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

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

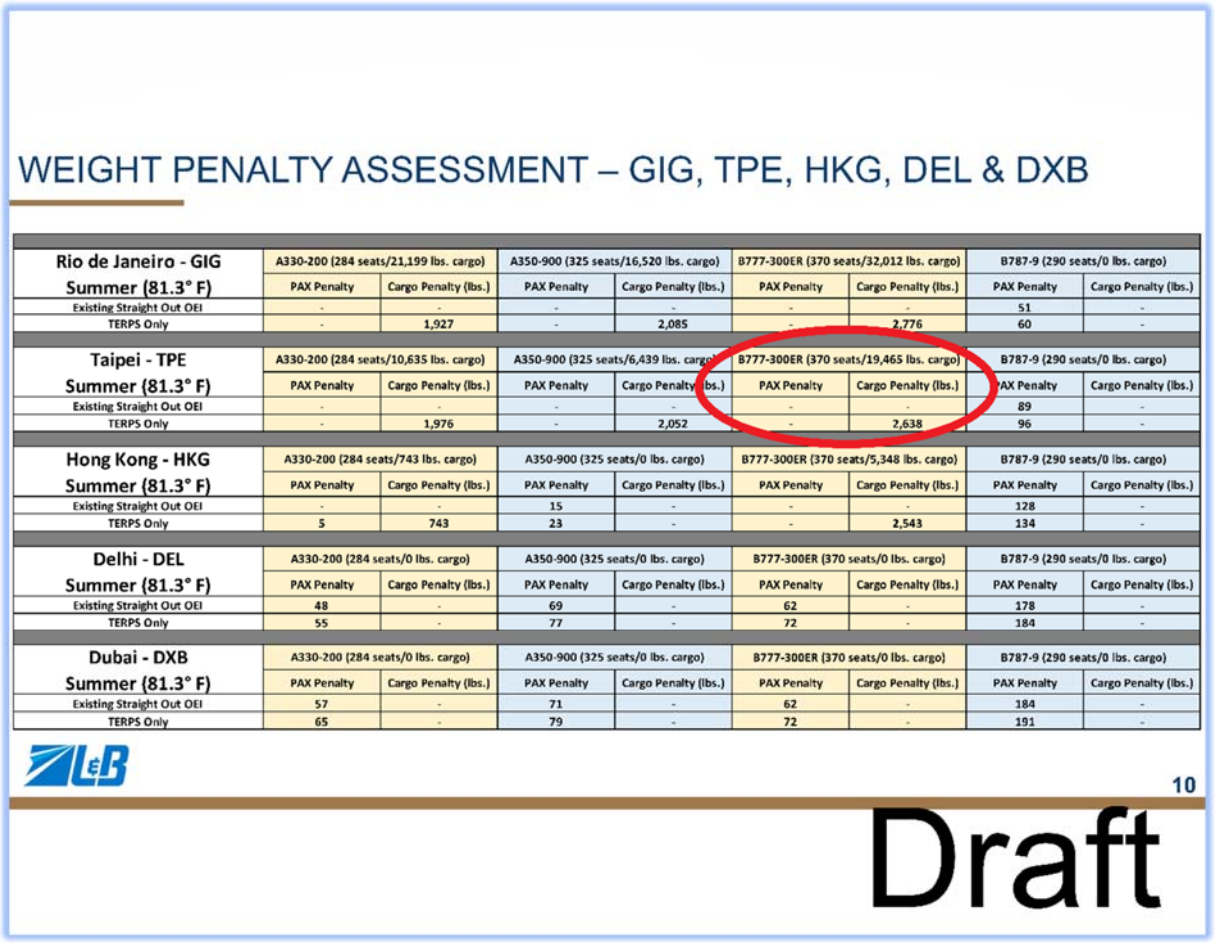
- Request another runway (wind, weather, air traffic permitting)
- Off-load passengers and/or cargo (weight penalty)
- Make a refueling stop
- Cancel current day's flight
- Change aircraft
- Change OEI procedure
- Cancel air service if payload loss affects financial viability

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	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	-

Hong Kong - HKG	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)	
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	-	-	15	-	-	-	128	-
TERPS Only	5	743	23	-	-	2,543	134	-

Delhi - DEL	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)	
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	48	-	69	-	62	-	178	-
TERPS Only	55	-	77	-	72	-	184	-

Dubai - DXB	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)	
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	57	-	71	-	62	-	184	-
TERPS Only	65	-	79	-	72	-	191	-

