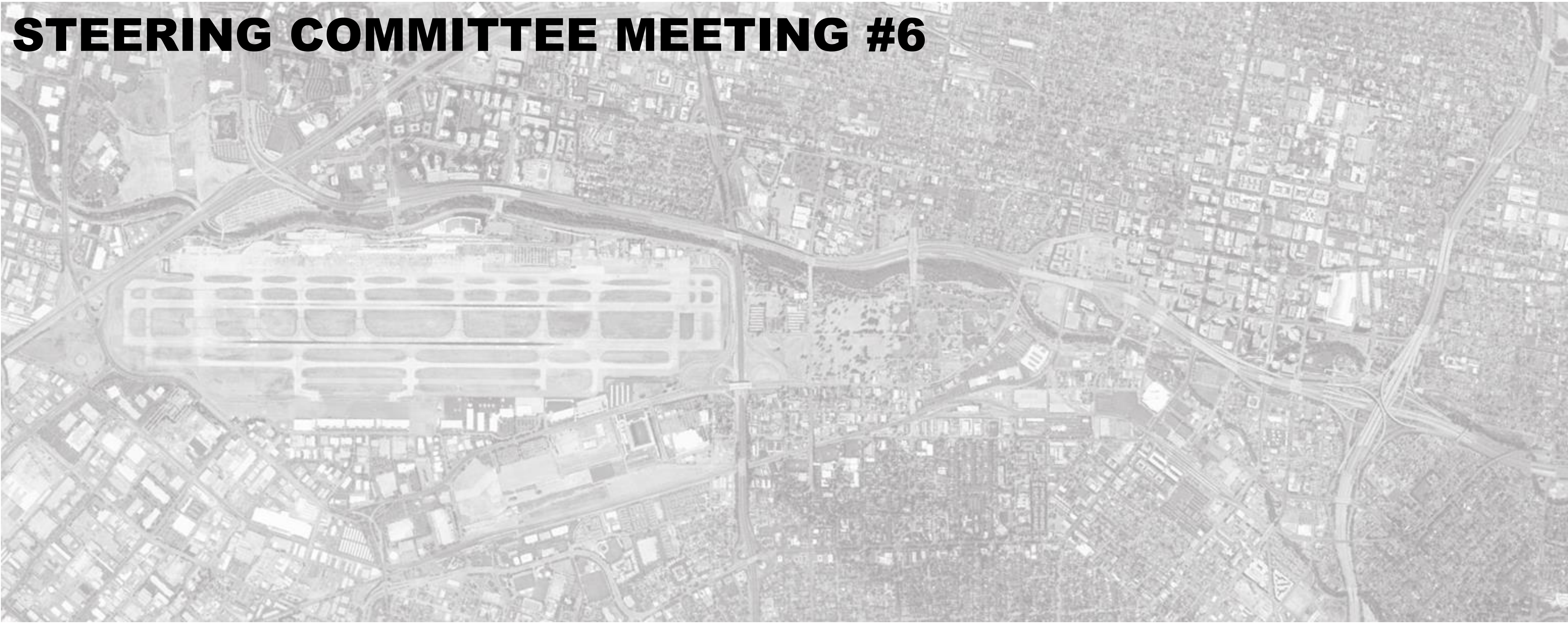
SAN JOSE

Destination		Scheduled Departures 2017	Scheduled Departures 2018
NRT	Tokyo Narita Intl	365	365
LHR	London Heathrow Apt	358	336
PEK	Beijing Capital Intl Apt	240	209
SJC Total		**963**	**910**

Source: OAG Aviation Worldwide Ltd, OAG Schedules Analyser

DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

STEERING COMMITTEE MEETING #6



September 7, 2018

AGENDA

- Introduction
- Airspace Protection Scenarios
- Aircraft Performance City Pair Assessment
- Airline Aircraft Performance Assessment
- Comments on Existing Conditions and Bay Area Airports Comparison Reports

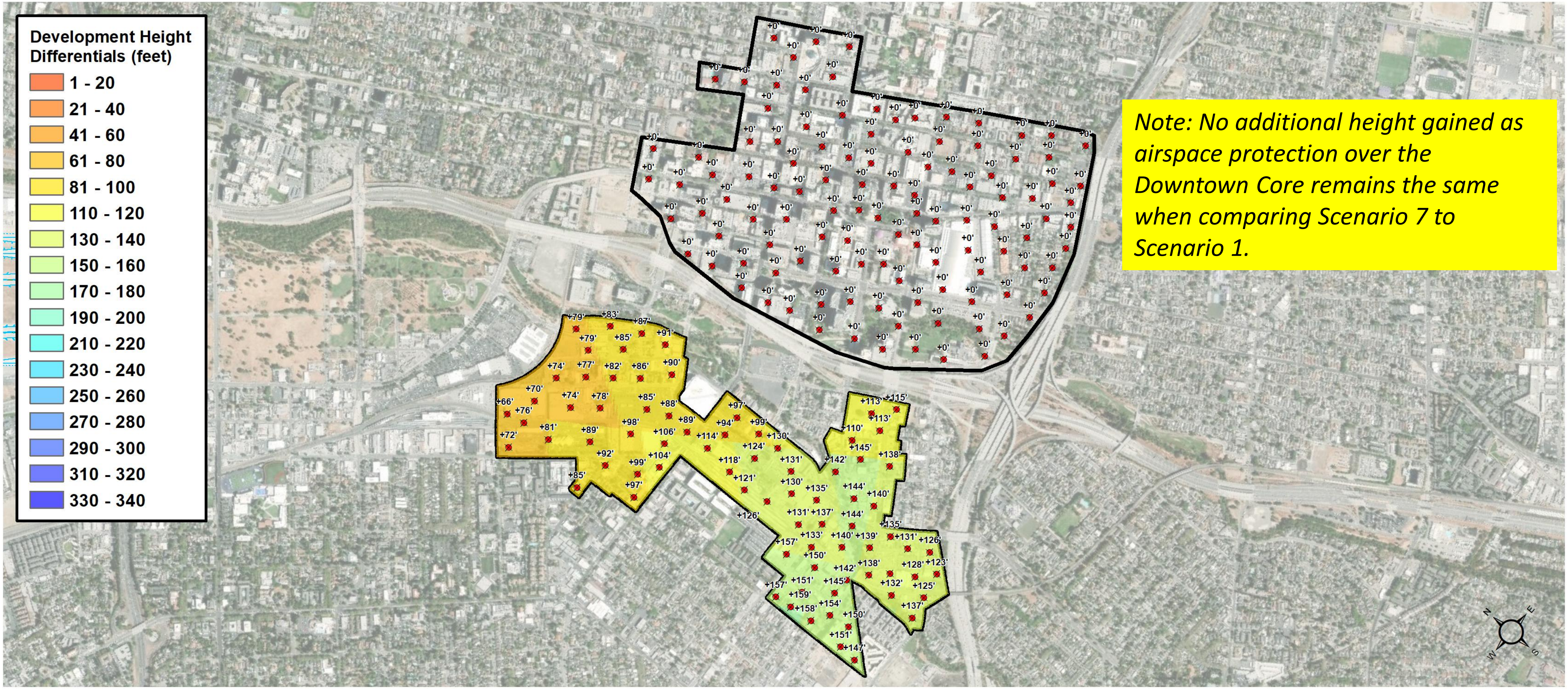
AIRSPACE PROTECTION SCENARIOS

- Five Airspace Scenarios
  - **Scenario 1**: Existing
  - **Scenario 4**: No OEI
  - **Scenario 7**: Straight-out OEI
  - **Scenario 10**: Straight-out OEI with West OEI Corridor alternatives
  - **Scenario 9**: No OEI, increased FAA height limits

SCENARIO 4 – NO OEI - DEVELOPMENT HEIGHT DIFFERENTIALS

Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

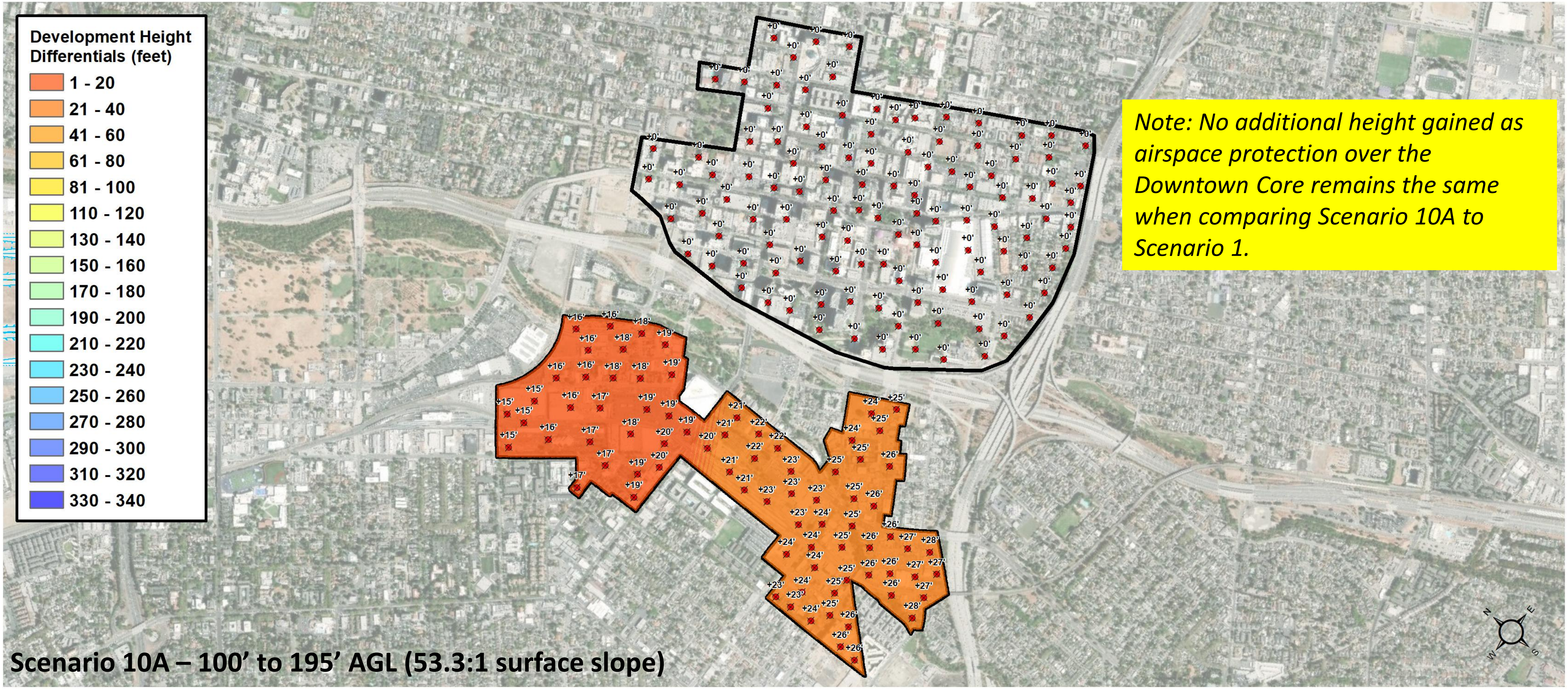
SCENARIO 7 - STRAIGHT-OUT OEI - DEVELOPMENT HEIGHT DIFFERENTIALS



Note: No additional height gained as airspace protection over the Downtown Core remains the same when comparing Scenario 7 to Scenario 1.

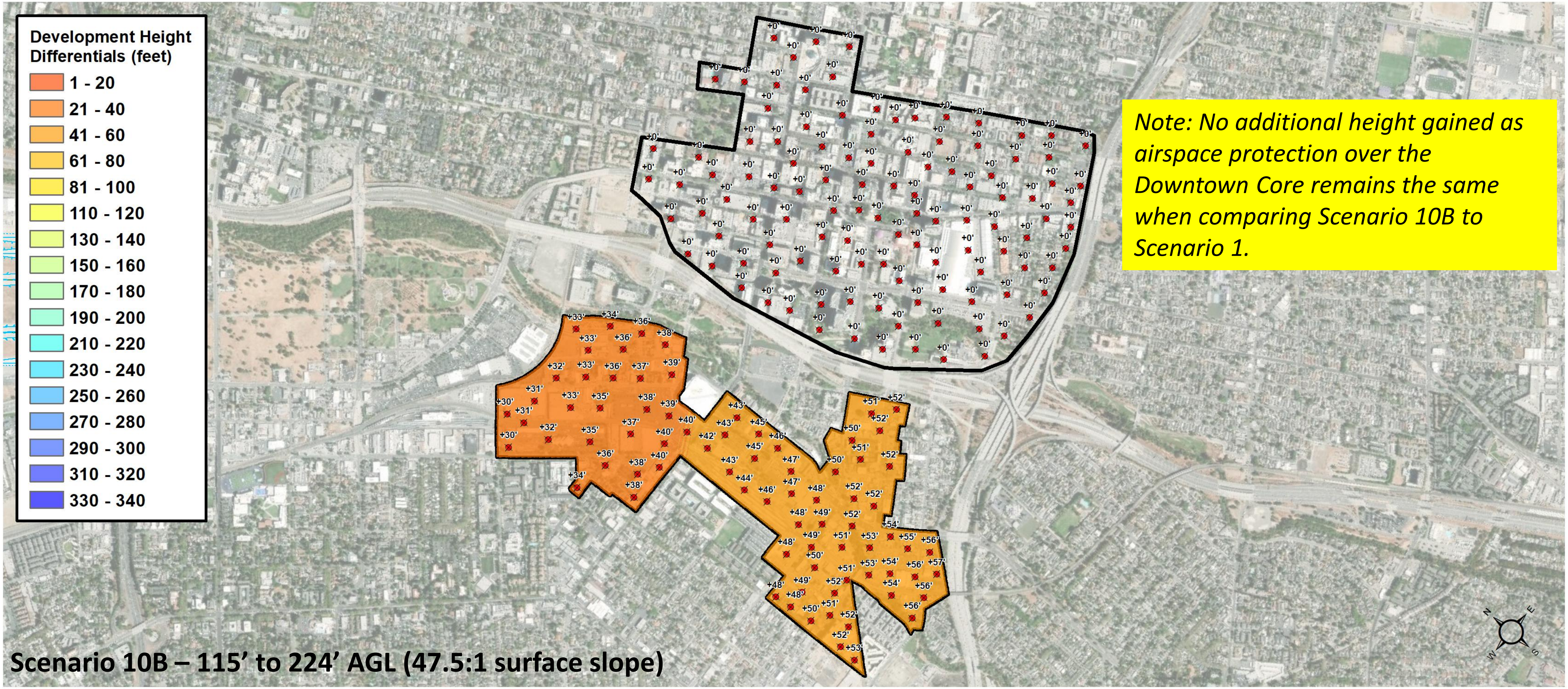
Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

SCENARIO 10A – STRAIGHT-OUT OEI WITH OEI WEST CORRIDOR ALTERNATIVES (PRESERVE STRAIGHT-OUT OEI) – DEVELOPMENT HEIGHT DIFFERENTIALS



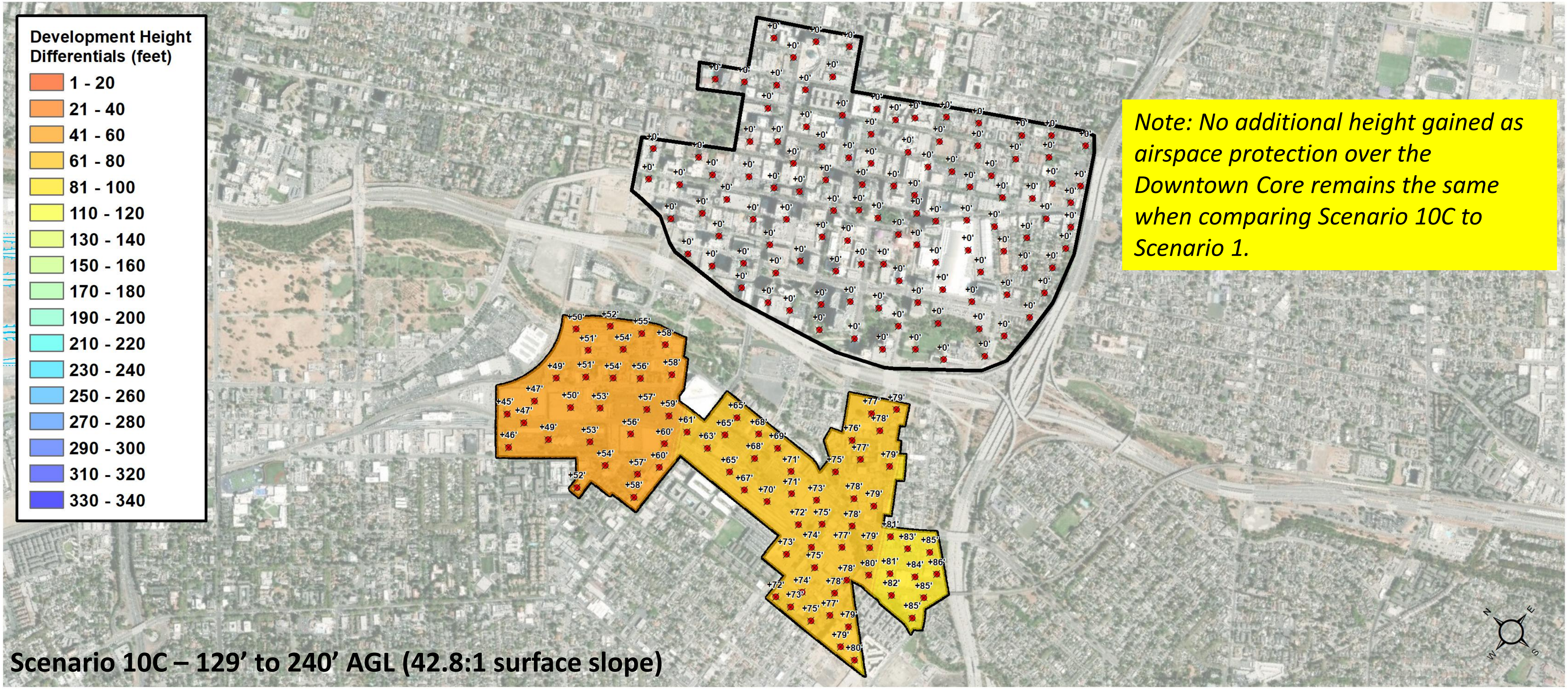
Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

SCENARIO 10B – STRAIGHT-OUT OEI WITH OEI WEST CORRIDOR ALTERNATIVES (PRESERVE STRAIGHT-OUT OEI) – DEVELOPMENT HEIGHT DIFFERENTIALS



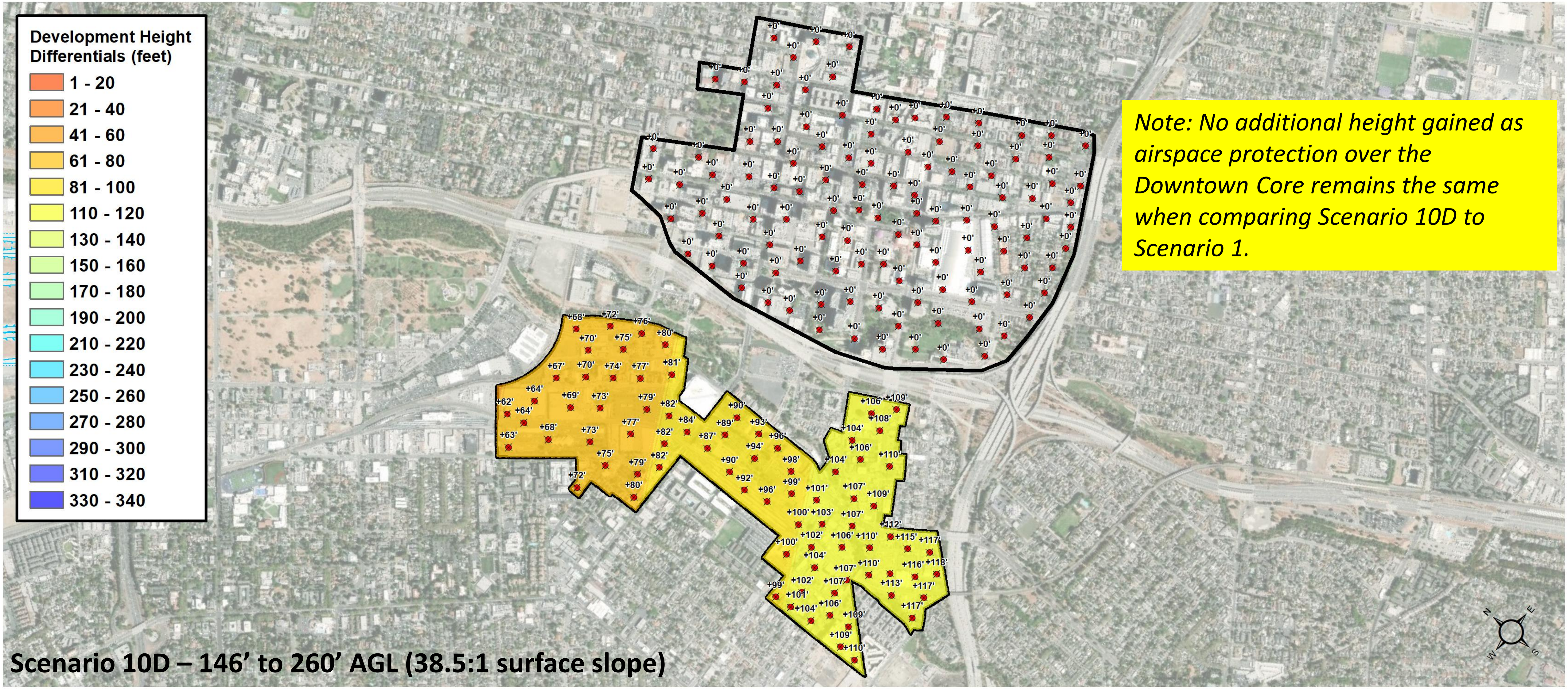
Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

SCENARIO 10C – STRAIGHT-OUT OEI WITH OEI WEST CORRIDOR ALTERNATIVES (PRESERVE STRAIGHT-OUT OEI) – DEVELOPMENT HEIGHT DIFFERENTIALS



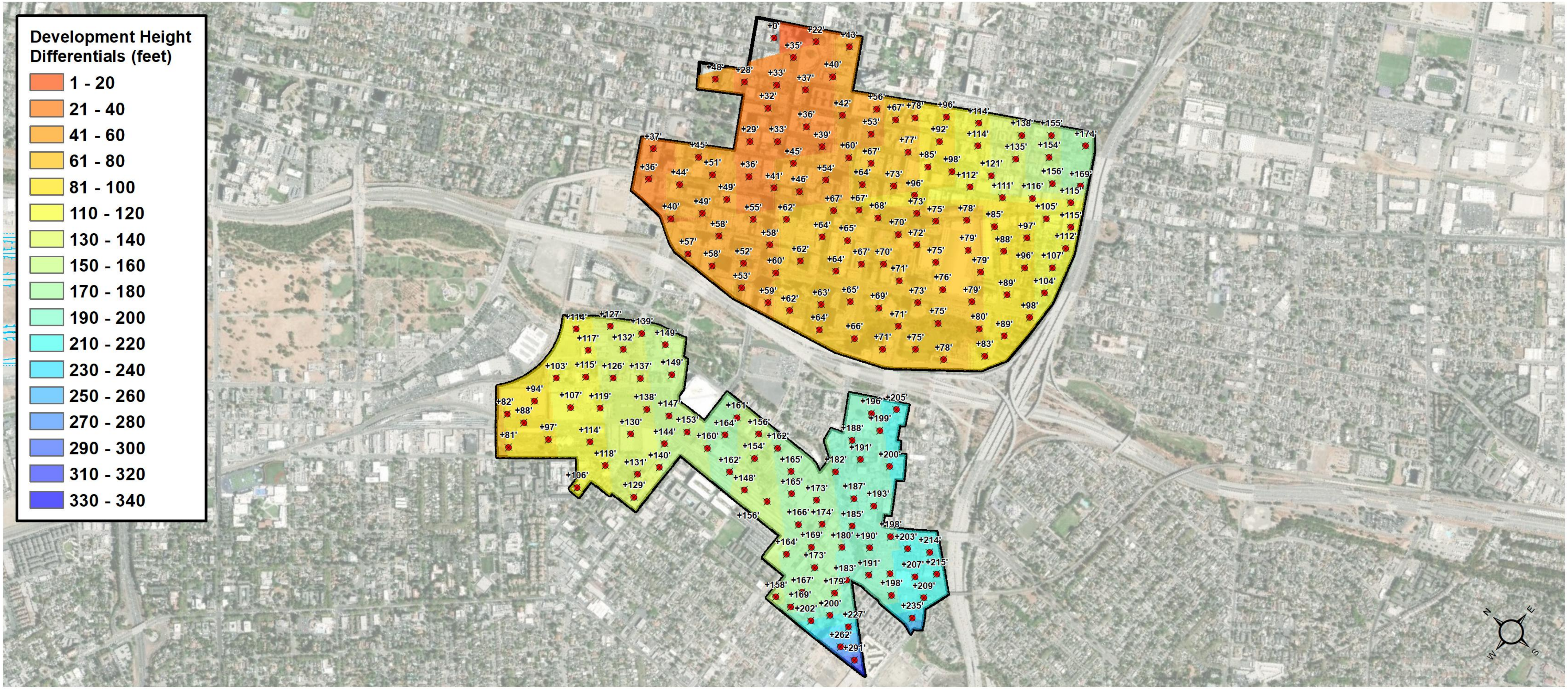
Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

SCENARIO 10D – STRAIGHT-OUT OEI WITH OEI WEST CORRIDOR ALTERNATIVES (PRESERVE STRAIGHT-OUT OEI) – DEVELOPMENT HEIGHT DIFFERENTIALS



Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

SCENARIO 9 – NO OEI, INCREASED FAA HEIGHT LIMITS – DEVELOPMENT HEIGHT DIFFERENTIALS



Note: Differential height increases represent the additional developable heights as compared to Scenario 1 (existing airspace protection)

AIRCRAFT PERFORMANCE CITY PAIR ASSESSMENT

AIRCRAFT PERFORMANCE CITY PAIR ASSESSMENT

- Aircraft performance assessment to evaluate the impacts of proposed obstacles heights under various airspace scenarios was conducted
- Various aircraft types, city pairs and seasonal temperature variations were assessed to identify impacts to aircraft payload and range
- Passenger (PAX) and cargo penalties were computed for each scenario

AIRCRAFT PERFORMANCE CITY PAIR ASSESSMENT

AIRCRAFT FLEET EVALUATION

Aircraft	Engine	Maximum Takeoff Weight (MTOW) (lbs.)	Seats
A320-200	CFM56-5B4	171,960	150
B737-800	CFM56-7B26	174,200	175
B787-9	GENX-1B74-7	560,000	290
B777-300ER	GE90-115BL	775,000	370

SEASONAL TEMPERATURES

Aircraft Type	Temperature (°F)	Notes
Winter		
A320-200 & B737-800	63°F	Early morning and evening departures
B787-9 & B777-300ER	68°F	Morning and afternoon departures
Summer		
A320-200 & B737-800	81.3°F	Boeing 85% reliability temperature
B787-9 & B777-300ER	81.3°F	Boeing 85% reliability temperature

CITY PAIR ASSESSMENT

Origin	Destination	Distance (Statue Miles)
Domestic		
SJC	JFK	2,569
SJC	HNL	2,417
International		
SJC	FRA	5,703
SJC	PEK	5,942

JFK: John F. Kennedy International Airport (New York)
HNL: Honolulu International Airport (Hawaii)
FRA: Frankfurt International Airport (Germany)
PEK: Peking International Airport (China)

PRELIMINARY FINDINGS - TRANSCONTINENTAL

- A320-200 operation to JFK results in PAX and minor cargo penalties under **Scenarios 4 and 9** in both summer and winter.
- B737-800 operation to JFK results in PAX and minor cargo penalties under **Scenario 9** in the summer.

TRANSCONTINENTAL WEIGHT PENALTY ASSESSMENT

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583

New York - JFK Summer (81.3° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,138 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

PRELIMINARY FINDINGS - HAWAII

- A320-200 operation to HNL results in significant PAX penalties under **Scenarios 4, 7, 9 and 10D** in the summer.
- B737-800 operation to HNL results in minor PAX and minor cargo penalties under **Scenario 9**.

HAWAII WEIGHT PENALTY ASSESSMENT

Hawaii - HNL Winter (63° F)		A320-200 (124 seats[1]/No Cargo)		B737-800 (173 seats[2]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	14	-	3	-

Hawaii - HNL Summer (81.3° F)		A320-200 (150 seats/No Cargo)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	8	-	-	-
Scenario 4	TERPS Only	25	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	16	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	8	-	-	-
	Opt 10A: 100' - 195' AGL	8	-	-	-
	Opt 10B: 115' - 224' AGL	8	-	-	-
	Opt 10C: 129' - 240' AGL	9	-	-	-
	Opt 10D: 146' - 260' AGL	18	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	36	-	1	1,599

Notes:

1. **HNL is fuel capacity limited in Feb because of winter winds to 124 PAX and no cargo (i.e., not a takeoff weight limitation).**

2. **HNL is fuel capacity limited in Feb to 173 PAX a no cargo (i.e., not a takeoff weight limitation).**

PRELIMINARY FINDINGS - ASIA

- B787-9 operation to Asia results in significant PAX and cargo penalties under **Scenarios 4, 7, 9, 10C and 10D** in both summer and winter.
- B777-300ER incurs no PAX penalties under any scenarios, however cargo penalties are incurred in all scenarios with **Scenarios 4, 7 and 10D** being most significant.

ASIA WEIGHT PENALTY ASSESSMENT

Peking - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672

Peking - PEK Summer (81.3° F)		B787-9 (290 seats/9,542 lbs. cargo)		B777-300ER (370 seats/55,588 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

PRELIMINARY FINDINGS - EUROPE

- B787-9 operation to Europe results in significant PAX and cargo penalties under **Scenario 9** and significant cargo penalties under **Scenarios 4, 7, 9, 10C and 10D**.
- B777-300ER incurs no PAX penalties under any scenarios, however cargo penalties are incurred in **Scenarios 4, 9 and 10D** with **Scenario 9** being most significant.

EUROPE WEIGHT PENALTY ASSESSMENT

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	**21,580**	-	**4,400**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	**15,338**	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	**10,000**	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	**9,349**	-	-
	Opt 10C: 129' - 240' AGL	-	**14,096**	-	-
	Opt 10D: 146' - 260' AGL	-	**19,282**	-	**2,027**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**29**	**26,198**	-	**11,735**

Frankfurt - FRA Summer (81.3° F)		B787-9 (290 seats/23,514 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	**2**	**22,911**	-	**7,811**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	**16,407**	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	**4,217**	-	-
	Opt 10B: 115' - 224' AGL	-	**9,353**	-	-
	Opt 10C: 129' - 240' AGL	-	**14,270**	-	-
	Opt 10D: 146' - 260' AGL	-	**19,612**	-	**3,876**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**41**	**23,514**	-	**15,397**

AIRLINE AIRCRAFT PERFORMANCE ASSESSMENT

AIRLINES RESPONSES

- The following airlines participated in the aircraft performance assessment for the various airspace scenarios presented:
  - Southwest Airlines
  - Alaska Airlines
  - American Airlines
  - British Airways
  - Hainan Airways

SOUTHWEST AIRLINES

- Evaluated the B737-800 aircraft
- Southwest utilizes the FAA AC120-91 straight-out OEI corridor
- Maximum temperature and structural takeoff weight was evaluated against each airspace scenario and associated obstacles
- Very high temperatures would be required to result in weight penalties for SWA operations to destinations served from SJC (91.4°F – 96.8°F)

ALASKA AIRLINES

- Alaska Airlines evaluated the B737-800 aircraft performance
- For Runway 12L, two obstacle points are within the splay
  - Parcels 30 and 31
  - No impact heights limited to 117’ AGL and 108’ AGL respectively
- Runway 12R OEI turn not impacted by DSAP development

AMERICAN AIRLINES

- American evaluated the following aircraft in their assessment:
  - Airbus A319, A320 and A321
  - Boeing B737-800
  - Bombardier CRJ-900
  - Embraer E175
- American Airlines performance assessment for Scenarios 1, 4, 7 and 9 resulted in no weight penalties under straight-out or West OEI corridor scenarios

BRITISH AIRWAYS

- British Airways indicates that Scenarios 4 and 7 have no impact to the current operation or the payloads can be achieved when departing Runways 12L/12R.
- Scenario 9 has the greatest impact to British's operation from both runways.
  - When departing Runway 12L, an average Take-off Performance Limiting Weight (TOPL) reduction of 13,000 lbs. and a maximum of just under 15,432 lbs. is required.
  - When departing Runway 12R, an average Take-off Performance Limiting Weight (TOPL) reduction of 9,700 lbs. and a maximum of just under 12,125 lbs. is required.

HAINAN AIRWAYS

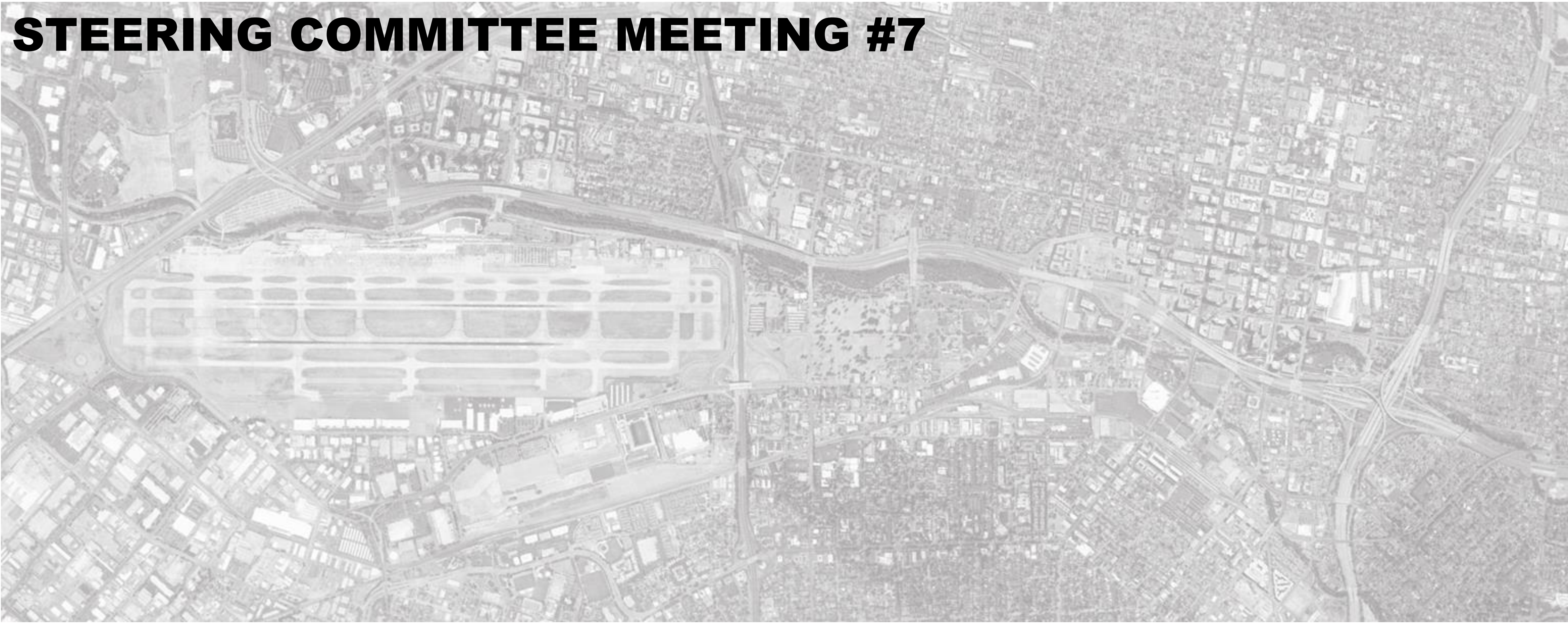
- Hainan evaluated both the B787-8 and B787-9 aircraft types
- Utilizes ICAO straight-out OEI surface for Runways 12L
- No additional takeoff weight impacts on Runway 12L
- Takeoff weight and payload impacts when departing Runway 12R
- Results of analysis based upon Scenario 4 – No OEI airspace protection

NEXT STEPS

- Community Stakeholder meeting – September 13, 2018
- City Council Committee update – September 24, 2018
- Economic impact analysis

DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

STEERING COMMITTEE MEETING #7



November 13, 2018

AGENDA

- Introduction
- Real Estate Economic Impact Assessment
- Aircraft Performance Assessment
- Aviation Direct Economic Impacts

PRELIMINARY REAL ESTATE ECONOMIC IMPACT ASSESSMENT

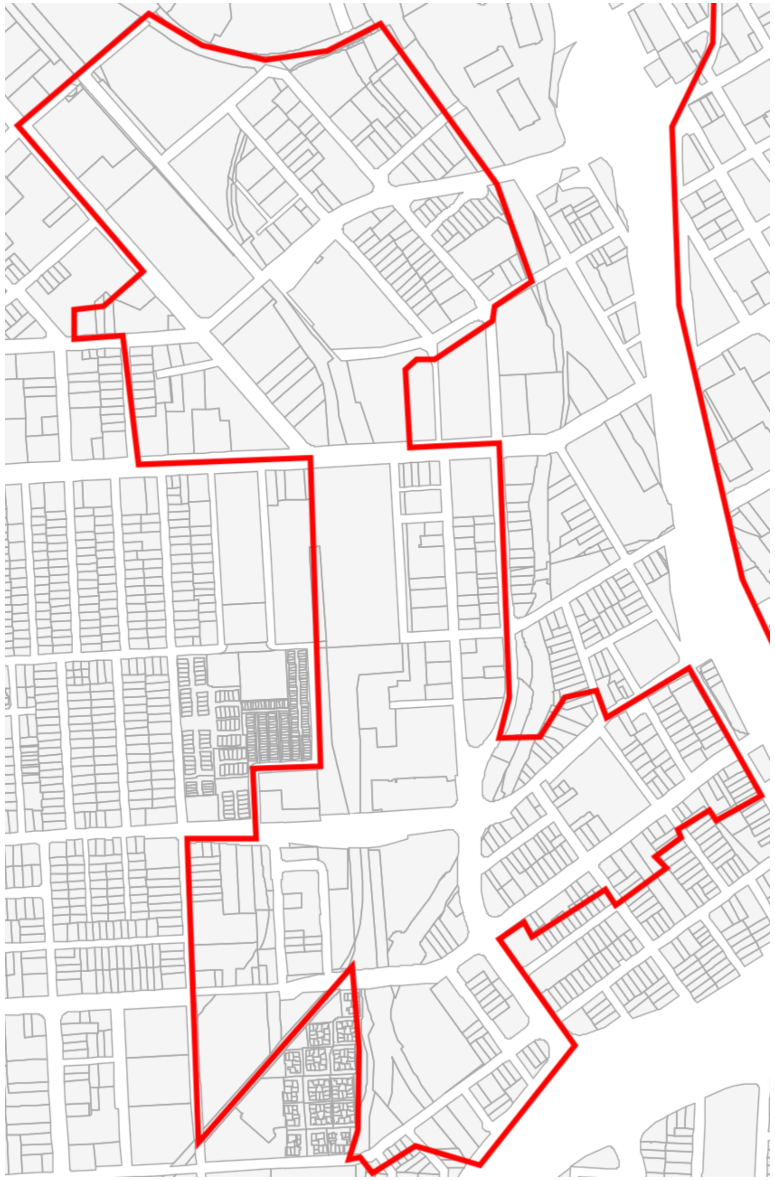
(JLL)

PURPOSE AND SCOPE OF REAL ESTATE ECONOMIC IMPACT ASSESSMENT

- Identify potential development sites in both Downtown Core and Diridon Station development areas
- Assess the local real estate market to understand the pace and feasibility of new development
- Estimate the increase in new development density for development areas due to airspace protection scenarios
- Support an economic impact assessment by providing key outputs to be used as IMPLAN inputs

DIRIDON STATION AREA

- JLL assessed the impact on total development potential of the Diridon Station area of each airspace protection scenario
- Analysis focuses on APN's that are underutilized or vacant and larger than 0.2 acres
- Analysis is agnostic to any specific development project, focusing instead on development potential in the aggregate



DENSITY INCREASE IN DIRIDON STATION AREA

Scenario	Net New Square Feet
4: No OEI	8,600,000
7: Straight-Out OEI	8,500,000
9: No OEI, incr. height limits	10,000,000
10A: Straight-Out OEI w/ West OEI Alts.	1,100,000
10B: Straight-Out OEI w/ West OEI Alts.	3,100,000
10C: Straight-Out OEI w/ West OEI Alts.	4,900,000
10D: Straight-Out OEI w/ West OEI Alts.	6,800,000

Note: Includes both office and residential development.

CONSTRUCTION VALUE AND TAX REVENUE IN DIRIDON STATION AREA

Scenario	Net New Construction Value	Net New Annual Tax Revenue
4: No OEI	$4,380,000,000	$5,550,000
7: Straight-Out OEI	$4,300,000,000	$5,450,000
9: No OEI, incr. height limits	$5,030,000,000	$6,370,000
10A: Straight-Out OEI w/ West OEI Alts.	$560,000,000	$710,000
10B: Straight-Out OEI w/ West OEI Alts.	$1,590,000,000	$2,020,000
10C: Straight-Out OEI w/ West OEI Alts.	$2,500,000,000	$3,160,000
10D: Straight-Out OEI w/ West OEI Alts.	$3,490,000,000	$4,420,000

Note: Values represent both office and residential development, are aggregate, and represent the total potential increase without regard to a specific timeframe.

NET NEW ONE-TIME FEES IN DIRIDON STATION AREA

Scenario	Building Fees	Development Taxes	Park Impact Fees	School District Fees
4: No OEI	$7,300,000	$177,150,000	$131,040,000	$4,830,000
7: Straight-Out OEI	$7,170,000	$173,890,000	$128,790,000	$4,740,000
9: No OEI, incr. height limits	$8,340,000	$203,720,000	$148,810,000	$5,580,000
10A: Straight-Out OEI w/ West OEI Alts.	$930,000	$22,660,000	$16,830,000	$620,000
10B: Straight-Out OEI w/ West OEI Alts.	$2,660,000	$64,260,000	$47,920,000	$1,750,000
10C: Straight-Out OEI w/ West OEI Alts.	$4,180,000	$101,050,000	$75,150,000	$2,740,000
10D: Straight-Out OEI w/ West OEI Alts.	$5,810,000	$141,100,000	$104,600,000	$3,830,000

Note: Values represent both office and residential development, are aggregate, and represent the total potential increase without regard to a specific timeframe.

EMPLOYEES AND RESIDENTS IN DIRIDON STATION

Scenario	Net New Employees	Net New Residents
4: No OEI	4,700	12,800
7: Straight-Out OEI	4,500	12,600
9: No OEI, incr. height limits	6,200	14,500
10A: Straight-Out OEI w/ West OEI Alts.	500	1,600
10B: Straight-Out OEI w/ West OEI Alts.	1,600	4,700
10C: Straight-Out OEI w/ West OEI Alts.	2,500	7,300
10D: Straight-Out OEI w/ West OEI Alts.	3,500	10,200

Note: Values are aggregate and represent the total potential increase without regard to a specific timeframe.

DOWNTOWN CORE AREA

- There is already significant density available in the Downtown core.
- Any increase in height restrictions due to airspace protection scenarios will not have an aggregate impact for a long period of time.

	Office*	Residential†
Development Potential	34,800,000 sf	32,900,000 sf
Historical Annual Net Absorption (speculative development)	50,000 sf/year	750 unit/year (637,500 sf @ 850sf/unit)

** Includes parking.*

† Includes parking. In addition, Downtown zoning limits developments to 800 du/acre; at an average of 850 sf/unit, in some cases residential projects will be less dense than office developments

IMPACT ON INDIVIDUAL DOWNTOWN SITES

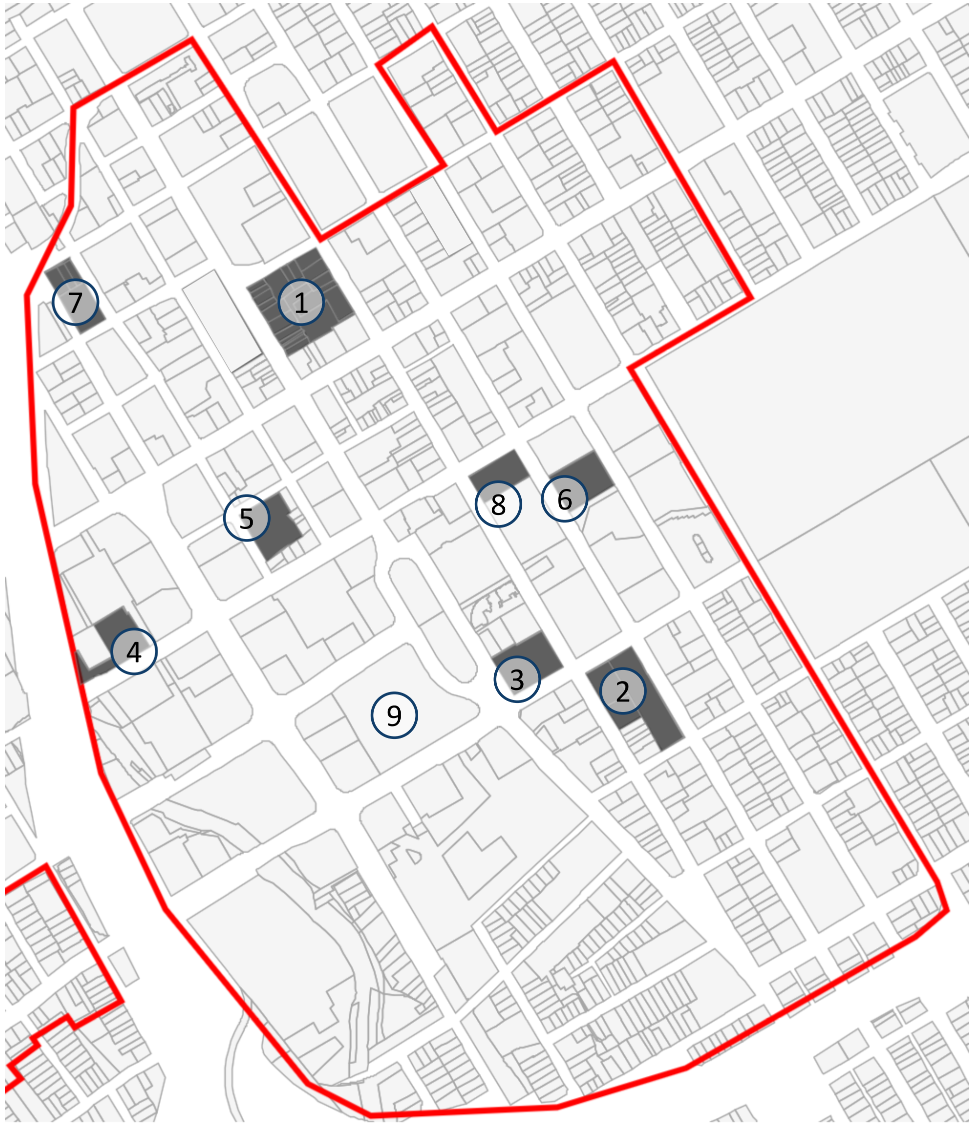
- Though Downtown can accommodate significant development potential under existing height limits, discrete development sites may still be impacted.
- In particular, build-to-suit development opportunities that occur outside of the normal "churn" of demand and supply will be impacted
- JLL and the City identified 9 test case development sites in Downtown and tested how the Scenarios 4 and 9 would impact development potential

Assumptions:

- Sites are "underutilized" or "vacant" – surface parking, parking structures, commercial buildings two stories or less, generally
- Includes contiguous underutilized or vacant spaces
- 14 feet average per story
- 80% lot coverage
- Office land use (residential and hospitality uses are not build-to-suit)
- Test case height limits established by airspace protection scenarios, though no more dense than limits established by the General Plan (3-30 stories and 30 FAR for Downtown)

IMPACT ON INDIVIDUAL DOWNTOWN SITES

	APN(s)	ADDRESS	CURRENT	NOTES	AREA
1	25934007-14, 25934020-31	66 N Market St (Approximate)	Surface Parking + Low-Rise Commercial		170,017 sf
2	46746080-82	345 S 2nd Street, 300 S 1st Street	Surface Parking + Low-Rise Commercial		123,173 sf
3	25942080	282 S Market St	Surface Parking		65,781 sf
4	25939116	333 W San Fernando St	Surface Parking	Planned site of Adobe Tower 4 (750,000sf)	62,242 sf
5	25940012	60 S Almaden Ave	Former Greyhound Terminal	Planned site of 708 residential units and 20,000 SF retail	61,874 sf
6	46722160	174 S 2nd St	Surface Parking	Site of planned Sobrato parking structure	58,456 sf
7	25931072, 25931077-80	115 Terraine St	One-Story industrial, Surface Parking		55,200 sf
8	46722142	8 E San Fernando St	Surface parking		43,513 sf
9	25942023	201 Market Street	Museum	Museum Place Development	107,815 sf

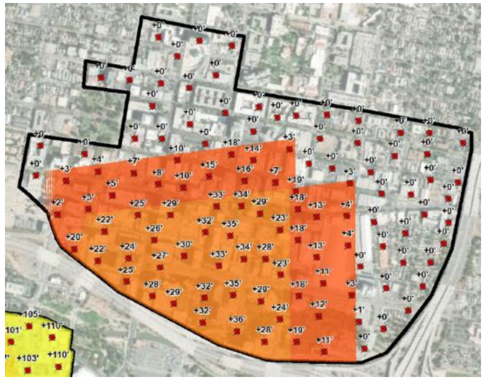


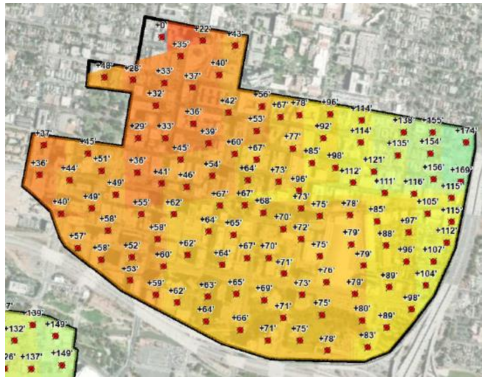
EXISTING DENSITY AND INCREASES FOR DOWNTOWN SITES

Address			Scenario 4		Scenario 9	
	Parcel Area	Existing Potential Density (SF)	Net New SF	% Increase	Net New SF	% Increase
66 N Market St (Approximate)	170,017	2,441,000	0*	0%	300,000	12%
345 S 2nd Street & 300 S 1st Street†	123,173	2,232,000	*Not Impacted*	*Not Impacted*	782,000	35%
282 S Market St	65,781	1,090,000	52,000	5%	363,000	33%
333 W San Fernando St	62,242	910,000	101,000	11%	202,000	22%
60 S Almaden Ave	61,874	966,000	107,000	11%	215,000	22%
174 S 2nd St	58,456	981,000	*Not Impacted*	*Not Impacted*	187,000	19%
115 Terraine St	55,200	653,000	44,000	7%	174,000	27%
8 E San Fernando St	43,513	754,000	36,000	5%	144,000	19%
Museum Place	107,815	988,203 (planned)	100,000	10%	250,000	25%

** An increase of zero square feet means either 1) the height limits imposed by the San Jose General Plan are below either the existing or the altered airspace protection scenarios or 2) an average of at least 14 feet must be achieved for each new floor, and the height increase afforded by a scenario does not meet this minimum.*

† Some parcels included in this test case site do fall under Scenario 4; however the majority do not, and therefore the development site as configured/tested assumes no height gain realized from Scenario 4.

