NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

RUNWAY INCURSION MITIGATION (RIM) STUDY/AIRFIELD DESIGN STANDARDS ANALYSIS

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Goals and Objectives

SJC Runway Incursion Mitigation (RIM)/Design Standards Analysis Study

Goals:

1. Retain the Airport's capability to meet existing and projected aircraft operational demand while:
   a. Eliminating or reducing airfield hotspots and conditions/factors that contribute to aircraft and vehicular runway incursions; and
   b. Conforming to the airfield dimensional design standards and geometric guidance criteria contained in AC 150/5300-13A to the maximum extent practical.
2. Update the Airport Master Plan and Airport Layout Plan to incorporate the selected airfield configuration alternative that best achieves Goal 1.

Supporting Objectives:

1. Conduct a thorough analysis of the airfield geometric and operational factors which contribute to runway incursion risks and design standard deficiencies.
2. Identify and evaluate feasible facility and operational modifications to reduce runway incursion risk and design standard deficiencies without constraining Airport capability to accommodate existing and projected operations demand.
3. Consider physical and financial feasibility factors in the formulation, evaluation, and selection of geometric and incursion mitigation alternatives.
4. Utilize the most practical operational simulation and safety risk assessment methodologies in the evaluation and selection of geometric and incursion mitigation alternatives.
5. Solicit input and achieve a high degree of consensus from a range of aviation stakeholders, including FAA, airlines, and general aviation operators, on the formulation, evaluation, and selection of recommended facility and operational modifications.
6. Prepare and complete analyses, documentation, and formal approval processes to allow the Airport to proceed with implementation of the selected alternative upon study completion.

NORMAN Y. MINETA-SAN JOSE INTERNATIONAL AIRPORT

RUNWAY INCURSION MITIGATION / AIRFIELD DESIGN STANDARDS ANALYSIS

TECHNICAL MEMORANDUM:

ANALYSIS OF RUNWAY INCURSION AND SURFACE INCIDENTS

2000 – TO PRESENT

KIMLEY HORN TEAM

February 15, 2017

Introduction

The San Jose Runway Incursion Mitigation (RIM) Study approaches the enhancement of the safety of ground movements on the airfield from two perspectives. The first perspective is assessing the existing airside facilities from the perspective of their conformity to both dimensional and design related criteria and standards. The second perspective is to focus in on areas of the airfield where actual events have taken place and identify the factors that contributed to the event so that specific remediation actions can be identified and assessed. In short, developing a realistic plan to mitigate surface incidents and runway incursions first requires an understanding of the events that have occurred and the identification of any patterns related to where on the airfield those events have taken place.

Establishing the understanding of past events and patterns is critical to focusing and prioritizing mitigation efforts and making the best use of limited financial resources available to make the necessary improvements to address the problems that contributed to the events. This technical memorandum presents an analysis of reported runway incursions and other surface incidents at SJC from the year 2000 to date. The noted time frame provides a sufficiently long and significant base of data to work from, and allows for a comparison of events occurring prior to and after the closure of Runway 11/29 in late 2009.

Data Sources

Five database sources were consulted to identify the history of surface incidents and runway incursions that have occurred on the airfield at SJC for the period of 2000 to the most current available month in 2016. Information from each database was queried to identify events that were applicable to this planning effort, which focuses on mitigating surface incidents and runway incursions. The reporting of incidents and incursions is guided by regulatory requirements in 49 Code of Federal Regulations Part 830, and responsibility for reporting is generally that of the aircraft operator. In other cases, an incident or incursion is reported by ATCT, while in the case of one of the databases reviewed (ASRS), the reporting party can be an observer of an event or an involved party. There is some overlap in incident and incursion reporting between the data sources resulting in an individual incident being cited in two or more databases. Where this occurred, it has been noted in the first column of the incident summary table later in this document and listed as a single incident.

Incident and incursion data is used as a key input, but not the sole factor in the identification and designation of airfield hotspots. SJC currently has two designated hotspots, both of which are located near the southern end of Taxiway W1 (former Runway 29 end). Hotspots are designated by Runway Safety Action Teams (RSAT) that are comprised of representatives of the FAA including air traffic, airport staff, tenants and airport users. A hotspot can be designated as a result of a history of incidents or based on an airfield geometric configuration that is determined to create the potential for incidents to occur. The SJC RSAT conducts periodic meetings to discuss possible airfield issues and recommend potential mitigation actions as appropriate and the Runway Safety Action Plan report developed by the SJC RSAT served as one of the data sources used in this effort. A total of 126 individual incidents and incursions were identified from the databases for the noted historic period used for this study and are summarized later in this document. The sources include:

- National Transportation Safety Board (NTSB), Aviation Accident Database (AAD);
- Federal Aviation Administration (FAA) Accident and Incident Database System (AID);

- National Aeronautics and Space Administration (NASA), Aviation Safety Reporting System (ASRS) Database;
- FAA Western Pacific Region Runway Safety Office incident data (RWS);
- San Jose Runway Safety Action Plan Report, May 31, 2016.

NTSB Aviation Accident Database:

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation. The NTSB aviation accident database contains information from 1962 and later about civil aviation accidents along with more limited data on selected incidents within the United States, its territories and possessions, and in international waters. Generally, a preliminary report is available online within a few days of an accident. When the investigation is completed, the preliminary report is replaced with a final description of the accident and its probable cause. The Aviation Accident Database was queried for the period 2000 to Present for the following categories of aviation activity in the searchable database. The search was done for Part 91 General Aviation, Part 121 Air Carrier, Part 125 20+ passengers/6000+ pounds, Part 135 Air Taxi and Commuter and Non-U.S. Commercial. Additionally, an "all categories" search was also done. None of the searches resulted in any recorded incidents being identified.

FAA Accident and Incident Data System

The FAA Accident and Incident Data system (AID) contains incident data records for all categories of civil aviation. Incidents are events that do not meet the aircraft damage or personal injury thresholds contained in the National Transportation Safety Board (NTSB) definition of an accident. There are twelve "Flight Conduct" categories in the AID data search system and of the twelve categories the following five categories comprise the aviation segments at SJC: Commercial/Air Carrier, Air Taxi/Commuter, General Operating Rules, Foreign Air Carriers and Part 125 operator categories. The following categories were not searched: Ultralight Vehicles, Agricultural, and Parachute Jumping and several others which do not include activities in evidence at SJC. Multiple searches cross-referencing the various Flight Conduct categories with Flight Phase categories were undertaken for the period 2000 to Present. For the Flight Phase element, the following elements were investigated: taxi operations, run up area, ground and ramp, final approach, landing approach, landing rollout, roll out fixed wing, and takeoff ground roll for the period 2000 to Present. From this search a total of four incidents were identified that were applicable to the RIM Study.

NASA Aviation Safety Reporting System

The Aviation Safety Reporting System (ASRS) database was established in 1976 through an agreement between the FAA and NASA. The ASRS collects voluntarily submitted aviation safety incident reports, with over 1,000,000 reports having been submitted to date. Pilots, air traffic controllers, flight attendants, ground personnel and others in the industry are encouraged to submit reports when they are involved in, or observe a situation in which aviation safety has been compromised. The program provides limited immunity from regulatory enforcement to those reporting as an incentive to facilitate reports as long as the incident is reported within ten days of its occurrence. The ASRS has become the largest single database of aviation incident reports and airfield safety related data, however it is still believed to represent only a portion of the total number of events that may or could be reported. ASRS data is

effective for identifying hazards, accident precursors and safety issues that require further analysis, which is how the data is being employed in the San Jose Runway Incursion Mitigation Planning effort. However, as the ASRS data provides a more thorough listing of events than other "formal" databases currently maintained by the NTSB, which focuses more on aircraft accidents or the data in the FAA AID database, the ASRS provided the largest majority of the historic data on surface incidents and incursions for the SJC study.

FAA Western Pacific Region Runway Safety Office Data (RSW)

The second largest number of incidents were identified from information provided by the FAA Western Pacific Region Runway Safety Office. The data provided covered a ten-year period from 2006 through September 2016 and included a total of 54 incidents and incursions during this timeframe. While this information is not available through a publicly available searchable database, FAA Western Pacific Region shared the information for the purposes of this planning effort. The information in the RSW includes a severity ranking of each event based on the FAA's classification of events.

Runway Safety Action Plan Data

A final source of information on more recent incidents that have taken place at SJC involved data the SJC Air Traffic Control Tower (ATCT) collected on events and pilot deviations that, in some cases were reported in the ASRS, but in other instances were not. The ATCT data was included in the RSAT Runway Safety Action Plan report dated May 31, 2016. This document included a list of events for the period 2014 through March of 2016. These events noted in the plan were reviewed and incorporated, as appropriate, into the summary table list of surface incidents and runway incursions. Where overlap with another database occurred, the overlapping databases are noted in Column One of the summary table (Table 1).

Determination of Incidents and Incursions

The four data sources that provided information on actual incidents that occurred on the airfield at SJC consisted of the AID, ASRS, RWS and RSAP data files. The RSAP and RWS data was solely focused on events taking place on the ramps, taxiways and runways at SJC. The AID and ASRS databases are much broader in scope. These databases include events reported on the airfield along with events that occurred while on approach to the runways, as well as while flying through SJC airspace and events involving impacts from activities off the airport. In this last category, there were noted concerns regarding off airport lighting sources and instances of intentional shining of lasers into the cockpit of aircraft on approach. While all of the events contained within the AID and ASRS database relate to matters of aviation safety, the focus of this study is on mitigating airfield surface incidents and runway incursions along with addressing airfield geometric conditions that may contribute to incidents and incursions. As a result, the reports contained in the AID and ASRS database associated with SJC were reviewed and only those reported events that involved a ground related incident, event, or incursion were collected. Over the past 16 years a total of 126 surface incidents/runway incursions were identified as being relevant to this study and data was collected on each of these.

The ASRS database is comprised of 96 separate data elements including incident summaries, which in some cases are from multiple observers or involved parties. Not all of those elements are necessary or applicable to the focus of the incident and incursion mitigation effort. As a result, the first step in the process was to identify and collect the key data points for each incident report identified as being

applicable to the ground incident and runway incursion mitigation planning for SJC. The data points collected for the SJC planning effort consist of:

- Month and year of the event;
- Aircraft make and model;
- Location of the event on the airfield system;
- Visibility/weather conditions at the time of the incident;
- Time of day – daytime, dusk, nighttime;
- Component of aviation involved (general aviation, business/corporate, commercial passenger including cargo, air taxi/regional commuter);
- Contributing factors to the event (procedural, situational awareness, human factors, airfield factors);
- Event summary narratives from those involved;
- Severity Rating (RWS and RSAP data).

The distribution of events over the period 2000 to Present was review with incidents and incursions broken down into three time frames by the total number of events in each period as listed below:

- 2000 thru 2003 — 33 incidents/incursions
- 2004 thru 2009 — 48 incidents/incursions
- 2010 thru Present — 45 incidents/incursions

The 126 separate events at SJC between 2000 to the Present were reviewed to see if any specific segment of aviation activity at the airport is driving the number of incidents occurring. If this is the case, then engaging representatives from that sector to provide insight and potential recommendations to address the situation can be undertaken. In the case of SJC, the incidence of events is dominated by two primary sectors consisting of General Aviation/Personal and Air Carriers with Corporate/Business Aviation being of consequence. The remaining categories account for far fewer events. The incidence of events by aviation category are presented below.

- General Aviation/Personal — 60 events
- Air Carrier — 32 events
- Corporate/Business Aviation — 15 events
- Vehicle/Pedestrian — 12 events
- Commuter Carrier — 5 events
- Procedural — 2 events

The review of the incident and incursion events considered time of day (daylight, dusk, and night) and weather conditions (visual, mixed, rain, marginal, mixed rain) for events determined to be applicable to the study. The following visibility and weather characteristics were identified and are delineated below:

- Ninety-eight of the one hundred twenty-six events occurred during daylight hours with two at dusk and nineteen at night. The remaining seven did not note time of day in the reports;
- Of the ninety-eight daylight events ninety-two were during visual conditions while the remaining six did not specify visibility conditions;

- Nineteen events occurred at night and of these, eleven occurred under visual conditions, three during instrument, marginal or mixed rain and the remaining five were not specified;
- Two events occurred during dusk and both occurred under visual conditions.

As noted, the databases also identify contributing factors to the events (surface incidents or incursions) that have occurred. In some instances, there are multiple contributing factors to a single event which results in the number of contributing factors exceeding the number of events. Based on the information developed for the one hundred twenty-six surface incidents or incursions that have occurred during the sixteen-year period reviewed for the SJC study effort, the following incidence of each contributing factor was identified and are listed below:

- Human Factors 113 references
- Airport Layout 10 references
- Ambiguous/not clear/not noted 2 references
- Procedural 14 references
- Company Policy 1 reference
- ATC Building/facilities 1 reference
- Workload 1 reference
- Environmental-non-weather related 1 reference

Incidents and incursions identified for this effort have also been classified based on the severity of the event. The FAA has developed a set of criteria that they employ in their classification of incursions and these same criteria have been applied to the incident descriptions from the ASRS database to define the relative severity of incidents contained in this non-FAA database. The FAA classifies incursions into one of six classes that are referenced A through E and described below.

Class A. A serious incident in which a collision was narrowly avoided;
Class B. An incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective or evasive response to avoid a collision;
Class C. An incident characterized by ample time and/or distance to avoid a collision;
Class D. Incident that meets the definition of runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the takeoff and landing of aircraft but with no immediate safety consequences;
Class E. An incident in which insufficient or conflicting evidence of the event precludes assigning another category.[1]

The number of incidents by severity class are delineated below:

- Class A 3 events
- Class B 9 events
- Class C 23 events
- Class D 88 events
- Class E 2 events
- Accident 1 event

[1] FAA Order 7050.1B Runway Safety Program, Appendix B

Finally, to the extent that the description of each incident or incursion specified either a general or specific location on the airport, these events were identified and subsequently mapped to define whether there were concentrations of events in specific areas on airfield that might focus the subsequent analyses. Five primary concentrations of incident and incursion events were identified, with three concentration areas being located on the southern half of the airfield.

Focus Area 1 – The first concentration is evident at the far south end of Runways 12L/30R and 12R/30L and primarily concentrated around the intersections of these runways with Taxiway B. A total of nineteen events were identified in this general vicinity that included air carrier, corporate and general aviation operations as well as two ground vehicle incidents.

Focus Area 2 - The second concentration of events is along Taxiway C between Taxiway W, on the west and Taxiway Y on the east and includes the landing thresholds for both Runway 30L and 30R. In the immediate vicinity of the described area a total of twenty events were identified that involved air carrier, commuter, corporate and general aviation operations along with one ground vehicle incident.

Focus Area 3 – The third major concentration of events includes the two designated hotspots on the airport. This area extends along Taxiway D between Taxiway V on the west to Taxiway Y on the east. A total of forty-one events, mostly involving general aviation operations, and including a number of wrong runway landings have occurred in this area. The predominance of general aviation events is logical as Taxiway D was the means of accessing Runway 29 prior to its closure and the primary run-up ramp on the southwest side of the airfield is at the intersection of Taxiway W and Taxiway D.

Focus Area 4 – This area is located along the alignment of Taxiway J between Taxiway V and Taxiway Z. A total of twelve events were identified in this area that involved air carrier, general aviation, commuter and corporate operators.

Focus Area 5 – Focus Area five includes the northern section of the airport including Taxiway L and Taxiway M between Taxiway W and Taxiway Z and extending north to the alignment of Taxiway N on the north end of the airport. A total of thirteen incidents were identified in this area, eight of which are located along Taxiway L. Four of the noted incidents in this focus area involved ground vehicle movements.

The nature of incidents over the period reviewed are varied, and to date none of the noted incidents have resulted in an event where aircraft have incurred any significant damage, although there have been events where aircraft came relatively close to one another. The listing of incidents set forth in **Table 1** summarize the narrative descriptions of the events from the AID, RWS, ASRS database and the RSAP report on a case by case basis. Included in these are incidents of aircraft landing or departing from an incorrect runway, aircraft departure from a taxiway, aircraft entering onto, or crossing a runway without ATC authorization, pilots correctly reading back ATC instructions and then failing to follow the instructions, confusion over ATC instruction provided and, aircraft taxiing on a runway without ATC authorization or being authorized to taxi on a runway, but taxiing on a different runway.

Table 1 is a multi-page table that presents the summary of surface incident and incursion information on a year by year basis at SJC, that includes a period of time within which Runway 11/29 was open and operational and a similar period of time during which this runway has been non-operational. This point is

critical to understanding issues that could arise should it be determined that Runway 11/29 be recommissioned and returned to operational status. Additionally, this data helps to determine whether the cessation of operations on Runway 11/29 resulted in the easing of incidents at the airport or if conditions still exist that create adverse interaction between aircraft on areas adjacent to the alignment of Runway 11/29.

Following **Table 1** are three maps displaying the location of each incident identified in the table. **Figure 1** shows the location of all 126 incidents from 2000 to Present. **Figure 2** shows the location of incidents occurring from 2000 through late 2009 when Runway 11/29 was operational. **Figure 3** shows the location of incidents occurring from 2010 to the present, corresponding with the period when Runway 11/29 has been closed and more recently re-designated as interim Taxiway W-1, which is its current status.

Table 1 – AID, ASRS, RSAT, and RWS Summary of Incidents - 2000 To Present								
Incident No. & Source	**Date**	**FAA Severity Class**	**Condition**	**Aviation Category**	**Location**	**Description**	**Main Contributor**	***Noted Construction***
1 ASRS	03-2000	D	Mixed Night	Air Carrier	Taxiway Z at Taxiway K	A B737-300 was given taxi instructions from Terminal C to RUNWAY 12R via TAXIWAY Z. Pilot and first officer were conducting taxi op along with other duties. Pilot was unfamiliar with airport and did not see end of hard surface on TAXIWAY Z and taxied past TAXIWAY K where he was supposed to turn although that movement was not noted in the taxi instructions. Jeppesen Approach Plate layout on airport diagram did not agree with actual configuration of Taxiway Z. Could not execute a 180 degree turn so called a tug to push aircraft back to access TAXIWAY K. Recommended hold short sign on TAXIWAY Z be bigger and brighter and placed further south to improve time to react and make a turn at TAXIWAY K.	Human Factors, Airfield Layout	Yes
2 ASRS	03-2000	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 29	Pilot of a PA-28 received progressive instructions from Ground Control from east side of airport to Runway 29 run-up area (west side). Contacted ground after run-up and was instructed to "cross TAXIWAY V to RUNWAY 29, and contact tower." Pilot was unsure whether instructed to stop prior to hold line to clear TAXIWAY or short of it. Hold short had not been part of instruction. Pilot stopped on hold line and contacted tower indicating ready for takeoff. Tower responded with "Hold short of RUNWAY 29" and shortly after noted that aircraft appeared to be in front of hold line and pilot instructed to taxi clear of runway and contact ATCT for Possible Dev. SJC Ground indicated that they did not "hold short" in their taxi instructions for RUNWAY 29.	Human Factors	Yes NOTAM 2000 – 01100, 01300, 01600 revised, 01700, 01800
3 ASRS	08-2000	C	VMC Daylight	Personal/ General Aviation	Runway 29	Radio frequency was congested at time of incident. Aircraft taxied from RUNWAY 29 run-up area across TAXIWAY V to hold position for RUNWAY 29. While holding short, the instructor remembers several traffic callouts for all three runways, including one to subject aircraft indicating they would be held for traffic for about two more minutes. Next call monitored was believed by instructor and student to be for them to take off on RUNWAY 29 and to expedite. Student responded "Cessna XYZ cleared for takeoff, RUNWAY 29, Expediting" (Instructor assumed tower getting them out in a gap). Aircraft entered runway, began take-off when they	Human Factors	Yes NOTAM-2000-10200, 10000, 09900, 09800, 09700, 09600, 09500, 09400, 09300, 09200, 09100, 09000, 08900

						heard a call to aircraft on final to go around and for them to stop. Tower indicated that Cessna XYZ had answered a clearance meant for an MD80 on the parallel. Reporter of incident question why ATCT did not question their read-back of takeoff clearance.		
4 ASRS & AID	09-2000	A	VMC Daylight	Air Carrier	Terminal Apron	During pushback from gate using a contract crew from another airline, the aircraft was pushed back into start of taxi roll, initiated engine start and other checklist procedures and cleared the tug operator to disconnect the tow bar. Pilot thought he heard the tow bar disconnect and thought he saw tug begin backing away. Saw aircraft marshal walk away from aircraft and pilot flashed the taxi lights to signal his readiness to taxi. Waited for another aircraft to pass and began taxi movement when aircraft began to shudder and then stopped stemming from No. 1 engine hitting the tug.	Human Factors	Yes NOTAM-2000-11800, 11600, 11500, 11400, 11300, 11200, 11100, 11000, 10900
5 ASRS	11-2000	D	VMC Time of day not noted	Pedestrian	Terminal Apron	During a mechanical at the gate, passengers were left uncontrolled and unattended on the ramp between the aircraft and the gate in proximity to various pieces of ramp equipment that were operating in the immediate vicinity. Passengers were apparently confused as to whether they should enplane or go back into terminal and there was an absence of personnel to attend to the situation.	Human Factors	Yes NOTAM-2000-12900
6 AID	12-2000	A	Daytime	Air Carrier	Taxiway C	A Boeing 777, while being taxied under aircraft power struck a parked Gulfstream 4, located at ACM aviation. Airlines' ground marshal crew was directing the aircraft movement along TAXIWAY C into the US customs area at the time of incident. Minor damage was done to the lower outboard left wing of the B777-200 caused by the G-4's left horizontal stabilizer	Human Factors	Yes NOTAM-2000-13600
7 ASRS	04-2001	D	Night	Air Carrier	Taxiway W	Cleared to RUNWAY 30L via, an unusual route, via TAXIWAY Y, TAXIWAY C, CROSS RUNWAY 30L, TAXIWAY C to TAXIWAY W to TAXIWAY B to RUNWAY 30L. We checked the airport page for restrictions – and noted a 75000 LB weight restriction on TAXIWAY W between TAXIWAY C and TAXIWAY B. Advised ground control that we were unable to use TAXIWAY W and were informed that the weight restriction had been lifted, but not yet published. Based on this, continued taxi movement as cleared by ATCT on an uncomfortably narrow taxiway. On the west side of RUNWAY 30L the pilot discovered the page note prohibiting taxi on TAXIWAY W along RUNWAY 30L, south of TAXIWAY J.	Human Factors, Airfield Layout	Yes NOTAM-2001-03901, 03601

8 ASRS	05-2001	C	Night	Air Carrier	Runway 30L at Taxiway C	Aircraft 1 taxied to RUNWAY 30L at TAXIWAY C intersection in response to flow control into LAX. There were three aircraft at the runway ahead of Aircraft 1 but Aircraft 1 was facing a time limit on his departure window. There was also a steady stream of arrivals to RUNWAY 30L at the time. One departure was being spaced between each arrival. Due to time of day (between sunset and sunrise taxi into position and hold could not be used. As an arrival was just touching down, Aircraft 1 was cleared for takeoff using anticipated separation. Pilot read back instructions but controller missed the addition of "position and hold" which was not part of the original clearance. Controller believes Aircraft 1 pilot did not expect takeoff clearance while landing aircraft was still turning off runway. Controller had moved on to two other traffic transmissions when the next arrival to RUNWAY 30L now on a 1-mile final asked if there was someone on the runway. Controller observed that Aircraft 1 had not departed and immediately re-cleared Aircraft 1 to depart and to expedite. Controller noted that since taxi into position and hold is not being used at intersections at night it removes the requirement to inform the arrival and departure of each other and this contributed to the potential incident noted.	Procedures and policy, human factors, airspace structure	No
9 ASRS	05-2001	D	VMC Daylight	Air Carrier	Runway 30L departure end	B737-300 (Aircraft 1) cleared into position and hold on RUNWAY 30L with a CL65 rolling out and a B737 on final. The CL65 missed all turnouts and rolled to end of RUNWAY 30L. ATCT directed Aircraft 1 to exit the runway to allow the B737 on final to land and to expedite the movement. While exiting the RUNWAY 30L the crew noticed the line of aircraft waiting to depart blocked their exit. Construction activity in the vicinity was also a factor. ATCT asked if Aircraft 1 had enough room and first officer responded affirmatively as from his position that appeared to be the case. The aircraft was straddling the hold bar and before they could contact the tower the B737 had landed.	Human Factors/ Construction	No
10 ASRS	05-2001	C	VMC Time of day not noted	Personal/ General Aviation	Taxiway F vicinity of Taxiway V	After landing on RUNWAY 29, pilot taxis off RUNWAY via TAXIWAY F and continues onto TAXIWAY V toward the threshold of RUNWAY 29 without stopping. After taxiing a few hundred feet, ATCT requests pilot to switch to ground frequency where pilot requests and receives a taxi clearance and a request to call the tower. Tower supervisor notes in call that a helicopter had departed TAXIWAY V and that the pilot had caused a "possible loss of	Human Factors	No

						separation" Pilot did not see the helicopter not hear any communication with the helicopter. Pilot also noted that while on roll-out on runway ATCT did not state "turn left at TAXIWAY F and contact ground, which per the pilot is done "90%" of the time.		
11 ASRS	09-2001	D	VMC Daylight	Air Carrier	Runway 30R	MD-80 cleared for takeoff while approaching the hold short position for RUNWAY 30R. Aircraft took the runway and started to spool up. Pilot heard ATCT clear an aircraft (Aircraft 2) that had just landed on RUNWAY 30L to cross RUNWAY 30R. MD-80 aborted takeoff roll while at about 5 to 10 knots. After aborting takeoff ATCT instructed Aircraft 2 to hold short of 30R. ATCT then re-cleared MD-80 for takeoff but pilot indicated they would exit runway and taxi back from TAXIWAY B intersection for full length departure.	Human Factors	Yes NOTAM-2001-10301, 10201, 10101, 09601.
12 ASRS	10-2001	D	VMC Daylight	Air Carrier	Taxiway Y at Taxiway B and Runway 30R	B737-300 instructed to taxi on TAXIWAY Y to RUNWAY 30R. Hawker Jet was conducting a run-up at the end of TAXIWAY Y resulting in the 737 needing to taxi around the corporate jet. Approaching the end of the runway, ATCT issues departure clearance for the 737. Given blockage, pilot of the 737 uses TAXIWAY B to access RUNWAY 30R and back taxis to TAXIWAY A at 30R end. 737 was not given clearance to conduct back-taxi.	Human Factors	Yes NOTAM-2001-11401, 11301, 11201, 11101, 11001, 10901
13 ASRS	11-2001	C	Daylight	Air Carrier	Runway 12L at Taxiway N	B737 (Aircraft 1) was holding short of RUNWAY 12L and was given clearance to take off. Finished checklist and checked final approach and taxied into position on RUNWAY 12L centerline for takeoff. Aircraft 1 pilot noticed a second B737 crossing RUNWAY 12L and queried ATCT about the crossing aircraft. ATCT responded that Aircraft 1 had been instructed taxi into position and hold. Aircraft 1 responded "roger position and hold". Pilot of Aircraft 1 asked ATCT to check their tapes as he believed ATCT had given him clearance to depart and not to position and hold.	Human Factors	Yes NOTAM-2001-11901, 11801, 11501
14 ASRS	01-2002	A	VMC Daylight	Air Carrier	Ramp to Taxiway Y at J	Cleared to taxi to RUNWAY 30R via TAXIWAY B. Access to TAXIWAY B would involve use of TAXIWAY Z, (rarely done) which was blocked by an aircraft push back. Pilot assumed intent of ATCT was for aircraft to use TAXIWAY Y. Access to TAXIWAY Y being immediately in front of aircraft supported pilot's assumption. In moving towards TAXIWAY Y, aircraft had to stop abruptly to avoid a fast-moving taxiing 737 which passed with a 15-20' clearance. Unclear instructions from ground controller and pilot not requesting clarification	Human Factors	No

15 ASRS	01-2002	D	VMC Night	Corporate	Runway 30R in lieu of 30L vicinity of TXY D	Cleared to land RUNWAY 30L, landed on RUNWAY 30R, Co-pilot training dominated the other pilot's attention along with monitoring preceding traffic. Previously RUNWAY 30R had been closed to night operations which contributed. Complacency and familiarity on part of pilot led to incident. **Wrong runway landing.**	Human Factors/ previous Construction	Yes NOTAM-2002-01002, 00902, 00802, 00702, 00602, 00502, 00402, 00202
16 ASRS	02-2002	D	VMC Daylight	Personal/ General Aviation	Taxiway Y at Taxiway A	Ground instructed pilot to taxi via TAXIWAY Z to RUNWAY 30R and instructed to position and hold, RUNWAY 30R. Pilot taxied into position on TAXIWAY Y in error and ATCT cleared aircraft for takeoff and aircraft departed on Taxiway Y. **Aircraft takeoff on TAXIWAY Y.**	Human Factors	No
17 ASRS	02-2002	D	VMC Night	Air Carrier	Runway 30R AT Taxiway A	Ground cleared aircraft to taxi from gate, make right on TAXIWAY H, cross TAXIWAY Y and back-taxi on RUNWAY 30R until advised. Captain complied and turned at TAXIWAY B. Captain was then advised to taxi on TAXIWAY B access TAXIWAY Y and hold short of RUNWAY 30R. Pilot believed he was cleared all the way to 30L and crossed 30R despite questioning by the first officer (FO).	Human Factors	No
18 ASRS	02-2002	B	VMC Daylight	Air Carrier	Taxiway J at Runway 30R	Landed on RUNWAY 30L and exited at TAXIWAY J and were instructed to "hold short of RUNWAY 30R." but pilot only heard TAXIWAY J. FO called Hold Short and pilot stopped aircraft but crossed hold line for 30R with MD80 conducting a departure on RUNWAY 30R. Contributing factor could be timing of instruction occurring during high reverse thrust (difficulty hearing) or when just turning off RUNWAY.	Human Factors	No
19 ASRS	02-2002	D	VMC Daylight	Personal/ General Aviation	Runway 30R	Aircraft 1 taxied into position behind Aircraft 2. ATCT instructed Aircraft 2 to taxi into position and hold. Aircraft 1 contacted ATCT with "ready for takeoff" and thought ATCT had cleared Aircraft 1 to takeoff on RUNWAY 30R. ATCT had not cleared Aircraft 1 which crossed hold bar and entered RUNWAY 30R. Pilot of Aircraft 1 was preoccupied and ATCT failed to catch wrong read-back.	Human Factors	Yes NOTAM-2002- 02702, 02602, 02502, 02402, 02202, 02102, 02002, 01902, 01802, 01702, 01602, 01502, 01402, 01302, 01202, 01102
20 ASRS	03-2002	D	Daylight	Corporate	Runway 30R	Lear 45 taxied from ramp following another aircraft onto RUNWAY 30R without clearance and without proper read-back of controller instructions, resulting in a runway incursion. RUNWAY 30R had	Human Factors/ previous Construction	No

						previously been closed for an extended period and assumed it was still closed.		
21 ASRS	03-2002	D	VMC Daylight	Corporate	Runway 30R	FAL 900 cleared to taxi to what pilot believed to be RUNWAY 30L as it was a common clearance from that part of airport, and RUNWAY 30R had been previously closed for repairs. Reached approach end of 30R checked for traffic and taxied across to hold short of RUNWAY 30L. Halfway across RUNWAY 30R ATC directed a 270 degree turn on RUNWAY 30R into position and hold. Entering RUNWAY 30R without clearance resulted in a runway incursion.	Human Factors/ previous Construction	No
22 ASRS	03-2002	D	VMC Daylight	Air Taxi/ Commuter	Runway 30R at Taxiway J Runway 29	Landed on RUNWAY 30L instructed to turn on TAXIWAY J, cross RUNWAY 30R and contact ground on other side. ATCT did not indicate right or left onto TAXIWAY J. Pilot in command turned left when should have gone right, given their intended destination on airport. Second in Command was doing after landing checklist. Aircraft crossed RUNWAY 29 w/o authorization and ATCT did not identify the mistake.	Human Factors	No
23 ASRS	03-2002	D	VMC Dusk	Air Taxi/ Commuter	Runway 30R	Pilot of a CL65 received taxi instructions while also receiving instructions from ground crew. RUNWAY 30R had been closed the night before and in the morning of this event. Both pilot and first office believed they were cleared to RUNWAY 30L. RUNWAY 30R was open for departures only, but no visual indication the runway was open. While crossing RUNWAY 30R aircraft called tower and were informed of incursion.	Human Factors	Yes NOTAM-2002-04602, 04402, 04202, 03902, 03602, 03002
24 ASRS	04-2002	B	VMC Daylight	Personal/ General Aviation	Runway 29	Ground instructed pilot to taxi to RUNWAY 29 and monitor ATCT. Pilot responded "going to TWR" and taxied onto RUNWAY 29 w/o clearance, other traffic executed go around. Factors included relief briefing distraction in tower, controller not getting appropriate read-back; aircraft not seen by ground control and pilot and combined situational awareness issues.	Human Factors	Yes NOTAM-2002-06702, 05402, 05102, 05002, 04902, 04702
25 ASRS	06-2002	C	Not Noted	Air Carrier	Runway 29	ATC cleared a B767-200 to takeoff on RUNWAY 30R with an aircraft inside a 4-mile final and a B737 still on landing roll out on same runway. 767 delayed departure until 737 exited runway, but then realized that a C152 on departure from RUNWAY 29 could be seriously impacted by having to fly through potential wake turbulence. Tower directed C152 to sidestep to the left due to proximity.	Human Factors	No

26 ASRS	08-2002	D	VMC Daylight	Personal/ General Aviation	Run-up Area at 29 end	RUNWAY 29 run-up area location requires aircraft to contact ground control prior to leaving run-up to taxi to RUNWAY 29 end. This requires ground control to be contact twice, once on the way to the run-up and then to leave the run-up area to taxi to airport. Pilot misunderstood clearance instructions to taxi and taxied into departure position on runway and held, rather than taxiing to the hold line. (Pilot noted very limited space between hold line and near edge of taxiway as contributor, Limited room means holding aircraft is partially blocking parallel taxiway). Controller did not catch inaccurate read-back and instructions from ATCT did not include "the usual hold short" instruction. No other traffic was impacted.	Human Factors	No
27 ASRS	12-2002	B	VMC Night	Air Carrier	Taxiway H at Taxiway Y	SJC ground was very busy and appeared task saturated, was confusing aircraft flight numbers given multiple pushbacks and operations occurring at the time. Cleared the reporting aircraft to follow a company aircraft to RUNWAY 30R via TAXIWAY Z to H to TAXIWAY Y to 30R with no indication of other traffic. While on TAXIWAY H to Y had to conduct a hard stop while taxing to avoid nearly interacting with a B757 that was not identified by ground control. Multiple updates of ATCT on aircraft position and actions went unacknowledged.	Human Factors, workload	Yes NOTAM-2002-16202, 16002
28 ASRS	02-2003	D	VMC Daylight	Corporate	Runway 30L vicinity of Taxiway D	RUNWAY 30R had been closed for extended period but reopened. Cleared to land RUNWAY 30R then sidestepped to RUNWAY 30L by controller. Pilot did not hear sidestep and landed on RUNWAY 30L. **Wrong runway landing.**	Human Factors Airfield Layout	No
29 ASRS	05-2003	D	VMC Daylight	Personal/ General Aviation	Runway 29	PA28 taxied into the takeoff position and held on RUNWAY 29 without ATC clearance.	Human Factors	No
30 ASRS	09-2003	D	VMC Daylight	Personal/ General Aviation	Runway 29 and Runway 30L	Aircraft instructed to cross midfield at or above 1,500 feet and enter downwind for RUNWAY 29. Pilot read-back correctly on several responses to progressive instructions and clearances and indicates he had clearly identified RUNWAY 29. While turning left base to final pilot noted position of other traffic, noted position of VASI (PAPI) on 30L and lost visual contact with RUNWAY 29. Pilot proceeds to land on 30L without clearance – **Wrong runway landing**	Human Factors	Yes NOTAM-2003-10903, 10203, 09903, 09803,
31 AID	10-2003	Accident	VMC Daylight	Air Taxi/ Commuter	Terminal Ramp	An EMB 120 aircraft had just landed and was on the AOA ramp under taxi to park at Gate 2c. While making a left turn into the gate parking, and under the direction of the ground marshal, the	Human Factors	No

						aircraft's left wing tip struck the back end of a parked fuel truck. This fuel truck had just finished fueling the aircraft at the adjacent gate. The aircraft's left wing tip fairing and clear lens cover were damaged during the collision. The aircraft obtained a special flight permit to be flown back to its home station for repairs.		
32 ASRS	11-2003	B	VMC Daylight	Corporate	Runway 30R south end of pavement	A Corporate aircraft contacted ATC 12 miles out noting their on-airport intended destination and that they were on visual for RUNWAY 30L, but could take RUNWAY 30R. ATCT cleared them for 30R. Airbus was landing on RUNWAY 30L and upon landing continued off the runway and was crossing RUNWAY 30R and pilot was concerned about whether the aircraft would be clear of runway by time they landed. Frequency congestion impeded both asking the question and receiving a response from ATC. Aircraft landed safely. Pilot told to contact the ATC and spoke to ATC Supervisor who indicated that aircraft had overflown an aircraft on the displaced threshold. Pilot informed supervisor: ATC never informed pilot of aircraft taxiing into position, ATC never issued instructions to go-around. Appeared the controller got very busy and forgot he had cleared corporate jet to land after taxiing another aircraft into position.	Procedure	Yes NOTAM-2003-12503, 12103, 12003
33 ASRS	12-2003	E	Night	Procedural	Ramp	An FAA controller from SJC reports a concern about airport lighting that is very bright and greatly restricts and adversely impacts the ability of controllers to clearly see and differentiate between aircraft. This includes portable lights sometimes used at night for cargo operations. Specifically notes the location and intensity of lights on cargo ramps, Terminal A and parking lot lights. Controller was very concerned about lighting being a potential contributor to a serious incident in the future.	Airfield Layout	Yes NOTAM-2003-14003, 13303,
34 ASRS	04-2004	D	Not noted	Personal/ General Aviation	Runway 29 Run-up	SJC ATCT process for clearance of traffic from the RUNWAY 29 run-up area to RUNWAY 29 questioned as a contributor to surface incidents and incursions. Pilot of a PA46 taxied into position for departure on RUNWAY 29 at SJC rather than to the hold position without clearance. Taxiway and run-up area at approach end of RUNWAY 29 is described as confusing. Pilot also notes that the phraseology used by ground control did not trigger the usual “hold short” response from the pilot.	Airfield Layou Procedure	Yes NOTAM-2004 10604,
35 ASRS	05-2004	D	Night	Air Carrier	Taxiway C at	A seven-hour delayed flight resulted in clearance to depart 20 minutes prior to ATCT closure. When pushback occurred ATCT had	Company policies,	Yes

