MEMORANDUM **VIA E-MAIL**

Date: October 8, 2009

To: Cary Greene
Norman Y. Mineta San Jose International Airport

From: Steve Ryan

Subject: CARGO AND GENERAL AVIAITON FACILITY REQUIREMENTS

The purpose of this memo is to present the 2027 requirements for air cargo and general aviation facilities based on the updated demand forecast for Norman Y. Mineta San Jose International Airport (the Airport). The facility requirements were developed using the methodology outlined in the Attachment A to this memo.

Air Cargo Requirements

Air cargo facility requirements were developed using the 2027 forecast and are presented in **Table 1**. For the all-cargo carriers, approximately 285,900 square feet of building space would be required. Based on the projected fleet mix and the number of aircraft positions required, approximately 513,400 square feet of aircraft parking apron are required. With allowances for truck and auto parking and GSE storage, a total site requirement of approximately 1.2 million square feet or 26.7 acres was calculated.

The belly cargo forecast indicates that approximately 44,000 square feet of cargo building will be required along with 48,400 square feet for truck and auto parking. The total site requirement is 2.1 acres.

Table 1

2027 Cargo Facility Requirements

	Air Cargo	Belly Cargo	Total
Forecast (tons)	164,400	25,300	189,700
Building Requirement (sf)	285,900	44,000	329,900
Truck/Auto Parking and Maneuvering (sf)	314,500	48,400	362,900
Aircraft Parking Apron	513,400	n/a	513,400
GSE Storage	51,300	n/a	51,300
Total (sf)	1,165,100	92,400	1,257,500
Total (acres)	26.7	2.1	28.8

Source: Ricondo & Associates, Inc., October 2009
Prepared by: Ricondo & Associates, Inc., October 2009

General Aviation Requirements

General aviation facility requirements are presented in **Table 2** along with a summary of the general aviation component of the forecast. Using the assumptions outlined in the methodology memo, based aircraft storage requirements were calculated as 96,660 square feet for tiedowns, 15,960 square feet for T-hangars, and 1.1 million square feet for conventional hangars reflecting the high proportion of jet aircraft in the fleet based at the Airport.

In order to determine the apron space required for parking and maneuvering of transient aircraft, the peak number of transient aircraft was estimated by taking the 57,400 itinerant operations forecast for 2027 and calculating the average day of the peak month. Based on a peak month factor of 9.4 percent, which occurs in August, and dividing by 31 days, the peak month average day activity is 170 operations, or 85 aircraft (assuming one aircraft represents two operations, an arrival and a departure). It is estimated that 50 percent of the peak month average day aircraft, or 43 aircraft, would be transient and require parking simultaneously. Using a fleet mix is comparable to the forecast based aircraft fleet mix, approximately 1.3 million square feet of apron area is required for transient aircraft parking and associated taxilanes.

In addition to aircraft storage, other general aviation space requirements include: 223,900 square feet for terminal and administration space, 111,900 square feet for aircraft maintenance functions (such as shops and parts storage), and a fuel storage and distribution area of 125,500 square feet. The total general aviation space requirement is approximately 4.5 million square feet or 102.3 acres.

Table 2

2027 General Aviation Facility Requirements

Forecast and Facility Requirements	2027
Forecast	
Based Aircraft	
Single Engine	48
Multi-Engine	6
Turboprop	10
Turbojet	140
Helicopter	4
Total	208
General Aviation Operations	
Itinerant Operations	57,400
Local Operations	15,800
Total Operations	73,200
Peak Month Average Day Itinerant Operations	170
Based Aircraft Storage	
Tiedown (sf)	96,660
T-Hangar (sf)	18,960
Conventional Hangar (sf)	1,119,400
GA Terminal/Admin. Space (sf)	223,900
Aircraft Maintenance (sf)	111,900
Auto Parking (sf)	1,455,200
Itinerant Aircraft Parking Apron (sf)	1,303,300
Fuel Storage and Distribution (sf)	125,500
Total (sf)	4,454,820
Total (acres)	102.3

Source: Ricondo & Associates, Inc., October 2009
Prepared by: Ricondo & Associates, Inc., October 2009

Attachment A Cargo and General Aviation Facility Requirement Methodology

As part of the Scope of Work for the Activity Forecast for Norman Y. Mineta San Jose International Airport (the Airport), requirements for air cargo and general aviation facilities are to be developed using the updated demand forecast. The purpose of this attachment is to present a proposed methodology for updating the air cargo and general aviation facility requirements.

Air Cargo Facilities

Air cargo facilities generally consist of apron for aircraft parking and movement of support equipment, cargo buildings for the transfer of cargo between airside and landside, truck/trailer parking and maneuvering areas and employee parking. Building and landside space requirements are driven by the projected cargo volumes for all-cargo operators and belly freight volumes for passenger airlines. The projected number of operations and fleet mix for the cargo carriers are used to determine the aircraft apron space requirement.