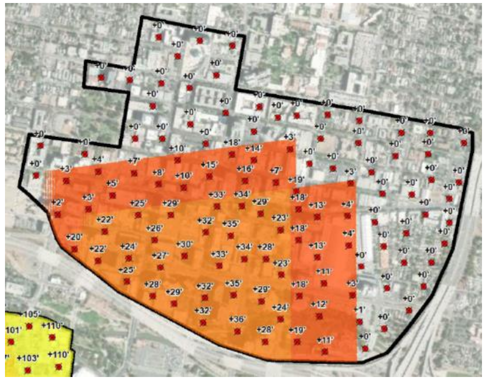


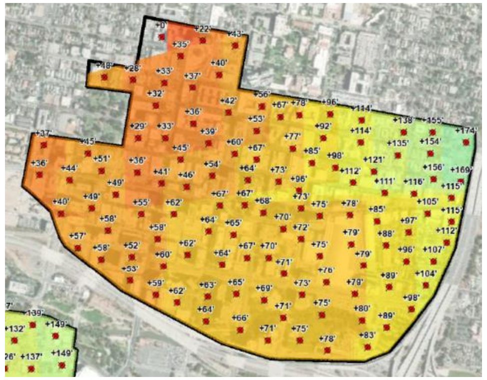


CONSTR. VALUE AND TAXES FOR DOWNTOWN SITES

Address	Scenario 4		Scenario 9	
	Net New Construction Value	Net New Annual Tax Revenue	Net New Construction Value	Net New Annual Tax Revenue
66 N Market St (Approximate)	*Not Impacted*	*Not Impacted*	$91,100,000	$115,000
345 S 2nd Street & 300 S 1st Street	*Not Impacted*	*Not Impacted*	$237,400,000	$301,000
282 S Market St	$15,800,000	$100,000	$110,300,000	$140,000
333 W San Fernando St	$30,700,000	$39,000	$61,300,000	$78,000
60 S Almaden Ave	$32,600,000	$41,000	$65,100,000	$82,000
174 S 2nd St	*Not Impacted*	*Not Impacted*	$56,700,000	$72,000
115 Terraine St	$13,200,000	$17,000	$52,900,000	$67,000
8 E San Fernando St	$10,900,000	$41,000	$43,600,000	$55,000
Museum Place	$30,300,000	$38,000	$75,800,000	$96,000

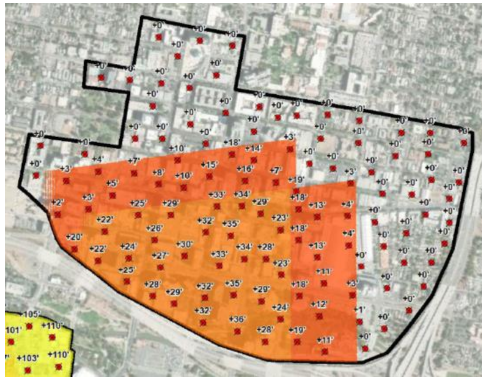
Note: Values represent both office development, are aggregate, and represent the total potential increase without regard to a specific timeframe.

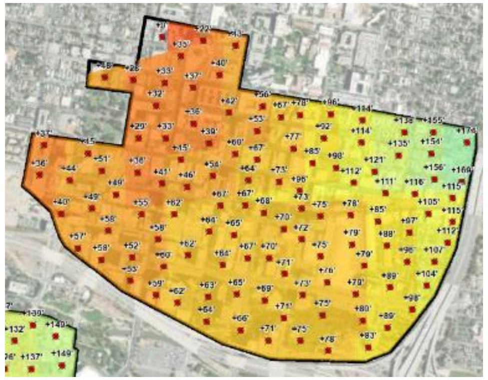




ONE-TIME FEES AND TAXES FOR DOWNTOWN SITES

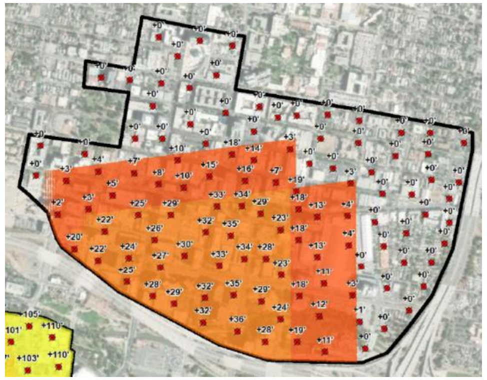
Address	Scenario 4		
	Net New City Building Fees	Net New City Development Taxes	Net New School District Fees
66 N Market St (Approximate)	*Not Impacted*	*Not Impacted*	*Not Impacted*
345 S 2nd Street & 300 S 1st Street	*Not Impacted*	*Not Impacted*	*Not Impacted*
282 S Market St	$14,700	$700,000	$500,000
333 W San Fernando St	$28,700	$1,400,000	$60,000
60 S Almaden Ave	$30,500	$1,500,000	$60,000
174 S 2nd St	*Not Impacted*	*Not Impacted*	*Not Impacted*
115 Terraine St	$12,400	$600,000	$20,000
8 E San Fernando St	$10,200	$500,000	$20,000
Museum Place	$28,400	$1,400,000	$60,000
	Scenario 9		
66 N Market St (Approximate)	$85,300	$4,100,000	$170,000
345 S 2nd Street & 300 S 1st Street	$222,200	$10,700,000	$440,000
282 S Market St	$103,200	$5,000,000	$200,000
333 W San Fernando St	$57,400	$2,800,000	$110,000
60 S Almaden Ave	$61,000	$2,900,000	$120,000
174 S 2nd St	$53,000	$2,600,000	$100,000
115 Terraine St	$49,500	$2,400,000	$100,000
8 E San Fernando St	$40,800	$2,000,000	$80,000
Museum Place	$71,000	$3,400,000	$140,000

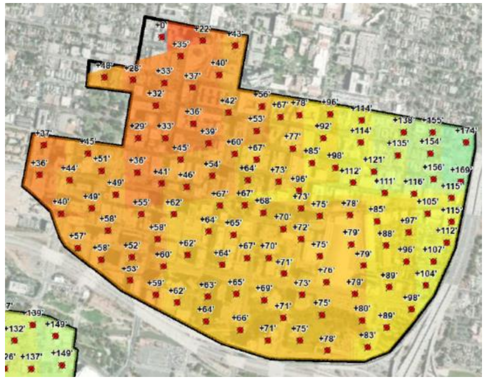




EMPLOYMENT IN DOWNTOWN SITES

Address	Scenario 4	Scenario 9
	Net New Employees	Net New Employees
66 N Market St (Approximate)	*Not Impacted*	1,400
345 S 2nd Street & 300 S 1st Street	*Not Impacted*	3,700
282 S Market St	200	1,700
333 W San Fernando St	500	900
60 S Almaden Ave	500	1,000
174 S 2nd St	*Not Impacted*	900
115 Terraine St	200	800
8 E San Fernando St	200	700
Musem Place	500	1,200





UPDATE AIRCRAFT PERFORMANCE ASSESSMENT

HAWAII WEIGHT PENALTY ASSESSMENT

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	2,537	3	-

Hawaii - HNL Summer (81.3° F)		A321 NEO (189 seats/21,658 lbs.)		B737-800 (175 seats/1,599 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	593	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	3,565	1	1,599

Notes:

1. **HNL is fuel capacity limited in Feb to 173 PAX and no cargo (i.e., not a takeoff weight limitation) for the B737-800.**

WEIGHT PENALTY ASSESSMENT – ANC, BOS AND MIA

Notes:

1. 1 and 3 Pax penalties as being due to Max Structural Takeoff Weight limits (and not related to the obstacles or runway length.)

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-

Boston - BOS Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-

Miami - MIA Summer (81.3° F)		A320 (150 seats/0 lbs. cargo)		B737-800 (175 seats/0 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

WEIGHT PENALTY ASSESSMENT – INTERNATIONAL MARKETS

- Assessment is underway to further evaluate Scenario 4
- Review of the following potential SJC markets
  - Rio
  - Taipei
  - Hong Kong
  - Delhi
  - Dubai
- Review of the following aircraft types
  - A350-9
  - A330
  - B787-9
  - B777-300

AVIATION DIRECT ECONOMIC IMPACT ASSESSMENT

METHODOLGY – AIRLINE COST

- Impacted flights calculated using percent of Southeast Flow departures
- Weight penalties for markets in winter and summer
- Account for airline load factors (average occupied seats)
- Annual passengers lost = lost passengers per flight X annual operations impacted
- Lost passenger cost
  - Average revenue per passenger to each market
  - Voucher cost (assume $200, no industry average data available)

Season	Percentage of Southeast Departures
Winter	22.30%
Summer	7.00%
Total	13.00%

Airline Load Factor by Market		
Region	Winter	Summer
Hawaii – SJC	89.70%	90.50%
Transcontinental – SJC	84.90%	82.20%
Europe – Bay Average	73.00%	87.20%
Asia – Bay Average	78.10%	81.50%

Load factor from BTS T100 = Bureau of Transportation Statistics Air Carrier Statistics Database, U.S. Departure of Transportation

ASSUMPTIONS – AIRLINE COST

- BTS O&D Survey was used to calculate revenue per one-way, nonstop passenger revenue excluding fees and taxes
- Representative aircraft used in weight penalty analysis on routes

Airline Cost Per Passenger

Market	Passenger Revenue	Voucher	Total Airline Cost	Aircraft	Seats
Hawaii	$251	$200	$451	A321 NEO	189
				B737-800	173
Transcontinental	$211	$200	$411	A320-200	150
				B737-800	175
Europe	$658	$200	$858	B787-9	290
Asia	$683	$200	$883	B787-9	290

BTS O&D Survey = Bureau of Transportation Statistics Origin & Destination Survey,
U.S. Departure of Transportation

ASSUMPTIONS – AIRPORT REVENUE AND LOCAL ECONOMIC SPENDING

- The number of annual passengers lost was calculated by multiplying the lost passengers by annual operations impacted
- Aircraft operations data based upon 2018 flight operations
- Airport Revenue Loss
  - Passenger Facility Charge (PFC): **$4.39** per outbound passenger
  - Airport concession revenue: **$2.26** per passenger
- Local Economic Spending Loss
  - Terminal Concession Spending: **$13.60** per passenger (includes $2.26 airport concessions portion)
  - Local International Visitor Spending: **$746.94** per passenger
  - Local Domestic Visitor Spending **$433.01** per passenger

Domestic visitor spending is based on the international visitor spend with an assumption on fewer days spent in the region.

SUMMARY OF 2018 ANNUAL DIRECT IMPACTS BY SCENARIO HISTORICAL LOAD FACTORS

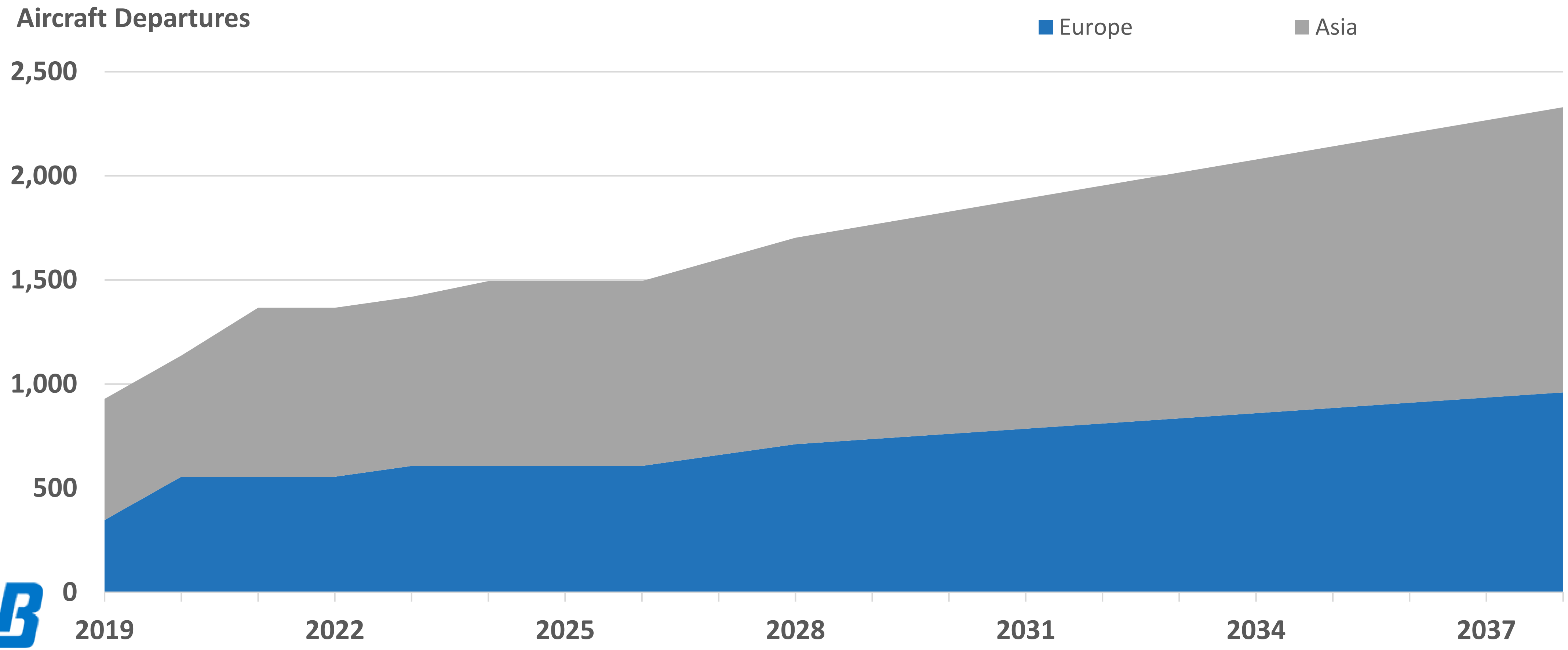
Summary of Losses		Airline Revenue	PFC Revenue	Terminal Concession Spending	Local Visitor Spending	Total
Scenario 1	Existing airspace protection	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 4	TERPS Only	**$56,000**	**$1,000**	**$2,000**	**$55,000**	**$114,000**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 10	Existing Conditions: 85' - 166' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10A: 100' - 195' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10B: 115' - 224' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10C: 129' - 240' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10D: 146' - 260' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**$2,247,000**	**$25,000**	**$74,000**	**$1,618,000**	**$3,976,000**

SUMMARY OF 2018 ANNUAL DIRECT IMPACTS
LOAD FACTOR SENSITIVTY TEST

Summary of Losses		Baseline Load Factor	85% Load Factor	90% Load Factor	95% Load Factor
Scenario 1	Existing airspace protection	**$0**	**$0**	**$0**	**$0**
Scenario 4	TERPS Only	**$114,000**	**$1,070,000**	**$2,716,000**	**$4,306,000**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**$0**	**$0**	**$79,000**	**$1,439,000**
Scenario 10	Existing Conditions: 85' - 166' AGL	**$0**	**$0**	**$0**	**$0**
	Opt 10A: 100' - 195' AGL	**$0**	**$0**	**$0**	**$0**
	Opt 10B: 115' - 224' AGL	**$0**	**$0**	**$0**	**$0**
	Opt 10C: 129' - 240' AGL	**$0**	**$0**	**$0**	**$67,000**
	Opt 10D: 146' - 260' AGL	**$0**	**$0**	**$663,000**	**$2,308,000**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**$3,964,000**	**$5,615,000**	**$7,510,000**	**$10,164,000**

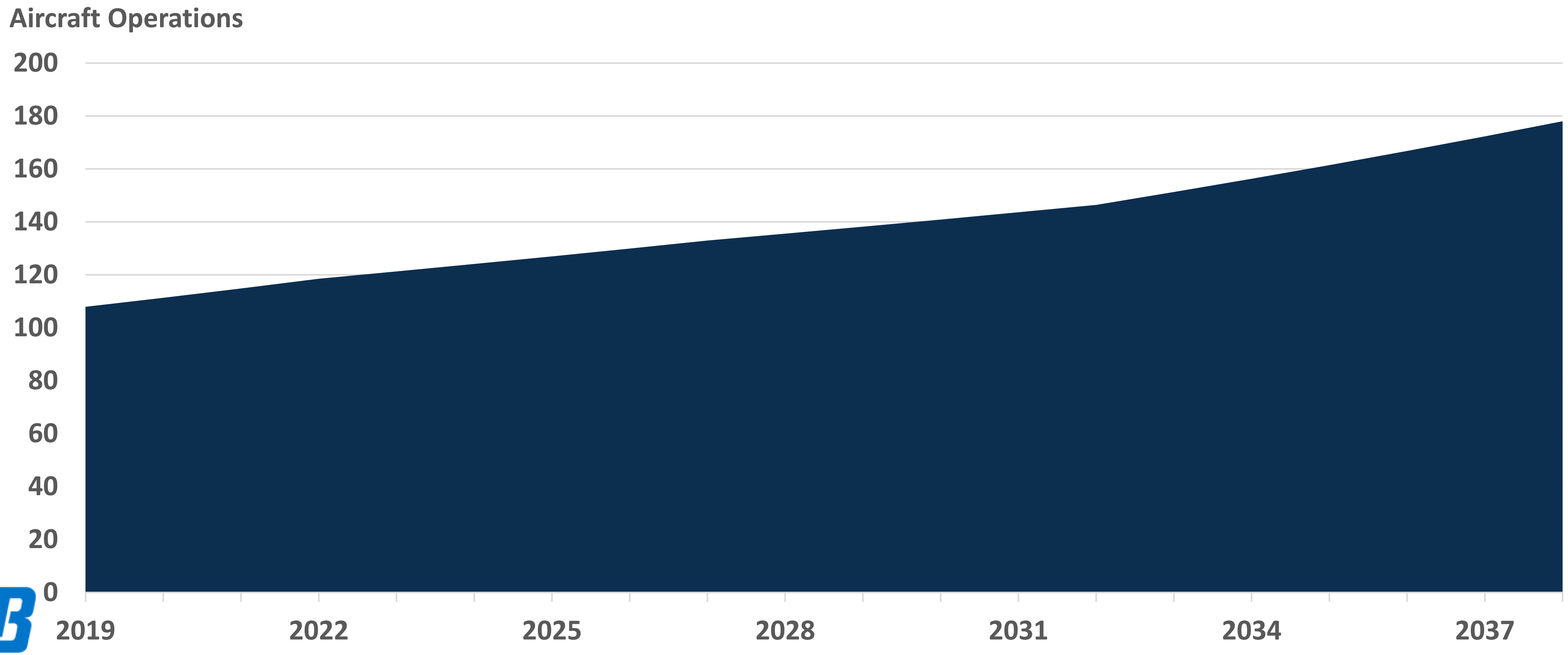
INTERNATIONAL DEPARTURE FORECAST

- 2019 through 2028 were obtained from the SJC unconstrained international forecast
- A trend analysis was performed for 2029 through 2038
- The year-over-year passenger growth multiplied by the load factors gathered from BTS T100 to determine future load factors

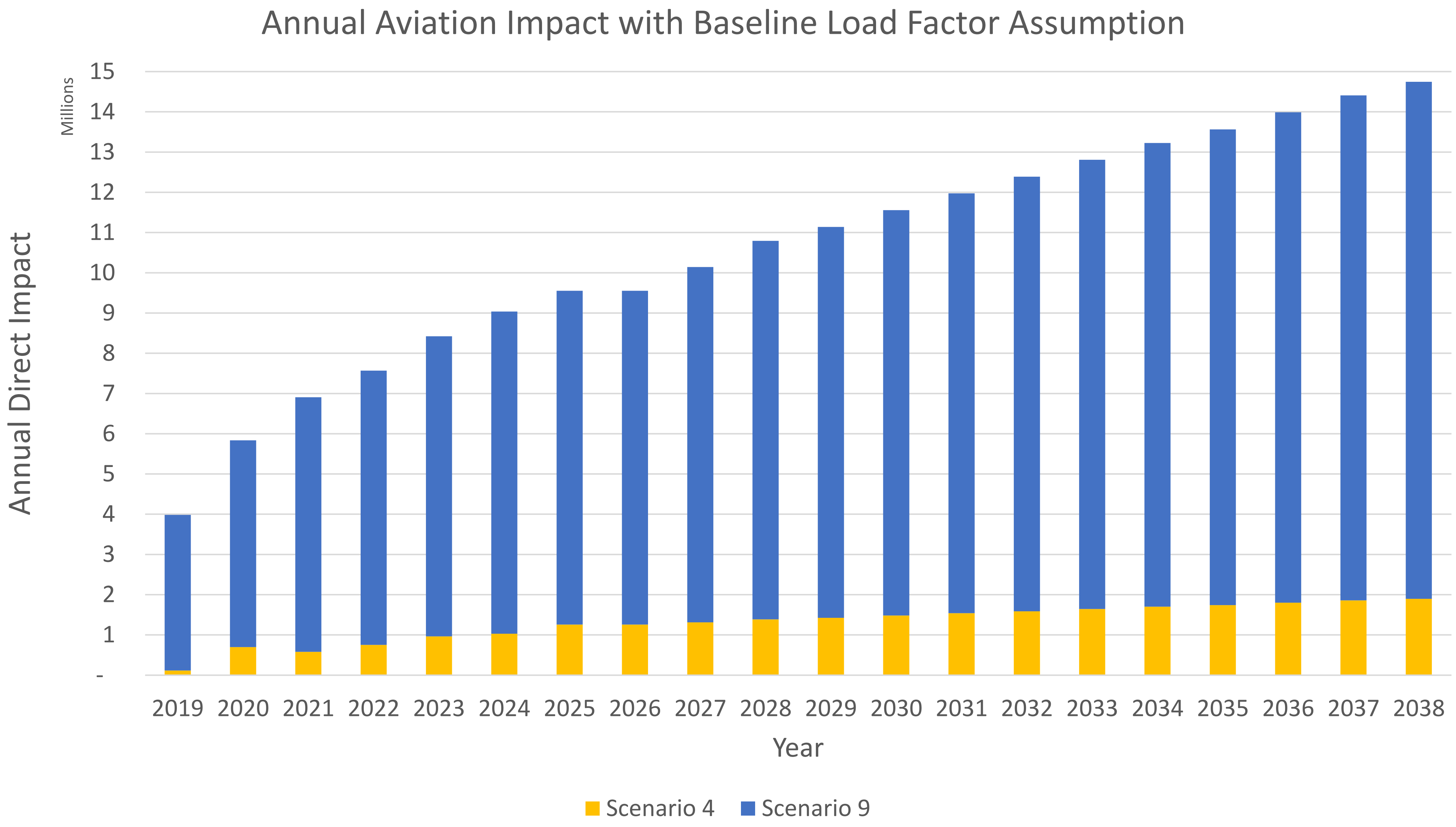


DOMESTIC OPERATIONS FORECAST

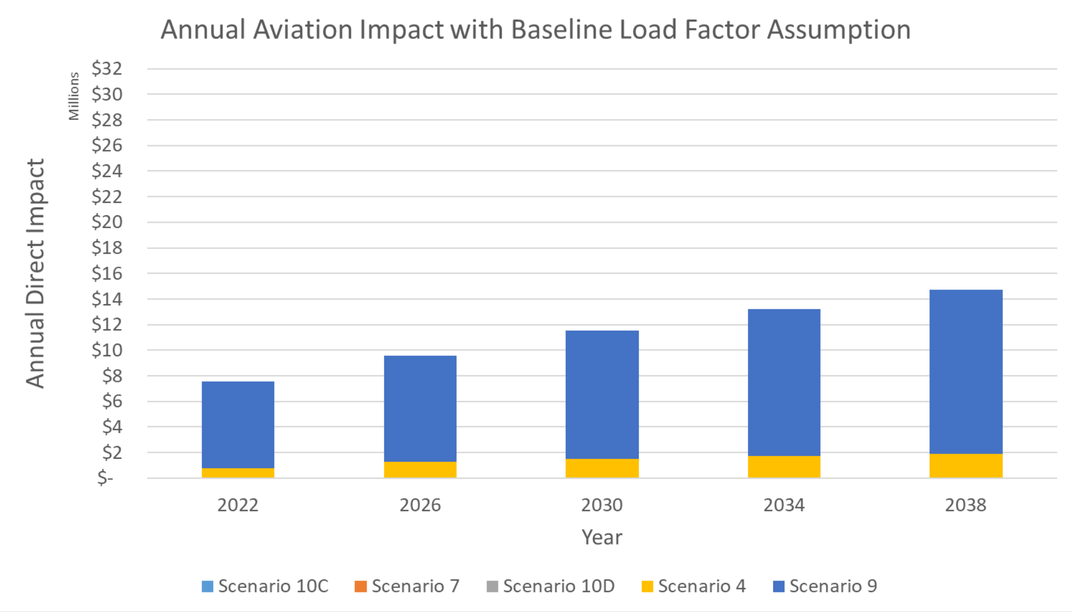
- 2019 through 2037 were obtained from the SJC domestic forecast. 2038 was estimated based on the previous year's growth.
- The year-over-year passenger growth multiplied by the load factors gathered from BTS T100 to determine future load factors

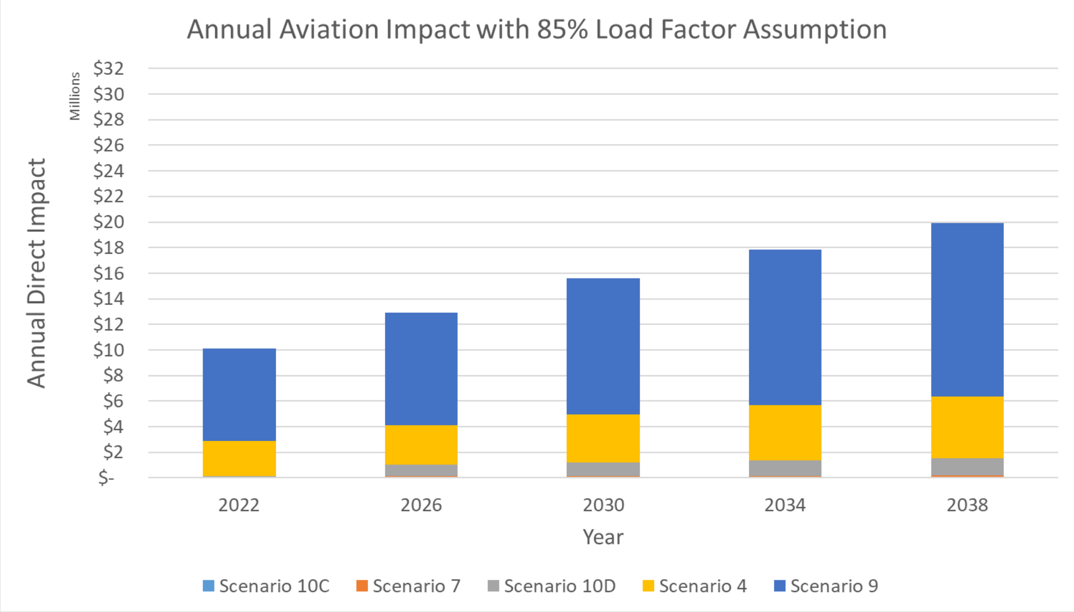


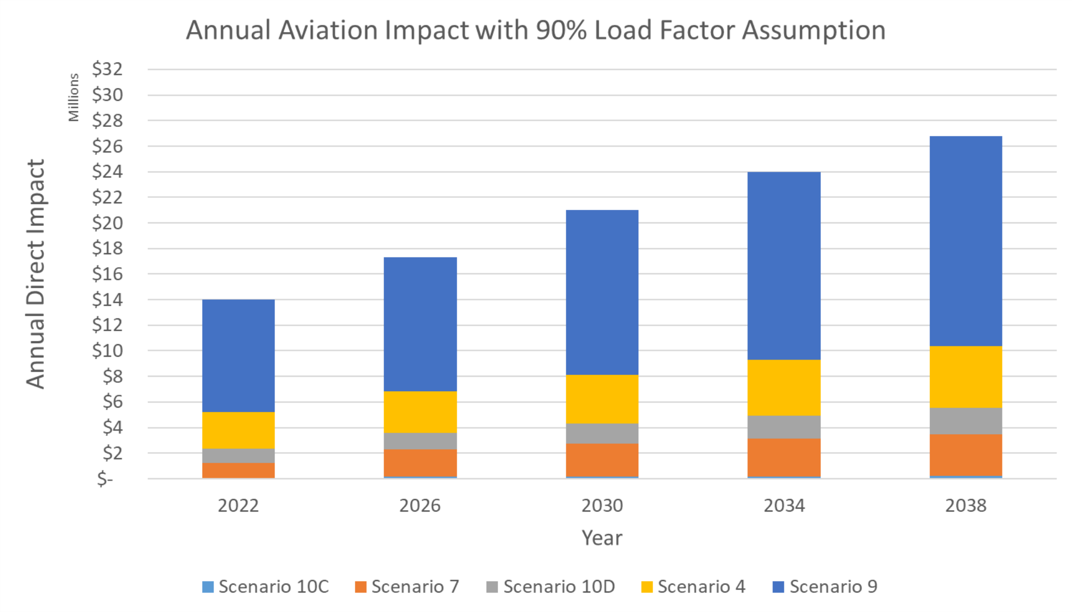
SUMMARY OF 20-YEAR DIRECT IMPACTS

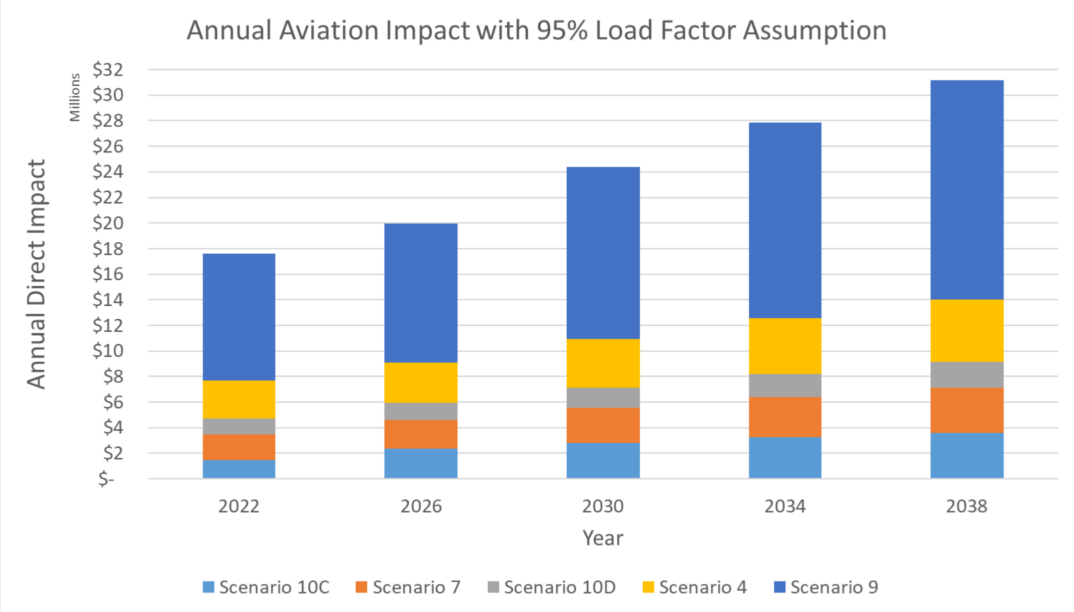


SUMMARY OF 20-YEAR DIRECT IMPACTS WITH LOAD FACTOR SENSITIVITY TEST









SUMMARY OF 20-YEAR CUMULATIVE DIRECT IMPACTS
LOAD FACTOR SENSITIVTY TEST

Cumulative Summary of Losses		Baseline Load Factor	85% Load Factor	90% Load Factor	95% Load Factor
Scenario 1	Existing airspace protection	**$0**	**$0**	**$0**	**$0**
Scenario 4	TERPS Only	**$26,034,000**	**$89,217,000**	**$148,827,000**	**$203,596,000**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**$0**	**$2,031,000**	**$47,238,000**	**$101,472,000**
Scenario 10	Existing Conditions: 85' - 166' AGL	**$0**	**$0**	**$0**	**$0**
	Opt 10A: 100' - 195' AGL	**$0**	**$0**	**$0**	**$0**
	Opt 10B: 115' - 224' AGL	**$0**	**$0**	**$0**	**$0**
	Opt 10C: 129' - 240' AGL	**$0**	**$0**	**$2,255,000**	**$49,906,000**
	Opt 10D: 146' - 260' AGL	**$0**	**$19,636,000**	**$76,975,000**	**$131,655,000**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**$211,596,000**	**$285,294,000**	**$385,051,000**	**$455,005,000**

NEXT FIVE MONTHS: NOVEMBER 2018 TO MARCH 2019

- Continue to meet with airline representatives
- Complete additional international aircraft payload/range analysis
- Complete economic impact analysis
- December 13, 2018: Project Steering Committee Meeting
- December 2018: Develop internal strategy recommendation
- January 2019: Stakeholder update meeting
- January 28, 2018: Present strategy recommendation to CEDC
- February/March 2019: Strategy recommendation to City Council

APPENDIX

KEY ECONOMIC OUTPUTS

Output	Value	Source
All-In Residential Construction Cost*	$534.51/sf	JLL
All-In Office Construction Cost†	$303.40/sf	JLL
Property Tax Millage Rate (City Only)	0.12660 per $100 in assessed value	Santa Clara County
Annual New Construction Residential Tax Revenue	$0.68/sf	JLL
Annual New Construction Office Tax Revenue	$0.38/sf	JLL
New Residents	Average of 1 new resident per 596 rentable square feet	JLL survey of new construction Downtown
New Employees	Average of 1 new employee per 185 rentable square feet	JLL survey of 90 JLL clients with 550+ million square feet under management

** Includes parking; excludes land; factors in 3% inflation per year*
† Includes parking @ $40,000/space, TI allowance, commission; excludes land; factors in 3% inflation per year

KEY ECONOMIC OUTPUTS (CONT'D)

Output	Value	Source
Plan Review Fee	Office: $172 per 1,000 sf above 40,000 sf Residential: $418 per 1,000 sf above 40,000 sf	City of San Jose
Inspection Fee	Office: $112 per 1,000 sf above 40,000 sf Residential: $502 per 1,000 sf above 40,000 sf	City of San Jose
CRMP	Office: 3.00% of valuation Residential: 2.42% of valuation	City of San Jose
Building and Structure Construction Tax	Office: 1.50% of valuation Residential: 1.54% of valuation	City of San Jose
Construction Tax	Office: $0.08 per sf Residential: $75 - $100 per unit	City of San Jose
Residential Construction Tax	$90 - $180 per unit	City of San Jose
New Construction Fee	Office/Residential: $0.56 per sf	San Jose Unified School District
Park Impact Fee (Residential Only)	$14,600 per unit	City of San Jose

Note: Does not include SMIPA or BSARSF.

ANNUAL TAX REVENUE (ANNUALIZED) IN DIRIDON STATION

Scenario	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
4	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$450,600	$450,600	$450,600	$450,600	$450,600	$450,600
7	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$450,600	$450,600	$450,600	$450,600	$450,600	$450,600
9	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$450,600	$450,600	$450,600	$450,600	$450,600	$450,600
10A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$450,600	$250,700	$6,200	$0	$0	$0
10B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$450,600	$450,600	$450,600	$450,600	$181,600	$19,200
10C	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$450,600	$450,600	$450,600	$450,600	$450,600	$450,600
10D	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$450,600	$450,600	$450,600	$450,600	$450,600	$450,600

Note: assumes a straight-line increase in office and residential development based on historical absorption/delivery pace. Values are net new tax revenues each year and are not cumulative.

ONE-TIME FEES (ANNUALIZED) FOR DIRIDON STATION

($ millions)

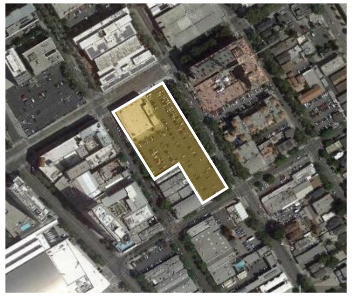
Scenario	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
4	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$22.97	$22.97	$22.97	$22.97	$22.97
7	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$22.97	$22.97	$22.97	$22.97	$22.97
9	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$22.97	$22.97	$22.97	$22.97	$22.97
10A	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$13.18	$0.59	$0.00	$0.00	$0.00
10B	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$22.97	$22.97	$22.97	$9.80	$1.85
10C	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$22.97	$22.97	$22.97	$22.97	$22.97
10D	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.97	$22.97	$22.97	$22.97	$22.97	$22.97

Note: assumes a straight-line increase in office and residential development based on historical absorption/delivery pace.

AERIALS OF SELECTED DOWNTOWN SITES

25934007-14, 25934020-31

66 N Market St (Approximate)

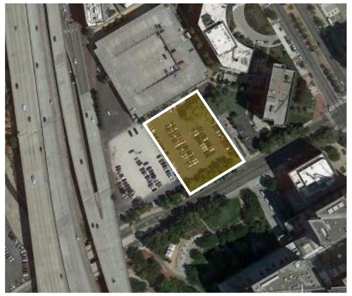


46746080-82

345 S 2nd Street & 300 S 1st Street

25942080

282 S Market St



25939116

333 W San Fernando St

25940012

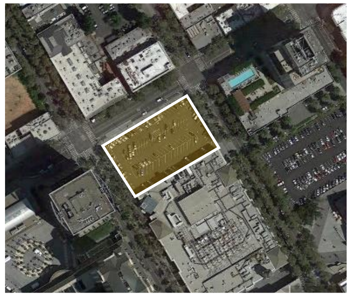
60 S Almaden Ave

46722160

174 S 2nd St

25931072, 25931077-80

115 Terraine St



46722142

8 E San Fernando St

EXISTING DENSITY AND INCREASES FOR DOWNTOWN SITES

Address			Scenario 4		Scenario 9	
	Parcel Area	Max Existing Potential SF	Max SF Increase	% Max SF Increase	Max SF Increase	% Max SF Increase
66 N Market St (Approximate)	170,017	2,441,000	0	0%	300,000	12%
345 S 2nd Street & 300 S 1st Street	123,173	2,232,000	*Not Impacted*	*Not Impacted*	782,000	35%
282 S Market St	65,781	1,090,000	52,000	5%	363,000	33%
333 W San Fernando St	62,242	910,000	101,000	11%	202,000	22%
60 S Almaden Ave	61,874	966,000	107,000	11%	215,000	22%
174 S 2nd St	58,456	981,000	*Not Impacted*	*Not Impacted*	187,000	19%
115 Terraine St	55,200	653,000	44,000	7%	174,000	27%
8 E San Fernando St	43,513	754,000	36,000	5%	144,000	19%
Museum Place	107,815	988,203 (planned)	100,000	10%	250,000	25%

333 San Ferndando St
Adobe Tower 4
Planned SF: 750k
Site Capacity: 859k-909k

60 S Almaden Ave
Former Greyhound Site
Planned SF: 622k (JLL est.)
Site Capacity: 980k

ASSUMPTIONS – ADJUSTED SEATING CAPACITY

Winter					
Aircraft Data		**Adjusted Seating Capacity Based on LFs**			
Aircraft	**Aircraft Seat Capacity (Max)**	**Hawaii (89.70% LF)**	**Transcontinental (84.90% LF)**	**Europe (73.00% LF)**	**Asia (78.10% LF)**
A320-200	150		127		
A321 NEO	189	170			
B737-800 (Transcon)	175		149		
B737-800 (Hawaii)	173	155			
B787-9	290			212	226

Summer					
Aircraft Data		**Adjusted Seating Capacity Based on LFs**			
Aircraft	**Aircraft Seat Capacity (Max)**	**Hawaii (90.50% LF)**	**Transcontinental (82.20% LF)**	**Europe (87.20% LF)**	**Asia (81.50% LF)**
A320-200	150		123		
A321 NEO	189	171			
B737-800 (Hawaii & Transcon)	175	158	144		
B787-9	290			253	236

PASSENGER PENALTY VS EMPTY SEATS SUMMARY

Destination (Season)	Aircraft Type	Aircraft Seat Capacity	Load Factor	Load Factor Seat Count	Available Empty Seats Due to Load Factor	Additional PAX Lost In Excess of Load Factor	Scenarios Impacted
Hawaii (Winter)	A321 NEO	189	89.70%	170	19	0	Scenarios 1,4,7,9 & 10
	B737-800	173	89.70%	155	18	0	Scenarios 1,4,7,9 & 10
Hawaii (Summer)	A321 NEO	189	90.50%	171	18	0	Scenarios 1,4,7,9 & 10
	B737-800	175	90.50%	158	17	0	Scenarios 1,4,7,9 & 10
Transcon (Winter)	A320-200	150	84.90%	127	23	0	Scenarios 1,4,7,9 & 10
	B737-800	175	84.90%	149	26	0	Scenarios 1,4,7,9 & 10
Transcon (Summer)	A320-200	150	82.20%	123	27	0	Scenarios 1,4,7,9 & 10
	B737-800	175	82.20%	144	31	0	Scenarios 1,4,7,9 & 10
Asia (Winter)	B787-9	290	78.10%	226	64	0	Scenarios 1,4,7 & 10
Asia (Winter)	B787-9	290	78.10%	226	64	30	Scenario 9
Asia (Summer)	B787-9	290	81.50%	236	54	0	Scenarios 1,4,7 & 10
Asia (Summer)	B787-9	290	81.50%	236	54	41	Scenario 9
Europe (Winter)	B787-9	290	73.00%	212	78	0	Scenarios 1,4,7 & 10
Europe (Winter)	B787-9	290	73.00%	212	78	0	Scenario 9
Europe (Summer)	B787-9	290	87.20%	253	37	0	Scenarios 1,4,7 & 10
Europe (Summer)	B787-9	290	87.20%	253	37	4	Scenario 9

LOST PFC REVENUE

Total		Annual Flights Impacted	Anuual Lost Passengers	Lost Revenue Per Year
Scenario 1	Existing airspace protection	**583**	**-**	**$0**
Scenario 4	TERPS Only	**583**	**201**	**$884**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**583**	**-**	**$0**
Scenario 10	Existing Conditions: 85' - 166' AGL	**583**	**-**	**$0**
	Opt 10A: 100' - 195' AGL	**583**	**-**	**$0**
	Opt 10B: 115' - 224' AGL	**583**	**-**	**$0**
	Opt 10C: 129' - 240' AGL	**583**	**-**	**$0**
	Opt 10D: 146' - 260' AGL	**583**	**-**	**$0**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**583**	**5,794**	**$25,435**

Note: Airport gets **$4.39** per outbound passenger for PFCs

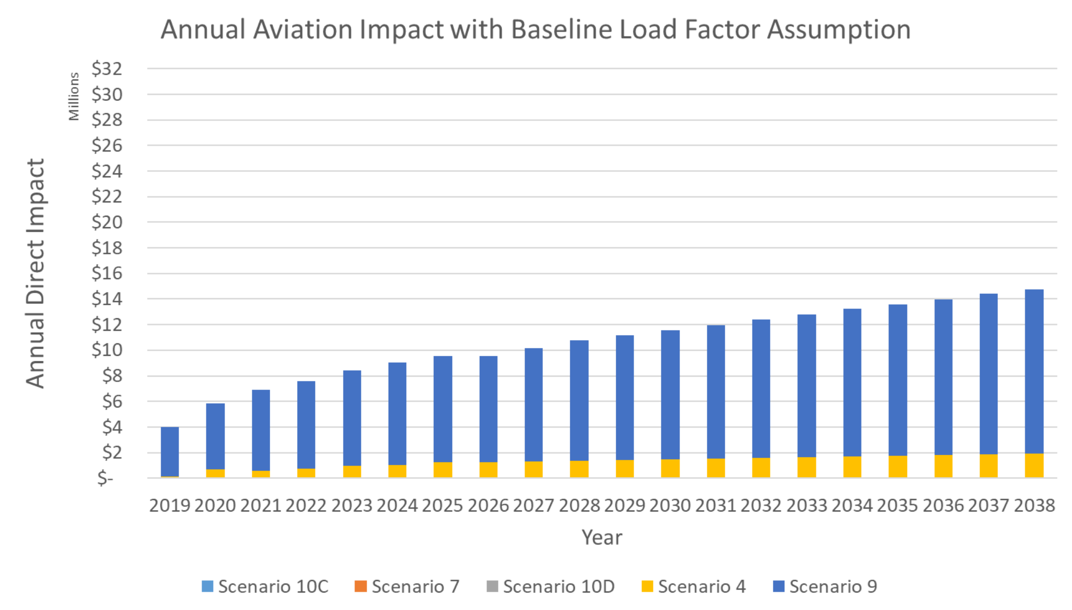
REVENUE LOSS SUMMARY

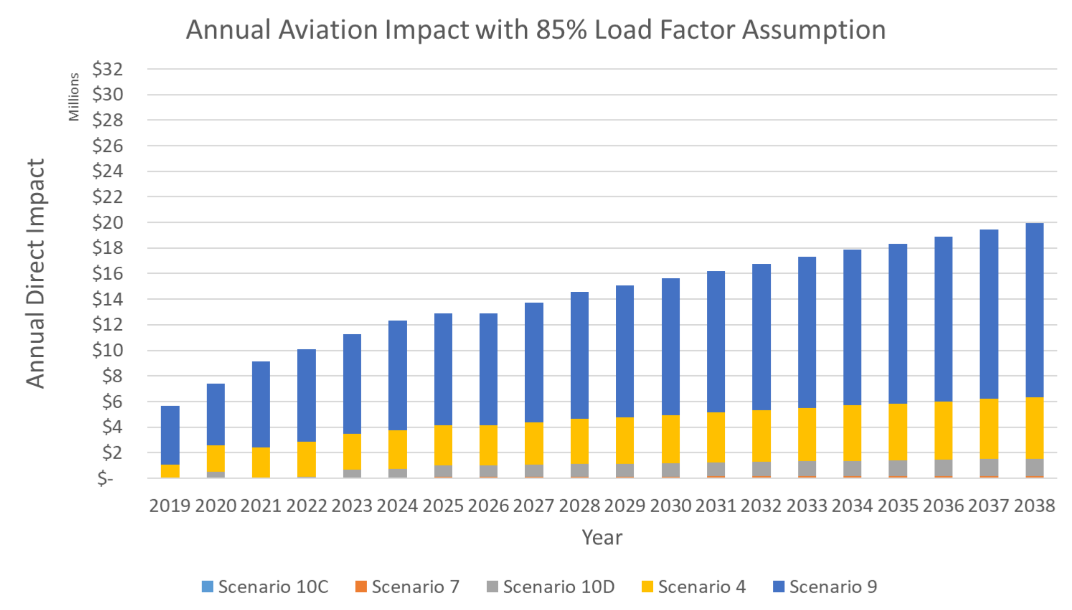
- No lost revenue per year for Hawaii and Transcontinental departures under any airspace scenario

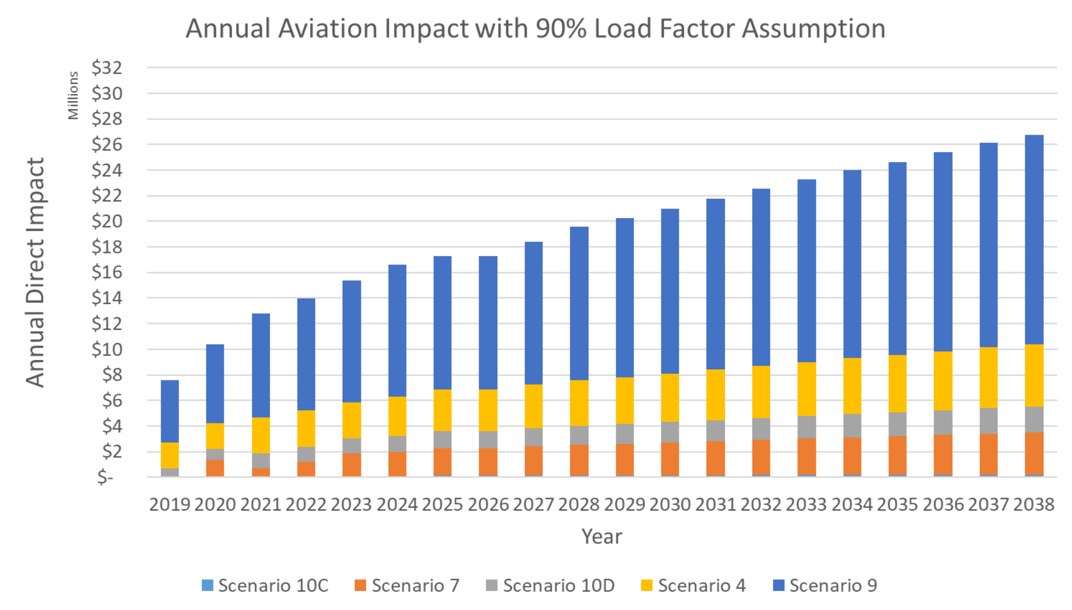
Market	Airspace Scenario	Lost Passengers Per Flight	Annual Departures	Flights Impacted	Airline Lost Revenue Per Year	Airport Concessions Lost Revenue Per Year	Terminal Concessions Lost Revenue Per Year	Lost Visitors Per Flight	Local Visitor Spending Lost Revenue Per Year
Europe	Scenario 1, 4, 7 & 10	0	359	47	$0	$0	$0	0	$0
	Scenario 9	4	359	47	$38,000	$400	$2,000	2	$70,000
Asia	Scenario 1, 7 & 10	0	582	74	$0	$0	$0	0	$0
	Scenario 4	2	582	74	$43,000	$400	$2,000	1	$55,000
	Scenario 9	71	582	74	$1,699,000	$12,000	$72,000	28	$1,548,000

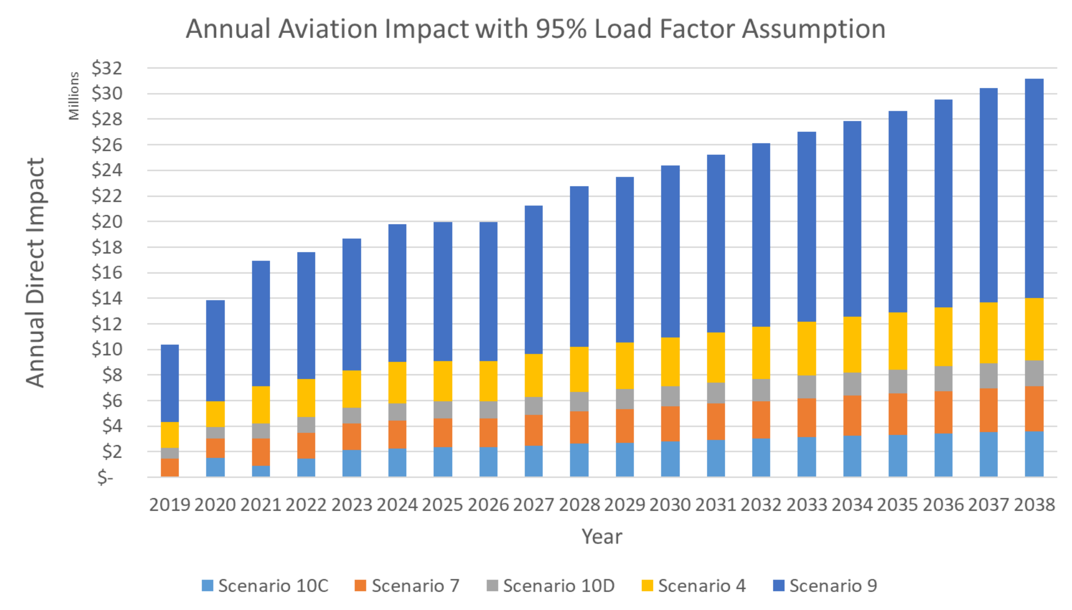
Note: Visitors are 28.9% for Europe and 39.1% for Asia

SUMMARY OF 20-YEAR DIRECT IMPACTS WITH LOAD FACTOR SENSITIVITY TEST



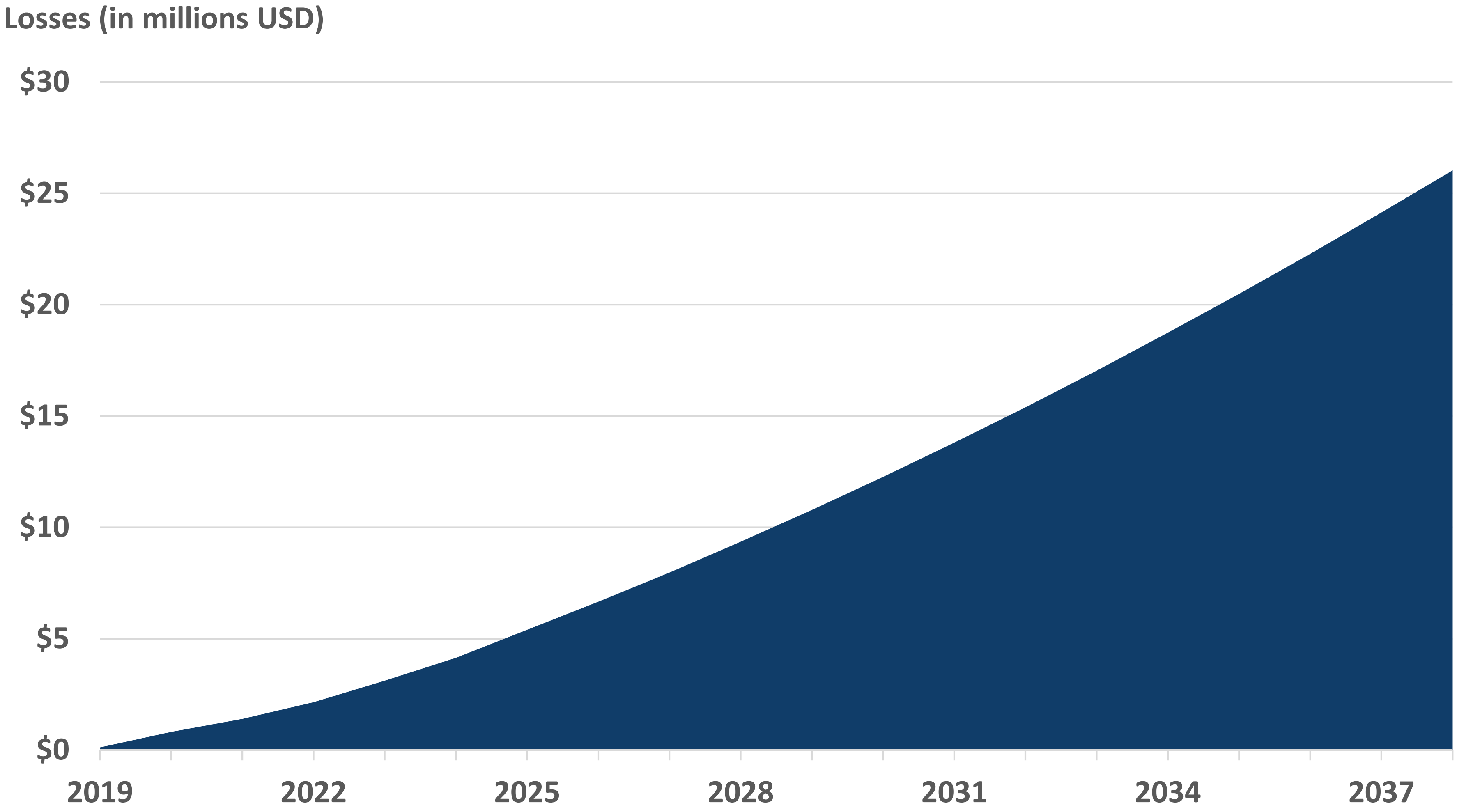






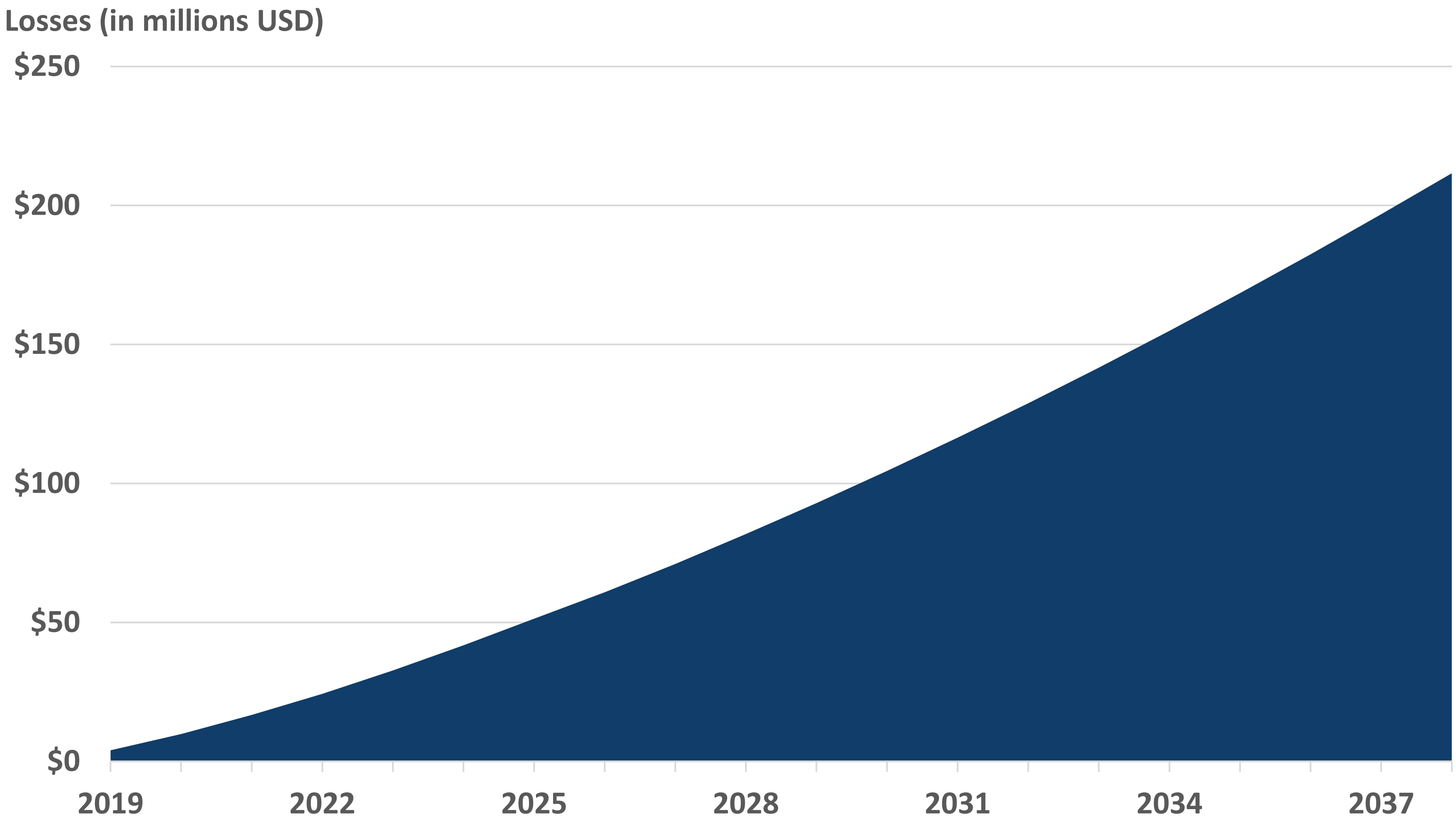
SCENARIO 4 CUMULATIVE SUMMARY OF LOSSES

- Scenario 4 is forecast to result in approximately $26.0 million over the next 20 years.