					Taxiway W	closed. During taxi-out on TAXIWAY Y pilot and FO were busy in cockpit with various tasks and as aircraft neared TAXIWAY C, to avoid construction on approach end to RUNWAY 30R, pilot elected to cross RUNWAY 30L and taxi down west side of runway on TAXIWAY W. Prior to entering TAXIWAY W flight crew became aware of wingtip restriction on TAXIWAY W and conducted a 180 degree turn on TAXIWAY C, back taxied on RUNWAY 30L and departed. Crew felt pressure due to next day flights that would be further delayed due to crew rest issue and wanted to minimize delay as much as possible.	Human factors/ Construction	NOTAM-2004-12104, 11904, 11704, 11604, 11204
36 ASRS	07-2004	D	VMC Daylight	Personal/ General Aviation	Runway 29 Run-up to Runway 29	Owner and new pilot of a TB 700 focuses on pre-flight checks in the RUNWAY 29 run-up area and appears to have misunderstood ATCT instructions. Pilot thought he was directed to "follow King Air into position and hold on RUNWAY 29 and contact tower." Pilot followed King Air and taxied into position on RUNWAY 29 and held. Experienced problems finding correct frequency to contact ATCT but once contacted pilot cleared for takeoff, but told to expect to be contacted about potential infraction. Pilot notes understanding that ground control cannot clear an aircraft onto an active runway. Recommends clearer instructions to avoid entering runway without proper clearance.	Human Factors	Yes NOTAM2004-16504, 15004, 14904, 14104,
37 ASRS	09-2004	B	VMC Daylight	Air Carrier	Taxiway Z at Taxiway F	MD80 facing south bound on TAXIWAY Z just north of TAXIWAY F. Ground instructed to taxi to RUNWAY 30R via TAXIWAY F and Y with no mention of other ground traffic. MD80 started to turn on TAXIWAY F and co-pilot emphatically told pilot to stop. Regional aircraft passed approximately 75 feet in front of MD80. Ground controller indicated he had failed to inform MD80 of other aircraft which pilot and FO could not see until beginning their turn.	Human Factors	Yes NOTAM-2004-21404, 21004, 20004
38 ASRS	11-2004	D	VMC Night	Air Carrier	Taxiway D exit in lieu of Taxiway C	Air carrier aircraft lands RUNWAY 12R, at approximately 50 knots and approaching TAXIWAY D, ATCT directs to aircraft to exit on TAXIWAY C, cross RUNWAY 12L and contact ground control. Pilot did not see sign indicating TAXIWAY D and assumed it was TAXIWAY C and exited onto TAXIWAY D by mistake. TAXIWAY D was closed at the time. Pilot observed red lights but did not associate these with a closed TAXIWAY. Aircraft stopped and was ultimately towed from TAXIWAY D to the gate. (NOTE: description in data base suggests aircraft may have struck barrier due to a reference to inspecting gear and a cut in tread of nose gear).	Human Factors/ Construction	Yes NOTAM-2004-25204, 25104, 25004, 24804, 24704, 24604, 24504, 24404, 24204, 24104, 24004, 23904, 23704, 23304

39 ASRS	12-2004	B	Mixed Rain -Night	Air Carrier	Runway 12L at Taxiway F	B737-7 after landing RUNWAY 12R and exiting at TAXIWAY F was cleared to cross RUNWAY 12L and taxi via TAXIWAY Y to J to gate. Both pilot and FO confirmed ATCT instructions. While taxiing along Taxiway F, 737-7 pilot notices an aircraft on RUNWAY 12L beginning takeoff roll and performs an aggressive stop beyond the hold short line and roughly 30' short of actual runway edge. Note that visual conditions were not optimum. Takeoff aircraft was another air carrier and was airborne at about 200-300 feet when passing TAXIWAY F. Pilot did not hear any clearance given to departing aircraft nor was the 737-7 informed he was on the runway. Controller noted it was his error.	Human Factors	No
40 RWS	01-2006	D	VMC Daytime	Personal/ General Aviation	Runway 29	A Cessna C560 was instructed to taxi to Runway 30L then was observed taxiing on Runway 29 without authorization. No conflicts reported.	Human Factors	Yes NOTAM-2006-00706, 00606, 00306,
41 ASRS	02-2006	C	Marginal Night	Air Carrier	Runway 12R	Air carrier aircraft arrived after ATCT closed due to flight delay and was vectored to final by NORCAL approach to intercept ILS for RUNWAY 12R and cleared for approach and handed off to CTAF. "No Tower" position reports made at 9 miles and 5 miles out with ceiling at 3,000. Good visibility below 3,000 where aircraft acquired airport and could see RUNWAY 12R lights only partially illuminated. Attempts to activate RUNWAY 12R lights unsuccessful and at 1,000 decision made to sidestep to RUNWAY 12L and land. Upon landing on RUNWAY 12L, pilot observed equipment and personnel about 2/3rds the way down RUNWAY 12R. No warning about runway closure was ever conveyed to aircraft.	Ambiguous/ Construction	Yes NOTAM-2006-02406, 02306, 02206, 02006, 01906, 01206
42 RWS	05-2006	D	VMC Daytime	Corporate	Runway 30L	A Bombardier GL5T, with current ATIS, was taxied to Runway 30L by Ground Control (GC). Local Control (LC) cleared the GL5T for takeoff Runway 30L and pilot read back 30L. The GL5T started turn to take off on Runway 30R instead of 30L as cleared. Runway 30R is configured as a taxiway due to construction. There were no vehicles or aircraft on 30R at the time. GC observed the GL5T and immediately advised LC who cancelled takeoff clearance. The GL5T pilot aborted and exited 30R approximately 500 feet down the runway.	Human Factors/ Procedural/ Construction	Yes NOTAM-2006-06906, 06606, 06506, 06306, 06206
43 RWS	06-2006	D	VMC Daytime	Personal/ General Aviation	Runway 29	A Piper PA28R correctly read back instructions to taxi to Runway 29. Subsequently Ground Control observed the PA28R taxi onto	Human Factors	Yes NOTAM-2006-09706,

						Runway 29 without authorization or contacting ATCT. No conflicts reported.		09106, 08906, 08806, 08706, 08506, 08406,
44 AID	07-2006	B	VMC Daylight	Air Carrier	Taxiway E at Runway 30R	An Airbus A319 captain stated: "pushed tail north from gate C-12, called for taxi, given the following route. "taxi Zulu" to "Echo" down 30R for a 30L departure. No notice of another airline taxiing was passed along to us. On echo after clearing left then to right. in first officer's forward window, I saw the other aircraft taxiing at a high rate of speed. To avoid any situation, brakes were applied. the other aircraft never stopped, passing the nose of the A319 the other aircraft slowed to a normal taxi speed." The captain was notified that one flight attendant in the aft galley area was thrown to the floor due to the sudden braking, causing minor injury.	Not Noted	No
45 RWS	09-2006	B	VMC Daytime	Vehicle/ Pedestrian	Runway 30L at Taxiway B to Taxiway C	An airport fire vehicle and 2 other emergency vehicles responding to an alert for Runway 29 were instructed to cross Runway 30L at Bravo. The lead fire vehicle driver read back "crossing Runway 30L at Bravo, be advised we're going to take Charlie down to our location". The fire vehicle proceeded onto 30L at Bravo and drove down 30L (1,500 feet) to Charlie without authorization. A Beech BE35, distress aircraft, was initially cleared to land Runway 29. Pilot stated they would land 30L and was cleared for 30L. Ground Control advised the fire vehicles to exit without delay due to aircraft landing behind them. The last vehicle with the lead fire vehicle exited at Charlie prior to the BE35 crossing 30L threshold. Closest proximity estimated was 1,900 feet horizontal, distance from threshold to Charlie.	Human Factors	No
46 RWS	09-2006	D	VMC Daytime	Personal/ General Aviation	Taxiway J at Runway 11	A Beech BE35 was taxied to Runway 11 and was asked by Ground Control (GC) if pilot needed a run-up with reply being in the affirmative. The BE35 crossed Taxiway Victor without authorization, continued across the hold lines at approach end Runway 11 (Juliet) and conflicted with a Beech BE9L crossing landing threshold same runway. The BE9L was instructed to go around and passed abeam Juliet at an estimated 40-50 feet vertical and the BE35 stopped approximately 6-10 feet past hold line. Hold line to runway edge is 75 feet with closest horizontal proximity estimated as 90 feet.	Human Factors	No
47 RWS	09-2006	D	VMC Daytime	Personal/	Runway 29	A Cessna C210 was issued taxi instructions to the Runway 29 run-up area but the aircraft mistakenly taxied to another ramp area.	Human Factors	No

				General Aviation		Ground Control (GC) tried to correct the error but received no response. Later the C210 called ready to taxi and was issued instructions to Runway 29. The C210 then entered Runway 29 without authorization. Both GC and Local Control directed the C210 to exit the runway. No conflicts reported.		
48 RWS	09-2006	C	VMC Daytime	Personal/ General Aviation	Runway 29	A Cessna C152 departed Runway 29 without a clearance. A Bombardier CL30 had been instructed to cross Runway 29 at Taxiway Juliet but was held short of the hold bars. No loss of separation or other conflicts reported.	Human Factors	Yes NOTAM-2006-12706, 12606, 12406, 11906, 11706, 11506
49 RWS	11-2006	D	VMC Daytime	Personal/ General Aviation	Taxiway V and Runway 29	A Cessna C182 entered Taxiway Victor and taxied to Runway 29 without authorization. The C182 held at the hold short lines and contacted ATCT. No conflicts reported.	Human Factors	Yes NOTAM-2006-14306
50 AID	12-2006	D	VMC Night	Air Carrier	Runway 30L at Taxiway L	B767-300 landed on RUNWAY 30L and was instructed to exit at TAXIWAY M. Pilot in command exited at TAXIWAY L which was closed at the time and marked with temporary barricades and taxied over one barricade and blew an additional six barricades over. The Pilot indicated he did not recall ATCT instructions to exit at TAXIWAY M, and had not noticed the barricades. ATIS current at the time indicated TAXIWAY L was closed between Runway 12R/30L and TAXIWAY Y. ATCT instructions to exit at TAXIWAY M were verified by ATCT staff and airport operations. No damage to the aircraft occurred	Human Factors	Yes Covered by previously noted NOTAMS
51 RWS	12-2006	D	VMC Night	Personal/ General Aviation	Taxiway H and Runway 30L	Multiple taxiways are closed due to construction. Taxiway Hotel would normally be the first egress point off Runway 30L. Local Control (LC) instructed a Beech BE20 after landing Runway 30L to turn at Hotel and contact Ground Control (GC). LC then cleared a Boeing B737 for takeoff Runway 30L full length with a second Boeing B737 on a 4- mile final. LC then realized the BE20 had been turned onto a closed and barricaded taxiway. The BE20 cleared the runway but was unable to proceed forward and stopped prior to hold line and within runway safety area. LC cancelled takeoff clearance on the B737 but the aircraft had rolled approximately 2,000 feet down the runway. Closest horizontal separation was 4,000 feet when the B737 reached taxi speed.	Procedural/ Construction	Yes Covered by previously noted NOTAMS

52 RWS	12- 2006	D	VMC Daylight	Vehicle/ Pedestrian	Runway 12L at Taxiway N	Supervisor (SUPVR) was on Local Control 2 (LC2) when an airport vehicle called for a runway inspection on Runway 12L. A CANADAIR CRJ2 was holding short of Runway 12L at Taxiway November for flow time. SUPVR placed a visual aid placard on the pad. Vehicle was between Taxiway Foxtrot and Golf when driver advised he would "need a couple of seconds here to re-bag this sign". Controller in Charge (CIC) started working LC2, to allow the SUPVR to handle a call, and did not receive a briefing. CIC did not know the vehicle had advised he needed some time to re-bag a sign so when he noticed the vehicle off to the right side of the runway and the driver out of the vehicle, the RID was removed. CIC cleared the CRJ2 for take-off. The CRJ2 held on the runway, did not roll, and reported the vehicle on the runway. CIC then observed the vehicle on the runway but could not transmit due to CD reading a SIGMET. As soon as the frequency cleared, CIC advised the vehicle to clear the runway and re-cleared the CRJ2 for takeoff when vehicle reported clear. Closest horizontal proximity reported was 5,000 feet.	Procedural	No
53 ASRS	12- 2006	D	VMC Daylight	Air Carrier	Runway 30R at Taxiway K	B737-3 landed on RUNWAY 30L and exited at TAXIWAY K. Pilot and FO both understood their clearance was to land RUNWAY 30L exit TAXIWAY K and cleared across RUNWAY 30R with an aircraft that was cleared into position on 30R and holding. Pilot read-back instructions that aircraft was cleared to cross RUNWAY 30R as understood and to stay with the controller. Pilot and FO looked down RUNWAY 30R to keep holding traffic in sight and overhead ATCT instructing traffic holding on RUNWAY 30R to cancel their takeoff clearance. Next transmission was telling the taxiing B737-3 to hold short of RUNWAY 30R which was impossible as aircraft was halfway across RUNWAY 30R. Pilot continued across RUNWAY 30R and cleared runway and called ATCT reiterating that ATCT had cleared their aircraft to cross and that pilot had read-back instructions. ATCT indicated they had not heard read back and then cleared the aircraft to the gate.	Human Factors	Yes NOTAM- 2006-17806, 17406, 17206, 17106, 17006, 16906, 16806,
54 RWS	02- 2007	D	VMC Daylight	Air Carrier	Runway 30R at Taxiway J	A Boeing B737 landed Runway 30L. A McDonnell-Douglas MD83 was cleared for takeoff Runway 30R abeam Taxiway Alpha. Local Control 2 (LC-2) was distracted with coordination regarding a helicopter landing and instructed the B737 to cross Runway 30R via Taxiway Juliet. The MD83 pilot observed the B737 enter Runway	Procedural	No

						30R and initiated his own abort after rolling approximately 1,500 feet (abeam Charlie). The MD83 was instructed to exit at Taxiway Echo, approximately 4,500 feet from Juliet.		
55 RWS	02-2007	D	VMC Daylight	Personal/ General Aviation	Runway 11	A Beech BE10 was instructed to taxi to Runway 11. Upon leaving the ramp the BE10 continued straight ahead instead of making the turn onto the correct taxiway and crossed the hold line for Runway 11. Ground Control instructed the BE10 pilot to stop and make a 180 turn. No conflicts reported.	Human Factors	No
56 RWS	03-2007	D	VMX Daylight	Air Carrier	Taxiway A1 at Runway 30R	A CANADAIR CL60 was holding on Taxiway Zulu short of Taxiway Bravo when instructed to continue on Zulu and hold short of Taxiway A1. Subsequently the CL60 was instructed to cross Taxiway Yankee and to hold short of Runway 30R. The CL60 read back hold short instructions then proceeded to cross Runway 30R. No conflicts reported.	Human Factors	Yes NOTAM-2007-04507
57 RWS	04-2007	D	VMC Daylight	Personal/ General Aviation	Runway 30R vicinity of Taxiway D	A Cessna C182 was cleared and read back clearance to land on Runway 29. The C182 then landed on Runway 30R without a clearance. **Wrong runway landing**. No conflicts reported.	Human Factors	No
58 ASRS	07-2007	D	VMC Daylight	Air Taxi/ Commuter	Taxiway V at RWY 11 end	FO called SJC ground control for clearance to taxi from FBO and were cleared to taxi to RUNWAY 30L and advised to obtain an updated ATIS and advise the ATCT when this was done. FO and pilot both anticipated directions to turn left off ramp to taxi to RUNWAY 30L, but FBO marshaller "vigorously" directed the aircraft to turn right to exit the FBO ramp. At start of taxi, the FO switched to the ATIS frequency, but did not have ground control frequency programmed into radio. Pilot and FO were unaware that neither was monitoring ground control. Pilot taxied to what was thought to be TAXIWAY V, but was the alignment of RUNWAY 11/29 resulting in a pilot deviation. ATC directed aircraft to continue taxiing on RUNWAY 11/29 to the far end and then continue to RUNWAY 30L. San Jose Flight Service District Office inspector confirmed that there had been a number of similar incidents over the previous year.	Human Factors	No
59 RWS	07-2007	D	VMX Daylight	Personal/ General Aviation	Runway 29	A Cessna C206 was instructed to taxi to Runway 29 and contact ATCT for crossing to the run-up area. The C206 began taxi and crossed the hold bars for Runway 29 without clearance and was	Human Factors	No

						instructed by Ground Control to stop. No conflicts reported. Subsequently the C206 was taxied across the runway.		
60 RWS	10-2007	D	VMC Daylight	Personal/ General Aviation	Runway 30L vicinity of Taxiway D	A Mooney M20P was cleared to land Runway 29. M20P pilot advised he was unfamiliar with the airport and Local Control (LC) informed the pilot that 29 was the short runway. LC then cleared a Beech BE40 for takeoff on Runway 30L with a Boeing B738, on 3-mile final 30L. The M20P then landed Runway 30L without clearance instead of 29. LC cancelled the BE40's takeoff clearance prior to the BE40 reaching the hold short line and sent the B738 around beyond 2-mile final. The BE40 stopped prior to the hold short lines. In addition, when the M20P exited 30L at H the pilot was instructed to cross Runway 29. The M20P instead turned onto Runway 29 rather than crossing. No conflicts reported for Runway 29. **Wrong runway landing.**	Human Factors	Yes NOTAM-2007-12807, 10607
61 ASRS	11-2007	D	VMC Daylight	Corporate	Runway 30R vicinity of Taxiway H	Rejected takeoff by pilot resulting from unspecific ATCT communication during takeoff roll. ATCT cleared aircraft to taxi into position and hold in the displaced threshold area of RUNWAY 30R. Almost immediately upon reaching position ATCT transmitted what the pilot and FO perceived as clearance to takeoff and the FO responded "aircraft XX cleared for takeoff. The pilot waited 4 to 5 seconds before commencing roll during which there was no negative response for ATCT. Pilot believes he was above 100 Knots and near V1 when aircraft received a transmission from the ATCT of "What are you doing" with no further details. Fearing that they (pilot and FO) may have mistakenly proceed, pilot executed a rejected takeoff and turned off runway after slowing down. Upon exiting the runway, pilot was asked if he wanted taxi clearance back to departure position and to contact to contact tower when ready for takeoff. Pilot asked ATCT if there were any problems or ramifications that needed to be addressed and ground control responded that there were none.	Human Factors	Yes NOTAM-2007-13707
62 ASRS	01-2008	E	VMC Daylight	Procedural	Airport	Situational awareness, very difficult for ATC personnel to see approach end of either runway due to height of Tower. Tower design was/is not suited for 11000 ft. Runway.	ATC Equipment Nav. Fac. Buildings	No
63 ASRS	02-2008	D	Not Noted	Personal/ General Aviation	Runway 30L at Taxiway D	Single engine Cessna cleared for RUNWAY 29 lands of RUNWAY 30L. Pilot deviation occurred but went unreported as such. **Wrong runway landing.**	Human Factors	No

64 RWS	03-2008	D	VMC Daylight	Personal/ General Aviation	Taxiway B and Runway 30R	A Cessna C150 was issued progressive taxi instructions from ACM FBO to Runway 30R via Taxiway Zulu to hold short of Taxiway Bravo. The C150 initially taxied wrong way on Zulu and was corrected by Ground Control (GC). GC monitored the C150's progress and when the C150 stopped short of Bravo, GC instructed the pilot to advise when ready for departure. The C150 then proceeded to enter Bravo and then crossed Yankee and the hold short lines for Runway 30R without clearance. GC instructed C150 pilot to stop. The C150 did not enter the runway. No conflicts reported.	Human Factors	No
65 RWS	03-2008	D	VMC Daylight	Personal/ General Aviation	Runway 30L at Taxiway D	A Cirrus SR22 cleared to land Runway 29 instead landed Runway 30L without clearance. No conflicts reported. **Wrong runway landing**	Human Factors	No
66 ASRS	05-2008	D	VMC Dusk	Corporate	Runway 30R	Pilot given detailed taxi instructions from FBO to RUNWAY 30R. NOTE: 30L had been closed for two weeks for lighting upgrades. Pilot of aircraft appeared confused either due to closure of RUNWAY 30L or detailed taxi instructions. Tower advised aircraft to Hold short of RUNWAY 30R and aircraft acknowledged "hold short instructions" and then proceeded onto RUNWAY 30R without clearance.	Human Factors/ Previous Construction	Yes
67 RWS	08-2008	D	VMC Daylight	Corporate	Taxiway J at Runway 30R	A Cessna C550 landed Runway 30L and advised taxi to Signature ramp. The C550 was instructed to turn left at Taxiway Juliet, cross Runway 29, then was given directions to parking. The C550 replied "roger". The C550 turned right on Juliet instead and crossed Runway 30R without clearance. No conflicts reported.	Human Factors	No
68 RWS	09-2008	D	VMC Daylight	Personal/ General Aviation	Runway 29	A Cessna C172 entered Runway 29 without clearance. No conflicts reported.	Human Factors	Yes NOTAM-2008-09708, 09508, 19408, 19208
69 RWS	10-2008	D	VMC Night	Personal/ General Aviation	Taxiway J at Runway 30R	A Beech BE40 was instructed to turn left at Taxiway Juliette, cross Runway 29, and contact ground. The BE40 read back only Taxiway Juliette then turned right and crossed Runway 30R without clearance. No conflicts reported.	Human Factors	No
70 RWS	11-2008	C	VMC Daylight	Personal/ General Aviation	Runway 29 and Taxiway J	A Cessna C310, landed Runway 30L, turned off on Taxiway Juliet and was instructed to cross Runway 29 at Juliet (departure end) and contact Ground Control (GC) on the other side. Local Control (LC) had forgotten about a Beech BE36 on final for Runway 29. LC instructed the C310 to hold short of Runway 29 for landing traffic.	Procedural	No

						The C310 pilot acknowledged but could not get stopped until past the hold short bars by approximately 5-10 feet. The BE36 landed, reached taxi speed approximately 700-800 feet from Taxiway Golf, and exited the runway at Golf. Closest proximity reported was 2,000 feet horizontal, distance from Golf to Juliet.		
71 RWS	12-2008	D	VMC Daylight	Corporate	Runway 30L	A Hawker H25B entered and departed Runway 30L without clearance. No conflicts reported.	Human Factors	No
72 RWS	12-2008	C	VMC Daylight	Air Carrier	Runway 30L at Taxiway K	A Boeing B733 was advised of runway change at push time from the gate and received new departure routing. The B733 was taxied to Runway 30R but turned wrong way on Taxiway Yankee towards Runway 12L. GC instructed the B733 to turn right on Zulu but pilot turned left towards runways at Lima. LC and GC coordinated a back taxi on Runway 30R for the B733 and GC instructed the pilot to contact tower passing Taxiway Charlie. The B733 started back taxi but turned right at Kilo. GC attempted to stop the aircraft but received no response and the B733 taxied past the hold short lines for Runway 30L at Taxiway Kilo without clearance and conflicted with a B737 touching down on 30L near Delta. The nose of the B733 stopped approximately 50 feet past the hold lines (B733 length is 110 feet) and did not enter the runway. Closest horizontal distance was approximately 120 feet based on hold line to runway edge distance of 170 feet. The landing B737 exited at Juliet (distance from Juliet to Kilo is 800 feet).	Human Factors	No
73 RWS	02-2009	D	VMC Daylight	Personal/ General Aviation	Runway 12R at Taxiway L	Ground Control (GC) coordinated with Local Control to cross Runway 12L at Lima with a Cessna C750. GC instructed the C750 to cross Runway 12R at Lima instead of 12L as coordinated. No conflicts reported.	Procedural	No
74 ASRS	03-2009	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 11/29	PA28A is issued VFR clearance and pilot was instructed to taxi to RUNWAY 29, which pilot reads back correctly. Pilot then stops short of the runway and on the active taxiway turns askew to conduct a run-up. Pilot informed of RUNWAY 29 run-up location across RUNWAY 29 and is told to hold short and contact Tower on 120.7, which was incorrect frequency for tower configuration. While local controller and ground controller are discussing frequency issue, pilot reads back the instructions incorrectly as "Taxi across RUNWAY 29 and contact tower", which was missed by ground controller. Controller noted the following: poorly placed	Human Factors Airfield layout	Yes NOTAM-2009-03037

						location of RUNWAY 29 run-up being the source of several pilot deviations as well as controller deviations.		
75 RWS	04-2009	D	VMC Daylight	Personal/ General Aviation	Runway 30L and Taxiway C	A Globe GC1B was issued taxi instructions to Runway 30L at Charlie for departure. Subsequently the GC1B pilot entered and departed Runway 30L from abeam Taxiway Charlie without clearance. No conflicts reported.	Human Factors	Yes NOTAM-2009-04057, 04056
76 ASRS	06-2009	D	VMC Night	Air Taxi/ Commuter	Runway 30L prior to Taxiway F	ATC late night limited staff during period of numerous pushbacks, clearance requests and taxi instruction requests. A CRJ-900 landed on RUNWAY 30L with another aircraft on a 2-mile final. As main taxiways were blocked by pushback traffic, the CRJ-900 was instructed to back taxi on RUNWAY 30R to TAXIWAY F and taxi to ramp on controller's frequency, which the pilot read back correctly. Controller checked radar and looked up to observe the aircraft that was on a 2-mile final executing a missed approach. The CRJ-900 was mistakenly back taxiing up RUNWAY 30L rather than RUNWAY 30R as instructed. Pilot indicated he thought they were supposed to back-taxi along RUNWAY 30L to TAXIWAY F.	Human Factors	
77 RWS	06-2009	D	VMC Daylight	Personal/ General Aviation	Runway 12R at Lima	A Cessna C172 was cleared for a touch and go operation on Runway 11. The C172 then executed a touch and go on Runway 12R without clearance. No conflicts reported. **Wrong runway event.**	Human Factors	Yes NOTAM-2009-06088, 06057
78 RWS	07-2009	D	VMC Daylight	Personal/ General Aviation	Runway 29 at Taxiway D	A Beech BE58 was issued taxi instructions to Runway 29 via Taxiway Victor for departure. The BE58 was taxiing back to FBO due to a mechanical issue when pilot stated they resolved it and requested to taxi back to Runway 29. GC instructed the BE58 to make a 180 on Victor and taxi to Runway 29. GC then observed the BE58 cross Runway 29 at Delta without clearance and proceeded to the run-up area. No conflicts reported.	Human Factors	Yes NOTAM-2009-07071, 07070, 07010
79 RWS	09-2009	D	VMC Daylight	Vehicle/ Pedestrian	Taxiway F between Runways 30R and 30L	Taxiway Foxtrot was NOTAMED closed between Runway 30R and 30L with low level barricades at the edge of Runway 30R. A painter was working on the hold markings for Runway 30R on Taxiway Foxtrot and thought he could proceed past the hold lines and crossed into the safety area towards the runway several times without authorization. No conflicts reported. There was no coordination advising that the individual would be in the safety area. Vehicle was radio equipped but individual was outside without a radio.	Human Factors Construction	Yes NOTAM-2009-09023, 09022, 09020, 09019, 09016, 09005, 09003, 09002

80 RWS	10-2009	D	VMC Daylight	Personal/ General Aviation	Runway 30R vicinity of TXY D	A Beech BE76 inbound on an ILS for Runway 30L was cleared to land same runway. The BE76 then landed on Runway 30R without clearance. No conflicts reported. **Wrong runway landing.**	Human Factors	Yes NOTAM-2009-10005, 10004, 10003
81 RWS	11-2009	D	VMC Daylight	Personal/ General Aviation	Runway 30R vicinity of TXY D	A Cessna C172 acknowledged and read back clearance to land on Runway 30L. Subsequently the C172 landed on parallel Runway 30R without clearance. No conflicts reported. **Wrong runway landing.**	Human Factors	No
82 RWS	03-2010	C	VMC Daylight	Vehicle/ Pedestrian	Taxiway B by Taxiway W	An airport mower pre-coordinated with ATCT to operate near the runways. FLM advised the operator to remain outside of the runway safety area (RSA) and offered to coordinate an escort by airport authority (MOD). The operator declined stating they had talked with MOD and knew he was to stay outside of the cones in that area. Subsequently the mower operator misidentified low level barricades at the edge of Runway 30L and crossed into the RSA beyond the tall orange cones near Taxiway Bravo (left side of runway between Bravo and Whiskey) thus conflicting with a DH8 on less than a mile final same runway. The DH8 was issued a go around at one half (.50) mile to avoid loss of separation.	Human Factors	Yes NOTAM-2010-03038, 03037, 03036, 03035, 03009
83 RWS	07-2010	C	VMC Daylight	Vehicle/ Pedestrian	Runway 12L at Taxiway D	Ground (GC) coordinated with Local (LC) for an airport NAVAID vehicle to cross Runway 12L at Taxiway Delta to the glideslope. LC was preparing for a position relief briefing and was coordinating with LICKE Sector on departures. LC cleared a Embraer E135 for takeoff on Runway 12L full length. GC advised LC the vehicle was not clear of Runway 12L and LC canceled the E135s takeoff clearance. The E135 aborted takeoff approximately 2,300 feet from departure point and exited the runway at Kilo. Distance from Kilo to Delta is 5,300 feet, the closest proximity reported.	Procedural	Yes NOTAM-2010-07025, 07024,
84 RWS	09-2010	D	VMC Daylight	Vehicle/ Pedestrian	Taxiway Victor at Taxiway D	An airline maintenance vehicle entered Taxiway Victor without authorization or contact with ATCT. The vehicle proceeded northwest bound from intersection of Victor and Delta. No hold lines or runways affected and no conflicts reported.	Human Factors	Yes NOTAM-2010- 09020, 09013
85 RWS	12-2010	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30L	A Cessna C172 completed run-up on Taxiway Delta abeam Runway 30L then proceeded to pull ahead and crossed the hold short lines without clearance. The C172 reversed course prior to runway edge and while taxiing the pilot questioned runway assignment. ATCT instructed the pilot to continue moving away from runway edge and	Human Factors	Yes NOTAM-2010 12066, 12065, 12021, 12019, 12007, 12005, 12004

						the C172 stopped on the runway side of the hold bars facing away from Runway 30L. No conflicts reported.		
86 RWS	01-2011	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Taxiway W	A Beech BE9L had been cleared for takeoff on Runway 30L abeam Charlie when the pilot advised they needed to return to the ramp for maintenance. Local (LC) instructed the pilot to turn left at Delta and contact Ground (GC). LC observed an aircraft taxiing out and instructed the BE9L to hold short of Taxiway Whiskey which pilot read back correctly. GC was unable to contact the BE9L and the aircraft crossed Whiskey and Runway 11/29 (closed for construction for more than a year). No vehicles were on the runway at the time. The aircraft taxiing out heard GC and held position. No loss of separation reported.	Human Factors	Yes Covered under a previous NOTAM
87 ASRS	03-2011	C	VMC Daylight	Personal/ General Aviation	Threshold Runway 30R vicinity of TXY D.	Small piston aircraft 5 miles from airport was instructed to follow a Gulfstream II on 2-mile final for RUNWAY 30L. Piston aircraft could not visually identify G-II. The piston aircraft landed inadvertently on RUNWAY 30R as the ATC was clearing an air carrier for departure on RUNWAY 30R at the same time. ATC quickly cancelled departure clearance for the air carrier. Pilot notes confusion between of taxiway for the alignment of RUNWAY 30R as main cause of error. **Wrong runway landing.**	Human Factors	No
88 RWS	06-2011	D	VMC Daylight	Vehicle/ Pedestrian	Runway 30R and Taxiway L	An emergency response vehicle was in correct location on Taxiway Lima for Runway 30R due to an inbound aircraft emergency. The aircraft was cleared to land on Runway 30L. Ground (GC) asked the response vehicle operator if they wanted to remain at their location or go between the runways. The vehicle operator stated they wanted to hold short of Runway 30L. GC responded “ok thanks”. GC needed to coordinate with Local (LC) on the crossing. The response vehicle then crossed Runway 30R at Lima without clearance. No conflicts reported.	Human Factors	No
89 RWS	06-2011	D	VMC Daylight	Vehicle/ Pedestrian	Runway 30L at Taxiway M	An airport ops vehicle contacted Local (LC) requesting to enter Runway 30R at Taxiway Mike. LC had no other traffic and approved the vehicle onto Runway 30R. An inbound aircraft called on 7-mile final. LC scanned the runway and observed the vehicle on Runway 30L without clearance. LC advised the vehicle operator to exit the runway. The vehicle was on Mike for Runway 30L at the time of the initial request. No conflicts reported**.**	Human Factors	No

90 ASRS	07-2011	D	Daylight	Personal/ General Aviation	Runway 30L at Taxiway D and Runway 29 Run-up Area	Controller was working another position when they observed a C172 taxi past the hold bars at RUNWAY 30L and TAXIYWAY D and turn their aircraft around with the tail of the aircraft facing RUNWAY 30L and perform what looked to be a run-up. Controller advised the Ground Controller that the Cessna appeared to be disoriented and overheard Ground Control tell the C172 that the run-up area was now ahead and to their left. The Cessna taxied back across RUNWAY 29 onto TAXIWAY V and the Ground Controller advised the C172 to turn back around cross RUNWAY 29 and taxi to the area which was 'black top'. This had been designated as the run-up area but not well marked. This issue had been noted with RSAT team. This issue has taken up a considerable amount of time and effort for the Ground Controller to orientate pilots who are not familiar with this layout. Additional signs were recommended to be placed at this location to better eliminate confusion and it was noted that the run-up should be noted in the airport directory and through pilot education. Controller believed that the area was to be designated as a 'hot spot' by RSAT.	Airfield Layout	No
91 RWS	08-2011	D	VMC Daylight	Personal/ General Aviation	Runway 30L at Taxiway F	A Piper 46 advised Ground (GC) ready for takeoff. GC responded taxi Runway 30L via Delta. The pilot responded, Runway 30L cleared for takeoff via Delta. GC did not respond and at the time was alerting Local (LC) as to the location of the PA46 when they observed the aircraft taxiing onto Runway 30L at Delta. GC instructed the PA46 to contact LC. LC instructed the PA46 to exit the runway for a wake turbulence hold. No conflicts reported.	Human Factors	No
92 RWS	08-2011	D	VMC Daylight	Vehicle/ Pedestrian	Runway 30R at Taxiway N	An airport vehicle requested to cross Runway 30L and 30R at Taxiway November. Ground (GC) needed to confirm location of the vehicle and asked to verify position. The vehicle operator seemed to be unsure of location based on transmission heard by GC. GC visually observed a vehicle holding short of Runway 30R at November and instructed the driver to hold short of 30R at November. The vehicle driver asked GC to repeat last transmission. GC repeated the hold short instructions for 30R which were read back correctly. GC coordinated with Local (LC) to cross both runways and went back to give crossing clearance when they observed the vehicle had entered Runway 30R at November without clearance. No conflicts reported.	Human Factors	Yes

93 RWS	10-2011	D	VMC Daylight	Air Carrier	Runway 30R at Taxiway H	A CANADAIR CRJ7 was issued taxi instructions by Ground (GC) to Runway 30R via Taxiways Hotel and Yankee. The CRJ7 then entered Runway 30R at Hotel without authorization and GC instructed the pilot to stop then to exit the runway. No conflicts reported.	Human Factors	No
94 ASRS	12-2011	D	Night	Air Carrier	Runway 30R and NE Cargo apron	B737-7 First Officer describes bright temporary lights set up on the northeast side of the airport (cargo ramp) pointed/angled at the displaced threshold for RUNWAY 30R that was very bright and distracting. Appeared to be conducting a temporary sort operation. First officer notes that the light affected his vision for several minutes after takeoff.	Environment not weather related, human factors	Yes NOTAM 2011-12064, 12063, 12062,
95 ASRS	03-2012	D	VMC Night	Corporate	Taxiway V And Taxiway W (north end of 11/29)	After exiting RUNWAY 30L onto TAXIWAY J, a Lear 45 is cleared to taxi to the FBO via TAXIWAY V. The pilot was approaching the TAXIWAY V signage and turned left before reaching the sign and inadvertently turned on, what the pilot believes now, is TAXIWAY W1 which the NOS chart at the time showed as RUNWAY 11/29. This is now a new taxiway which parallels TAXIWAY V (W1). The chart needs to be updated. The yellow line turns left onto TAXIWAY W. The pilot was confused as he had apparently already passed the sign for TAXIWAY W when given the clearance and thought the first taxiway to the left would have been TAXIWAY V. Pilot subsequently realized that he should have passed the taxiway sign before turning. Pilot noted that painting the letter of each taxiway onto the pavement as a potential mitigation effort to the runway safety action team and noted that this action was deemed too expensive. Pilot believes this idea would have helped in this case at SJC where there are two parallel taxiways.	Human Factors	Yes NOTAM 2011-12064, 12063, 12062,
96 ASRS	05-2012	C	Not Noted	Personal/ General Aviation	Runway 30L at Taxiway D	A Cessna 340 was instructed to taxi to RUNWAY 30L via TAXIWAYS V, C and W and the pilot read back the clearance correctly and proceeded to turn onto TAXIWAY D and entered the engine run-up area at TAXIWAY D at W. After run-up, pilot was instructed to follow TAXIWAY W to RUNWAY 30L. The aircraft taxied straight ahead to RUNWAY 30L at the intersection with TAXIWAY D and crossed the hold line with a B737 over Runway 30L at TAXIWAY C at roughly 50 feet. B737 instructed to go around. The C340 pilot believed he was cleared to taxi into position on RUNWAY 30L while controller indicated he was cleared to taxiway to RUNWAY 30L.	Human Factors	No

97 RWS	06-2012	D	VMC Daylight	Air Carrier	Runway 12L	E135 received Line Up and Wait (LUAW) instructions for Runway 12. Read back was correct. E135 departed without a takeoff clearance and later queried LC as to whether they were cleared for takeoff or not. No loss of separation or conflicts with other aircraft.	Human Factors	No
98 RWS	06-2012	D	VMC Daylight	Personal/ General Aviation	Taxiway V at Taxiway C	C177 received clearance from Clearance Delivery. Without contacting Ground Control (GC) C177 proceeded on Taxiway Victor to Taxiway Charlie. C177 did not respond to repeated calls on all operational SJC frequencies. Eventually, C177 established contact with GC. Pilot in command claimed he had been given taxi clearance from 118.0.	Human Factors/Procedural	Yes NOTAM 2012-06037, 06014
99 RWS	10-2012	C	VMC Daylight	Air Carrier	End of Runway 30R	B737 was put in position by Local Control (LC) on Runway 30R at the full length (Taxiway Alpha 1). Second B737 was on a 4-mile final to land Runway 30R. After a corporate jet exited Runway 30R, the B737 in position was issued takeoff clearance with the arriving B737 now "just inside 2-mile final." Loss of runway separation resulted when LC allowed the landing B737 to cross the runway threshold as the departing B737 was airborne and an estimated 5000 feet (6000 feet required) from the runway threshold. In consideration of potential conflicting over flight traffic, LC did not issue go around instructions and allowed the B737 to land with less than minimum runway separation. Closest proximity was estimated at 5000 feet.	Procedural	Yes
100 RWS	11-2012	D	VMC Daylight	Corporate	Runway 30L and Taxiway B	LJ55 was taxied from transit parking on the west side of the airport to Runway 30L for departure. Local Control (LC) initially instructed the LJ55 to hold short of Runway 30L for landing traffic, followed shortly thereafter by a clearance to Line Up and Wait (LUAW) Runway 30L. LJ55 read back the LUAW instruction correctly and taxied onto Runway 30L from Taxiway Bravo. LC was conducting a position relief briefing and did not observe the LJ55 departing until the aircraft was airborne. LJ55 departed without receiving a takeoff clearance and was instructed to maintain visual separation with traffic departing from Runway 30R. Visual separation was applied to prevent a loss of separation with the airborne parallel runway departure.	Human Factors	No
101 RWS	12-2012	C	VMC Night	Personal/ General Aviation	Runway 30R at Taxiway C	SR22 landed Runway 30R and after exiting at Taxiway Hotel was instructed to taxi via Taxiway Yankee and hold short of Runway 30R at Taxiway Delta and remain on Local Control (LC2) frequency. Pilot read back both taxi and hold short instructions correctly. After pilot advised LC2 of destination parking, LC2 issued instructions to hold	Human Factors	No

						short of Runway 30R at Taxiway Charlie which was read back correctly. At Taxiway Charlie, the SR22 turned right and crossed the Runway 30R hold bars without authorization with E135 on short final to Runway 30R. The SR22 did not cross the runway edge lines. Taxiway Charlie crosses the displaced portion of Runway 30R approximately 2300 feet north of the displaced approach end and 200 feet south of the displaced threshold. To ensure separation, go around instructions were issued to the E135 which did not overfly the SR22. Low Cost Ground Surveillance (LCGS) was cited by controllers in assisting in detecting this night time incursion.		
102 RWS	05-2013	D	VMX Daylight	Personal/ General Aviation	Runway 30R at TXY D vicinity	C172 called from the north and was instructed to make right traffic Runway 30R. Read back was correct. Local Control (LC) issued subsequent landing clearance on Runway 30L with wake turbulence caution due to a prior B737 landing Runway 30L which the C172 reported in sight. Read back was correct. C172 landed on Runway 30R without authorization. Air Traffic Control (ATC) reports in scanning for the C172 and sighting the aircraft short final the pilot appeared to be aligned for Runway 30L and then at an estimated 100 feet began to veer right and landed Runway 30R. No conflicts. **Wrong runway landing.**	Human Factors	No
103 ASRS	07-2013	C	VMC Night	Corporate	At 30R hold position and Taxiway A	Challenger 300 was cleared to taxi to RUNWAY 30L and at the hold short line was cleared by ATC to cross RUNWAY 30L, specifically, "cleared to cross 30L and sort of angle to the right across to hold short of RUNWAY 30R at TAXIWAY A". Pilot taxied per instruction but misidentified a TAXIWAY A sign on the far side of the runway and taxied across the hold short line for 30R by approximately one plane length. (The appropriate TAXIWAY A sign required a hard 90-degree right turn to see the sign and once past the RUNWAY 30L hold line the sign is not easily visible. Pilot notes limited distance between RUNWAY 30L and RUNWAY 30R hold lines and that ATC instruction was not standard. Pilot focused on looking for TAXIWAY A sign, and not on the location of hold lines.	Human Factors	Yes NOTAM-2013 07013, 07012
104 RWS	08-2013	D	VMC Daylight	Personal/ General Aviation	Taxiway D and Runway 30R	DA42 was taxied to Runway 30R at Taxiway Charlie across Runway 30L. DA42 turned onto Taxiway Delta by mistake. Ground Control (GC) told DA42 to hold their position. GC then cleared the DA42 to cross Runway 30L at Taxiway Delta, hold short of Runway 30R at Taxiway Delta. Read back was correct. DA42 crossed Runway 30R at Taxiway Delta without authorization. Local Control had C525	Human Factors	Yes NOTAM-2013 08039, 08038, 08037, 08036, 08035,

						waiting for departure on Runway 30R at Taxiway Charlie. DA42 crossed approximately 950 feet in front of the C525.		
105 RWS	01-2014	D	VMC Daylight	Vehicle/ Pedestrian	Taxiway B and Runway 30R	Airport vehicle was on Taxiway Yankee and requested to cross Runways 30R and 30L to pick up FOD on Taxiway Bravo. Ground Control (GC) instructed the vehicle to cross Runways 30R and 30L on Taxiway Bravo. Vehicle proceeded across both runways and was observed driving on Taxiway Bravo, clear of Runway 30L, looking for the FOD. GC then observed the car proceed on Taxiway Bravo and cross Runways 30R and 30L without authorization. No conflicts.	Human Factors	No
106 RSAP & ASRS	05-2014	C	VMC Daylight	Personal/ General Aviation	Taxiway Y at Taxiway B	PA32 requested clearance for departure on RUNWAY 30L at TAXIWAY B and was instructed to cross RUNWAY 30L and line up and wait. Read back by pilot was correct. After crossing RUNWAY 30L Local Control cleared aircraft to depart RUNWAY 30L at TAXIWAY B. Again, read back was correct. PA32 crossed RUNWAY 30R, turned onto TAXIWAY Y and initiated takeoff. MD83 southbound on TAXIWAY Y alerted Local Control and the PA32 departure clearance is immediately cancelled. PA32 to MD83 proximity was 4,200 feet. **Aircraft takeoff from TAXIWAY Y**	Human Factors	No
107 RSAP	06-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway V north of Taxiway D	C172 entered TAXIWAY V, north of TAXIWAY D without authorization from ATC. No conflict occurred as the aircraft did not cross the hold line or enter the runway.	Human Factors	No
108 RSAP	06-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30L	PA32 in the run-up area at TAXIWAY D and TAXIWAY W requests taxi clearance to departure and Ground Control instructs the pilot to taxi to RUNWAY 30L at TAXIWAY D. Read back was clipped (partially interrupted) but included RUNWAY 30L at TAXIWAY D. The PA32 crossed RUNWAY 30L on TAXIWAY D without clearance. No conflicts occurred. Reference is made in the report of this event involving Hotspot 2.	Human Factors/ Airfield Layout	No
109 RSAP & ASRS	06-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30L	C172 had been taxied to the run-up position at the intersection of TAXIWAY D and TAXIWAY W with Ground Control advising the C172 to remain on the frequency and notify ATC when run-up was completed. C172 acknowledged the instructions. C172 completed their run-up and taxied to RUNWAY 30L hold short marking at TAXIWAY D without clearance. No conflicts occurred. Hotspot 2 is referenced in the report.	Human Factors/ Airfield Layout	No
110 RSAP	06-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway D at	M20K had been taxied to the run-up area at TAXIWAY D and TAXIWAY W and told to contact Ground Control upon completion of run-up. M20K acknowledged the instructions but when the run-up	Human Factors/	No