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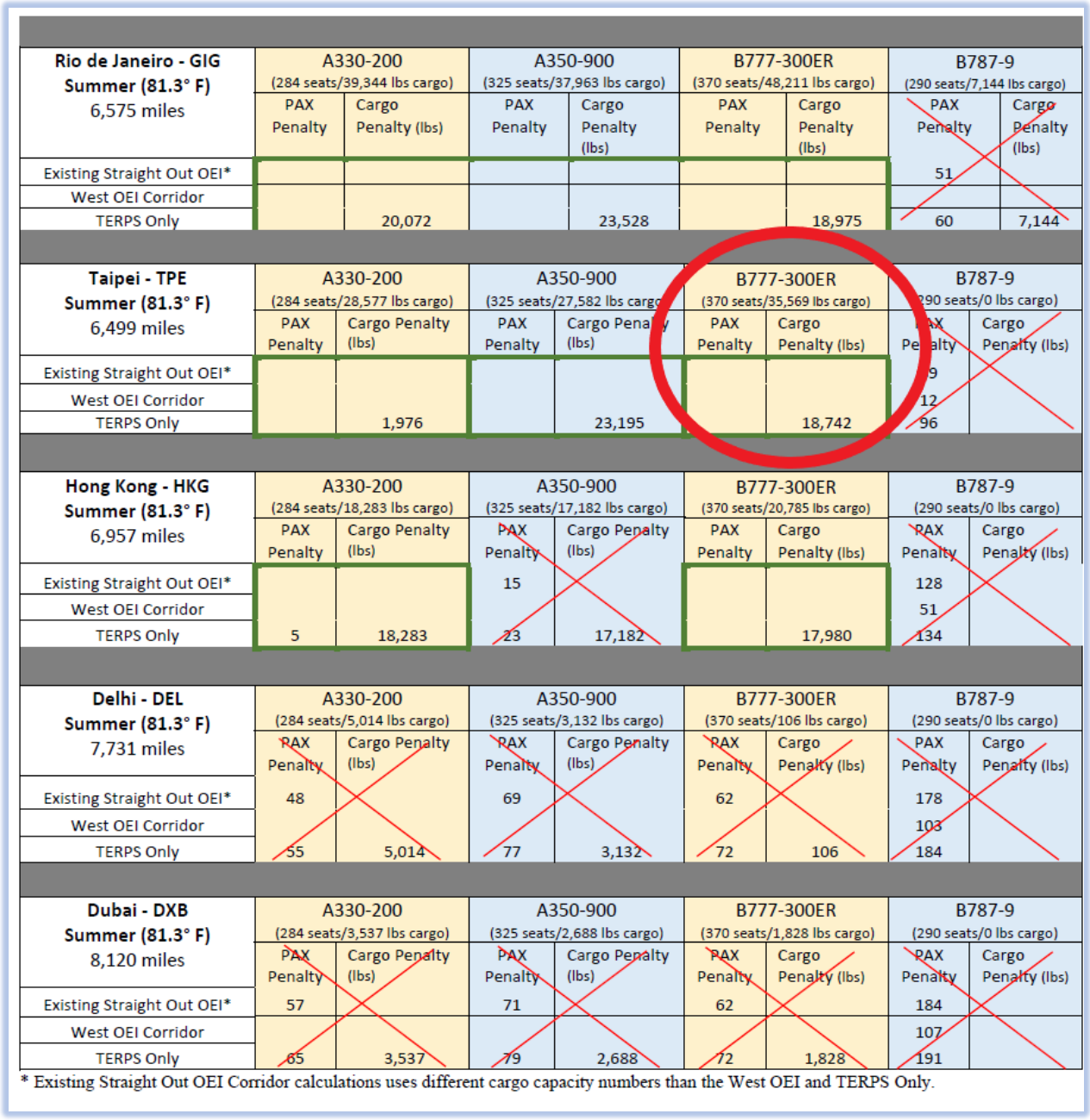
Figure 2, Weight Penalty Chart from the January 10, 2019 Memorandum



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

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.

   Economic Impact

   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)

		Airspace Scenario 4	**Airspace Scenario 10B**
Total Economic Impact Summary (2038) Gain/Loss[5]	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

		Airspace Scenario 4	**Airspace Scenario 10B**
Incremental Commercial & Residential Square Footage	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.*

[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=Qgl3or

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

		Airspace Scenario 4	**Airspace Scenario 10B**
Incremental Commercial & Residential Units	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

		Airspace Scenario 4	**Airspace Scenario 10B**
Incremental Tax Revenues	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."

[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. **<u>Aircraft Technology, Selection and Fuel Economy</u>**

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 <u>two</u> 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 <u>additional</u> 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. **<u>Customer Inconvenience</u>**

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. **<u>Legal Ramifications</u>**

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.