SCENARIO 9 CUMULATIVE SUMMARY OF LOSSES

- Scenario 9 is forecast to result in approximately $211.6 million over the next 20 years.

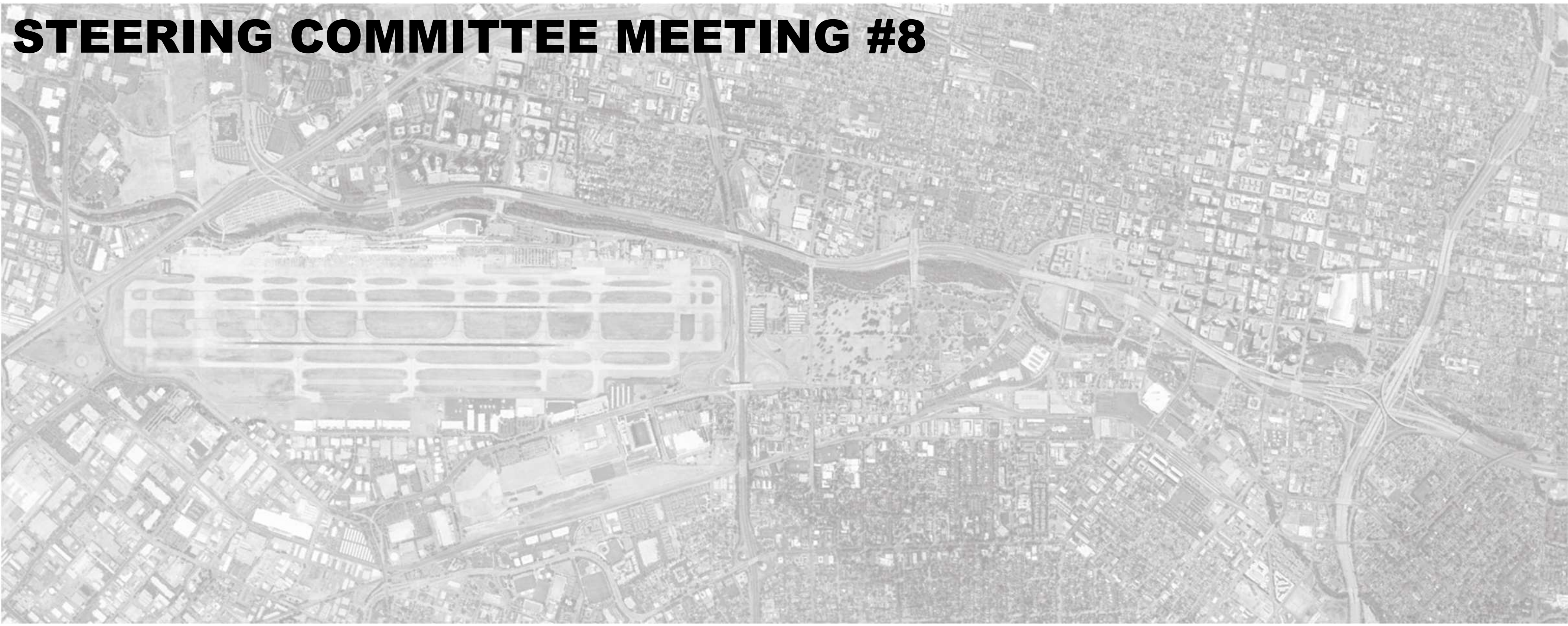


SUMMARY OF 20-YEAR CUMULATIVE DIRECT IMPACTS

Cumulative Summary of Loses		Airline Revenue	PFC Revenue	Terminal Concession Spending	Local Visitor Spending	Total
Scenario 1	Existing airspace protection	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 4	TERPS Only	**$12,762,000**	**$192,000**	**$637,000**	**$12,443,000**	**$26,034,000**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**$119,389,000**	**$1,231,000**	**$4,791,000**	**$86,185,000**	**$211,596,000**
Scenario 10	Existing Conditions: 85' - 166' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10A: 100' - 195' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10B: 115' - 224' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10C: 129' - 240' AGL	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10D: 146' - 260' AGL	**$0**	**$0**	**$0**	**$0**	**$0**

DOWNTOWN SAN JOSÉ AIRSPACE & DEVELOPMENT CAPACITY STUDY (PROJECT CAKE)

STEERING COMMITTEE MEETING #8



December 13, 2018

AGENDA

- Introduction
- Real Estate Economic Impact Assessment Update
- International Aircraft Performance Assessment
- Airline Aircraft Performance Assessment
- Aviation Direct Economic Impacts Update
- Induced Economic Impacts Assessment
- Strategy Recommendation Discussion
- Next Steps

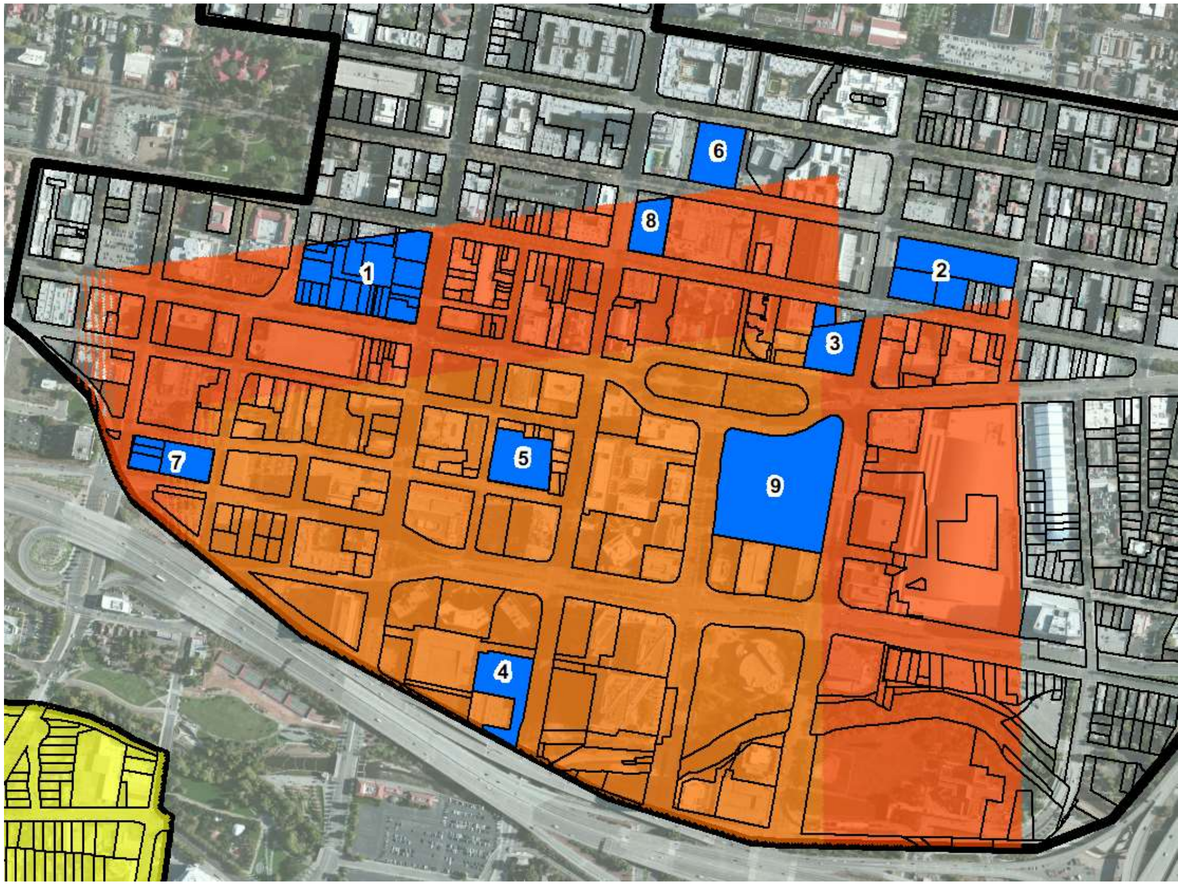
REAL ESTATE

ECONOMIC IMPACT ASSESSMENT UPDATE

(JLL)

IMPACT ON INDIVIDUAL DOWNTOWN SITES

	APN(s)	ADDRESS	CURRENT	NOTES	AREA
1	25934007-14, 25934020-31	66 N Market St (Approximate)	Surface Parking + Low-Rise Commercial		170,017 sf
2	46746080-82	345 S 2nd Street, 300 S 1st Street	Surface Parking + Low-Rise Commercial		123,173 sf
3	25942080	282 S Market St	Surface Parking		65,781 sf
4	25939116	333 W San Fernando St	Surface Parking	Planned site of Adobe Tower 4 (750,000sf)	62,242 sf
5	25940012	60 S Almaden Ave	Former Greyhound Terminal	Planned site of 708 residential units and 20,000 SF retail	61,874 sf
6	46722160	174 S 2nd St	Surface Parking	Site of planned Sobrato parking structure	58,456 sf
7	25931072, 25931077-80	115 Terraine St	One-Story industrial, Surface Parking		55,200 sf
8	46722142	8 E San Fernando St	Surface parking		43,513 sf
9	25942023	201 Market Street	Museum	Museum Place Development	107,815 sf



Note: Graphic depicts the area of increased height differentials for Scenario 4 in relation to the nine test sites depicted in blue. Please note that portions of test sites 1, 2, 3 and 8 are outside of the area of increased heights. Test site 6 is completely outside the area of increased heights.

UPDATES TO PREVIOUS ASSESSMENT

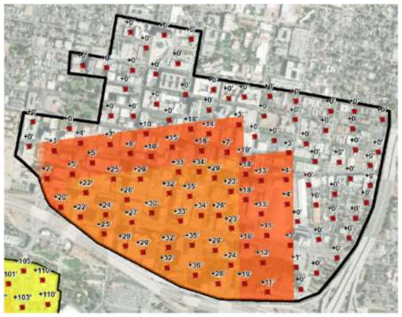
- Per the discussion at the November 13 meeting, JLL reviewed development test sites #3 and #8.
- There is a slight (though not significant compared to other sites) increase in density for these two future development sites.
- JLL adjusted the model and findings to reflect this, including all outputs.
- Development site #6 is outside of the area where additional height can be gained under Scenario 4. This area is governed by TERPS in both Scenarios 1 and 4 so no additional height would be gained over this parcel.

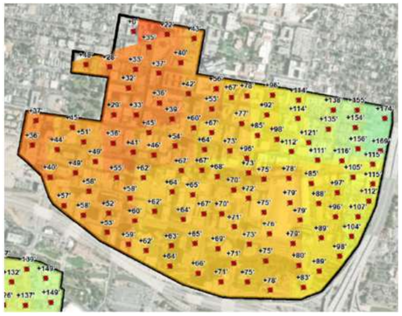
EXISTING DENSITY AND INCREASES FOR DOWNTOWN SITES

Address			Scenario 4		Scenario 9	
	Parcel Area	Existing Potential Density (SF)	Net New SF	% Increase	Net New SF	% Increase
66 N Market St (Approximate)	170,017	2,441,000	0*	0%	300,000	12%
345 S 2nd Street & 300 S 1st Street†	123,173	2,232,000	*Not Impacted*	*Not Impacted*	782,000	35%
282 S Market St	65,781	1,090,000	52,000	5%	363,000	33%
333 W San Fernando St	62,242	910,000	101,000	11%	202,000	22%
60 S Almaden Ave	61,874	966,000	107,000	11%	215,000	22%
174 S 2nd St	58,456	981,000	*Not Impacted*	*Not Impacted*	187,000	19%
115 Terraine St	55,200	653,000	44,000	7%	174,000	27%
8 E San Fernando St	43,513	754,000	36,000	5%	144,000	19%
Museum Place	107,815	988,203 (planned)	100,000	10%	250,000	25%

** An increase of zero square feet means either 1) the height limits imposed by the San Jose General Plan are below either the existing or the altered airspace protection scenarios or 2) an average of at least 14 feet must be achieved for each new floor, and the height increase afforded by a scenario does not meet this minimum.*

† Some parcels included in this test case site do fall under Scenario 4; however the majority do not, and therefore the development site as configured/tested assumes no height gain realized from Scenario 4.

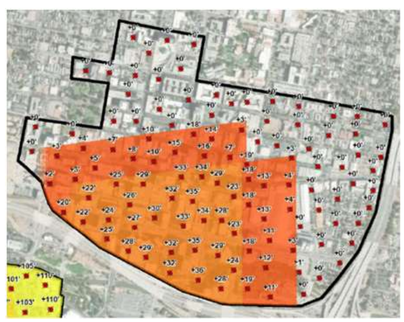


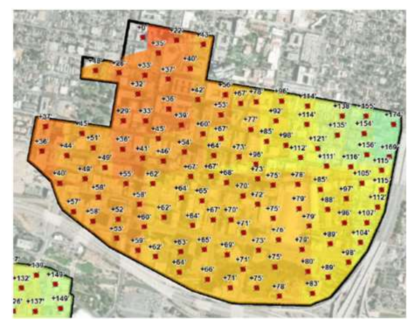


CONSTR. VALUE AND TAXES FOR DOWNTOWN SITES

Address	Scenario 4		Scenario 9	
	Net New Construction Value	Net New Annual Tax Revenue	Net New Construction Value	Net New Annual Tax Revenue
66 N Market St (Approximate)	*Not Impacted*	*Not Impacted*	$91,100,000	$115,000
345 S 2nd Street & 300 S 1st Street	*Not Impacted*	*Not Impacted*	$237,400,000	$301,000
282 S Market St	$15,800,000	$100,000	$110,300,000	$140,000
333 W San Fernando St	$30,700,000	$39,000	$61,300,000	$78,000
60 S Almaden Ave	$32,600,000	$41,000	$65,100,000	$82,000
174 S 2nd St	*Not Impacted*	*Not Impacted*	$56,700,000	$72,000
115 Terraine St	$13,200,000	$17,000	$52,900,000	$67,000
8 E San Fernando St	$10,900,000	$41,000	$43,600,000	$55,000
Museum Place	$30,300,000	$38,000	$75,800,000	$96,000

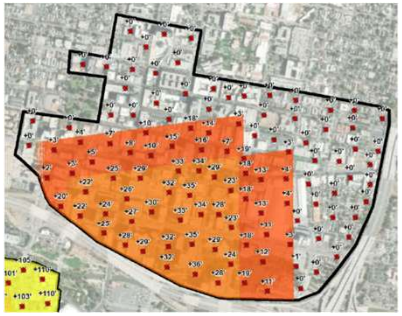
Note: Values represent both office development, are aggregate, and represent the total potential increase without regard to a specific timeframe.

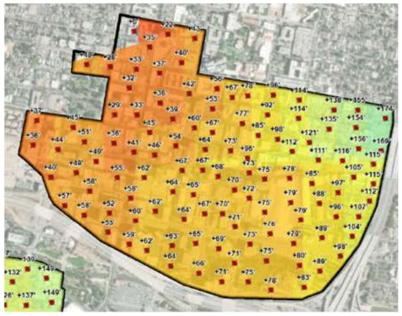




EMPLOYMENT IN DOWNTOWN SITES

Address	Scenario 4	Scenario 9
	Net New Employees	**Net New Employees**
66 N Market St (Approximate)	*Not Impacted*	1,400
345 S 2nd Street & 300 S 1st Street	*Not Impacted*	3,700
282 S Market St	200	1,700
333 W San Fernando St	500	900
60 S Almaden Ave	500	1,000
174 S 2nd St	*Not Impacted*	900
115 Terraine St	200	800
8 E San Fernando St	200	700
Musem Place	500	1,200





INTERNATIONAL AIRCRAFT PERFORMANCE ASSESSMENT

ASSESSMENT OF EXISTING STRAIGHT-OUT OEI VS TERPS ONLY FOR ADDITIONAL MARKETS

Aircraft Evaluated:
A330-200
A350-900
B777-300
B787-9

Route	Destination	Distance (Statute Miles)
SJC - FRA	Frankfurt	5,702
SJC - PEK	Beijing	5,943
SJC - TPE	Taipei	6,499
SJC - GIG	Rio De Janeiro	6,575
SJC - HKG	Hong Kong	6,957
SJC - DEL	Delhi	7,731
SJC - DXB	Dubai	8,120

Source: www.greatcirclemap.com, Landrum & Brown

WEIGHT PENALTY ASSESSMENT – GIG, TPE, HKG, DEL & DXB

Rio de Janeiro - GIG Summer (81.3° F)	A330-200 (284 seats/21,199 lbs. cargo)		A350-900 (325 seats/16,520 lbs. cargo)		B777-300ER (370 seats/32,012 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	51	-
TERPS Only	-	1,927	-	2,085	-	2,776	60	-

Taipei - TPE Summer (81.3° F)	A330-200 (284 seats/10,635 lbs. cargo)		A350-900 (325 seats/6,439 lbs. cargo)		B777-300ER (370 seats/19,465 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	89	-
TERPS Only	-	1,976	-	2,052	-	2,638	96	-

Hong Kong - HKG Summer (81.3° F)	A330-200 (284 seats/743 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/5,348 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	15	-	-	-	128	-
TERPS Only	5	743	23	-	-	2,543	134	-

Delhi - DEL Summer (81.3° F)	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	48	-	69	-	62	-	178	-
TERPS Only	55	-	77	-	72	-	184	-

Dubai - DXB Summer (81.3° F)	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	57	-	71	-	62	-	184	-
TERPS Only	65	-	79	-	72	-	191	-

AIRLINE AIRCRAFT PERFORMANCE ASSESSMENT

AIRLINES RESPONSES

- The following airlines participated in the aircraft performance assessment for the various airspace scenarios presented:

Responded	**No Response**
AeroMexico	Air Canda/Jazz
Air China	California Pacific
Alaska	Frontier
American	Lufthansa
ANA	UPS
British Airways	
Delta	
FedEx	
Hainan Airways	
Hawaiian	
Southwest	
United	
Volaris	

AIRLINE AIRCRAFT PERFORMANCE ANALYSIS RESULTS (1 OF 3)

- ANA
  - Evaluated B787-8 (max 169 PAX configuration)
  - No PAX penalty impacts in Scenarios 1,4,7 and 10, however cargo impact.
  - Scenario 9 results in PAX penalties between 30-37 PAX in Summer temperatures (92º F), including additional cargo penalties
- Hainan Airways
  - For B787-8/9, Scenario 4 obstacles results in significant reduction in cargo and PAX payload (50+ PAX for B787-9) due to loss of the West Corridor

AIRLINE AIRCRAFT PERFORMANCE ANALYSIS RESULTS (2 OF 3)

- British Airways
  - Scenarios 4 and 7 have no impact at all to current operations
  - Scenario 9 results in greatest impact when operating on Runways 12L/12R
  - Scenario 10 has no impact on 12L when departing straight-out, however a payload and engine impact for 12R when making a right course correction
- Alaska, American, Aeromexico, Delta, and Southwest, Volaris
  - No penalties for operations below 92º F.
- United
  - Significant PAX and cargo penalties for B737-900ER operation in Scenarios 1, 4, 7 and 9
  - Minor PAX and cargo penalties in Scenario 4 for B737-800; moderate PAX and cargo penalties in Scenario 9 for B737-800

AIRLINE AIRCRAFT PERFORMANCE ANALYSIS RESULTS (3 OF 3)

- Hawaiian (Aircraft - A321 NEO)
  - HNL, OGG, or KOA has no passenger penalties, some cargo penalties.
  - LIH has minimal passenger penalties and some cargo penalties.
- Federal Express
  - Cargo Penalties in most scenarios; however, will cube out before weight out.

AVIATION DIRECT ECONOMIC IMPACT ASSESSMENT UPDATE

REVISED LOAD FACTORS

- Account for airline load factors (average occupied seats)
- Europe and Asia load factors update to reflect anticipated load factors in 2024

Airline Load Factor by Market		
Region	**Winter**	**Summer**
Hawaii – SJC	89.7%	90.5%
Transcontinental – SJC	84.9%	82.2%
Europe – Bay Average	77.0%	86.0%
Asia – Bay Average	81.0%	85.0%

- Aviation/airline impacts assumed to begin in 2024 with either new high-rise development or associated construction cranes

Notes:

- Historic load factor data including winter and summer data from BTS T100 = Bureau of Transportation Statistics Air Carrier Statistics Database, U.S. Departure of Transportation, 2015 - 2017
- International general load factor data from "International Arriving Passengers 2018-2028 Estimate," the City of San Jose - SJC International Airport

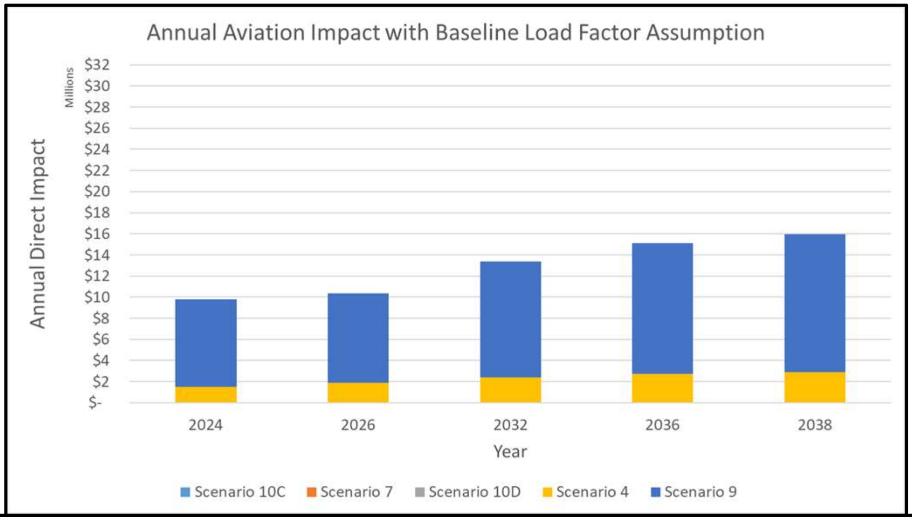
SUMMARY OF 2024 ANNUAL DIRECT IMPACTS BY SCENARIO HISTORICAL LOAD FACTORS

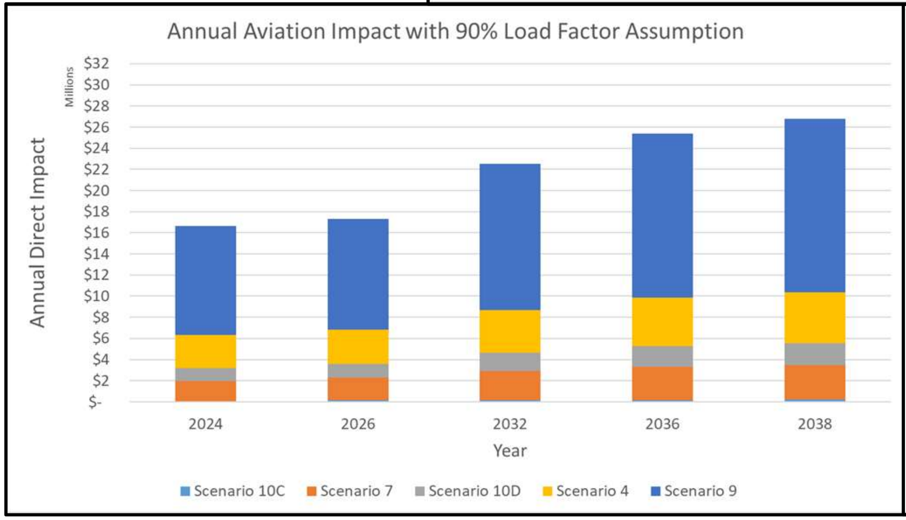
Summary of Loses		Airline Revenue	PFC Revenue	Terminal Concession Spending (Airport Share)	Terminal Concession Spending (Concession Share)	Local Visitor Spending	Total
Scenario 1	Existing airspace protection	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 4	TERPS Only	**$802,000**	**$10,000**	**$5,000**	**$31,000**	**$669,000**	**$1,517,000**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 10	Existing Conditions: 85' - 166' AGL	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10A: 100' - 195' AGL	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10B: 115' - 224' AGL	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10C: 129' - 240' AGL	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
	Opt 10D: 146' - 260' AGL	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**$5,566,000**	**$57,000**	**$32,000**	**$191,000**	**$3,966,000**	**$9,812,000**

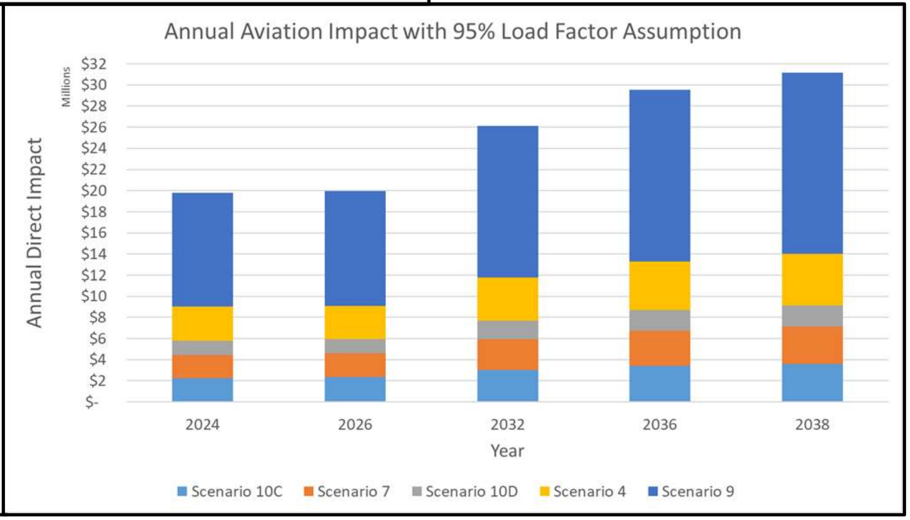
SUMMARY OF 2024 ANNUAL DIRECT IMPACTS LOAD FACTOR SENSITIVTY TEST

Summary of Losses		**Baseline Load Factor**	**90% Load Factor**	**95% Load Factor**
Scenario 1	Existing airspace protection	**$0**	**$0**	**$0**
Scenario 4	TERPS Only	**$1,517,000**	**$2,716,000**	**$4,306,000**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	**$0**	**$79,000**	**$1,439,000**
Scenario 10	Existing Conditions: 85' - 166' AGL	**$0**	**$0**	**$0**
	Opt 10A: 100' - 195' AGL	**$0**	**$0**	**$0**
	Opt 10B: 115' - 224' AGL	**$0**	**$0**	**$0**
	Opt 10C: 129' - 240' AGL	**$0**	**$0**	**$67,000**
	Opt 10D: 146' - 260' AGL	**$0**	**$663,000**	**$2,308,000**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**$9,812,000**	**$7,510,000**	**$10,164,000**

SUMMARY OF 20-YEAR DIRECT IMPACTS WITH LOAD FACTOR SENSITIVITY TEST







INDUCED ECONOMIC IMPACT ASSESSMENT

INDUCED ECONOMIC IMPACT ASSESSMENT ASSUMPTIONS

- Assume Asia and Europe service remains and airlines accept weight penalties for passengers and cargo
- JLL's assessment for Diridon Station Area used as basis for real estate impacts
- Used IMPLAN to assess indirect and induced economic impact
  - Aviation impact: weight penalty related losses, airline revenue, lost airport passenger and visitor expenditures
  - Real estate impact: net new construction expenditures, engineering, office jobs
- Potential losses of airport service markets are not modeled

INDUCED ECONOMIC IMPACT ASSESSMENT SUMMARY

Total Economic Impact Summary (2038)

Airspace Scenario	Aviation Impact		Real Estate Impact	
	Employment	GDP Gain/Loss	Employment	GDP Gain/Loss
10A	-	-	1,000	$184,000,000
10B	-	-	2,400	$438,000,000
10C	-	-	4,300	$700,000,000
4, 7, 10D	-27	-$2,000,000	4,900	$747,000,000

Estimated City of San Jose Local Sales Tax

Airspace Scenario	2024		2026		2032		2036		2038	
	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate	Airline/Airport	Real Estate
4	-$2,100	-	-$2,600	-	-$3,200	$110,000	-$3,500	$206,800	-$3,700	$253,400
7	-	-	-	-	-	$110,000	-	$206,800	-	$253,400
9	-$13,700	-	-$14,200	-	-$17,800	$110,000	-$19,600	$206,800	-$20,500	$253,400
10A	-	-	-	-	-	$110,000	-	$57,700	-	$57,700
10B	-	-	-	-	-	$110,000	-	$141,100	-	$137,400
10C	-	-	-	-	-	$110,000	-	$206,800	-	$226,800
10D	-	-	-	-	-	$110,000	-	$206,800	-	$253,400

STRATEGY RECOMMENDATION DISCUSSION

NEXT STEPS

- December 2018: Develop internal strategy recommendation
- Week of January 14, 2019: Stakeholder update meeting
- January 28, 2019: Present strategy recommendation to CEDC
- February 2019: Strategy recommendation to City Council

Appendix J – Draft Working Papers

Appendix J consists of a compilation of draft working papers prepared by the L&B project team and submitted to the City of San Jose and various project stakeholders.

Aviation Planning at the Leading Edge

TO: JUDY ROSS, ASSISTANT DIRECTOR, MINETA SAN JOSÉ INTERNATIONAL AIRPORT

FROM: LANDRUM & BROWN, INC.

DATE: FEBRUARY 19, 2019

RE: DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY (PROJECT DADCS) EXISTING CONDITIONS ASSESSMENT MEMORADUM

DRAFT WORK PRODUCT

Introduction

A focus of the Downtown Airspace and Development Capacity Study (Project DADCS) is understanding the impacts to airline/aircraft operations in Southeast Flow (Runway 12L/12R) as impacts to departures are greater due to the existing obstacle environment south of the Airport. This memorandum provides a summary of an assessment of airport runway configurations, historical weather trends and airline operations/fleet mix at San José International Airport (SJC). Understanding the aircraft fleet mix, times of day when these aircraft operate and the destinations served from SJC is an integral component in evaluating potential impacts to domestic, international and transoceanic operations as it applies to proposed high-rise developments south of the Airport and the potential for modifications to protected airspace protection surrounding the Airport.

The second part of this memorandum compiles an assessment of the existing air service operations at SJC, regional competition with San Francisco International Airport (SFO) and Oakland International Airport (OAK), and economic influence of the air service area. The following topics are described in detail:

- Bay Area Airport Service Area
- Economic Base of Air Travel
- Benefits of SJC, SFO and OAK
- Bay Area Airports Air Service
- Bay Area Market Share
- Airline Operations
- Costs of Doing Business
- Advantages and Disadvantages of the Bay Area Airports
- Regional Competition

Table of Contents

Section 1: SJC Airport Operations

Section 1A. Airport Runway Operating Configurations

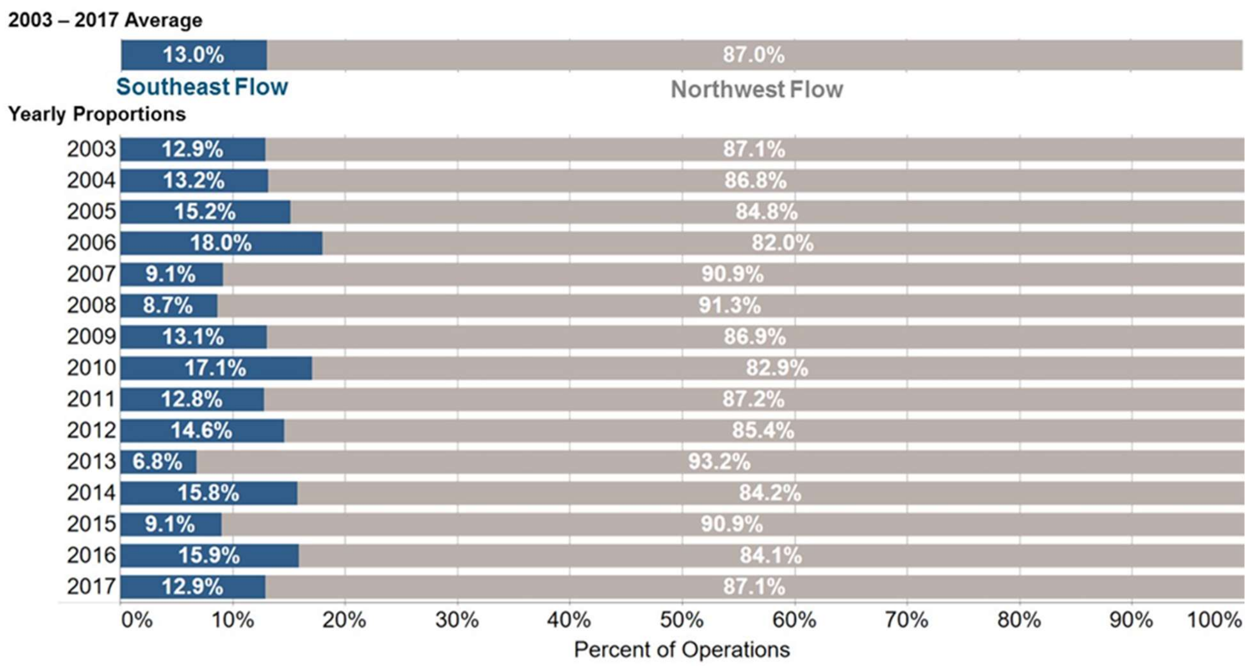
The primary operating configuration at SJC is the Northwest Flow (landing and departing on Runways 30L and 30R). Arrivals on final approach descend over Downtown San José. Departures initially take off over Santa Clara, away from Downtown San Jose. During Southeast Flow conditions, aircraft land and depart on Runways 12L and 12R, with departures over Downtown San José as depicted in **Figure 1**.

Figure 1: Runway 12L Departure View of Downtown San José Hi-Rise Buildings

Source: Kimley Horn

As presented in **Figure 2**, operations data collected from the SJC Airport Noise and Operations Monitoring System (ANOMS) from 2003-2017 show that the Airport operates in the Northwest Flow approximately 87 percent of the time annually while operations in the Southeast Flow (arriving and departing Runways 12L and 12R) occur 13 percent of the time annually.

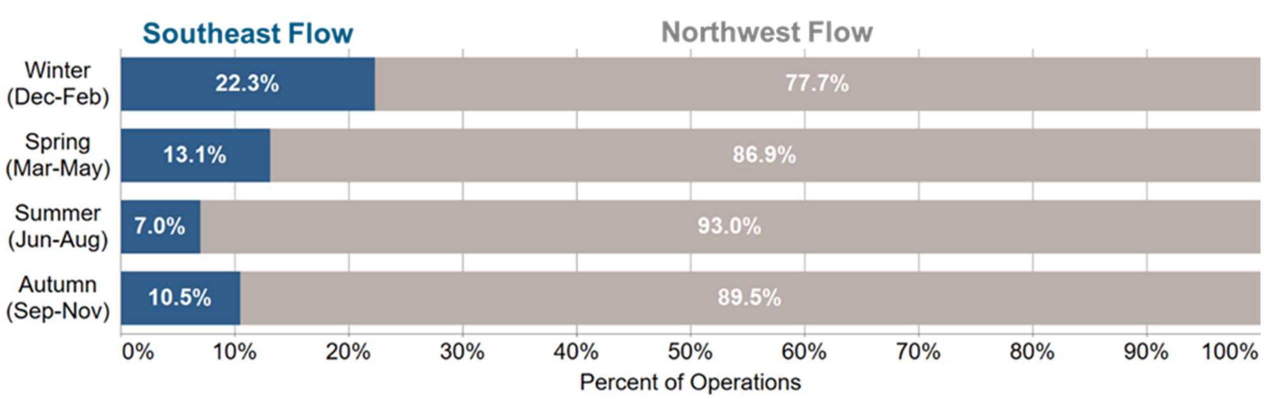
Figure 2: 2003 – 2017 Historical Airport Runway Configurations at SJC



Source: Data: ANOMS (2003 – 2017), Figure: Landrum & Brown

Figure 3 provides a summary of the historical runway configurations by season. It is important to note that operations in the Southeast Flow primarily occur in the winter months between December and February.

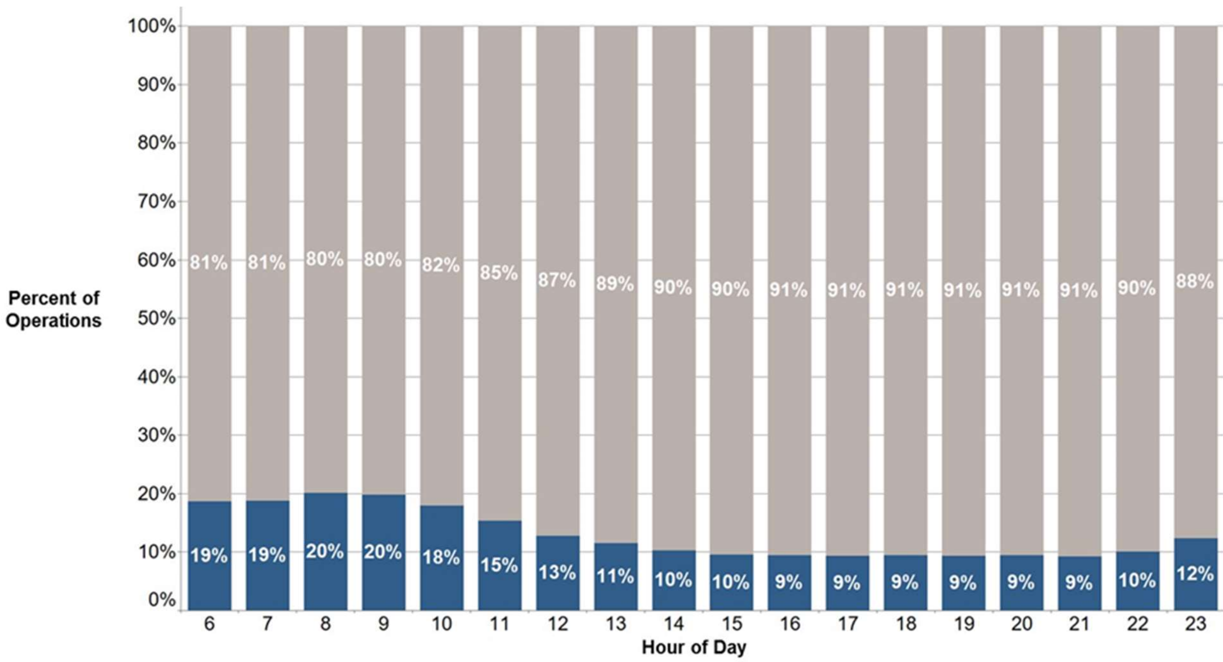
Figure 3: 2003 – 2017 Seasonal Historical Airport Runway Configurations at SJC



Source: Data: ANOMS (2003 – 2017), Figure: Landrum & Brown

With respect to time of day, the morning hours average approximately 80 percent of the time in the Northwest Flow. As depicted in **Figure 4**, that average increases to approximately 91 percent in the afternoon hours.

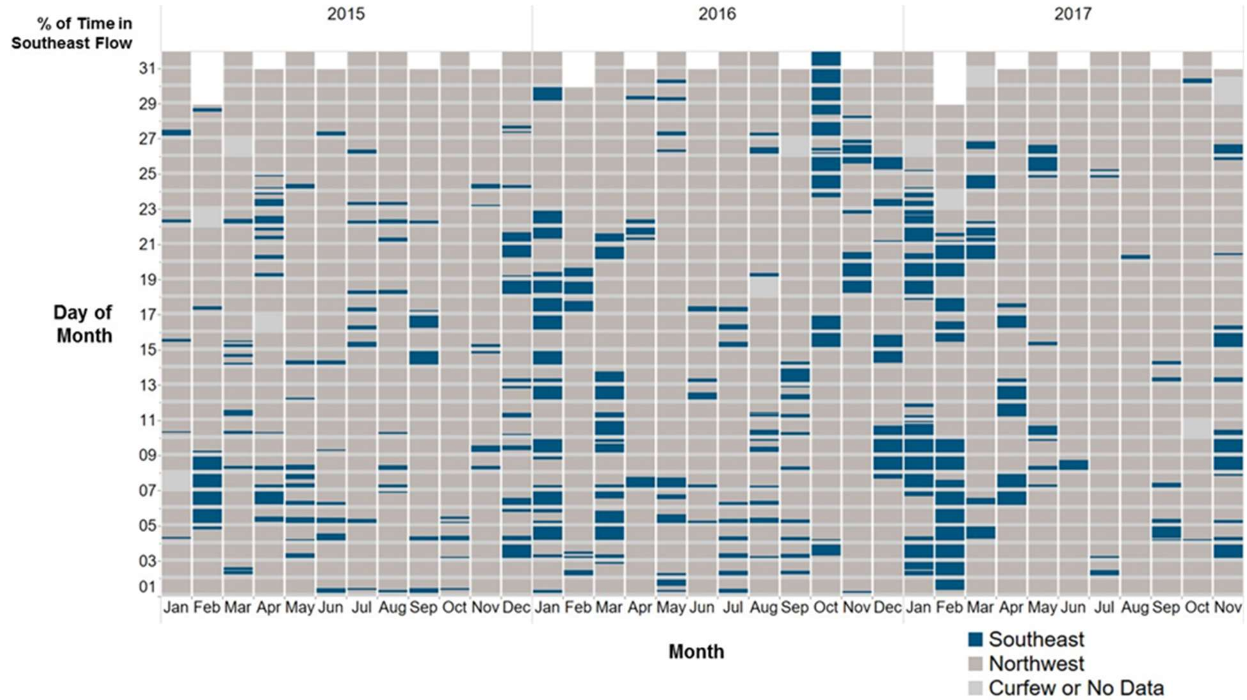
Figure 4: Southeast Flow by Hour of Day



Source: Data: ANOMS (2003 – 2017), Figure: Landrum & Brown

The Southeast Flow is usually associated with inclement weather that typically occurs in the winter months. That trend is reflected in **Figure 5**, which shows greater use of the Southeast Flow from October through April (although these monthly trends vary by year). Conversely, the Southeast Flow is not as frequently used in/near the summer months (May through September).

Figure 5: Flow by Calendar Hour



Source: Data: FAA ASPM (2015 – 2017), Figure: Landrum & Brown

As depicted in **Table 1**, there are typically 100 days each year when the Southeast Flow is in use, and during the winter months, the Southeast Flow may operate for several consecutive days.

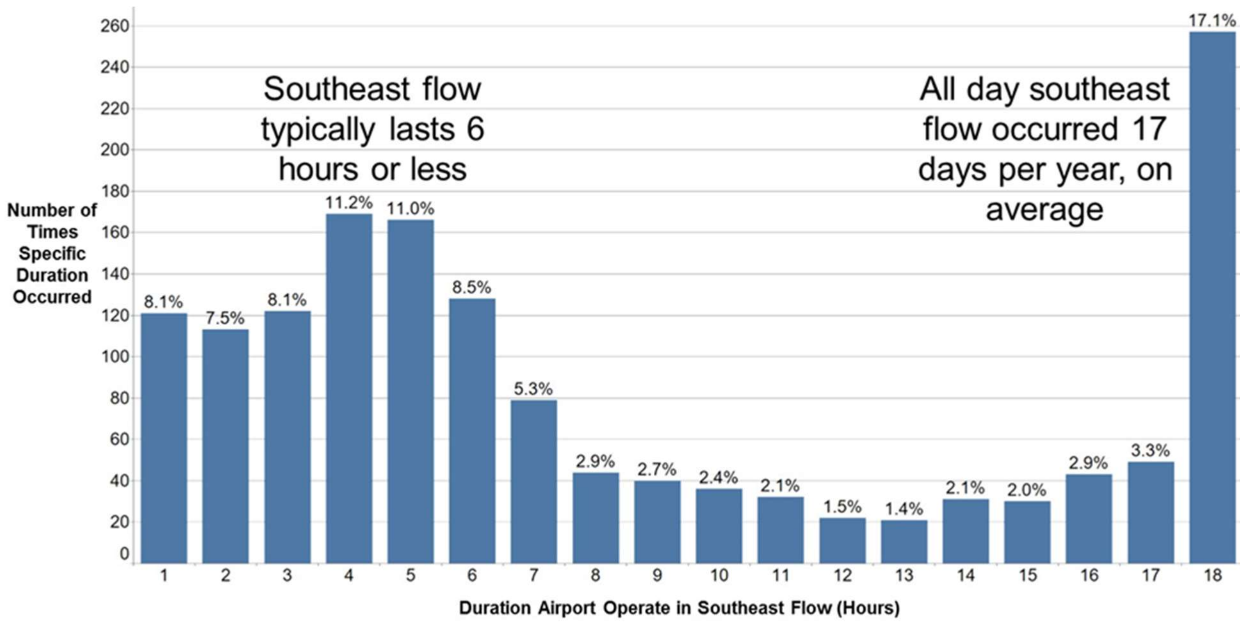
Table 1: Southeast Flow by Number of Days Annually

Year	Number of Days When Southeast Flow Occurred	Year	Number of Days When Southeast Flow Occurred
2003*	37	2011	110
2004	101	2012	110
2005	112	2013	66
2006	129	2014	119
2007	89	2015	98
2008	72	2016	119
2009	100	2017**	87
2010	127		

* 2003 only includes data for August – December
** 2017 only includes data for January – November
Source: Data: FAA ASPM (2003 – 2017), Table: Landrum & Brown

Although the Southeast Flow occurs during an average of 100 days per year, that flow typically occurs for six hours or less during each instance. As depicted in **Figure 6**, all-day Southeast Flow occurs an average of 17 days per year.

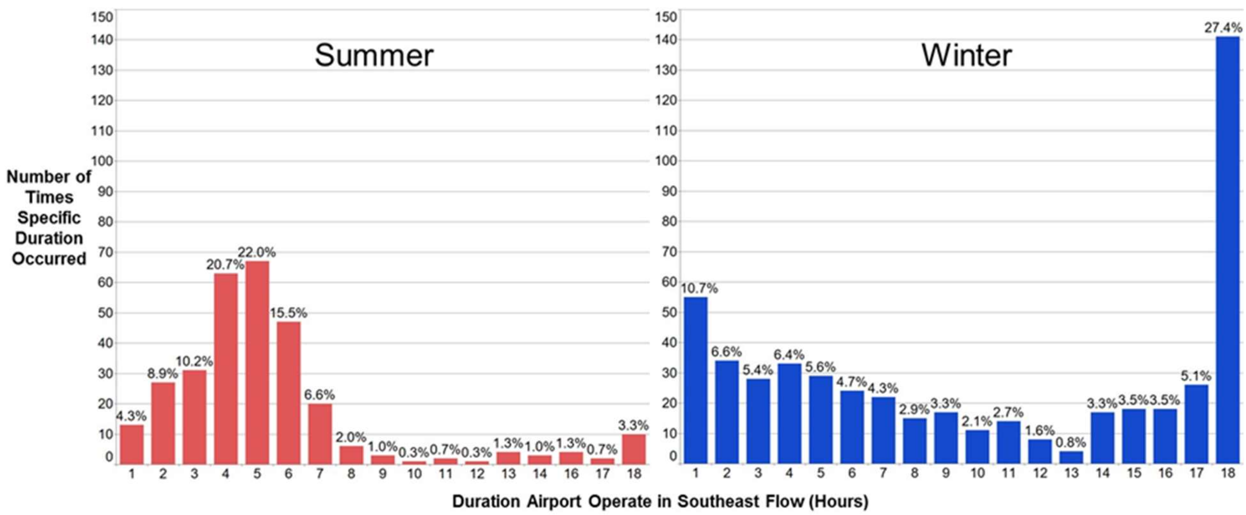
Figure 6: Average Duration of Southeast Flow



Source: Data: FAA ASPM (2003 – 2017), Figure: Landrum & Brown

Consistent with other observations, there are typically shorter durations while operating in the Southeast Flow during the summer months and longer durations during the winter months. These trends are reflected in **Figure 7**.All-day Southeast Flow rarely occurs in the summer months but occurs more frequently in the winter months.