					Runway 30L	was completed taxied to RUNWAY 30L at TAXIWAY D and called Tower. No conflicts occurred and the aircraft did not cross the hold line. Hotspot 2 referenced as a contributing factor.	Airfield Layout	
111 RSAP	07-2014	C	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30L	P180 was instructed to taxi to RUNWAY 30L via TAXIWAY W and TAXIWAY D and to monitor Tower. Read-back was correct. P180 taxied onto RUNWAY 30L without contacting Local Control and without a clearance and with a CRJ 900 on a two-mile final. P180 was cleared for takeoff and no conflicts arose.	Human Factors	No
112 ASRS and RSAP	07-2014	C	VMC Daylight	Air Carrier	Taxiway B at Runway 30R	A B737-800 was cleared to RUNWAY 30R via TAXIWAYS J and Y. Pilot read-back the instructions correctly. The aircraft taxied onto RUNWAY 30R at TAXIWAY B without clearance. No conflicts occurred.	Human Factors	Yes NOTAM-2014-July 07001, 07015,
113 ASRS & RSAP	10-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway C at Taxiway W	BE33 was cleared for takeoff on RUNWAY 30L at TAXIWAY C by Local Control and the pilot read-back "rolling on RUNWAY 30." BE33 then turned left onto TAXIWAY W and took off from the taxiway. Local Control attempted to cancel clearance, but determined it was safer to allow aircraft to continue to depart. No conflicts occurred. **Aircraft takeoff from TAXIWAY W.**	Human Factors	Yes NOTAM-2014-October 10006, 10012, 10013, 10016, 10017, 10019
114 RSAP	11-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway V	C172 contacted Ground Control for approval to taxi. Ground Control queried the pilot on what his intentions were and then instructed the pilot to contact Clearance Delivery. After receiving a VFR clearance without re-contacting Ground Control the C172 entered TAXIWAY V without clearance. No conflicts occurred.	Human Factors	No
115 ASRS	11-2014	B	Daylight	Air Carrier	Not specific	B737 was cleared for takeoff and had accelerated to approximate taxi speed when they heard the tower clear another aircraft to cross the same runway. Takeoff was discontinued as the other aircraft had just begun to cross at the far end of the runway after landing on the parallel runway.	Procedure, Human Factors	No
116 ASRS & RSAP	12-2014	C	Daylight	Corporate	Runway 12L at Taxiway L	C560 (maintenance taxi) was instructed by Local Control to cross RUNWAY 12R at TAXIWAY L and hold between the RUNWAY 12R and RUNWAY 12L to conduct run-up. Read back was correct. The C560 crossed the RUNWAY 12L hold bars with a B737 in position and cleared for takeoff on RUNWAY 12L. Takeoff clearance for the B737 was cancelled prior to start of takeoff roll.	Procedure, Human Factors	No
117 ASRS	01-2015	D	VMC Daylight	Personal/ General Aviation	FBO Ramp to Runway 30L	A pilot did not comply with taxi instructions at SJC. He interpreted "Victor, Delta, Charley, and Bravo to 30L", as meaning "Pass Delta to Charley the way we always used to go." Ground Control called and asked why he did not follow his directions. Contributing factor	Human Factors	Yes NOTAM-2015-01-

						was that charts still showed RUNWAY 11/29 in existence at the time despite the runway being closed. Deviation from Tower taxi instructions.		January 01207
118 RWS	02-2015	C	VMC Daylight	Personal/ General Aviation	Runway 30R vicinity of TXY D	SR22 was cleared to land Runway 30L. Read back was correct. SR22 landed Runway 30R. SWA383/B737 was within a mile final to Runway 30R was changed to Runway 30L and landed Runway 30L without incident. **Wrong runway landing.**	Human Factors	Yes NOTAM-2015-02 February 02018
119 RSAP	08-2015	D	VMC Daylight	Personal/ General Aviation	Taxiway B between Runway 30R and 30L	A BE36 was cleared for takeoff on RUNWAY 30L at TAXIWAY B, but then stated that they needed to exit the runway. The BE36 entered TAXIWAY B between RUNWAY 30L and RUNWAY 30R, which was closed for construction (TAXIWAY B). No conflicts occurred.	Human Factors	Yes NOTAM-2015-08 August 08027, 08028
120 RSAP	10-2015	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30R	A C195 was instructed to taxi to RUNWAY 30R via TAXIWAY D and cross RUNWAY 30L. Instructions were read-back correctly. C195 crossed the RUNWAY 30R hold bars at TAXIWAY D with a B737 holding in position on RUNWAY 30R waiting for takeoff clearance. No conflict occurred.	Human Factors	Yes NOTAM-2015-10 October 10001, 10002, 10077, 10084
121 RSAP	01-2016	D	VMC Daylight	Vehicle/ Pedestrian	Taxiway V	An unauthorized pedestrian entered the movement area on TAXIWAY V abeam the Signature Ramp, while assisting a helicopter departing from the ramp. Rotor-wash from the helicopter departure blew debris onto TAXIWAY V and the pedestrian ran onto the taxiway to retrieve the debris. No conflict occurred.	Human Factors	Yes NOTAM-2016-01 January 01008, 01014
122 ASRS	03-2016	D	VMC Daylight	Personal/ General Aviation	Taxiway B at Runway 30L	A C206 called ATC indicating they were ready to depart at RUNWAY 30L. After a short delay for traffic, Local Control instructed the aircraft "RUNWAY 30L, intersection BRAVO, line up and wait." Pilot read-back was correct, however the C206 taxied onto RUNWAY 30L and departed without clearance. No conflicts occurred.	Human Factors	Yes NOTAM-2016-03 March – 03049, 03071, 03074, 03086,
123 RWS	04-2016	D	VMC Daylight	Corporate	Runway 30L at Taxiway B	Local Control instructed a LJ35 to line up and wait on Runway 30L at Taxiway Bravo. Read back was correct. LJ35 departed without a clearance. No conflicts.	Human Factors	Yes NOTAM-2016-04 April 04031, 04032, 04033, 04034,

								04038, 04044, 04055, 04068,
124 RWS	05-2016	C	VMC Daylight	Air Carrier	Runway 30R and Taxiway J	A/C 1 a B737 landed Runway 30L and exited at the intersection of Juliet and crossed the Runway 30R hold bars before coming to a stop. A/C 2 a B738 was on departure roll on runway 30R. Local Control instructed the B738 to abort. Separation was lost when the B737 crossed the Runway 30R hold bars. Closest proximity approximately 4600 feet lateral. The B738 exited Runway 30R at intersection Hotel prior to Intersection Juliet.	Human Factors	Yes NOTAM-2016-05 May 05012, 05027
125 RWS	09-2016	D	VMC Daylight	Personal/ General Aviation	Runway 30L vicinity of TXY D	A/C 1 was cleared to land on Runway 30R. Pilot read back was correct. A/C 1 landed on runway 30L. No conflicts. Not a hot spot event. Wrong Runway Landing/Runway Confusion. **Wrong runway landing.**	Human Factors	No
126 ASRS	11-2016	C		Personal/ General Aviation	Runway 30L vicinity of TXY D	A Beechcraft Bonanza as performing pattern work and was on a right base, when asked if he had a visual of a Citation departing Runway 30L, Bonanza acknowledged, Bonanza was then cleared to land Runway 30L and Bonanza read-back instructions correctly. United B767 was told to line up and wait Runway 30R and they read back their instructions correctly. As the B767 was turning north to line up in the middle of the runway, they stopped the aircraft as the Bonanza flew overhead the aircraft and United informed ATCT. While all markings were inspected, and found to be acceptable, the 30R numbers had rubber deposits which could use some cleaning to make them more prominent. **Wrong Runway landing**.	Human Factors	No

Sources: Accident and Incident Database, Federal Aviation Administration Airport Safety Reporting System Database, National Aeronautics and Space Administration, Local-Runway Safety Action Plan Report, May 31, 2016, Federal Aviation Administration, Runway Safety Office Runway Incursion Report (RWS), Federal Aviation Administration, Western Pacific Region

Preliminary Findings

The preceding information provides an overview of a set of incidents and occasional runway incursion events that cover the period from 2000 to present, including an extended period when Runway 11/29 was operational and the seven years that is has been closed. The incident and incursion data will be used as input for the safety risk assessment of baseline conditions and for the identification and prioritization of a range of potential actions to minimize or mitigate the factors that contributed to the events that have occurred. A number of considerations have been anecdotally identified from the incident data listed in **Table 1** and are noted below:

- Between 2000 and the present, the airport has experienced a total of one hundred and twenty-six reported surface incidents and runway incursions with the aviation segments having the greatest contribution to the number of incidents being: General Aviation/Personal, Air Carriers and Corporate Aviation segments.

- The majority of historic incidents have occurred in the southern third of the airfield and these are clustered into three individual concentrations all of which are located from Taxiway D and south. One of these focus areas encompasses both of the designated hotspots.

- Based on the distribution of historic incidents, three primary and two secondary focus areas should be considered for the subsequent analysis and development of potential mitigation actions.

- The results of the overview bear out the basis for designation of the two hotspots on the airport in the immediate vicinity of the former threshold of Runway 29.

- The level of incidents in the vicinity of the two hotspots did not show a significant reduction with the closure of Runway 11/29, which may, based on descriptions, be related to the location and configuration of the run-up apron at the intersection of Taxiway D and Taxiway W.

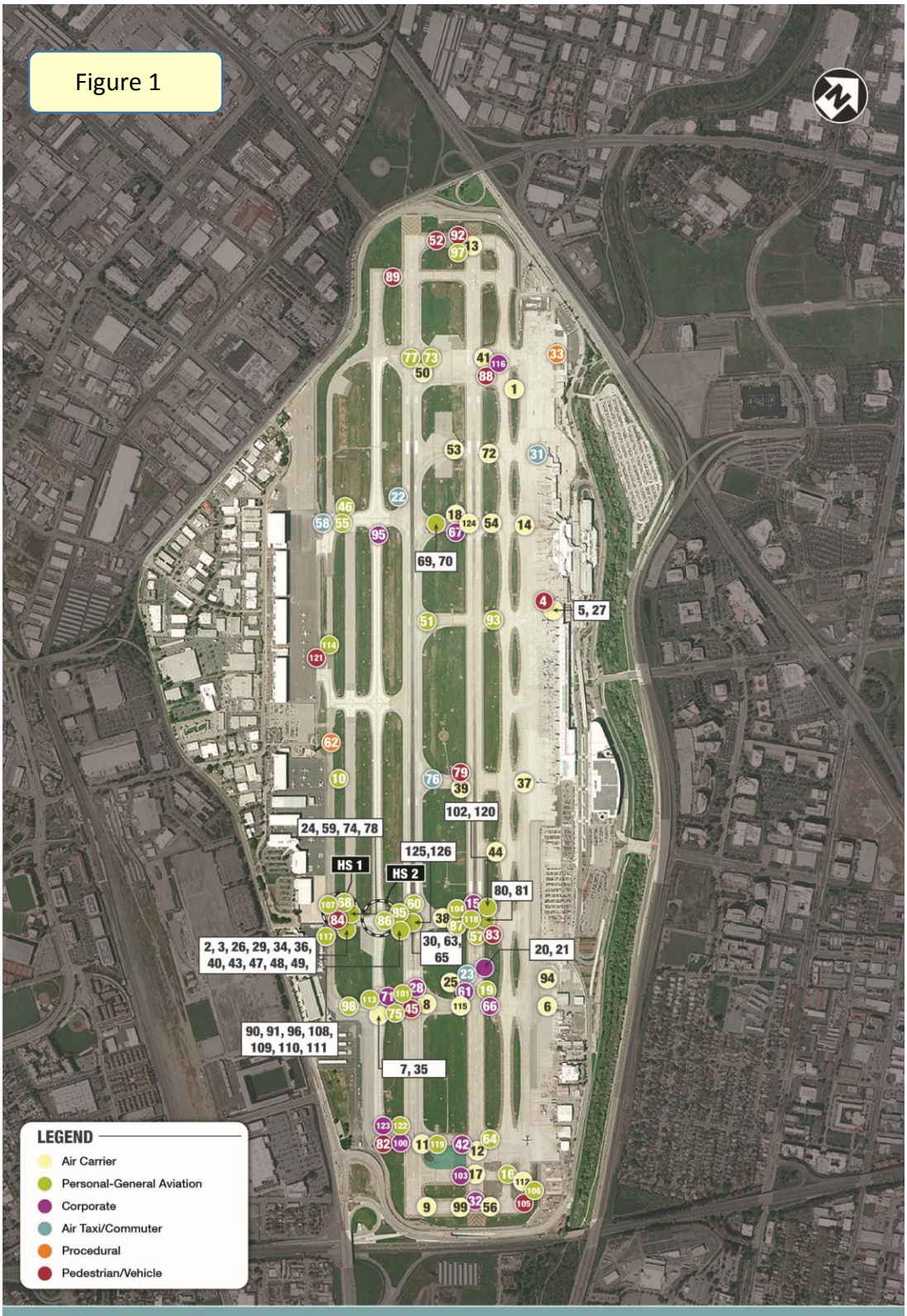
- Time of day and weather conditions do not appear (based on the data) to have a significant contributory factor to the number of incidents and incursions at SJC as most have occurred in daily hours and when visibility was good.

- The large majority of the noted incidents are attributed to human factors as the main contributor. Attaining a better understanding of the specific aspects of human factors through discussion with members of the TWG relative to cockpit activities during ground movements, and the ATCT relative to communication procedures and airfield utilization.

- A total of twelve pedestrian or vehicle incidents were contained in the available databases for the historic period identified.

- It needs to be remembered that not all incidents are reported and FAA reported data is anticipated to represent only a portion of the actual number of incidents that occur on an annual basis.

Figure 1



SJC Incursion Incident Map
2000 - Present

Figure 2



SJC Incursion Incident Map
2000 - 2009

Figure 3



SJC Incursion Incident Map
2010 - Present

NORMAN Y. MINETA-SAN JOSE INTERNATIONAL AIRPORT

RUNWAY INCURSION MITIGATION / AIRFIELD DESIGN STANDARDS ANALYSIS

TECHNICAL MEMORANDUM

BASELINE SAFETY RISK ASSESSMENT RESULTS SUMMARY

KIMLEY HORN TEAM

April 28, 2017

Introduction

The Norman Y. Mineta San Jose International Airport (SJC) Runway Incursion Mitigation (RIM) Study approaches the enhancement of the safety of ground movements on the airfield from two perspectives. The first involves assessing the existing airside facilities from the perspective of their conformity to both dimensional and design related criteria and standards. The second perspective focuses on areas of the airfield where actual events have taken place and identify the factors that contributed to the event so that specific remediation actions can be identified and assessed. In short, developing a realistic plan to mitigate surface incidents and runway incursions first requires an understanding of the events that have occurred and the identification of any patterns related to where on the airfield those events have taken place. To support the development of a plan to mitigate surface incidents and runway incursions, a planning level Safety Risk Assessment (SRA) was conducted in an effort to identify hazards, assess risks, and ultimately to compare the effectiveness that mitigation alternatives have on reducing risk.

This summary report outlines the results of the Baseline Risk Assessment. The baseline represents the quantification of risk in the current condition. The current condition in the case of SJC is based on the current (2017) active runway, taxiway and aircraft apron configuration, airfield, markings, lighting and signage on the airfield, level of aircraft operation, the aircraft fleet mix operating at SJC, air traffic procedures and the manner of moving aircraft and vehicles on the airfield. At SJC there is the need to look at two operational scenarios relative to a runway that has been closed since 2009. The final status of Runway 11-29 as either a runway or as a taxiway is currently being evaluated and, as a result it was necessary to assess it under both operational conditions in the baseline safety risk assessment. In subsequent tasks of the RIM Study, the risk levels of mitigation alternatives will be identified and compared to the baseline to ensure that the alternatives have a positive impact (reduction) on risk levels and to compare the alternatives.

This baseline risk assessment focuses on the following areas that included where incidents have occurred or where geometries do not meet the most current FAA standards for airport layout:

- Direct access from a ramp or aircraft parking apron to a runway
- High energy runway crossings (Runway crossings in the center third of a runway alignment)
- Wide expanses of airfield pavement
- Procedural (operational incident)
- FAA designated airfield Hot spots
- Locations having a history of multiple surface incidents and/or runway incursions
- Runway 11-29 Operations (Prior to conversion to a taxiway)

Baseline Risk Assessment Process

Although not an official Safety Risk Management Document (SRMD), the process followed, individuals participating in the risk analysis process, and resulting documentation was prepared to conform to the Federal Aviation Administration (FAA) Office of Airports *Safety Management System (SMS) Desk Reference (Version 1.0 – June 1, 2012)* and FAA *Order 5200.11*. The FAA SMS Desk Reference identifies several analysis tools for use in conjunction with airport planning projects including runway incursion mitigation efforts. After reviewing each tool, it was determined that the Comparative Safety Analysis (CSA) was the most appropriate analysis tool as it is best suited to assessing multiple alternatives. (CSA) provides decision makers with a listing of all potential hazards coupled with a risk assessment for alternatives to mitigate hazards.

The CSA is a risk assessment, in that it defines both severity and likelihood in terms of the risk associated with each alternative under consideration. The basic tasks involved in the development of the CSA are depicted by **Figure 1** below. The CSA format has been used to assess and define a baseline risk condition at multiple locations on the airfield and will be subsequently used to clearly distinguish the relative safety merit of each alternative.

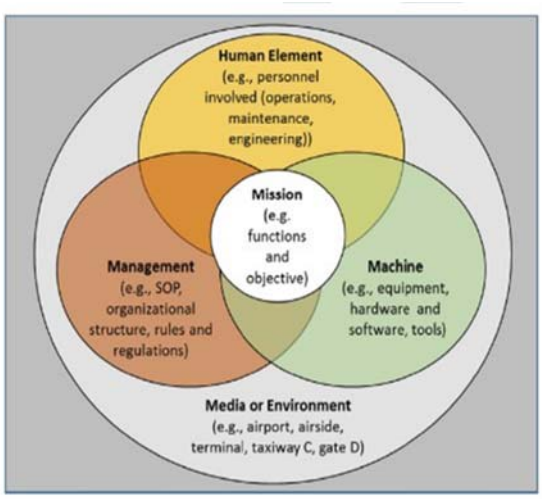
Figure 1 – SRA Process



System Description

The Airport currently has two closely spaced runways, 12L-30R and 12R-30L, laid out generally in a northeast/southwest configuration. A third general aviation runway, 11-29, was in operation until 2009 when it was closed due to construction. Since 2009the runway has operated as Taxiway W1. Since 2009, the airfield has also undergone several other enhancements, including completion of a crossfield Taxiway D, and construction of parallel Taxiway, W west of Runway 12R-30L. In addition to airfield improvements, the airport has also seen a shift in users; the commercial air service market at SJC has increased while light general aviation operations have decreased. The commonly accepted 5M-Model was used to direct the system description portion of the SRA, and is comprised of five core areas that help define the system. Use of the model allows the opportunity to effectively capture all elements of the system state and take them into consideration during the SA process. The five core components of the system description are huMan, Machine, environMent, Mission, and Management. **Figure 2** provides a depiction of the 5M model interaction. Following is a description of the system state in the 5M Model format.

Figure 2 – 5M Model



huMan

- Surface vehicle drivers (routine airfield inspections , maintenance activities, FAA Tech Ops)
- SJC Operations personnel
- Air Traffic Controllers
- Pilots

Machine

- Surface vehicles (with and without GPS positioning transponders) – Airport Operations, FAA, Police/ARFF)
- Aircraft
- Signage, markings and lighting

environMent

- Runway 12R-30L serves primarily as a commercial service arrival runway, while also accommodating many of the departures from aircraft that park on the west side of the airfield

- Runway 12L-30R serves primarily as a commercial service departure runway
- Operating configuration - North flow occurs approximately 86% and South flow 14% of the year
- Weather – Instrument Meteorological Conditions occurs approximately 4% and Visual Meteorological Conditions occurs 96% of the year
- Average daily operations – 487 (departures and arrivals)

Mission

- Safe and efficient movement of aircraft and vehicles within the airfield

Management

- ATCT control and training
- Vehicle driver procedures and training
- Pilot training

Note: Airport's Environment (Operations and Weather Data) are derived from averages over a 10-year period.

Hazard Identification & Risk Analysis

In consideration of the system state information, conditions and situations that could result in adverse safety effects for the Airport, tenants and users can be identified and the extent of the hazard associated with each defined. The effects, or credible effects, of this hazard are then discussed and documented. Then, each effect is quantified using severity and likelihood definitions and a predictive risk matrix that considers severity and probability of the effect. The definitions and risk matrix utilized for this assessment is the same as outlined in FAA Office of Airports *Safety Management System (SMS) Desk Reference (Version 1.0 – June 1, 2012)* and FAA *Order 5200.11*. **Appendix A** includes the definitions and matrix utilized.

A major component of identifying hazards is the history of reported incidents. **Appendix B** contains a multi-page table that presents a summary of surface incidents and runway incursions on an annual basis starting for the period 2000 through 2016. This timeframe was identified in part because it includes a period of time within which Runway 11-29 was open and operational and a subsequent period of time during which this runway has been non-operational. This point is critical to understanding issues that could arise should it be determined that Runway 11-29 be recommissioned and returned to operational status. Additionally, this data helps to determine whether the cessation of operations on Runway 11-29 resulted in the easing of incidents at the airport or if conditions still exist that create adverse interaction between aircraft on areas adjacent to the alignment of Runway 11-29. Following the table are three maps displaying the location of each incident identified in the table. **Figure B1** shows the location of all 126 incidents from 2000 to Present. **Figure B2** shows the location of incidents occurring from 2000 through late 2009 when Runway 11-29 was operational. **Figure B3** shows the location of incidents occurring from 2010 to the present, corresponding with the period when Runway 11-29 has been closed and more recently re-designated as interim Taxiway W-1, which is its current status.

Hazard Identification

Hazards were identified based on the history of incidents and non-standard geometries. In addition, hazard identification considered the use of Runway 11-29 and the use of the closed runway as Taxiway W1. Finally, future expansion of the terminal gates to the south was considered as it relates to direct access from ramp to a runway. Based on a review of the airfield configuration (both with and without Runway 11/29 being operational) four general hazard categories were identified. These included hazards that were related to airfield geometric criteria specified in FAA guidance. Hazards were been organized into the following four categories:

- Direct access from ramp to runway
- Wide expanses of pavement
- Operational/Procedural
- Other (i.e. location and configuration of the Taxiway D run-up apron)

Risk Analysis

Table 1 depicts the identification of hazards and the results of the risk analysis. For each hazard (shown as a hazard ID # and description), the Cause, System State and Existing Controls are documented particular to that hazard. Then the Possible (or Credible) Outcomes are listed. Finally, the severity and likelihood score

is provided with comments related to the rational for that score. Following Table 1, Figures 3 through 7 depict the hazard ID numbers from the table on a standard color coded risk matrix, and are organized by each hazard category.

Table 1 - SJC Baseline Risk Assessment

ID #	Hazard Description	Cause(s)	System State	Existing Controls	Possible Effect(s)	Incident History Potentially Related to Effect (Note 1)	Severity	Comments	Likelihood	Comments
Direct Access from Ramp to Runway										
1a	Taxiway B from East Ramp to Runway 30R	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Wide expanse of pavement on Taxiway B.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	**3.6**	12L-30R is the primary departure runway. Distance between runway end and Taxiway B is short, therefore the departing aircraft will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow).	**C**	Limited overall activity. UPS activity during off-peak hours. Once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
1b					Runway incursion or operational deviation (vehicle)	n/a	**4.8**	12L-30R is the primary departure runway. Distance between runway end and Taxiway B is short, therefore the departing aircraft will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow).	**C**	Although it could be a logical crossing point for vehicles, no history of incidents.
2a	Taxiway C on the East Ramp to Runway 30R	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	**3.6**	12L-30R is the primary departure runway. Distance between runway end and Taxiway C is short, therefore the departing aircraft will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow).	**C**	Limited overall activity. UPS activity during off-peak hours. Once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
2b					Runway incursion or operational deviation (vehicle)	n/a	**4.8**	12L-30R is the primary departure runway. Distance between runway end and Taxiway C is short, therefore the departing aircraft will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow).	**C**	Although it could be a logical crossing point for vehicles, no history of incidents.
3a	Taxiway D on the East Ramp to Runway 30L *(Future Condition with Terminal Concourse expanded south)*	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Adjacent to terminal ramp so activity levels are higher. Adjacent to high energy portion of Runway 12L-30R.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	**2.3**	12L-30R is the primary departure runway. High energy portion of runway.	**C/D**	No noted incidents in the past 15 years, but once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a. Continuous activity from terminal ramp.
3b					Runway incursion or operational deviation (vehicle)	83 RWS	**2.8**	12L-30R is the primary departure runway. High energy portion of runway.	**D**	No noted incidents in the past 15 years. Not a logical crossing point for vehicles.
4a	Taxiway E on the East Ramp to Runway 30L	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Adjacent to terminal ramp so activity levels are higher. Adjacent to high energy portion of Runway 12L-30R.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	**2.3**	12L-30R is the primary departure runway. High energy portion of runway.	**C/D**	No noted incidents in the past 15 years, but once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a. Continuous activity from terminal ramp.
4b					Runway incursion or operational deviation (vehicle)	n/a	**2.8**	12L-30R is the primary departure runway. High energy portion of runway.	**D**	No noted incidents in the past 15 years. Not a logical crossing point for vehicles.
5a	Taxiway F on the East Ramp to Runway 30R	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Adjacent to terminal ramp so activity levels are higher. Adjacent to high energy portion of Runway 12L-30R.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	**2.3**	12L-30R is the primary departure runway. High energy portion of runway.	**C/D**	No noted incidents in the past 15 years, but once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a. Continuous activity from terminal ramp.
5b					Runway incursion or operational deviation (vehicle)	n/a	**2.8**	12L-30R is the primary departure runway. High energy portion of runway.	**D**	No noted incidents in the past 15 years. Not a logical crossing point for vehicles.
6a	Taxiway H on the East Ramp to Runway 30R	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Adjacent to terminal ramp so activity levels are higher. Adjacent to high energy portion of Runway 12L-30R.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	93 RWS	**2.3**	12L-30R is the primary departure runway. High energy portion of runway.	**C/D**	Once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a. Continuous activity from terminal ramp.
6b					Runway incursion or operational deviation (vehicle)	n/a	**2.8**	12L-30R is the primary departure runway. High energy portion of runway.	**D**	No noted incidents in the past 15 years. Not a logical crossing point for vehicles.
7a	Taxiway J on the East Ramp to Runway 30R	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Adjacent to terminal ramp so activity levels are higher. Adjacent to high energy portion of Runway 12L-30R.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	**3.0**	Not high energy portion of runway, but aircraft speeds are still high (particularly in north flow when aircraft may not be airborne).	**C**	No noted incidents in the past 15 years, but once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a. Continuous activity from terminal ramp.
7b					Runway incursion or operational deviation (vehicle)	n/a	**3.0**	Not high energy portion of runway, but aircraft speeds are still high (particularly in north flow when aircraft may not be airborne).	**D**	No noted incidents in the past 15 years. Not a logical crossing point for vehicles.

Table 1 - SJC Baseline Risk Assessment

ID #	Hazard Description	Cause(s)	System State	Existing Controls	Possible Effect(s)	Incident History Potentially Related to Effect (Note 1)	Severity	Comments	Likelihood	Comments
8a	Taxiway K on the East Ramp to Runway 30R	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	3.6	12L-30R is the primary departure runway. Distance between runway end and Taxiway K is short, therefore the departing aircraft will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow).	C	No noted incidents in the past 15 years, but once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a. Continuous activity from terminal ramp.
8b					Runway incursion or operational deviation (vehicle)	n/a	4.8	12L-30R is the primary departure runway. Distance between runway end and Taxiway K is short, therefore the departing aircraft will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow).	C	No history of incidents, but could be a logical crossing point vehicles.
9a	Taxiway L on the East Ramp to Runway 30R	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	3.6	12L-30R is the primary departure runway. Distance between runway end and Taxiway L is short, therefore the departing aircraft will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow).	C	No noted incidents in the past 15 years, but once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
9b					Runway incursion or operational deviation (vehicle)	n/a	4.8	12L-30R is the primary departure runway. Distance between runway end and Taxiway L is short, therefore the departing aircraft will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow).	C	Although it could be a logical crossing point for vehicles, no history of incidents.
10a	*Taxiway F on the West Ramp to Runway 11-29*	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	55 RWS (Potentially)	2.3	High energy portion of runway.	B	Continuous activity on from terminal ramps to Taxiway V in the vicinity of Taxiway F. SJC District Officer Inspector confirmed incidents similar to Incident 58 ASRS occurring frequently.
10b					Runway incursion or operational deviation (vehicle)	n/a	2.8	High energy portion of runway.	C/D	No noted incidents in the past 15 years. Not a logical crossing point for vehicles. Close proximity from ramp to runway.
11a	*Taxiway D on the West Ramp to Runway 11-29*	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	55 RWS (Potentially), 78 RWS	2.9	Taxiway Delta is the entrance taxiway for Runway 29 departures. Smaller GA aircraft will land closer to the threshold, therefore increasing the severity.	B/C	There have been numerous incidents reported regarding aircraft entering the Runway 29 environment at Taxiway D, however none were clearly specific to aircraft coming from the ramp. However, the proximity of the taxiway entrance to the ramp and the location of the run-up area all contribute to a history of runway incursions. Therefore, the likelihood score should be higher. (Also see hazards for run-up area and proximity of runways)
11b					Runway incursion or operational deviation (vehicle)	n/a	4.0	Taxiway Delta is the entrance taxiway for Runway 29 departures. Smaller GA aircraft will land closer to the threshold, therefore increasing the severity, however is it thought to be less than an aircraft.	C/D	Low vehicle traffic area. Not logical crossing point. No history of incidents. Close proximity from ramp to runway.
12a	Taxiway C on the West Ramp to Runway 30L	Non Standard Airfield Geometry	During IMC and VMC conditions, mainly GA operations, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Run-up area contributes to confusion.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	n/a	2.3	Runway 12R-30L is primary arrival runway. High energy area in north flow specifically.	C/D	No history of incidents related to aircraft coming off of the ramp and inadvertently entering the runway environment, but once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
12b					Runway incursion or operational deviation (vehicle)	n/a	2.8	Runway 12R-30L is primary arrival runway. High energy area in north flow specifically.	D	Low vehicle traffic area. Not logical crossing point. No history of incidents.
13a	Taxiway D on the West Ramp to Runway 30L	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. GA traffic, 2 hotspots on Taxiway D.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings, driver training.	Runway incursion or operational deviation (aircraft)	85 RWS	2.3	Runway 12R-30L is primary arrival runway. High energy area.	C/D	No history of incidents related to aircraft coming off of the ramp and inadvertently entering the runway environment, but once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
13b					Runway incursion or operational deviation (vehicle)	n/a	2.8	Runway 12R-30L is primary arrival runway. High energy area.	D	Low vehicle traffic area. Not logical crossing point. No history of incidents.

Table 1 - SJC Baseline Risk Assessment

ID #	Hazard Description	Cause(s)	System State	Existing Controls	Possible Effect(s)	Incident History Potentially Related to Effect (Note 1)	Severity	Comments	Likelihood	Comments
Wide Expanse of Pavement										
14a	Wide Expansive Pavement on Taxiway B between Runway 30L and Taxiway Z	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings.	Runway incursion or operational deviation (aircraft)	64 RWS, 106 RSAP & ASRS, 112 RSAP & ASRS	**3.6**	Distance between runway end and Taxiway B is short, therefore the departing aircraft on 12L-30R will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow). Arriving aircraft on 12R-30L will be passing over due to displaced threshold locations.	**C**	High traffic area. Once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
14b					Runway incursion or operational deviation (vehicle)	105 RWS	**4.8**	Distance between runway end and Taxiway L is short, therefore the departing aircraft on 12L-30R will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow). Arriving aircraft on 12R-30L will be passing over due to displaced threshold locations.	**C**	Once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
15	Wide Expansive Pavement on Taxiway L between Runway 30L and Taxiway Z	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. This area is used for run-ups and as the location where aircraft are parked in the event of a bomb threat. Only used for run-up when in north flow.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings.	Runway incursion (aircraft) resulting from aircraft being cleared to (1) cross one of the runways and hold short of the other or (2) exit Runway 30L on arrival and hold short of Runway 30R. Confusion from expanse of pavement leads to confusion and the runway incursion. Aircraft hitting each other as a result of one aircraft being in the pad for a run-up and another assuming there is ample room to pass, even though there may not be.	116 ASRS & RSAP	**3.6**	Distance between runway end and Taxiway B is short, therefore the departing aircraft on 12L-30R will either have good visual indication before starting take-off roll (north flow) or aircraft is likely to be airborne (south flow). Arriving aircraft on 12R-30L will be passing over due to displaced threshold locations.	**C**	Once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
16	Wide Expansive Pavement on Taxiway K between Runway 30L and Runway 30R	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. This area is used for run-ups.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings.	Aircraft hitting each other as a result of one aircraft being in the pad for a run-up and another assuming there is ample room to pass, even though there may not be.	53 ASRS	**2.9**	High energy portion of runway.	**C**	Once every 10-100 years (D) seems too conservative given this condition goes against AC 150/5300-13a.
Operational/Procedural Hazards										
17	High energy crossing of Runway 12L-30R at Taxiways H and F.	ATC Procedural	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Limited distance between runways. Taxiway H is used by approx. 10% of arrivals on Runway 30L. Taxiway F is used a slightly higher amount for Runway 12R arrivals.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings.	Runway incursion (aircraft)	39 ASRS	**2.4**	High energy portion of runway.	**C**	
18	High energy crossing of Runway 11-29 at Taxiway G (aircraft exiting Runway 12R-30L).	ATC Procedural	During IMC and VMC conditions, daytime and nighttime. Includes aircraft authorized to operate in movement area and directed to do so by ATC.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings.	Runway incursion (aircraft)	n/a	**2.4**	High energy portion of runway.	**C/D**	
19	Pavement Use - Runway used as a Taxiway - Back taxi on 30L to position for 30L departure. (Operation being performed for wake turbulence.)	ATC Procedural	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. It is common for aircraft to be instructed to back taxi on the runway, entering at Taxiway B, and then turn around and position for departure. This maneuver allows the aircraft to not be delayed as much waiting for wake turbulence to dissipate from the adjacent runway operation.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings.	Aircraft being told to hold short of 30L until they are cleared, but because they are used to taxiing on the runway to position for departure, they perform the back taxi and then end up with someone else landing over the top of them.	100 RWS	**3.6**	Distance between runway end and Taxiway B is short, therefore arriving aircraft on 12R-30L will be passing over due to displaced threshold locations.	**B/C**	ATC indicates that this is a fairly common operation, although incident history is minimal.

Table 1 - SJC Baseline Risk Assessment

ID #	Hazard Description	Cause(s)	System State	Existing Controls	Possible Effect(s)	Incident History Potentially Related to Effect (Note 1)	Severity	Comments	Likelihood	Comments
Other										
20	Proximity of Runway 11-29 to Other Runways	Limited Separation between Runways 11-29 and 12R-30L	During IMC and VMC conditions, daytime and nighttime. Includes aircraft and vehicles authorized to operate in movement area and directed to do so by ATC. Taxiway previously functional as a Runway.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings.	Wrong Runway Landing/Wrong Runway Event	25 ASRS, 30 ASRS, 57 RWS, 60 RWS, 63 ASRS, 65 RWS. 77 RWS	**1.5**	Aircraft mistaking Runway 12R-30L for their intended Runway 11-29 (more commonly to depart) would be entering a runway heavily used for arrival operations and would potentially be entering the runway environment in a high energy area.	**B**	See incident history.
21	Close proximity of Run- Up area to Approach end of Runway 29 and Runway 30L departure operation	Non Standard Airfield Geometry	During IMC and VMC conditions, daytime and nighttime. Hotspot at the intersection of Taxiway D and Runway 29. Mostly GA piston aircraft running up before departure on Runway 29. Limited distance between hold line and near edge of taxiway. Frequency of use varies, but is estimated at approx. 4/day during the week and 10/day on weekends.	ATC instructions and procedures, controller scanning (radar & visual), procedures, pilot checklists, redundancies/back up systems, taxiway & runway signs, lighting and markings.	Runway incursion (aircraft)	2 ASRS, 3 ASRS, 26 ASRS, 34 ASRS, 36 ASRS, 47 RWS, 59 RWS, 74 ASRS, 90 ASRS, 96 ASRS, 108 RSAP, 109 RSAP & ASRS, 110 RSAP	**2.9**	Taxiway Delta is the entrance taxiway for Runway 29 departures. Smaller GA aircraft will land closer to the threshold, therefore increasing the severity.	**B/C**	See incident history. Run Up area location requires ground control to be contacted twice, once on the way to the run up and then to leave the run up area to taxi to Runway. Failure to contact the GC twice leads to OD. In some cases, pilots are authorized for one but end up taxiing to departure position without clearance

Notes:

1 Five database sources were consulted to identify the history of surface incidents and runway incursions that have occurred on the airfield at SJC for the period of 2000 to the most current available month in 2016. (1) National Transportation Safety Board (NTSB) Aviation Accident Database (AAD), (2) Federal Aviation Administration (FAA) Accident and Incident Database System (AID), (3) National Aeronautics and Space Administration (NASA) Aviation Safety Reporting System (ASRS) Database, (4) FAA Western Pacific Region Runway Safety Office incident data, (5) San Jose Runway Safety Action Plan Report, May 31, 2016.