The proposed methodology for building space (air cargo and belly cargo) is based on the application of a utilization factor measured in terms of tons per square feet. This utilization factor is then applied to the projected cargo tonnage to determine the overall cargo building space requirement. The utilization factor used in the previous forecast update was reviewed against the factors used previous Master Plan and with industry standard factors to determine if any adjustments should be made. The current (2008) utilization factor for the belly cargo building(s) for the passenger airlines is 0.23 tons per square foot compared to 0.575 tons per square foot used in the Master Plan and the last forecast revision. The current utilization factor of 0.23 is reflective of a sharp decline in belly cargo since 2002 being handled through the same building square footage. The industry planning factor is 0.5 tons per square foot, which is between the existing utilization and the factor used in the previous analyses. It is recommended that the 0.575 tons per square foot factor, first recommended in the Master Plan, be retained in the facility requirements calculations. The industry has seen an increase in truck-to-truck transfers through airport cargo facilities necessitating more space than required for only the air cargo tonnage. The recommended factor assumes a more efficient on-Airport cargo facility primarily due to the fact that most of the cargo carriers have off-Airport processing facilities in place and that the truck-to-truck transfers would remain at those existing locations because of the premium on space at the Airport. The industry planning factor for truck/trailer parking, maneuvering, and auto parking is 110 percent of the calculated building space requirement for both air cargo and belly cargo buildings.

The cargo aircraft parking apron requirement will calculated based on the number of aircraft that are projected to be simultaneously parked on the apron, and using the sizes of the aircraft types projected in the air cargo fleet mix (**Table A-1**) along with allowances for wingtip clearances (25 feet), GSE

storage (10 percent of apron space), and taxiway object free areas (112.5 feet from center to fixed or movable object). Based on the 2027 air cargo operations forecast, parking apron will be required for nine aircraft.

Table A-1

2027 Air Cargo Fleet Mix Aircraft Characteristics

Aircraft	Departures	Percent	Wingspan (ft)	Length (ft)
McDonnell Douglas MD-11	85	2.5%	170.5	202.2
McDonnell Douglas DC-10-30	171	5.0%	165.3	181.6
McDonnell Douglas DC-10-10	137	4.0%	155.3	182.3
Boeing 767-300/300ER	1,451	42.5%	156.1	180.3
Airbus Industrie A300-600/R/CF/RCF	1,537	45.0%	147.1	177.4
Cessna 208A/B	34	1.0%	52.1	41.6

Source: Ricondo & Associates, Inc., Aircraft Manufacturer Data, August 2009
Prepared by: Ricondo & Associates, Inc., August 2009

General Aviation Facilities

For general aviation facilities, the total future square footage/acreage requirement is determined by the space required for aircraft parking apron (based aircraft and itinerant aircraft) and aircraft hangars with associated support space and auto parking.

The number of required transient parking positions is typically determined by using the Peak Month Average Day (PMAD) number of general aviation operations, and assuming that fifty percent of those aircraft making itinerant operations are transient and would occupy the apron at one time. This factor can be influenced by two variables: the proportion of based aircraft that make itinerant operations, and of the remaining transient aircraft, the number of aircraft that simultaneously need parking apron. PMAD operations are calculated by multiplying the historic peak month percentage to the forecast annual itinerant operations and dividing by the number of days in that month. The number of operations is divided by two to determine the number of aircraft, as one aircraft will conduct two operations, an arrival and a departure.

The calculation of the transient aircraft parking apron area requirement is calculated by multiplying the number of required parking positions by the average amount of apron area needed to accommodate one aircraft, based on the fleet mix distribution in the revised forecast accounting for space required for clearances between parked aircraft and the taxilane for maneuvering.

The based aircraft fleet mix forecast will be used to calculate space requirements for apron parking (tie-downs) and for hangar storage. A typical square footage per aircraft based on fleet category (single engine, multi-engine, turboprop, turbojet, and helicopter) is used in conjunction with

assumptions regarding the distribution of aircraft between tie-down apron (typically single engine and some twin engine aircraft) and hangars (typically larger and more expensive aircraft).

For conventional hangar space requirements, an allowance is added for building space used for terminal and/or administrative functions, aircraft maintenance building space and auto parking. For this analysis, a terminal space allowance of 20 percent of hangar space was used. The allowance for aircraft maintenance space was estimated to at ten percent of required hangar space. The allowance for parking is an area of 100 percent of total building space (hangar, terminal, and maintenance). Additionally, an allowance was added for fuel storage and distribution facilities in the general aviation area, calculated as five percent of the total based and transient aircraft parking requirement.

Table A-2 presents the proposed distribution of general aviation aircraft by storage type (e.g., tiedown, t-hangar, or conventional hangar) and the amount of assumed tie-down and hangar space (square feet) per aircraft.

Table A-2

General Aviation Based Aircraft Distribution and Space Requirement by Fleet Mix

	Single Engine	Multi-engine	Turboprop/Turbojet	Helicopter
Typical Storage Distribution				
Tiedown	65%	10%	0%	20%
T-Hangar	30%	10%	0%	0%
Conventional Hangar	5%	80%	100%	80%
Space per Aircraft (square ft)				
Tiedown	2,700	3,600	N/A	2,700
T-Hangar	1,200	2,400	N/A	N/A
Conventional Hangar	1,200	2,400	7,500	2,700

Source: Ricondo & Associates, Inc., Aircraft Manufacturer Data, August 2009
Prepared by: Ricondo & Associates, Inc., August 2009

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