Figure 7: Seasonal Duration of Southeast Flow



Source: Data: FAA ASPM (2003 – 2017, June – August, December – February), Figure: Landrum & Brown

Section 1B. Historical Temperature Analysis

The FAA Aviation System Performance Metrics (ASPM) database provides hourly temperature data. This data was analyzed to identify average temperature trends with respect to hour, month, and flow configuration. For all hours (i.e., both the Northwest and Southeast Flows), the average temperature was 62 degrees Fahrenheit. Average temperatures by month varied from an average of 50 degrees in December to an average of 69 degrees in July, August, and September. Average temperatures by hour varied from an average of 54 degrees Fahrenheit in the 0500 and 0600 hours to an average of 71 degrees Fahrenheit in the 1400, 1500, and 1600 hours.

When the data was filtered to consider only temperatures during the Southeast Flow, the average temperature decreased to 59 degrees Fahrenheit. The meteorological patterns that typically cause the Southeast Flow often occur during the cooler winter months, and they also result in weather that is more temperate (i.e., narrower temperature ranges). Average temperatures by month varied from an average of 54 degrees Fahrenheit in January to an average of 66 degrees Fahrenheit in September. Similarly, the range narrowed of average temperatures by hour, from an average of 55 degrees in the 0400, 0500, and 0600 hours to an average of 63 degrees Fahrenheit in the 1200, 1300, 1400, 1500, and 1600 hours. **Table 2** provides a summary of the aforementioned temperatures assessment from 2015 to 2017.

Table 2: Historical Temperature Analysis

Temperature (F)	Both Flows	Southeast Flow only
Average (avg)	62	59
Lowest, avg month	50	54
Highest, avg month	69	66
Lowest, avg hour	54	55
Highest, avg hour	71	63

Source: Data: FAA ASPM (2015 – 2017), Table: Landrum & Brown

Section 1C. Aviation Fleet Mix and Markets Served

Table 3 provides a summary of the domestic and international airlines at the Airport as of July 2018

Table 3: Airlines Currently Service SJC (As of July 2018)

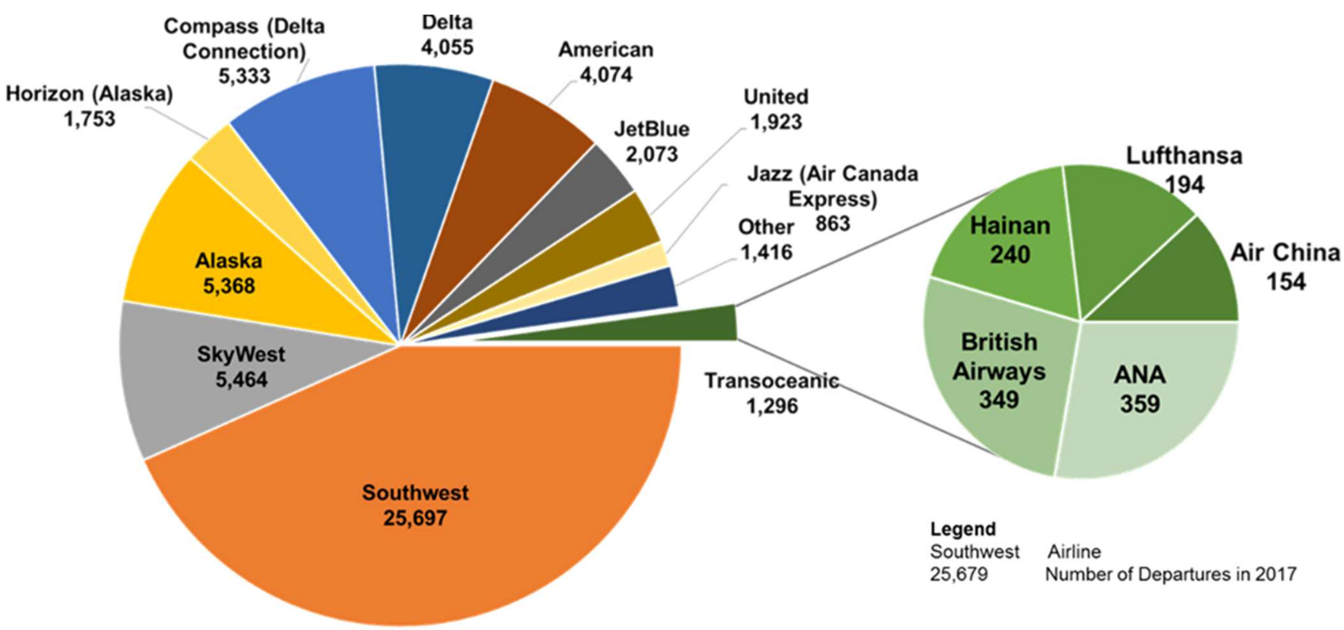
Airlines Currently Serving SJC	
Domestic Airlines	**International Airlines**
Alaska	Aeromexico
American	Air Canada
Delta	Air China
Frontier	ANA
Hawaiian	British Airways
JetBlue	Hainan
Southwest	Lufthansa
United	Volaris

Source: www.flysjc.com/airlines

To understand the fleet mix and markets at SJC, FAA ASPM data (2003 – 2017) was studied. Additionally, runway use data (2003 – 2017) was analyzed from the ANOMS.

As depicted in **Figure 8**, Southwest operated the largest number of flights in 2017. Other carriers with substantial operations included Alaska, American, and Delta. In addition, the competitive landscape at SJC changed between 2013 and 2017 as Delta (including Delta Connection) and JetBlue both increased their presence at the airport. It should be noted that SkyWest operated flights for Alaska, Delta, and United. SJC's transoceanic operations are comprised of five carriers: Air China, ANA, British Airways, Hainan, and Lufthansa.

Figure 8: Airline Market Share – Passenger

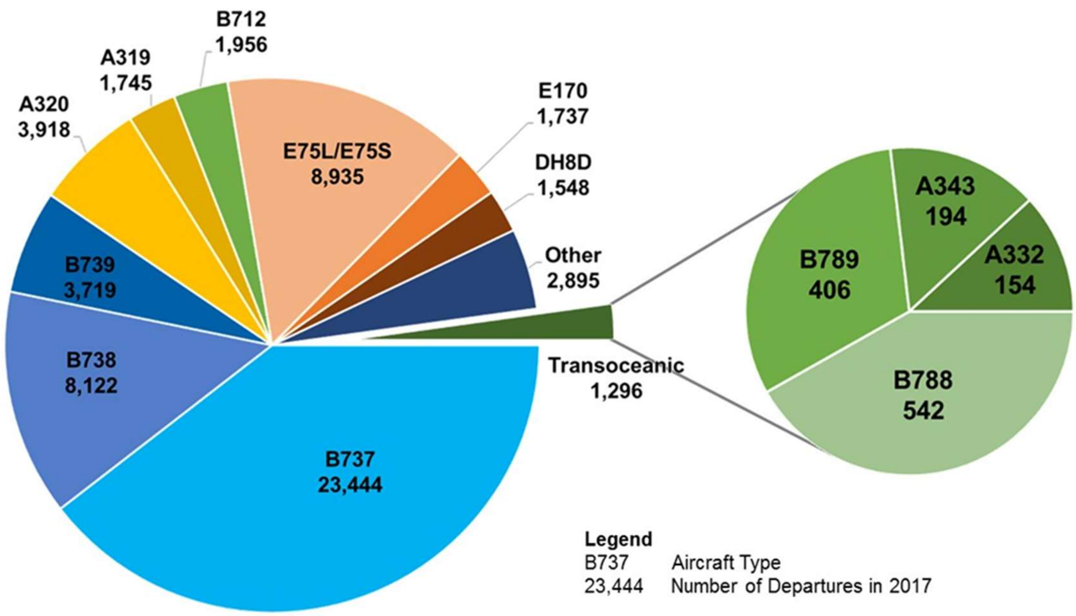


Source: Data: ANOMS (2017), Figure: Landrum & Brown

As depicted in **Figure 9**, the same ANOMS data was used to analyze aircraft types that operated at SJC in 2017. Consistent with Southwest's large presence, the Boeing 737-700 was the most commonly operated aircraft at the airport. Other popular types included the Boeing 737-800 and -900, the Airbus A319 and A320, and the Embraer 175. Some changes have occurred in the fleet mix at SJC including the retirement of the Boeing 737-300 by Southwest, and the removal of the Bombardier CRJ-200 by SkyWest. Other aircraft types have increased operations, such as the Embraer 175 and the Boeing 717-200 (operated by Delta). Transoceanic operations were comprised of four aircraft types:

- Airbus A330-200: Air China to PVG
- Airbus A340-300: Lufthansa to FRA
- Boeing 787-8: ANA to NRT, Hainan to PEK
- Boeing 787-9: British Airways to LHR, Hainan to PEK

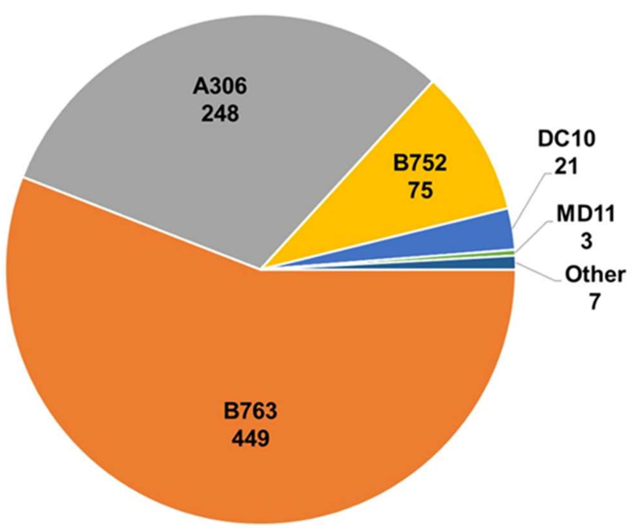
Figure 9: Aircraft Profile – Passenger



Source: Data: ANOMS (2017), Figure: Landrum & Brown

Cargo operations at SJC are comprised of a distinctly different fleet mix when compared with the passenger fleet mix. As depicted in **Figure 10**, the most commonly used cargo aircraft is the Boeing 767-300, which is operated by both FedEx and UPS. The Airbus A300-600 also has a substantial presence at SJC (used by FedEx and UPS).

Figure 10: Aircraft Profile – Cargo



Source: Data: ANOMS (2017), Figure: Landrum & Brown

The following analyses illustrate flight operations by stage length (the length of a flight as measured in statute miles). As depicted in **Table 4**, stage lengths are organized as follows:

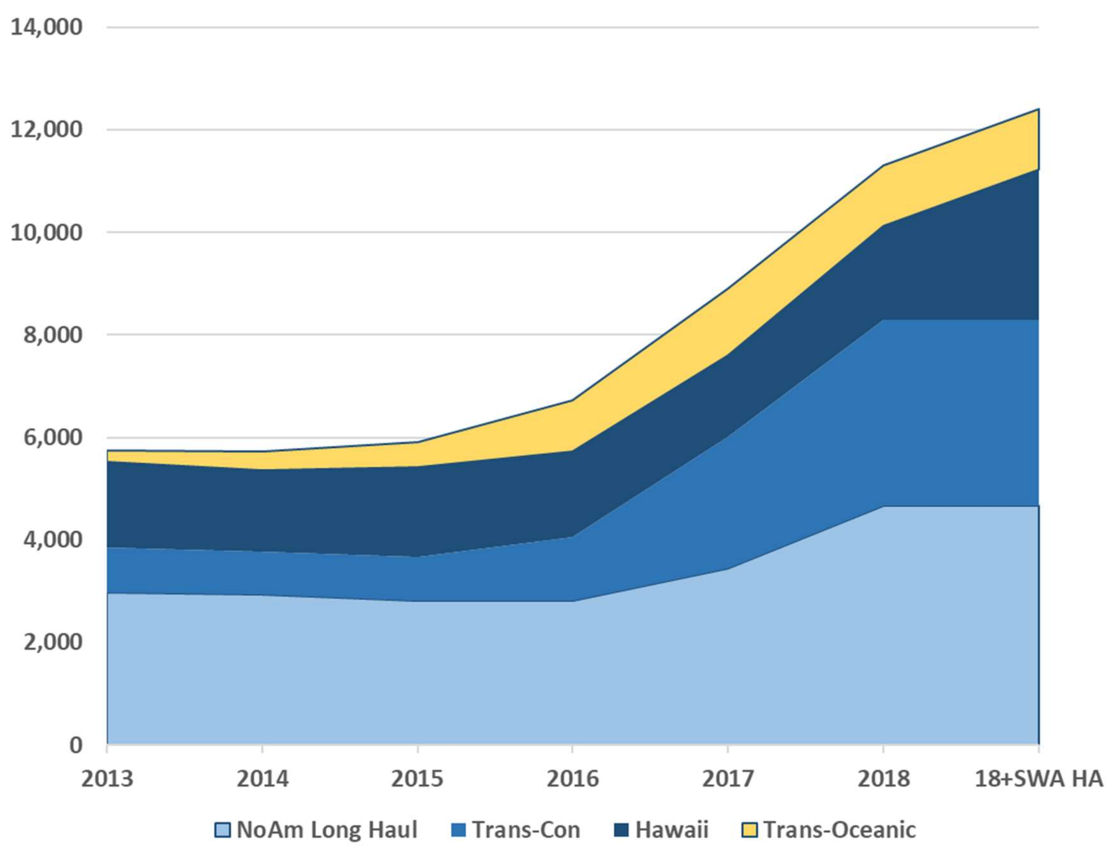
Table 4: Stage Length Categories

Distance (Miles)	Category	Examples
0 - 749	Short Haul	LAX, SEA, SAN, PHX
750 - 1,499	Mid-Range	AUS, DFW, SAT, SJD
1,500 - 1,999	NoAm Long Haul	HOU, MSP, MEX, STL
2,000 - 3,000	Trans-Con	BOS, BWI, JFK, MCO
2,000 - 3,000	Hawaii	HNL, OGG, LIH, KOA
3,000 +	Trans-Oceanic	LHR, PEK, FRA, NRT

Source: DIIO and Innovata Global Flight Schedules Calendar 2018

Since 2013, there has been a significant increase in the number of longer-haul flights (mid-continent, transcontinental, and transoceanic). This increase, which is particularly noticeable starting in 2016, is depicted in **Figure 12**.

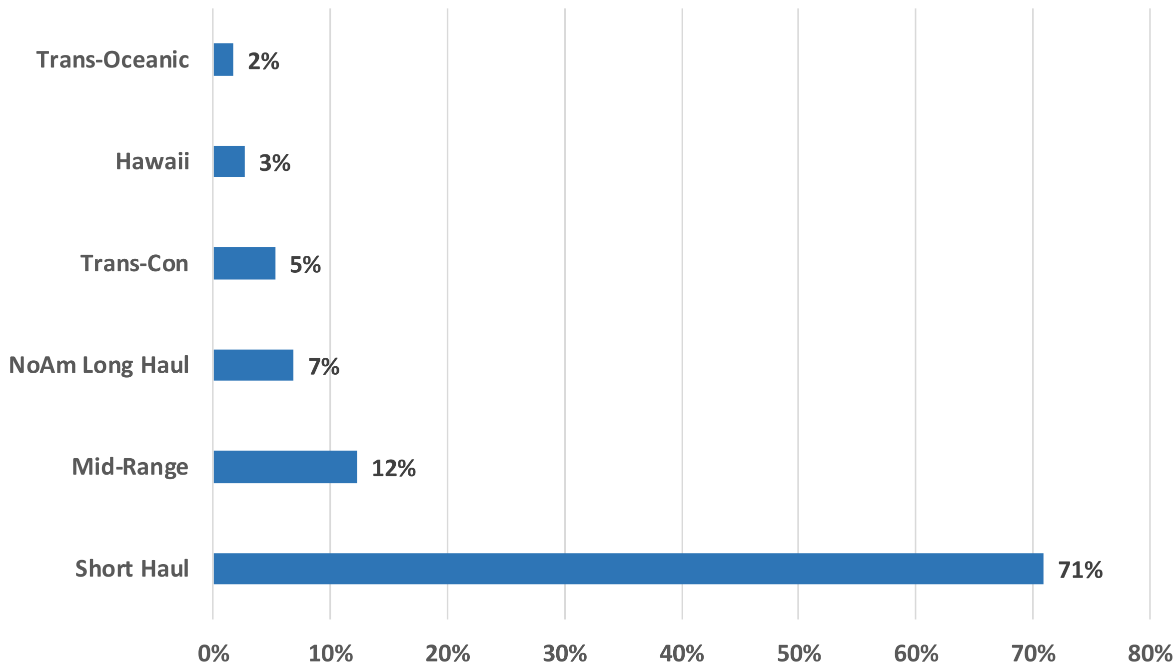
Figure 11: Long Haul Departure Trend



Source: DIIO and Innovata Global Flight Schedules, Departures of 1,500+ Miles

As depicted in **Figure 12**, an analysis of the passenger and cargo flights at SJC reveal that over 71 percent of the flights are classified as "shorter haul" and mid-range flights account for 12 percent of total operations. The remaining 10 percent of commercial operations include transcontinental, Hawaii and transoceanic flights.

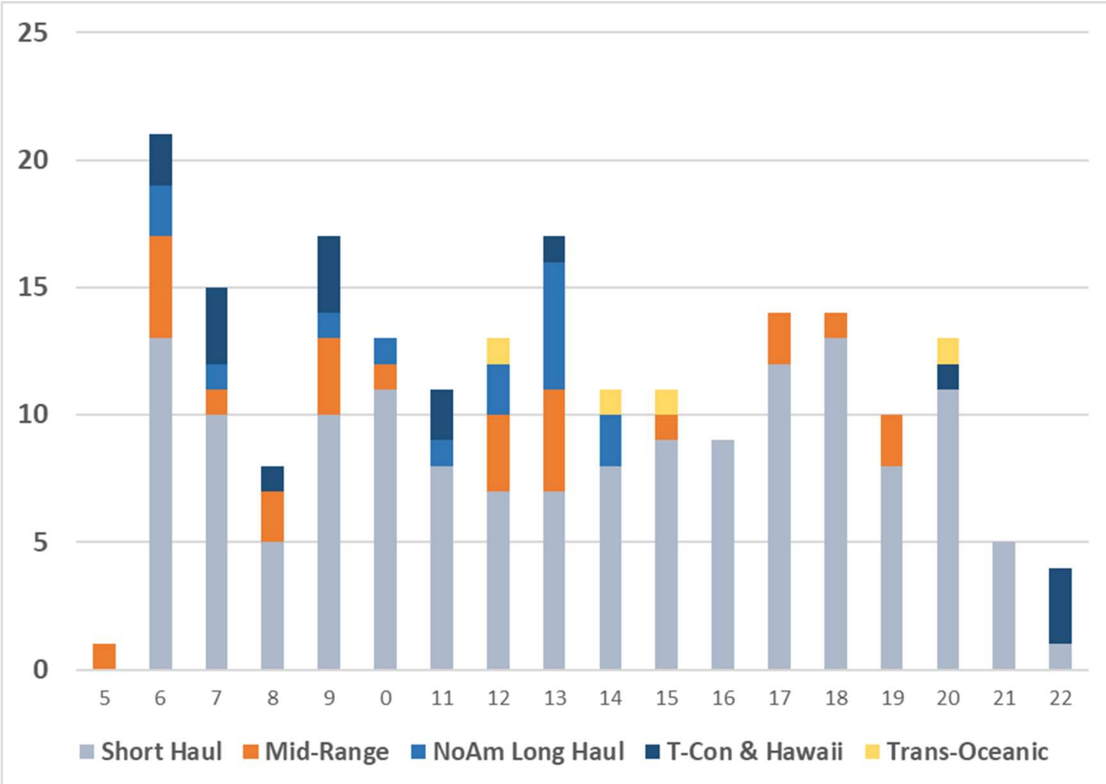
Figure 12: Departures by Stage Length (2018)



Source: DIIO and Innovata Global Flight Schedules Calendar 2018

As depicted in **Figure 13**, the largest portion of shorter-haul flights operate in the morning and early evening hours; however, traffic is fairly consistent throughout the day. Transoceanic flights to Asia typically operate in the late morning to mid-day hours while transoceanic flights to Europe operate in the afternoon and evening hours. Hawaii flights typically depart in the morning while mid-continent flights operate throughout the day.

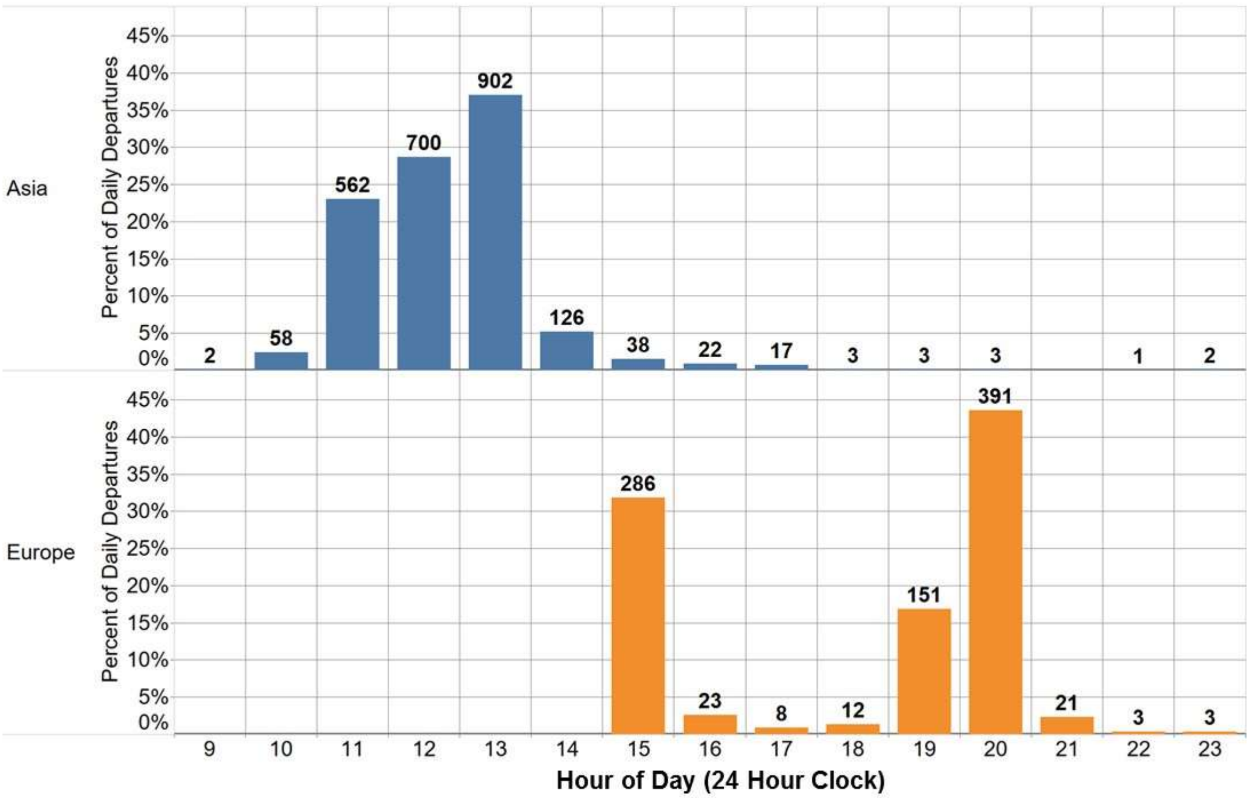
Figure 13: Hourly Departures by Stage Length (2013-2017)



Source: DIIO and Innovata Global Flight Schedules Calendar 2018

A more detailed analysis of transoceanic flights is depicted in **Figure 14**. Most Asia departures are concentrated in the 1100 to 1300 hours while Europe departures operate in the latter part of the day, starting in the 1500 hour with noticeable increases in the 1900 and 2000 hours.

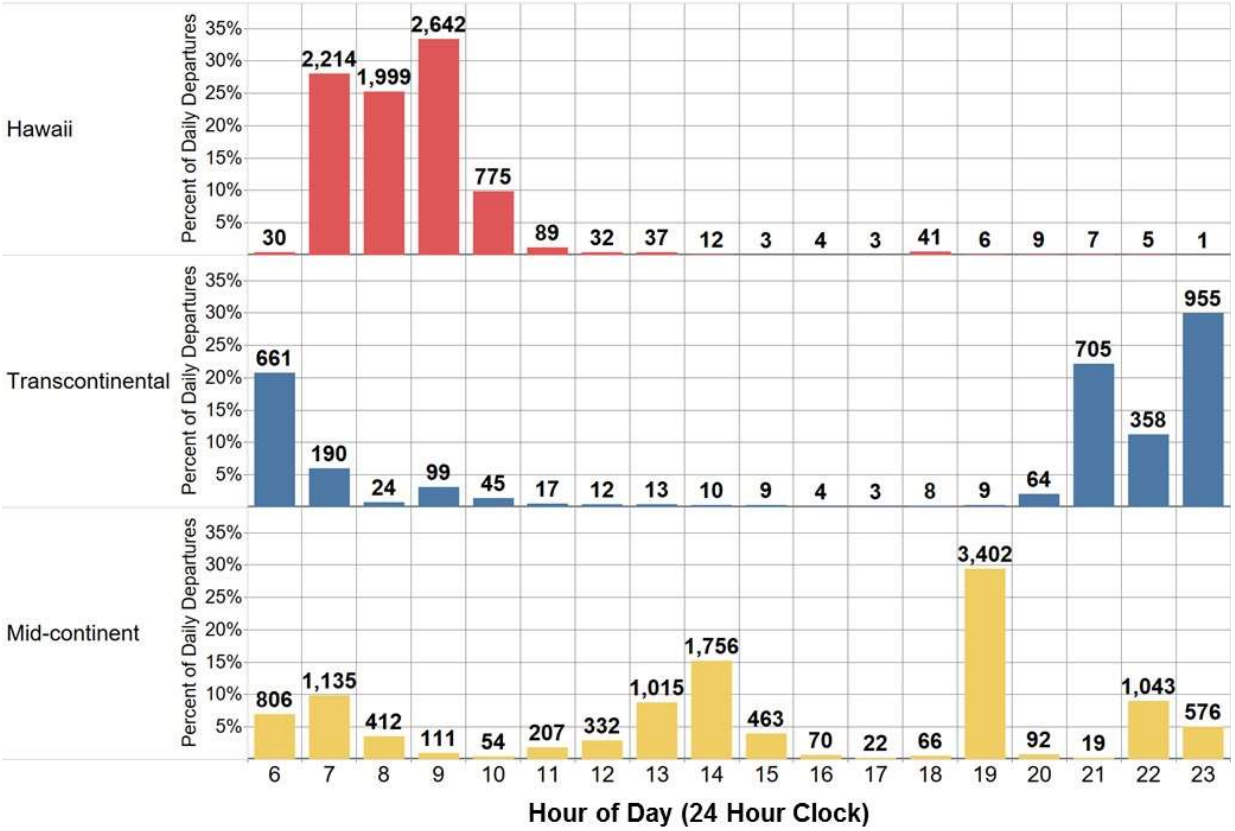
Figure 14: Departure Pattern by Stage Length



Source: Data: ANOMS (2013 – 2017), Figure: Landrum & Brown

Domestic departures also exhibit patterns based on the time of day. As depicted in **Figure 15**, Hawaii departures mostly depart between 0700 and 1000 hours, transcontinental departures mostly operate in the early morning or late evening (red-eye), and mid-continent departures operate with several peaks throughout the day. All flights are subject to the City of San Jose's airport curfew ordinance, which starts at 2330 and ends at 0630.

Figure 15: Departure Pattern by Stage Length



Source: Data: ANOMS (2013 – 2017), Figure: Landrum & Brown

Section 2: Bay Area Airport Service Area

The area served by SJC, including the City of San José and Santa Clara County, is a part of the San José-San Francisco-Oakland Combined Statistical Area (referred to herein as the Bay Area CSA). A CSA is the collection of two or more Metropolitan Statistical Areas. These metro or micro areas consist of one or more counties that have a high degree of social and economic integration. The Bay Area CSA, as defined by the U.S. Department of Commerce, Bureau of the Census, includes the 12 counties of Alameda, Contra Costa, Marin, Napa, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma.

There are three international commercial passenger service airports located in the Bay Area CSA: SJC, SFO and OAK. SJC is located less than three miles from Downtown San José and conveniently located within Silicon Valley. SFO is located 13 miles south of downtown San Francisco. OAK is located across the Bay from SFO. SJC and OAK are medium-hub airports and provide primarily short-and medium-haul domestic service. SFO is a large-hub airport, international gateway, and dominates long-haul domestic service. Because of the proximity of SJC, OAK, and SFO, it is essential to understand local socioeconomic trends in the broader regional context. Economic growth and activity stimulate a significant portion of passenger demand at all three airports. **Figure 16, Bay Area CSA**, graphically depicts the Bay Area CSA and the international commercial service airports within.

Figure 16: Bay Area CSA

Source: Landrum & Brown

Section 3: Economic Base of Air Travel

Potential travelers make air travel decisions based primarily on the following three factors: (1) availability of air service, (2) price, and (3) distance of an airport from point of local trip origin/destination. Air travelers will typically select the closest airport if all other selection factors are equal. Conversely, a better set of air service options at more competitive prices will cause travelers to select airports which are not necessarily the closest to where their trip begins or ends. Catchment area "leakage" occurs when passengers use an airport other than the most convenient airport (usually closest) to their trip origin.

This is the case at SJC where a significant portion of the passengers who begin or end their journeys in Silicon Valley. Alternate airports such as SFO and OAK are available for air service needs if unmet at SJC. SJC appeals to high-yield business traffic, being the closest airport to many companies in Silicon Valley. SJC can leverage this convenient location to attract many high-yield business travelers in the technology industry. However, if air service is not available, passengers may choose to utilize SFO and OAK for their travels. Likewise, if high-yield business travelers originate in or are destined for San Francisco, then SFO or OAK may be the easiest airport for those passengers. Additionally, SFO offers a high frequency of flights to key business markets, and OAK offers many low-cost alternatives.

It is attractive to high yield business travelers to have non-stop and long-haul flight opportunities. There are intrinsic links between the growth of aviation activity and economic growth. Growth in population, employment, personal income, and tourism typically lead to increased demand for air travel for both business and leisure purposes. An individual's demand for air travel is often referred to as "underlying demand" in that it cannot be realized without the presence of airline service at a price that results in the decision to fly rather than use other modes of transportation or not traveling. Because the Bay Area is densely populated and highly compensated, the demand for air travel is higher than the national average.

Future aviation activity at SJC and the Bay Area airports depend on a combination of trends in the airline industry, national and international economic conditions, and the socioeconomic conditions in the Bay Area. As the Bay Area is an influential global business location, as well as a vacation destination in the United States, changes in the broader U.S. economy and in the world economy have the potential to affect the number of passengers at SJC. An overview of the economic factors that generate underlying demand for air travel at SJC and within the Bay Area is provided below. Historical and forecast socioeconomic variables were obtained from Woods & Poole Economics, Inc., of Washington D.C. All economic variables are presented in constant dollars to eliminate any distortion in the data resulting from inflation.

Section 3A. Population

When the population base of an air service region increases, so does the passenger demand. The Bay Area CSA was ranked as the fifth most populated combined statistical area in the United States, and second most populated in California. The Bay Area CSA has shown steady population growth since 1990, at an average rate of 1.0% annually through 2017. In 2017, the Bay Area CSA had an estimated population of more than 8.8 million. The Bay Area CSA is expected to experience steady population growth over the planning horizon at a rate of 0.8% annually, on par with national expected growth, and slightly below expected growth in the State of California (see **Table 5, Population Trends**). Due to the positive population forecast in both the Bay Area and United States, it is expected demand will continue to be strong for the Bay Area Airports. Passengers will continue to make choices based on availability of air service, price, and distance from their origin/destination.

Table 5: Population Trends

POPULATION (IN THOUSANDS)			
YEAR	**BAY AREA CSA**	**CALIFORNIA**	**UNITED STATES**
1990	6,814	29,960	249,623
1995	7,168	31,697	266,278
2000	7,680	33,988	282,162
2005	7,781	35,828	295,517
2010	8,174	37,333	309,348
2015	8,686	38,994	320,899
2016	8,752	39,250	323,132
2017	8,827	39,619	325,888
2020	9,076	40,835	335,058
2025	9,503	42,930	350,937
2030	9,937	45,067	367,239
2035	10,349	47,125	382,998
2040	10,731	49,063	397,912
2045	11,090	50,911	412,256
2050	11,437	52,717	426,439
AAGR			
1990-2017	1.0%	1.0%	1.0%
2000-2017	0.8%	0.9%	0.9%
2017-2050	0.8%	0.9%	0.8%

Source: Woods & Poole 2018; Landrum & Brown

SJC serves a catchment population close to 4 million residents and thousands of Silicon Valley companies with global operations. Residents and visitors within this area can utilize SJC versus driving an hour or more to and from SFO or OAK Airports.

Section 3B. Employment

Growth in employment is an important indicator of the overall health of the local economy. Population changes and employment changes tend to be closely correlated as people migrate in and out of areas largely depending on their ability to find work in the local economy.

The San José area is home to some of the biggest tech giants in the world including Apple, Adobe, Cisco, Facebook, Google, Intel, Netflix, Hewlett Packard, and eBay. There are 105 companies within 18 miles of SJC worth $39.3 billion in capital expenditures, with $628 billion in global sales. As time savings is often correlated with money, businesses travelers often prefer non-stop routes, convenient flight schedules, and long-haul flight opportunities to capitalize on work productivity and personal life balance. SJC can leverage its convenient location to attract many high-yield business travelers in the technology industry. However, if long-haul/trans-oceanic direct routes are unavailable or discontinued, SJC catchment area passengers may decide to travel to SFO or OAK for these preferred routes, even though they may drive past SJC to get there.

Employment in the Bay Area CSA grew at the same rate as the State of California from 1990 through 2017, at an average annual growth rate (AAGR) of 1.3% (see **Table 6, Employment Trends**). Bay Area CSA employment is forecast to increase at an AAGR of 1.1% from 2017 through 2050, which is on par with expected growth for the United States, and slightly slower than the State of California.

Table 6: Employment Trends

EMPLOYMENT (IN THOUSANDS OF JOBS)			
YEAR	BAY AREA CSA	CALIFORNIA	UNITED STATES
1990	4,192	16,835	138,332
1995	4,296	16,940	147,917
2000	4,962	19,228	165,372
2005	4,772	20,147	172,557
2010	4,721	19,654	173,035
2015	5,598	22,701	190,423
2016	5,759	23,265	193,668
2017	5,921	24,019	198,990
2020	6,195	25,239	208,570
2025	6,651	27,180	223,254
2030	7,110	29,118	237,848
2035	7,536	30,915	251,572
2040	7,920	32,541	264,330
2045	8,275	34,066	276,751
2050	8,617	35,554	289,232
AAGR			
1990-2017	1.3%	1.3%	1.4%
2000-2017	1.0%	1.3%	1.1%
2017-2050	1.1%	1.2%	1.1%

Source: Woods & Poole 2018; Landrum & Brown

Section 3C. Personal Income

Income statistics are broad indicators of the relative earning power and wealth of the region and inferences can be made related to a resident's ability to purchase air travel. PCPI (per capita personal income) corresponds to the average income per inhabitant (total personal income divided by total population). As personal income increases, air travel becomes more affordable and can be used more frequently.

The Bay Area CSA PCPI is much higher than the United States and State of California. Between 1990 and 2017, PCPI for the Bay Area CSA area had increased at an average annual rate of 2.4%, significantly higher than the State of California and the United States. The Bay Area CSA is expected to increase 0.8% annually from 2017-2050 in line with the State of California expected growth, and slightly below the United States. **Table 7, Personal Income Per Capita Trends**, displays the historical and forecast PCPI trends. It is expected that air carriers will continue to increase markets and air service operations to the Bay Area, as the local and national economies continues to flourish.

Table 7: Personal Income Per Capita Trends

PCPI (IN 2009 DOLLARS)			
YEAR	BAY AREA CSA	CALIFORNIA	UNITED STATES
1990	36,894	31,872	29,050
1995	39,561	32,211	30,867
2000	55,395	39,811	36,812
2005	54,993	42,836	38,916
2010	54,469	42,612	39,622
2015	67,562	49,979	44,255
2016	69,490	50,884	44,450
2017	70,273	51,737	45,335
2020	72,914	53,853	47,348
2025	76,781	56,849	50,233
2030	80,447	59,574	52,882
2035	83,583	61,732	55,039
2040	86,409	63,556	56,946
2045	89,106	65,272	58,828
2050	92,064	67,223	61,015
AAGR			
1990-2017	2.4%	1.8%	1.7%
2000-2017	1.4%	1.6%	1.2%
2017-2050	0.8%	0.8%	0.9%

Source: Woods & Poole 2018; Landrum & Brown

Section 3D. Tourism

SJC is a gateway to some of California's leading tourist destinations, including Big Sur, Carmel, Monterey, Pebble Beach, Santa Cruz, and Yosemite National Park. Many cultural, entertainment, and site seeing opportunities are also available in the Bay Area. Visitors to the region likely make their air travel decisions similar to the local catchment area passengers, basing airport choice on availability of air service, price, and distance from their origin/destination.

Section 4: Benefits of SJC, SFO and OAK

Section 4A. Benefits of SJC

Based on a 2013-14 Economic Impact Study at SJC: 57% of SJC passengers were visitors (41% for business vs. 59% leisure), while the remaining 43% of passengers were residents (38% for business vs. 62% leisure). If traveling within Silicon Valley or the San José region, flying to SJC is most convenient. SJC is assessible by various rail and transit networks and has an easily navigated airport layout. SJC has also had historically less flight delays than SFO and OAK.

SJC has been actively adding new air service. In San José, city officials spent years courting a direct flight to Asia, something Silicon Valley businesses had been highly desired. They worked with business leaders to assure airlines that there was pent up demand for new routes. All Nippon Airways launched a direct flight to Japan in 2013 on the new 787 Dreamliner. A wave of other flights quickly followed, including other trans-pacific flights and other trans-oceanic flights to Europe (Frankfurt and London), opening flight connections across both the Pacific and Atlantic Oceans.

In five years, SJC went from 29 domestic and 2 international destinations in 2012 to 42 domestic and 11 international destinations including long-haul markets to Asia (Tokyo, Beijing, and Shanghai), European markets (Frankfurt and London), and Transborder (Los Cabos, Guadalajara, Zacatecas, Morelia, Mexico City. Leon, Los Cabos, and Vancouver) in 2018. Passengers are expected to increase over 15% from 2017 to 2018. During this period, many new markets have been added at the Airport. In 2018, Delta and Alaska Airlines added transcontinental service to New York, John F Kennedy Airport, in addition to JetBlue. Low-cost Frontier Airlines, which started flying out of SJC last fall with new service to Denver and Las Vegas, has targeted the airport for expansion this year, including service to the east including Cincinnati, Austin, San Antonio, Atlanta, and Tulsa. Southwest has been actively adding flights in 2018, with the addition of 80 more flights per week since 2017, including new non-stop service to eight cities and more frequencies on existing routes, and its first-ever international service from the airport (Cabo San Lucas, Mexico). Southwest has also had an aggressive expansion to Hawaii from SJC, developing a significant market share in leisure markets to Honolulu, Kahului, Kona, and Lihue.

Section 4B. Benefits of SFO and OAK

Residents and visitors traveling to/from downtown San Francisco and Oakland have closer proximity to SFO/OAK than SJC. It is sensible to assume that passengers traveling from counties north of San Francisco and Oakland, including Sonoma, Napa, and Solano would utilize SFO or OAK instead of passing the airport and heading south to SJC.

SFO is an international gateway airport and is the only airport in the Bay Area CSA and Northern California with substantial international service (48 international destinations) and connecting traffic, as well as domestic non-stop service to 83 destinations. SFO has the most international service compared to the other Bay Area airports. Due to United's hub at SFO, there is much more high-yield business traffic with many flight frequencies. United has increased its capacity at SFO in recent years versus capacity reductions at its other hub airports such as Newark and Chicago.

In July 2018, OAK had non-stop direct service to 54 domestic and 14 international destinations. OAK added a significant amount of international traffic over the past few years including transatlantic service to Barcelona, Copenhagen, London-Gatwick, Azores, Paris, Oslo, Stockholm and Rome, as well as transborder flights to Mexico including Mexico City, Guanajuato, Guadalajara, Morelia, Los Cabos, and Puerto Vallarta. OAK also has significant Southwest Airlines domestic connectivity to 34 markets in 2018, including recent additional daily service added to five highly sought destinations from the East Bay: Newark, San Antonio, Orlando, Minneapolis, and Indianapolis.

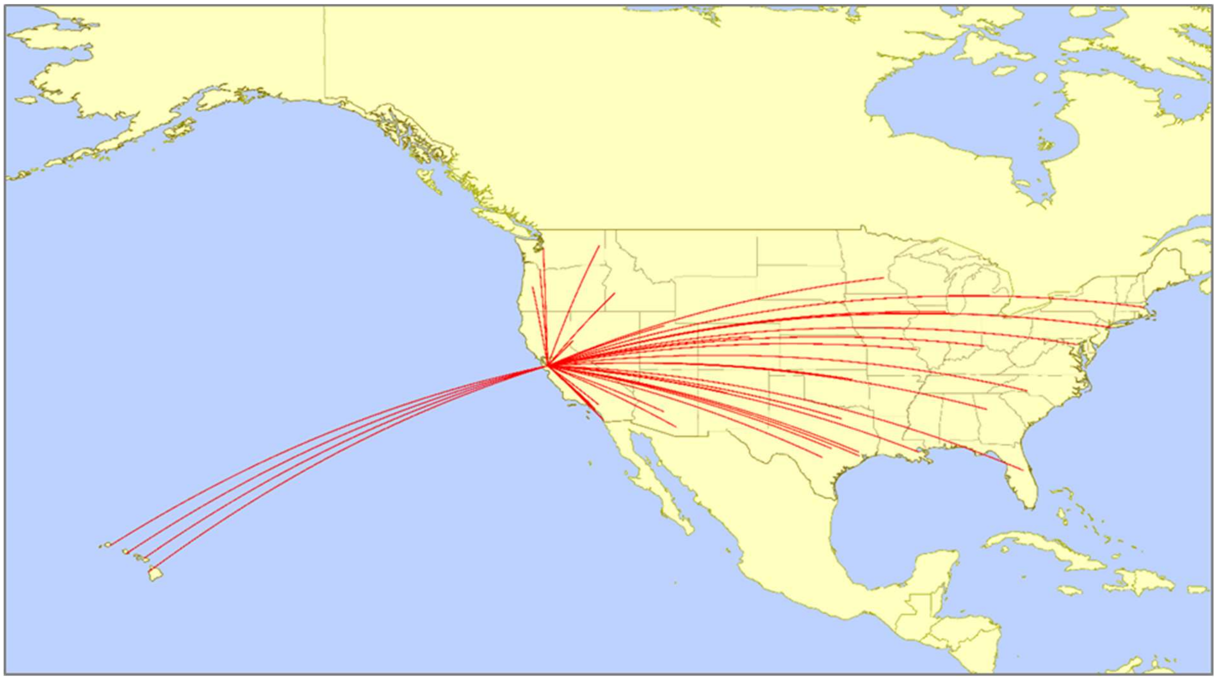
Section 5: Bay Area Airports Air Service

Section 5A. SJC Air Service

In 2017, SJC served approximately 12.5 million passengers, of which 11.6 million were domestic and 900 thousand were international. During this time, 93% of total activity was origin & destination (O&D) passengers with the remaining 7% as connecting passengers. As of July 2018, it is the second busiest airport in the bay area.

In July 2018, SJC provided service to 42 domestic destinations (see **Figure 17, SJC Domestic Routes (July 2018)**) with 182 average daily domestic departures, with an average distance of 702 nm. It also provided service to 11 international destinations including long-haul markets to Asia (Tokyo, Beijing, and Shanghai), European markets (Frankfurt and London), and Transborder (Los Cabos, Guadalajara, Zacatecas, Morelia, Mexico City, Leon, and Vancouver) (see **Figure 18, SJC International Routes (July 2018)**) with 12 average daily international departures (includes Asia, Mexico, and Europe), which had an average distance of 2,241 nm.

Figure 17: SJC Domestic Routes (July 2018)



Source: Official Airline Guide; Landrum & Brown

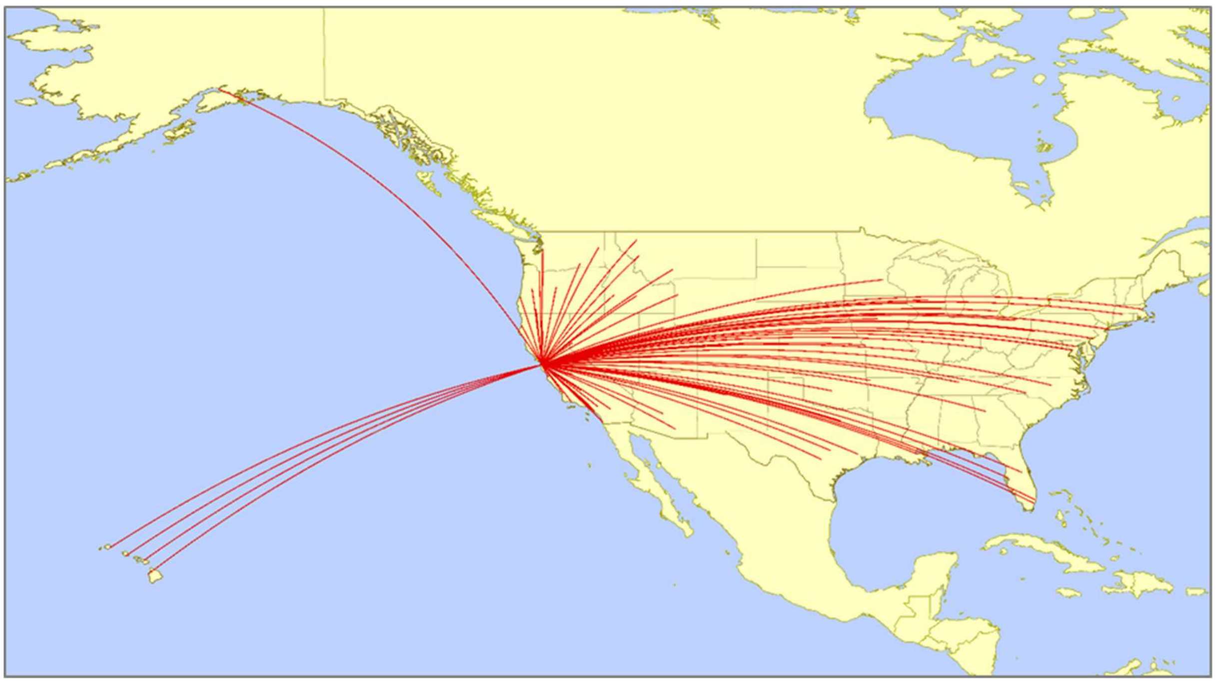
Figure 18: SJC International Routes (July 2018)

Source: Official Airline Guide; Landrum & Brown

Section 5B. SFO Air Service

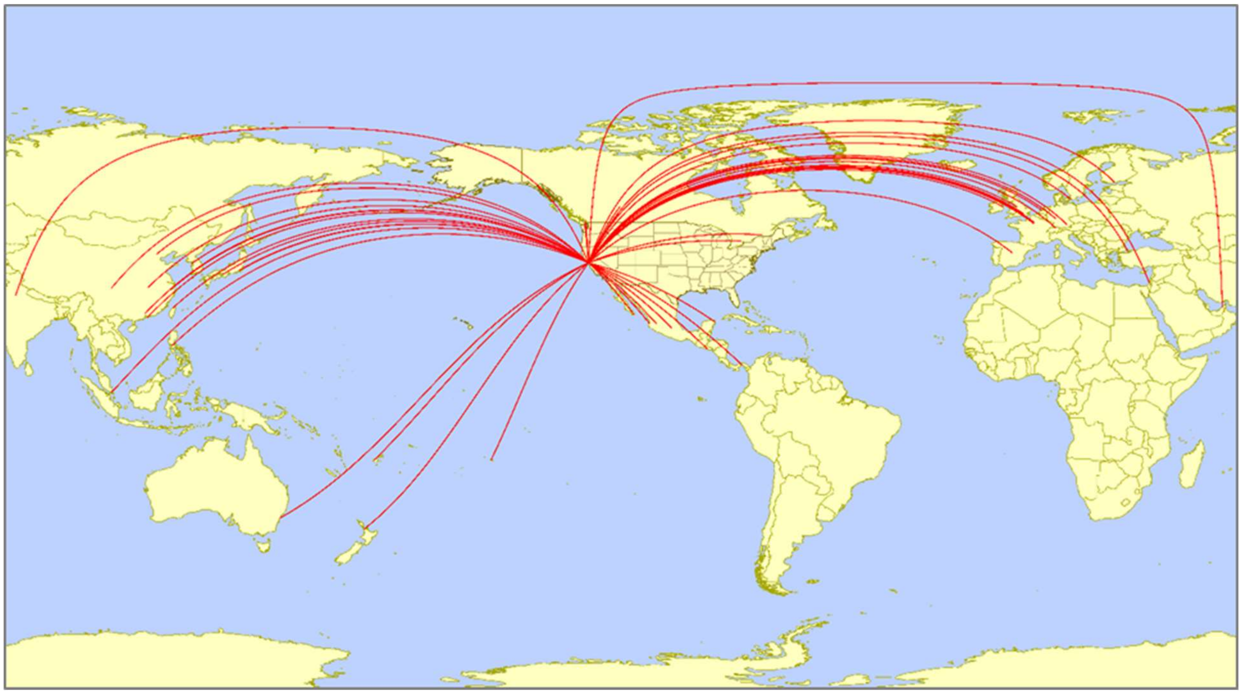
In 2017, SFO served approximately 55.8 million passengers, of which 42.4 million were domestic and 13.4 million were international. During this time, 75% of total activity was O&D passengers. In July 2018, SFO provided service to 83 domestic destinations (see **Figure 19, SFO Domestic Routes (July 2018)**) with 527 average daily domestic departures, with an average distance of 1.060 nm. It also provided service to 48 international destinations (see **Figure 20, SFO International Routes (July 2018)**) with 107 average daily international departures (as an international gateway), which had an average distance of 3.643 nm.