Figures 3 through **7** depict the hazard ID numbers on the risk matrix, organized by each category.

Figure 3 - Direct Access from Ramp to Runway (East Ramp)

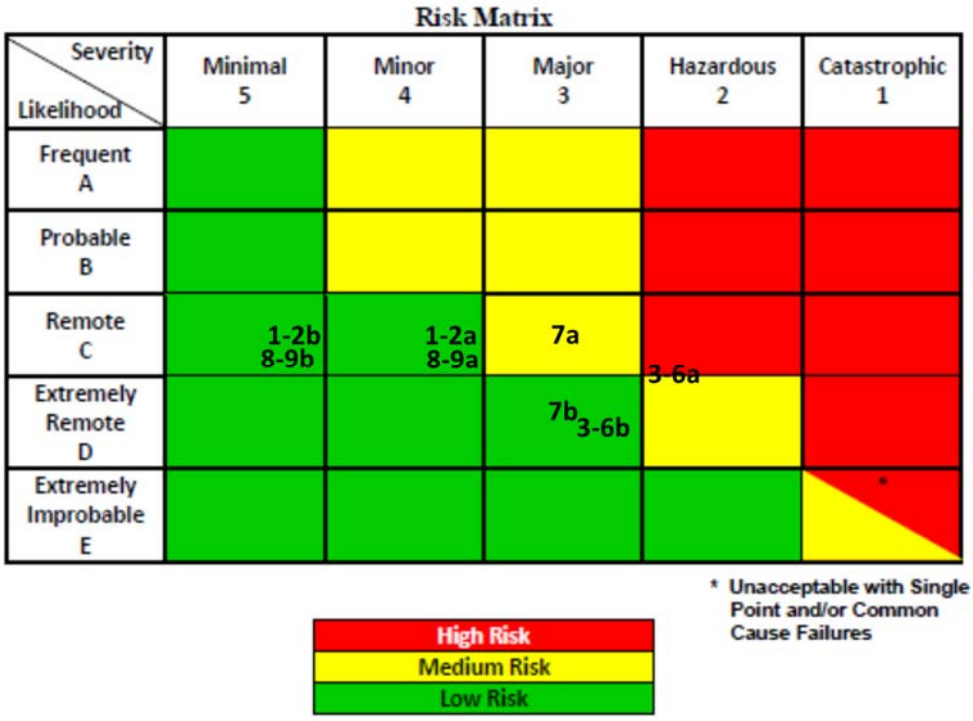


Figure 4 - Direct Access from Ramp to Runway (West Ramp)

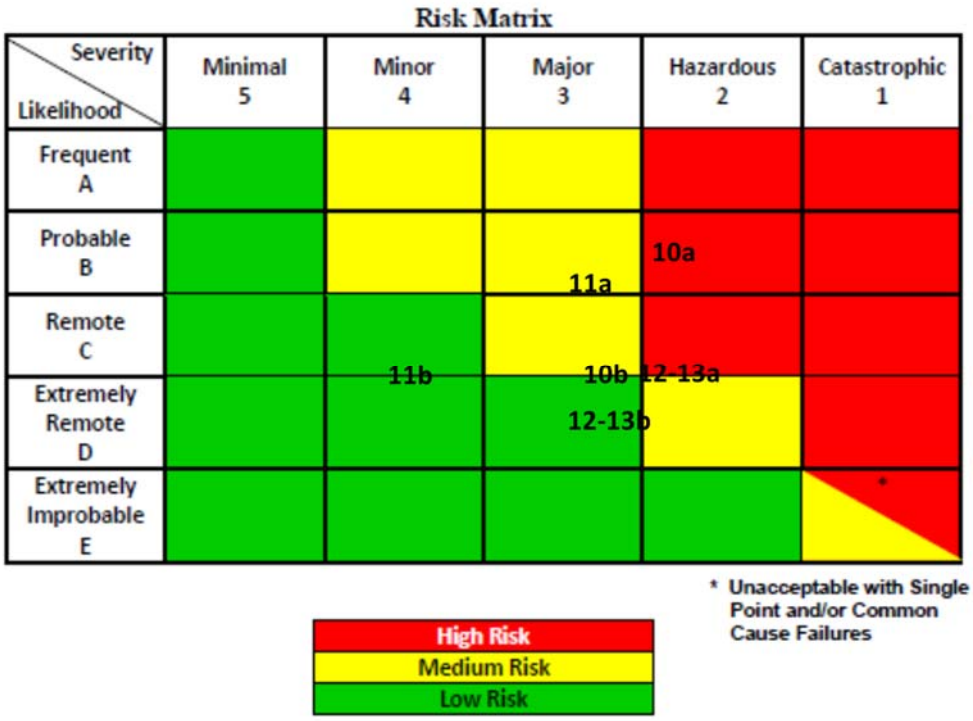


Figure 5 – Wide Expanse of Pavement

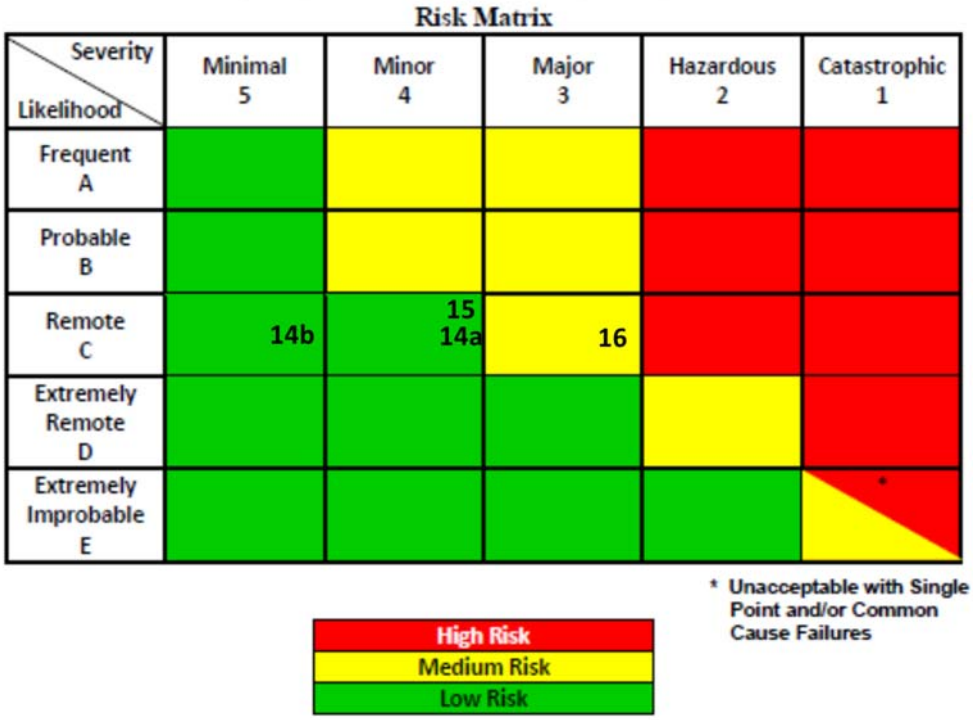


Figure 6 – Operational/Procedural

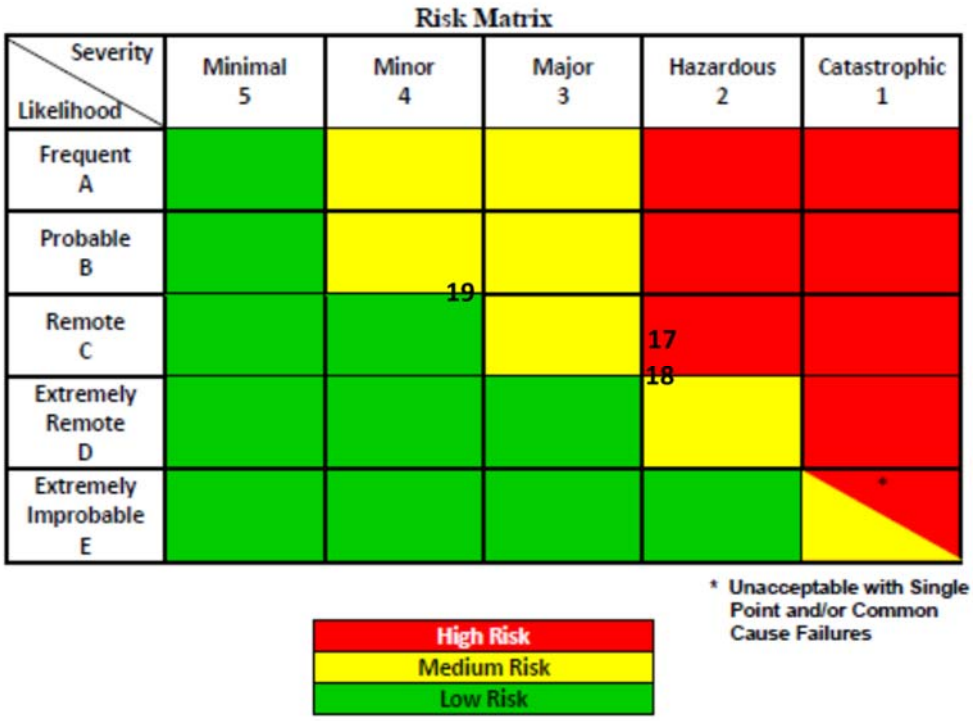
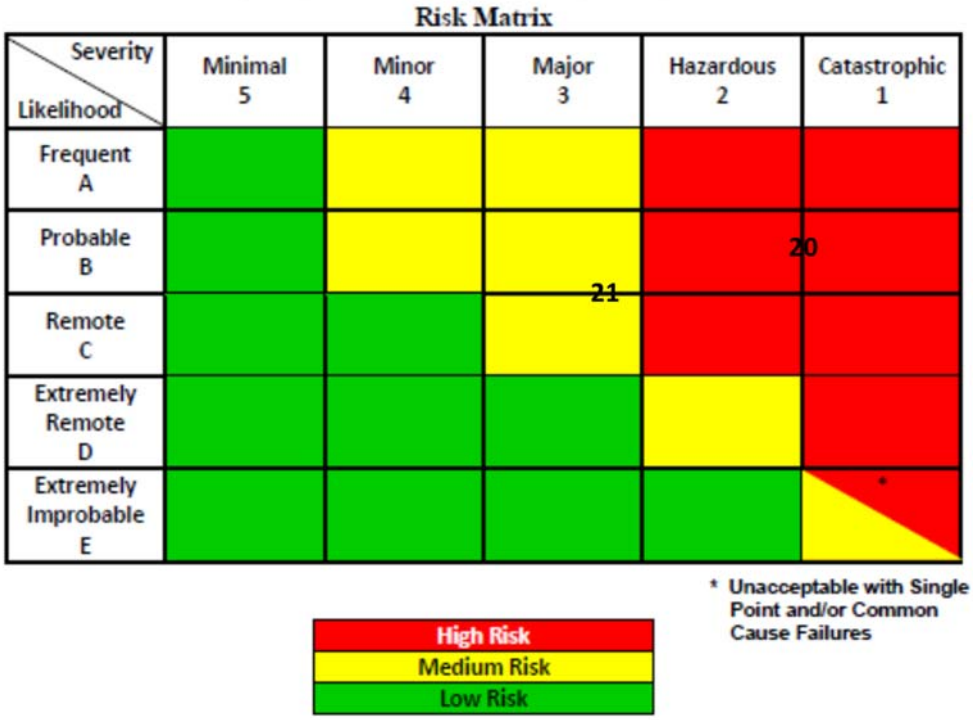


Figure 7 – Other



Preliminary Baseline Risk Assessment Results

A primary output of the Baseline Risk Assessment is the identifications of hazards that merit mitigations (physical modifications, procedures, training, etc.). These mitigations will assist in formulating alternatives that will then be reassessed and compared against each other to inform the selection of mitigations strategies that will be implemented.

The risk matrix includes color coding for risk level scores: red, yellow and green. The FAA has defined the risk levels as they pertain to mitigations as follows:

- **High Risk** – High risk is unacceptable within the FAA's Office of Airport (ARP) SMS. If a hazard presents a high-initial risk, the proposal cannot be carried out unless hazards are further mitigated so risk is reduced to medium or low level and the ARP Safety Review Board recommends that ARP-1 approve the mitigations. Tracking and management of high-risk hazards and controls are required.
- **Medium Risk** – Medium risk is acceptable within the ARP SMS. A medium risk is the minimum acceptable safety objective. With medium risk, the proposal may be carried out as long as the risk is tracked and managed.
- **Low Risk** – Within the ARP SMS, low risk is the target. Low risk is acceptable without restriction. Low-risk hazards do not need to be actively managed but must be recorded in the SRM documentation.

Based on the results of the Baseline Risk Assessment, the following High Risk hazards should have mitigations developed and compared. The following Medium Risk items may or may not require mitigations, but should be considered.

<u>High Risk</u>

- 3-6a – Direct access to Runway 12L-30R from east ramp (Taxiways D, E, F and H)
- 10a – Direct access to Runway 11-29 from west ramp (Taxiway F) - Aircraft
- 12-13a – Direct access to Runway 12R-30L from west ramp (Taxiways C and D)
- 17 – High energy crossing of Runway 12L-30R (Taxiways H and F)
- 18 – High energy crossing of Runway 11-29 (Taxiway G)
- 20 – Proximity of Runway 11-29 to other runways

<u>Medium Risk</u>

- 7a - Direct access to Runway 12L-30R from east ramp (Taxiway J)
- 10b – Direct access to Runway 11-29 from west ramp (Taxiway F) - Vehicle
- 11a – Direct access to Runway 11-29 from west ramp (Taxiway D) – Aircraft
- 16 - Wide expansive of pavement on Taxiway K between Runway 30L and Runway 30R
- 19 - Back taxi on 30L to position for 30L departure
- 21 - Close proximity of Run- Up area to approach end of Runway 29 and Runway 30L departure operation

Appendix A – Risk Assessment Definitions & Matrix

Severity Classifications

Effect On:	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
ATC Services	-Conditions Resulting in a minimal reduction in ATC services, or -A loss of separation resulting in a Category D Runway Incursion (RI), or -An Operational Deviation (OD), or -A Proximity Event (PE)	-Conditions resulting on a slight reduction in ATC services, or -A loss of separation resulting on a Category C RI, or Operational Error (OE)	-Conditions r resulting in a partial loss of ATC services, or -A loss of separation resulting in Category B RI or OE	-Conditions resulting in a total loss of ATC services (A TC Zero), or -A loss of separation resulting in a Category A RI or OE	Conditions resulting in a collision between aircraft, obstacles or terrain
Flight Crew	-Flight crew receives TCAS Traffic Advisory informing of nearby traffic or, -Pilot Deviation (PD) where loss of airborne separation falls within the same parameters of a Category D OE or PE, or -Minimal effect on operation of aircraft	-Potential for PD due to TCAS Preventive Resolution Advisory (PRA) advising crew not t o deviate from present vertical profile, or -PD where loss of airborne separation falls within the same parameters of a Category C OE , or -A reduction of functional capability of aircraft but does not impact overall safety (e.g. normal procedures per AFM)	-PD due to response to TCAS Corrective Resolution Advisory (CRA) issued advising crew to take vertical action to avoid developing conflict with traffic, or -PD where loss of airborne separation falls within the same parameters of a Category B OE, or -Reduction in safety margin or functional capability of the aircraft requiring crew to follow abnormal procedures per AFM	-Near mid-air collision (NMAC) results due to proximity of less than 500 feet from another aircraft or a report filed by pilot or flight crew member that a collision hazard existed between two or more aircraft; or -Reduction of safety margin and functional capability of the aircraft requiring crew to follow emergency procedures as per AFM.	-Conditions resulting in a mid- air collision (MAC) or impact with obstacle or terrain resulting in hull loss, multiple fatalities, or fatal injury
Flying Public	Minimal injury or discomfort to passenger(s)	-Physical discomfort to passenger(s) (e.g. extreme braking action; clear air turbulence causing unexpected movement of aircraft causing injuries to one or two passengers out of their seats) -Minor injury to greater than zero to less or equal to 10% of passengers	-Physical distress on passengers (e.g. abrupt evasive action; severe turbulence causing unexpected aircraft movements), or -Minor injury to greater than 10% of passengers	Serious injury to passenger(s)	Fatalities or fatal injury to passenger(s)
Airport	No damage to aircraft but minimal injury or discomfort of little consequence to passenger(s) or workers	-Minimal damage to aircraft, or -Minor injury to passengers, or -Minimal unplanned airport operations limitations (i.e. taxiway closure), or -Minor incident involving the use of airport emergency procedures	-Major damager to aircraft and/or minor injury to passenger(s)/worker(s), or -Major unplanned disruption to airport operations, or -Serious incident, or -Deduction on the airport's ability to deal with adverse conditions	-Severe damage to aircraft and/or serious injury to passenger(s)/worker(s); or -Complete unplanned airport closure, or -Major unplanned operations limitations (i.e.. runway closure), or -Major airport damage to equipment and facilities	-Complete loss of aircraft and/or facilities or fatal injury in passenger(s)/worker(s); or -Complete unplanned airport closure and destruction of critical facilities; or -Airport facilities and equipment destroyed

Source: *FAA Order 5200.11: FAA Airports (ARP) Safety Management System*, Appendix C.

Definitions

Runway Incursion (RI) – Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft.

Surface Incident (SI) – Any event where unauthorized or unapproved movement occurs within the airport movement area, or an occurrence in the movement area associated with the operation of an aircraft that affects or could affect the safety of flight. A surface incident can occur anywhere on the airport's surface including the runway.

Operational Error – An action of an air traffic controller that results in less than the required minimum separation between two or more aircraft, or between an aircraft and obstacles or an aircraft landing or departing on a runway closed to aircraft.

Operational Deviation - An aircraft, vehicle, equipment, or personnel encroached upon a landing area that was delegated to another position of operation without prior coordination and approval.

Proximity Event - A loss of separation minima where 90 percent or greater separation is retained in either the horizontal or vertical plane, and does not include any violation of wake turbulence separation minima. A Proximity Event is not an operational error.

Source: *Federal Aviation Administration*

Runway Incursion Classifications

Current FAA Runway Incursion Severity Classification	
Class	**Description of Severity**
Accident	Refer to NTSB 49 CFR 830
A	A serious incident in which a collision was narrowly avoided
B	An incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective or evasive response to avoid a collision
C	An incident characterized by ample time and/or distance to avoid a collision
D	Incident that meets the definition of runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and takeoff of aircraft but with no immediate safety consequences
E	Insufficient information, inconclusive or conflicting evidence precludes severity assessment.

Source: *Federal Aviation Administration*

Likelihood Classifications

	NAS System & ATC Operational	NAS Systems		ATC Operational		Flight Procedures	Airports
		Individual Item/System	ATC Service/NAS Level System	Per Facility	NAS-Wide		Airport Specific
Frequent A	Probability of occurrence per operation/operational hour is equal to or greater than 1x10-3	Expected to occur about once every 3 months for an item	Continuously experienced in the system	Expected to occur more than once per week	Expected to occur more than every 1-2 days	Probability of occurrence per operation/operational hour is equal to or greater than 1x10-5	Expected to occur more than once per week or every 2500 departures, whichever occurs sooner
Probable B	Probability of occurrence per operation/operational hour is equal to or greater than 1x10-5	Expected to occur about once per year for an item	Expected to occur frequently in the system	Expected to occur about once every month	Expected to occur about several times per month		Expected to occur about once every month or 250,000 departures, whichever occurs sooner
Remote C	Probability of occurrence per operation/operational hour is less than or equal to 1x10-5 but equal to or greater than 1x10-7	Expected to occur several times during the life cycle of an item	Expected to occur numerous times in a system's life cycle	Expected to occur about once every year	Expected to occur about once every 3 years	Probability of occurrence per operation/operational hour is less than or equal to 1x10-5, but equal to or greater than 1x10-7	Expected to occur about once every year or 2.5 million departures, whichever occurs sooner
Extremely Remote D	Probability of occurrence per operation/operational hour is less than or equal to 1x10-7 but equal to or greater than 1x10-9	Unlikely to occur, but possible in an item's life cycle	Expected to occur several times in a system's life cycle	Expected to occur once every 10-100 years	Expected to occur about once every 3 years	Probability of occurrence per operation/operational hour is less than or equal to 1x10-7 but equal to or greater than 1x10-9	Expected to occur once every 10-100 years or 25 million departures, whichever occurs sooner
Extremely Improbable E	Probability of occurrence per operation/operational hour is less than 1x10-9	So unlikely that it can be assumed that it will not occur in an item's life cycle	Unlikely to occur, but it is possible in system life cycle	Expected to occur less than every 100 years	Expected to occur less than every 30 years	Probability of occurrence per operation/operational hour is less than 1x10-9	Expected to occur less than every 100 years

Note: Likelihood Classifications used in the SRA pertained specifically to the SJC Airport environment, the highlighted boxes represent the categories of the matrix that were used in the assessment.
Source: *FAA Order 5200.11: FAA Airports (ARP) Safety Management System*, Appendix C.

FAA Recommended Risk Matrix

Risk Matrix

Severity / Likelihood	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Frequent A					
Probable B					
Remote C					
Extremely Remote D					
Extremely Improbable E					*

* Unacceptable with Single Point and/or Common Cause Failures

High Risk
Medium Risk
Low Risk

Source: *FAA Order 5200.11: FAA Airports (ARP) Safety Management System*, Appendix C.

Appendix B – Hazard History

Table B1 – AID, ASRS, RSAT, and RWS Summary of Incidents - 2000 To Present								
Incident No. & Source	**Date**	**FAA Severity Class**	**Condition**	**Aviation Category**	**Location**	**Description**	**Main Contributor**	***Noted Construction***
1 ASRS	03-2000	D	Mixed Night	Air Carrier	Taxiway Z at Taxiway K	A B737-300 was given taxi instructions from Terminal C to RUNWAY 12R via TAXIWAY Z. Pilot and first officer were conducting taxi op along with other duties. Pilot was unfamiliar with airport and did not see end of hard surface on TAXIWAY Z and taxied past TAXIWAY K where he was supposed to turn although that movement was not noted in the taxi instructions. Jeppesen Approach Plate layout on airport diagram did not agree with actual configuration of Taxiway Z. Could not execute a 180 degree turn so called a tug to push aircraft back to access TAXIWAY K. Recommended hold short sign on TAXIWAY Z be bigger and brighter and placed further south to improve time to react and make a turn at TAXIWAY K.	Human Factors, Airfield Layout	Yes
2 ASRS	03-2000	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 29	Pilot of a PA-28 received progressive instructions from Ground Control from east side of airport to Runway 29 run-up area (west side). Contacted ground after run-up and was instructed to "cross TAXIWAY V to RUNWAY 29, and contact tower." Pilot was unsure whether instructed to stop prior to hold line to clear TAXIWAY or short of it. Hold short had not been part of instruction. Pilot stopped on hold line and contacted tower indicating ready for takeoff. Tower responded with "Hold short of RUNWAY 29" and shortly after noted that aircraft appeared to be in front of hold line and pilot instructed to taxi clear of runway and contact ATCT for Possible Dev. SJC Ground indicated that they did not "hold short" in their taxi instructions for RUNWAY 29.	Human Factors	Yes NOTAM 2000 – 01100, 01300, 01600 revised, 01700, 01800
3 ASRS	08-2000	C	VMC Daylight	Personal/ General Aviation	Runway 29	Radio frequency was congested at time of incident. Aircraft taxied from RUNWAY 29 run-up area across TAXIWAY V to hold position for RUNWAY 29. While holding short, the instructor remembers several traffic callouts for all three runways, including one to subject aircraft indicating they would be held for traffic for about two more minutes. Next call monitored was believed by instructor and student to be for them to take off on RUNWAY 29 and to expedite. Student responded "Cessna XYZ cleared for takeoff, RUNWAY 29, Expediting" (Instructor assumed tower getting them out in a gap). Aircraft entered runway, began take-off when they	Human Factors	Yes NOTAM-2000-10200, 10000, 09900, 09800, 09700, 09600, 09500, 09400, 09300, 09200, 09100, 09000, 08900

						heard a call to aircraft on final to go around and for them to stop. Tower indicated that Cessna XYZ had answered a clearance meant for an MD80 on the parallel. Reporter of incident question why ATCT did not question their read-back of takeoff clearance.		
4 ASRS & AID	09-2000	A	VMC Daylight	Air Carrier	Terminal Apron	During pushback from gate using a contract crew from another airline, the aircraft was pushed back into start of taxi roll, initiated engine start and other checklist procedures and cleared the tug operator to disconnect the tow bar. Pilot thought he heard the tow bar disconnect and thought he saw tug begin backing away. Saw aircraft marshal walk away from aircraft and pilot flashed the taxi lights to signal his readiness to taxi. Waited for another aircraft to pass and began taxi movement when aircraft began to shudder and then stopped stemming from No. 1 engine hitting the tug.	Human Factors	Yes NOTAM-2000-11800, 11600, 11500, 11400, 11300, 11200, 11100, 11000, 10900
5 ASRS	11-2000	D	VMC Time of day not noted	Pedestrian	Terminal Apron	During a mechanical at the gate, passengers were left uncontrolled and unattended on the ramp between the aircraft and the gate in proximity to various pieces of ramp equipment that were operating in the immediate vicinity. Passengers were apparently confused as to whether they should enplane or go back into terminal and there was an absence of personnel to attend to the situation.	Human Factors	Yes NOTAM-2000-12900
6 AID	12-2000	A	Daytime	Air Carrier	Taxiway C	A Boeing 777, while being taxied under aircraft power struck a parked Gulfstream 4, located at ACM aviation. Airlines' ground marshal crew was directing the aircraft movement along TAXIWAY C into the US customs area at the time of incident. Minor damage was done to the lower outboard left wing of the B777-200 caused by the G-4's left horizontal stabilizer	Human Factors	Yes NOTAM-2000-13600
7 ASRS	04-2001	D	Night	Air Carrier	Taxiway W	Cleared to RUNWAY 30L via, an unusual route, via TAXIWAY Y, TAXIWAY C, CROSS RUNWAY 30L, TAXIWAY C to TAXIWAY W to TAXIWAY B to RUNWAY 30L. We checked the airport page for restrictions – and noted a 75000 LB weight restriction on TAXIWAY W between TAXIWAY C and TAXIWAY B. Advised ground control that we were unable to use TAXIWAY W and were informed that the weight restriction had been lifted, but not yet published. Based on this, continued taxi movement as cleared by ATCT on an uncomfortably narrow taxiway. On the west side of RUNWAY 30L the pilot discovered the page note prohibiting taxi on TAXIWAY W along RUNWAY 30L, south of TAXIWAY J.	Human Factors, Airfield Layout	Yes NOTAM-2001-03901, 03601

8 ASRS	05-2001	C	Night	Air Carrier	Runway 30L at Taxiway C	Aircraft 1 taxied to RUNWAY 30L at TAXIWAY C intersection in response to flow control into LAX. There were three aircraft at the runway ahead of Aircraft 1 but Aircraft 1 was facing a time limit on his departure window. There was also a steady stream of arrivals to RUNWAY 30L at the time. One departure was being spaced between each arrival. Due to time of day (between sunset and sunrise taxi into position and hold could not be used. As an arrival was just touching down, Aircraft 1 was cleared for takeoff using anticipated separation. Pilot read back instructions but controller missed the addition of "position and hold" which was not part of the original clearance. Controller believes Aircraft 1 pilot did not expect takeoff clearance while landing aircraft was still turning off runway. Controller had moved on to two other traffic transmissions when the next arrival to RUNWAY 30L now on a 1-mile final asked if there was someone on the runway. Controller observed that Aircraft 1 had not departed and immediately re-cleared Aircraft 1 to depart and to expedite. Controller noted that since taxi into position and hold is not being used at intersections at night it removes the requirement to inform the arrival and departure of each other and this contributed to the potential incident noted.	Procedures and policy, human factors, airspace structure	No
9 ASRS	05-2001	D	VMC Daylight	Air Carrier	Runway 30L departure end	B737-300 (Aircraft 1) cleared into position and hold on RUNWAY 30L with a CL65 rolling out and a B737 on final. The CL65 missed all turnouts and rolled to end of RUNWAY 30L. ATCT directed Aircraft 1 to exit the runway to allow the B737 on final to land and to expedite the movement. While exiting the RUNWAY 30L the crew noticed the line of aircraft waiting to depart blocked their exit. Construction activity in the vicinity was also a factor. ATCT asked if Aircraft 1 had enough room and first officer responded affirmatively as from his position that appeared to be the case. The aircraft was straddling the hold bar and before they could contact the tower the B737 had landed.	Human Factors/ Construction	No
10 ASRS	05-2001	C	VMC Time of day not noted	Personal/ General Aviation	Taxiway F vicinity of Taxiway V	After landing on RUNWAY 29, pilot taxis off RUNWAY via TAXIWAY F and continues onto TAXIWAY V toward the threshold of RUNWAY 29 without stopping. After taxiing a few hundred feet, ATCT requests pilot to switch to ground frequency where pilot requests and receives a taxi clearance and a request to call the tower. Tower supervisor notes in call that a helicopter had departed TAXIWAY V and that the pilot had caused a "possible loss of	Human Factors	No

						separation" Pilot did not see the helicopter not hear any communication with the helicopter. Pilot also noted that while on roll-out on runway ATCT did not state "turn left at TAXIWAY F and contact ground, which per the pilot is done "90%" of the time.		
11 ASRS	09-2001	D	VMC Daylight	Air Carrier	Runway 30R	MD-80 cleared for takeoff while approaching the hold short position for RUNWAY 30R. Aircraft took the runway and started to spool up. Pilot heard ATCT clear an aircraft (Aircraft 2) that had just landed on RUNWAY 30L to cross RUNWAY 30R. MD-80 aborted takeoff roll while at about 5 to 10 knots. After aborting takeoff ATCT instructed Aircraft 2 to hold short of 30R. ATCT then re-cleared MD-80 for takeoff but pilot indicated they would exit runway and taxi back from TAXIWAY B intersection for full length departure.	Human Factors	Yes NOTAM-2001-10301, 10201, 10101, 09601.
12 ASRS	10-2001	D	VMC Daylight	Air Carrier	Taxiway Y at Taxiway B and Runway 30R	B737-300 instructed to taxi on TAXIWAY Y to RUNWAY 30R. Hawker Jet was conducting a run-up at the end of TAXIWAY Y resulting in the 737 needing to taxi around the corporate jet. Approaching the end of the runway, ATCT issues departure clearance for the 737. Given blockage, pilot of the 737 uses TAXIWAY B to access RUNWAY 30R and back taxis to TAXIWAY A at 30R end. 737 was not given clearance to conduct back-taxi.	Human Factors	Yes NOTAM-2001-11401, 11301, 11201, 11101, 11001, 10901
13 ASRS	11-2001	C	Daylight	Air Carrier	Runway 12L at Taxiway N	B737 (Aircraft 1) was holding short of RUNWAY 12L and was given clearance to take off. Finished checklist and checked final approach and taxied into position on RUNWAY 12L centerline for takeoff. Aircraft 1 pilot noticed a second B737 crossing RUNWAY 12L and queried ATCT about the crossing aircraft. ATCT responded that Aircraft 1 had been instructed taxi into position and hold. Aircraft 1 responded "roger position and hold". Pilot of Aircraft 1 asked ATCT to check their tapes as he believed ATCT had given him clearance to depart and not to position and hold.	Human Factors	Yes NOTAM-2001-11901, 11801, 11501
14 ASRS	01-2002	A	VMC Daylight	Air Carrier	Ramp to Taxiway Y at J	Cleared to taxi to RUNWAY 30R via TAXIWAY B. Access to TAXIWAY B would involve use of TAXIWAY Z, (rarely done) which was blocked by an aircraft push back. Pilot assumed intent of ATCT was for aircraft to use TAXIWAY Y. Access to TAXIWAY Y being immediately in front of aircraft supported pilot's assumption. In moving towards TAXIWAY Y, aircraft had to stop abruptly to avoid a fast-moving taxiing 737 which passed with a 15-20' clearance. Unclear instructions from ground controller and pilot not requesting clarification	Human Factors	No

15 ASRS	01-2002	D	VMC Night	Corporate	Runway 30R in lieu of 30L vicinity of TXY D	Cleared to land RUNWAY 30L, landed on RUNWAY 30R, Co-pilot training dominated the other pilot's attention along with monitoring preceding traffic. Previously RUNWAY 30R had been closed to night operations which contributed. Complacency and familiarity on part of pilot led to incident. **Wrong runway landing.**	Human Factors/ previous Construction	Yes NOTAM-2002-01002, 00902, 00802, 00702, 00602, 00502, 00402, 00202
16 ASRS	02-2002	D	VMC Daylight	Personal/ General Aviation	Taxiway Y at Taxiway A	Ground instructed pilot to taxi via TAXIWAY Z to RUNWAY 30R and instructed to position and hold, RUNWAY 30R. Pilot taxied into position on TAXIWAY Y in error and ATCT cleared aircraft for takeoff and aircraft departed on Taxiway Y. **Aircraft takeoff on TAXIWAY Y.**	Human Factors	No
17 ASRS	02-2002	D	VMC Night	Air Carrier	Runway 30R AT Taxiway A	Ground cleared aircraft to taxi from gate, make right on TAXIWAY H, cross TAXIWAY Y and back-taxi on RUNWAY 30R until advised. Captain complied and turned at TAXIWAY B. Captain was then advised to taxi on TAXIWAY B access TAXIWAY Y and hold short of RUNWAY 30R. Pilot believed he was cleared all the way to 30L and crossed 30R despite questioning by the first officer (FO).	Human Factors	No
18 ASRS	02-2002	B	VMC Daylight	Air Carrier	Taxiway J at Runway 30R	Landed on RUNWAY 30L and exited at TAXIWAY J and were instructed to "hold short of RUNWAY 30R." but pilot only heard TAXIWAY J. FO called Hold Short and pilot stopped aircraft but crossed hold line for 30R with MD80 conducting a departure on RUNWAY 30R. Contributing factor could be timing of instruction occurring during high reverse thrust (difficulty hearing) or when just turning off RUNWAY.	Human Factors	No
19 ASRS	02-2002	D	VMC Daylight	Personal/ General Aviation	Runway 30R	Aircraft 1 taxied into position behind Aircraft 2. ATCT instructed Aircraft 2 to taxi into position and hold. Aircraft 1 contacted ATCT with "ready for takeoff" and thought ATCT had cleared Aircraft 1 to takeoff on RUNWAY 30R. ATCT had not cleared Aircraft 1 which crossed hold bar and entered RUNWAY 30R. Pilot of Aircraft 1 was preoccupied and ATCT failed to catch wrong read-back.	Human Factors	Yes NOTAM-2002- 02702, 02602, 02502, 02402, 02202, 02102, 02002, 01902, 01802, 01702, 01602, 01502, 01402, 01302, 01202, 01102
20 ASRS	03-2002	D	Daylight	Corporate	Runway 30R	Lear 45 taxied from ramp following another aircraft onto RUNWAY 30R without clearance and without proper read-back of controller instructions, resulting in a runway incursion. RUNWAY 30R had	Human Factors/ previous Construction	No

						previously been closed for an extended period and assumed it was still closed.		
21 ASRS	03-2002	D	VMC Daylight	Corporate	Runway 30R	FAL 900 cleared to taxi to what pilot believed to be RUNWAY 30L as it was a common clearance from that part of airport, and RUNWAY 30R had been previously closed for repairs. Reached approach end of 30R checked for traffic and taxied across to hold short of RUNWAY 30L. Halfway across RUNWAY 30R ATC directed a 270 degree turn on RUNWAY 30R into position and hold. Entering RUNWAY 30R without clearance resulted in a runway incursion.	Human Factors/ previous Construction	No
22 ASRS	03-2002	D	VMC Daylight	Air Taxi/ Commuter	Runway 30R at Taxiway J Runway 29	Landed on RUNWAY 30L instructed to turn on TAXIWAY J, cross RUNWAY 30R and contact ground on other side. ATCT did not indicate right or left onto TAXIWAY J. Pilot in command turned left when should have gone right, given their intended destination on airport. Second in Command was doing after landing checklist. Aircraft crossed RUNWAY 29 w/o authorization and ATCT did not identify the mistake.	Human Factors	No
23 ASRS	03-2002	D	VMC Dusk	Air Taxi/ Commuter	Runway 30R	Pilot of a CL65 received taxi instructions while also receiving instructions from ground crew. RUNWAY 30R had been closed the night before and in the morning of this event. Both pilot and first office believed they were cleared to RUNWAY 30L. RUNWAY 30R was open for departures only, but no visual indication the runway was open. While crossing RUNWAY 30R aircraft called tower and were informed of incursion.	Human Factors	Yes NOTAM-2002-04602, 04402, 04202, 03902, 03602, 03002
24 ASRS	04-2002	B	VMC Daylight	Personal/ General Aviation	Runway 29	Ground instructed pilot to taxi to RUNWAY 29 and monitor ATCT. Pilot responded "going to TWR" and taxied onto RUNWAY 29 w/o clearance, other traffic executed go around. Factors included relief briefing distraction in tower, controller not getting appropriate read-back; aircraft not seen by ground control and pilot and combined situational awareness issues.	Human Factors	Yes NOTAM-2002-06702, 05402, 05102, 05002, 04902, 04702
25 ASRS	06-2002	C	Not Noted	Air Carrier	Runway 29	ATC cleared a B767-200 to takeoff on RUNWAY 30R with an aircraft inside a 4-mile final and a B737 still on landing roll out on same runway. 767 delayed departure until 737 exited runway, but then realized that a C152 on departure from RUNWAY 29 could be seriously impacted by having to fly through potential wake turbulence. Tower directed C152 to sidestep to the left due to proximity.	Human Factors	No