<u>SUMMARY</u>

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.

[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

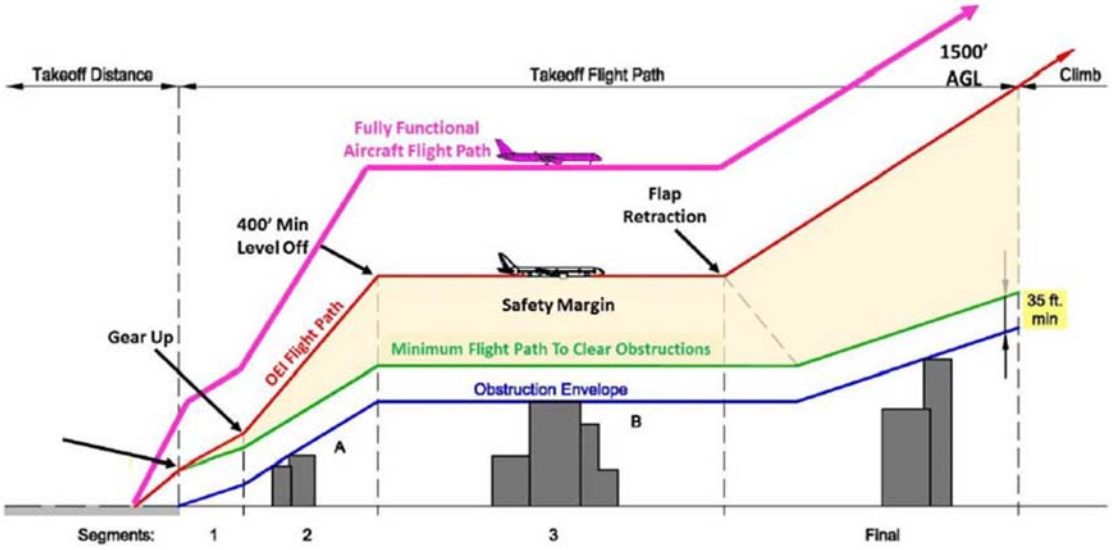
City Council approval of the above recommendations would allow for maximum safe development heights and associated economic benefits in the Downtown and Diridon Station areas.

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.

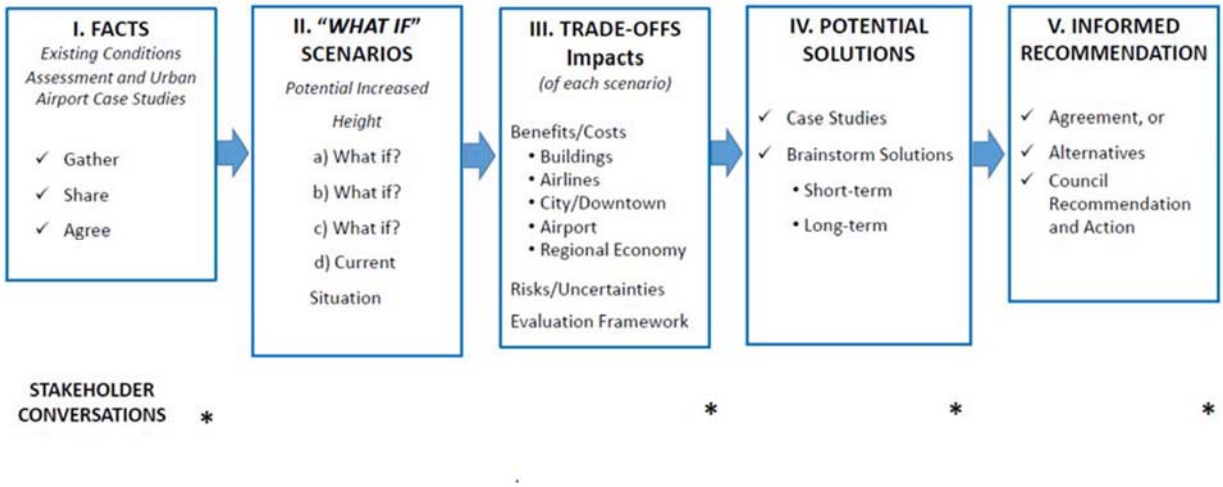
Separately, in addition to the project Steering Committee, three broader downtown stakeholder information meetings were held during the study, once at the initial launch of the study, once to report on study progress and initial findings, and once to present a proposed strategy. The stakeholder meetings 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 for B787-900).

Overall, these airline responses are consistent with the consultant's technical analysis.

Task 3

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.