Figure 19: SFO Domestic Routes (July 2018)



Source: Official Airline Guide; Landrum & Brown

Figure 20: SFO International Routes (July 2018)

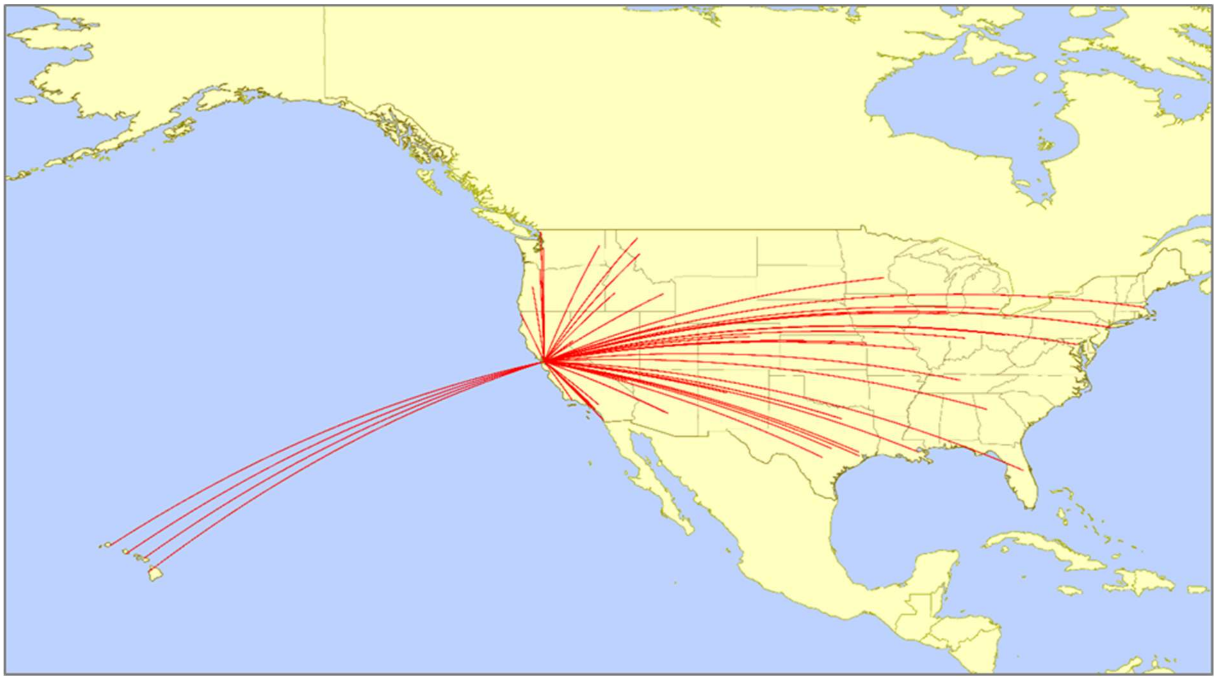


Source: Official Airline Guide; Landrum & Brown

Section 5C. OAK Air Service

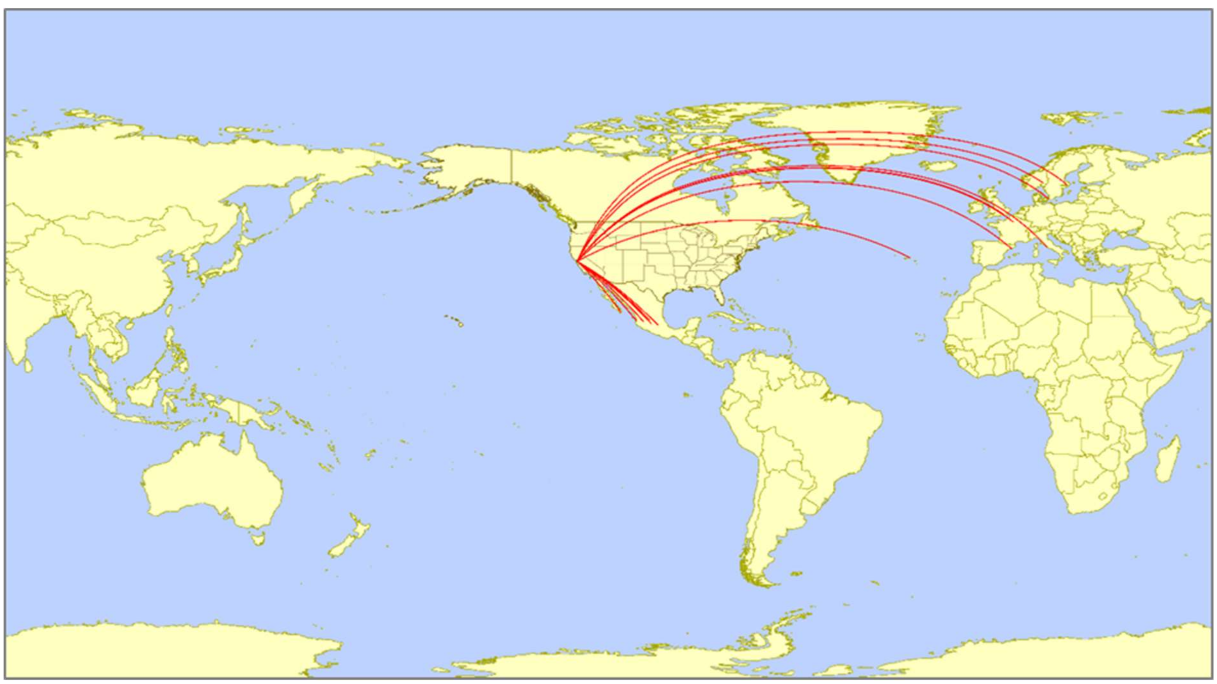
In 2017, OAK served approximately 13.0 million passengers, of which 12.3 million were domestic and 700 thousand were international (almost double from the previous year, 400 thousand). During this time, 89% of total activity was O&D passengers. In July 2018, OAK provided service to 54 domestic destinations (see **Figure 21, OAK Domestic Routes (July 2018)**) with 171 average daily domestic departures, with an average distance of 687 nm. It also provided service to 14 international destinations (see **Figure 22, OAK International Routes (July 2018))** with 9 average daily international departures (focused on Mexico and Europe), which had an average distance of 3,020 nm. OAK has an easily navigated layout with less airline competition than SFO yet offers competitive travel costs.

Figure 21: OAK Domestic Routes (July 2018)



Source: Official Airline Guide; Landrum & Brown

Figure 22: OAK International Routes (July 2018)

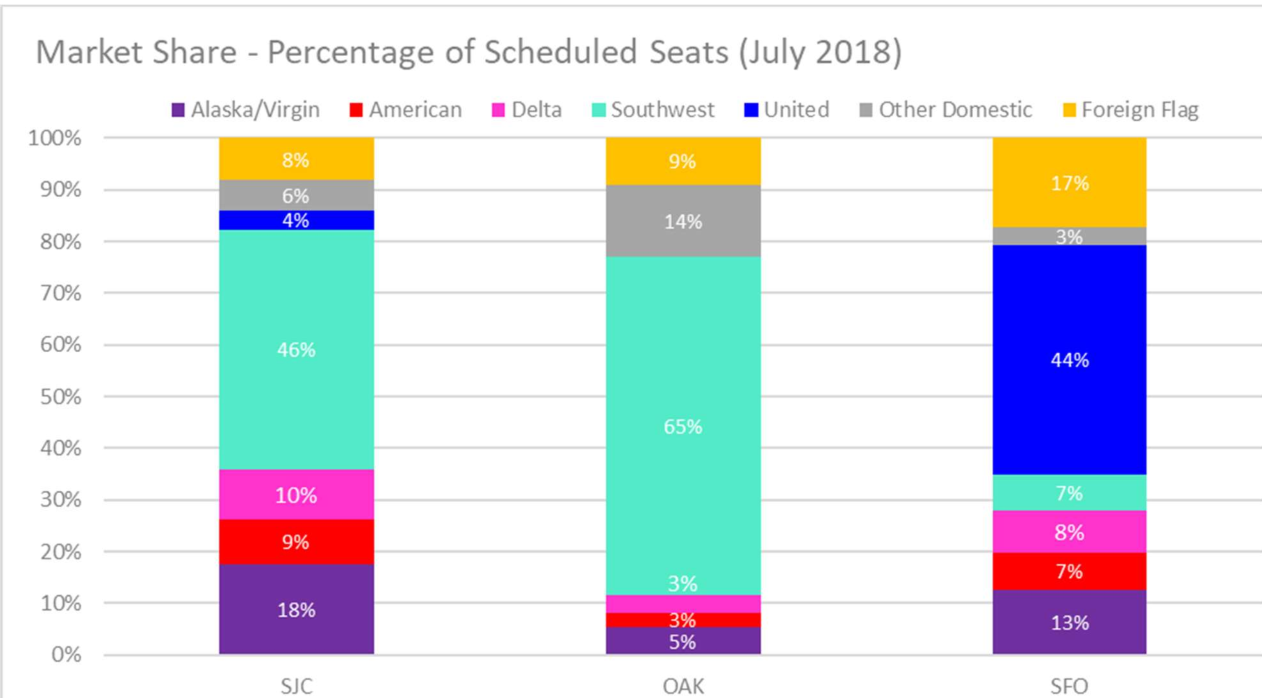


Source: Official Airline Guide; Landrum & Brown

Section 6: Bay Area Market Share

Figure 23, Bay Area – Percentage of Scheduled Seats (July 2018) displays the percentage of scheduled seats by carrier at each Bay Area airport. In July 2018, Southwest Airlines was the primary carrier at SJC (46% of total seats) with a steadily increasing Alaska Airlines market share (18%) and increasing foreign flag carrier presence (8%). United Airlines utilizes SFO as one of its hub airports and is the primary carrier at the airport (44% of total seats). This activity generates network connectivity and high yield business traffic. Alaska Airlines (13% of total seats) operates a mini-hub at SFO and foreign flag carriers have a large presence (17%) due to being an international gateway. OAK is a focus city for Southwest Airlines (65% of total seats in July 2018). OAK also had an increasing amount of foreign flag of seats (9%).

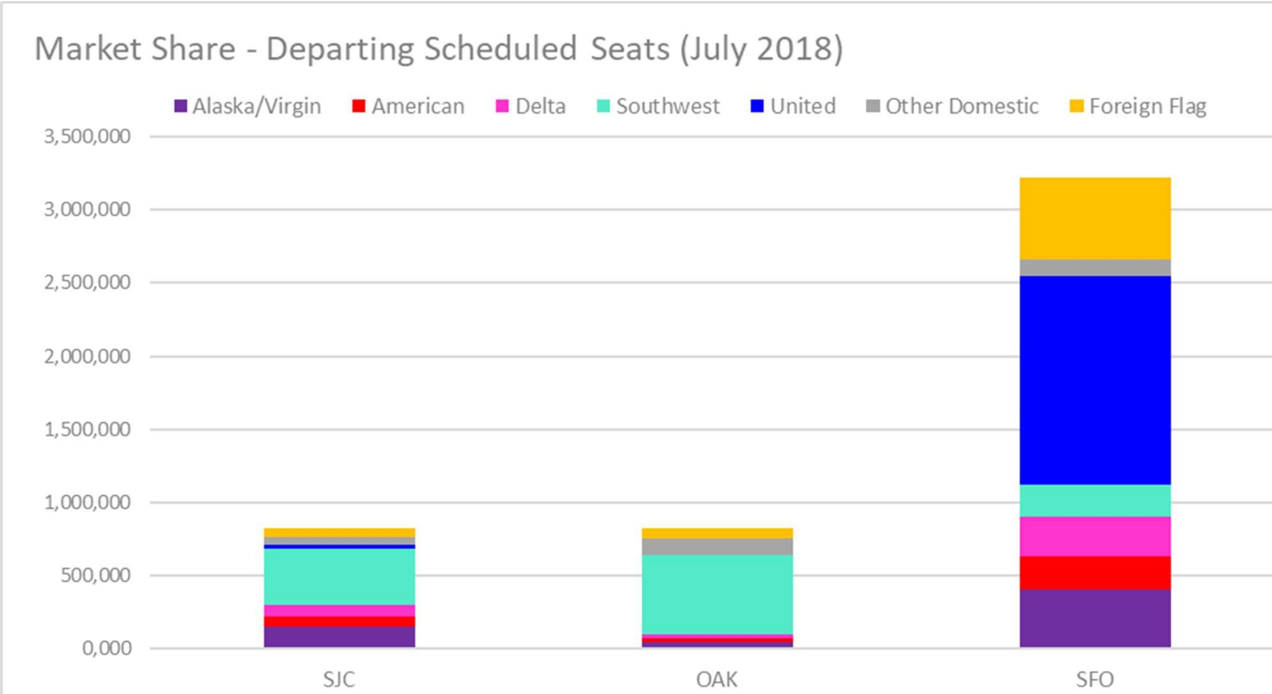
Figure 23: Bay Area – Percentage of Scheduled Seats (July 2018)



Source: Official Airline Guide; Landrum & Brown)

Figure 24, Bay Area – Departing Scheduled Seats (July 2018) displays total departing scheduled seats by carrier at each Bay Area airport. In July 2018, the primary carrier at SJC, Southwest, scheduled approximately 383,200 departing seats, followed by 145,500 departing seats scheduled by Alaska. SJC foreign flag scheduled departing seats in July 2018 were 68,000. United Airlines, the primary carrier at SFO had approximately 1,427,400 scheduled departing seats in July 2018, followed by Alaska, the second largest carrier, with approximately 407,300 scheduled departing seats. During the same period, foreign flag scheduled departing seats at SFO were approximately 560,700. Southwest, the primary carrier at OAK, had scheduled approximately 540,200 departing seats in July 2018. During the same period, foreign flag scheduled departing seats at OAK were 75,100.

Figure 24: Bay Area – Departing Scheduled Seats (July 2018)



Source: Official Airline Guide; Landrum & Brown

Section 7: Airline Operations

The Bay Area airports generally operate as a system with all airports predominantly operating in the west flow. However, each airport may individually transition to the southeast flow when winds dictate such a change. These southeast winds most often occur during the winter season, but they can appear at other times of year.

In addition to runway configurations, flight procedures at each airport are designed in such a manner to ensure vertical and lateral separation between traffic flows. These types of restrictions optimize use of the available airspace while allowing each airport to maximize throughput.

In irregular operations, the airports depend on each other to accommodate flight diversions. Among the Bay Area airports, SFO is most prone to weather-related delays, a result of its closely-spaced parallel runways. In these instances, arriving aircraft are often guided into hold patterns. Excessive delays in a hold pattern may necessitate a diversion to another airport for refueling, and these diverted flights often use SJC and OAK as their alternate airports.

In another example of this close relationship among Bay Area airports, it was recently reported that Alaska Airlines is experimenting with a new operational adjustment where SFO-bound flights could purposefully be re-routed to OAK or SJC to avoid lengthy delays. Instead of a delayed departure from another airport (bound for SFO), the flight could depart on-time but destined for OAK or SJC instead. Upon arrival in OAK or SJC, passengers would be transferred to SFO via pre-arranged ground transportation. Meanwhile, with the aircraft positioned at either OAK or SJC, the subsequent departure would also depart from either OAK or SJC and departing passengers would be transported from SFO to either one of the other airports. This strategy demonstrates how airlines can leverage the proximity of each airport to manage operations and mitigate delays.

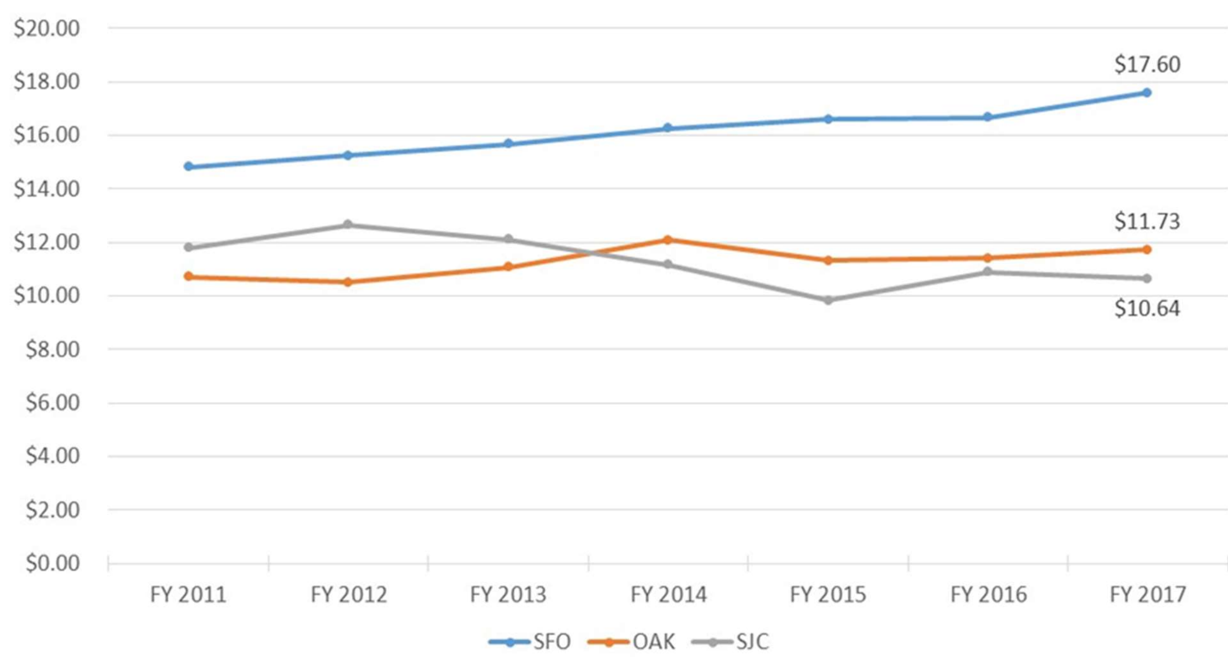
Section 8: Cost of Doing Business

To evaluate the cost of doing business at each Bay Area airport, it was necessary to study the cost per enplanement (CPE) for each airport. CPE is an industry standard in determining average costs for an airline to operate at a particular airport. Per the Certification Activity Tracking System (CATS) website of the Federal Aviation Administration (FAA), the following costs were summed and included in calculating CPE:

- Passenger airline landing fees
- Terminal arrival fees, rents, and utilities
- Terminal area apron charges/tiedowns
- Federal Inspection Fees
- Other passenger aeronautical fees

These costs, coupled with enplanement data, were used in determining CPE. Among the Bay Area airports, SFO has always had the highest CPE while OAK and SJC have had lower and fairly comparable CPEs. In the 2017 fiscal year, SJC had the lowest CPE of $10.64 (of all Bay Area airports). Meanwhile, SFO had the highest CPE of $17.60. **Figure 25, CPE Comparison** displays historical passenger airline CPE from FY 2011-2017 at the Bay Area airports.

Figure 25: CPE Comparison



Source: Compliance Activity Tracking System (CATS), Federal Aviation Administration, cats.airports.faa.gov; Landrum & Brown

Section 9: Advantage and Disadvantages of the Bay Area Airports

Each airport has unique characteristics that may be classified as advantages or disadvantages for passengers and airlines. These characteristics are diverse and include a variety of features such as airline competition, facilities, destinations served, congestion, and weather patterns.

SJC:

Advantages

- Lower operating costs: As discussed in the CPE comparison, SJC has the lowest costs among all Bay Area airports.
- Fewer airlines – less competition to many markets: Airlines at SJC often face less competition when compared to operating at busier airports such as SFO.
- Appeals to high-yield business traffic in Silicon Valley: SJC is the closest airport to many companies in Silicon Valley. The airport can leverage this convenient location to attract many high-yield business travelers in the technology industry.
- Few delays: Unlike SFO, SJC has a simple runway layout and favorable weather conditions that do not affect flight operations, thus resulting in few delays.
- Positive passenger experience with less traffic and simple airport layout: Compared to SFO, SJC offers a simple airport layout, less congestion, and easy curbside access.

Disadvantages

- Does not attract San Francisco travelers: Given SJC's location, which is 45 miles south of San Francisco, it is difficult for the airport to attract travelers who are originating in or destined for San Francisco. The airport's primary catchment area is the South Bay.
- Fewer destinations and flight frequencies as that of SFO: SJC has fewer flights and destinations when compared to SFO, especially with respect to international and transcontinental flights. Although SJC may be more conveniently located for some travelers, those travelers may choose SFO for long haul flights.
- Curfew restrictions: SJC observes a noise-based curfew program between the hours of 23:30 and 06:30. This curfew could affect international or transcontinental flights that would otherwise operate in the late night or early morning hours. In contrast, SFO has several international and transcontinental flights that operate around 01:00 and 06:00, respectively.

SFO:

Advantages

- Prestige of operating at the region's primary airport: SFO has the distinction of serving the region's largest market, San Francisco. Therefore, many airlines prioritize service to this airport over the region's smaller airports.
- Appeals to high-yield business traffic with proximity to SF and many flight frequencies: Many high-yield business travelers originate in or are destined for San Francisco, and SFO is the easiest gateway airport for those passengers. Additionally, the airport offers a high frequency of flights to key business markets.

- Robust facilities that accommodate all aircraft types and many passengers: SFO has a variety of facilities that can accommodate all types of aircraft and large volumes of passengers. In this regard, the airport is more capable than its Bay Area counterparts are.
- Connections to many destinations: SFO has flights to the most destinations of any Bay Area airport.
- CBP operating hours: CBP is staffed for most hours of the day at SFO, which enables international flights to operate at many hours. In contrast, SJC and OAK only have CBP staffing at specific hours, which may limit the addition of new international flights.

Disadvantages

- Higher operating costs: As discussed, SFO has the highest CPE of all Bay Area airports (by a wide margin).
- Competition from dominant United hub and smaller Alaska hub (previously Virgin America): New airlines that start service and existing airlines that want to add service at SFO face stiff competition from United's dominant hub and Alaska's smaller yet still significant hub. These two carriers provide significant challenges for other airlines.
- Prone to weather-related delays: Unlike SJC and OAK, SFO is susceptible to significant weather-related delays because of its closely spaced parallel runways and frequent low ceilings. These delays result in significant operational challenges that compromise airline schedule integrity.

<u>OAK:</u>

Advantages

- Lower operating costs: OAK's operating cost is significantly lower than that of SFO and comparable (albeit slightly higher) than that of SJC.
- Fewer airlines – less competition to many markets: With fewer airlines and flights compared to SFO, airlines at OAK generally face less competition on a given route. However, airlines often encounter competition from Southwest, which is the dominant carrier at OAK.
- Appeals to San Francisco travelers: Although OAK is located in the East Bay, it still attracts many travelers who are originating in or destined for San Francisco. Additionally, BART provides convenient public transportation to downtown San Francisco from OAK.
- Few delays: With one air carrier runway and a modest flight schedule, OAK rarely experiences delays.
- Positive passenger experience with less traffic and simple airport layout: OAK has a simple airport layout that is comprised of just two terminals and easy curbside access for passengers.

Disadvantages

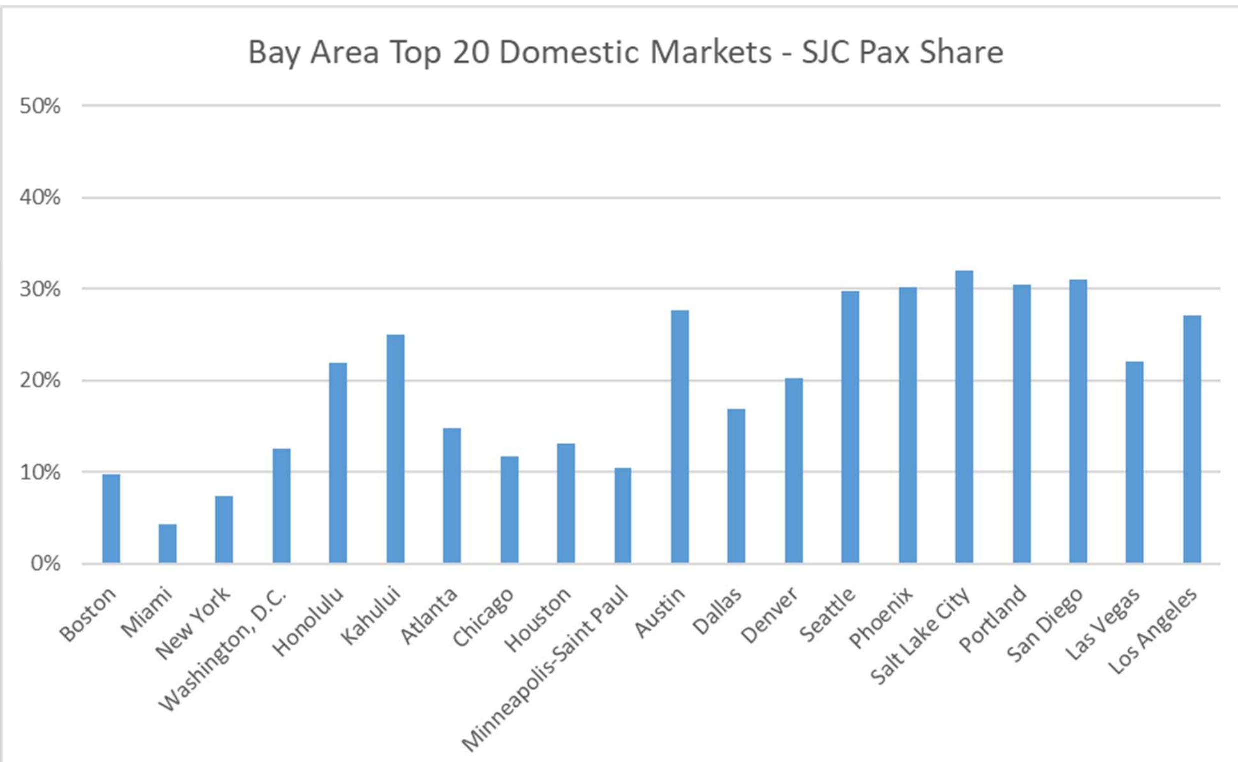
- Competition from dominant Southwest hub and sizable operations from other low-cost carriers: Carriers at OAK often face competition from Southwest's dominant hub. Depending on routes and services, Southwest can be a formidable opponent when establishing new routes for existing carriers or adding new carriers. There is also a significant presence of ultra-low-cost carriers with Allegiant and Spirit.
- Facilities: Unlike Terminal 2, Terminal 1 does not provide a competitive level of service.
- Fewer destinations and flight frequencies as that of SFO: When compared with SFO, OAK has fewer destinations and flights.

Section 10: Regional Competition

To study SJC's role among the Bay Area airports, it is important to evaluate the airport's passenger share among the Bay Area's busiest markets. The airport primarily serves shorter routes and accommodates an average of 27% of the Bay Area passengers on these routes. Example destinations include Los Angeles, Las Vegas, and San Diego. However, SJC's passenger share falls to an average of just 13% on longer domestic routes such as Chicago, New York, and Boston. While the airport does not have as much passenger share in domestic long-haul markets, it does have a significant market share in leisure markets to Hawaii (Honolulu and Kahului). In the Bay Area's top 20 international markets, SJC averages just 10% of the passenger share with the notable exception of Guadalajara, which has substantial service from SJC.

Figure 26, Top Bay Area O&D Domestic Markets displays SJC's passenger share in the top 20 Bay Area domestic O&D markets.

Figure 26: Top Bay Area Domestic O&D Markets



Miami: FLL, MIA; New York: EWR, JFK, LGA; Washington, D.C.: BWI, DCA, IAD; Chicago: MDW, ORD; Houston: HOU, IAH; Dallas: DAL, DFW; Los Angeles: BUR, LAX, LGB, ONT, SNA. Destinations sorted in descending order by distance from the Bay Area. "Shorter" Haul defined as destinations less than 1,500 miles from the Bay Area.
Sources: U.S. DOT, Air Passenger Origin-Destination Survey, 2017 data

Figure 27, Top Bay Area O&D International Markets displays SJC's passenger share in the top 20 Bay Area international O&D markets.

Figure 27: Top Bay Area O&D International Markets

London: LGW, LHR; Tokyo: HND, NRT.
Destinations sorted in descending order by distance from the Bay Area.
Sources: U.S. DOT, Air Passenger Origin-Destination Survey, 2017 data

Aviation Planning at the Leading Edge

TO: JUDY ROSS, ASSISTANT DIRECTOR, MINETA SAN JOSÉ INTERNATIONAL AIRPORT

FROM: LANDRUM & BROWN, INC.

DATE: FEBRUARY 19, 2019

RE: DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY (PROJECT DADCS) AIRSPACE SCENARIOS AND AIRCRAFT PERFORMANCE ASSESSMENT

DRAFT WORK PRODUCT

Introduction

In 2007, the Airspace Obstruction Study with the associated composite mapping assessment was conducted for Norman Y. Mineta San José International Airport (SJC or Airport). In this analysis, airspace protection surfaces were evaluated to determine the lowest controlling obstacles that surround the Airport within a 3-mile radius, and to map out a proposed set of maximum allowable heights for development surrounding SJC based on the most restrictive airline one-engine inoperative (OEI) procedure surfaces and Federal Aviation Administration (FAA) "TERPS" surfaces (arrival and departure instrument procedures).

A decade has passed since the previous assessment was conducted, and changes in the Airport operating environment have occurred, including the following:

a. The FAA implemented satellite-based navigation along with existing ground-based navigation. Specifically, the implementation of RNP procedures since 2007 as these are technically the newest satellite-based procedures that have been developed.
b. New aircraft came into San Jose which among them included the Boeing 787-8/9 and Airbus 321-NEO and Airbus has introduced the A350 into worldwide service.
c. This study focused was very specific to SJC, the area south of the airport, the aircraft and markets served
d. The Airport recently completed new obstacle data survey in late 2016.

Table 1 depicts the existing commercial airlines that currently operate at SJC. **Table 2** provides a summary of the existing markets that are currently served from SJC.

The new study, initiated in early 2018, is intended to update and reassess the current airspace protection surfaces for SJC and to identify potential changes to maximum allowable development heights, particularly in Downtown Core of San José and the Diridon Station Area immediately to the west of the Downtown Core. At the conclusion of the study, a newly updated composite airspace protection map for SJC will be developed for use by the City of San José.

Table 1: Existing Passenger Commercial Airlines at SJC

Existing Commercial Airlines	
Aeromexico	Frontier Airlines
Air Canada	Hainan Airlines
Alaska	Hawaiian Airlines
American Airlines	JetBlue
ANA	Lufthansa
British Airways	Southwest
California Pacific	United
Delta	Volaris

Source: www.flysjc.com/airlines

Table 2: Existing Markets Served at SJC

City	Country	City	Country
Albuquerque	United States	London-Heathrow	Europe
Atlanta	United States	Long Beach	United States
Austin	United States	Los Angeles	United States
Baltimore/Washington	United States	Minneapolis-St. Paul	United States
Beijing	China	Morelia	Mexico
Boise	United States	Nashville	United States
Boston	United States	New Orleans (Seasonal)	United States
Burbank	United States	New York-JFK	United States
Cabo San Lucas	United States	Newark (New York Area)	United States
Chicago-Midway	United States	Ontario	United States
Chicago-O'Hare	United States	Orange County	United States
Dallas/Fort Worth	United States	Orlando	United States
Dallas-Love Field	United States	Phoenix	United States
Denver	United States	Portland	United States
Detroit	United States	Raleigh/Durham	United States
El Paso	United States	Reno	United States
Everett (Seattle Area)	United States	Salt Lake City	United States
Guadalajara	Mexico	San Diego	United States
Honolulu	United States (Hawaii)	Seattle	United States
Houston-Hobby	United States	Spokane	United States
Houston-Intercontinental	United States	St. Louis	United States
Kahului (Maui)	United States (Hawaii)	Tokyo-Narita	China
Kona (Hawaii)	United States (Hawaii)	Tucson	United States
Las Vegas	United States	Vancouver	Canada
León	Mexico	Zacatecas	Mexico
Lihue (Kauai)	United States (Hawaii)		

Source: www.flysjc.com/destinations

Below are commonly used acronyms in this memorandum:

- AGL: Above Ground Level (feet).
- CG: Climb Gradient
- FAA: Federal Aviation Administration
- ICAO: International Civil Aviation Organization
- MSL: Mean Sea Level (feet)
- OEI: One-Engine Inoperative
- OCS: Obstacle Clearance Surface
- PAX: Passenger
- Project DADCS: Downtown San José Airspace and Development Capacity Study
- Project Consultants': Landrum & Brown Inc. and Flight Engineering LLC.
- TERPS: United States Terminal Instrument Procedures
- SJC: Norman Y. Mineta San José International Airport

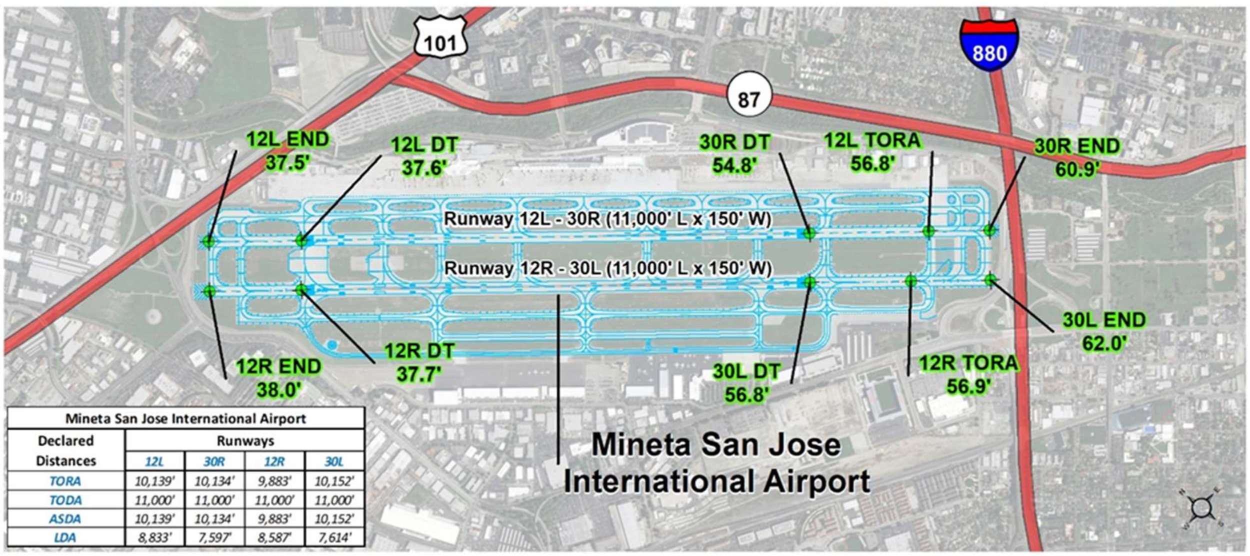
Table of Contents

Section 1: Airport and Project Study Area Overview

Section 1A. Airport Layout Overview

Figure 1 depicts the existing airport layout for SJC. The Airport is currently served by two closely-spaced parallel runways. Runways 12L-30R and 12R-30L are both 11,000 feet long and 150 feet wide. Runway 12R-30L is classified as a precision instrument runway (PIR) with CAT I and II instrument landing system capabilities. Runway 12L-30R is classified as a non-precision instrument (NPI) runway and does not accommodate instrument landing system operations. A temporarily closed runway, 11-29, was previously used for general aviation operations on the west side of the Airport but is currently operated as Taxiway W1. A separate independent study is evaluating the permanent disposition of this runway. Current declared distances for the two existing runways is depicted in the inset table on Figure 1. Please note that all elevations are measured in feet (ex. 37.5').

Figure 1: Mineta San José International Airport (SJC) Layout



Mineta San Jose International Airport				
Declared Distances	Runways			
	12L	30R	12R	30L
TORA	10,139'	10,134'	9,883'	10,152'
TODA	11,000'	11,000'	11,000'	11,000'
ASDA	10,139'	10,134'	9,883'	10,152'
LDA	8,833'	7,597'	8,587'	7,614'

Source: Landrum & Brown

Section 1B. Project Study Area Overview

Figure 2 depicts the two study areas for Project DADCS, consisting of the Downtown Core and Diridon Station Area. The Downtown Core is located east of Highway 87 and begins approximately 7,200 feet from the approach ends of Runways 30L and 30R and extends to a distance of approximately 13,100 feet from Runways 30L and 30R. The Downtown Core is where high-rise development is most prevalent.

The Diridon Station Area is located west of Highway 87 and begins approximately 5,300 feet from the approach end of Runways 30L and 30R and extends to a distance of approximately 11,200 feet from the runway ends. The Diridon Station Area is currently devoid of high-rise development but is considered to be part of a future expanded downtown given the multiple existing and proposed rail and transit systems serving Diridon Station.

The 2007 Airspace Obstruction Study found that most airlines operating at SJC use OEI procedures that go straight out over the Downtown Core when departing to the south. A few airlines, however, including those with larger aircraft going to more distant destinations, use OEI procedures that curve away from the Downtown Core in order to avoid the existing high-rise buildings and instead overfly the Diridon Station Area where existing development heights are much lower. As described further in

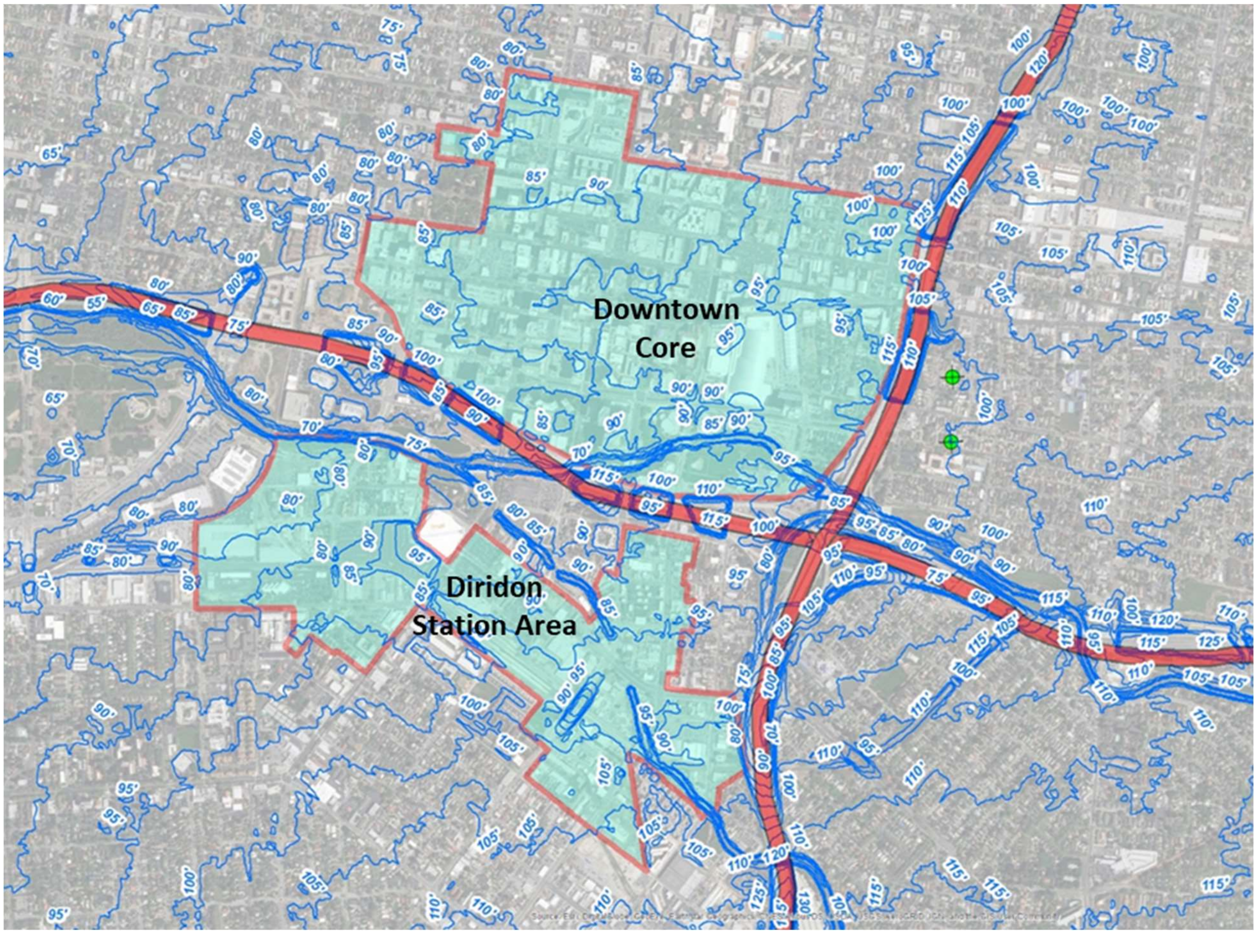
Section 3 of this memorandum, protecting for this westerly curving maneuver by larger/heavier aircraft in an OEI situation results in maximum allowable development heights that are much more restrictive than in the Downtown Core.

Figure 2: Existing Airport Layout and Study Evaluation Area

Source: Landrum & Brown

As depicted in **Figure 3,** ground elevations in the Downtown Core and Diridon Station Area generally range from 80 feet MSL to 105 feet MSL in a northerly to southerly direction. As development heights are typically expressed in AGL, setting a maximum allowable building height for airspace protection purposes at any given location is derived by subtracting the ground MSL elevation from the airspace surface MSL elevation.

Figure 3: Downtown Core and Diridon Station Area Ground Contour Elevations



Source: Graphic prepared by Landrum & Brown. USGS 1/3 arc-second Contour Downloadable Data Collection, 2014; Ground contour data obtained from USGC "The National Map" Staged Products Directory: https://prd-tnm.s3.amazonaws.com/index.html?prefix=StagedProducts/Contours/Shape/

Section 2: Airspace Protection Framework

A Project Steering Committee was formed to guide this process. Steering Committee members represent diverse organizations that have interest in the successful growth of the Airport and the Downtown Core/Diridon Station Area. Participating organizations are listed below:

- The Airport Commission and Downtown Resident
- San José Downtown Association
- Santa Clara Building Trades Council (SCBTC)
- Santa Clara County Residents for Responsible Development
- San Francisco Bay Area Planning and Urban Research Association (SPUR)
- Silicon Valley Leadership Group (SVLG)
- The Silicon Valley Organization (SVO)

Additionally, City staff from the Mayor's office, the Downtown Councilmember's office, the Office of Economic Development and the Department of Planning, Building and Code Enforcement were engaged in the study. The Project Steering Committee provided guidance and direction on the study, and allowed for stakeholders to have an open forum to provide feedback and input. A series of Committee meetings was conducted to present and discuss analytical assumptions, methodology/approach, and findings on the various aspects of this project. In addition to the Project Steering Committee, three broader stakeholder meetings were held, offering stakeholders the ability to ask questions and receive updates as the study progressed. The Project Steering Committee utilized a decision-making framework to evaluate various airspace protection scenarios, aircraft types, and airport destinations.

Section 2A. Potential Scenarios Evaluated

The Project Steering Committee explored a variety of potential airspace protection scenarios. A total of ten scenarios and the existing conditions were proposed:

1. **Existing airspace protection**
    a. Used as the base case and comparison to potentially heights gained in other scenarios
2. **West OEI Corridor with increased surface slopes**
    a. This scenario was removed and replaced with further refinement of the defined development in Scenario 10.
3. **East OEI Corridor with a TERPS only scenario over Diridon Station Area**
    a. Evaluate the feasibility of an East OEI corridor which would essentially be a mirror image of the West OEI Corridor and require long-haul departures to turn left to avoid Downtown Core
    b. Increased development height over Diridon Station Area with the elimination of the existing West OEI Corridor
4. **No OEI protection/TERPS Only**
    a. Removal of existing straight-out and West OEI Corridor surface protection for Runways 12L/12R
    b. TERPS Only scenario would essentially provide increased development heights over Downtown Core and Diridon Station Area
5. **West OEI Corridor surface protection without Straight-out OEI**
    a. Maintain existing West OEI Corridor while removing straight-out OEI protection for Runways 12L/12R
    b. Additional heights gained of Downtown Core while heights over Diridon Station Area would remain the same
6. **West OEI Corridor with greater than 15 degree turn**
    a. Evaluate the feasibility of airlines' ability to make a right turn greater than 15 degrees to avoid Diridon Station Area, allowing additional heights for development
    b. Downtown Core heights would remain the same
7. **Straight-out OEI protection without West OEI Corridor**
    a. Maintain existing straight-out OEI surface protection for Runway 12L/12R departures
    b. West OEI corridor would be removed, allowing for additional development height within Diridon Station Area.
8. **TERPS only with increased TERPS departure climb gradients**
    a. Similar to Scenario 4, with the exception that the current lowest published climb gradient procedures (261 feet/NM and 290 feet/NM) would be eliminated.

    b. A 470 foot/NM published TERPS departure climb gradient would be protect for thereby increasing developable heights over the Downtown Core and Diridon Station Area.

9. **No OEI/TERPS Only, increased FAA height limits**
    a. Assumes that the lowest TERPS departure surface climb gradient protection (261 feet/NM and 290 feet/NM) would be eliminated for Runway 12L/12R and non-precision instrument circling approach surface heights would be increased
    b. Assumes no changes to vertically guided precision instrument approach procedures for Runway 30L/30R operations
10. **Modified West OEI Corridor at defined development heights**
    a. Assumes that the surface slope of the West OEI Corridor could be adjusted to allow for additional development heights in Diridon Station Area
    b. Incremental surface slopes adjustments would be conducted to determine the impact on aircraft performance
11. **Extend the approach ends of Runways 12L and/or 12R to the north**
    a. Theoretically solution to extend the arrival end of Runways 12L and/or 12R to the north (across Highway 101) in order to provide a longer runway for departures
    b. TERPS departure airspace surface protection for Runways 12L and/or 12R would shift further away from the Downtown Core and Diridon Station Area thereby resulting in additional development height opportunities

The scenarios were analyzed to determine the overall impacts to aviation operations and the development capacity, including an evaluation of the timing and feasibility of implementation.

Section 2B. Decision Making Criteria

The Project Steering Committee developed a list of decision-making criteria to evaluate the potential feasibility of the various airspace protection scenarios described in Section 2A. An airspace scenario evaluation matrix was created in order to provide a basis of comparison for each of the airspace scenarios above. The evaluation criteria included the following metrics:

- Potential gain in building heights (Downtown Core)
- Potential gain in building heights (Diridon Station Area)
- Potential loss of air service
- Timeframe for action
- Degree of difficulty
- Airlines affected
- Decision making bodies

Table 3 presents the evaluation of the scenarios using a comparative matrix criterion.

Table 3: Project DADCS Airspace Scenario Summary Matrix

DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY (PROJECT DADCS) AIRSPACE SCENARIO SUMMARY MATRIX								
	Existing conditions AGL building heights	**200'-290' AGL**	**80'-160' AGL**					
Scenario	***Scenario Description***	***Potential gain in building heights (Downtown Core)***	***Potential gain in building heights (Diridon Station Area)***	***Potential loss of air service***	***Timeframe for action***	***Degree of Difficulty***	***Airlines affected***	***Decision making bodies***
#1	Existing airspace protection	-	-	None	N/A	N/A	None	City
#2	West OEI Corridor with increased surface slopes	-	60'-100'	Moderate to Significant	Under a year	Moderate	Alaska, Aero Mexico, Air China, American, British, Hainan, Hawaiian	City
#3	East OEI Corridor with a TERPS only scenario over Diridon Station Area	Reduce 10'-30'	90'-130'	Significant	Under a year	Moderate	Alaska, Aero Mexico, Air China, American, British, Hainan, Hawaiian	City
#4	No OEI/TERPS Only	1'-36'	69'-165'	Significant	Under a year	Moderate	All airlines	City
#5	West OEI Corridor surface protection without Straight-out OEI	10'-30'	-	Moderate	Under a year	Moderate	Air Canada, ANA, Lufthansa, Volaris, FedEx, UPS, Delta, jetBlue, Southwest, United	City
#6	West OEI Corridor with greater than 15 degree turn	-	130' (south only)	Significant	Under a year	Moderate	Alaska, Aero Mexico, Air China, American, British, Hainan, Hawaiian	City
#7	Straight-out OEI protection without West OEI Corridor	-	90'-130'	Significant	Under a year	Moderate	Alaska, Aero Mexico, Air China, American, British, Hainan, Hawaiian	City
#8	TERPS only with increased TERPS departure climb gradients	30'-60'	110'-130'	Significant	One to two years	Moderate to High	General aviation and all airlines	City and FAA
#9	No OEI,TERPS Only with increased FAA height limits	1'-179'	76' - 322'	Severe	One to three years	High	All airlines and other aircraft operators	City and FAA
#10	Modified West OEI Corridor at defined development heights	-	Ranging from 14'-121'	TBD	One to three years	TBD	TBD	Likely City and FAA
#11	Extend the approach ends of Runways 12L and/or 12R to the north	30'-60'	110'-130'	None	Over three years	High	TBD	City, FAA, Caltrans, Santa Clara, resource agencies

Source: Project Steering Committee

Upon review of the various alternative airspace protection scenarios, the Project Steering Committee selected four potential scenarios against existing Scenario 1 (the current protection scenario) for further evaluation. The scenarios selected were the following:

- Scenario 1: Existing airspace protection
- Scenario 4: No OEI protection/TERPS Only
- Scenario 7: Straight-out OEI protection without West OEI Corridor
- Scenario 9: No OEI protection, increased FAA height limits
- Scenario 10: Modified West OEI Corridor at defined development heights

Section 2C. Selected Aircraft for Performance Evaluation

Once an agreement was reached regarding the airspace protection scenarios that were to be evaluated further, a decision on the various aircraft types to be considered as part of an aircraft performance assessment was made. A list of commonly flown aircraft and proposed future aircraft that will likely operate out of SJC is listed below:

Narrow-Body Aircraft

- **Airbus A320-200** - Currently the aircraft with the longest transcontinental flight distance operating at SJC (Boston non-stop) and second most heavily used aircraft for transcontinental operations.
- **Boeing 737-800** - Most heavily used aircraft at SJC for transcontinental operations.

Wide-Body Aircraft

- **Boeing 777-300ER** – A heavily used, long-range aircraft for international routes. When an international route is successful and air carriers want to increase seats, the Boeing 777 is a typical aircraft used. The Boeing 777-200 was previously used at SJC for Tokyo service.
- **Boeing 787-9** - Currently operating at SJC and serving Asia and Europe

Based on the initial aircraft performance evaluation results, additional assessments were conducted for the following aircraft types to provide additional information for decision-making:

Narrow-Body Aircraft

- **Airbus A321 NEO** - Highest seating capacity long-haul narrow-body aircraft. Currently serves New York and Hawaii.

Wide-Body Aircraft

- **Airbus A330-200** - Currently operating at SJC and serving Asia
- **Airbus A350-900** - Likely replacement for the A340 service to Frankfurt and by a potential new entrant carrier.

Section 3: Existing OEI Surface Protection for Runways 12L/12R

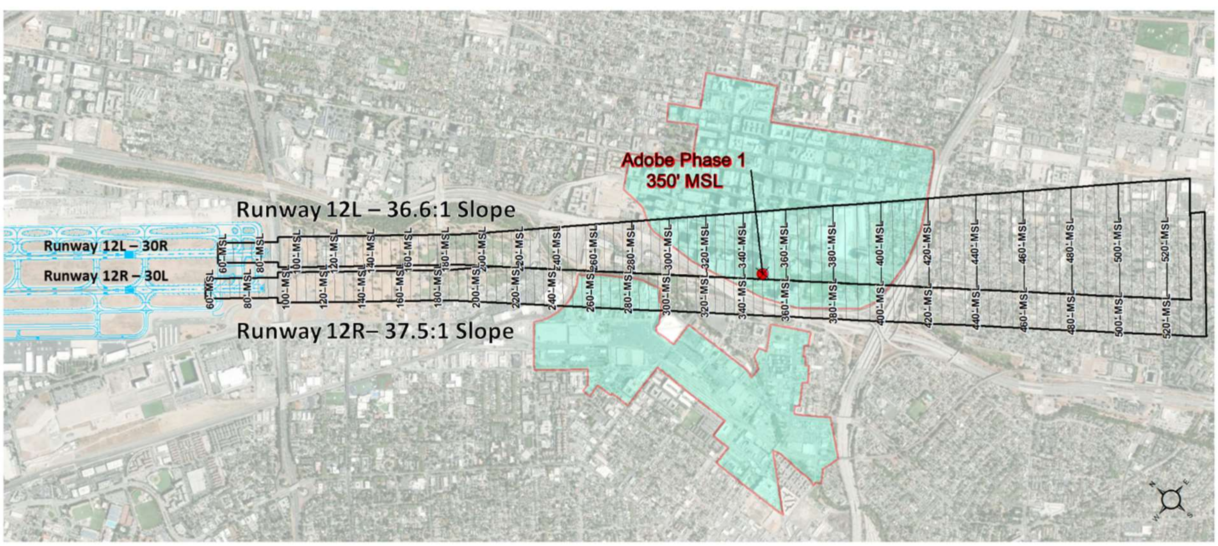
The primary focus of the aircraft performance evaluation was to assess the impacts of increased obstacle heights on OEI departure operations on Runways 12L and 12L at SJC (departures to the southeast over the identified study areas). Scenarios 1, 4, 7 and 10 result in no changes in instrument approach and departure procedures as the TERPS criteria established by the FAA for the safe landing and take-off operations with all engines operating are unchanged. Scenario 9 potentially increases ceiling and visibility minimums for several non-precision approaches but does not eliminate those procedures.

Historical weather analysis indicates that the SJC operates in Southeast Flow approximately 13% annually. In Southeast Flow, aircraft are departing towards the taller buildings in the Downtown Core as well as Diridon Station Area. As previously mentioned, in 2007 the City of San José adopted composite airspace height restriction mapping which included several protected OEI corridors including the ICAO Annex 6, FAA AC120-91 and West OEI Corridors. The FAA has considered protection of OEI procedures to be an economic decision to be made by the airlines, not an FAA safety consideration. It is currently up to local jurisdictions to address the tradeoffs of air service capability versus high-rise development.