26 ASRS	08-2002	D	VMC Daylight	Personal/ General Aviation	Run-up Area at 29 end	RUNWAY 29 run-up area location requires aircraft to contact ground control prior to leaving run-up to taxi to RUNWAY 29 end. This requires ground control to be contact twice, once on the way to the run-up and then to leave the run-up area to taxi to airport. Pilot misunderstood clearance instructions to taxi and taxied into departure position on runway and held, rather than taxiing to the hold line. (Pilot noted very limited space between hold line and near edge of taxiway as contributor, Limited room means holding aircraft is partially blocking parallel taxiway). Controller did not catch inaccurate read-back and instructions from ATCT did not include "the usual hold short" instruction. No other traffic was impacted.	Human Factors	No
27 ASRS	12-2002	B	VMC Night	Air Carrier	Taxiway H at Taxiway Y	SJC ground was very busy and appeared task saturated, was confusing aircraft flight numbers given multiple pushbacks and operations occurring at the time. Cleared the reporting aircraft to follow a company aircraft to RUNWAY 30R via TAXIWAY Z to H to TAXIWAY Y to 30R with no indication of other traffic. While on TAXIWAY H to Y had to conduct a hard stop while taxing to avoid nearly interacting with a B757 that was not identified by ground control. Multiple updates of ATCT on aircraft position and actions went unacknowledged.	Human Factors, workload	Yes NOTAM-2002-16202, 16002
28 ASRS	02-2003	D	VMC Daylight	Corporate	Runway 30L vicinity of Taxiway D	RUNWAY 30R had been closed for extended period but reopened. Cleared to land RUNWAY 30R then sidestepped to RUNWAY 30L by controller. Pilot did not hear sidestep and landed on RUNWAY 30L. **Wrong runway landing.**	Human Factors Airfield Layout	No
29 ASRS	05-2003	D	VMC Daylight	Personal/ General Aviation	Runway 29	PA28 taxied into the takeoff position and held on RUNWAY 29 without ATC clearance.	Human Factors	No
30 ASRS	09-2003	D	VMC Daylight	Personal/ General Aviation	Runway 29 and Runway 30L	Aircraft instructed to cross midfield at or above 1,500 feet and enter downwind for RUNWAY 29. Pilot read-back correctly on several responses to progressive instructions and clearances and indicates he had clearly identified RUNWAY 29. While turning left base to final pilot noted position of other traffic, noted position of VASI (PAPI) on 30L and lost visual contact with RUNWAY 29. Pilot proceeds to land on 30L without clearance – **Wrong runway landing**	Human Factors	Yes NOTAM-2003-10903, 10203, 09903, 09803,
31 AID	10-2003	Accident	VMC Daylight	Air Taxi/ Commuter	Terminal Ramp	An EMB 120 aircraft had just landed and was on the AOA ramp under taxi to park at Gate 2c. While making a left turn into the gate parking, and under the direction of the ground marshal, the	Human Factors	No

						aircraft's left wing tip struck the back end of a parked fuel truck. This fuel truck had just finished fueling the aircraft at the adjacent gate. The aircraft's left wing tip fairing and clear lens cover were damaged during the collision. The aircraft obtained a special flight permit to be flown back to its home station for repairs.		
32 ASRS	11-2003	B	VMC Daylight	Corporate	Runway 30R south end of pavement	A Corporate aircraft contacted ATC 12 miles out noting their on-airport intended destination and that they were on visual for RUNWAY 30L, but could take RUNWAY 30R. ATCT cleared them for 30R. Airbus was landing on RUNWAY 30L and upon landing continued off the runway and was crossing RUNWAY 30R and pilot was concerned about whether the aircraft would be clear of runway by time they landed. Frequency congestion impeded both asking the question and receiving a response from ATC. Aircraft landed safely. Pilot told to contact the ATC and spoke to ATC Supervisor who indicated that aircraft had overflown an aircraft on the displaced threshold. Pilot informed supervisor: ATC never informed pilot of aircraft taxiing into position, ATC never issued instructions to go-around. Appeared the controller got very busy and forgot he had cleared corporate jet to land after taxiing another aircraft into position.	Procedure	Yes NOTAM-2003-12503, 12103, 12003
33 ASRS	12-2003	E	Night	Procedural	Ramp	An FAA controller from SJC reports a concern about airport lighting that is very bright and greatly restricts and adversely impacts the ability of controllers to clearly see and differentiate between aircraft. This includes portable lights sometimes used at night for cargo operations. Specifically notes the location and intensity of lights on cargo ramps, Terminal A and parking lot lights. Controller was very concerned about lighting being a potential contributor to a serious incident in the future.	Airfield Layout	Yes NOTAM-2003-14003, 13303,
34 ASRS	04-2004	D	Not noted	Personal/ General Aviation	Runway 29 Run-up	SJC ATCT process for clearance of traffic from the RUNWAY 29 run-up area to RUNWAY 29 questioned as a contributor to surface incidents and incursions. Pilot of a PA46 taxied into position for departure on RUNWAY 29 at SJC rather than to the hold position without clearance. Taxiway and run-up area at approach end of RUNWAY 29 is described as confusing. Pilot also notes that the phraseology used by ground control did not trigger the usual “hold short” response from the pilot.	Airfield Layou Procedure	Yes NOTAM-2004 10604,
35 ASRS	05-2004	D	Night	Air Carrier	Taxiway C at	A seven-hour delayed flight resulted in clearance to depart 20 minutes prior to ATCT closure. When pushback occurred ATCT had	Company policies,	Yes

					Taxiway W	closed. During taxi-out on TAXIWAY Y pilot and FO were busy in cockpit with various tasks and as aircraft neared TAXIWAY C, to avoid construction on approach end to RUNWAY 30R, pilot elected to cross RUNWAY 30L and taxi down west side of runway on TAXIWAY W. Prior to entering TAXIWAY W flight crew became aware of wingtip restriction on TAXIWAY W and conducted a 180 degree turn on TAXIWAY C, back taxied on RUNWAY 30L and departed. Crew felt pressure due to next day flights that would be further delayed due to crew rest issue and wanted to minimize delay as much as possible.	Human factors/ Construction	NOTAM-2004-12104, 11904, 11704, 11604, 11204
36 ASRS	07-2004	D	VMC Daylight	Personal/ General Aviation	Runway 29 Run-up to Runway 29	Owner and new pilot of a TB 700 focuses on pre-flight checks in the RUNWAY 29 run-up area and appears to have misunderstood ATCT instructions. Pilot thought he was directed to "follow King Air into position and hold on RUNWAY 29 and contact tower." Pilot followed King Air and taxied into position on RUNWAY 29 and held. Experienced problems finding correct frequency to contact ATCT but once contacted pilot cleared for takeoff, but told to expect to be contacted about potential infraction. Pilot notes understanding that ground control cannot clear an aircraft onto an active runway. Recommends clearer instructions to avoid entering runway without proper clearance.	Human Factors	Yes NOTAM2004-16504, 15004, 14904, 14104,
37 ASRS	09-2004	B	VMC Daylight	Air Carrier	Taxiway Z at Taxiway F	MD80 facing south bound on TAXIWAY Z just north of TAXIWAY F. Ground instructed to taxi to RUNWAY 30R via TAXIWAY F and Y with no mention of other ground traffic. MD80 started to turn on TAXIWAY F and co-pilot emphatically told pilot to stop. Regional aircraft passed approximately 75 feet in front of MD80. Ground controller indicated he had failed to inform MD80 of other aircraft which pilot and FO could not see until beginning their turn.	Human Factors	Yes NOTAM-2004-21404, 21004, 20004
38 ASRS	11-2004	D	VMC Night	Air Carrier	Taxiway D exit in lieu of Taxiway C	Air carrier aircraft lands RUNWAY 12R, at approximately 50 knots and approaching TAXIWAY D, ATCT directs to aircraft to exit on TAXIWAY C, cross RUNWAY 12L and contact ground control. Pilot did not see sign indicating TAXIWAY D and assumed it was TAXIWAY C and exited onto TAXIWAY D by mistake. TAXIWAY D was closed at the time. Pilot observed red lights but did not associate these with a closed TAXIWAY. Aircraft stopped and was ultimately towed from TAXIWAY D to the gate. (NOTE: description in data base suggests aircraft may have struck barrier due to a reference to inspecting gear and a cut in tread of nose gear).	Human Factors/ Construction	Yes NOTAM-2004-25204, 25104, 25004, 24804, 24704, 24604, 24504, 24404, 24204, 24104, 24004, 23904, 23704, 23304

39 ASRS	12-2004	B	Mixed Rain -Night	Air Carrier	Runway 12L at Taxiway F	B737-7 after landing RUNWAY 12R and exiting at TAXIWAY F was cleared to cross RUNWAY 12L and taxi via TAXIWAY Y to J to gate. Both pilot and FO confirmed ATCT instructions. While taxiing along Taxiway F, 737-7 pilot notices an aircraft on RUNWAY 12L beginning takeoff roll and performs an aggressive stop beyond the hold short line and roughly 30' short of actual runway edge. Note that visual conditions were not optimum. Takeoff aircraft was another air carrier and was airborne at about 200-300 feet when passing TAXIWAY F. Pilot did not hear any clearance given to departing aircraft nor was the 737-7 informed he was on the runway. Controller noted it was his error.	Human Factors	No
40 RWS	01-2006	D	VMC Daytime	Personal/ General Aviation	Runway 29	A Cessna C560 was instructed to taxi to Runway 30L then was observed taxiing on Runway 29 without authorization. No conflicts reported.	Human Factors	Yes NOTAM-2006-00706, 00606, 00306,
41 ASRS	02-2006	C	Marginal Night	Air Carrier	Runway 12R	Air carrier aircraft arrived after ATCT closed due to flight delay and was vectored to final by NORCAL approach to intercept ILS for RUNWAY 12R and cleared for approach and handed off to CTAF. "No Tower" position reports made at 9 miles and 5 miles out with ceiling at 3,000. Good visibility below 3,000 where aircraft acquired airport and could see RUNWAY 12R lights only partially illuminated. Attempts to activate RUNWAY 12R lights unsuccessful and at 1,000 decision made to sidestep to RUNWAY 12L and land. Upon landing on RUNWAY 12L, pilot observed equipment and personnel about 2/3rds the way down RUNWAY 12R. No warning about runway closure was ever conveyed to aircraft.	Ambiguous/ Construction	Yes NOTAM-2006-02406, 02306, 02206, 02006, 01906, 01206
42 RWS	05-2006	D	VMC Daytime	Corporate	Runway 30L	A Bombardier GL5T, with current ATIS, was taxied to Runway 30L by Ground Control (GC). Local Control (LC) cleared the GL5T for takeoff Runway 30L and pilot read back 30L. The GL5T started turn to take off on Runway 30R instead of 30L as cleared. Runway 30R is configured as a taxiway due to construction. There were no vehicles or aircraft on 30R at the time. GC observed the GL5T and immediately advised LC who cancelled takeoff clearance. The GL5T pilot aborted and exited 30R approximately 500 feet down the runway.	Human Factors/ Procedural/ Construction	Yes NOTAM-2006-06906, 06606, 06506, 06306, 06206
43 RWS	06-2006	D	VMC Daytime	Personal/ General Aviation	Runway 29	A Piper PA28R correctly read back instructions to taxi to Runway 29. Subsequently Ground Control observed the PA28R taxi onto	Human Factors	Yes NOTAM-2006-09706,

						Runway 29 without authorization or contacting ATCT. No conflicts reported.		09106, 08906, 08806, 08706, 08506, 08406,
44 AID	07-2006	B	VMC Daylight	Air Carrier	Taxiway E at Runway 30R	An Airbus A319 captain stated: "pushed tail north from gate C-12, called for taxi, given the following route. "taxi Zulu" to "Echo" down 30R for a 30L departure. No notice of another airline taxiing was passed along to us. On echo after clearing left then to right. in first officer's forward window, I saw the other aircraft taxiing at a high rate of speed. To avoid any situation, brakes were applied. the other aircraft never stopped, passing the nose of the A319 the other aircraft slowed to a normal taxi speed." The captain was notified that one flight attendant in the aft galley area was thrown to the floor due to the sudden braking, causing minor injury.	Not Noted	No
45 RWS	09-2006	B	VMC Daytime	Vehicle/ Pedestrian	Runway 30L at Taxiway B to Taxiway C	An airport fire vehicle and 2 other emergency vehicles responding to an alert for Runway 29 were instructed to cross Runway 30L at Bravo. The lead fire vehicle driver read back "crossing Runway 30L at Bravo, be advised we're going to take Charlie down to our location". The fire vehicle proceeded onto 30L at Bravo and drove down 30L (1,500 feet) to Charlie without authorization. A Beech BE35, distress aircraft, was initially cleared to land Runway 29. Pilot stated they would land 30L and was cleared for 30L. Ground Control advised the fire vehicles to exit without delay due to aircraft landing behind them. The last vehicle with the lead fire vehicle exited at Charlie prior to the BE35 crossing 30L threshold. Closest proximity estimated was 1,900 feet horizontal, distance from threshold to Charlie.	Human Factors	No
46 RWS	09-2006	D	VMC Daytime	Personal/ General Aviation	Taxiway J at Runway 11	A Beech BE35 was taxied to Runway 11 and was asked by Ground Control (GC) if pilot needed a run-up with reply being in the affirmative. The BE35 crossed Taxiway Victor without authorization, continued across the hold lines at approach end Runway 11 (Juliet) and conflicted with a Beech BE9L crossing landing threshold same runway. The BE9L was instructed to go around and passed abeam Juliet at an estimated 40-50 feet vertical and the BE35 stopped approximately 6-10 feet past hold line. Hold line to runway edge is 75 feet with closest horizontal proximity estimated as 90 feet.	Human Factors	No
47 RWS	09-2006	D	VMC Daytime	Personal/	Runway 29	A Cessna C210 was issued taxi instructions to the Runway 29 run-up area but the aircraft mistakenly taxied to another ramp area.	Human Factors	No

				General Aviation		Ground Control (GC) tried to correct the error but received no response. Later the C210 called ready to taxi and was issued instructions to Runway 29. The C210 then entered Runway 29 without authorization. Both GC and Local Control directed the C210 to exit the runway. No conflicts reported.		
48 RWS	09-2006	C	VMC Daytime	Personal/ General Aviation	Runway 29	A Cessna C152 departed Runway 29 without a clearance. A Bombardier CL30 had been instructed to cross Runway 29 at Taxiway Juliet but was held short of the hold bars. No loss of separation or other conflicts reported.	Human Factors	Yes NOTAM-2006-12706, 12606, 12406, 11906, 11706, 11506
49 RWS	11-2006	D	VMC Daytime	Personal/ General Aviation	Taxiway V and Runway 29	A Cessna C182 entered Taxiway Victor and taxied to Runway 29 without authorization. The C182 held at the hold short lines and contacted ATCT. No conflicts reported.	Human Factors	Yes NOTAM-2006-14306
50 AID	12-2006	D	VMC Night	Air Carrier	Runway 30L at Taxiway L	B767-300 landed on RUNWAY 30L and was instructed to exit at TAXIWAY M. Pilot in command exited at TAXIWAY L which was closed at the time and marked with temporary barricades and taxied over one barricade and blew an additional six barricades over. The Pilot indicated he did not recall ATCT instructions to exit at TAXIWAY M, and had not noticed the barricades. ATIS current at the time indicated TAXIWAY L was closed between Runway 12R/30L and TAXIWAY Y. ATCT instructions to exit at TAXIWAY M were verified by ATCT staff and airport operations. No damage to the aircraft occurred	Human Factors	Yes Covered by previously noted NOTAMS
51 RWS	12-2006	D	VMC Night	Personal/ General Aviation	Taxiway H and Runway 30L	Multiple taxiways are closed due to construction. Taxiway Hotel would normally be the first egress point off Runway 30L. Local Control (LC) instructed a Beech BE20 after landing Runway 30L to turn at Hotel and contact Ground Control (GC). LC then cleared a Boeing B737 for takeoff Runway 30L full length with a second Boeing B737 on a 4- mile final. LC then realized the BE20 had been turned onto a closed and barricaded taxiway. The BE20 cleared the runway but was unable to proceed forward and stopped prior to hold line and within runway safety area. LC cancelled takeoff clearance on the B737 but the aircraft had rolled approximately 2,000 feet down the runway. Closest horizontal separation was 4,000 feet when the B737 reached taxi speed.	Procedural/ Construction	Yes Covered by previously noted NOTAMS

52 RWS	12-2006	D	VMC Daylight	Vehicle/ Pedestrian	Runway 12L at Taxiway N	Supervisor (SUPVR) was on Local Control 2 (LC2) when an airport vehicle called for a runway inspection on Runway 12L. A CANADAIR CRJ2 was holding short of Runway 12L at Taxiway November for flow time. SUPVR placed a visual aid placard on the pad. Vehicle was between Taxiway Foxtrot and Golf when driver advised he would "need a couple of seconds here to re-bag this sign". Controller in Charge (CIC) started working LC2, to allow the SUPVR to handle a call, and did not receive a briefing. CIC did not know the vehicle had advised he needed some time to re-bag a sign so when he noticed the vehicle off to the right side of the runway and the driver out of the vehicle, the RID was removed. CIC cleared the CRJ2 for take-off. The CRJ2 held on the runway, did not roll, and reported the vehicle on the runway. CIC then observed the vehicle on the runway but could not transmit due to CD reading a SIGMET. As soon as the frequency cleared, CIC advised the vehicle to clear the runway and re-cleared the CRJ2 for takeoff when vehicle reported clear. Closest horizontal proximity reported was 5,000 feet.	Procedural	No
53 ASRS	12-2006	D	VMC Daylight	Air Carrier	Runway 30R at Taxiway K	B737-3 landed on RUNWAY 30L and exited at TAXIWAY K. Pilot and FO both understood their clearance was to land RUNWAY 30L exit TAXIWAY K and cleared across RUNWAY 30R with an aircraft that was cleared into position on 30R and holding. Pilot read-back instructions that aircraft was cleared to cross RUNWAY 30R as understood and to stay with the controller. Pilot and FO looked down RUNWAY 30R to keep holding traffic in sight and overhead ATCT instructing traffic holding on RUNWAY 30R to cancel their takeoff clearance. Next transmission was telling the taxiing B737-3 to hold short of RUNWAY 30R which was impossible as aircraft was halfway across RUNWAY 30R. Pilot continued across RUNWAY 30R and cleared runway and called ATCT reiterating that ATCT had cleared their aircraft to cross and that pilot had read-back instructions. ATCT indicated they had not heard read back and then cleared the aircraft to the gate.	Human Factors	Yes NOTAM-2006-17806, 17406, 17206, 17106, 17006, 16906, 16806,
54 RWS	02-2007	D	VMC Daylight	Air Carrier	Runway 30R at Taxiway J	A Boeing B737 landed Runway 30L. A McDonnell-Douglas MD83 was cleared for takeoff Runway 30R abeam Taxiway Alpha. Local Control 2 (LC-2) was distracted with coordination regarding a helicopter landing and instructed the B737 to cross Runway 30R via Taxiway Juliet. The MD83 pilot observed the B737 enter Runway	Procedural	No

						30R and initiated his own abort after rolling approximately 1,500 feet (abeam Charlie). The MD83 was instructed to exit at Taxiway Echo, approximately 4,500 feet from Juliet.		
55 RWS	02-2007	D	VMC Daylight	Personal/ General Aviation	Runway 11	A Beech BE10 was instructed to taxi to Runway 11. Upon leaving the ramp the BE10 continued straight ahead instead of making the turn onto the correct taxiway and crossed the hold line for Runway 11. Ground Control instructed the BE10 pilot to stop and make a 180 turn. No conflicts reported.	Human Factors	No
56 RWS	03-2007	D	VMX Daylight	Air Carrier	Taxiway A1 at Runway 30R	A CANADAIR CL60 was holding on Taxiway Zulu short of Taxiway Bravo when instructed to continue on Zulu and hold short of Taxiway A1. Subsequently the CL60 was instructed to cross Taxiway Yankee and to hold short of Runway 30R. The CL60 read back hold short instructions then proceeded to cross Runway 30R. No conflicts reported.	Human Factors	Yes NOTAM-2007-04507
57 RWS	04-2007	D	VMC Daylight	Personal/ General Aviation	Runway 30R vicinity of Taxiway D	A Cessna C182 was cleared and read back clearance to land on Runway 29. The C182 then landed on Runway 30R without a clearance. **Wrong runway landing**. No conflicts reported.	Human Factors	No
58 ASRS	07-2007	D	VMC Daylight	Air Taxi/ Commuter	Taxiway V at RWY 11 end	FO called SJC ground control for clearance to taxi from FBO and were cleared to taxi to RUNWAY 30L and advised to obtain an updated ATIS and advise the ATCT when this was done. FO and pilot both anticipated directions to turn left off ramp to taxi to RUNWAY 30L, but FBO marshaller "vigorously" directed the aircraft to turn right to exit the FBO ramp. At start of taxi, the FO switched to the ATIS frequency, but did not have ground control frequency programmed into radio. Pilot and FO were unaware that neither was monitoring ground control. Pilot taxied to what was thought to be TAXIWAY V, but was the alignment of RUNWAY 11/29 resulting in a pilot deviation. ATC directed aircraft to continue taxiing on RUNWAY 11/29 to the far end and then continue to RUNWAY 30L. San Jose Flight Service District Office inspector confirmed that there had been a number of similar incidents over the previous year.	Human Factors	No
59 RWS	07-2007	D	VMX Daylight	Personal/ General Aviation	Runway 29	A Cessna C206 was instructed to taxi to Runway 29 and contact ATCT for crossing to the run-up area. The C206 began taxi and crossed the hold bars for Runway 29 without clearance and was	Human Factors	No

						instructed by Ground Control to stop. No conflicts reported. Subsequently the C206 was taxied across the runway.		
60 RWS	10-2007	D	VMC Daylight	Personal/ General Aviation	Runway 30L vicinity of Taxiway D	A Mooney M20P was cleared to land Runway 29. M20P pilot advised he was unfamiliar with the airport and Local Control (LC) informed the pilot that 29 was the short runway. LC then cleared a Beech BE40 for takeoff on Runway 30L with a Boeing B738, on 3-mile final 30L. The M20P then landed Runway 30L without clearance instead of 29. LC cancelled the BE40's takeoff clearance prior to the BE40 reaching the hold short line and sent the B738 around beyond 2-mile final. The BE40 stopped prior to the hold short lines. In addition, when the M20P exited 30L at H the pilot was instructed to cross Runway 29. The M20P instead turned onto Runway 29 rather than crossing. No conflicts reported for Runway 29. **Wrong runway landing.**	Human Factors	Yes NOTAM-2007-12807, 10607
61 ASRS	11-2007	D	VMC Daylight	Corporate	Runway 30R vicinity of Taxiway H	Rejected takeoff by pilot resulting from unspecific ATCT communication during takeoff roll. ATCT cleared aircraft to taxi into position and hold in the displaced threshold area of RUNWAY 30R. Almost immediately upon reaching position ATCT transmitted what the pilot and FO perceived as clearance to takeoff and the FO responded "aircraft XX cleared for takeoff. The pilot waited 4 to 5 seconds before commencing roll during which there was no negative response for ATCT. Pilot believes he was above 100 Knots and near V1 when aircraft received a transmission from the ATCT of "What are you doing" with no further details. Fearing that they (pilot and FO) may have mistakenly proceed, pilot executed a rejected takeoff and turned off runway after slowing down. Upon exiting the runway, pilot was asked if he wanted taxi clearance back to departure position and to contact to contact tower when ready for takeoff. Pilot asked ATCT if there were any problems or ramifications that needed to be addressed and ground control responded that there were none.	Human Factors	Yes NOTAM-2007-13707
62 ASRS	01-2008	D	VMC Daylight	Procedural	Airport	Situational awareness, very difficult for ATC personnel to see approach end of either runway due to height of Tower. Tower design was/is not suited for 11000 ft. Runway.	ATC Equipment Nav. Fac. Buildings	No
63 ASRS	02-2008	D	Not Noted	Personal/ General Aviation	Runway 30L at Taxiway D	Single engine Cessna cleared for RUNWAY 29 lands of RUNWAY 30L. Pilot deviation occurred but went unreported as such. **Wrong runway landing.**	Human Factors	No

64 RWS	03-2008	D	VMC Daylight	Personal/ General Aviation	Taxiway B and Runway 30R	A Cessna C150 was issued progressive taxi instructions from ACM FBO to Runway 30R via Taxiway Zulu to hold short of Taxiway Bravo. The C150 initially taxied wrong way on Zulu and was corrected by Ground Control (GC). GC monitored the C150's progress and when the C150 stopped short of Bravo, GC instructed the pilot to advise when ready for departure. The C150 then proceeded to enter Bravo and then crossed Yankee and the hold short lines for Runway 30R without clearance. GC instructed C150 pilot to stop. The C150 did not enter the runway. No conflicts reported.	Human Factors	No
65 RWS	03-2008	D	VMC Daylight	Personal/ General Aviation	Runway 30L at Taxiway D	A Cirrus SR22 cleared to land Runway 29 instead landed Runway 30L without clearance. No conflicts reported. **Wrong runway landing**	Human Factors	No
66 ASRS	05-2008	D	VMC Dusk	Corporate	Runway 30R	Pilot given detailed taxi instructions from FBO to RUNWAY 30R. NOTE: 30L had been closed for two weeks for lighting upgrades. Pilot of aircraft appeared confused either due to closure of RUNWAY 30L or detailed taxi instructions. Tower advised aircraft to Hold short of RUNWAY 30R and aircraft acknowledged "hold short instructions" and then proceeded onto RUNWAY 30R without clearance.	Human Factors/ Previous Construction	Yes
67 RWS	08-2008	D	VMC Daylight	Corporate	Taxiway J at Runway 30R	A Cessna C550 landed Runway 30L and advised taxi to Signature ramp. The C550 was instructed to turn left at Taxiway Juliet, cross Runway 29, then was given directions to parking. The C550 replied "roger". The C550 turned right on Juliet instead and crossed Runway 30R without clearance. No conflicts reported.	Human Factors	No
68 RWS	09-2008	D	VMC Daylight	Personal/ General Aviation	Runway 29	A Cessna C172 entered Runway 29 without clearance. No conflicts reported.	Human Factors	Yes NOTAM-2008-09708, 09508, 19408, 19208
69 RWS	10-2008	D	VMC Night	Personal/ General Aviation	Taxiway J at Runway 30R	A Beech BE40 was instructed to turn left at Taxiway Juliette, cross Runway 29, and contact ground. The BE40 read back only Taxiway Juliette then turned right and crossed Runway 30R without clearance. No conflicts reported.	Human Factors	No
70 RWS	11-2008	C	VMC Daylight	Personal/ General Aviation	Runway 29 and Taxiway J	A Cessna C310, landed Runway 30L, turned off on Taxiway Juliet and was instructed to cross Runway 29 at Juliet (departure end) and contact Ground Control (GC) on the other side. Local Control (LC) had forgotten about a Beech BE36 on final for Runway 29. LC instructed the C310 to hold short of Runway 29 for landing traffic.	Procedural	No

						The C310 pilot acknowledged but could not get stopped until past the hold short bars by approximately 5-10 feet. The BE36 landed, reached taxi speed approximately 700-800 feet from Taxiway Golf, and exited the runway at Golf. Closest proximity reported was 2,000 feet horizontal, distance from Golf to Juliet.		
71 RWS	12-2008	D	VMC Daylight	Corporate	Runway 30L	A Hawker H25B entered and departed Runway 30L without clearance. No conflicts reported.	Human Factors	No
72 RWS	12-2008	C	VMC Daylight	Air Carrier	Runway 30L at Taxiway K	A Boeing B733 was advised of runway change at push time from the gate and received new departure routing. The B733 was taxied to Runway 30R but turned wrong way on Taxiway Yankee towards Runway 12L. GC instructed the B733 to turn right on Zulu but pilot turned left towards runways at Lima. LC and GC coordinated a back taxi on Runway 30R for the B733 and GC instructed the pilot to contact tower passing Taxiway Charlie. The B733 started back taxi but turned right at Kilo. GC attempted to stop the aircraft but received no response and the B733 taxied past the hold short lines for Runway 30L at Taxiway Kilo without clearance and conflicted with a B737 touching down on 30L near Delta. The nose of the B733 stopped approximately 50 feet past the hold lines (B733 length is 110 feet) and did not enter the runway. Closest horizontal distance was approximately 120 feet based on hold line to runway edge distance of 170 feet. The landing B737 exited at Juliet (distance from Juliet to Kilo is 800 feet).	Human Factors	No
73 RWS	02-2009	D	VMC Daylight	Personal/ General Aviation	Runway 12R at Taxiway L	Ground Control (GC) coordinated with Local Control to cross Runway 12L at Lima with a Cessna C750. GC instructed the C750 to cross Runway 12R at Lima instead of 12L as coordinated. No conflicts reported.	Procedural	No
74 ASRS	03-2009	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 11/29	PA28A is issued VFR clearance and pilot was instructed to taxi to RUNWAY 29, which pilot reads back correctly. Pilot then stops short of the runway and on the active taxiway turns askew to conduct a run-up. Pilot informed of RUNWAY 29 run-up location across RUNWAY 29 and is told to hold short and contact Tower on 120.7, which was incorrect frequency for tower configuration. While local controller and ground controller are discussing frequency issue, pilot reads back the instructions incorrectly as "Taxi across RUNWAY 29 and contact tower", which was missed by ground controller. Controller noted the following: poorly placed	Human Factors Airfield layout	Yes NOTAM-2009-03037

						location of RUNWAY 29 run-up being the source of several pilot deviations as well as controller deviations.		
75 RWS	04-2009	D	VMC Daylight	Personal/ General Aviation	Runway 30L and Taxiway C	A Globe GC1B was issued taxi instructions to Runway 30L at Charlie for departure. Subsequently the GC1B pilot entered and departed Runway 30L from abeam Taxiway Charlie without clearance. No conflicts reported.	Human Factors	Yes NOTAM-2009-04057, 04056
76 ASRS	06-2009	D	VMC Night	Air Taxi/ Commuter	Runway 30L prior to Taxiway F	ATC late night limited staff during period of numerous pushbacks, clearance requests and taxi instruction requests. A CRJ-900 landed on RUNWAY 30L with another aircraft on a 2-mile final. As main taxiways were blocked by pushback traffic, the CRJ-900 was instructed to back taxi on RUNWAY 30R to TAXIWAY F and taxi to ramp on controller's frequency, which the pilot read back correctly. Controller checked radar and looked up to observe the aircraft that was on a 2-mile final executing a missed approach. The CRJ-900 was mistakenly back taxiing up RUNWAY 30L rather than RUNWAY 30R as instructed. Pilot indicated he thought they were supposed to back-taxi along RUNWAY 30L to TAXIWAY F.	Human Factors	
77 RWS	06-2009	D	VMC Daylight	Personal/ General Aviation	Runway 12R at Lima	A Cessna C172 was cleared for a touch and go operation on Runway 11. The C172 then executed a touch and go on Runway 12R without clearance. No conflicts reported. **Wrong runway event.**	Human Factors	Yes NOTAM-2009-06088, 06057
78 RWS	07-2009	D	VMC Daylight	Personal/ General Aviation	Runway 29 at Taxiway D	A Beech BE58 was issued taxi instructions to Runway 29 via Taxiway Victor for departure. The BE58 was taxiing back to FBO due to a mechanical issue when pilot stated they resolved it and requested to taxi back to Runway 29. GC instructed the BE58 to make a 180 on Victor and taxi to Runway 29. GC then observed the BE58 cross Runway 29 at Delta without clearance and proceeded to the run-up area. No conflicts reported.	Human Factors	Yes NOTAM-2009-07071, 07070, 07010
79 RWS	09-2009	D	VMC Daylight	Vehicle/ Pedestrian	Taxiway F between Runways 30R and 30L	Taxiway Foxtrot was NOTAMED closed between Runway 30R and 30L with low level barricades at the edge of Runway 30R. A painter was working on the hold markings for Runway 30R on Taxiway Foxtrot and thought he could proceed past the hold lines and crossed into the safety area towards the runway several times without authorization. No conflicts reported. There was no coordination advising that the individual would be in the safety area. Vehicle was radio equipped but individual was outside without a radio.	Human Factors Construction	Yes NOTAM-2009-09023, 09022, 09020, 09019, 09016, 09005, 09003, 09002

80 RWS	10-2009	D	VMC Daylight	Personal/ General Aviation	Runway 30R vicinity of TXY D	A Beech BE76 inbound on an ILS for Runway 30L was cleared to land same runway. The BE76 then landed on Runway 30R without clearance. No conflicts reported. **Wrong runway landing.**	Human Factors	Yes NOTAM-2009-10005, 10004, 10003
81 RWS	11-2009	D	VMC Daylight	Personal/ General Aviation	Runway 30R vicinity of TXY D	A Cessna C172 acknowledged and read back clearance to land on Runway 30L. Subsequently the C172 landed on parallel Runway 30R without clearance. No conflicts reported. **Wrong runway landing.**	Human Factors	No
82 RWS	03-2010	C	VMC Daylight	Vehicle/ Pedestrian	Taxiway B by Taxiway W	An airport mower pre-coordinated with ATCT to operate near the runways. FLM advised the operator to remain outside of the runway safety area (RSA) and offered to coordinate an escort by airport authority (MOD). The operator declined stating they had talked with MOD and knew he was to stay outside of the cones in that area. Subsequently the mower operator misidentified low level barricades at the edge of Runway 30L and crossed into the RSA beyond the tall orange cones near Taxiway Bravo (left side of runway between Bravo and Whiskey) thus conflicting with a DH8 on less than a mile final same runway. The DH8 was issued a go around at one half (.50) mile to avoid loss of separation.	Human Factors	Yes NOTAM-2010-03038, 03037, 03036, 03035, 03009
83 RWS	07-2010	C	VMC Daylight	Vehicle/ Pedestrian	Runway 12L at Taxiway D	Ground (GC) coordinated with Local (LC) for an airport NAVAID vehicle to cross Runway 12L at Taxiway Delta to the glideslope. LC was preparing for a position relief briefing and was coordinating with LICKE Sector on departures. LC cleared a Embraer E135 for takeoff on Runway 12L full length. GC advised LC the vehicle was not clear of Runway 12L and LC canceled the E135s takeoff clearance. The E135 aborted takeoff approximately 2,300 feet from departure point and exited the runway at Kilo. Distance from Kilo to Delta is 5,300 feet, the closest proximity reported.	Procedural	Yes NOTAM-2010-07025, 07024,
84 RWS	09-2010	D	VMC Daylight	Vehicle/ Pedestrian	Taxiway Victor at Taxiway D	An airline maintenance vehicle entered Taxiway Victor without authorization or contact with ATCT. The vehicle proceeded northwest bound from intersection of Victor and Delta. No hold lines or runways affected and no conflicts reported.	Human Factors	Yes NOTAM-2010- 09020, 09013
85 RWS	12-2010	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30L	A Cessna C172 completed run-up on Taxiway Delta abeam Runway 30L then proceeded to pull ahead and crossed the hold short lines without clearance. The C172 reversed course prior to runway edge and while taxiing the pilot questioned runway assignment. ATCT instructed the pilot to continue moving away from runway edge and	Human Factors	Yes NOTAM-2010 12066, 12065, 12021, 12019, 12007, 12005, 12004

						the C172 stopped on the runway side of the hold bars facing away from Runway 30L. No conflicts reported.		
86 RWS	01-2011	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Taxiway W	A Beech BE9L had been cleared for takeoff on Runway 30L abeam Charlie when the pilot advised they needed to return to the ramp for maintenance. Local (LC) instructed the pilot to turn left at Delta and contact Ground (GC). LC observed an aircraft taxiing out and instructed the BE9L to hold short of Taxiway Whiskey which pilot read back correctly. GC was unable to contact the BE9L and the aircraft crossed Whiskey and Runway 11/29 (closed for construction for more than a year). No vehicles were on the runway at the time. The aircraft taxiing out heard GC and held position. No loss of separation reported.	Human Factors	Yes Covered under a previous NOTAM
87 ASRS	03-2011	C	VMC Daylight	Personal/ General Aviation	Threshold Runway 30R vicinity of TXY D.	Small piston aircraft 5 miles from airport was instructed to follow a Gulfstream II on 2-mile final for RUNWAY 30L. Piston aircraft could not visually identify G-II. The piston aircraft landed inadvertently on RUNWAY 30R as the ATC was clearing an air carrier for departure on RUNWAY 30R at the same time. ATC quickly cancelled departure clearance for the air carrier. Pilot notes confusion between of taxiway for the alignment of RUNWAY 30R as main cause of error. **Wrong runway landing.**	Human Factors	No
88 RWS	06-2011	D	VMC Daylight	Vehicle/ Pedestrian	Runway 30R and Taxiway L	An emergency response vehicle was in correct location on Taxiway Lima for Runway 30R due to an inbound aircraft emergency. The aircraft was cleared to land on Runway 30L. Ground (GC) asked the response vehicle operator if they wanted to remain at their location or go between the runways. The vehicle operator stated they wanted to hold short of Runway 30L. GC responded “ok thanks”. GC needed to coordinate with Local (LC) on the crossing. The response vehicle then crossed Runway 30R at Lima without clearance. No conflicts reported.	Human Factors	No
89 RWS	06-2011	D	VMC Daylight	Vehicle/ Pedestrian	Runway 30L at Taxiway M	An airport ops vehicle contacted Local (LC) requesting to enter Runway 30R at Taxiway Mike. LC had no other traffic and approved the vehicle onto Runway 30R. An inbound aircraft called on 7-mile final. LC scanned the runway and observed the vehicle on Runway 30L without clearance. LC advised the vehicle operator to exit the runway. The vehicle was on Mike for Runway 30L at the time of the initial request. No conflicts reported**.**	Human Factors	No

90 ASRS	07-2011	D	Daylight	Personal/ General Aviation	Runway 30L at Taxiway D and Runway 29 Run-up Area	Controller was working another position when they observed a C172 taxi past the hold bars at RUNWAY 30L and TAXIYWAY D and turn their aircraft around with the tail of the aircraft facing RUNWAY 30L and perform what looked to be a run-up. Controller advised the Ground Controller that the Cessna appeared to be disoriented and overheard Ground Control tell the C172 that the run-up area was now ahead and to their left. The Cessna taxied back across RUNWAY 29 onto TAXIWAY V and the Ground Controller advised the C172 to turn back around cross RUNWAY 29 and taxi to the area which was 'black top'. This had been designated as the run-up area but not well marked. This issue had been noted with RSAT team. This issue has taken up a considerable amount of time and effort for the Ground Controller to orientate pilots who are not familiar with this layout. Additional signs were recommended to be placed at this location to better eliminate confusion and it was noted that the run-up should be noted in the airport directory and through pilot education. Controller believed that the area was to be designated as a 'hot spot' by RSAT.	Airfield Layout	No
91 RWS	08-2011	D	VMC Daylight	Personal/ General Aviation	Runway 30L at Taxiway F	A Piper 46 advised Ground (GC) ready for takeoff. GC responded taxi Runway 30L via Delta. The pilot responded, Runway 30L cleared for takeoff via Delta. GC did not respond and at the time was alerting Local (LC) as to the location of the PA46 when they observed the aircraft taxiing onto Runway 30L at Delta. GC instructed the PA46 to contact LC. LC instructed the PA46 to exit the runway for a wake turbulence hold. No conflicts reported.	Human Factors	No
92 RWS	08-2011	D	VMC Daylight	Vehicle/ Pedestrian	Runway 30R at Taxiway N	An airport vehicle requested to cross Runway 30L and 30R at Taxiway November. Ground (GC) needed to confirm location of the vehicle and asked to verify position. The vehicle operator seemed to be unsure of location based on transmission heard by GC. GC visually observed a vehicle holding short of Runway 30R at November and instructed the driver to hold short of 30R at November. The vehicle driver asked GC to repeat last transmission. GC repeated the hold short instructions for 30R which were read back correctly. GC coordinated with Local (LC) to cross both runways and went back to give crossing clearance when they observed the vehicle had entered Runway 30R at November without clearance. No conflicts reported.	Human Factors	Yes

93 RWS	10-2011	D	VMC Daylight	Air Carrier	Runway 30R at Taxiway H	A CANADAIR CRJ7 was issued taxi instructions by Ground (GC) to Runway 30R via Taxiways Hotel and Yankee. The CRJ7 then entered Runway 30R at Hotel without authorization and GC instructed the pilot to stop then to exit the runway. No conflicts reported.	Human Factors	No
94 ASRS	12-2011	D	Night	Air Carrier	Runway 30R and NE Cargo apron	B737-7 First Officer describes bright temporary lights set up on the northeast side of the airport (cargo ramp) pointed/angled at the displaced threshold for RUNWAY 30R that was very bright and distracting. Appeared to be conducting a temporary sort operation. First officer notes that the light affected his vision for several minutes after takeoff.	Environment not weather related, human factors	Yes NOTAM 2011-12064, 12063, 12062,
95 ASRS	03-2012	D	VMC Night	Corporate	Taxiway V And Taxiway W (north end of 11/29)	After exiting RUNWAY 30L onto TAXIWAY J, a Lear 45 is cleared to taxi to the FBO via TAXIWAY V. The pilot was approaching the TAXIWAY V signage and turned left before reaching the sign and inadvertently turned on, what the pilot believes now, is TAXIWAY W1 which the NOS chart at the time showed as RUNWAY 11/29. This is now a new taxiway which parallels TAXIWAY V (W1). The chart needs to be updated. The yellow line turns left onto TAXIWAY W. The pilot was confused as he had apparently already passed the sign for TAXIWAY W when given the clearance and thought the first taxiway to the left would have been TAXIWAY V. Pilot subsequently realized that he should have passed the taxiway sign before turning. Pilot noted that painting the letter of each taxiway onto the pavement as a potential mitigation effort to the runway safety action team and noted that this action was deemed too expensive. Pilot believes this idea would have helped in this case at SJC where there are two parallel taxiways.	Human Factors	Yes NOTAM 2011-12064, 12063, 12062,
96 ASRS	05-2012	C	Not Noted	Personal/ General Aviation	Runway 30L at Taxiway D	A Cessna 340 was instructed to taxi to RUNWAY 30L via TAXIWAYS V, C and W and the pilot read back the clearance correctly and proceeded to turn onto TAXIWAY D and entered the engine run-up area at TAXIWAY D at W. After run-up, pilot was instructed to follow TAXIWAY W to RUNWAY 30L. The aircraft taxied straight ahead to RUNWAY 30L at the intersection with TAXIWAY D and crossed the hold line with a B737 over Runway 30L at TAXIWAY C at roughly 50 feet. B737 instructed to go around. The C340 pilot believed he was cleared to taxi into position on RUNWAY 30L while controller indicated he was cleared to taxiway to RUNWAY 30L.	Human Factors	No

97 RWS	06-2012	D	VMC Daylight	Air Carrier	Runway 12L	E135 received Line Up and Wait (LUAW) instructions for Runway 12. Read back was correct. E135 departed without a takeoff clearance and later queried LC as to whether they were cleared for takeoff or not. No loss of separation or conflicts with other aircraft.	Human Factors	No
98 RWS	06-2012	D	VMC Daylight	Personal/ General Aviation	Taxiway V at Taxiway C	C177 received clearance from Clearance Delivery. Without contacting Ground Control (GC) C177 proceeded on Taxiway Victor to Taxiway Charlie. C177 did not respond to repeated calls on all operational SJC frequencies. Eventually, C177 established contact with GC. Pilot in command claimed he had been given taxi clearance from 118.0.	Human Factors/Procedural	Yes NOTAM 2012-06037, 06014
99 RWS	10-2012	C	VMC Daylight	Air Carrier	End of Runway 30R	B737 was put in position by Local Control (LC) on Runway 30R at the full length (Taxiway Alpha 1). Second B737 was on a 4-mile final to land Runway 30R. After a corporate jet exited Runway 30R, the B737 in position was issued takeoff clearance with the arriving B737 now "just inside 2-mile final." Loss of runway separation resulted when LC allowed the landing B737 to cross the runway threshold as the departing B737 was airborne and an estimated 5000 feet (6000 feet required) from the runway threshold. In consideration of potential conflicting over flight traffic, LC did not issue go around instructions and allowed the B737 to land with less than minimum runway separation. Closest proximity was estimated at 5000 feet.	Procedural	Yes
100 RWS	11-2012	D	VMC Daylight	Corporate	Runway 30L and Taxiway B	LJ55 was taxied from transit parking on the west side of the airport to Runway 30L for departure. Local Control (LC) initially instructed the LJ55 to hold short of Runway 30L for landing traffic, followed shortly thereafter by a clearance to Line Up and Wait (LUAW) Runway 30L. LJ55 read back the LUAW instruction correctly and taxied onto Runway 30L from Taxiway Bravo. LC was conducting a position relief briefing and did not observe the LJ55 departing until the aircraft was airborne. LJ55 departed without receiving a takeoff clearance and was instructed to maintain visual separation with traffic departing from Runway 30R. Visual separation was applied to prevent a loss of separation with the airborne parallel runway departure.	Human Factors	No
101 RWS	12-2012	C	VMC Night	Personal/ General Aviation	Runway 30R at Taxiway C	SR22 landed Runway 30R and after exiting at Taxiway Hotel was instructed to taxi via Taxiway Yankee and hold short of Runway 30R at Taxiway Delta and remain on Local Control (LC2) frequency. Pilot read back both taxi and hold short instructions correctly. After pilot advised LC2 of destination parking, LC2 issued instructions to hold	Human Factors	No

						short of Runway 30R at Taxiway Charlie which was read back correctly. At Taxiway Charlie, the SR22 turned right and crossed the Runway 30R hold bars without authorization with E135 on short final to Runway 30R. The SR22 did not cross the runway edge lines. Taxiway Charlie crosses the displaced portion of Runway 30R approximately 2300 feet north of the displaced approach end and 200 feet south of the displaced threshold. To ensure separation, go around instructions were issued to the E135 which did not overfly the SR22. Low Cost Ground Surveillance (LCGS) was cited by controllers in assisting in detecting this night time incursion.		
102 RWS	05-2013	D	VMX Daylight	Personal/ General Aviation	Runway 30R at TXY D vicinity	C172 called from the north and was instructed to make right traffic Runway 30R. Read back was correct. Local Control (LC) issued subsequent landing clearance on Runway 30L with wake turbulence caution due to a prior B737 landing Runway 30L which the C172 reported in sight. Read back was correct. C172 landed on Runway 30R without authorization. Air Traffic Control (ATC) reports in scanning for the C172 and sighting the aircraft short final the pilot appeared to be aligned for Runway 30L and then at an estimated 100 feet began to veer right and landed Runway 30R. No conflicts. **Wrong runway landing.**	Human Factors	No
103 ASRS	07-2013	C	VMC Night	Corporate	At 30R hold position and Taxiway A	Challenger 300 was cleared to taxi to RUNWAY 30L and at the hold short line was cleared by ATC to cross RUNWAY 30L, specifically, "cleared to cross 30L and sort of angle to the right across to hold short of RUNWAY 30R at TAXIWAY A". Pilot taxied per instruction but misidentified a TAXIWAY A sign on the far side of the runway and taxied across the hold short line for 30R by approximately one plane length. (The appropriate TAXIWAY A sign required a hard 90-degree right turn to see the sign and once past the RUNWAY 30L hold line the sign is not easily visible. Pilot notes limited distance between RUNWAY 30L and RUNWAY 30R hold lines and that ATC instruction was not standard. Pilot focused on looking for TAXIWAY A sign, and not on the location of hold lines.	Human Factors	Yes NOTAM-2013 07013, 07012
104 RWS	08-2013	D	VMC Daylight	Personal/ General Aviation	Taxiway D and Runway 30R	DA42 was taxied to Runway 30R at Taxiway Charlie across Runway 30L. DA42 turned onto Taxiway Delta by mistake. Ground Control (GC) told DA42 to hold their position. GC then cleared the DA42 to cross Runway 30L at Taxiway Delta, hold short of Runway 30R at Taxiway Delta. Read back was correct. DA42 crossed Runway 30R at Taxiway Delta without authorization. Local Control had C525	Human Factors	Yes NOTAM-2013 08039, 08038, 08037, 08036, 08035,

						waiting for departure on Runway 30R at Taxiway Charlie. DA42 crossed approximately 950 feet in front of the C525.		
105 RWS	01-2014	D	VMC Daylight	Vehicle/ Pedestrian	Taxiway B and Runway 30R	Airport vehicle was on Taxiway Yankee and requested to cross Runways 30R and 30L to pick up FOD on Taxiway Bravo. Ground Control (GC) instructed the vehicle to cross Runways 30R and 30L on Taxiway Bravo. Vehicle proceeded across both runways and was observed driving on Taxiway Bravo, clear of Runway 30L, looking for the FOD. GC then observed the car proceed on Taxiway Bravo and cross Runways 30R and 30L without authorization. No conflicts.	Human Factors	No
106 RSAP & ASRS	05-2014	C	VMC Daylight	Personal/ General Aviation	Taxiway Y at Taxiway B	PA32 requested clearance for departure on RUNWAY 30L at TAXIWAY B and was instructed to cross RUNWAY 30L and line up and wait. Read back by pilot was correct. After crossing RUNWAY 30L Local Control cleared aircraft to depart RUNWAY 30L at TAXIWAY B. Again, read back was correct. PA32 crossed RUNWAY 30R, turned onto TAXIWAY Y and initiated takeoff. MD83 southbound on TAXIWAY Y alerted Local Control and the PA32 departure clearance is immediately cancelled. PA32 to MD83 proximity was 4,200 feet. **Aircraft takeoff from TAXIWAY Y**	Human Factors	No
107 RSAP	06-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway V north of Taxiway D	C172 entered TAXIWAY V, north of TAXIWAY D without authorization from ATC. No conflict occurred as the aircraft did not cross the hold line or enter the runway.	Human Factors	No
108 RSAP	06-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30L	PA32 in the run-up area at TAXIWAY D and TAXIWAY W requests taxi clearance to departure and Ground Control instructs the pilot to taxi to RUNWAY 30L at TAXIWAY D. Read back was clipped (partially interrupted) but included RUNWAY 30L at TAXIWAY D. The PA32 crossed RUNWAY 30L on TAXIWAY D without clearance. No conflicts occurred. Reference is made in the report of this event involving Hotspot 2.	Human Factors/ Airfield Layout	No
109 RSAP & ASRS	06-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30L	C172 had been taxied to the run-up position at the intersection of TAXIWAY D and TAXIWAY W with Ground Control advising the C172 to remain on the frequency and notify ATC when run-up was completed. C172 acknowledged the instructions. C172 completed their run-up and taxied to RUNWAY 30L hold short marking at TAXIWAY D without clearance. No conflicts occurred. Hotspot 2 is referenced in the report.	Human Factors/ Airfield Layout	No
110 RSAP	06-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway D at	M20K had been taxied to the run-up area at TAXIWAY D and TAXIWAY W and told to contact Ground Control upon completion of run-up. M20K acknowledged the instructions but when the run-up	Human Factors/	No

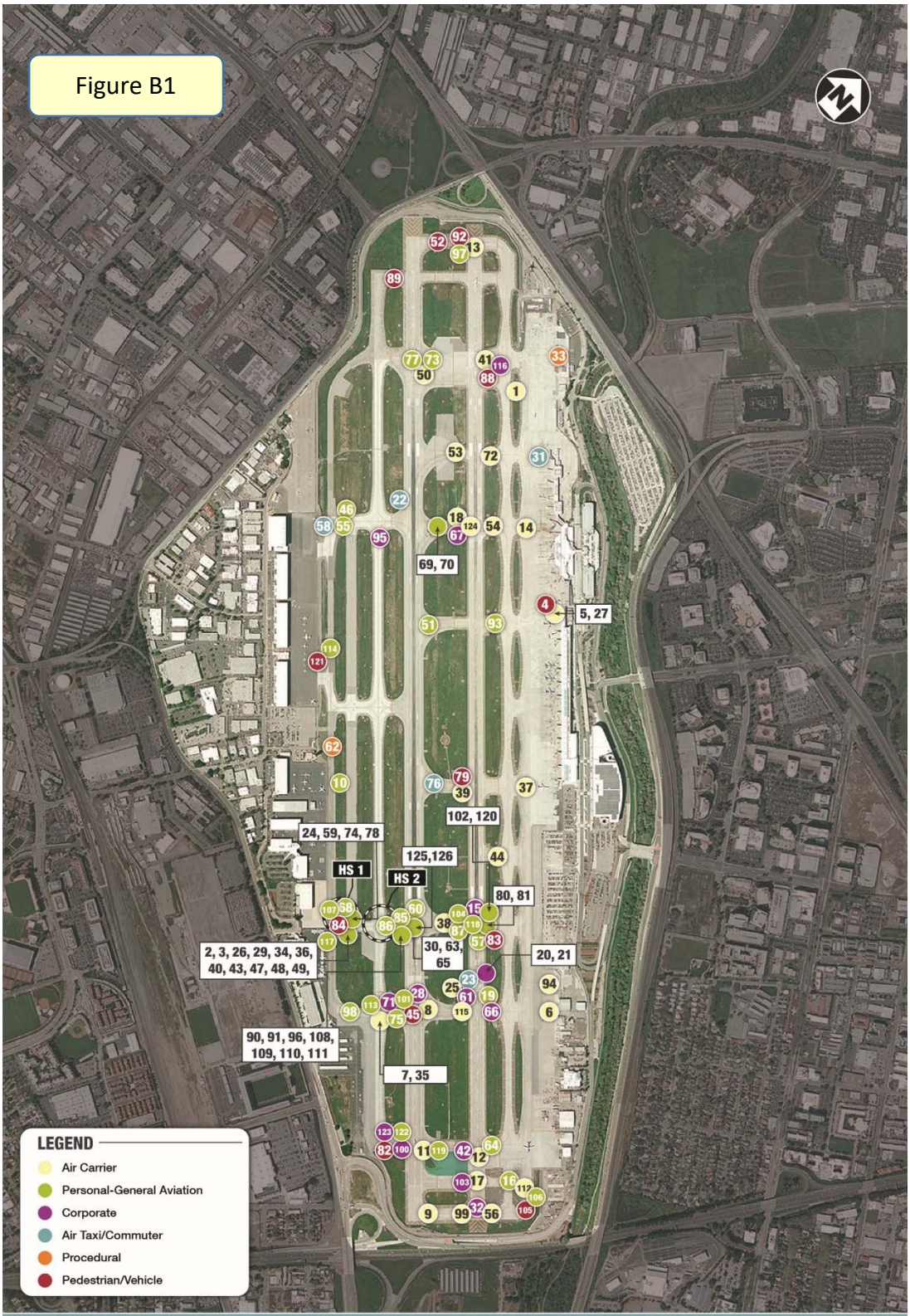
					Runway 30L	was completed taxied to RUNWAY 30L at TAXIWAY D and called Tower. No conflicts occurred and the aircraft did not cross the hold line. Hotspot 2 referenced as a contributing factor.	Airfield Layout	
111 RSAP	07-2014	C	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30L	P180 was instructed to taxi to RUNWAY 30L via TAXIWAY W and TAXIWAY D and to monitor Tower. Read-back was correct. P180 taxied onto RUNWAY 30L without contacting Local Control and without a clearance and with a CRJ 900 on a two-mile final. P180 was cleared for takeoff and no conflicts arose.	Human Factors	No
112 ASRS and RSAP	07-2014	C	VMC Daylight	Air Carrier	Taxiway B at Runway 30R	A B737-800 was cleared to RUNWAY 30R via TAXIWAYS J and Y. Pilot read-back the instructions correctly. The aircraft taxied onto RUNWAY 30R at TAXIWAY B without clearance. No conflicts occurred.	Human Factors	Yes NOTAM-2014-July 07001, 07015,
113 ASRS & RSAP	10-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway C at Taxiway W	BE33 was cleared for takeoff on RUNWAY 30L at TAXIWAY C by Local Control and the pilot read-back "rolling on RUNWAY 30." BE33 then turned left onto TAXIWAY W and took off from the taxiway. Local Control attempted to cancel clearance, but determined it was safer to allow aircraft to continue to depart. No conflicts occurred. **Aircraft takeoff from TAXIWAY W.**	Human Factors	Yes NOTAM-2014-October 10006, 10012, 10013, 10016, 10017, 10019
114 RSAP	11-2014	D	VMC Daylight	Personal/ General Aviation	Taxiway V	C172 contacted Ground Control for approval to taxi. Ground Control queried the pilot on what his intentions were and then instructed the pilot to contact Clearance Delivery. After receiving a VFR clearance without re-contacting Ground Control the C172 entered TAXIWAY V without clearance. No conflicts occurred.	Human Factors	No
115 ASRS	11-2014	B	Daylight	Air Carrier	Not specific	B737 was cleared for takeoff and had accelerated to approximate taxi speed when they heard the tower clear another aircraft to cross the same runway. Takeoff was discontinued as the other aircraft had just begun to cross at the far end of the runway after landing on the parallel runway.	Procedure, Human Factors	No
116 ASRS & RSAP	12-2014	C	Daylight	Corporate	Runway 12L at Taxiway L	C560 (maintenance taxi) was instructed by Local Control to cross RUNWAY 12R at TAXIWAY L and hold between the RUNWAY 12R and RUNWAY 12L to conduct run-up. Read back was correct. The C560 crossed the RUNWAY 12L hold bars with a B737 in position and cleared for takeoff on RUNWAY 12L. Takeoff clearance for the B737 was cancelled prior to start of takeoff roll.	Procedure, Human Factors	No
117 ASRS	01-2015	D	VMC Daylight	Personal/ General Aviation	FBO Ramp to Runway 30L	A pilot did not comply with taxi instructions at SJC. He interpreted "Victor, Delta, Charley, and Bravo to 30L", as meaning "Pass Delta to Charley the way we always used to go." Ground Control called and asked why he did not follow his directions. Contributing factor	Human Factors	Yes NOTAM-2015-01-

						was that charts still showed RUNWAY 11/29 in existence at the time despite the runway being closed. Deviation from Tower taxi instructions.		January 01207
118 RWS	02-2015	C	VMC Daylight	Personal/ General Aviation	Runway 30R vicinity of TXY D	SR22 was cleared to land Runway 30L. Read back was correct. SR22 landed Runway 30R. SWA383/B737 was within a mile final to Runway 30R was changed to Runway 30L and landed Runway 30L without incident. **Wrong runway landing.**	Human Factors	Yes NOTAM-2015-02 February 02018
119 RSAP	08-2015	D	VMC Daylight	Personal/ General Aviation	Taxiway B between Runway 30R and 30L	A BE36 was cleared for takeoff on RUNWAY 30L at TAXIWAY B, but then stated that they needed to exit the runway. The BE36 entered TAXIWAY B between RUNWAY 30L and RUNWAY 30R, which was closed for construction (TAXIWAY B). No conflicts occurred.	Human Factors	Yes NOTAM-2015-08 August 08027, 08028
120 RSAP	10-2015	D	VMC Daylight	Personal/ General Aviation	Taxiway D at Runway 30R	A C195 was instructed to taxi to RUNWAY 30R via TAXIWAY D and cross RUNWAY 30L. Instructions were read-back correctly. C195 crossed the RUNWAY 30R hold bars at TAXIWAY D with a B737 holding in position on RUNWAY 30R waiting for takeoff clearance. No conflict occurred.	Human Factors	Yes NOTAM-2015-10 October 10001, 10002, 10077, 10084
121 RSAP	01-2016	D	VMC Daylight	Vehicle/ Pedestrian	Taxiway V	An unauthorized pedestrian entered the movement area on TAXIWAY V abeam the Signature Ramp, while assisting a helicopter departing from the ramp. Rotor-wash from the helicopter departure blew debris onto TAXIWAY V and the pedestrian ran onto the taxiway to retrieve the debris. No conflict occurred.	Human Factors	Yes NOTAM-2016-01 January 01008, 01014
122 ASRS	03-2016	D	VMC Daylight	Personal/ General Aviation	Taxiway B at Runway 30L	A C206 called ATC indicating they were ready to depart at RUNWAY 30L. After a short delay for traffic, Local Control instructed the aircraft "RUNWAY 30L, intersection BRAVO, line up and wait." Pilot read-back was correct, however the C206 taxied onto RUNWAY 30L and departed without clearance. No conflicts occurred.	Human Factors	Yes NOTAM-2016-03 March – 03049, 03071, 03074, 03086,
123 RWS	04-2016	D	VMC Daylight	Corporate	Runway 30L at Taxiway B	Local Control instructed a LJ35 to line up and wait on Runway 30L at Taxiway Bravo. Read back was correct. LJ35 departed without a clearance. No conflicts.	Human Factors	Yes NOTAM-2016-04 April 04031, 04032, 04033, 04034,

								04038, 04044, 04055, 04068,
124 RWS	05-2016	C	VMC Daylight	Air Carrier	Runway 30R and Taxiway J	A/C 1 a B737 landed Runway 30L and exited at the intersection of Juliet and crossed the Runway 30R hold bars before coming to a stop. A/C 2 a B738 was on departure roll on runway 30R. Local Control instructed the B738 to abort. Separation was lost when the B737 crossed the Runway 30R hold bars. Closest proximity approximately 4600 feet lateral. The B738 exited Runway 30R at intersection Hotel prior to Intersection Juliet.	Human Factors	Yes NOTAM-2016-05 May 05012, 05027
125 RWS	09-2016	D	VMC Daylight	Personal/ General Aviation	Runway 30L vicinity of TXY D	A/C 1 was cleared to land on Runway 30R. Pilot read back was correct. A/C 1 landed on runway 30L. No conflicts. Not a hot spot event. Wrong Runway Landing/Runway Confusion. **Wrong runway landing.**	Human Factors	No
126 ASRS	11-2016	C		Personal/ General Aviation	Runway 30L vicinity of TXY D	A Beechcraft Bonanza as performing pattern work and was on a right base, when asked if he had a visual of a Citation departing Runway 30L, Bonanza acknowledged, Bonanza was then cleared to land Runway 30L and Bonanza read-back instructions correctly. United B767 was told to line up and wait Runway 30R and they read back their instructions correctly. As the B767 was turning north to line up in the middle of the runway, they stopped the aircraft as the Bonanza flew overhead the aircraft and United informed ATCT. While all markings were inspected, and found to be acceptable, the 30R numbers had rubber deposits which could use some cleaning to make them more prominent. **Wrong Runway landing**.	Human Factors	No

Sources: Accident and Incident Database, Federal Aviation Administration Airport Safety Reporting System Database, National Aeronautics and Space Administration, Local-Runway Safety Action Plan Report, May 31, 2016, Federal Aviation Administration, Runway Safety Office Runway Incursion Report (RWS), Federal Aviation Administration, Western Pacific Region

Figure B1



SJC Incursion Incident Map
2000 - Present

Figure B2



SJC Incursion Incident Map
2000 - 2009

Figure B3



SJC Incursion Incident Map
2010 - Present

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
RUNWAY INCURSION MITIGATION/AIRFIELD DESIGN STANDARDS ANALYSIS

TECHNICAL MEMORANDUM:

IDENTIFICATION OF AIRFIELD DESIGN STANDARDS DEFICIENCIES

Kimley Horn Associates
October 26, 2016

Introduction

One of the goals of the SJC Runway Incursion Mitigation/Design Standards Analysis Study is to assess and address to the maximum extent practical, the physical or operational variances or "deficiencies" from FAA design standards in order to ensure a safe operating environment for both current and projected aircraft activity, including a reduced potential for runway incursion incidents. This technical memorandum presents an analysis of the conformity of the SJC airfield with the FAA's current design standards set forth in Advisory Circular 150/5300.13A, as most recently updated in 2014 (Change 1).

FAA design standards addressed in the report consist primarily of dimensional criteria for, and separation distances between, runways, taxiways, and other defined airfield pavement or safety areas. These standards vary considerably depending on the type of actual or projected aircraft utilizing those facilities. Standards for runways can also vary depending on the weather conditions under which they are allowed to operate. In instances where it is determined not feasible to meet a design standard, the FAA recognizes that deficiencies can be addressed through accepted "Modifications to Standards (MOS)" and/or specialized operational procedures for control and movement of aircraft on the ground, as long as an appropriate level of safety can be assured.

The basic components of the SJC airfield are its three parallel runways, conventionally aligned with prevailing wind patterns: 12R/30L and 12L/30R, both of which are 11,000 feet long and 150 feet wide, and 11/29, which is 4,600 feet long and 100 feet wide, but closed in 2009 for an interim period of time due to adjacent construction activity and converted to an interim taxiway (W-1). Currently supporting the runways are 5 parallel taxiways (Y and Z to the east of Runway 12L/30R, and V, W, and interim W-1 to the west of Runway 12R/30L), and 14 cross taxiways (A-1, A, B, C, D, E, F, G, H, J, K, L, M, N) which intersect one or more of the three runways. The airfield ramps on the east side of the Airport serve air carrier and cargo airline activity, passenger terminals, and associated landside facilities, while the ramps on the west side of the Airport serve general aviation activity and associated facilities.

This airfield geometry is affected by two key factors. First, SJC cannot physically expand beyond its boundaries due to the presence of freeways, a river, and urban development on all sides. The 1,000 acres comprising the entire airport make SJC one of the physically smaller medium hub airports in the nation. Second, as aviation demand has evolved over time, and most notably within the last decade, SJC has been attracting larger commercial airline aircraft, and larger and higher-performing corporate general aviation aircraft, than were assumed at the time most of the existing airfield facilities were originally constructed. The design standards deficiencies identified in the following sections of this memorandum, and the potential measures to be formulated to address these deficiencies, relate to one or both of these key factors.

Determination of Applicable Design Standards

Assessing the conformity of airfield facilities to the appropriate design criteria requires the determination/validation of the characteristics of a "design aircraft". The "Design Aircraft" is an aircraft with characteristics that determine the application of airport design standards for a specific runway, taxiway, taxilane, apron, or other facility. This aircraft can be a specific aircraft model or a composite of specific characteristics from several aircraft using, expected, or intended to use the airport or part of the airport. The design aircraft is sometimes also referred to as the "critical aircraft" or "critical design

aircraft". **Table 1** summarizes the aircraft characteristics that relate to airfield design criteria and elements.

Table 1 - Airplane Characteristic and Design Element	
Aircraft Characteristic	**Airfield Design Element**
Wing-Span and Tail Height	Taxiway and Apron Object Free Area, Taxiway to Runway and Taxiway to Taxiway Separation, Aircraft Parking Configuration and Hangar Location
Approach Speed	Runway Safety Area, Runway Object Free Area, Runway Protection Zones, Runway Width, Runway to Taxiway Separation, Runway Centerline to Fixed or Moveable Object
Landing and Takeoff Distance	Runway Length
Cockpit to Main Gear Length	Fillet Design, Parking Layout, Apron Area
Main Gear Width	Taxiway Width and Fillet
Source: FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*	

For most design standards, the design aircraft is expressed as a letter and roman numeric code, the letter referring to an Airport Approach Category (AAC) and the number referring to an Airplane Design Group (ADG). Aircraft are also classified into one of eight Taxiway Design Groups (TDG), which are based on the distance between the cockpit of the aircraft and its main landing gear and the width between the main landing gear on an aircraft.

The selection of a design aircraft is based on the most critical aircraft operating, or projected to operate, on the airfield facility, the activity threshold of that aircraft type being either 500 or more annual itinerant operations or used in scheduled commercial service (FAA Order 5090.3C). Additionally, airports, such as SJC, that have multiple runways can have different design aircraft for different runways. **Table 2** and **Table 3** display the Airplane Design Group and Aircraft Approach Category groupings.

Table 2 - Airplane Design Groups		
Group No.	**Wingspan (ft. [m])**	**Tail Height (ft. [m])**
I	Less than 49' (15 m)	Less than 20' (6 m)
II	49' (15m) but less than 79' (24 m)	20' (6 m) but less than 30' (9 m)
III	79' (24 m) but less than 118' (36 m)	30' (9 m) but less than 45' (13.5 m)
IV	118' (36 m) but less than 171' (52 m)	45' (13.5 m) but less than 60' (18.5 m)
V	171' (52 m) but less than 214' (65 m)	60' (18.5 m) but less than 66' (20 m)
VI	214' (65 m) but less than 262' (80 m)	66' (20 m) but less than 80' (24.5 m)
Source: FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*		

Table 3 – Aircraft Approach Categories	
Approach Category	**Speed**
A	Speed less than 91 knots
B	Speed 91 knots or more but less than 121 knots
C	Speed 121 knots or more but less than 141 knots
D	Speed 141 knots or more but less than 166 knots
E	Speed 166 knots or more
Source: FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*	

For SJC Runways 12R/30L and 12L/30R, the Airport Layout Plan (ALP), as last updated in 2014, identifies the current and future design aircraft as the B767-400, a D-IV aircraft. For SJC Runway 11/29, historically a visual runway limited to non-jet aircraft, the ALP identifies the design aircraft more broadly as B-II rather than a specific aircraft.

The design aircraft for each runway is also used in combination with visibility minimums (displayed in **Table 4**) to designate a Runway Design Code (RDC) for each end of the runway. As identified on the ALP, the RDC is currently D-IV-2400 for Runway 12R/30L, D-IV-4000 for Runway 12L/30R, and B-II-5000 for Runway 11/29.

Table 4 - Visibility Minimums for Airfield Design Criteria	
Runway Visual Range (Horizontal Visibility in feet)	**Instrument Flight Visibility Category (statute mile)**
5,000	Not lower than 1 mile
4,000	Lower than 1 mile but not lower than ¾ mile
2,400	Lower than ¾ mile, but not lower than ½ mile
1,600	Lower than ½ mile but not lower than ¼ mile
1,200	Lower than ¼ mile
Source: FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*	

It is significant to note that SJC currently has scheduled airline service by D-V aircraft (e.g., B787 and A340). Thus, this design standards conformity analysis evaluates both D-IV and D-V as design aircraft for Runways 12R/30L and 12L/30R and associated airfield facilities.

Runway Design Standards

For reference runway design standard elements for SJC are graphically depicted in **Figure 1** and **Figure 2.**

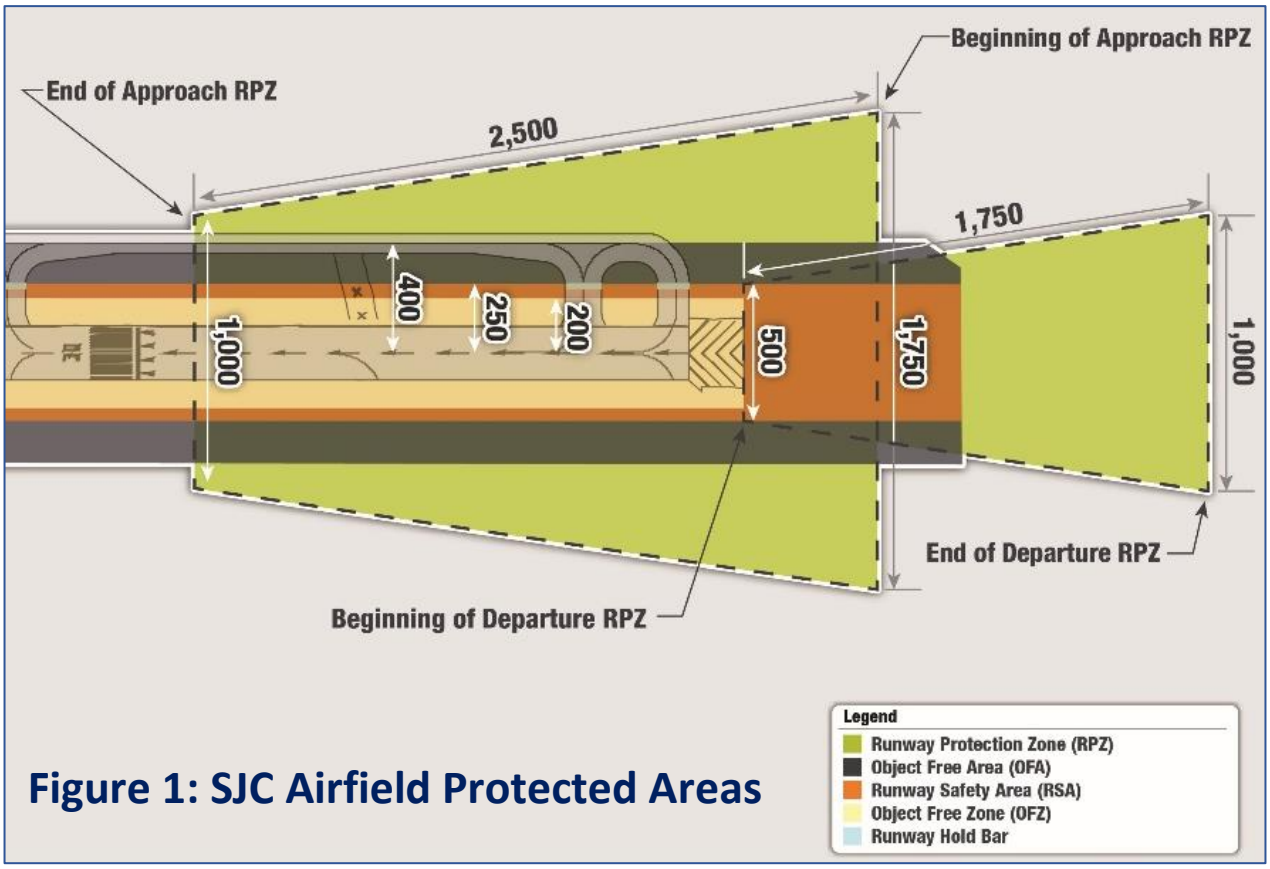


Figure 1: SJC Airfield Protected Areas

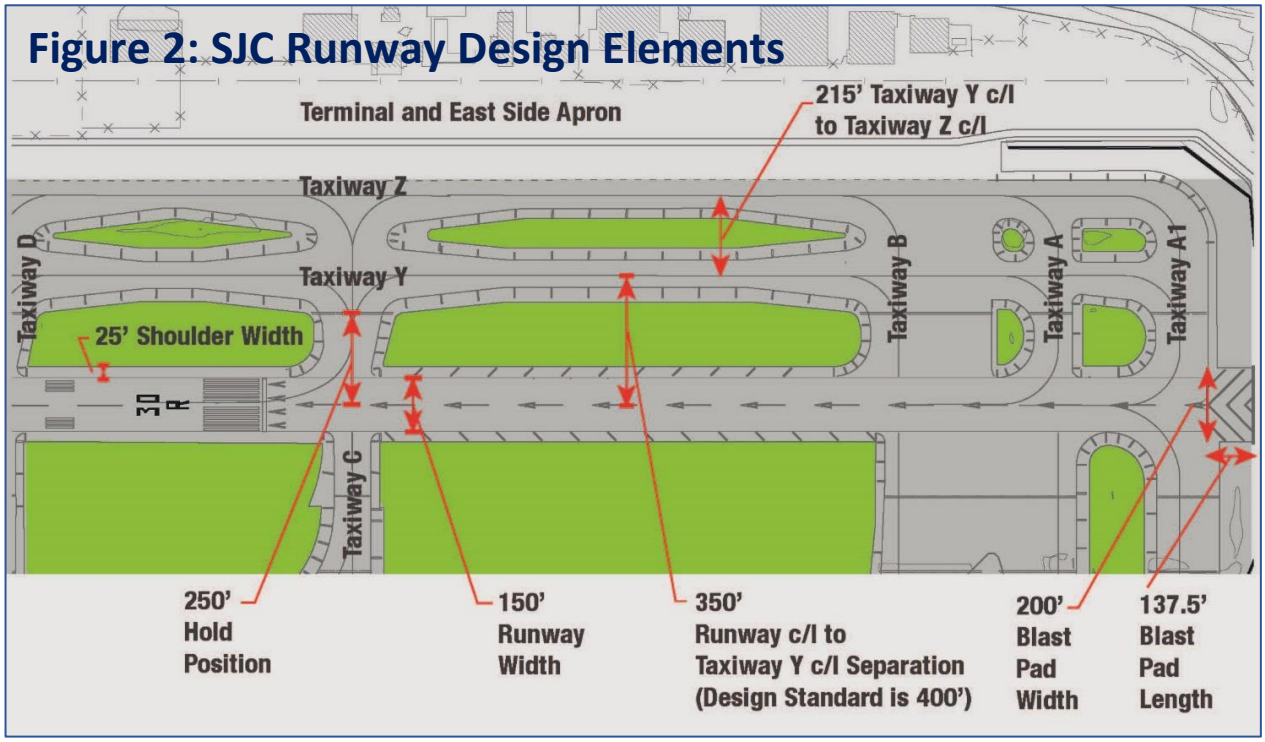


Figure 2: SJC Runway Design Elements

Using the runway design criteria that has been summarized in this section, the runway systems, including the currently closed alignment of Runway 11/29, were evaluated based on the runway design code for each runway and the current design aircraft for the airport. Because the airport has experience activity by aircraft in design group V these criteria have also been identified in the runway assessment. **Tables 5-7** present the conformity analysis of the runway design standards requirements vs actual existing conditions for each of the SJC runways.

Table 5 - Runway 12L-30R
Design Aircraft: D-IV (B767-400) & D-V

Design Standard	Design Dimension	Actual Dimension	Notes
Runway width	**150 feet**	**150 feet**	
Runway Centerline to parallel runway centerline	**700 feet**	**700 feet**	
Runway centerline to parallel taxiway (TXY-Y) centerline	**400 feet**	**350 feet**	**1**
Runway centerline to aircraft holding position on taxiways	**250 feet (D-IV)** **280 feet (D-V)**	**250 feet** (for all cross taxiways)	
Runway Object Free Area width	**800 feet** **(D-IV, D-V)**	**800 feet** (both ends)	
Runway Safety Area width	**500 feet** **(D-IV, D-V)**	**500 feet** **(D-IV, D-V)**	**2**
Runway Safety Area undershoot Length	**600 feet** **(D-IV, D-V)**	**600 feet** **(D-IV, D-V)**	**2**
Runway Safety Area overrun length	**1,000 feet** **(D-IV, D-V)**	**1,000 feet** **(D-IV, D-V)**	**2**
Runway Blast Pad width	**200 feet ADG-IV** **220 feet ADG-V**	**12L – 200 feet** **30R – 200 feet**	
Runway Blast Pad length	**200 feet ADG-IV** **220 feet ADG-V**	**12L – 146 feet** **30R – 143 feet**	**3**
Runway Shoulder Width	**25 feet ADG-IV** **35 feet ADG-V**	**25 feet**	

Notes:
1. ALP notes that Group V aircraft are accommodated with operational restrictions applied during taxiing to maintain separation requirements.
2. RSA conformity off at ends of runway achieved through application of declared distances.
3. Blast Pad Length addressed by blast barrier at 30L end of, and extending beyond, blast pad

Source: AC 150/5300.13A, Change 1 Airport Design Guide, SJC Airport Layout Plan, FAA records

Table 6 - Runway 12R-30L
Design Aircraft: D-IV (B767-400) & D-V

Design Standard	Design Dimension	Actual Dimension	Notes
Runway Width	**150 feet**	**150 feet**	
Runway centerline to parallel runway centerline	**700 feet**	**700 feet**	
Runway centerline to parallel taxiway (TXY-W) centerline	**400 feet** **500 feet ADG-V in CAT-II**	**400 feet**	
Runway centerline to aircraft holding position	**250 feet (D-IV)** **280 feet (D-V)**	**250 feet** (all cross taxiways)	
Runway Object Free Area width	**800 feet** **(D-IV, D-V)**	**500 feet** (both ends)	**1**
Runway Safety Area Width	**500 feet**	**500 feet**	
Runway Safety Area undershoot length	**600 feet**	**600 feet**	**2**
Runway Safety Area overrun length	**1,000 feet**	**1,000 feet**	
Runway Blast Pad width	**200 feet ADG-IV** **220 feet ADG-V**	**220 feet -12R** **220 feet - 30L**	
Runway Blast Pad length	**200 feet ADG-IV** **220 feet ADG-V**	**220 feet -12R** **51 feet – 30L**	**3**
Runway Shoulder Width	**25 feet ADG-IV** **35 feet ADG-V**	**35 feet**	

Notes:
1. OFA deficiency identified on ALP as approved Modification to Standard.
2. RSA length conformity achieved through application of declared distances
3. Blast Pad Length addressed by blast barrier at 30L end of, and extending beyond, blast pad

Source: AC 150/5300.13A, Change 1 Airport Design Guide, SJC Airport Layout Plan, FAA records

Table 7 - Runway 11-29
Design Aircraft: B-II

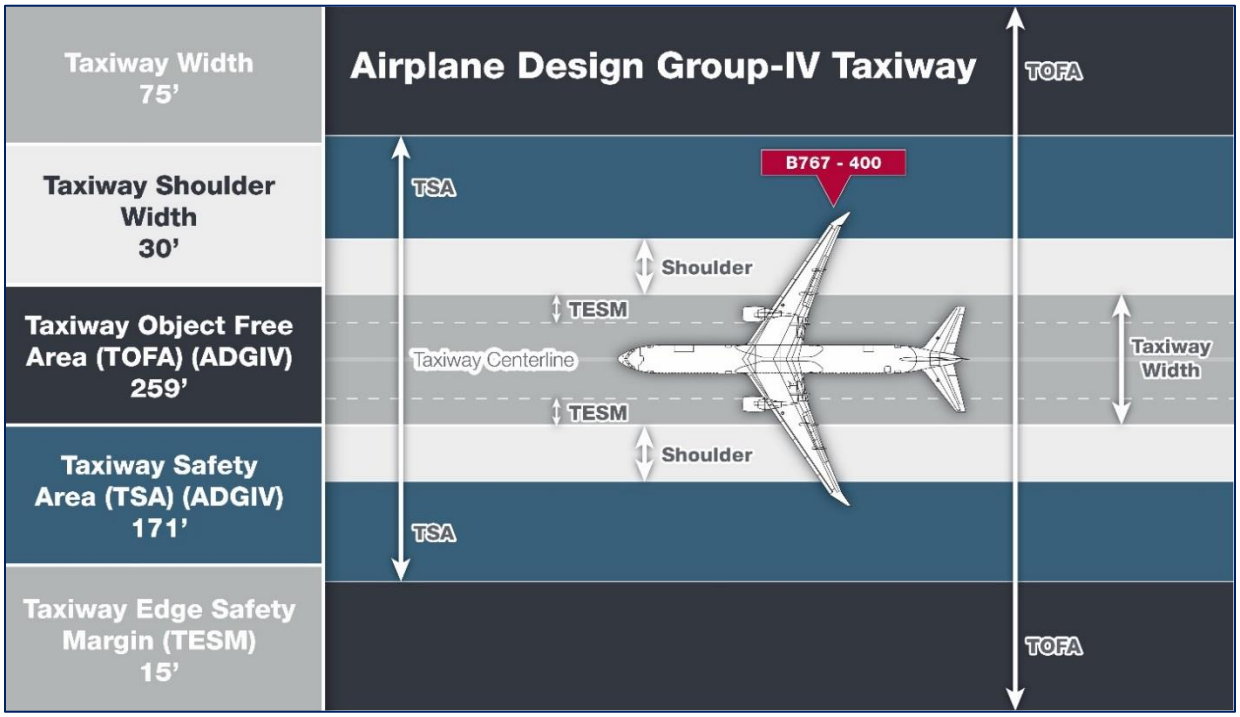
Design Standard	Design Dimension	Actual Dimension	Notes
Runway width	**75 feet**	**100 feet**	
Runway centerline to parallel runway centerline	**700 feet**	**700 feet**	
Runway centerline to parallel taxiway (TXY-W) centerline	**240 feet**	**300 feet – TXY W** **220 feet south of TXY F** **232.5 feet north of TXY F**	**1**
Runway centerline to aircraft holding position	**200 feet**	**125 feet**	**2**
Runway Object Free Area width	**500 feet**	**500 feet**	

Design Standard	Design Dimension	Actual Dimension	Notes
Runway Safety Area Width	**500 feet**	**500 feet**	
Runway Safety Area undershoot length	**300 feet**	**300 feet**	
Runway Safety Area overrun length	**300 feet**	**300 feet**	
Runway Blast Pad width	**95 feet**	**None -RWY 11** **None – RWY 29**	
Runway Blast Pad length	**150 feet**	**None -RWY 11** **None – RWY 29**	**3**
Runway Shoulder width	**10 feet**	**10 feet**	
Notes: 1. Operational restriction with maximum allowable wingspan limitation in place to address this issue. 2. Operational restrictions applied by ATCT for B-II and large A-1/B-1 aircraft. 3. Runway 11/29 is limited to propeller and turbo-prop aircraft only.			
Source: AC 150/5300.13A, Change 1 Airport Design Guide, SJC Airport Layout Plan, FAA records			

Taxiway Design Standards

Figure 3 depicts taxiway design standards for ADG-IV and Taxiway Design Group (TDG) 4 for reference. Taxiway design standard elements for SJC, and the conformity analysis of requirements vs actual existing conditions, are presented in **Table 8 through Table 12**. Criteria associated with taxiway separation from other taxiways and separation from objects along with protected areas around the taxiway are defined based on the airplane design group of the aircraft routinely operating or anticipated to operate on the taxiway. Criteria that establish required taxiway width, taxiway edge safety margins and taxiway shoulder widths are based upon the aircraft's landing gear configuration.