Section 3A. Existing Airline OEI Surfaces for Runways 12L/12R

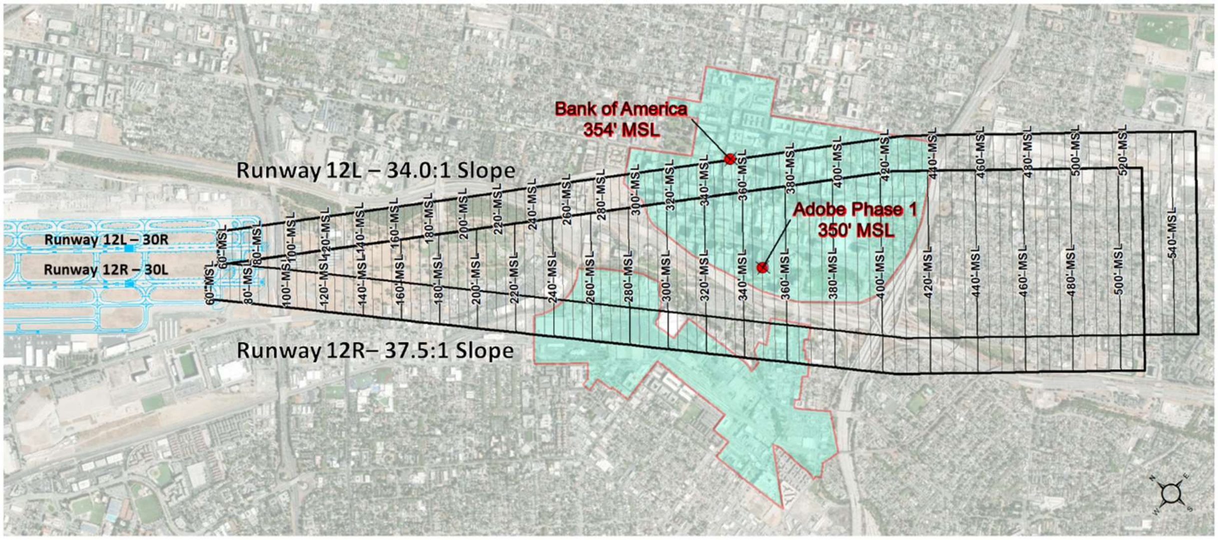
Figure 4, Figure 5 and **Figure 6** depict the existing OEI corridors for Runway 12L/12R departures. The existing "controlling obstacles" which define the slopes of each corridor are also identified. As part of this study, the project consultants evaluated existing OEI surface slopes against updated obstacle survey datasets, specifically the 2016 SJC airspace obstacle survey data, which confirmed that there were no new controlling obstacles that impact existing OEI surface slopes.

Figure 4: Runways 12L/12R FAA AC120-91 OEI Surface Existing Heights



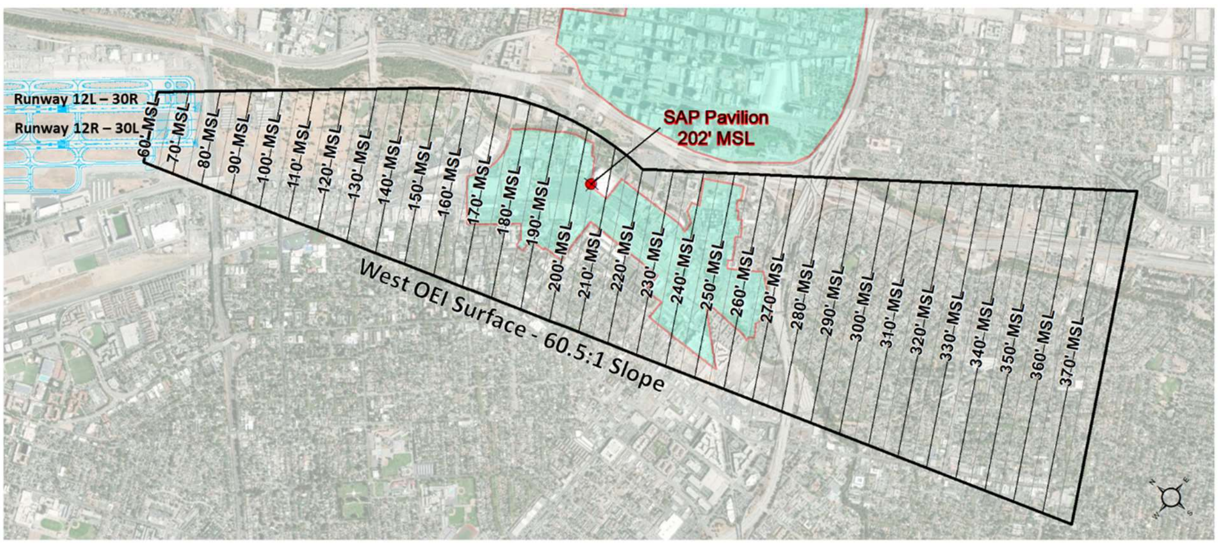
Source: Landrum & Brown

Figure 5: Runways 12L/12R ICAO Annex 6 OEI Surface Existing Heights



Source: Landrum & Brown

Figure 6: Runways 12L/12R West OEI Corridor Existing Heights



Source: Landrum & Brown

Section 3B. Existing Airline OEI Procedures for Runways 12L/12R

Table 4 summarizes the current OEI procedures utilized by Airlines at SJC.

Table 4: Airlines OEI Procedures for Runways 12L/12R

Current Airline	***OEI Procedure (12L & 12R)***
Alaska	West Corridor (AC 120-91 w/course correction)
Aero Mexico	East Corridor for 12L, West Corridor for 12R (ICAO w/ course correction)
Air China	West Corridor (ICAO w/ course correction)
American	West Corridor (AC 120-91 w/course correction)
British Airways	Straight Out (ICAO) and West Corridor (ICAO w/ course correction**)
Hainan	Straight Out for 12L (ICAO), West Corridor for 12R (ICAO w/ course correction)
Hawaiian	West Corridor (AC 120-91 w/course correction)
Air Canada	Straight Out (ICAO)
ANA	Straight Out (ICAO)
Lufthansa	Straight Out (ICAO)
Volaris	Straight Out (ICAO)
Fedex	Straight Out (ICAO)
UPS	Straight Out (ICAO)
Delta	Straight Out (AC 120-91)
JetBlue	Straight Out (AC 120-91)
Southwest	Straight Out (AC 120-91)
United	Straight Out (AC 120-91)
Frontier	TBD

** updated August 2017*
***British Airways utilizes the West Corridor in specific engine-out scenarios.*

Source: City of San José Airport Department and Airlines

Section 4: Airspace Protection Scenarios

As previously mentioned, an assessment of various TERPS and OEI OCS were constructed based upon current procedures at SJC. **Appendix A** contains the aforementioned FAA TERPS airport procedure charts for reference. The following TERPS and OEI surfaces were evaluated and applied to the selected airspace protection scenarios in the study:

TERPS Surfaces:

- Instrument Landing System (ILS) Approach (CAT I & II) – applicable to Runway 12R/30L
- Localizer Only (LOC)
- Localizer Performance with Vertical Guidance (LPV)
- Lateral Navigation (LNAV)
- Lateral Navigation/Vertical Navigation (LNAV-VNAV)
- Required Navigation Performance (RNP 0.11, 0.15, 0.18, 0.30)
- Circling Approaches (CAT A – CAT D)
- Minimum Vectoring Altitude
- Instrument Departure Procedures (200'/NM CG, 261'/NM CG, 290'/NM, 470'/NM CG and 500'/NM CG)

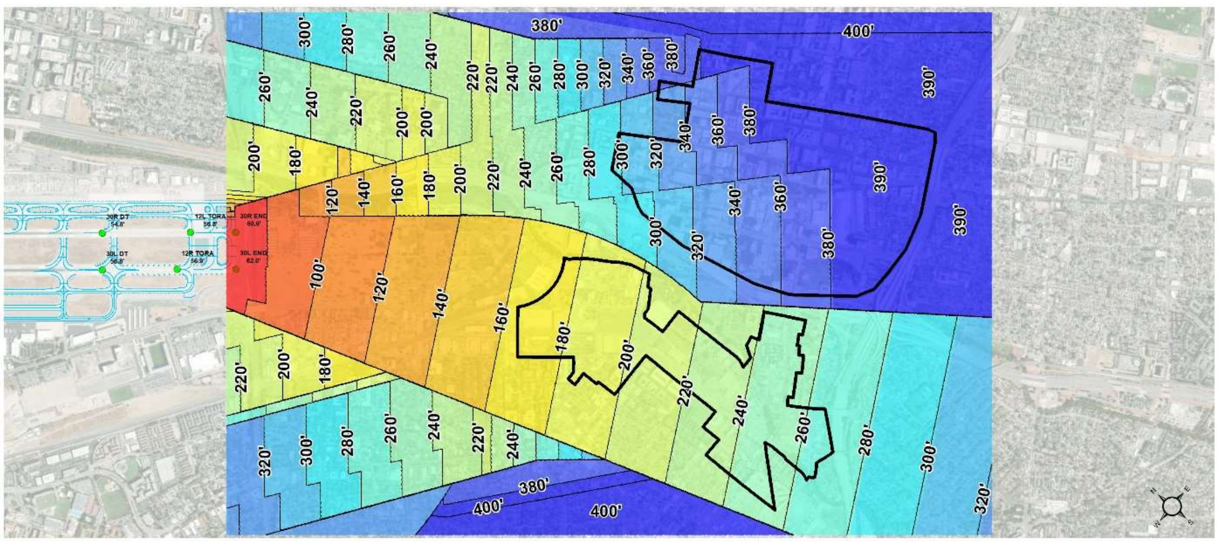
One-Engine Inoperative Surfaces:

- West OEI Corridor
- ICAO Straight-Out Departures
  FAA AC120-91 Straight-Out Departures

Section 4A. Scenario 1 – Existing Airspace Protection

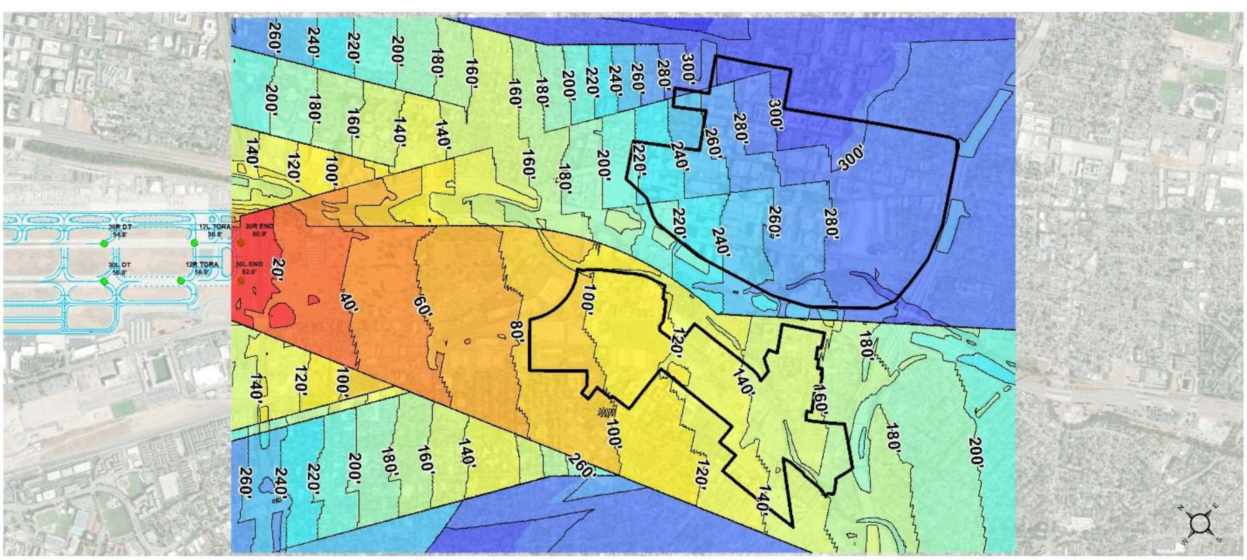
Figure 7 and Figure 8 display the existing airspace OCS protection south of the Airport. OCS protection consists of a combination of TERPS and OEI airspace surfaces. Existing heights within the Downtown Core range from **290 feet MSL – 390 feet MSL** (**202 feet AGL – 310 feet AGL**). Existing heights within the Diridon Station Area range from **164 feet MSL – 270 feet MSL** (**84 feet AGL – 185 feet AGL**).

Figure 7: Scenario 1: Existing Surface Mapping (MSL) Heights



Source: Landrum & Brown

Figure 8: Scenario 1: Existing Surface Mapping (AGL) Heights



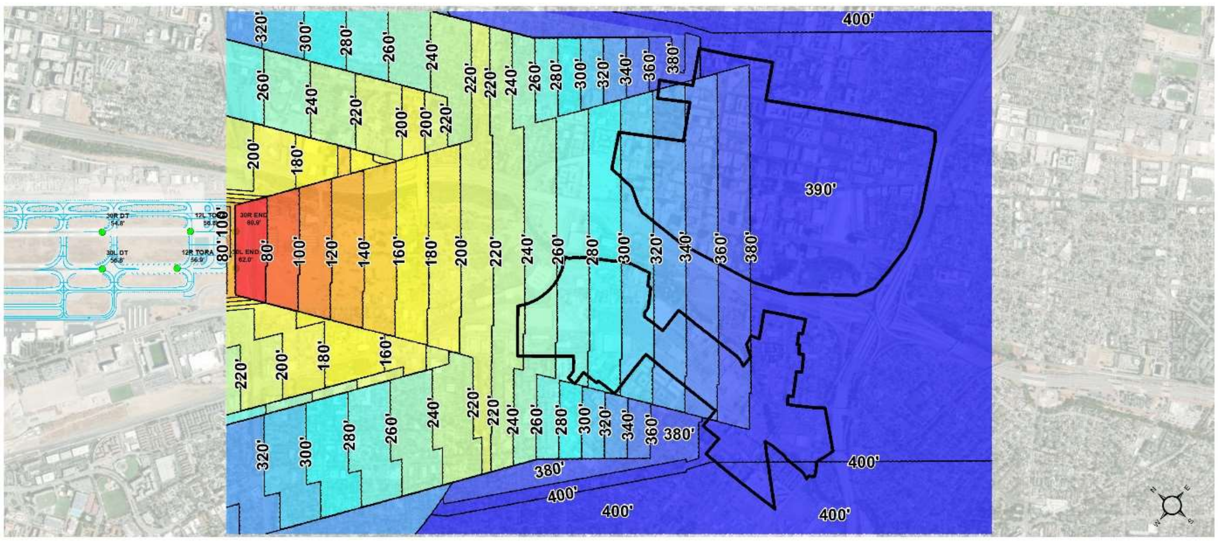
Source: Landrum & Brown

Section 4B. Scenario 4 - No OEI Airspace Protection/TERPS Only

As depicted in **Figure 9 and Figure 10**, the Scenario 4 airspace assumes that the existing OEI OCS protection for Runways 12L/12R departures would be removed and the airspace would consist of TERPS arrivals and departure OCS protection over the Downtown Core and the Diridon Station Area. These identified TERPS OCSs would function as the new OEI OCS surface protection even if the FAA were to increase a TERPS OCS in the future.

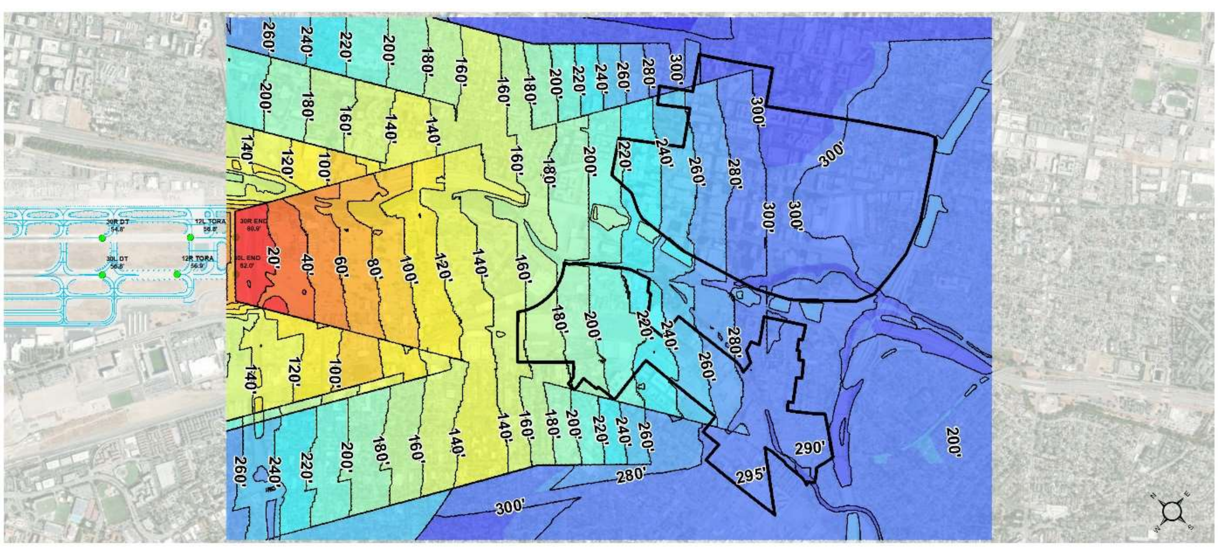
Under Scenario 4, maximum heights within the Downtown Core range from **294 feet MSL – 390 feet MSL** (**212 feet AGL – 315 feet AGL**). Scenario 4 heights within the Diridon Station Area range from **235 feet MSL – 400 feet MSL** (**154 feet AGL – 310 feet AGL**).

Figure 9: Scenario 4: No OEI Protection/TERPS Only Heights (MSL)



Source: Landrum & Brown

Figure 10: Scenario 4: No OEI Protection/TERPS Only Heights (AGL)



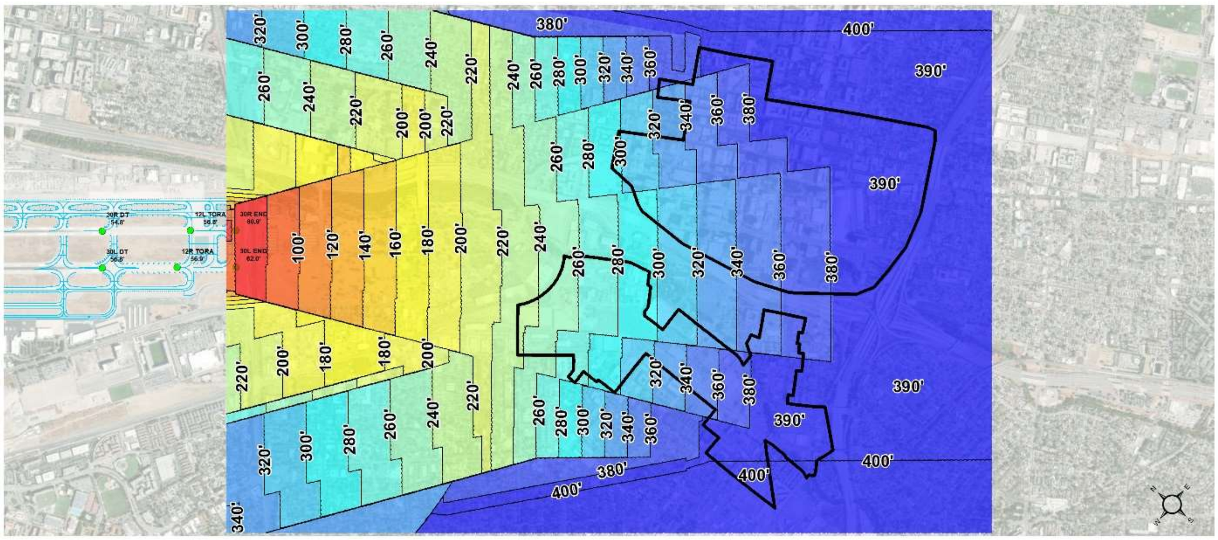
Source: Landrum & Brown

Section 4C. Scenario 7 - Straight-Out OEI Protection without West OEI Corridor

As depicted in **Figure 11 and Figure 12**,the Scenario 7 airspace assumes that the existing straight-out OEI OCS protection for Runways 12L/12R departures would be maintained, while the West OEI Corridor surface which directly impacts Diridon Station Area would be removed.

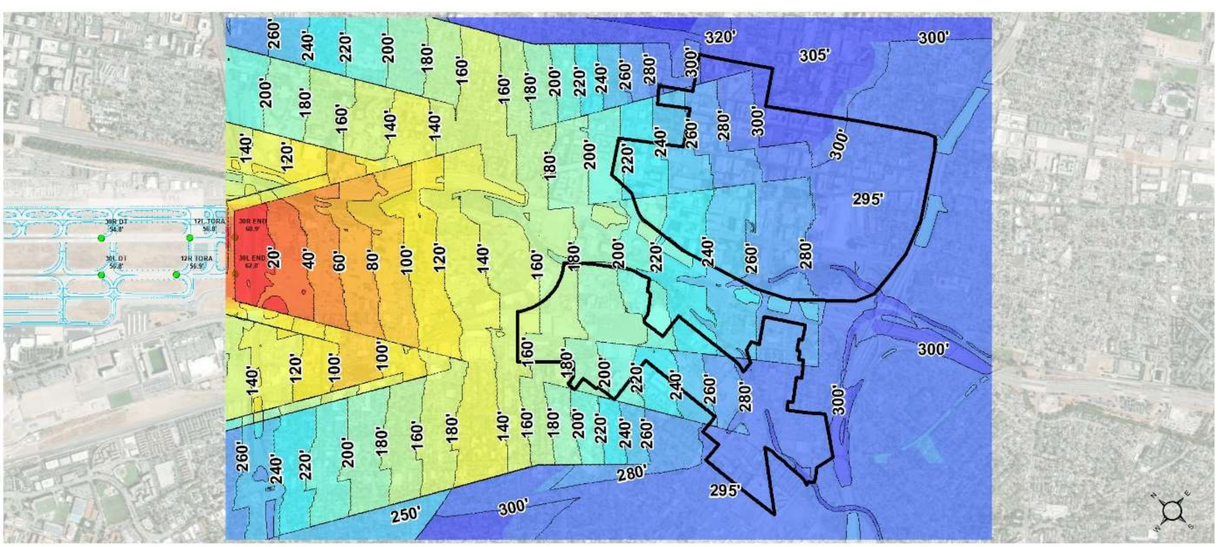
Under Scenario 7, there would be no changes in the existing maximum heights within the Downtown Core, however maximum heights within the Diridon Station Area would increase to **229 feet MSL – 400 feet MSL** (**149 feet AGL – 310 feet AGL**) as the West OEI Corridor is removed and TERPS OCSs would govern over the Diridon Station Area.

Figure 11: Scenario 7: Straight-Out OEI Protection without West OEI Corridor Heights (MSL)



Source: Landrum & Brown

Figure 12: Scenario 7: Straight-Out OEI Protection without West OEI Corridor Heights (AGL)



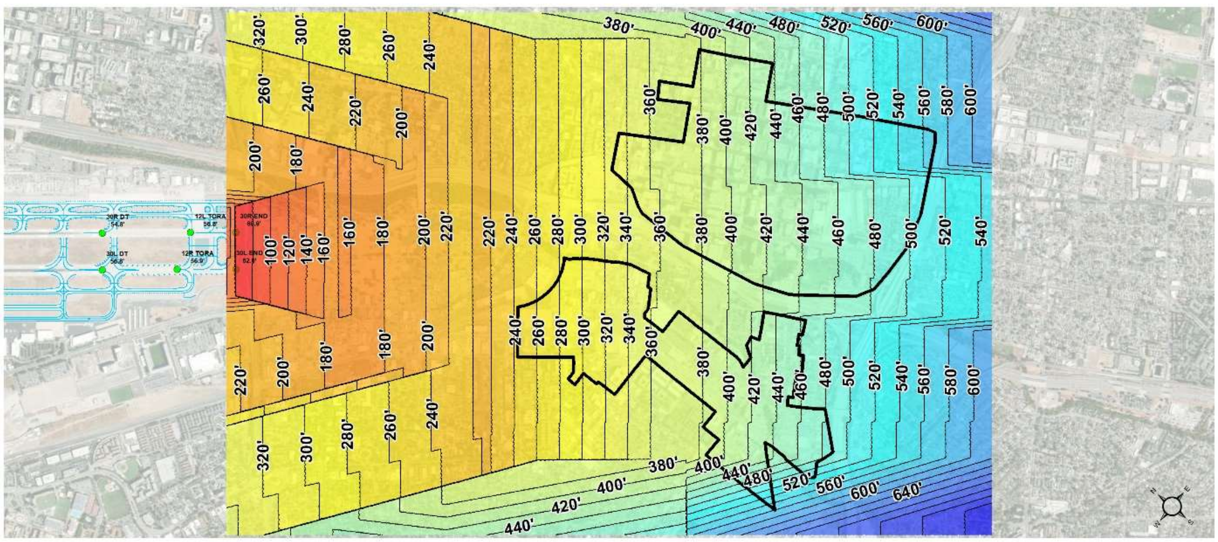
Source: Landrum & Brown

Section 4D. Scenario 9 - No OEI, Increased FAA Height Limits

As depicted in **Figure 13 and Figure 14**, the Scenario 9 airspace assumes that the existing OEI OCS protection for Runways 12L/12R departures would be removed and the airspace would consist of increased TERPS arrivals and departure OCS heights over the Downtown Core and the Diridon Station Area.

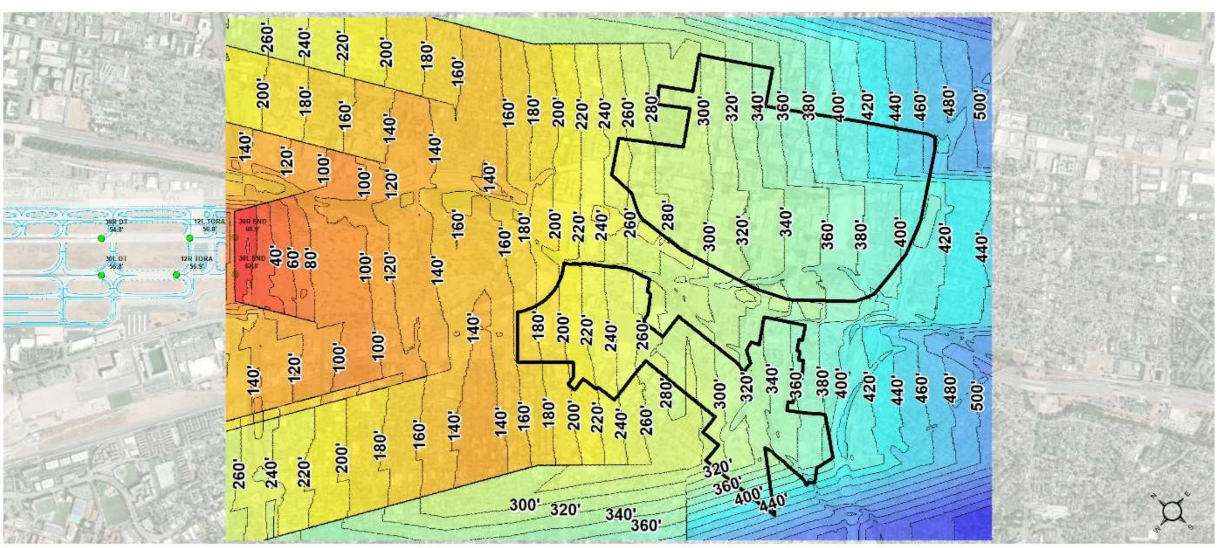
Under Scenario 9, maximum heights within the Downtown Core range from **327 feet MSL – 569 feet MSL** (**245 feet AGL – 469 feet AGL).** Scenario 9 heights within the Diridon Station Area range from **243 feet MSL – 578 feet MSL** (**161 feet AGL – 473 feet AGL**).

Figure 13: Scenario 9: No OEI Protection, Increased FAA Heights (MSL)



Source: Landrum & Brown

Figure 14: Scenario 9: No OEI, Increased FAA Height (AGL)



Source: Landrum & Brown

Section 4E. Scenario 10 – Modified West OEI Corridor at Defined Development Heights

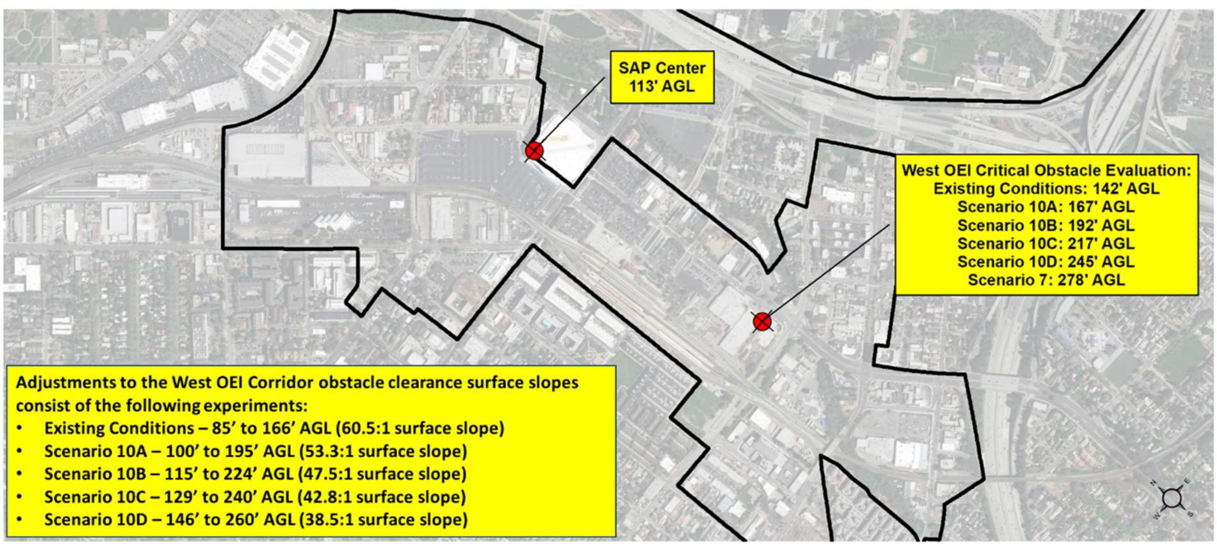
In Scenario 10, the focus was to evaluate the impacts of various increases to the OCS slope of the West OEI Corridor which directly impacts development heights in Diridon Station Area. The existing West OEI Corridor surface is set at a slope of 60.5:1. In the previous airspace study for SJC conducted in 2007, the critical airspace obstacle that was used to define the West OEI Corridor surface slope was the SAP Center, with a maximum height range in Diridon Station Area of 85 feet to 166 feet AGL. For this study a new not-yet constructed critical obstacle was defined in the vicinity where the taller building developments are anticipated.

Four variations of adjustment to the slope of the West OEI Corridor were evaluated in Scenario 10. As depicted in **Figure 15**, Scenarios 10A – 10D were evaluated with critical obstacle heights adjust by 25-foot increments (with the exception of Scenario 10D adjustment of 28 feet).

Adjustments to the West OEI Corridor OCS slopes consist of the following experiments:

- Scenario 10A (53.3:1 surface slope) – 178 feet to 298 feet MSL (100 feet to 195 feet AGL)
- Scenario 10B (47.5:1 surface slope) – 193 feet to 328 feet MSL (115 feet to 224 feet AGL)
- Scenario 10C (42.8:1 surface slope) – 207 feet to 357 feet MSL (129 feet to 240 feet AGL)
- Scenario 10D (38.5:1 surface slope) – 224 feet to 390 feet MSL (146 feet to 260 feet AGL)

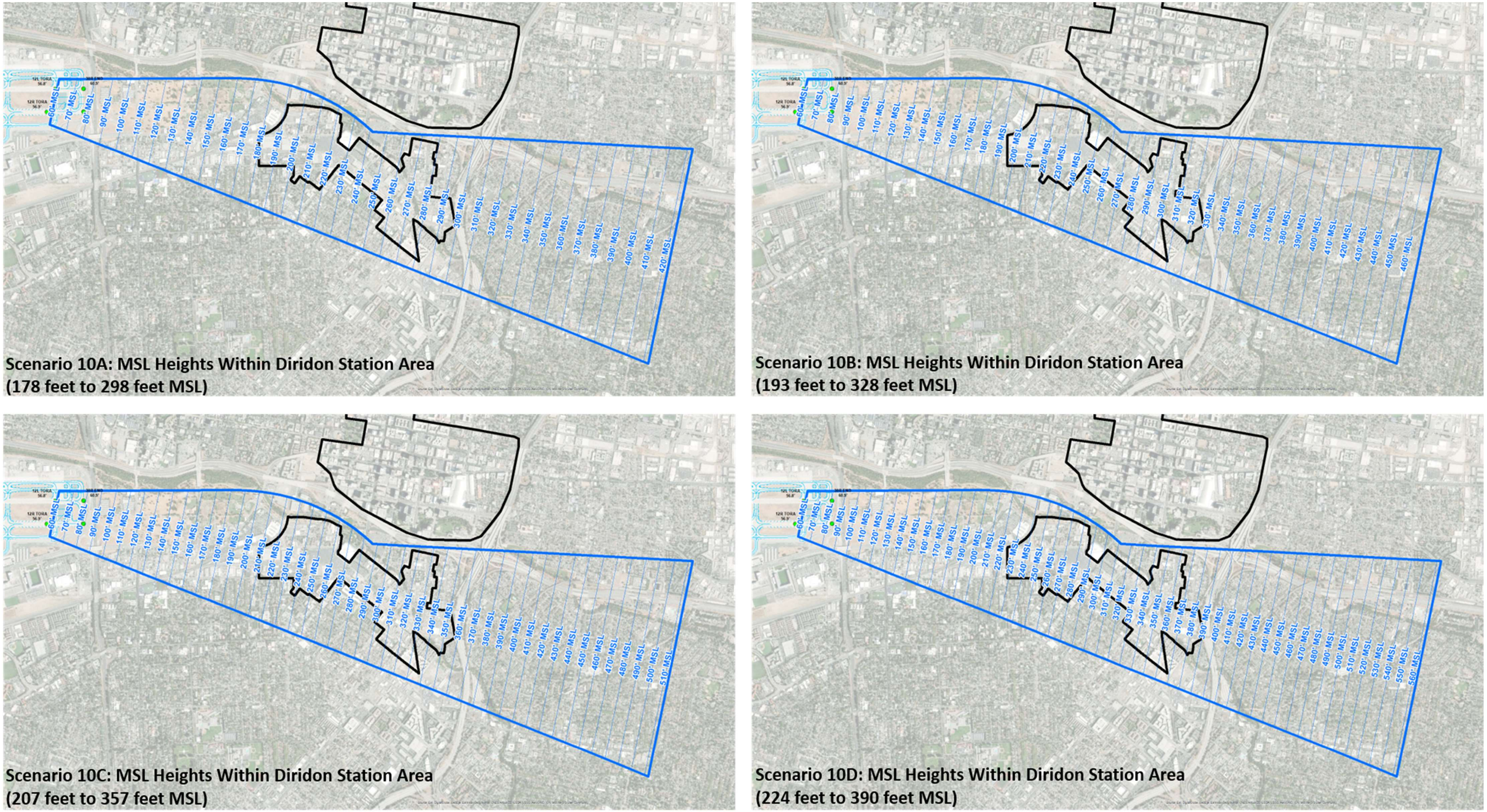
Figure 15: Scenario 10: Modified West OEI Corridor at Defined Development Heights Critical Obstacle



Source: Landrum & Brown

Figure 16 depicts the MSL heights for the four variants of the Scenario 10 West OEI corridor assessment over the Diridon Station Area.

Figure 16: Scenario 10: Modified West OEI Corridor at Defined Development Heights (MSL)



Source: Landrum & Brown

Section 4F. Airspace Scenario Height Differentials

Table 5 provides a general range of additional height gains within the Downtown Core and Diridon Station Area that can be achieved in each of the airspace scenarios when compared to the existing airspace protection (Scenario 1).

It is important to note that in Scenario 7 and 10, the existing airspace protection over the Downtown Core would not change as straight-out OEI protection is maintained in both scenarios.

Table 5: Airspace Protection Scenario Height Differentials as Compared to Scenario 1 (Existing Airspace Protection)

Airspace Protection Scenario Height Differentials		
Airspace Scenarios	**Height Gain Differentials (feet)**	
	Downtown Core	*Diridon Station Area*
Scenario 4 - No OEI Airspace Protection/TERPS Only	5 feet - 35 feet	70 feet - 150 feet
Scenario 7 - Straight-Out OEI Protection without West OEI Corridor	-	70 feet - 150 feet
Scenario 9 - No OEI, Increased FAA height limits	35 feet - 100 feet	80 feet - 220 feet
Scenario 10 - Modified West OEI Corridor at Defined Development Heights		
Scenario 10A	-	15 feet - 25 feet
Scenario 10B	-	30 feet - 55 feet
Scenario 10C	-	45 feet - 85 feet
Scenario 10D	-	65 feet - 115 feet

Source: Landrum & Brown

Section 5: Aircraft Performance City Pair Assessment

Section 5A. Assumptions

Aircraft performance assessments were conducted to evaluate the impacts of proposed obstacles heights under each of the shortlisted airspace scenarios. Suspected aircraft types, city pair combinations and seasonal temperature variations were assessed to identify impacts to aircraft payload (allowable PAX and cargo) and range. Passenger (PAX) and cargo penalties were computed for each scenario. The assumptions used in the aircraft performance assessment are listed below. For the aircraft performance assessment, a 100% load factor was applied to each aircraft to determine the maximum PAX and cargo weight penalties that would be incurred under each airspace protection scenarios/destination combination.

Table 6 summarizes that various aircraft that were evaluated in the aircraft performance assessment.

Table 6: Aircraft Fleet Evaluation

Aircraft	Aircraft Type	Engine	Maximum Takeoff Weight (lbs.)	Seating Capacity
Existing Aircraft Types Serving SJC				
A320-200	Narrow-Body	CFM56-5B4	171,960	150
A321 NEO	Narrow-Body	PW 1000G	206,132	189
B737-800	Narrow-Body	CFM56-7B26	174,200	175
A330-200	Wide-Body	Trent 772	524,700	284
B787-9	Wide-Body	GENX-1B74-7	560,000	290
Potential Aircraft Types Serving SJC				
A350-900	Wide-Body	Trent XWB-84	617,294	325
B777-300ER	Wide-Body	GE90-115BL	775,000	370

Source: Flight Engineering LLC.

An assumed average PAX weight of 228 pounds was used for narrow-body aircraft (domestic and North America) and 248 pounds for wide-body aircraft (international and transoceanic) operations in both the summer and winter aircraft performance analyses.

Table 7 provides a summary of the seasonal temperatures in the aircraft performance assessment that account for the season and reflect the temperatures at the typical time of day these operations occur.

Table 7: Seasonal Temperatures

Aircraft	Temperature (°F)	Notes
Winter		
A320-200, A321 NEO & B737-800	63°F	Early morning and evening departures
A330-200, A350-900, B787-9 & B777-300ER	68°F	Morning and afternoon departures
Summer		
A320-200, A321 NEO & B737-800	81.3°F	Boeing 85% realiablity temperature
A330-200, A350-900, B787-9 & B777-300ER	81.3°F	Boeing 85% realiablity temperature

Source: Landrum & Brown

A weather analysis using historical weather data from 2003 – 2017 was conducted. Additionally, an evaluation of aircraft operations was conducted to identify typical departure patterns based upon the time of day specific flights operate in order to focus the weather assessment around those time periods, specifically during the winter season.

For summer temperatures, the Boeing 85% reliability temperature was used as the basis of the aircraft performance assessment. Boeing publishes reliability temperature charts and these datasets are based upon annual historical weather trends at individual airports. The 85% reliability temperature is typically used by Airlines when conducting aircraft performance evaluations, assessing weight penalty impacts to aircraft operations, and to ultimately make decisions regarding starting, maintaining or ending service at a particular airport.

Section 5B. Narrow-Body (Domestic/North America) Aircraft Performance

The preliminary Narrow-body aircraft assessment included the A320-200, A321 NEO and B737-800. Two domestic markets were evaluated:

- John F. Kennedy International Airport (JFK)
- Honolulu International Airport (HNL)

JFK and HNL are non-stop destinations which are currently served by airlines at SJC. The A321 NEO was only evaluated to the HNL market as the A320-200 is not currently used to that market and the A321 NEO has entered that market by a current airline.

Table 8 summarizes the results of the aircraft performance assessment for JFK.

- A320-200 operations to JFK result in minor PAX and cargo penalties under Scenarios 4 and 9 in both summer and winter.
- B737-800 operations to JFK results in PAX and minor cargo penalties under Scenario 9 in the summer.

Table 8: JFK PAX & Cargo Penalty Assessment

New York - JFK Winter (63° F)		A320-200 (150 seats/2,384 lbs. cargo)		B737-800 (175 seats/1,604 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	1,067	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	106	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	8	2,384	-	583
New York - JFK Summer (81.3° F)		**A320-200 (150 seats/2,384 lbs. cargo)**		**B737-800 (175 seats/1,138 lbs. cargo)**	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	3	2,384	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	1,378	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	13	2,384	3	860

Source: Flight Engineering LLC., & Landrum & Brown

Table 9 summarizes the results of the aircraft performance assessment for HNL for the A321 NEO and B737-800 aircraft.

- A321 NEO operations to HNL result in no PAX penalties under any of the airspace scenarios and minor cargo penalties incurred in Scenarios 4 and 9
- B737-800 operations to HNL results in one PAX penalty in summer with no additional cargo allowed. In the winter, operations to HNL are fuel capacity limited due to increased headwinds resulting in a lower overall seat count (173 PAX) and a three PAX penalty.

Table 9: Hawaii PAX & Cargo Penalty Assessment

Hawaii - HNL Winter (63° F)		A321 NEO (189 seats/18,481 lbs.)		B737-800 (173 seats[1]/No Cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	**2,537**	**3**	-
Hawaii - HNL Summer (81.3° F)		**A321 NEO (189 seats/21,658 lbs.)**		**B737-800 (175 seats/1,599 lbs. cargo)**	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	**593**	-	-
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	-	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	-	-	-
	Opt 10C: 129' - 240' AGL	-	-	-	-
	Opt 10D: 146' - 260' AGL	-	-	-	-
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	-	**3,565**	**1**	**1,599**

Source: Flight Engineering LLC., & Landrum & Brown

After the completion of the preliminary aircraft performance assessment, a secondary analysis of various transcontinental destinations was assessed to identify weight and cargo penalty impacts to Anchorage (ANC), Boston (BOS) and Miami (MIA) markets. ANC and MIA are non-stop markets not currently served at SJC, but were evaluated given their distance from SJC in order to more fully understand the impacts of the various airspace scenario heights on aircraft performance.

Two summer weather airspace scenarios were evaluated in this assessment, Scenario 1 (existing airspace protection) and Scenario 4 (No OEI/TERPS Only). The focus of this analysis was to evaluate the impacts of increased heights for straight-out departures over the Downtown Core. For this analysis, the A320-200 and the B737-800 aircraft types were evaluated. **Table 10** provides a summary of the results of this assessment.

- The B737-800 aircraft for all three markets would have minor PAX penalties and no cargo penalties in both Scenarios 1 and 4. The one to three PAX penalties incurred for BOS and MIA result from maximum structural takeoff weight limits and are not related to the proposed airspace scenario obstacle heights or runway lengths at SJC.
- The A320-200 would incur minor PAX penalties to BOS and MIA in Scenario 1 and no PAX penalties to ANC. No additional cargo penalties are incurred when operating to the three markets under both scenarios.
- The A320-200 will incur moderate PAX penalties to BOS and MIA in Scenario 4 and no PAX penalties to ANC. No additional cargo penalties are incurred when operating to the three markets under both scenarios.

Table 10: ANC, BOS and MIA PAX & Cargo Penalty Assessment

Anchorage - ANC Summer (81.3° F)		A320 (150 seats/1,379 lbs. cargo)		B737-800 (175 seats/7,100 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	-	-	-
Boston - BOS Summer (81.3° F)		**A320 (150 seats/0 lbs. cargo)**		**B737-800 (175 seats/0 lbs. cargo)**	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	7	-	1	-
Scenario 4	TERPS Only	23		1	-
Miami - MIA Summer (81.3° F)		**A320 (150 seats/0 lbs. cargo)**		**B737-800 (175 seats/0 lbs. cargo)**	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	1	-	3	-
Scenario 4	TERPS Only	17		3	-

Source: Flight Engineering LLC., & Landrum & Brown

Section 5C. Wide-Body (International) Aircraft Performance

A wide-body aircraft assessment was performed for the typical aircraft from SJC to various transoceanic destinations. A preliminary aircraft performance assessment was conducted using the B787-9 and B777-300ER aircraft to two destinations, Beijing International Airport (PEK) and Frankfurt International Airport (FRA).

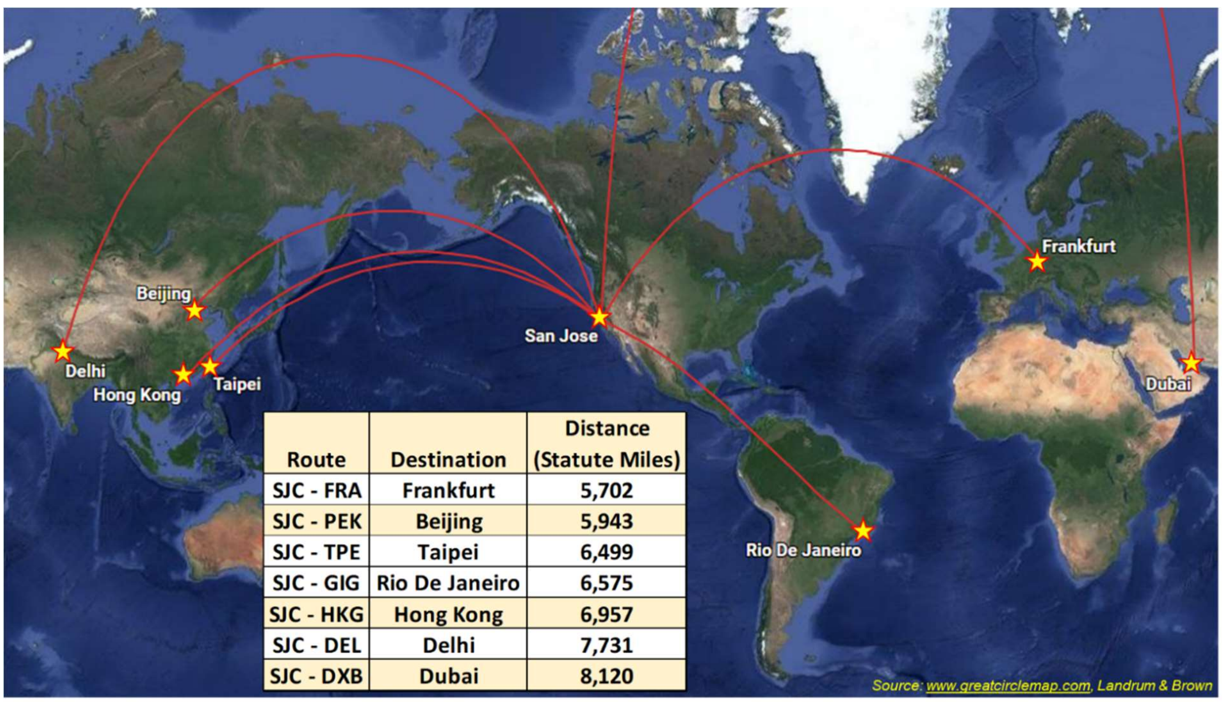
A secondary wide-body aircraft performance evaluation assessment was conducted for additional transoceanic destinations that are currently not served from SJC. The intent of the assessment was to evaluate the operational limitations of each of the aircraft to these long-haul transoceanic destinations to better understand if non-stop air service from SJC would be achievable. The following destinations were evaluated to identify the weight and cargo penalties associated with both Scenarios 1 and 4 airspace protection:

- Rio de Janeiro (GIG)
- Taipei (TPE)
- Hong Kong (HKG)
- Delhi (DEL)
- Dubai (DXB)

As part of the secondary wide-body performance assessment, two additional wide-body aircraft types (A330-200 and A350-900) were evaluated along with the B787-9 and B777-300ER. The A330-200 recently operated service from SJC to China. The A350-900 is a new aircraft that could possibly enter service at SJC in the future.

Figure 17 depicts the great circle distances from SJC to the previously mentioned transoceanic destinatoins.

Figure 17: Great Circle Map of International Destinations



Route	Destination	Distance (Statute Miles)
SJC - FRA	Frankfurt	5,702
SJC - PEK	Beijing	5,943
SJC - TPE	Taipei	6,499
SJC - GIG	Rio De Janeiro	6,575
SJC - HKG	Hong Kong	6,957
SJC - DEL	Delhi	7,731
SJC - DXB	Dubai	8,120

Source: Greatcirclemap.com and Landrum & Brown

Table 11 summarizes the wide-body aircraft performance assessment for PEK for the B787-9 and B777-300ER aircraft:

- B787-9 operation to Asia results in significant PAX and cargo penalties under Scenarios 4, 7, 9 and 10D in both summer and winter.
- B787-9 operation to Asia results in moderate PAX and significant cargo penalties under Scenario 10C in both summer and winter.
- No airlines at SJC currently operate the B777-300ER. However, it is anticipated that this aircraft will operate out of SJC in the future as airlines operating successful international routes from SJC

may opt to increase passenger volumes thereby moving to larger wide-body aircraft such as the B777-300ER.

- B777-300ER incurs no PAX penalties under any scenarios, however cargo penalties are incurred in all scenarios except Scenario 1 with Scenarios 4, 7 and 10D being most significant.

Table 11: Beijing PAX & Cargo Penalty Assessment

Beijing - PEK Winter (68° F)		B787-9 (290 seats/10,853 lbs. cargo)		B777-300ER (370 seats/56,089 lbs. cargo)	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	51	10,853	-	19,278
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	25	10,853	-	11,801
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	4,534	-	5,479
	Opt 10B: 115' - 224' AGL	-	9,408	-	6,673
	Opt 10C: 129' - 240' AGL	13	10,853	-	10,537
	Opt 10D: 146' - 260' AGL	34	10,853	-	16,929
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	93	10,853	-	26,672
Beijing - PEK Summer (81.3° F)		**B787-9 (290 seats/9,542 lbs. cargo)**		**B777-300ER (370 seats/55,588 lbs. cargo)**	
		PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	56	9,542	-	20,597
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	30	9,542	-	13,268
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	3,933	-	5,293
	Opt 10B: 115' - 224' AGL	-	8,725	-	10,223
	Opt 10C: 129' - 240' AGL	15	9,542	-	11,020
	Opt 10D: 146' - 260' AGL	36	9,542	-	17,545
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	95	9,542	-	28,076

Source: Flight Engineering LLC., & Landrum & Brown

Table 12 summarizes the wide-body aircraft performance assessment to FRA for the B787-9 and B777-300ER aircraft:

- B787-9 operation to Europe results in significant PAX and cargo penalties under Scenario 9 and significant cargo penalties under Scenarios 4, 7, 9, 10C and 10D.
- B777-300ER incurs no PAX penalties under any scenarios, however cargo penalties are incurred in Scenarios 4, 9 and 10D with Scenario 9 being most significant.

Table 12: Frankfurt PAX & Cargo Penalty Assessment

Frankfurt - FRA Winter (68° F)		B787-9 (290 seats/26,198 lbs. cargo)		B777-300ER (370 seats/62,240 lbs. cargo)	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	-	**21,580**	-	**4,400**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	**15,338**	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	**10,000**	-	-
	Opt 10A: 100' - 195' AGL	-	-	-	-
	Opt 10B: 115' - 224' AGL	-	**9,349**	-	-
	Opt 10C: 129' - 240' AGL	-	**14,096**	-	-
	Opt 10D: 146' - 260' AGL	-	**19,282**	-	**2,027**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**29**	**26,198**	-	**11,735**
Frankfurt - FRA Summer (81.3° F)		**B787-9 (290 seats/23,514 lbs. cargo)**		**B777-300ER (370 seats/62,240 lbs. cargo)**	
		PAX Penalty	**Cargo Penalty (lbs.)**	**PAX Penalty**	**Cargo Penalty (lbs.)**
Scenario 1	Existing airspace protection	-	-	-	-
Scenario 4	TERPS Only	**2**	**22,911**	-	**7,811**
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	-	**16,407**	-	-
Scenario 10	Existing Conditions: 85' - 166' AGL	-	-	-	-
	Opt 10A: 100' - 195' AGL	-	**4,217**	-	-
	Opt 10B: 115' - 224' AGL	-	**9,353**	-	-
	Opt 10C: 129' - 240' AGL	-	**14,270**	-	-
	Opt 10D: 146' - 260' AGL	-	**19,612**	-	**3,876**
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	**41**	**23,514**	-	**15,397**

Source: Flight Engineering LLC., & Landrum & Brown

Table 13 summarizes the results of the secondary wide-body aircraft performance assessment for the previously mentioned transoceanic destination. As mentioned, the A330-200, A350-900, B777-300ER and B787-9 aircraft were evaluated to each destination:

- A330-200, A350-900 and B777-300ER operations to GIG, TPE and HKG would incur minor PAX penalties in all scenarios. Utilizing the existing West OEI Corridor would not result in any additional cargo penalties, however, when utilizing existing straight-out OEI or Scenario 4 straight-out, additional cargo penalties ranging from minor to significant will be incurred.
- B787-9 would incur significant PAX penalties under existing straight-out and Scenario 4 straight-out scenario heights for GIG, TPE, HKG, DEL and DXB operations.
- Given the extended distance from SJC to DEL and DXB, it is unlikely that non-stop service to these destinations would be achievable operating the B787-9 aircraft. No additional cargo would be allowed to any of the destinations when operating the B787-9 aircraft.