Figure 3: Airplane Design Group (ADG) – IV Taxiway Design Standards



Using the taxiway criteria summarized above in this section, the system of taxiways on the airfield were evaluated based on the runway design code for each runway and the current design aircraft for the airport. For Taxiway W, Y and Z criteria associated with both ADG-IV and ADG-V has been included. In the case of taxiways on the west side of the airport that are intended to serve corporate and general aviation aircraft and not intended for commercial air carriers, Design Group II criteria was applied to Taxiway V and connector taxiways between Taxiway V and interim Taxiway W1 (former Runway 11/29) consistent with the RDC-II designation when it operated as a runway.

The review identified no deficiencies on the system of connector taxiways between the airport runways and the parallel taxiways. The assessment did identify a limited number of non-standard conditions on the parallel some parallel taxiway most of which have been addressed though MOS and operational procedures. **Tables 8, 9, 10, 11, and 12** show the results of the standards analysis for the five parallel taxiways starting with Taxiway V on the west side and including interim Taxiway W1.

Table 10 - Taxiway Victor (V)
Design Aircraft: ADG-II

Design Standard	Design Dimension	Actual Dimension	Notes
Taxiway width (Taxiway Design Group II)	**35 feet**	**50 feet**	**1**
Taxiway shoulder width	**15 feet**	**Varies from 0 to 20 feet**	
Taxiway centerline to parallel taxiway centerline	**105 feet (ADG II)**	**Varies – 220 feet and 232.5 feet**	
Taxiway Safety Area width	**79 feet – (ADG-II)**	**77 feet**	
Taxiway Object Free Area width	**131 feet – (ADG-II) 89 feet – (ADG-I)**	**101 feet – (ADG II) 82 feet – (ADG-I)**	
Taxiway Edge Safety Margin	**7.5 feet**	**7.5+ feet**	
Taxiway Wingtip Clearance	**26 feet (ADG II)**	**24 feet (ADG-II)**	

Notes:
1. Taxi Design Group 2 (TDG) is based off the current fleet of general aviation aircraft in design group II observed to operate at SJC. TDG is based on the width of the main gear landing width and distance from the cockpit to main gear.

Source: AC 150/5300.13A, Change 1 Airport Design Guide, SJC Airport Layout Plan, FAA records

Table 11 - Taxiway Whiskey 1 (W1)
Design Aircraft: ADG-II

Design Standard	Design Dimension	Actual Dimension	Notes
Taxiway Width	**35 feet for TDG 2**	**100 feet**	

Design Standard	Design Dimension	Actual Dimension	Notes
Taxiway Shoulder Width	**15 feet**		
Taxiway centerline to parallel taxiway centerline	**105 feet**	**220/232.5 feet – TXY V** **300 feet Taxiway W**	
Taxiway Safety Area width	**79 feet**	**79 feet**	
Taxiway Object Free Area Width	**131 feet – (ADG-II)**	**131 feet south of TXY G** **186 feet north of TXY G**	
Taxiway Edge Safety Margin	**7.5 feet**	**7.5 feet**	
Taxiway Wingtip Clearance	**26 feet**	**>26 feet**	
Notes: N/A			

Table 12 - Taxiway Whiskey (W)
Design Aircraft: D-IV (B767-400) & D-V

Design Standard	Design Dimension	Actual Dimension	Notes
Taxiway Width	**75 feet for TDG 5**	**75 feet**	**1**
Taxiway Shoulder width	**30 feet**	**25 feet**	
Taxiway centerline to parallel Taxiway centerline	**215 feet (ADG IV)** **267 feet (ADG-V)**	**300 feet** **To W1**	
Taxiway Safety Area width	**171 feet – (ADG-IV)** **214 feet – (ADG-V)**	**171 feet** (both ends)	
Taxiway Object Free Area Width	**259 feet – (ADG-IV)** **320 feet – (ADG-V)**	**259 feet**	
Taxiway Edge Safety Margin	**15 feet**	**15 feet**	
Taxiway Wingtip Clearance	**44 feet (ADG IV)** **53 feet (ADG-V)**	**44 feet**	

Notes:
1. Taxi Design Group 5 accommodates the current fleet of air carrier and cargo aircraft at SJC, based on main gear width and distance from nose wheel to main gear.

Source: AC 150/5300.13A, Change 1 Airport Design Guide, SJC Airport Layout Plan, FAA records

Table 13 - Taxiway Yankee (Y)
Design Aircraft: D-IV (B767-400) & D-V

Design Standard	Design Dimension	Actual Dimension	Notes
Taxiway Width	**75 feet for TDG 5**	**75 feet**	**1**
Taxiway Shoulder width	**30 feet for TDG 5**	**35 feet**	
Taxiway centerline to parallel runway centerline	**400 feet (ADG IV)** **400 feet (ADG V)**	**350 feet**	**2**
Taxiway centerline to parallel taxiway centerline	**215 feet (ADG IV)** **267 feet (ADG-V)**	**215 feet**	

Design Standard	Design Dimension	Actual Dimension	Notes
Taxiway Safety Area width	**171 feet – (ADG-IV) 214 feet – (ADG-V)**	**171 feet**	
Taxiway Object Free Area Width	**259 feet – (ADG-IV) 320 feet – (ADG-V)**	**259 feet**	
Taxiway Edge Safety Margin	**15 feet**	**15 feet**	
Taxiway Wingtip Clearance	**44 feet (ADG IV) 53 feet (ADG-V)**	**44 feet**	

Notes:
1. Taxi Design Group 5 accommodates the current fleet of air carrier and cargo aircraft at SJC, based on main gear width and distance from nose wheel to main gear.
2. Group V aircraft are accommodated with operational restriction to taxi operations on Taxiway Y when Group V are operating on Runway 12L/30R.

Source: AC 150/5300.13A, Change 1 Airport Design Guide, SJC Airport Layout Plan, FAA records

Table 14 - Taxiway Zulu (Z)
Design Aircraft: D-IV (B767-400) & D-V

Design Standard	Design Dimension	Actual Dimension	Notes
Taxiway Width	**75 feet for TDG 5**	**75 feet**	**1**
Taxiway Shoulder width	**30 feet for TDG 5**	**35 feet**	
Taxiway centerline to parallel taxiway centerline	**215 feet (ADG IV) 267 feet (ADG-V)**	**215 feet**	
Taxiway Safety Area width	**171 feet – (ADG-IV) 214 feet – (ADG-V)**	**171 feet – TXT A1 to K, 167 feet TXY K north**	
Taxiway Object Free Area Width	**259 feet – (ADG-IV) 320 feet – (ADG-V)**	**259 feet**	
Taxiway Edge Safety Margin	**15 feet**	**15 feet**	
Taxiway Wingtip Clearance	**44 feet (ADG IV) 53 feet (ADG-V)**	**44 feet**	

1. Taxi Design Group 5 accommodates the current fleet of air carrier and cargo aircraft at SJC, based on main gear width and distance from nose wheel to main gear.

Source: AC 150/5300.13A, Change 1 Airport Design Guide, SJC Airport Layout Plan, FAA records

Existing Modifications to Standards

The first step in the analysis involved identifying existing Modifications to Design Standards (MOS) that have been approved in the past by the FAA to allow for a non-standard condition at SJC. MOS are granted on the basis that the variation from the specific design criteria or standard would not result in a lessening of operational safety. It should be noted that granting a MOS does not necessarily mean that the condition is allowed to exist in perpetuity. Many MOS approvals are granted with specific timeframes at the end of which the airport sponsor needs to bring the non-standard condition into conformity with the criteria. In cases where no timeframe is specified in the MOS, the FAA has begun to require airports to re-visit the circumstances surrounding the issuance of the MOS and re-validate

that the modification is still justified or if a more robust mitigation effort is needed. There are presently three approved airfield MOS in force at SJC that address non-standard conditions.

- In correspondence dated August 18, 1989 the acting manager of the Airports District Office responded to a request for a "*waiver*" (MOS) "*to maintain a 350' distance between runway 12L/30R and Taxiway 1 (current Taxiway Y) the eastside parallel taxiway for runways 12R/30L and 12L/30R*." In his response the acting manager noted that "*a waiver (MOS) is not required as this is the distance on the approved ALP.*" Based on the contents of the letter the airport was granted approval to maintain a 350' runway centerline to taxiway centerline separation in lieu of the required 400' of separation specified in the standards that were in force at the time, and continue in force today.

- The second listed MOS on the most current version of the Airport Layout Plan granted by a letter issued March 9, 1992 approved a 500' width for the Runway 12R/30L ROFA in lieu of the 800' required per then in force Advisory Circular 150/5300-13 Airport Design Guide. The 800' width criteria for a ROFA on this runway remains as the standard under the current version of the Airport Design Guide, (AC 150/5300-13A, Change 1).

- The third and final MOS listed on the most current Airport Layout Plan is associated with runway centerline to parallel taxiway centerline separation between the centerline of closed runway 11/29 and the alignment of Taxiway V to the west of the runway. The runway centerline to taxiway centerline separation for Runway Design Code (RDC) B-II-5000 is 240 feet. Separation between Runway 11/29 and Taxiway V is 220' south of Taxiway F and 232.5' north of Taxiway F. The modification was granted with the following operational restrictions:

  1. Runway 11/29 may be used by aircraft with wingspans of 65' or less (a limited design group II) and approach categories A, B, C, and D.
  2. Aircraft in approach categories D and C with wingspans greater than 65' cannot operate on Runway 11/29 while there is an aircraft on taxiway 4, (Taxiway V).

Conformity Findings and Issues

Table 15 below lists the current SJC airfield design standards deficiencies. In summary:

- Runways 12R/30L and 12L/30R each do not meet one design standard for D-IV aircraft (addressed through approved Modifications to Standards).
- Under D-V aircraft criteria, one additional design standard is not met by Runway 12R/30L and two additional design standards are not met by Runway 12L/30R.
- Runway 11/29, when operational, does not meet three design standards for B-II aircraft as well as for A-II and some A-I and B-I aircraft (addressed through an approved Modification to Standards).
- For the taxiway system, the majority of design standards deficiencies pertain to the two outside parallel taxiways (Z on the east side and V on the west side).

Table 8 - List of SJC Airfield Design Standards Deficiencies

Runway 12R/30L:	
• Object Free Area Width for D-IV & D-V (at both ends):	800’ required vs 500’ actual*
• Centerline to Holding Position for D-V (all cross taxiways):	280’ required vs 250’ actual
Runway 12L/30R:	
• Centerline to Parallel Taxiway Centerline for D-IV & D-V:	400’ required vs 350’ actual*
• Shoulder Width for D-V:	35’ required vs 25’ actual
• Blast Pad Width for D-V:	220’ required vs 200’ actual
Runway 11/29:	
• Centerline to Parallel Taxiway Centerline for A-I/B-I >12,500 lbs:	225’ required vs 220’ south of F
• Centerline to Parallel Taxiway Centerline for A-II/B-II:	240’ required vs 220’ south of F & 232.5’ north of F
• Centerline to Holding Position for A-I/B-I >12,500 lbs & A-II/B-II:	200’ required vs 125’ actual
Taxiways:	
• **Taxiway Z** Safety Area Width (centerline to landside ramp) for D-IV:	85.5’ required vs <81’ north of K
• **Taxiway Z** Safety Area Width (centerline to landside ramp) for D-V:	107’ required vs <107’ between H & K
• **Taxiway Z** Object Free Area Width (centerline to landside ramp) for D-IV:	129.5’ required vs <129’ north of H
• **Taxiway Z** Object Free Area Width (centerline to landside ramp) for D-V:	160’ required vs <140’ between A-1 & H
• **Taxiway Z** Centerline to Fixed or Movable Object (to landside ramp) for D-IV & D-V:	same as Object Free Area
• **Taxiway Z/Taxiway Y** Centerline Separation for D-V:	267’ required vs 215’ actual
• **Taxiway V** Safety Area Width (centerline to landside ramp) for ADG II:	39.5’ required vs 37.5’ actual south of ATCT
• **Taxiway V** Object Free Area Width (centerline to landside ramp) for ADG I:	44.5’ required vs 37.5’ south of ATCT
• **Taxiway V** Object Free Area Width (centerline to landside ramp) for ADG II:	65.5’ required vs 37.5’ south of ATCT
• **Taxiway V** Centerline to Fixed or Movable Object (to landside ramp) for ADG I & II:	same as Object Free Area
* *Deficiencies previously approved as Modifications to Standards for D-IV aircraft,*	

For Runways 12R/30L and 12L/30R and associated taxiways, the conditions addressed by the existing Modifications to Standards (MOS), i.e., reduced 12R/30L Object Free Area width and reduced 12L/30R separation from parallel Taxiway Y, remain in place. However, now that five international airlines are providing regularly-scheduled service at SJC with D-V aircraft (with such service likely to continue and potentially increase in the future), D-V has essentially become the appropriate ADG aircraft for these runways. Consideration may need to be given to expanding or adding MOS and operational measures to mitigate the associated design standards deficiencies. The operation of D-V aircraft also exacerbates the deficient Taxiway Z protection areas and separations on the landside ramp side, and

impact the separation between the Taxiways Y and Z centerlines, and the Taxiway Edge Safety Margin at two intersections (Z at A-1 and A).

A related but less significant implication of D-V aircraft is the recent establishment of a Category II ("CAT-II") approach capability for landings on Runway 30L. This approach capability facilitates landings at lower visibility minimums – horizontal visibility of 1,200 feet vs the 2,400-foot minimum for landings on Runway 12R and the 4,000-foot minimum for landings on 12L and 30R. When CAT-II landings are occurring, other aircraft cannot be held on the cross taxiway segments between 12L/30R and 12R/30L, nor be operating on parallel Taxiway W, due to insufficient separation. This impact may not be significant since other operations would already be restricted during CAT-II conditions.

It should also be noted that some design standards for Runways 12R/30L and 12L/30R have been met through alternative means. One example is Runway Safety Area length for ADG IV and V aircraft, which should extend 1,000 feet beyond the runway end. Since this was determined not feasible at SJC, "declared distances" have been established to shorten the length of runway pavement available for takeoffs and landings, and thereby meet the design criterion. Declared distances are established at many airports for this purpose and to mitigate other design standards. Another example is Blast Pad length for Runways 12R/30L and 12L/30R, which should be 400 feet for D-V aircraft. The existing 200-foot long pads (meeting the D-IV standard) extend to a vertical blast fence which directs jet blast from departing aircraft upward, thus mitigating the non-standard length.

For Runway 11/29 and its associated taxiways, the conditions addressed by the existing Modification to Standard, i.e., reduced separation from parallel Taxiway V, also remain in place. As long as 11/29 continues to be closed for runway operation, these design standards are not relevant. A permanent runway closure would also allow for consideration of the future of existing Taxiway V given its deficient protection areas and separations on its landside ramp side (particularly if 11/29 is permanently converted to a parallel Taxiway W-1 to potentially replace Taxiway V). If, however, 11/29 is reopened as a runway, the viability of the existing Modification to Standard may need to be reconsidered given the recent historical and projected trend toward larger and higher-performing general aviation aircraft operating at SJC that would have to bypass 11/29 to get to and from the commercial-length runways.

The preceding information will be used to identify potential actions to improve SJC design standards conformity and reduce the potential for runway incursion and other safety incidents. Those actions may involve the continuation or expansion of existing Modifications to Standards, developing additional Modification to Standards if justified, and the continuation, revision, or expansion of operational and procedural measures to mitigate design standards deficiencies.

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
RUNWAY INCURSION MITIGATION/AIRFIELD DESIGN STANDARDS ANALYSIS

TECHNICAL MEMORANDUM

SUMMARY OF UPDATED AVIATION ACTIVITY FORECASTS

Kimley Horn Associates
June 1, 2017

Introduction

The current Airport Master Plan for the Norman Y. Mineta San Jose International Airport (SJC) was last updated in 2010 using aviation demand forecasts for a horizon year of 2027. Given the age of these demand projections, and the need to retain a long-term planning horizon, the preparation of an updated set of demand forecasts is a necessary component of the SJC Runway Incursion Mitigation/Design Standards Analysis Study (RIM). The new updated aviation activity forecasts will be used in the analysis of airfield incursion mitigation and design conformity alternatives, and in turn be incorporated into updates of the SJC Airport Master Plan and Airport Layout Plan along with the recommended RIM study alternative.

This technical memorandum summarizes an extensive and detailed demand forecasting analysis prepared by the study consultant team and documented in a technical report which is available as an appendix. The forecasts are presented in 5-, 10-, 15-, and 20-year time increments, with the year 2037 serving as a new 20-year planning horizon. Each major segment of aviation activity (e.g., air passenger, air cargo, and general aviation) is analyzed separately using the most appropriate assumptions and methodologies as described in the technical report. For reference, **Table 3.1** below presents historical activity at SJC for the key activity components.

Table 3.1
Historical SJC Activity, 2000-2016

Year	Total Passengers	Cargo Tonnage	General Aviation Based Aircraft	Aircraft Operations				
				Passenger Airline	All-Cargo Airline	General Aviation	Military	Total
2000	13,097,196	163,096	316	141,880	5,986	139,000	206	287,072
2001	13,091,193	158,671	279	151,132	6,582	97,661	295	255,670
2002	11,115,778	154,522	218	136,466	5,103	65,836	105	207,510
2003	10,677,906	120,317	191	132,050	3,834	62,066	132	198,082
2004	10,733,532	119,914	175	133,056	3,610	61,523	125	198,314
2005	10,756,786	104,661	184	126,982	3,528	63,401	76	193,987
2006	10,708,065	101,045	172	127,030	3,452	57,883	97	188,462
2007	10,658,395	91,430	166	128,152	3,240	55,793	78	187,263
2008	9,717,717	81,222	151	118,366	2,884	51,253	73	172,576
2009	8,321,750	59,471	149	102,774	2,364	40,342	358	145,838
2010	8,249,136	49,363	136	90,542	1,984	30,691	273	123,490
2011	8,357,384	44,041	129	88,686	1,932	30,094	254	120,966
2012	8,296,174	41,817	123	86,314	1,540	31,324	251	119,429
2013	8,783,319	46,820	133	90,000	1,434	31,286	227	122,947
2014	9,385,212	53,286	133	91,604	1,546	30,796	192	124,138
2015	9,799,427	53,837	136	93,256	1,542	33,987	236	129,021
2016	10,796,725	60,360	137	103,280	1,616	33,743	276	138,915

Source: Norman Y. Mineta San Jose International Airport Activity Statistics

It should be noted that upon conclusion of the demand forecasting process, a subsequent analysis of airport capacity and facility requirements will be conducted to determine the extent to which the identified demand at SJC can be adequately accommodated.

Air Passenger Demand

Forecasts of commercial aviation activity begin with analysis of passenger enplanement demand, which includes domestic originations, international originations, and connecting passengers as separate elements of total enplanements. Forecast enplanements are then multiplied by two (to account for an assumed equal number of deplanements) to generate the forecast of total passengers.

Domestic Originating Passengers. The standard approach to forecasting domestic originations is to utilize regression analysis, a statistical method that tests the relationship of a range of socioeconomic variables to historical air passenger activity in order to develop a specific equation or model for forecasting future activity. Through this analysis, a regression model demonstrating the best statistical fit was selected, the key socioeconomic variables being:

- population and per capita income of a "SJC trade area" comprising Santa Clara County and adjacent Alameda, Monterey, San Benito, San Mateo, and Santa Cruz counties, using county population projections prepared by the State of California Department of Finance and county income projections prepared by the national economic forecasting firm of Woods & Poole;
- average air fares for SJC, using airline yield forecasts prepared by the FAA;
- U.S. unemployment rate, taken from an average of several sets of national forecasts.

In addition, given that SJC is one of three major airports serving the San Francisco Bay Area, an adjustment was made in the longer-term forecast horizon to account for some gradual spillover passenger demand from the greater Bay Area due to airfield capacity constraints at San Francisco International (SFO) and Oakland International (OAK) airports, as projected by FAA and as identified in regional studies.

International Originating Passengers. As international travel demand in the SJC trade area has historically been primarily served at SFO, the forecasting method for SJC international originations was based on a broader regression analysis that generated a regional demand for all three Bay Area airports combined, from which a percentage share was assigned to SJC. The model determined to be the best statistical fit for Bay Area international originations included world gross domestic product (GDP), dollar exchange rates, and average Bay Area international air fares as key variables. SFO is assumed to continue its role of a major international gateway airport for the Bay Area; however, SJC's share of that projected regional international demand is expected to increase slightly, from an estimated 6.7% in 2016 to 8.0% over the forecast horizon, thereby continuing a trend that is evidenced by new international service to both Asian and European markets that has emerged over the past several years.

Connecting and Other Passenger Enplanements. Through most of SJC's history, a small percentage of passenger activity has been connecting airline passengers, i.e., flying in on one flight and transferring to another flight, rather than originating at SJC. As SJC is expected to remain primarily an origin/destination airport without an airline hubbing operation, the forecasting analysis assumes that connecting passenger activity will remain at an estimated 4.1% of all SJC enplanements based on U.S. Department of Transportation data. In addition to connecting passengers, other enplanements include the relatively insignificant number of "non-revenue" airline passengers (approximately 1.4% of all enplanements).

Table 3.2 below presents the updated projections for air passenger demand at SJC, with actual activity in 2016 provided for reference. Key finding of the analysis are:

- Domestic originating passenger demand will increase from the almost 5.0 million served in 2016 to approximately 9.7 million in 2037, an annual compounded growth rate of 3.4%.
- International originating passenger demand will increase from just over the 0.5 million served in 2016 to more than 0.9 million in 2037, an annual compounded growth rate of 5.3%.
- Total passenger demand will increase from 10.8 million in 2016 to 22.5 million in 2037, an annual compounded growth rate of 3.6%.

Table 3.2
Projected SJC Air Passengers

Year	Domestic Originations	International Originations	Other*	Total Enplanements	Total Passengers
2016 Actual	4,955,062	334,713	87,658	5,377,433	10,796,725
2022	5,933,900	545,000	375,400	6,854,300	13,708,600
2027	6,762,700	655,000	429,900	7,847,600	15,695,200
2032	7,781,100	776,100	495,900	9,053,100	18,106,200
2037	**9,735,800**	**913,100**	**617,100**	**11,266,000**	**22,532,000**

* Connecting plus non-revenue passengers (approximately 5.5% of total enplanements).

Source: San Jose RIM Consultant Team Analysis

Passenger Airline Operations Demand

Projecting the number of airline operations (takeoffs and landings) needed to accommodate the forecast passenger demand involves a series of assumptions and calculations that include:

- Load factors, i.e., the share of available aircraft seats that are filled, and dividing the passenger enplanement forecasts by the load factor percentages to derive total seat departures.
- Existing and future non-stop market destinations for SJC flights and allocating seat departures among those destinations.

- Types of aircraft and frequency of service that airlines would use to serve the projected non-stop destination seat departures.

Airline load factors at SJC in 2016 were 76.0% for domestic flights and 77.1% for international flights. Assuming that load factors at SJC would change at the same very slight rates projected on a national level by the FAA, the resulting load factor for SJC would increase to 77.3% in the year 2037 for domestic operations and stabilize at 77.0% for international operations through 2037.

The identification of projected new non-stop markets at SJC utilized an analysis of current thresholds of revenue (passenger originations multiplied by average fare), in combination with national level airline revenue projections based on FAA data, to determine potential new or additional SJC non-stop destinations. Seat departures by market were based on current SJC data for that market or the most similar existing market.

Aircraft types and frequencies were matched to seat departure projections for each market based on historical service patterns, current dominant carriers, aircraft currently in use, aircraft on order, length of flight, and announced plans of current and new entrant airlines. By 2037, the predominant aircraft for domestic service at SJC are projected to be current and new generation versions of the narrow-body Boeing 737-700/800/900, Airbus 319/320/321, and smaller Embraer 175 and the new Bombardier CS-100. Predominant aircraft for international service at SJC are projected to be the wide-body Airbus 330 and A350 and Boeing 787 800/900 for transoceanic destinations and the narrow-body Boeing 737-800/900 and Airbus 320 for North American destinations. The largest aircraft projected for scheduled service at SJC will be the Boeing 777-300.

Table 3.3 below presents the updated projections for passenger airline operations demand at SJC. The forecast analysis shows passenger airline operations increasing from a total of 103,280 scheduled passenger airline operations in 2016 to 183,920 in 2037, an annual compounded growth rate of 2.8%.

Table 3.3
Projected SJC Passenger Airline Operations

Year	Domestic Operations	International Operations	Total Operations
2016 Actual	98,249	5,031	103,280
2022	118,500	7,610	126,110
2027	132,930	9,100	142,030
2032	146,410	9,940	156,350
2037	**172,300**	**11,620**	**183,920**

Source: San Jose RIM Consultant Team Analysis

Air Cargo Demand

Air cargo includes air mail, express packages, and containerized freight carried by passenger airlines (as belly-cargo) and all-cargo airlines (currently Federal Express and UPS at SJC). Forecasting consists of projections of cargo tonnage demand, followed by an allocation of that tonnage demand between the passenger and all-cargo airlines, and the projection of cargo airline aircraft operations needed to accommodate its share of the tonnage demand. Historically at SJC, the all-cargo airlines have handled the majority of cargo tonnage (73% in 2016), although the small but growing volume of international cargo is almost totally handled by the passenger airlines with direct international flights.

Major structural changes have occurred in the air cargo industry over the last couple of decades (such as the replacement of overnight document packages with electronic transmittals and diversion of some traditional types of air cargo shipments to truck delivery) that disfavor use of regression analysis for forecasting cargo tonnage due to the lack of reasonably strong statistical relationships between activity and economic variables. Instead, an airport market share analysis approach was utilized based on applying a SJC share of the national level tonnage forecasts prepared by the FAA, Boeing, and Airbus (and averaged among the three). To account for local economic factors, the current SJC share of total domestic air cargo was adjusted for the future years by the projected ratio of SJC air trade area personal income to U.S. personal income.

The portion of the SJC cargo tonnage demand assumed to be carried by the passenger airlines as belly-cargo utilized the FAA's projected national ratio of revenue ton miles (RTMs) to available seat miles (ASMs) and applying that ratio to the SJC forecast of scheduled airline seat departures. The remainder of the SJC cargo tonnage is assumed to be carried by the all-cargo airlines. This allocation approach is consistent with the methodology used by Boeing and Airbus in their industry-wide projections.

The forecast of all-cargo airline aircraft operations was derived from the tonnage projections, historical load factors (tons/operation), and the anticipated cargo airline fleets. The Boeing 767-300 and Airbus A330-200 are expected to account for the majority of cargo airline operations by the year 2037.

Table 3.4 below presents the updated projections for air cargo demand at SJC. The forecast analysis shows cargo tonnage increasing at an annual compounded growth rate of 2.4%. The share of the tonnage demand handled by the passenger airlines are projected to increase from 27% in 2016 to 42% in 2037 as the number of airline operations, destinations served, and average size of aircraft increase. Aircraft operations by the all-cargo airlines are projected to increase at an annual compounded growth rate of 0.9%, reflecting its share of the tonnage demand and gradual use of higher-capacity aircraft.

Table 3.4
Projected SJC Air Cargo Tonnage and All-Cargo Airline Operations

Year	Passenger Airline Belly Tonnage	All-Cargo Airline Tonnage	Total Tonnage	All-Cargo Airline Operations
2016 Actual	16,534	43,826	60,360	1,616
2022	28,200	47,600	75,800	1,730
2027	32,900	50,500	83,400	1,830
2032	37,500	53,900	91,400	1,890
2037	**42,900**	**57,300**	**100,200**	**1,960**

Source: San Jose RIM Consultant Team Analysis

General Aviation Demand

General aviation, being all aviation activity that is not airline or military, ranges from small piston-powered aircraft operated for personal or recreational use to large jet aircraft used for the transport of corporate employees and executives, and also includes aircraft operations used for pilot training, law enforcement, emergency medical, and sports team transport purposes. General aviation activity forecasts are comprised of the number and type of aircraft expected to be based at SJC, and the number of general aviation aircraft operations, including "local" operations (aircraft operating in the traffic pattern or within sight of the air traffic control tower) and "itinerant" operations (aircraft arriving from, or departing to another airport).

General aviation activity has declined over time, both nation-wide and at SJC, for a myriad of economic, demographic, and regulatory factors, although this overall trend is primarily associated with personal/recreational aviation, whereas business/corporate activity has gradually increased over time. As with air cargo, regression analysis is not a viable methodology for forecasting general aviation activity due to the changes that have occurred over the previous few decades, plus the difficulty in accounting for SJC-specific factors such as landside facility limitations that may have constrained demand in the past. Therefore, an airport share analysis approach was again utilized based on FAA national level projections, with an adjustment to account for local economic factors as represented by the projected ratio of SJC air trade area personal income to U.S. personal income.

For based aircraft, a series of separate projections were generated for each of the five major types of general aviation aircraft: single-engine piston, multi-engine piston, turboprop, jet, and rotorcraft (helicopter). On a national level, the FAA forecasts show the total general aviation fleet growing at a relatively slight 0.2% annual rate over the next twenty years, with projected increases in turboprop, jet, and rotorcraft offsetting projected decreases in single and multi-engine piston aircraft. SJC has historically seen a much higher percentage of the based aircraft fleet comprised of jet aircraft than at most U.S. airports.

Table 3.5 below presents the based aircraft demand at SJC by type. Based aircraft are assumed to grow by an overall compounded annual growth rate of 0.9%. Consistent with the projected national trend, jet aircraft are expected to account for an increasingly larger percentage of SJC based aircraft.

Table 3.5
Projected SJC General Aviation Based Aircraft

Year	Single Engine Piston	Multi Engine Piston	Turbo-prop	Jet	Rotor-craft	Total Based Aircraft
2016 Actual	62	9	8	53	5	137
2022	59	9	8	59	6	141
2027	56	8	8	66	6	144
2032	53	8	9	75	7	152
2037	**51**	**8**	**11**	**86**	**8**	**164**

Source: San Jose RIM Consultant Team Analysis

Forecasts of general aviation operations are typically derived through assumed ratios of operations per based aircraft. Available SJC data on operations for each type of general aviation aircraft was projected according to FAA national level forecasts of hours flown for each aircraft type.

Table 3.6 below presents the operations projections for general aviation demand at SJC. Total operations are projected to increase at an annual compounded growth rate of 2.0%. Consistent with national projections of higher rates of aircraft utilization in the future, operations per based aircraft at SJC would increase from 246 in 2016 to 315 in 2037. With almost all the growth being by higher-performance corporate aircraft, the share of local operations (i.e., flights that remain in the local airspace and primarily associated with training) will gradually decrease while itinerant operations increase.

Table 3.6
Projected SJC General Aviation Operations

Year	Based Aircraft	Local Operations	Itinerant Operations	Total Operations
2016 Actual	137	4,363	29,380	33,743
2022	141	4,260	33,740	38,000
2027	144	4,070	37,350	41,420
2032	152	4,010	41,950	45,960
2037	**164**	**4,020**	**47,560**	**51,580**

Source: San Jose RIM Consultant Team Analysis

Military Aviation Demand

Military aviation activity at SJC has historically been insignificant and no military aircraft are stationed at SJC. The standard practice in forecasting military activity in such cases is to simply assume a constant annual number of operations. As military operations at SJC since 2010 have averaged approximately 250 a year (ranging from 192 in 2014 to 276 in 2016), this average was assumed for the forecast horizon years. The majority of military aircraft operations are by a mix of aircraft types similar to general aviation, with occasional larger troop movements conducted in airline narrow-body aircraft such as the Boeing 737-700.

Total Aviation Demand

Table 3.7 below presents a summary of the key demand projections. Total aircraft operations are projected to increase at a compounded annual growth rate of 2.6% over the next twenty years. Passenger airline activity will account for approximately 77% of all SJC operations by 2037 (compared to 74% in 2016).

Table 3.7
Summary of Projected SJC Annual Activity Demand

Year	Total Passengers	Cargo Tonnage	General Aviation Based Aircraft	Aircraft Operations				
				Passenger Airline	Cargo Airline	General Aviation	Military	Total
2016 (Actual)	10,796,725	60,360	137	103,280	1,616	33,743	276	138,915
2022	13,708,600	75,800	141	126,110	1,730	38,000	250	166,090
2027	15,695,200	83,400	144	142,030	1,830	41,420	250	185,530
2032	18,106,200	91,400	152	156,350	1,890	45,960	250	204,450
2037	**22,532,000**	**100,200**	**164**	**183,920**	**1,960**	**51,580**	**250**	**237,710**

Source: San Jose RIM Consultant Team Analysis

Design Level Demand

For facility planning purposes, forecasts of annual aviation activity are used to derive peak period demand levels, two typical measures being “design day” and “design hour”. Design day is defined as the average day of the peak activity month, and design hour as the busiest 60-minute period of the design day.

At SJC, as at most air carrier airports, passenger airline activity usually peaks in July or August, with weekday volumes being approximately 6% higher than on a weekend. Cargo activity usually peaks in December, and general aviation activity can peak either in late spring, summer, or early fall. Thus, the design day for all operations combined tends to reflect passenger airline activity which accounts for the majority of all operations at SJC.

Design hour activity is based on recent and current operating characteristics which are assumed to remain relatively consistent over the forecast period. For air passenger activity at SJC, the design hour generally occurs during midday (roughly 12:30-1:30 p.m.), but with a departure peak also occurring in the early morning (6:30-7:30 a.m.) and an arrival peak also occurring in the late evening (10:00-11:00 p.m.).

Table 3.8 below presents the projected design day and design hour demand at SJC in the horizon year of 2037. Peak period air passenger volumes would roughly double by 2037, while passenger airlines operations would increase by approximately 80%. Peak activity for all types of aircraft operations combined would increase by about 75% in the design day and by two-thirds in the design hour.

Table 3.8
Projected SJC Design Level Demand

	Design Day		Design Hour	
	2016	**2037**	**2016**	**2037**
Air Passengers	34,200	71,400	2,900	5,700
Passenger Airline Operations	324	588	26	47
Cargo Airline Operations	8	11	4	6
General Aviation Operations	155	257	20	32
Military Operations	1	1	0	0
Total Operations*	487	856	43	72

***** Note: Design Day and Design Hour operations for each type of aviation activity do not coincide, so total is not additive.

Source: San Jose RIM Consultant Team Analysis

Operational Fleet Mix for 2037

Table 3.9 below provides a detailed fleet mix breakdown of projected aircraft operations for the year 2037. Key findings relevant to forthcoming tasks in the SJC Runway Incursion Mitigation/Design Standards Analysis Study are as follows:

- The narrow-body Boeing 737 series of aircraft (Aircraft Design Group III), will continue to dominate the commercial operational fleet at SJC and account for just over half of all commercial airline operations in 2037.

- Group V aircraft operations will increase (to a projected 6,100 annually by 2037) and, although remaining a relatively small share of all operations (2.5% in 2037), will continue to be the critical aircraft for the air carrier runways and associated taxiways and ramps on the east side of the Airport according to FAA airfield design criteria.

- Corporate/business jets will account for just over 75% of all general aviation operations by 2037 and approximately 17% of total SJC operations.

- The number of annual Aircraft Design Group III general aviation operations are projected to increase (to approximately 7,500 by 2037), and thus will be the critical aircraft for the west side of the Airport based on FAA airfield design criteria.