Table 13: Potential International Market PAX & Cargo Penalty Assessment

Rio de Janeiro - GIG Summer (81.3° F)	A330-200 (284 seats/39,344 lbs. cargo)		A350-900 (325 seats/37,963 lbs. cargo)		B777-300ER (370 seats/48,211 lbs. cargo)		B787-9 (290 seats/7,144 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	-	-
TERPS Only	-	20,072	-	23,528	-	18,975	60	7,144
	A330-200 (284 seats/21,199 lbs. cargo)		A350-900 (325 seats/16,520 lbs. cargo)		B777-300ER (370 seats/32,012 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	51	-
TERPS Only	-	1,927	-	2,085	-	2,776	60	-
Taipei - TPE Summer (81.3° F)	A330-200 (284 seats/28,577 lbs. cargo)		A350-900 (325 seats/27,582 lbs. cargo)		B777-300ER (370 seats/35,569 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	12	-
TERPS Only	-	1,976	-	23,195	-	18,742	96	-
	A330-200 (284 seats/10,635 lbs. cargo)		A350-900 (325 seats/6,439 lbs. cargo)		B777-300ER (370 seats/19,465 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	-	-	-	-	89	-
TERPS Only	-	1,976	-	2,052	-	2,638	96	-
Hong Kong - HKG Summer (81.3° F)	A330-200 (284 seats/18,283 lbs. cargo)		A350-900 (325 seats/17,182 lbs. cargo)		B777-300ER (370 seats/20,785 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	51	-
TERPS Only	5	18,283	23	17,182	-	17,980	134	-
	A330-200 (284 seats/743 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/5,348 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	-	-	15	-	-	-	128	-
TERPS Only	5	743	23	-	-	2,543	134	-
Delhi - DEL Summer (81.3° F)	A330-200 (284 seats/5,014 lbs. cargo)		A350-900 (325 seats/3,132 lbs. cargo)		B777-300ER (370 seats/106 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	103	-
TERPS Only	55	5,014	77	3,132	72	106	184	-
	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	48	-	69	-	62	-	178	-
TERPS Only	55	-	77	-	72	-	184	-
Dubai - DXB Summer (81.3° F)	A330-200 (284 seats/3,537 lbs. cargo)		A350-900 (325 seats/2,688 lbs. cargo)		B777-300ER (370 seats/1,828 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
West OEI Corridor	-	-	-	-	-	-	107	-
TERPS Only	65	3,537	79	2,688	72	1,828	191	-
	A330-200 (284 seats/0 lbs. cargo)		A350-900 (325 seats/0 lbs. cargo)		B777-300ER (370 seats/0 lbs. cargo)		B787-9 (290 seats/0 lbs. cargo)	
	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)	PAX Penalty	Cargo Penalty (lbs.)
Existing Straight Out OEI	57	-	71	-	62	-	184	-
TERPS Only	65	-	79	-	72	-	191	-

Source: Flight Engineering LLC., & Landrum & Brown

Section 6: Airline Aircraft Performance Assessment

Participation from the Airlines currently operating at SJC was an integral part of the aircraft performance assessment exercises conducted for this study. Project consultants and Airport staff educated and informed the airlines as to (1) the nature of the project, (2) the various airspace protection scenarios being considered and (3) to provide critical obstacle datasets for the airlines performance engineering departments to evaluate the potential PAX and cargo weight penalties on their respective aircraft fleets.

A conference call was arranged by the Project Consultant and the Airlines at SJC to provide them with an overview of the project and to formally request their assistance with conducting an aircraft performance assessment for the various airspace scenarios. At the conclusion of the conference call, the Project Consultant send the Airlines a detailed email with a data package containing information about each airspace scenario and critical obstacles. Airlines were requested to evaluate their existing and potential aircraft fleets and markets served from SJC as part of against each of the scenario obstacles. **Appendix B** contains a copy of the email sent to each airline, as well as the dataset provided.

Results of the airlines' aircraft performance assessment were used to double-check the project consultants' analysis of weight penalty impacts for each airspace protection scenario, and to support an informed decision by the City staff regarding future airspace protection. **Table 14** lists the airlines that participated in aircraft performance assessment for this study. 13 of 19 airlines responded to the project consultant's request to evaluate their aircraft fleets performance against each of the scenario obstacles. Air China provided results of their aircraft performance assessment of the various airspace protection scenarios prior to its decision to discontinue operations at SJC.

Table 14: SJC Airline Aircraft Performance Assessment Participants

Responded	No Response
Aeromexico	Air Canada/Jazz
Air China	California Pacific
Alaska	Frontier
American	JetBlue
ANA	Lufthansa
British Air	UPS
Delta	
FedEx	
Hainan Airways	
Hawaiian	
Southwest	
United	
Volaris	

An agreement was made with each airline that participated in the aircraft performance assessment to ensure that the results of their individual aircraft performance assessment would be confidential in nature and proprietary due to the competitive nature of the industry. To maintain confidentiality, all transmittals and aircraft performance assessment results were sent directly to the project consultants. Exact PAX and cargo penalty results calculated by each airline will not be reported publicly. However, a general summary of the results from each participating airline is provided below:

ANA

- Evaluated B787-8 (max 169 PAX configuration)
- No PAX penalty impacts in Scenarios 1, 4, 7 and 10, however cargo impact.
- Scenario 9 results in significant PAX penalties in Summer temperatures (92º F), including additional cargo penalties
- ANA will not their assessment of the B787-9 aircraft by the end of February

Hainan Airways

- For B787-8/9, Scenario 4 obstacles results in significant reduction in cargo and PAX (50+ PAX for B787-9) due to loss of the West Corridor

British Airways

- Scenarios 4 and 7 have no impact at all to current Runway 12L operations but both would result in PAX and cargo penalty impacts to 12R
- Scenario 9 results in greatest impact when operating on Runways 12L/12R
- Scenario 10 has no impact on Runway 12L when departing straight-out which would have a PAX and cargo penalties similar to Scenario 1
- Scenario 10 has a PAX and cargo penalty impacts for Runway 12R when using the West OEI Corridor compared with Scenario 1

Alaska, American, Aeromexico, Delta, and Southwest, Volaris

- No penalties for operations below 92º F

United

- Minor PAX and cargo penalties in Scenario 4 for B737-800; moderate PAX and cargo penalties in Scenario 9 for B737-800
- Significant PAX and cargo penalties for B737-900ER operation in Scenarios 1, 4, 7 and 9.

Hawaiian (Aircraft - A321 NEO)

- HNL, OGG, or KOA has no passenger penalties, some cargo penalties
- LIH has minimal passenger penalties and some cargo penalties

Federal Express

- Cargo penalties in most scenarios; however, the aircraft will run out of space before it reaches the maximum weight limit

Section 7: Steering Committee Airspace Protection Recommendation

A new composite airspace protection map has been created which defines the proposed heights within a 3-mile radius from each runway end at SJC for the Scenario 4 airspace. As part of the proposed Scenario 4 airspace protection, the City of San Jose will work to develop a construction crane operation policy to aid in minimizing the impacts of erected construction cranes on aircraft operations at SJC.

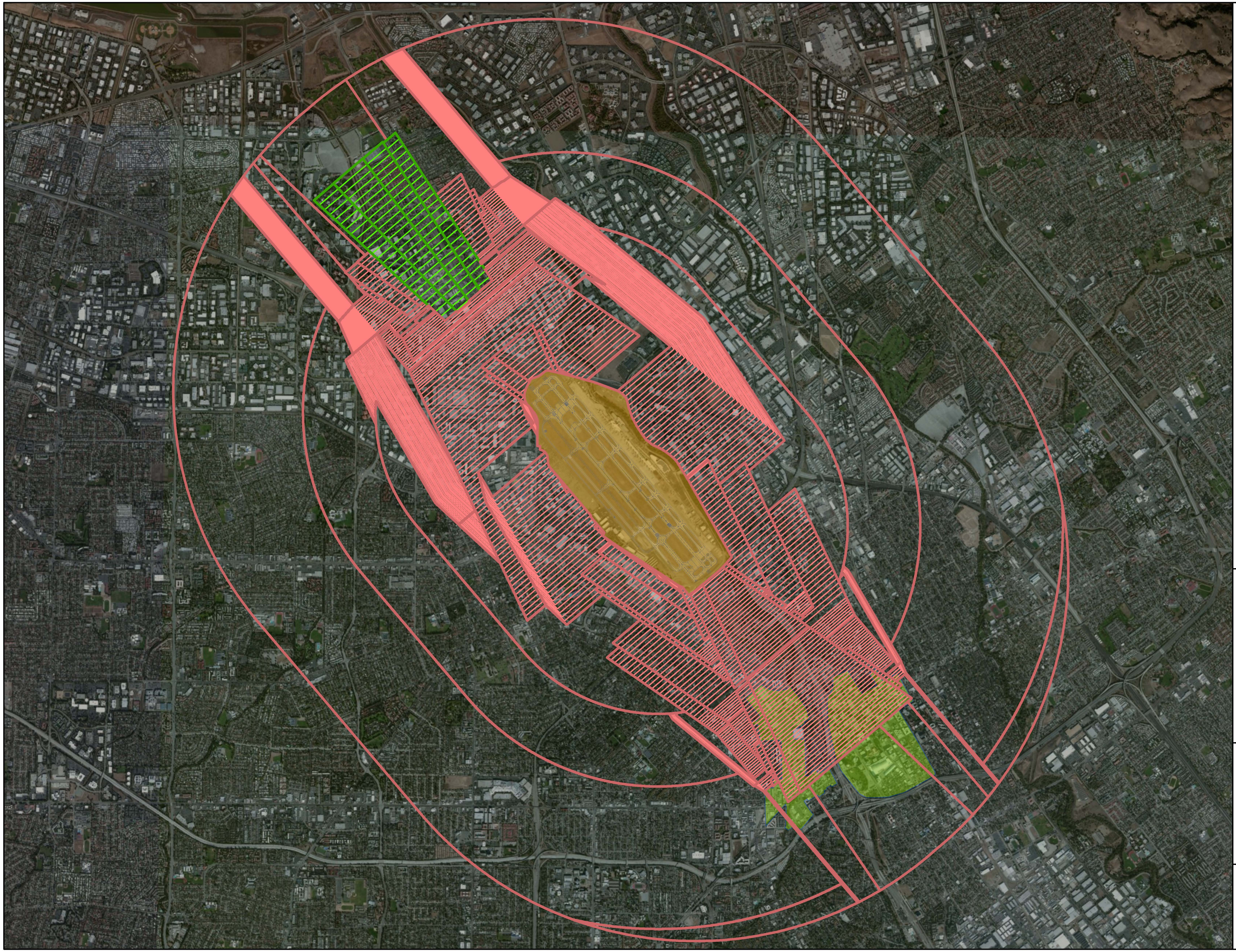
Section 7A. Proposed Scenario 4 Composite Airspace Protection Surfaces

The Scenario 4 composite airspace protection includes the lowest controlling TERPS OCS surfaces within a 3-mile radius of each runway end at SJC. For the Downtown Core and Diridon Station Area, all OEI surface protection as depicted in **Figure 4, Figure 5, and Figure 6** would no longer be protected by the City, and the new Scenario 4 airspace surface would be used to set the maximum allowable building heights in the Downtown Core and Diridon Station Area, thereby becoming the new OEI protection heights.

If the FAA were to change the heights of a TERPS surface in the future, the City would continue to use Scenario 4 to avoid the potential for any further impact on airline OEI performance. The FAA may institute new or modified approach and departure procedures that could lower the TERPS surfaces below those indicated in Scenario 4 (as was the case for some procedures implemented since the 2007 analysis). Therefore, the lower of the Scenario 4 surfaces or an FAA Obstruction Evaluation determination would dictate the height of a proposed structure.

It should be noted that the federal requirement under FAR Part 77 for FAA review of proposed structures which would exceed an airspace surface defined under the regulation is unaffected by any change in City policy on maximum building heights. Further, existing City policy requiring development applicants, if applicable, to obtain "determinations of no hazard" from the FAA, and to comply with any conditions set forth by the FAA in such determinations, will continue. The FAA retains discretion to determine whether any proposed structure elevation would constitute a hazard to aviation. The City can only presume that the FAA would allow a structure to be as tall as indicated under Scenario 4.

Exhibit 1 depicts the 3-mile airspace protection surface coverage for Scenario 4. OEI protection for Runway 30L/30R departures is maintained in this scenario. OEI impacts for northbound departures were not evaluated as part of this study and any impacts to airline operations as it pertains to PAX and/or cargo penalties is unknown. For Runways 30L/30R, straight-out OEI corridor protection is maintained in the Scenario 4 composite airspace. **Exhibit 2** depicts the Scenario 4 composite airspace height limits over the Downtown Core and Diridon Station Area.



LEGEND

Lowest TERPS obstacle clearance surface (OCS), edge or intersection

230' — Lowest TERPS OCS elevation contour (feet NAVD88)

Lowest One-Engine Inoperative (OEI) (Runways 30L/30R) obstacle clearance surface (OCS), edge or intersection

230' — Lowest OEI (Runways 30L/30R) OCS elevation contour (feet NAVD88)

Downtown Core & Diridon Station Study Areas

DRAFT WORK PRODUCT
February 13, 2019

NORTH ARROW

N
W E
S

0 2,000 4,000 8,000 Feet

COMPOSITE AIRSPACE PROTECTION SURFACES

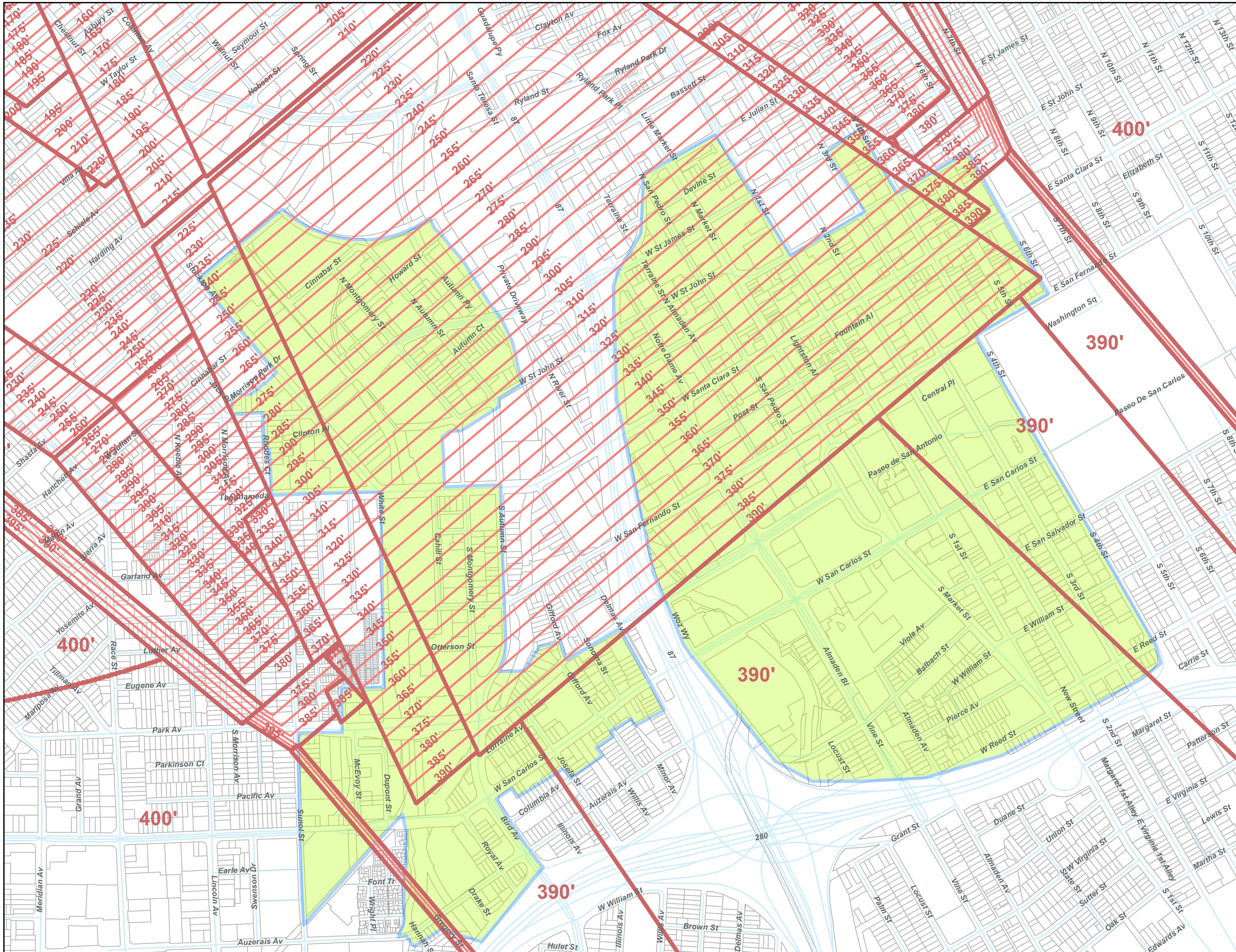
SAN JOSE INTERNATIONAL AIRPORT

February 13, 2019

Exhibit:

1

Aviation Planning at the Leading Edge



LEGEND

Lowest TERPS obstacle clearance surface (OCS), edge or intersection

—230'— Lowest TERPS OCS elevation contour (feet NAVD88)

DRAFT WORK PRODUCT
February 13, 2019

NORTH ARROW

N / S / E / W

0 800 1,600 Feet

COMPOSITE AIRSPACE PROTECTION SURFACES

SAN JOSE INTERNATIONAL AIRPORT

February 13, 2019

Exhibit: 2

L&B — Aviation Planning at the Leading Edge

TO: JUDY ROSS, ASSISTANT DIRECTOR, MINETA SAN JOSÉ INTERNATIONAL AIRPORT

FROM: LANDRUM & BROWN, INC.

DATE: FEBRUARY 19, 2019

RE: DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY (PROJECT DADCS)
AIRPORT CASE STUDIES MEMORADUM

DRAFT WORK PRODUCT

Introduction

As part of the Downtown San José Airspace and Development Capacity Study (Project DADCS), three airport case studies were conducted to better understand how other airports and the local development community has worked together to resolve issues of airspace protection and their impacts on proposed developments surrounding the airport environment. As part of the case studies, Landrum & Brown conducted phone interview with staff from the following airports:

- Miami International Airport (MIA)
- Ronald Reagan Washington National Airport (DCA)
- Las Vegas McCarran International Airport (LAS) (later removed due to concerns from the Clark County Department of Aviation, the airport owner, regarding how the information could be used)

Based on the information received from the interviews, the following describes each airport's airspace protection regulatory and policy framework, the development issues faced in the airport area, and the similarities and differences to San Jose's situation along with the best practices used for dealing with airspace protection and high-rise development.

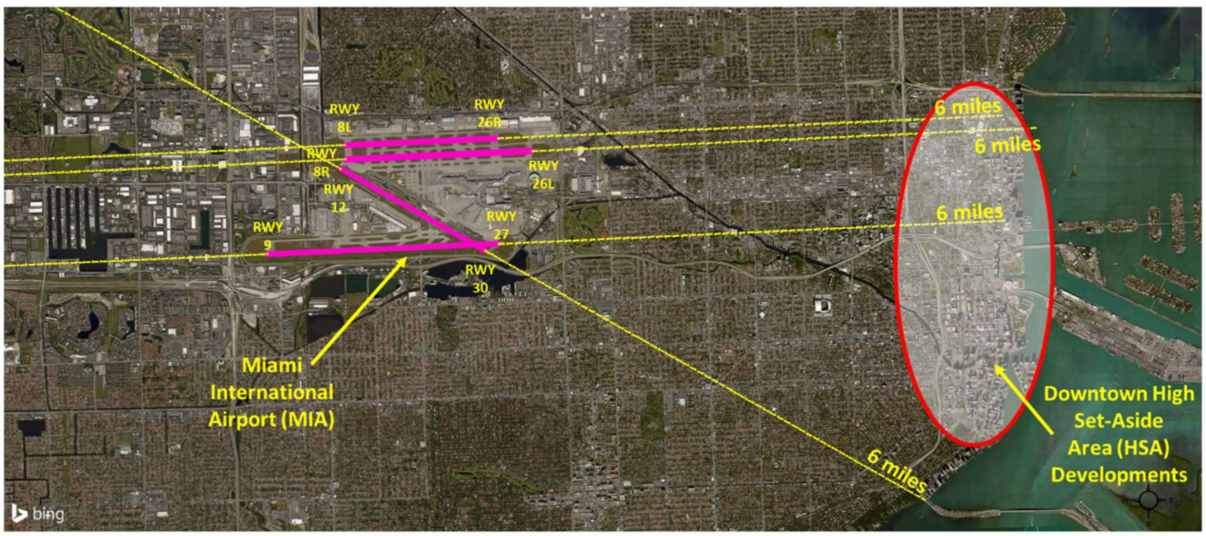
Miami International Airport (MIA) Case Study

Airport Overview

Miami International Airport (MIA) is located in Miami, Florida and is operated by the Miami Dade Aviation Department (MDAD). **Figure 1** depicts the existing runway configuration at MIA and the downtown high-rise development area. MIA operates four active runways Runway 08L/26R (8,600 feet x 150 feet), Runway 08R/26L (10,506 feet x 200 feet), Runway 09/27 (13,016 feet x 150 feet) and Runway 12/30 (9,355 feet x 150 feet), three of which send departures over the downtown high-rise area during west flow conditions.

Downtown is located approximately six miles to the east of the airport. Given the distance between the runway departure ends and the downtown high-rise area, airlines do not experience OEI weight penalties and range impacts.

Figure 1: MIA Airport Runway Configuration



Source: Landrum & Brown

Airspace Protection

In 1969, Miami-Dade County (airport operator) established airport height zoning districts enforced by an official Height Zoning Code. The protected airspace surfaces are mostly modeled after FAA airspace safety criteria contained in 14 CFR Part 77. In general, the airspace protection surfaces conform to Part 77 surface standards, however in some cases, airspace protection is more restrictive than the Part 77 imaginary surfaces. MDAD does protect for OEI corridors, which slope upward at a 65:1 surface slope for Runways 8R/26L and 12/30. For both runways, the initial 10,000 feet of the instrument approach surface has a slope of 65:1 with an additional 40,000 feet at a slope of 40:1.

For Runway 9/27, the initial 10,000 feet of the instrument approach district has a slope of 50:1 with an additional 40,000 feet at a slope of 40:1, which is consistent with Part 77 standards.

The Miami-Dade County Height Zoning Code is explicit and municipalities and communities have to follow the code. MDAD does not issue any variances to the height limitations and will not approve any developments that exceed the airspace heights established as part of the code. MDAD also has memorandums of understanding with local municipalities to ensure that they abide by and enforce the Height Zoning Code for proposed developments.

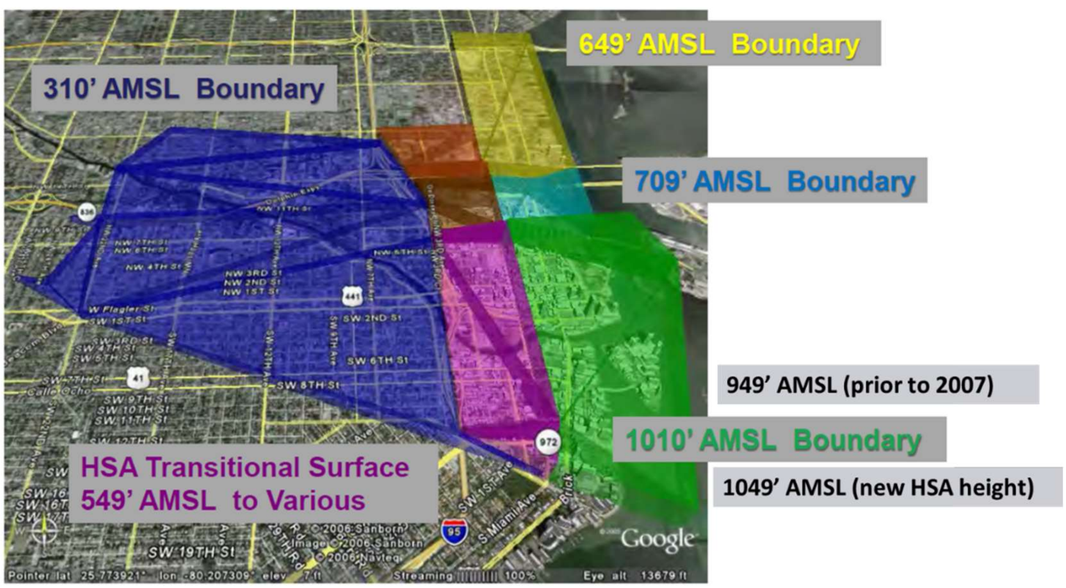
As part of the zoning code, developers are required to file an application with the local municipality and MDAD also requires that the developer to comply with Part 77 by filing a 7460-1 "Notice of Proposed Construction or Alteration" form with the FAA to initiate an airspace study of the proposed development. If the FAA issues a favorable "determination of no hazard", MDAD will issue a letter of approval to the developer.

There have been cases where a developer has built a structure that penetrated the protected airspace surfaces. MDAD notified the developer by letter and ensured that the incompatible structure height was lowered, as required under the zoning code.

Examples of Collaboration Between the Airport and the Local Development Community

As part of the Height Zoning Code, "high structure-set aside districts (HSAs)" are established. These areas are located between 4-6 miles east of the Airport, including downtown, where high-rise development is most prominent or desired. **Figure 2** depicts the HSA development areas and the associated height limit at the outer edge of each of the individual areas.

Figure 2: MDAD High-Set Aside District Areas Heights Limits



Source: Airspace Solutions and Protection in the City of Miami; "Changes in Zoning Surfaces and UAV Restrictions" presentation. Jose A. Ramos, Division Director of Aviation Planning, Land Use and Grants. December 15, 2015.

In 2014 the local development community proposed a change to the Height Zoning Code to allow additional high-rise development heights in downtown Miami. The proposal was to raise the ceiling of the HSA from a maximum of 1,010 feet above mean sea level (MSL) to 1,049 feet above MSL. MDAD reached out to airlines at MIA to engage them in the analysis of potential impacts to their aircraft operations. The airlines evaluated and verified that there would be no impacts to departure payloads with the proposed airspace protection modifications, however they were concerned with the prospect of losing non-precision approaches. MDAD, provided this feedback to the FAA and a collaborative effort over the course of three years was undertaken to evaluate the proposed change to the zoning code. The outcome of the process was that airlines at MIA confirmed that the increase to the 1,049-foot MSL height would have no impact on departure payloads and OEI as straight-out OEI protection surfaces do not directly overfly the 1,049-foot MSL HSA zone.

Similarities, Difference and Best Practices for Airspace Protection

Figure 3 summarizes some of the similarities, differences and best practices for that MDAD use for airspace protection at MIA as compared to airspace protection practices at SJC.

Figure 3: Similarities, Differences and Best Practices for Airspace Protection

Similarities	Airport works with developers identifying available heights Protects for OEI
Differences	High-rise development areas 4-6 miles from runways, much of which are outside of flight corridors Height Zoning Code based primarily on Part 77 and protection for OEI MDAD has approval authority over development projects Straight-out OEI on two runways at 65:1 slopes for first 10,000 feet
Best Practices	Height Zoning Code that protects airspace and allows for high-rise development in certain areas Airport, airlines, development community, and FAA work collaboratively to proposed changes to Height Zoning Code

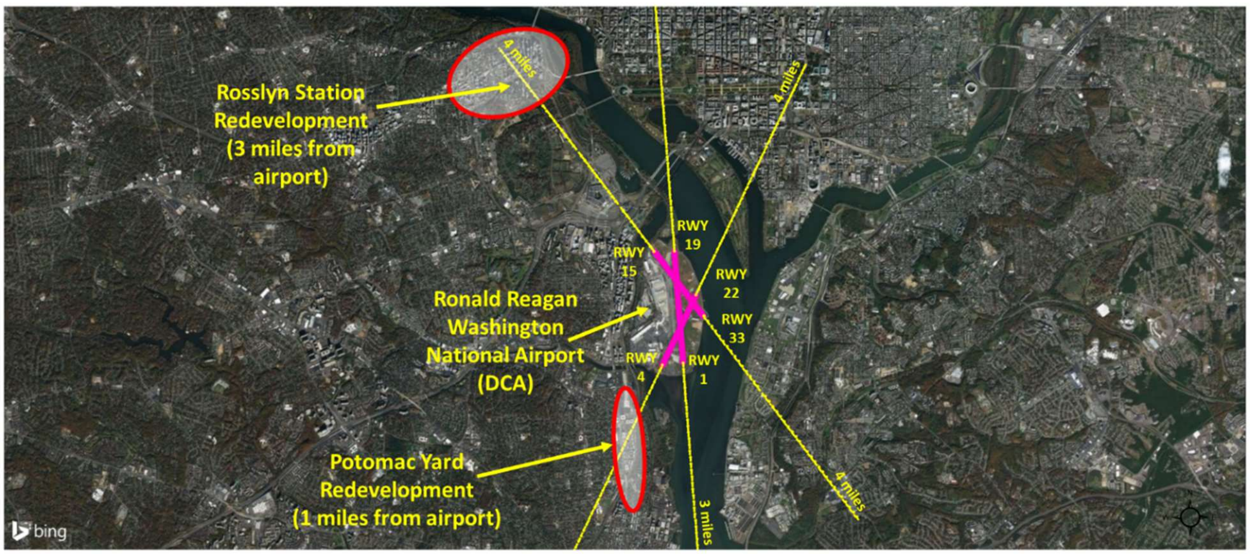
Ronald Reagan Washington National Airport (DCA) Case Study

Airport Overview

Ronald Reagan Washington National Airport (DCA) is located in Arlington, Virginia and is operated by the Metropolitan Washington Airports Authority (MWAA). MWAA also operates Washington Dulles International Airport (IAD). **Figure 4** depicts the existing runway configuration at DCA. DCA operates three active runways Runway 01/19 (7,169 feet x 150 feet), Runway 15/33 (5,204 feet x 150 feet) and Runway 04/22 (5,000 feet x 150 feet). Currently, new high-rise development is taking place in Arlington Country, specifically in the Rosslyn Station area which is located approximately 3 miles northwest of the Airport.

Arlington County, specifically Roselyn, Part 77, TERPS and OEI composite map for Runway 01 and 33

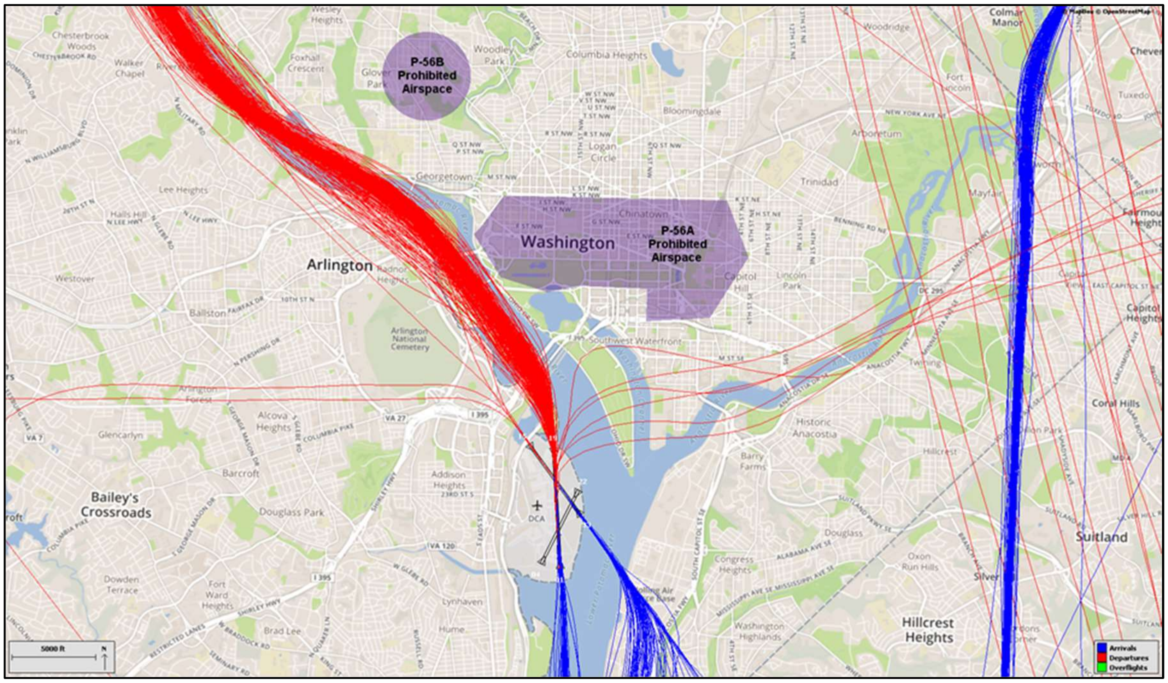
Figure 4: DCA Airport Runway Configuration



Source: Landrum & Brown

When operating in north flow, departure flight tracks from Runway 33 are generally routed north and follow the path of the Potomac River as depicted in the in **Figure 5**. Flight tracks (both arrivals and departures must remain clear of the federally protected P-56 airspace. Within the P-56 airspace, operation of commercial and private aircraft near the White House, U.S. National Mall and the Naval Observatory is prohibited which makes options for OEI corridor alignment very restrictive.

Figure 5: Departure Flight Tracks from Runway 33 at DCA



Source: *The Metropolitan Washington Airport Authority (MWAA)*

Airspace Protection Surfaces

The MWAA produces composite airspace surface protection mapping to provide guidance for airspace height limitations surrounding the Airport. Airspace protection mapping consists of a combination of the lowest controlling FAR Part 77 imaginary, TERPS and OEI surfaces surrounding the Airport. Airspace protection at DCA is not governed by law or enforced by an ordinance, rather it is policy based and used as a planning tool by MWAA to protect the airspace from obstacles which may have an adverse impact on aviation operations. MWAA work directly with airlines operating at DCA to maintain OEI airspace protection corridors to ensure departure operations in north flow are not impacted by incompatible obstacles. Given the defined OEI protection corridors for Runways 01 and 33 at DCA, OEI protection is not an issue for Airlines at the DCA as the primary flight tracks follow the Potomac River and airspace protection surfaces limit heights of building developments.

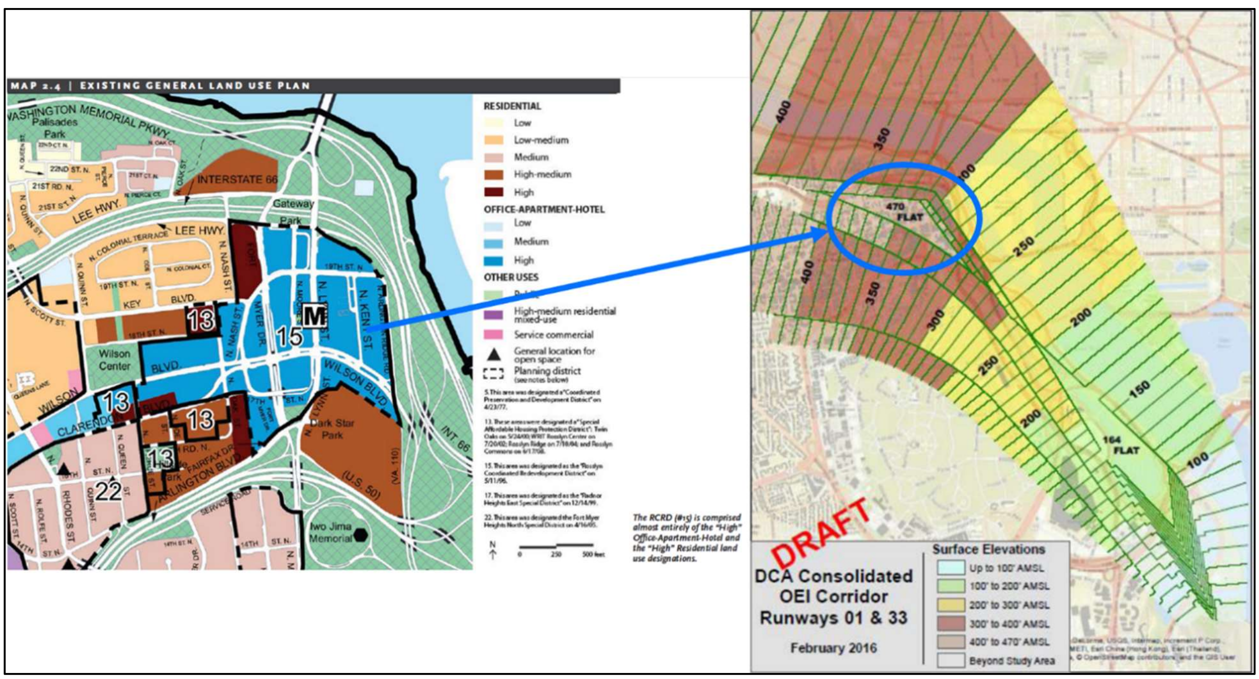
Developers that seek guidance pertaining to building height impacts on aviation operations at DCA will often coordinate directly with MWAA. However, the formal process for an official airspace evaluation is to require property developers in the vicinity of DCA to file a FAA 7460-1 “Notice of Proposed Construction or Alteration” form with the FAA so that a formal airspace evaluation can be initiated. MWAA receives notifications and monitors the FAA’s Obstacle Evaluation/Airport Airspace Analysis (OE/AAA) system for submissions of proposed developments, status updates and final determinations that are accessible from the system. During the OE/AAA evaluation process, if the FAA provides a determination of no hazard to a potential development with heights that may not impact TERPS, but may exceed to OEI corridor height limitations, MWAA will typically try to petition the FAA to consider lowering the determination height. However, this has varied success rates according to MWAA staff. It should be noted that the OEI composite airspace protection mapping developed by MWAA is not enforced by the FAA, however MWAA and the FAA have a collaborative working relationship to help protect the interest of the aviation community.

According to MWAA staff, there have been cases when pressure from outside entities to raises FAA arrival and departure minimums for aircraft operations to foster increased developments surrounding the Airport. However, impacts to the aviation community at DCA is a priority and MWAA does not typically promote increasing arrival and departure procedures minimums at DCA, which would raise protected airspace surfaces to accommodate taller developments surrounding the Airport.

Examples of Collaboration Between the Airport and the Local Development Community

Figure 6 depicts an example of the DCA Consolidated OEI Corridor composite mapping for Runways 01 and 33. The mapping primarily consist of several OEI corridors with various surface slopes, however MWAA staff worked with the airlines and the FAA to modify OEI protection heights by assessing the impacts of incorporating a section of heights governed by TERPS into the composite OEI protection mapping.

Figure 6: DCA Consolidated OEI Corridors – Runways 01 & 33



Source: The Metropolitan Washington Airport Authority (MWAA)

A land use redevelopment known as the Rosslyn Coordinated Development District (RCRD) in Arlington, Virginia, which is located approximately 3 miles northwest of DCA, consist of the redevelopment of the Rosslyn Station Area (RSA). RSA redevelopment includes various developments including high-rise building developments. During the planning process for RSA, it was determined that the existing OEI protection surfaces over RCRD would limit the ability to build high-rise developments to desired heights.

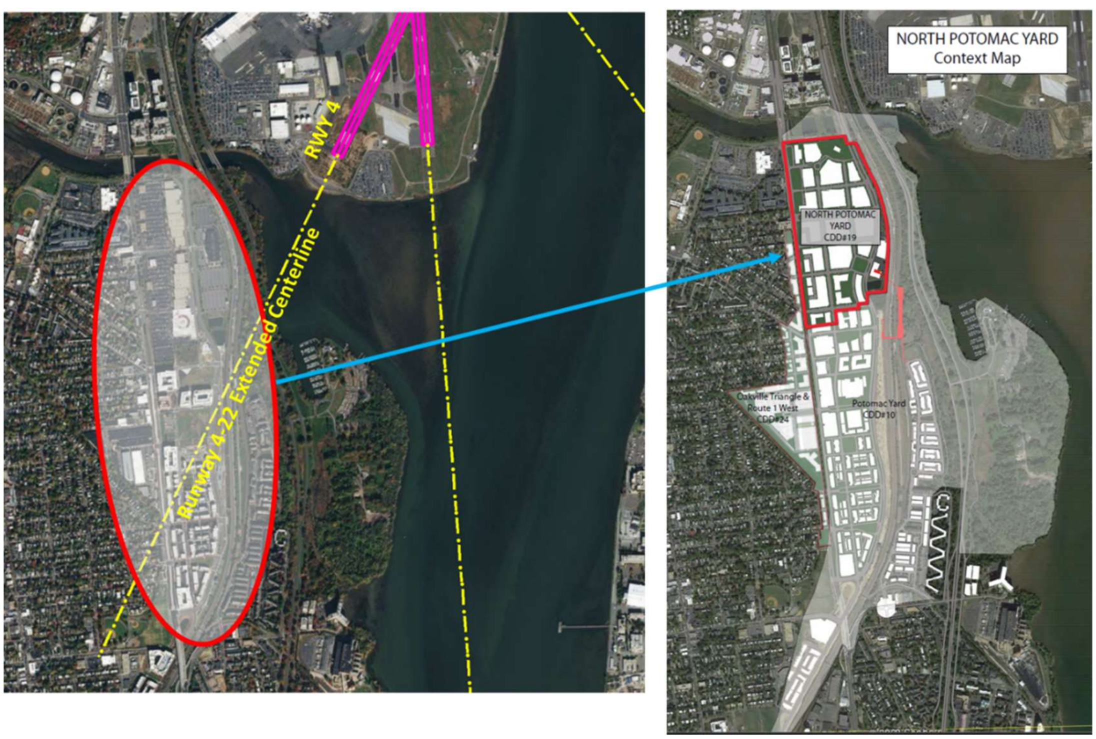
Property developers desired additional development height within the RCRD to accommodate taller structures which would require modifications to the OEI protection heights. The lowest governing

TERPS surface within this area is a non-precision instrument Vertical Navigation (VNAV) surface with a height of 470 feet above MSL. This surface is a flat surface which will allow for the additional heights for high-rise developments within the RCRD. Through coordination with the airlines, it was determined that the additional heights would not have adverse impacts on OEI operations at DCA. Additionally, there would be no impacts to TERPS according to the FAA, so MWAA modified the OEI protection surfaces and incorporated the 470 feet AMSL flat surface protection over the desire high-rise development area.

Another example of MWAA coordination with the local development community involves the redevelopment of the North Potomac Yard, located approximately 1 mile southwest of DCA and directly under the final approach and departure of Runway 04/22. As depicted in **Figure 7**, the North Potomac Yard redevelopment consists of various commercial and residential developments. Property developers requested additional development heights as primary airspace protection over North Potomac Yard is governed by FAR Part 77 imaginary surfaces according to MWAA's composite airspace surface protection map.

To allow increased development heights in this area, MWAA worked with the airlines and the FAA to increase the glide path angle (GPA) for approaches to Runway 04 at DCA. Runway 04 at DCA is a non-precision instrument runway with visibility minimums greater than ¾ statute miles and is not a primary arrival runway at the Airport, therefore increases to the GPA for this runway would have minimal impacts on aviation operations. There was no impact to OEI operations as Runway 22 is not a primary departure runway and aircraft departure in South Flow would primarily use Runway 33 with a flight path following the Potomac River.

Figure 7: North Potomac Yard Redevelopment Area Proximity to Runway 4 at DCA



Source: Landrum & Brown and https://www.alexandriava.gov/uploadedFiles/PYLandbayMap.pdf

Similarities, Difference and Best Practices for Airspace Protection

Figure 8 summarizes some of the similarities, differences and best practices for that MWAA use for airspace protection at DCA as compared to airspace protection practices at SJC.

Figure 8: Similarities, Differences and Best Practices for Airspace Protection

Similarities	Airport works with developers identifying available heights Use of Part 77, TERPS and OEI composite airspace height mapping Rosslyn high-rise development area 3.0 miles from runway along flight path Potomac Yard redevelopment area 1.0 miles from runway along flight path Policy-based
Differences	Unique OEI corridors based on restricted airspace
Best Practices	Redevelopment plans integrating airspace protection surfaces FAA, Airport and development community coordination to adjust procedures

Source: Landrum & Brown

TO: JUDY ROSS, ASSISTANT DIRECTOR, MINETA SAN JOSÉ INTERNATIONAL AIRPORT

FROM: LANDRUM & BROWN, INC. AND JONES LANG LASALLE

DATE: MARCH 6, 2019 REV MAY 22, 2019

RE: DOWNTOWN AIRSPACE AND DEVELOPMENT CAPACITY STUDY (PROJECT DADCS) REAL ESTATE IMPACTS ASSESSMENT

DRAFT WORK PRODUCT

Executive Summary

This memorandum reports the assumptions, methodology, and findings of an assessment and comparison between aviation and real estate related economic gains and losses associated with airspace protection Scenarios considered under the Downtown Airspace and Development Capacity Study (DADCS).

For reference, the following airspace protection Scenarios were evaluated:

- **Scenario 1: Existing airspace protection**
  - Existing West OEI Corridor and straight-out ICAO OEI surface protection for Runways 12L/12R
  - Used as the base case and comparison to potential heights gained in other Scenarios
- **Scenario 4: No OEI protection/TERPS Only**
  - Removal of existing straight-out and West OEI Corridor surface protection for Runways 12L/12R
  - TERPS Only scenario would essentially provide increased development heights over Downtown Core and Diridon Station Area
- **Scenario 7: Straight-out OEI protection without West OEI Corridor**
  - Maintain existing straight-out OEI surface protection for Runway 12L/12R departures
  - West OEI corridor would be removed, allowing for additional development height within Diridon Station Area
- **Scenario 9: No OEI protection, increased FAA height limits**
  - Assumes that the lowest TERPS departure surface climb gradient protection (261 feet/NM and 290 feet/NM) would be eliminated for Runway 12L/12R and non-precision instrument circling approach surface heights would be increased
  - Assumes no changes to vertically guided precision instrument approach procedures for Runway 30L/30R operations

- **Scenario 10: Modified West OEI Corridor at defined development heights**
  - Assumes that the surface slope of the West OEI Corridor could be adjusted to allow for additional development heights in Diridon Station Area
  - Incremental surface slopes adjustments conducted to determine the impact on aircraft performance and development height

Scenario 1 describes airspace protection zone ceiling heights under existing OEI and TERPS. The remaining Scenarios describe increases in airspace protection zone ceiling heights associated with various modifications to each procedure. **Increases in ceiling heights under each scenario must be compensated by reductions in aircraft departure weights during airport south flow conditions**. These “weight penalties” were calculated for each airspace protection scenario. Similarly, the local economic benefits of increasing ceiling heights for new development within each scenario was also calculated.

The weight penalty/building height trade-off creates two opposing economic effects. Raising existing ceiling heights can adversely affect the level of airline service through the imposition of weight penalties. Loss of airline service reduces regional connectivity and the agglomerative effects of the airport on the economic geography of the region- particularly how and where industries tend to cluster. By contrast, raising existing ceiling heights positively affects potential real estate development density. Increases in development density enhance the agglomerative effects of real estate development- in terms of how firms and residents make locational decisions.

The objective of this economic analysis was to quantify these opposing effects under each scenario for comparative purposes.

Study Methodology

The general approach used in the study was to measure existing levels of aviation and real estate development related local industry output and employment, then measure changes in those levels caused by adjustments in ceiling heights under each airspace protection scenario. Direct aviation related economic impacts were calculated by using weight penalties assessed under each scenario to estimate passenger and visitor losses that were then used to calculate lost aviation related industry output. Lost industry output was measured as reductions in airline revenue and local expenditures by passengers and visitors. Direct real estate related economic impacts were calculated by using elevations in airspace protection zone ceiling heights under each scenario to estimate new development potential square footage that was then used to predict gained real estate related industry output. Gained real estate related industry output was measured as increases in construction expenditures and office space absorption related employment.

IMPLAN economic impact forecasting software was then used to simulate induced and total overall economic impacts across all local industrial sectors. The study area was defined as only the City of San José, although the economic impacts associated with aviation activity and real estate development are spread throughout the region (on other areas of Santa Clara County, Silicon Valley, and the Greater Bay Area).

Existing economic variables and forecasts were used as inputs into IMPLAN to project future economic growth in the City of San José under Scenario 1 to establish an economic growth baseline. Changes in local forecasted output of both aviation and real estate development related industries related to changes in airspace protection zone ceiling heights were projected for each of the remaining scenarios. IMPLAN estimated the overall effect across all industries that comprise the local economy, and therefore the total economic impact of ceiling height adjustments on the City of San José.

IMPLAN estimates 3 types of economic impact- direct, indirect (supply-chain) and induced (secondary demand). Direct economic impacts are changes in local employment, revenues or expenditures in aviation and real estate related industries that are caused by the changes in ceiling heights. Supply-chain and secondary demand impacts, combined in this study as induced impacts, are economic impacts across all local industries that are caused by the initial set of direct impacts. The study period is 2019 through 2038, although the economic impacts from both aviation activity losses and real estate development gains are not expected to occur until the year 2032.

Direct Economic Impacts

<u>Direct Aviation Related Impacts</u>

Landrum & Brown (L&B) estimated the annual number of passengers lost when reductions in aircraft departure weights ("weight penalties") during south flow conditions are applied under each scenario. Passenger "losses" occur when the number of weight-restricted seats on a flight exceeds the typical number of empty (unsold) seats. This calculation is made on the basis of the following considerations:

- directional flow of airport departures (which flights are affected)
- aircraft seating capacity
- distance to market served
- time of year
- flight frequency
- market load factor

L&B then estimated the portion of annual lost passengers that were visitors to the region. Once the annual number of lost passengers and visitors was estimated, the direct economic impact to airlines, the airport, and the City of San José was measured as reductions in local expenditures by both passengers and visitors. Reductions in passengers and visitors directly impact the local economy in the form of reductions in revenues earned by airlines from passengers and decreases in local spending by passengers and visitors. The following types of airline and airport related revenue reductions were calculated:

- reductions in airline revenues and increases in airline voucher costs (2018 dollars)

- reductions in passenger expenditures at the airport- concessions sales (2018 dollars)
- reductions in Passenger Facility Charge (PFC) revenue to the airport (2018 dollars)
- reductions in local spending by visitors within the city of San José (2018 dollars)

Direct Aviation Related Economic Impacts

Metric	Year and Scenario					
	2032		2036		2038	
	Scenario 4 No OEI	Scenario 9 No OEI, incr. height	Scenario 4 No OEI	Scenario 9 No OEI, incr. height	Scenario 4 No OEI	Scenario 9 No OEI, incr. height
Lost enplanements	(1,434)	(8,599)	(1,628)	(9,710)	(1,716)	(10,237)
Lost visitors	(384)	(2,532)	(436)	(2,859)	(459)	(3,014)
Lost Airline revenue	($ 979,429)	($5,849,839)	($1,111,959)	($6,606,156)	($1,171,781)	($6,964,187)
Passenger vouchers	($286,825)	($1,719,825)	($325,639)	($1,942,039)	($343,158)	($2,07,358)
Lost visitor expenditures	($1,083,063)	($5460,878)	($1,224,982)	($6,163,749)	($1,292,206)	($6,495,390)
Lost Passenger expenditures	(55,285)	($303,177)	($62,529)	($342,046)	($65,961)	($360,370)
Lost PFCs	($15,425)	($77,424)	($17,465)	($87,500)	($18,485)	($92,538)

The earliest year that passenger losses are assumed to occur is the year 2032, when Diridon Station Area estimated existing development potential (Scenario 1) is exceeded by development potential estimated under each scenario. This difference is referred to in this study as "net new development density", when existing Diridon Station Area development potential is fully absorbed and new construction begins to add net new development density. L&B also estimates that these losses occur only under Scenarios 4 and 9. Lost passenger traffic, number of visitors, and associated lost aviation related revenue under these two scenarios is illustrated for selected years in the table above. Between 2032 and 2038 these losses growth at an average annual compounded rate of approximately 3.5%.

Direct Real Estate Related Impacts

Real estate related economic impacts are derived from increases in **development potential** or **"net new development density"** that are associated with the elevation of air protection zones under each scenario. Jones Lang LaSalle (JLL) estimated total **existing available density** under the current TERPS and OEI protection zone (Scenario 1) ceiling heights for both the Downtown Core and the Diridon Station Area using the following:

- minimum floor requirement of 14 feet per
- exiting building heights
- existing parcel footprints

An estimate was then made of existing total potential density under Scenario 1. Average annual absorption (excluding build to suit projects) of existing density was also calculated based on:

- distribution between the rate of absorption between office and residential use
- annual amount of square footage absorbed for both office and residential use

JLL then estimated existing development potential as the difference between:

- existing available density
- annual absorption
- existing total potential density

Downtown Core

JLL concluded that without increasing the height limits on development in the Downtown Core, there is significant enough "room" for new density that any increases to the height limits may not have a meaningful impact for a long period of time (70 years for office construction and 55 years for residential construction) based on current rates of absorption. There are then no anticipated increases in economic activity related to real estate development that can be attributed to an increase inf ceiling heights under any of the scenarios.

Diridon Station Area

For the Diridon Area, 55 parcels were identified that satisfied the following development criteria:

- located within the airspace protection zone
- are of sufficient size for development
- have an existing underproductive, or underutilized use or is undeveloped

Using the above methodology, JLL then calculated on an annual basis the development potential under each scenario. The "net new development density" (the difference between Scenario 1 and the development potential of each scenarios was measured in terms of the net new square footage available for residential and commercial development on an annual basis. Assumptions were then made as the extent to which net new density would be constructed and absorbed by the Diridon Station Area residential and commercial real estate markets, using a 90%/10% mix between residential and commercial construction. JLL estimated annual increases in the following real estate related economic variables:

- residential construction expenditures (2018 dollars)
- commercial construction expenditures (2018 dollars)
- permanent absorption related employment (individuals)
- annual tax revenues (2018 dollars)
- one-time tax revenues (2018 dollars)
- permanent residents (individuals)

IMPLAN software limits the economic variables that can be used to illustrate the economic impact of a policy choice. Therefore, only residential and commercial construction expenditures and employment related to the absorption of net new office construction could be used in the study. IMPLAN software determines the remaining changes in economic variable values by its own internal calculations.

Annual increases in estimated amounts of both construction expenditures and absorption related employment are equal under Scenarios 4, 7, 9, 10c and 10d throughout the study period. Direct economic gains from each are larger than those of Scenarios 10a and 10b. This is because they produced larger annual construction expenditures and cumulative absorption related employment over the study period. Scenarios 7, 10a, 10b, 10c and 10d produce no aviation related losses. Therefore, over the study period these Scenarios can be evaluated on the basis of the economic gains they produce and other aeronautical considerations and need not be compared to coincidental aviation related economic loses. Scenarios 4 and 9 have the same annual direct economic impact each year. Direct economic impacts under each scenario are shown in the table below. Because annual increases in employment are assumed to be permanent employment, gains are cumulative.

Direct Real Estate Related Economic Impacts, Scenarios 4 and 9

Metric	2032	2036	2038
Net new square feet	637,500	637,500	637,500
Net-new commercial construction	$15,170,000	$15,170,000	$15,170,000
Net-new residential construction	$340,170,000	$340,170,000	$340,170,000
Absorption related employment	230	1,150	1,610

Source: Landrum & Brown

Adjusted Direct, Induced and Total Economic Impacts

Estimates of decreases in aviation related outputs that were estimated by L&B and increases in key real estate outputs developed by JLL for each airspace protection scenario were then used as inputs into the IMPLAN software to simulate changes in the City of San José baseline economic forecasts across all industries. Inputs were made as either expenditure increases or reduces, or as increases in employment. Each input was assigned to the industrial sector of the NAICS (North American Industrial Classification System) where it was expected to occur.

Broad descriptions of expenditures, such as visitor spending or passenger spending at the airport (concessions), were distributed to more detail industrial classifications. For example, visitor spending was assigned to more narrowly defined industrial sectors such as hotel, restaurants, retail sales and other such industry classes. The amount of each estimated direct expenditure was adjusted by IMPLAN to account for the extent to which it could be satisfied by locally produced goods and services. Increases and decreases in expenditures by industry were also codified as increase and decreases in employment by industry sector.

Adjusted Direct and Induced and Aviation Related Economic Impacts, Scenarios 4 and 9

Type	Scenario	Year					
		2032		2036		2038	
		Employ.	Regional GDP	Employ.	Regional GDP	Employ.	Regional GDP
Adjusted Direct	4	(18)	($1,267,000)	(20)	($1,406,000)	(21)	($1,464,000)
Induced		(5)	($566,000)	(5)	($629,000)	(5)	($655,000)
Adjusted Direct	9	(94)	($6,921,000)	(104)	($7,635,000)	(109)	($7,964,000)
Induced		(26)	($3,108,000)	(28)	($3,436,000)	(30)	($3,584,000)

Source: Landrum & Brown

Adjusted Direct and Induced and Real Estate Related Economic Impacts, Scenarios 4 and 9

Type	Scenario	Year					
		2032		2036		2038	
		Employ.	Regional GDP	Employ.	Regional GDP	Employ.	Regional GDP
Adjusted Direct	4, 9	1,463	$188,290,000	2,383	$406,588,000	2,843	$511,631,000
Induced		882	$97,610,000	1,651	$190,131,000	2,023	$234,896,000

Source: Landrum & Brown

Each simulation resulted in the multiplication of direct impacts based on additional economic exchanges it induced in the local economy. For example, when an airport worker loses his or her job, they lose wages that would have been used to make purchases, many of which would be local. Because lost local purchases represent reductions in income to local business and labor, another round of economic reductions is put in motion. Through this process, additional economic loses are induced. Direct and induced impacts are summed to produce total economic impacts. Adjusted direct and induced aviation related and real estate related economic impacts are summarized in the tables above for study years 2032, 2036 and 2038.

Comparison of Total Aviation and Real Estate Impacts

Since there are no estimated aviation related losses associated with Scenarios 7, 10c and 10d, only Scenarios 4 and 9 need be assessed for comparative purposes. Scenarios 7, 10c and 10d are shown below however, for economic impact assessment purposes. Scenarios 10a and 10b were dropped from the analysis because Scenarios 7, 10c and 10d produced higher economic gains than either. The table below reports results for the years 2032, 2036 and 2038.

Net Economic Impacts by Scenario

Scenario	Year	Aviation Related Impacts		Real Estate Related Impacts		Net Economic Impact	
		Employment	Regional GDP	Employment	Regional GDP	Employment	Regional GDP
		(Losses)	(Losses)	Gains	Gains	Gains	Gains
4	2032	(23)	($1,833,000)	2,345	$285,901,000	2,322	$284,068,000
	2036	(25)	($2,035,000)	4,034	$596,718,000	4,009	$594,683,000
	2038	(26)	($2,119,000)	4,866	$746,527,000	4,840	$744,408,000
9	2032	(120)	($10,028,000)	2,345	$285,901,000	2,225	$275,873,000
	2036	(132)	($11,070,000)	4,034	$596,718,000	3,902	$585,648,000
	2038	(138)	($11,548,000)	4,866	$746,527,000	4,728	$734,979,000
7, 10c, 10d	2032	(0)	($)	2,345	$285,901,000	2,345	$285,901,000
	2036	(0)	($)	4,034	$596,718,000	4,034	$596,718,000
	2038	(0)	($)	4,866	$746,527,000	4,866	$746,527,000

Source: Landrum & Brown

Local Tax Implications

The table below shows estimated one-time and annual real estate and sale tax increases associated with each scenario. Amounts indicated represent the net difference between tax revenue increases from real estate economic gains and decreases from aviation related economic losses. One-time taxes were estimated by JLL and include increases in building, parking and school district fees and development taxes. JLL also estimated increase in annual real estate tax revenues. Annual sales tax revenues were estimated by L&B by apportioning net annual sales tax increases between the State, County and City of San José.

Estimated One-Time Real Estate and Annual Real Estate and Net Local Sales Tax Increases

Scenario	One-Time Real Estate	2032		2036		2038	
		Annual Real Estate Tax	Annual Sales Tax (San José)	Annual Real Estate Tax	Annual Sales Tax (San José)	Annual Real Estate Tax	Annual Sales Tax (San José)
4	$320,320,000	$450,600	$106,800	$450,600	$203,300	$450,600	$249,700
7	$314,590,000	$450,600	$110,000	$450,600	$206,800	$450,600	$253,400
9	$366,450,000	$450,600	$92,200	$450,600	$187,200	$450,600	$232,900
10a	$41,040,000	$450,600	$110,000	$0	$57,700	$0	$57,700
10b	$116,590,000	$450,600	$110,000	$181,600	$141,100	$13,100	$137,400
10c	$183,120,000	$450,600	$110,000	$450,600	$206,800	$391,600	$226,800

10c	$255,340,000	$450,600	$110,000	$450,600	$206,800	$450,600	$253,400

Source: Landrum & Brown

Observations and Conclusions

- Annual and total economic gains related to real estate development of the Diridon Station Area significantly exceed aviation loses in the scenarios where both occur.
- Assuming aviation related economic losses continue to grow at an annual rate of 3.5%, the difference between such losses and real estate related economic gains is expected to persist into the distant future.
- Over the study term, and beyond, Scenario 4 maximizes the difference between real estate related economic gains and aviation related economic loses to the City of San José.

Agglomerative Effects and Other Considerations

Even though economic benefits associated with real estate impacts are relatively larger than losses associated with lost airport activity, caution should be exercised in interpreting these results. While subtle, the diminished agglomerative economic impacts of the airport should not be understated. The airport offers local industries access to global markets, and vice-versa. Domestic and global accessibility offered by the airport positively affects locational decisions of both households and businesses. At the point that operating constraints placed on the airport begin to cause reductions in airport connectivity and connective frequency, those decisions become adversely affected. The airport and airlines that serve it are an essential part of the supply chain of every industry that comprises the greater San José economy. Moreover, the airport helps to establish the region's identity and signals the competitiveness of the region. The point at which the agglomerative effects of the airport start to be diminished is difficult to assess but nonetheless real. This study does not assume any reductions in airport connectivity or connective frequency.

The agglomerative effects related to real estate development of the Diridon Station Area are positive and essential to the success of the infrastructure investment this decision analysis supports. The the economic and environmental benefits of (BART, electrified Caltrain and high-speed rail) investments cannot be realized unless a significant amount of new growth can occur in a compact form around Diridon Station and in downtown San José.

The massing of local consumption demand expands the variety of locally available goods and services, which in turn positively affects the locational decisions of future potential residents. The massing of residents increases the availability of specialized labor, which in turn raises the area's productivity, which then positively affects the locational decisions of firms. This process both supports and is supported by the development of the local infrastructure.

Finally, real estate economic gains estimated in this study will be realized only to the extent that assumed absorption related employment is "new" employment and is not "cannibalized" from absorption related employment that would otherwise take place in other areas of the city.

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Section 1. Aviation Economic Impacts (Direct)

This analysis estimates the revenues lost by the airlines, the airport, and the community as a result of passenger weight penalties for long haul aircraft departures in Southeast Flow. The loss is calculated by taking the average load factor for the impacted flights, by season, and determining the number of additional seats that must be left vacant due to the weight penalty.

Section 1A. Airline Load Factors

Airline load factor refers to the average percentage of occupied seats on airline flights. The Bureau of Transportation Statistics (BTS) Air Carrier Statistics Database (T100) provides average historical load factor data for each season (winter and summer). Load factors for the Hawaii and Transcontinental markets are based on airline departures from SJC. Load factors for the Europe and Asia markets are based on airline departures from the Bay Area (SFO, OAK, and SJC combined) to account for the limited number and fairly recent growth of international service at SJC.

These historical load factors were used to forecast anticipated load factors for the year 2024, the first year assumed to be when new Downtown Core or Diridon Station Area construction reaching the airspace height surfaces of each scenario could be completed.

Table 1 provides the load factors by market region for the past three years. The load factors were adjusted for year 2024 based on passenger forecasts for each market and the seating configuration for the representative aircraft assumed to serve the markets. This was used to determine the average number of projected empty passenger seats. Additional empty passenger seats due to OEI-related weight penalties can then be derived to determine the assumed number of passengers lost per departure.

Table 1: Airline Load Factor by Market by Season – 2015-2018 Three-Year Average

Region	Winter	Summer
Hawaii	89.7%	90.5%
Transcontinental	84.9%	82.2%
Europe	75.1%	88.0%
Asia	79.6%	82.4%

Source: Bureau of Transportation Statistics, Air Carrier Statistics Database

Section 1B. Airport Revenue and Local Economic Spending Losses

Revenue and economic spending losses were calculated based on the number of impacted flights per year due to weight penalties for Southeast Flow departures. According to the Airport Noise and Monitoring Management System (ANOMS) data, an average of 13.0% of all departing flights from 2003 through 2017 at the Airport were in Southeast Flow, more so in winter (22.3% of the time) than in summer (7.0% of the time). It was assumed that these Southeast Flow percentages would remain constant in the future.

In June 2017, Kimley Horn Associates updated the aviation activity forecasts for SJC (2017 forecast) for the proposed update to the Airport Master Plan. The year-over-year growth rates provided were applied to actual 2018 operations. The resulting projection for 2024 is 2,140 flights to Hawaii, 1,940 transcontinental flights, 628 Europe flights, and 888 Asia flights.

The number of annual flights impacted was calculated by applying the South Flow occurrence rates to the number of operations within the season. Based on this information, there will be approximately 83 Europe flights, 112 Asia flights, 280 Hawaii flights, and 250 transcontinental flights in 2024 in South Flow. The lost passengers per operation, provided in the weight penalty analysis, were multiplied by the annual impacted operations. The result was the total number of annual passengers lost. **Table 2** provides the annual lost passengers by scenario for 2024.

Table 2: Summary of 2024 Lost Passengers

Scenarios	Airspace Protection	Baseline
Scenario 1	Existing airspace protection	0
Scenario 4	TERPS Only	908
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	0
Scenario 10	Existing Conditions: 85' - 166' AGL	0
	Opt 10A: 100' - 195' AGL	0
	Opt 10B: 115' - 224' AGL	0
	Opt 10C: 129' - 240' AGL	0
	Opt 10D: 146' - 260' AGL	0
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	6,327

Sources: Bureau of Transportation Statistics, Air Carrier Statistics Database; Bureau of Transportation Statistics, Airline Origin and Destination Survey; Kimley Horn Associates; Landrum & Brown Analysis.

Section 1C. Airline Costs

The BTS Airline Origin and Destination (O&D) Survey was reviewed to determine the average revenue for each of the impacted markets. The total revenue as provided in the O&D survey for each route was divided by the O&D passengers to determine an average passenger revenue. It was assumed that airlines would lose 100% of the passenger revenue for each lost passenger as once the seat was gone, the revenue was lost. Additionally, airlines typically provide vouchers for passengers that are reassigned to a later flight. The amount for each voucher is at the discretion of the airline. For the purpose of this analysis, it was assumed that all airlines would provide a $200 voucher for each lost passenger. The airline cost per lost passenger by market is provided in **Table 3.**

Table 3: Airline Cost Per Lost Passenger

Market	Passenger Revenue	Voucher Cost	Total Airline Cost
Hawaii	$251	$200	$451
Transcontinental	$211	$200	$411
Europe	$658	$200	$858
Asia	$683	$200	$883

Source: Bureau of Transportation Statistics, Airline Origin and Destination Survey

Section 1D. Passenger Facility Charges

The Passenger Facility Charge (PFC) is a federal authorized program allowing airports to charge passengers boarding a flight (enplaned passengers) a fee of up to $4.50 per flight. Airports use these fees to fund FAA-approved projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition. Airlines collect the PFC fees as part of the airline ticket price and remit up to $4.39 to the airport with the airlines retaining the difference. The annual number of lost enplaned passengers was multiplied by SJC's share of the PFC fee, $4.39. The result is the total lost PFC revenue for the Airport.

Section 1E. Airport Concession Revenue

The Airport receives a portion of all concession sales from retail and food/beverage businesses operating within the passenger terminal facilities. The airport revenue on concession sales divided by the number of enplaned passengers for fiscal year (FY) 2018 was used to determine an estimate of $2.26 on Airport concession revenue per enplaned passenger. Multiplying the annual number of lost passengers by $2.26 determines the lost airport concession revenue.

Section 1F. Terminal Concession Spending

The gross concession sales divided by enplaned passengers for FY2018 was used to determine an estimate of passenger spending on concessions. On average, passenger spend $13.60 on concession in the terminal at SJC. The per passenger concession revenue was multiplied by the annual number of lost passengers to determine the concession revenue lost for the local economy.

Section 1G. Additional Loss from Weight Penalties

A recent economic impact report for prepared in 2015 for SJC states that local international visitor spending was $746.94 per passenger and domestic visitor spending was $433.01 per passenger. Per passenger visitor spending is multiplied by the number of annual lost passengers per market to determine the loss in visitor spending to the region.

Section 1H. Lost Revenue Results

In 2024, the number of lost passengers due to weight penalties exceeds the number of available empty seats for only Scenario 4 and Scenario 9. Therefore, these are the only Scenarios with actual direct impacts. Scenario 4 would result in a loss of $1.5 million and Scenario 9 would result in a loss of $9.8 million in 2024. A detailed breakdown of the loss by scenario is provided in **Table 4**.

Table 4: Summary of 2024 Annual Direct Impacts - Baseline

Scenarios		Airline Revenue	PFC Revenue	Terminal Concession Spending (Airport Share)	Terminal Concession Spending (Concession Share)	Additional Loss from Weight Penalties	Total
Scenario 1	Existing airspace protection	$0	$0	$0	$0	$0	$0
Scenario 4	TERPS Only	$802,000	$10,000	$5,000	$31,000	$669,000	$1,517,000
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	$0	$0	$0	$0	$0	$0
Scenario 10	Existing Conditions: 85' - 166' AGL	$0	$0	$0	$0	$0	$0
	Opt 10A: 100' - 195' AGL	$0	$0	$0	$0	$0	$0
	Opt 10B: 115' - 224' AGL	$0	$0	$0	$0	$0	$0
	Opt 10C: 129' - 240' AGL	$0	$0	$0	$0	$0	$0
	Opt 10D: 146' - 260' AGL	$0	$0	$0	$0	$0	$0
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	$5,566,000	$57,000	$32,000	$191,000	$3,966,000	$9,812,000

Sources: Bureau of Transportation Statistics, Air Carrier Statistics Database; Bureau of Transportation Statistics, Airline Origin and Destination Survey; Kimley Horn Associates; Landrum & Brown Analysis.

Section 1I. Lost Revenue Results With Higher Load Factors

In order to determine the potential impact of higher than anticipated load factors, two additional sensitivity scenarios were analyzed. The baseline load factor for 2024 that was provided earlier was tested with load factors of 90% and 95% respectively. The results of this analysis are provided in **Table 5**.

Table 5: Summary of 2024 Annual Direct Impacts – Sensitivity Tests

Scenarios	Airspace Protection	Baseline	90% Load Factor	95% Load Factor
Scenario 1	Existing airspace protection	$0	$0	$0
Scenario 4	TERPS Only	$1,517,000	$6,320,000	$9,007,000
Scenario 7	Straight-Out ICAO OEI surface protection without West OEI Corridor	$0	$1,961,000	$4,455,000
Scenario 10	Existing Conditions: 85' - 166' AGL	$0	$0	$0
	Opt 10A: 100' - 195' AGL	$0	$0	$0
	Opt 10B: 115' - 224' AGL	$0	$0	$0
	Opt 10C: 129' - 240' AGL	$0	$0	$2,268,000
	Opt 10D: 146' - 260' AGL	$0	$3,199,000	$5,776,000
Scenario 9	TERPS only with increased TERPS departure climb gradients and approach procedure minima	$9,812,000	$16,627,000	$19,468,000

Sources: Bureau of Transportation Statistics, Air Carrier Statistics Database; Bureau of Transportation Statistics, Airline Origin and Destination Survey; Kimley Horn Associates; Landrum & Brown Analysis.

Section 2. Aviation Economic Impacts (Induced)

Section 2A. Economic Impact Assessment Methodology

Assessment of economic impacts related to reductions in local spending associated with lost passengers and visitors required estimation of the existing size and economic growth potential of the City of San José local economy. Using IMPLAN, this estimate was calibrated to the existing economic conditions and structure of the local economy. This initial forecast excluded any assumptions pertaining to the imposition of aircraft weight penalties associated with development of new Diridon Station Area development density. As a result, a baseline set of economic forecasts was generated that were unaffected by reductions in local spending associated with lost passenger activity at the airport and visitors to the region. The data sets used for this purpose are shown in **Table 6.**

Estimates of reductions in airline and airport revenues and local visitor spending under each airspace protection scenario were then used as inputs in the IMPLAN software to generate changes in the City of San José baseline economic forecasts for selected years. Of the various airspace protection Scenarios considered in the assessment of the economic impact of new Diridon Station Area development density, only two, Scenarios 4 and 9, indicated measurable direct economic impacts to airline and airport revenues and local visitor spending.

Table 6: IMPLAN Data Sets

IMPLAN Data Sets
U.S. Bureau of Labor Statistics (BLS) Covered Employment and Wages (CEW) program
U.S. Bureau of Economic Analysis (BEA) Regional Economic Information System (REA) program
U.S. Bureau of Economic Analysis Benchmark I/O Accounts of the U.S., BEA Output estimate
BLS Consumer Expenditure Survey
U.S. Census County Business Patterns (CBP) program
U.S. Census Bureau Decennial Census and Population Surveys
U.S. Census Bureau Economic Censuses and Surveys
U.S. Department of Agriculture Census

Source: Source: Principles of Impact Analysis and IMPLAN Applications

Section 2B. Airline and Airport Direct Expenditure Reductions

Table 7 presents estimated direct economic impact of airline and airport lost revenues and local consumption by visitors for selected years. Airline lost revenue is measured as reductions in expenditures by passengers for air transportation services. Airport lost revenue is measured in terms of reductions in passenger expenditures at the airport and reductions in passenger facility charges paid to the airport by passengers. Visitor expenditures are measured based on average expenditures within the city of San José per trip.

L&B estimates that measurable airline and Airport related impacts exceeding the typical unsold seats on a route (accounting for the average load factors presented previously for the specific markets) occur only with regard to passenger related activities for Scenarios 4 and 9 and do not occur at all for cargo related activity under any scenario. The estimated direct reductions in air travel expenditures by passengers and visitors to the City related to Scenarios 4 and 9 are illustrated in **Table 7**. By year 2038, reductions in passenger and visitor related expenditures are projected to reach $16.0 million. Reductions in expenditures related to airline revenues ($9.0 million) and visitor spending ($6.5 million) account for the largest portion of these losses.

Table 7: Airlines and Airport Related Direct Expenditure Reductions (Losses in 1,000's)

	Year ($1,000)									
	2024		**2028**		**2032**		**2036**		**2038**	
Economic Impact Type	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9
Airline Revenue and Vouchers	($802)	($5,566)	($1,107)	($6,594)	($1,266)	($7,562)	($1,438)	($8,540)	($1,515)	($9,003)
Visitor Expenditures	($669)	($3,966)	($941)	($4,750)	($1,083)	($5,461)	($1,225)	($6,164)	($1,292)	($6,495)
Airport Concessions Expenditures	($31)	($222)	($48)	($264)	($47)	($303)	($54)	($342)	($57)	($360)
Airport PFC Construction Expenditures	($16)	($57)	($13)	($67)	($23)	($77)	($26)	($88)	($28)	($93)
Total Aviation Direct Economic Impacts	($1,518)	($9,811)	($2,110)	($11,675)	($2,420)	($13,403)	($2,743)	($15,133)	($2,892)	($15,951)

Source: Landrum & Brown

Section 2C. Airline and Airport Induced Employment (Losses) Impacts

Direct local expenditure reductions by passengers and visitors are used as inputs into the IMPLAN software. The IMPLAN model calibrated by L&B to the economic conditions and structure of the City of San José is used to simulate induced economic impacts. IMPLAN simulates reductions in local spending that are determined by complex economic relationships that define the City's local economy. The direct economic impacts illustrated in **Table 7** were allocated by the industrial sector of the local economy where direct reductions in spending would likely occur. **Table 8** provides a summary of the IMPLAN input choice variables that were factored into this analysis. Visitor expenditures are based on the Bureau of Economic Analysis tourism industry satellite statistic.

Table 8: IMPLAN Input Choice Variable

Selected Industrial Sectors
Airline
Air transportation (408), Air passenger carriers, scheduled 481111
Visitors
Hotels (except casino hotels) with golf courses, tennis. (499) 721110
Bars and restaurants (57, 23)
Retail- miscellaneous store retailers (412)
Performing arts companies (488)
Amusement park and arcades (494)
Other amusement and recreation industries (496)
Water transportation (410)
Transit and ground passenger transportation 412)
Rail transportation (409)
Facilities support services (462)
Office administrative and support services (461)
Real estate (440)
Concessions
All other food and drinking places (503)
Food and beverage stores (400)
Retail- Miscellaneous store retailers (406)
Retail- Miscellaneous store retailers (406) (Duty-Free)
Personal care services (509)
PFC
Construction of other new commercial structures (58)
Architectural, engineering, and related services (449)

Source: 2018 Minnesota IMPLAN Group, Inc.

IMPLAN reports economic impacts in terms of several economic variables that describe the size and changes in the size of the local economy. In this section, economic impact is reported in terms of reductions in local employment. **Table 9** illustrates the economic impact of passenger and visitor spending reductions in terms of related reductions in local permanent employment for the years 2024, 2028, 2032, 2036 and 2038.

The size of estimated employment losses is determined by a number of factors that include, but are not limited to, the size, industrial base, demography and economic composition of the City of San José local economy. Because the study area is defined as the City of San Jose, some economic impacts "leak" into other Santa Clara County cities and other counties that comprise the Bay Area and Silicon Valley. This is due to the fact that some industries where reductions in visitor and passenger spending takes place may not represent a significant portion of the City's industrial base.

By year 2038 projected induced employment associated with Scenario 4 increase to 5 workers, while for Scenario 9 increases to 30 jobs. Total employment losses for each of these Scenarios increase to 26 and 138 respectively by the year 2038.

Table 9: Airline and Airport Related Local Employment Impacts (Losses)

	Year									
	2024		2028		2032		2036		2038	
Economic Impact Type	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9
Direct	(12)	(71)	(14)	(75)	(18)	(94)	(20)	(104)	(21)	(109)
Induced	(3)	(20)	(4)	(23)	(5)	(26)	(5)	(28)	(5)	(30)
Total Employment Impacts	(15)	(91)	(21)	(107)	(23)	(120)	(25)	(132)	(26)	(138)

Source: Landrum & Brown, IMPLAN

Section 2D. Airline and Airport Induced Regional GDP (Losses) Impacts

Regional Gross Domestic Product (GDP) impacts are illustrated in **Table 10**. Direct GDP reductions in each category from **Table 7** have been adjusted to reflect the extent to which reductions in passenger and visitor expenditures occur within the boundaries of the City of San José. For example, in year 2038, $16.0 million in projected direct reductions in airline revenue and other passenger and visitor expenditures have been adjusted down to $8.0 million in direct impacts. This adjustment also reflects the fact that in some industries where expenditure reductions occur, such as retail, expenditures reductions are largely composed of items not locally produced and therefore only marginally impact local GDP.

Table 10: Airline and Airport Related Regional GDP Impacts (Losses in 1,000s)

Year ($1,000s)										
	2024		2028		2032		2036		2038	
Economic Impact Type	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9	Scenario 4	Scenario 9
Direct	($829)	($5,292)	($1,147)	($6,217)	($1,267)	($6,921)	($1,406)	($7,635)	($1,464)	($7,964)
Induced	($371)	($2,380)	($512)	($2,793)	($566)	($3,108)	($629)	($3,436)	($655)	($3,584)
Regional GDP Impacts	($1,200)	($7,672)	($1,659)	($9,010)	($1,833)	($10,028)	($2,035)	($11,070)	($2,119)	($11,548)
Economic Multipliers	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.4	1.5

Source: Landrum & Brown, IMPLAN

By year 2038 total reductions in local GDP are estimated to reach $11.5 million, composed of $8.0 million in direct spending reductions by passengers and visitors and $3.6 million in induced local spending reductions. Adjustments for retail cost of goods sold also account for the relatively low observed economic multipliers.

Table 11 summarizes the total economic impact in 2038 for both aviation and real estate direct impacts driven by new Diridon Station Area development density. By observation aviation impacts are relatively small when compared to real estate impacts. This is due primarily to the condition that aviation impacts are assumed to be marginal and do not reflect changes in the existing airport service market under any airspace protection scenario. At the same time, real estate assessments under each of the Scenarios presented in table 10 include an assumption of a relatively significant increases in permanent employment associated with new Diridon Station Area development density.

Table 11: Total Economic Impact Summary (2038)

Airspace	Aviation Impact		Real Estate Impact	
Scenario	Employment	GDP Gain/Loss	Employment	GDP Gain/Loss
10A	-	-	1,000	$184,000,000
10B	-	-	2,400	$438,000,000
10C	-	-	4,300	$700,000,000
4, 7, 10D	(27)	($2,000,000)	4,900	$747,000,000

Source: Landrum & Brown, IMPLAN

Table 12 summarizes the estimated City of San José local tax implications associated with each of the airspace protection Scenarios and is broken down further by airlines/airport and real estate tax impacts.

Table 12: Estimated City of San José Local Sales Tax

Airspace Scenario	2024		2028		2032		2036		2038	
	Airline /Airport	Real Estate	Airline /Airport	Real Estate	Airline /Airport	Real Estate	Airline /Airport	Real Estate	Airline /Airport	Real Estate
4	($2,100)	-	($2,873)	-	($3,200)	$110,000	($3,500)	$206,800	($3,700)	$253,400
7	-	-	-	-	-	$110,000	-	$206,800	-	$253,400
9	($13,700)	-	($16,002)	-	($17,800)	$110,000	($19,600)	$206,800	($20,500)	$253,400
10A	-	-	-	-	-	$110,000	-	$57,700	-	$57,700
10B	-	-	-	-	-	$110,000	-	$141,100	-	$137,400
10C	-	-	-	-	-	$110,000	-	$206,800	-	$226,800
10D	-	-	-	-	-	$110,000	-	$206,800	-	$253,400

Source: Landrum & Brown, IMPLAN

Section 3. Real Estate Density Impacts

Section 3A. Real Estate Impact Methodology

To assess impacts to real estate development by the airspace protection Scenarios, JLL first identified parcels or collections of parcels which may be candidates for development or redevelopment in the future. Not all areas of the Downtown Core and Diridon Station Area will be impacted by changes to the airspace protection surfaces. Many parcels are already developed with high-density land uses, and/or other "productive" uses (such as city parking garages) which are not redevelopment candidates.

JLL's analysis is based on the following assumptions:

1. Using County parcel data, JLL first identified all parcels that are at least 0.2 acres (or approximately 8,700 square feet) in size.
2. Among those parcels, JLL then conducted a visual survey to identify those parcels that were vacant or underutilized. "Underutilized" parcels include those that have improvements significantly below allowable density afforded by City of San José zoning regulations and the General Plan.
3. Based on the Preliminary Assessment published on August 31, 2018, which estimated that each floor of new construction in Downtown San José is an average of 14 feet in height, JLL calculated

the total existing density available under the current TERPS and OEI protection areas, and used this number to estimate any potential increase in density due to height limit increases (for example, a height limit increase of only 10 feet would not be sufficient to add a new floor, and therefore would not result in increased density).

4. Based on the market analysis in the Preliminary Assessment published on August 31, 2018, since 2009, average annual absorption of office space in San José is 50,000 square feet. Average new delivery of residential units is 750 units, or an average of 450,000 square feet each year (assuming an average of 600 sf per unit based on a survey of new construction in the market). That is, office has historically accounted for approximately 10% of net new demand by square feet compared to residential. The analysis assumes that square footage of new development moving forward comprises 10% office and 90% residential.
    a. It should be noted that this does not include any potential new office construction which may result from build-to-suit projects, as many in Downtown San José have. These dynamics may also change as the economic environment changes and as new development plans are put into place. Predicting the delivery of new build-to-suit projects over period requires predicting which companies will relocate to San José and the extent to which they will require new office buildings of their own (as opposed to renting space in existing buildings). There are no metrics that lend themselves to this assessment, therefore, historical performance of "organic" office and residential demand is used in this analysis as a conservative measure.
5. The analysis assumes 80% lot coverage to calculate the total potential footprint of any new construction. Though the City does not maintain lot coverage standards in its zoning code, there are setback requirements that vary with lot size and land use. A lot coverage assumption of 80% was confirmed as appropriate by City staff.
6. To estimate construction value, JLL's Project and Development Services professionals provided an average "all-in" cost (including hard costs, soft costs, and contingencies) of $534.51/sf for residential and $303.40/sf for office construction.
7. Annual property taxes to the City of San José are calculated at a millage rate of 0.12660 per $100 in assessed value per tax records for Santa Clara County. "Assessed value" for the purposes of this analysis is new construction value, as the assessed value for new buildings in the County is assessed in the first year based on total construction cost. It is difficult to predict the performance of properties over long periods of time, therefore making the income-based approach to assessment an unreliable indicator of value. In addition, improvements and land are assessed separately; and because this study is focused only on incremental value, assessing land value is not necessary. Therefore, incremental assessed value equals new construction value for the purposes of this analysis.
8. The analysis also estimates the increase in one-time fees due to increased density. These one-time fees are depicted in **Table 13.**

Table 13: One-Time Fees and Taxes

Output	Value	Source
Building Fees		
Plan Review Fee	Office: $172 per 1,000 sf above 40,000 sf Residential: $418 per 1,000 sf above 40,000 sf	City of San José
Inspection Fee	Office: $112 per 1,000 sf above 40,000 sf Residential: $502 per 1,000 sf above 40,000 sf	City of San José
CRMP	Office: 3.00% of valuation Residential: 2.42% of valuation	City of San José
Building and Structure Construction Tax	Office: 1.50% of valuation Residential: 1.54% of valuation	City of San José
Construction Tax	Office: $0.08 per sf Residential: $75 - $100 per unit	City of San José
Residential Construction Tax	$90 - $180 per unit	City of San José
School District Fees		
New Construction Fee	Office/Residential: $0.56 per sf	San José Unified School District

Source: JLL

Using the above assumptions, JLL calculated the total potential density under existing airspace protection areas as well as San José's General Plan using existing height limits. Then, JLL calculated the additional density afforded by each of the airspace protection Scenarios by calculating the difference in maximum height between existing and each scenario and applying the assumptions above.

For example:

- 20,000 square feet parcel × 80% lot coverage = 16,000 square feet development footprint
- 100 feet existing height limit ÷ 14 feet per floor = 7 floor existing limit
- 16,000 square feet development footprint × 7 floor existing limit = 112,000 square feet existing total development potential

If a scenario allows for an additional 50 feet of height, then:

- 50 feet additional height limit ÷ 14 feet per floor = 3 floor additional limit
- 16,000 square feet development footprint × 3 floor additional limit = 48,000 additional square feet existing total development potential

Section 3B. Diridon Station Area

JLL first assessed the impact to the Diridon Station Area and this analysis ultimately included 55 parcels in the defined geography, accounting for 32 out of a total of 250 acres.

For the Diridon Station Area, the maximum additional square feet in density afforded by each scenario as depicted in **Table 14**.

Table *14: Net New Density Increase in Diridon Station Area*

Scenario	Net New Square Feet
4: No OEI	8,600,000
7: Straight-Out OEI	8,500,000
9: No OEI, incr. height limits	10,000,000
10A: Straight-Out OEI w/ West OEI Alts.	1,100,000
10B: Straight-Out OEI w/ West OEI Alts.	3,100,000
10C: Straight-Out OEI w/ West OEI Alts.	4,900,000
10D: Straight-Out OEI w/ West OEI Alts.	6,800,000

Source: JLL

It is important to note that the number of square feet noted above is incremental to existing density. JLL has estimated that the Diridon Station Area, under existing height limitations, can support 10.7 million square feet of existing density using the assumptions above. The values in the table above are in addition to that base amount.

These values are also aggregate, in that they indicate the total increase in density under each scenario, but do not reflect specific projects or the timing of those projects. These estimates only provide an indication of the maximum additional density the Diridon Station Area may achieve under each scenario, not necessarily when and over what timeline this may occur.

Based on these estimates of increased allowable density, JLL calculated that the total increase in construction value and requisite increase in annual tax revenue as depicted in **Table 15Error! Reference source not found.**.

Table 15: Net new increase in Construction Value and Annual Tax Revenue in the Diridon Station Area

Scenario	Maximum Increase in Construction Value	Maximum Increase in Annual Tax Revenue
4: No OEI	$4,380,000,000	$5,550,000
7: Straight-Out OEI	$4,300,000,000	$5,450,000
9: No OEI, incr. height limits	$5,030,000,000	$6,370,000
10A: Straight-Out OEI w/ West OEI Alts.	$560,000,000	$710,000
10B: Straight-Out OEI w/ West OEI Alts.	$1,590,000,000	$2,020,000
10C: Straight-Out OEI w/ West OEI Alts.	$2,500,000,000	$3,160,000
10D: Straight-Out OEI w/ West OEI Alts.	$3,490,000,000	$4,420,000

Source: JLL

As with density, these values indicate the additional construction value and tax revenue over what the Diridon Station Area can support today. These values include both office and residential construction.

Finally, JLL calculated the total, aggregate impact (from both office and residential construction) on one-time fees to the City and School District for each scenario as depicted **Table 16**.

Table 16: *Increase in One-Time Taxes and Fees in the Diridon Station Area*

Scenario	Building Fees	Development Taxes	Park Impact Fee	School District Fees
4	$7,300,000	$177,150,000	$131,040,000	$4,830,000
7	$7,170,000	$173,890,000	$128,790,000	$4,740,000
9	$8,340,000	$203,720,000	$148,810,000	$5,580,000
10A	$930,000	$22,660,000	$16,830,000	$620,000
10B	$2,660,000	$64,260,000	$47,920,000	$1,750,000
10C	$4,180,000	$101,050,000	$75,150,000	$2,740,000
10D	$5,810,000	$141,100,000	$104,600,000	$3,830,000

Source: JLL

Regarding the timing of these impacts, JLL looked to the historical pace of absorption and new construction to determine what the impact of each scenario may look like in specific years. These are distinct from the total, aggregate impacts outlined above, in that they focus solely on the increase in density that the City may experience in a particular year. This allows IMPLAN to then calculate the economic impacts of new construction just in that year.

Using the assumptions in Section 3A, JLL identified the potential increase in density for the years 2024, 2028, 2032, 2036, and 2038 to gain a sample understanding of these long-term impacts. The results are depicted in **Table 17** and these values were used in the IMPLAN analysis.

JLL estimates that, should new airspace protection Scenarios go into effect in 2019, the impact of development above and beyond what is allowed presently would not be realized until approximately 2032. That is, it would take 13 years before demand in the Diridon Station Area would reach a point that today's available density would be absorbed, and the additional density afforded by each scenario is realized. Again, this assessment is in aggregate and does not speak to specific projects. It indicates that, under today's height limitations, the Diridon Station Area may have approximately 13 years of available development capacity based on historical demand.

In addition, each scenario has varying effects on development capacity in Diridon Station Area over time. For example, Scenario 10A only increases the height limits by a marginal amount, therefore impacts are not felt beyond 2036. That is, after 2036, the density increases offered by Scenario 10A has been fully realized. Similarly, for Scenarios 10B and 10C, the impacts are strongest in 2032, but begin to decline as years go on and as density is absorbed. For Scenarios 4, 7, 9, and 10D the density increase is significant enough that the impacts will be felt beyond 2038.

Table 17: One-Year Sample of Density Increases in the Diridon Station Area

Scenario	2024	2028	2032	2036	2038
4	0	0	687,500	687,500	687,500
7	0	0	687,500	687,500	687,500
9	0	0	687,500	687,500	687,500
10A	0	0	687,500	16,223	0
10B	0	0	687,500	687,500	0
10C	0	0	687,500	687,500	50,000
10D	0	0	687,500	687,500	687,500

Source: JLL

JLL also estimated the increase in annual tax revenues in these years as depicted in **Table 18**.

Table 18: One-Year Sample of Annual Tax Revenue Increase to the City of San José from additional development in the Diridon Station Area

Scenario	2024	2028	2032	2036	2038
4	$0	$0	$450,600	$450,600	$450,600
7	$0	$0	$450,600	$450,600	$450,600
9	$0	$0	$450,600	$450,600	$450,600
10A	$0	$0	$450,600	$0	$0
10B	$0	$0	$450,600	$181,600	$13,100
10C	$0	$0	$450,600	$450,600	$391,600
10D	$0	$0	$450,600	$450,600	$450,600

Source: JLL

While not explored more in depth, JLL did assess how varying levels of office versus residential development may impact development potential in the Diridon Station Area. The assessment above assumes that, based on historical performance, 10% of new development will be office product and 90% will be residential product. As these ratios shift, net new development capacity also changes, as does potential employment and new residents. The results of these scenarios are summarized in

Table 19, *Table 20*, *Table 21* and *Table 22*:

Table 19: 65% Office and 35% Residential

	Net New Square Feet	Employees	Residents
4: No OEI	9,500,000	30,600	5,000
7: Straight-Out OEI	9,100,000	29,300	4,900
9: No OEI, incr. height limits	11,900,000	40,000	5,700
10a: Straight-Out OEI w/ West OEI Alts.	1,200,000	3,500	600
10b: Straight-Out OEI w/ West OEI Alts.	3,300,000	10,200	1,800
10c: Straight-Out OEI w/ West OEI Alts.	5,100,000	16,100	2,900
10d: Straight-Out OEI w/ West OEI Alts.	7,300,000	22,800	4,000

Source: JLL

Table 20: 10% Office and 90% Residential

	Net New Square Feet	Employees	Residents
4: No OEI	8,600,000	4,700	12,800
7: Straight-Out OEI	8,500,000	4,500	12,600
9: No OEI, incr. height limits	10,000,000	6,200	14,500
10a: Straight-Out OEI w/ West OEI Alts.	1,100,000	500	1,600
10b: Straight-Out OEI w/ West OEI Alts.	3,100,000	1,600	4,700
10c: Straight-Out OEI w/ West OEI Alts.	4,900,000	2,500	7,300
10d: Straight-Out OEI w/ West OEI Alts.	6,800,000	3,500	10,200

Source: JLL

Table 21: 100% Office and 0% Residential

	Net New Square Feet	Employees	Residents
4: No OEI	10,000,000	47,000	0
7: Straight-Out OEI	9,600,000	45,000	0
9: No OEI, incr. height limits	13,100,000	61,600	0
10a: Straight-Out OEI w/ West OEI Alts.	1,200,000	5,500	0
10b: Straight-Out OEI w/ West OEI Alts.	3,300,000	15,700	0
10c: Straight-Out OEI w/ West OEI Alts.	5,300,000	24,700	0
10d: Straight-Out OEI w/ West OEI Alts.	7,500,000	35,100	0

Source: JLL

Table 22: 0% Office and 100% Residential

	Net New Square Feet	Employees	Residents
4: No OEI	8,500,000	0	14,200
7: Straight-Out OEI	8,300,000	0	14,000
9: No OEI, incr. height limits	9,600,000	0	16,100
10a: Straight-Out OEI w/ West OEI Alts.	1,100,000	0	1,800
10b: Straight-Out OEI w/ West OEI Alts.	3,100,000	0	5,200
10c: Straight-Out OEI w/ West OEI Alts.	4,900,000	0	8,200
10d: Straight-Out OEI w/ West OEI Alts.	6,800,000	0	11,400

Source: JLL

Section 3C. Downtown Core

JLL conducted a similar analysis for the Downtown Core. As in the Diridon Station Area, the Downtown Core can support a certain amount of existing density under existing height restrictions imposed by both airspace protection surfaces and the City of San José General Plan. However, the Downtown Core is considerably larger than the Diridon Station Area and contains a far greater number of underutilized parcels.

As a result, and using the assumptions above in Section 3A, the Downtown Core can support between 34.8 million and 32.9 million in additional density under existing conditions and depending on if construction is 100% office or 100% residential. As development is not likely to be 100% of either land use, the full development potential of the Downtown Core will be somewhere in between.

That is, even without increasing the height limits on development in the Downtown Core, there is significant enough "room" for new density that any increases to the height limits may not have a meaningful impact for a long period of time. If the 10% office/90% residential assumption is carried over to the Downtown Core, based on past absorption and new construction rates, it may be 70 years until the current available density is realized for office construction under existing conditions, and 55 years until residential density is fully realized under existing conditions as depicted in **Table 23**.

Table 23: Maximum Potential Density Under Existing Conditions for Office and Residential in the Downtown Core

Land Use	Maximum Existing Development Potential (total square feet)	Estimated Number of Years Until Existing Density Realized
Office	34,800,000	70
Residential	32,900,000	55

Source: JLL

Section 4. Real Estate Economic Impacts

Section 4A. Economic Impact Assessment Methodology

Assessment of economic impacts related to Diridon Station Area new development density first required estimation of the existing size and economic growth potential of the City San José local economy. Using IMPLAN, this estimate was calibrated to the existing economic conditions and structure of the local economy. This initial forecast excluded any assumptions pertaining to new Diridon Station Area development density. As a result, a baseline set of economic forecasts was generated that were unaffected by increases in development density of each of the various airspace protection Scenarios. The data sets used for this purpose were previously described and depicted in **Table 6**.

Estimates of increases in key real estate outputs developed by JLL for each airspace protection scenario were then used as inputs into the IMPLAN software to generate changes in the City of San José baseline economic forecasts for selected years. The selection of real estate outputs used as inputs in the IMPLAN modeling software were based on the extent they could be used to change or otherwise modify the IMPLAN baseline forecasts. Changes in most indicators of economic growth for the IMPLAN City of San José Model are determined by the software, leaving a limited set of economic variables from which to input direct economic impacts related to new Diridon Station Area development density.

For each of the airspace protection Scenarios (4, 7, 9, 10A, 10B, 10C and 10D), only increases in annual local expenditures for residential and office construction and annual permanent employment that were strictly related to new Diridon Station Area development density were selected. The remaining projected increases in real estate outputs were excluded as IMPLAN inputs because they are determined by calculations embedded in the modeling software. The selected real estate outputs were then translated into direct economic expenditure and employment impacts within the City of José local economy.

Section 4B. Diridon Station Area Development Direct Expenditure and Employment Impacts

Table 24 illustrates estimated direct economic impacts from construction related expenditures and permanent employment associated with new development density of the Diridon Station Area for selected years.

The year 2032 is projected to be the first-year real estate construction and employment occurs under each scenario and is the same across each of the airspace protection Scenarios. This reflects that there would be development in the Diridon Station Area under each scenario but that 2032 is the first year in which there would be net new square footage development greater than what could be achieved in existing conditions airspace Scenario 1.

In the year 2032, annual construction expenditures related to developing new Diridon Station Area development density were estimated to be $355.9 million with an associated increase of 230 permanently employed office workers. By 2036, economic impacts under several Scenarios differentiate. In particular, there is no annual construction under scenario 10A and less under scenario 10B ($143.5 million) than under the remaining Scenarios 4, 7, 9, 10C and 10D. As construction of commercial real estate is completed and occupied, it is assumed that 1,150 permanent jobs will be created under each scenario, with the exception of Scenario 10A, which creates 540 jobs.

Table 24: Diridon Station Area Development Direct Expenditure and Employment Impacts (Gains)

	Year ($1,000)							
	2032	2036			2038			
	Scenario	Scenario			Scenario			
Economic Impact Variable	4, 7, 9, 10A, 10B, 10C, 10D	4, 7, 9, 10C, 10D	10A	10B	4, 7, 9, 10D	10A	10B	10C
Construction (Office)	15,170	15,170	-	15,170	15,170	-	10,378	15,170
Construction (Residential)	340,751	340,751	-	128,301	340,751	-	-	294,164
Total Construction	$355,921	$355,921	-	$143,471	$355,921	-	$10,378	$309,334
Permanent Employment	230	1,150	540	1,150	1,610	540	1,540	1,610

Source: JLL

In year 2038 construction will continue to contribute $355.9 million in local construction expenditures under Scenarios 4, 7, 9 and 10D and none under scenario 10A. Only office related construction expenditures occur under Scenario 10B ($10.3 million). Construction under Scenario 10C decreases to $309.3 million. Permanent employment increases under all Scenarios with the exception of Scenario 10A (540 jobs), increasing to 1,540 jobs under scenario 10B and to 1,610 jobs under Scenarios 4, 7, 9 and 10D.

Section 4C. Diridon Station Area Development Induced Employment Impacts

New construction expenditures and permanent employment associated with new Diridon Station Area development density are catalyst for successive additional rounds of economic exchange and spending. This additional spending occurs because, in economic exchange, expenditures of a buyer of goods, services and labor represents income to the seller of the same. This income is then, for the most part, spent, initiating another iteration of income and spending in economic exchange. When these induced exchanges occur locally, they result in additional local economic growth. IMPLAN estimates the final amount of this "induced" economic growth that may be associated any initial amount of direct expenditures or direct employment.

The amount of induced economic growth associated with new Diridon Station Area development density is determined by the amount of annual construction expenditures and permanent employment associated with that development and the industrial sector of the local economy in which it occurs.

Table 25 lists the industrial sectors selected to input new construction and permanent employment into the IMPLAN software.

Table 25: IMPLAN Input Choice Variables

Selected Industrial Sectors
• **Construction of other new commercial structures**
• **Construction of multifamily homes**
• **Architectural, engineering, and related services**
• **Custom computer programming services**

Source: 2018 Minnesota IMPLAN Group, Inc.

Table 26 illustrates the economic impact of new Diridon Station Area development density in terms of increased total employment for the years 2032, 2036 and 2038. Direct employment is employment related to Diridon Station Area incremental construction and new permanent employment related to the absorption of newly constructed incremental office spaces. Real estate construction expenditures and permanent employment under each scenario were translated by IMPLAN into 1,463 incremental local direct jobs and total local incremental employment of 2,345 jobs in 2032. Additional employment of 882 jobs are induced and distributed across various industrial sectors. Local employment multipliers are indicated for each scenario for each year. Local employment multipliers estimate total local employment created for each additional direct local job created.

Table 26: Diridon Station Area Development Related Total Local Employment Impacts (Gains)

	Year							
	2032	2036			2038			
	Scenario	Scenario			Scenario			
Economic Impact Type	4, 7, 9, 10A, 10B, 10C, 10D	4, 7, 9, 10C, 10D	10A	10B	4, 7, 9, 10D	10A	10B	10C
Direct	1463	2383	540	1514	2843	540	1300	2533
Induced	882	1651	459	1123	2023	459	1091	1810
Total Employment Impacts	2345	4034	999	2637	4866	999	2391	4342
Local Employment Multipliers	1.6	1.7	1.9	1.7	1.7	1.9	1.8	1.7

Source: Landrum & Brown, IMPLAN

By 2038, projected induced employment associated with Scenarios 4, 7, 9 and 10D increases by 2,023 workers. These workers are again distributed to multiple industrial sectors such as architectural, engineering and related services, employment services and full-time restaurant workers. IMPLAN estimates incremental employment of 2,843 workers in construction and office employment directly related to new Diridon Station Area development density. Total employment gains from each of these Scenarios are estimated to be 4,866 jobs.

Section 4D. Diridon Station Area Development Induced Local GDP Impacts

Total, direct and induced local economic impacts in terms of incremental GDP growth are depicted in **Table 27.** Local GDP is reported because it measures local increases in value-added to goods and services associated new Diridon Station Area development density and is therefore a good measure of the economic benefits to the City of San José local community.

Table 27: Diridon Station Area Development Related Total Local GDP Impacts (Gains)

Year ($1,000s)								
	2032	2036			2038			
	Scenario	Scenario			Scenario			
Economic Impact Type	4, 7, 9, 10A, 10B, 10C, 10D	4, 7, 9, 10C, 10D	10A	10B	4, 7, 9, 10D	10A	10B	10C
Direct	$188,290	$406,588	$129,233	$293,971	$511,631	$129,233	$306,932	$459,497
Induced	$97,610	$190,131	$55,124	$131,897	$234,896	$55,124	$131,087	$210,413
Total Local GDP Impacts	$285,901	$596,718	$184,357	$425,867	$746,527	$184,357	$438,019	$669,910
Local GDP Multipliers	1.5	1.5	1.4	1.4	1.5	1.4	1.4	1.5

Source: Landrum & Brown, IMPLAN

Two types of economic impact are indicated: direct and induced. Direct impacts are construction expenditures and expenditures of employers directly related to developing new Diridon Station Area development density. IMPLAN adjusts these amounts to reflect the extent to which they can be spent locally within the City of San José. In year 2032, under all Scenarios, $355.9 million in construction expenditures and 230 permanent jobs translate into $188.3 million in direct economic impacts in terms of local GDP. By the year 2038, direct impacts on City GDP for Scenarios 4, 7, 9 and 10D of $511.6 million are equivalent to $355.9 million in construction expenditures plus an increase of 1,610 jobs.

Induced GDP impacts include expenditures and or employment by businesses within the City of José that provide goods and services in the supply-chain of construction companies and occupants of newly constructed commercial spaces. It also includes economic impacts represented by local expenditures by workers for purposes of consumption. By year 2038 it is estimated that new Diridon Station Area development density described in Scenarios 4, 7, 9 and 10D will each contribute an additional $746.5 million to local GDP. In the same year, Scenarios 10A, 10B and 10C are estimated to contribute an additional $184.4, $438.0 and 669.9 million to local GDP respectively.