Table 3.9
Projected SJC Aircraft Fleet Mix for 2037

Aircraft Type	Operations		
	Annual	Average Daily	% of Total
Commercial Airline:			
Airbus 319, 319 Neo	3,990	11.0	1.7%
Airbus 320-100/200, 320 Neo	4,650	12.5	1.9%
Airbus 321, 321 Neo	11,290	31.0	4.8%
Airbus 330-200 (passenger)	1,060	3.0	0.5%
Airbus 330-200 (cargo)	480	1.5	<0.5%
Airbus 350-900	1,550	4.0	0.5%
Boeing 737-700/700LR, 737-7 Max	36,880	101.0	15.5%
Boeing 737-800, 737-8 Max	64,980	178.0	27.0%
Boeing 737-900/900ER, 737-9 Max	23,900	65.5	10.0%
Boeing 767-300/300ER (cargo)	1,440	4.0	0.5%
Boeing 777-200/200ER/300ER	770	2.0	0.5%
Boeing 787-800/900	2,190	6.0	1.0%
Bombardier CS100	14,210	39.0	6.0%
Embraer 175/190	17,750	48.5	7.5%
Other	740	2.0	0.5%
General Aviation:			
Beechcraft Bonanza 33/35/36	1,150	3.0	0.5%
Beechcraft 55/58 Baron	600	1.5	<0.5%
Beechcraft King Air 90/200/300/350	1,260	3.5	0.5%
Beechcraft Beechjet 400	350	1.0	<0.5%
Bombardier Challenger 300/350	4,000	11.0	2.0%
Bombardier Global 500/Global Express	2,620	7.0	1.0%
Canadair Bombardier CL600/610	800	2.0	0.5%
Cessna 172/182/206/210	2,070	5.5	1.0%
Cessna Citation 510/550/560/560XL	5,160	14.0	2.0%
Cessna Citation 680/750	5,600	15.5	2.5%
Cessna Citation CJ1/2/3	800	2.0	0.5%
Cirrus SR22	1,400	4.0	0.5%
Dassault Falcon 7X/50/900/2000	4,190	11.5	2.0%
Embraer EMB/ERJ-145, Phenom 100/300	5,900	16.0	2.5%
Gulfstream IV/V/VI	5,560	15.0	2.5%
Gulfstream G150/200/280	1,030	3.0	0.5%
Learjet 35/45/60	1,100	3.0	0.5%
Pilatus PC12	1,340	3.5	0.5%
Piper Cherokee/Malibu/Saratoga	520	1.5	<0.5%
Raytheon Hawker 800	580	1.5	<0.5%
Other - Single-Engine/Multi-Engine Piston	2,430	6.5	1.0%
Other - Turboprop	670	2.0	<0.5%
Other - Jet	1,930	5.5	1.0%
Other - Helicopter	520	1.5	<0.5%
Military	250	0.5	<0.5%
Total	**237,710**	**651.5**	

DRAFT TECHNICAL MEMORANDUM

UPDATED AIRPORT CAPACITY AND FACILITY REQUIREMENTS ANALYSIS

City of San Jose
September 13, 2017

The work program for the SJC Runway Incursion Mitigation/Design Standards Analysis Study includes an assessment of the ability of the Airport to accommodate projected aviation demand as updated in a previous study task. This master planning-level assessment is needed prior to the analysis and selection of an airfield configuration alternative to confirm the overall capability of the airfield and landside development areas, as depicted in the current SJC Master Plan and Airport Layout Plan, is sufficient to serve the new 20-year demand projections. This technical memorandum provides a summary of the capacity analysis/facility requirements findings.

A. AIRFIELD FACILITY CAPACITY AND REQUIREMENTS

The airfield capacity analysis update relies primarily on the methodology contained in FAA Advisory Circular AC150-5060.5, *Airport Capacity and Delay* (commonly referred to as the Airport Capacity and Delay Manual). The analysis conducted for SJC assesses both a 2-runway scenario (as currently operated) and a 3-runway scenario (with reactivation of west side Runway 11/29 as set forth in the current Airport Master Plan and Airport Layout Plan).

The methodology contained in the Airport Capacity and Delay Manual utilizes various typical airfield layout diagrams and general operational parameters that are assumed to be generally representative of most, but not all airfield configurations and operational situations. The typical airfield layout most closely approximating that of SJC is identified as the starting point of the capacity analysis. Applying the general airfield layout, the internal operational parameters in the methodology, along with other required input data, allows for the development of three airfield capacity measures:

- **Annual Service Volume (ASV),** which is the maximum number of aircraft operations an airfield can accommodate in a one-year period without excessive delay. ASV does not represent an absolute limit of operational capability of an airfield, but is indicative of a level of service. Many airports operate above their calculated ASV.

- **Hourly Capacity,** which is the maximum number of aircraft operations an airfield can accommodate under continuous demand in a one-hour period given the runway use configuration, aircraft fleet mix, and weather. Hourly capacity is calculated for both Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) conditions, and can be used to identify peak-period constraints on a given day.

- **Average Aircraft Delay,** which combines hourly airfield capacity and ASV with the assumed volume of operational demand to measure the average delay time per aircraft operation basis. It should be noted that there will be periods during any given day where delay levels will exceed the average calculated delay per operation (peak hour demand under IFR conditions, for example) as well as periods of where little if any operational delay occurs.

Inputs to the Demand/Capacity Analysis

The Airport Capacity and Delay Manual requires the following data inputs:

Aircraft Fleet Mix Index – Ratio of the classes of aircraft serving an airport, based upon four aircraft weight-based categories specified in the advisory guidance;

Runway-Use Configuration – Number and orientation of the active runways. As mentioned earlier, this analysis for SJC used a two closely-spaced runway scenario and a three closely-spaced runway scenario;

Percentage of Aircraft Arrivals – Ratio of landing operations to total operations;

Touch and Go Factor – Ratio of landings with an immediate takeoff (generally affiliated with training activity), to total operations;

Location of Exit Taxiways – Number of exit taxiways available to an aircraft within a given distance from the arrival end of a runway and tied to the calculated mix index;

Meteorological Conditions – Percentages of times an airfield experiences VFR, IFR and PVC (Poor Visibility) conditions.

Built into the calculations contained in the Airport Capacity and Delay Manual are air traffic assumptions including minimum separation times between two in-trail departing or arriving aircraft along with wake turbulence considerations. These assumptions are based on "typical" conditions and capabilities, and pre-date the Wake Turbulence Recategorization that has recently been implemented at SJC.

While the Airport Capacity and Delay Manual provides an accepted method for high-level capacity analysis, the general nature of the typical airfield layouts and the operational assumptions that are built into the capacity calculation model may not account for airport-specific conditions, such as at SJC. Several adjustments were therefore made to the methodology, as highlighted below.

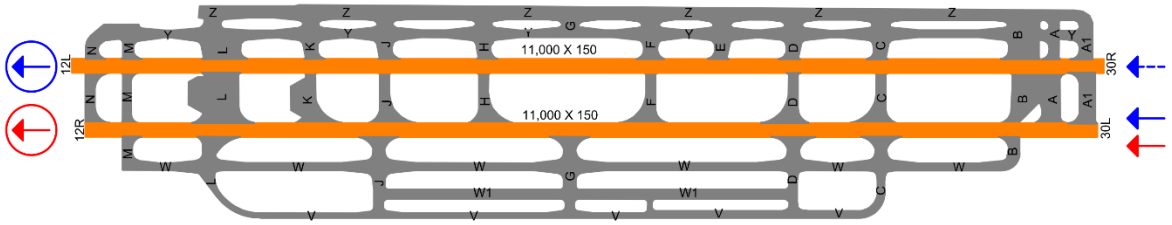
The model includes a typical configuration that best reflects SJC's two closely-spaced 11,000 feet-long parallel runways at SJC. That is not the case when the closely-spaced parallel 4,600 feet-long Runway 11/29, is added to the model. Runway 11/29, if operational, is limited to use by propeller-driven aircraft and light turbo-props and would be unavailable during IFR conditions, while the majority of operations conducted at SJC are by aircraft that can only use the two longer runways.

SJC airspace is constrained by the proximity of San Francisco International Airport (SFO) to the north as well as by rising terrain to the east and west. These constraints limit north and south flow departures at SJC to a single departure heading in each direction. The single departure heading funnels all departing aircraft, regardless of runway, along the same departure route, requiring increased spacing that would not be necessary if the airspace accommodated divergent departure headings. The required spacing (4, 5 and 6 nautical miles depending upon size of aircraft) between sequential departures significantly increases the required minimum departure-to-departure separation time that is assumed in the AC 150/5060-5 methodology.

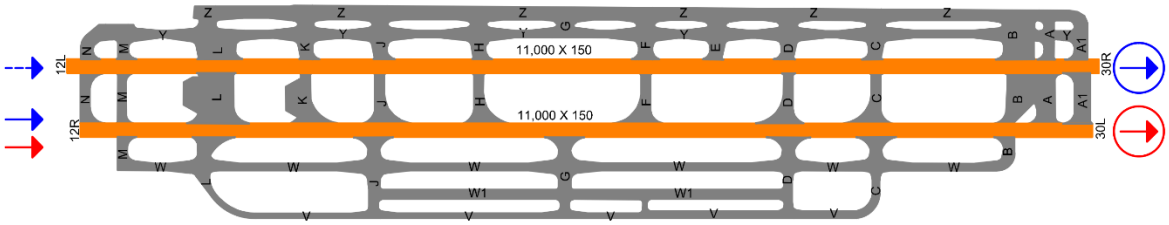
Because the time interval between aircraft departures increases due to airspace constraints, there results a corresponding reduction in the overall hourly operational capacity that the airfield can achieve. This impacts the current two-runway system and negates any significant capacity increase from the former and potential reactivated three- runway system. As a result, an adjustment to the hourly capacity output obtained using the Airport Capacity and Delay manual methodology was necessary to reasonably reflect the reality of the airspace characteristics at SJC. **Figure 1** presents the runway operating configurations for the SJC airfield, followed by specific inputs to the FAA methodology.

Figure 1 - SJC Runway Operating Configurations

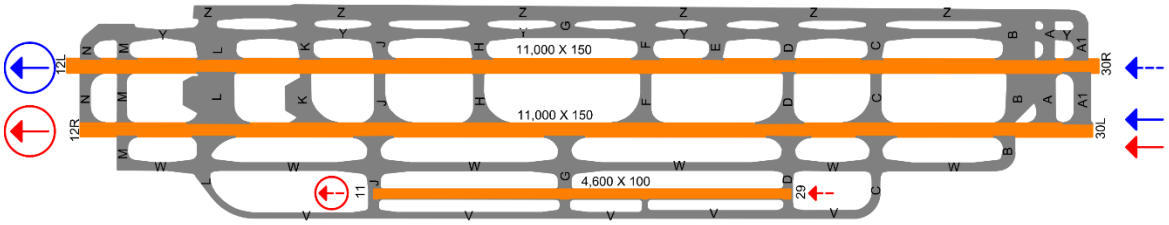
2 Runways, North Flow:



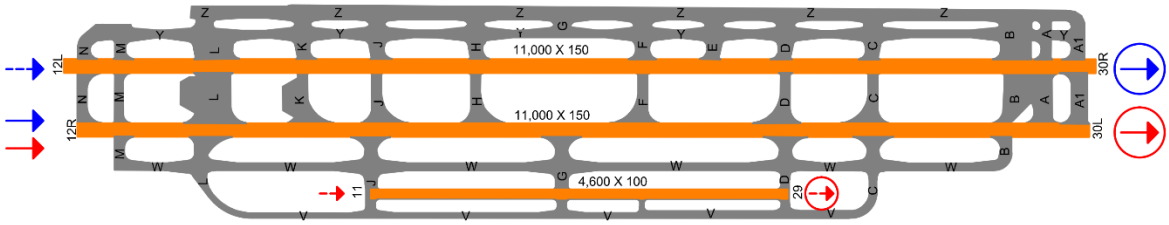
2 Runways, South Flow:



3 Runways, North Flow:



3 Runways, South Flow:



	Runway Pavement
	Taxiway Pavement
	Primary General Aviation & Air Taxi Arrival
	Secondary General Aviation & Air Taxi Arrival
	Primary Commercial Arrival
	Secondary Commercial Arrival
	Primary General Aviation & Air Taxi Departure
	Secondary General Aviation & Air Taxi Departure
	Commercial Departure

Aircraft Fleet Mix Index

The Airport Capacity Manual classifies aircraft into four classes (Class A through D) based upon the weight of the aircraft. Class A and B consists of aircraft of 12,500-pound maximum takeoff weight (MTOW) or less, Class C are aircraft of between 12,500 pounds and 300,000 pounds, and Class D consists of aircraft greater than 300,000 pounds. As shown in **Table 1**, the Mix Index consists only of Class C and D aircraft, with the percentage of Class D aircraft weighted by a factor of 3 and added to the percentage of Class C aircraft in the fleet.

Table 1 – SJC Class C and D Aircraft Fleet Mix Percentages

Classification (lbs.)	2016		2037	
	VFR	IFR	VFR	IFR
C (12,500-300,000)	88%	92%	92%	94%
D (300,000+)	3%	3%	3%	3%
Index	97	101	101	103

Source: Airport Activity Statistic, 2017 Aviation Activity Forecasts

Runway-Use Configuration and Meteorological Conditions

Table 2 presents the percentages of activity for both VFR and IFR conditions. The airport operates in north flow 86 percent of the time and south flow 14 percent of the time. Based on ten years of weather data, SJC is in VFR conditions 96 percent of the time and IFR conditions 4 percent of the time.

Table 2 – SJC Runway Use by Weather Condition

Traffic Flow	Weather Conditions	Usage
North Flow	VFR	83%
North Flow	IFR	3%
South Flow	VFR	13%
South Flow	IFR	1%

Source: FAA ASPM Database 2001 – 2010, SJC Airfield Simulation Assumptions Document
NOAA hourly observed weather data, 2006 - 2016

Percentage of Aircraft Arrivals and Touch and Go Factor

The percentage of arrivals to total operations at SJC is 50 percent. SJC activity reports and discussions with the SJC Air Traffic Control Tower indicate that touch-and-go activity is approximately 1 percent of all operations annually.

Number and Location of Exit Taxiways from Runway Threshold

Airfield capacity is affected by the ability of aircraft to efficiently and expeditiously exit the runway upon landing. As a result, the number and location (distance from the runway landing threshold) is a key factor. The Airport Capacity and Delay Manual identifies the optimum distances for exit taxiways based on the mix index and, also establishes values based on whether there are no exits, one exit or two or more exits within the optimum distance. For Runways 12R/30L and 12L/30R, the optimum exit location is between 5,000 feet and 7,000 feet from each landing threshold. For Runway 11/29,

the optimum exit location is between 2,000 feet and 4,000 feet from each landing threshold. Based on this, the following exit values were identified.

- Runways 12R/30L and 12L/30R: North Flow = 3 exits, South Flow = 1 exit
- Runway 11/29**:** North or South Flow - 1 exit

The preceding inputs into the capacity calculation methodology generate the following numerical findings:

Table 3 - **SJC Weighted Hourly Capacity (Operations)**

Configuration	2016	2037
2 Runway Scenario	74	73
3 Runway Scenario	82	81

Source: Kimley Horn Analysis

Table 4 – SJC Annual Service Volume (Operations)

Configuration	2016	2037
2 Runway Scenario	240,363	241,700
3 Runway Scenario	265,693	267,003

Source: Kimley Horn Analysis

Table 5 – SJC Average Aircraft Delay

Configuration	2016	2017
2 Runway Scenario	0.50 minutes	2.25 minutes
3 Runway Scenario	0.40 minutes	1.30 minutes

Source: Kimley Horn Analysis

The above analysis indicates that the SJC airfield can sufficiently accommodate projected 2037 demand levels. The calculated ASV for both the 2-runway and 3-runway scenarios (Table 4) is higher than the projected total demand of 237,710 annual operations. The calculated Average Aircraft Delay for both the 2-runway and 3-runway scenarios (Table 5) is well within the “acceptable” range. Practical airfield capacity typically only becomes an issue of concern when average delay begins to exceed 4-6 minutes.

B. LANDSIDE FACILITY CAPACITY AND REQUIREMENTS

The landside capacity analysis update develops summary estimates of spatial and facility needs to accommodate the projected long-term aviation demand based on general airport planning principles, guidelines, and the existing facility layout at SJC. The analysis separately addresses passenger terminal, air cargo, general aviation, and aviation support facilities.

Passenger Terminal Facilities

- **Passenger Terminal Building**

The existing passenger terminal building at SJC is comprised of 28 airline gates and a total area of approximately 1,050,000 square feet. Terminal A has 16 gates and approximately 450,000 square feet of operational space (including hold rooms, ticket counter lobby, security checkpoints, baggage claim, the Federal Inspection Services facility for international arrivals, and concession, office, and support space), which equates to an average of 28,100 square feet of building space per gate. The newer Terminal B comprises 12 airline gates and a total area of approximately 600,000 square feet of operational space (inclusive of all building functions), which equates to an average of 50,000 square feet of building space per gate. A temporary addition of two gates with a passenger concourse connected to the south end of Terminal B is currently being constructed in response to recent growth in activity, but is not considered a permanent facility in this analysis.

Based on the projected 2037 design day passenger and airline operations demand, a total of 42 airline gates would be needed (14 more than the existing 28). The current Airport Master Plan calls for terminal expansion to be provided in a Terminal B "south concourse". Applying existing Terminal B's 50,000 square feet of building space per gate translates into an additional 700,000 square feet of terminal space, resulting in an overall terminal building size of 1,750,000 square feet, as summarized in **Table 1** below.

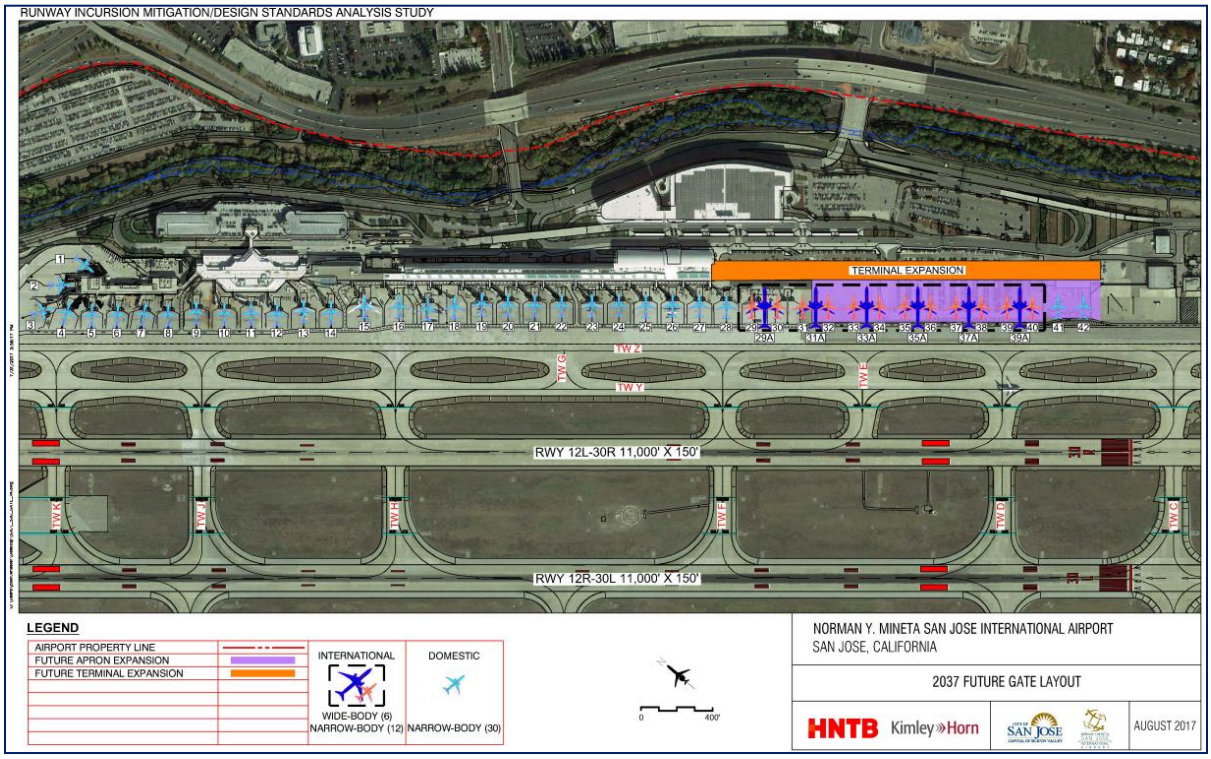
Table 1. Passenger Terminal Facility Requirements

	Existing Terminal A	Existing Terminal B	Existing Total	Projected Expansion	Total 2037
Gates	16	12	28	14	42
Area (sf)	450,000	600,000	1,050,000	700,000	1,750,000

Sources: SJC Airport, Kimley-Horn.

A graphic depicting a future conceptual layout of the expansion of the SJC terminal is displayed in **Figure 1**. Based on this conceptual layout, the expanded passenger terminal building would extend through existing open ramp, two of the interim surface public parking lots, and the existing airline belly-cargo facility (designated in the current Airport Master Plan for relocation outside the future expanded terminal zone).

Figure 1. Future Conceptual Terminal Expansion



- **Vehicle Parking**

Vehicle parking requirements for the passenger terminal consist of garages and surface lots for the public, employees, and rental cars. The Airport currently has facilities providing a capacity for approximately 6,600 public parking spaces, 1,500 terminal area employee parking spaces, and 2,000 rental car ready/return spaces.

Based on planning metrics identified in Airport Cooperative Research Program (ACRP) Report 25, *Airport Passenger Terminal Planning and Design*, as well as review of other airports with varying passenger activity, peaking, and airline hubbing characteristics, a range of parking space requirements were developed, with the median values used as the requirements, as presented in **Table 2** below. It should be noted that this analysis has not attempted to factor in the recent introduction and growing public acceptance of Transportation Network Companies (such as Lyft and Uber), nor the potential future introduction of self-driving vehicles, which are evolving trends which will likely impact traditional airport parking requirements.

The current Airport Master Plan designates locations for additional parking garages in the terminal zone, including opposite the future expansion to Terminal B, that would appear capable of adequately serving projected public and employee parking demand. The existing Rental Car Garage, which is designed to accommodate up to 2,000 rental car spaces (plus additional vehicle storage) is sufficient to serve rental car demand in the long term.

Table 2. Terminal Area Auto Parking Requirements			
	Existing (2016)	Projected 2037	
		Range	Recommended
Public Parking:			
Spaces per million originating enplanements	--	900-1,400	1,150
Total Spaces	6,600	9,600-14,900	12,300
Employee Parking:			
Spaces per million enplanements	--	250-400	325
Total Spaces	1,500	2,800-4,500	3,700
Rental Car Ready/Return:			
% of design hour destination deplanements	--	30%-60%	45%
Total Spaces	2,000	1,100-2,100	1,600
Sources: SJC Airport, ACRP Report 25, Kimley-Horn.			

Air Cargo Facilities

- **All-Cargo Airline Facilities**

SJC currently has approximately 300,000 square feet of cargo airline facilities, divided into two areas, one on the northeast side of the airfield used by FedEx and one on the southeast side of the airfield used by UPS. Each area provides aircraft parking apron space and associated loading/unloading, ground vehicle movement, equipment staging, and office and support space. Cargo airline building and landside space requirements are typically driven by the projected volume of cargo tonnage handled, while apron space requirements are based on the number of projected design hour cargo operations and aircraft size.

For cargo airline buildings, the industry guideline is to apply a square foot per cargo ton ratio, ranging from 0.50 square feet of building per ton at smaller airports up to 1.0 square feet of building per ton at larger airports. For SJC, a factor of 0.575 square feet of building per ton (slightly more than the median) was used. For landside vehicle movement and parking, the industry guideline is to apply 110 percent of the calculated building space requirement.

Apron space for aircraft parking is determined by applying the number of design hour operations to the footprint of the largest aircraft anticipated to be in operation (for SJC, a Boeing 767-300), with a 25-foot buffer between aircraft for wingtip clearance. Apron space for aircraft movement and maneuvering is assumed at approximately 75 percent of the aircraft parking area, and an additional 10 percent of the apron space subtotal is needed for ground support equipment (GSE) staging and storage. **Table 3** below summarizes these calculated facility requirements.

Table 3. Cargo Airline Facility Requirements		
Element	**Existing (2016)**	**Projected 2037**
Cargo tonnage (enplaned and deplaned)	43,826	57,252
Cargo building space (0.575 sq. ft. per ton)		33,000 sq.ft.
Truck/auto parking and maneuvering (110% of building space)		36,200 sq.ft.
Design hour all-cargo operations	4	6
Design aircraft footprint (767-300)	28,500 sq.ft.	
Aircraft parking apron including wingtip buffer space		207,200 sq.ft.
Aircraft maneuvering and GSE apron space		191,700 sq.ft.
Total cargo airline space	**300,000 sq.ft.**	**468,100 sq.ft.**
Acres	**6.9**	**10.7**
Sources: SJC Airport, Kimley-Horn.		

As shown, it is projected that approximately 10.7 acres will be needed for all-cargo airline facilities by 2037. Although the existing two cargo airline facility sites are considered somewhat inefficiently configured, the current Airport Master Plan anticipated that all-cargo airline demand and associated space requirements (at a higher volume than now projected) could be accommodated through expanded and reconfigured facilities at or adjacent to the existing cargo airline operational areas.

- **Belly Cargo Facilities**

Belly cargo facilities for the passenger airlines include similar building, landside parking/movement, and apron operational and GSE storage space requirements as the all-cargo airlines with the major exception of aircraft parking/maneuvering (as the loading and unloading of belly-cargo is typically performed at the aircraft parking positions at the terminal gates). The existing belly-cargo facility at SJC, used by multiple airlines, totals approximately 85,000 square feet in area, including a 22,000-sq.ft. building, although some cargo-related activity is conducted in other buildings leased by individual airlines.

The projection of belly-cargo facility requirements was performed using similar industry guidelines as for the all-cargo airline facilities, as well as from review of cargo operations at other airports. For building space, a factor of 0.575 square feet per ton of building per ton was used, augmented by an additional 15% contingency factor to account for belly-cargo handling that might be conducted at multiple sites. Landside vehicle movement and parking was assumed to be 110 percent of the calculated building space requirement. Apron space requirements for GSE storage, staging, and movement was determined to be twice the calculated building space. **Table 4** below summarizes these facility requirements.

Table 4. Belly Cargo Facility Requirements		
Element	**Existing (2016)**	**Projected 2037**
Cargo tonnage (enplaned and deplaned)	16,534	42,903
Cargo building space (0.575 sq.ft. per ton + 15%)		28,400 sq.ft.
Truck/auto parking and maneuvering (110% of building space)		31,200 sq.ft.
Apron space (200% of building space)		56,800 sq.ft.
Total belly-cargo space	**85,000 sq.ft.**	**116,400 sq.ft.**
Acres	**2.0**	**2.7**
Sources: SJC Airport, Kimley-Horn.		

As shown, it is projected that approximately 2.7 acres will be needed for airline belly-cargo facilities by 2037. The current Airport Master Plan anticipated that the existing belly-cargo facility would be relocated and moderately expanded to a similar size on the east side of the Airport.

General Aviation Facilities

General aviation facilities include aprons and hangars for based and itinerant aircraft parking, storage, and movement, as well as FBO terminal space, aircraft fueling and maintenance areas, and landside vehicle parking. SJC currently consists of approximately 80 acres of general aviation facilities on the west side of the Airport comprising five FBO leaseholds plus individual aircraft hangar and tiedown spaces managed by the Airport. Future facility requirements were generated through general airport planning principles and guidelines applied primarily to the projections of based aircraft and operational fleet mix demand.

- **Based Aircraft Storage and Transient Aircraft Parking**

The area requirements for the storage of based aircraft and parking of transient aircraft utilized the aircraft size and storage/parking facility assumptions shown in **Table 5** below. As applied to the projected based aircraft, fleet mix, and design day operations at SJC, it was determined that approximately 806,700 square feet of space would be required to store the projected 164 based aircraft in 2037, and an additional 543,300 square feet of space would be required to park the projected 82 transient aircraft that may be on the ground at the same time.

Table 5. Aircraft Storage Planning Metrics/Assumptions						
Aircraft Type	**Aircraft Footprint (sq.ft.)**	**Based Aircraft**			**Transient Aircraft**	
		% Tiedown	**% T-Hangar**	**% Conventional Hangar**	**% Tiedown**	**% Conventional Hangar**
Single-Piston	2,000	35%	60%	5%	85%	15%
Multi-Piston	2,500	10%	70%	20%	75%	25%
Turboprop	2,500	--	--	100%	50%	50%
Jet (small)	5,000	--	--	100%	50%	50%
Jet (large)	10,050	--	--	100%	50%	50%
Rotorcraft	1,250	20%	--	80%	50%	50%
Source: Kimley-Horn Analysis.						

- **Other General Aviation Facilities**

Aircraft movement areas and taxilanes were assumed to be equal to the total area calculated for based and transient aircraft storage and parking. Terminal building space was assumed to be 15% of total conventional hangar space. Aircraft maintenance space was also assumed to be 15% of total conventional hangar space, while aircraft fueling facility and operational space was assumed to be 5% of the total area calculated for based and transient aircraft storage and parking. Vehicle parking for general aviation employees, pilots, and visitors was based upon the existing ratio of vehicle parking areas to total hangar space area at SJC (82%).

Table 6 summarizes the future demand for general aviation facilities based on project demand.

Table 6. General Aviation Facility Requirements

Element	Existing (2016)	Projected 2037
Based Aircraft Storage:		
Tie-Down		43,500 sq.ft.
T-Hangar		74,500 sq.ft.
Conventional Hangar		688,700 sq.ft.
Transient Aircraft Storage:		
Tie-Down		277,900 sq.ft.
Conventional (FBO) Hangar		265,400 sq.ft.
Other GA Facilities:		
Apron/Taxilane Movement Areas		1,350,000 sq.ft.
FBO Terminal Space		143,100 sq.ft.
Vehicle Parking		782,400 sq.ft.
Aircraft Maintenance/Fueling Areas		210,600 sq.ft.
Total General Aviation Area	**3,441,240 sq.ft.**	**3,836,100** sq.ft.
Acres	**79**	**88**

Source: Kimley-Horn Analysis.

As shown in Table 6, a total of 88 acres of general aviation facilities will be needed to accommodate the projected long-term demand. In addition to the 79 acres on the west side of the Airport currently dedicated to existing general aviation facilities, there are approximately 20 acres of vacant or non-aviation areas on the west side (comprised of three separate sites) that are designated for further general aviation development in the current Airport Master Plan. Thus, sufficient acreage is available on the west side to serve the projected demand.

Aviation Support Facilities

Facilities which support the ongoing operation of the Airport include the FAA Tower on the west side, the jet fuel storage facility on a non-contiguous site across from the northeast side of the terminal area (connected by pipeline to the airfield), and the Airport Rescue and Firefighting Facility (ARFF), flight

catering, and Airport and airline maintenance and equipment storage areas in various buildings and operational areas on the southeast side of the Airport. Although some of these facilities would need to expand to adequately serve projected demand, sufficient space appears to be available. The jet fuel storage facility, for example, which currently operates with three tanks capable of storing 2 million gallons of jet fuel, has unused space available to add a fourth large tank and is fed by pipeline from an off-site major storage terminal. While the total available area on the southeast side of the Airport, will decrease with the future south expansion of Terminal B, the current Airport Master Plan already anticipates a redevelopment and reconfiguration of expanded facilities to more efficiently utilize that area. Moreover, some aviation support functions may be feasible to relocate to sites on the west side of the Airport not needed for general aviation.

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
RUNWAY INCURSION MITIGATION/AIRFIELD DESIGN STANDARDS ANALYSIS

TECHNICAL MEMORANDUM:

POTENTIAL DESIGN STANDARDS CONFORMITY AND RUNWAY INCURSION MITIGATION (RIM) ALTERNATIVES

City of San Jose
November 27, 2017

A. CONCEPTUAL DESIGN STANDARDS CONFORMITY ALTERNATIVES

The technical memorandum entitled "Identification of Airfield Design Standards Deficiencies" prepared earlier in the SJC Runway Incursion Mitigation/Airfield Design Standards Analysis Study presented the various FAA airfield design standards that SJC does not currently meet. Most of these deficiencies relate to the constrained site comprising SJC which limits lateral separation between runways, parallel taxiways, and aprons. The three most noteworthy deficiencies have been historically addressed through FAA-approved "Modifications to Standards" documented on the current Airport Layout Plan for SJC:

- The 350-foot separation between the Runway 12L/30R and Taxiway Y centerlines (vs the 400-ft. requirement for D-IV & D-V aircraft).
- The 500-foot Object Free Area (OFA) width at both ends of Runway 12R/30L (vs the 800-ft. requirement for D-IV & D-V aircraft).
- The 220-232.5-foot separation between the Runway 11/29 (when operational) and Taxiway V centerlines (vs the 240-ft. requirement for A-II & B-II aircraft).

As noted in the earlier technical memorandum referenced above, and as confirmed in the subsequent technical memorandum entitled "Summary of Updated Aviation Activity Forecasts", these design standards deficiencies are exacerbated by the findings regarding the critical aircraft for airfield design at SJC. Based on both current and projected activity, the runways and taxiways used by the commercial airlines should be designed to Aircraft Design Group V (ADG-V) standards, and the runways and taxiways used by general aviation should be designed to Aircraft Design Group III (ADG-III) standards.

With one of the primary goals of the study being to reduce the number and magnitude of these design standards deficiencies to the maximum extent practical while still accommodating projected aviation demand, a number of conceptual airfield configuration alternatives have been formulated and assessed. As presented below, seven conceptual alternatives are described for the eastern/commercial aviation side of the airfield and five conceptual alternatives are described for the western/general aviation side of the airfield.

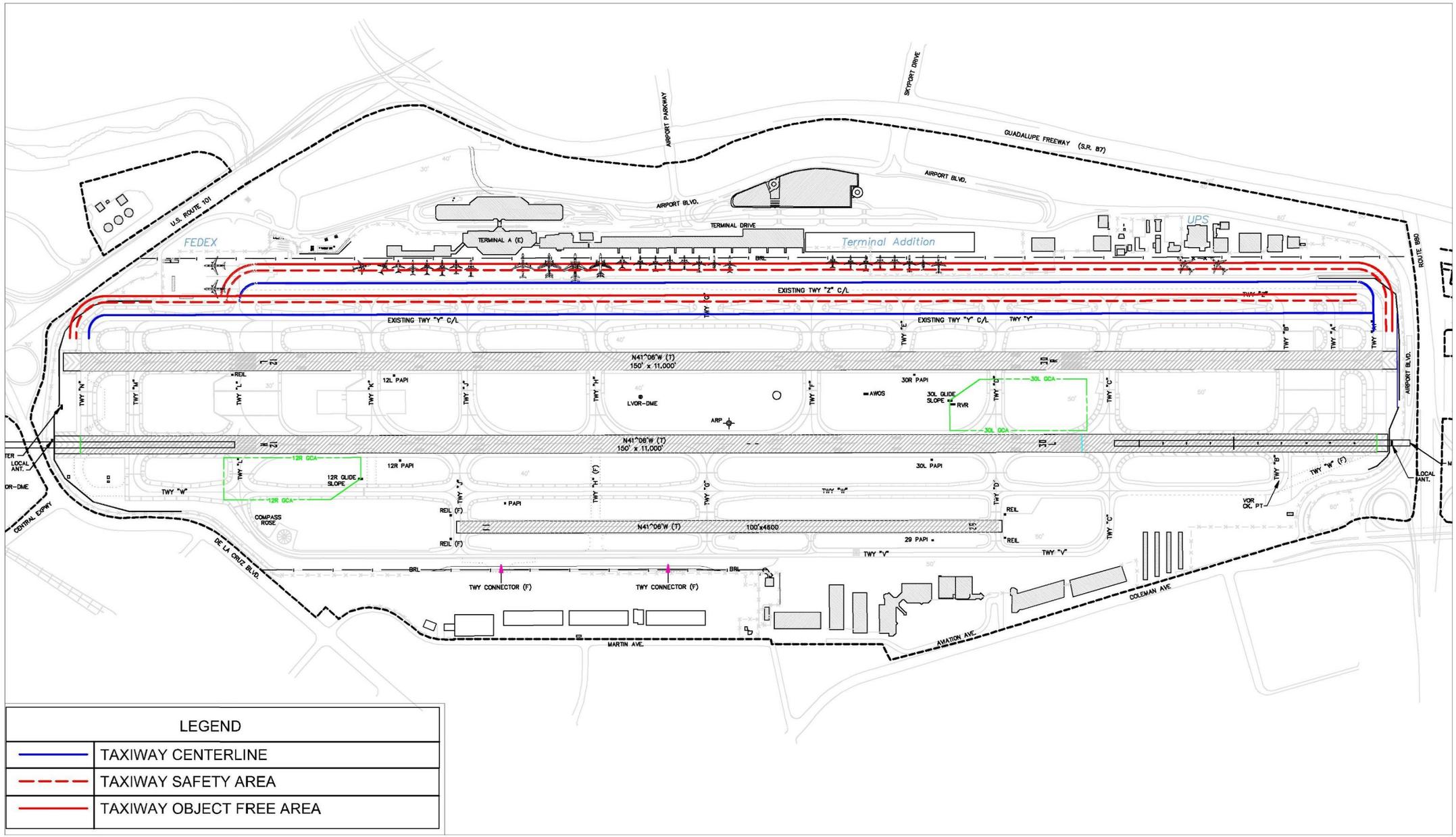
East Airfield Conceptual Design Standards Conformity Options

East Airfield Option 1 – Shift Taxiways Y and Z to East to Achieve ADG-V Conformity

Option 1 relocates the alignments of Taxiway Y and Taxiway Z to conform to Aircraft Design Group (ADG) IV & V standards. Taxiway Y would be shifted to the east to provide a 400-foot separation from Runway 12L/30R (currently 350 feet) and Taxiway Z would be shifted to the east to provide a 267-foot separation from Taxiway Y (currently 215 feet). **Figure EA-1** depicts the location of the relocated taxiway centerlines and their associated Safety Area and Object Free Area boundaries. This alternative generates the following key actions, benefits, and impacts:

East Airfield Option 1 Actions:

- Shift Taxiway Y 50 feet to the east of its current centerline alignment to meet the 400-ft. ADG-IV & V separation standard from Runway 12L/30R.



LEGEND	
	TAXIWAY CENTERLINE
	TAXIWAY SAFETY AREA
	TAXIWAY OBJECT FREE AREA

Figure EA-1

Shift Taxiway Y and Z to East - ADG - V

- Shift Taxiway Z 102 feet to the east of its current centerline alignment to conform to the 267-ft. ADG-V separation standard from relocated Taxiway Y.
- Provide a 214-ft. wide Taxiway Safety Area (ADG-V standard), 107 feet on either side of the relocated Taxiway Y and Z centerlines.
- Provide a 320-ft. wide Taxiway Object Free Area (ADG-V standard), 160 feet on either side of the relocated Taxiway Y and Z centerlines.

East Airfield Option 1 Benefits:

- Provides the capability to accommodate simultaneous ADG-IV & V movements on Runway 12L/30R, Taxiway Y, and Taxiway Z.
- Eliminates the existing Modification to Standards for Runway 12L/30R-to-Taxiway Y centerline separation and associated ATCT operational restrictions on ADG-IV & V movements.

East Airfield Option 1 Impacts:

- Relocated Taxiway Z Safety Area overlaps ADG III/IV/V parking positions at 11 terminal gates, as well as aircraft parking positions at the two cargo airline aprons and the vehicle service road, all of which are not allowed in a Taxiway Safety Area.
- Relocated Taxiway Z Object Free Area overlaps all but two ADG III/IV/V parking positions at terminal gates, as well as aircraft parking positions at the two cargo airline aprons, vehicle service road, and much of the east side aprons used for airline support equipment and remote aircraft parking, all of which are not allowed in a Taxiway Object Free Area.
- Relocated Taxiway Y Safety Area and Object Free Area overlap an approximately 750-foot section of blast fence on the northeast side, an extended section of the vehicle service road, and a portion of the north cargo airline apron.
- Potential significant operational impacts during construction of the taxiway relocations.

Conclusion: While the separations between Runway 12L/30R, Taxiway Y, and Taxiway Z would meet ADG-IV & V standards, Option 1 would essentially preclude commercial aircraft parking along almost the entire terminal complex, as well as preclude use of most of the cargo airline aprons and airline support aprons on the east side, all of which cannot in turn be relocated east to provide adequate separation from the relocated taxiways.

East Airfield Option 2 – Shift Runways and Taxiways Y, W, and V to West to Achieve ADG-V Conformity

Option 2 would bring the airfield into conformity with ADG-IV & V separation standards by reconfiguring the alignments of all runways and taxiways west of Taxiway Z. In east-to-west order: Taxiway Y would be shifted to the west to provide a 267-ft. separation from Taxiway Z (currently 215 feet); Runway 12L/30R would be shifted to the west to provide a 400-ft. separation from relocated Taxiway Y; Runway 12R/30L would be shifted to the west to retain a 700-ft. separation from relocated 12L/30R; and Taxiway W, Runway 11/29, and Taxiway V would be shifted to the west accordingly by requisite distances. **Figure EA-2** depicts the location of relocated runway and taxiway centerlines and their associated Runway Safety Area, Runway Object Free Area, Taxiway Safety Area, and Taxiway Object Free Area boundaries. This alternative generates the following key actions, benefits, and impacts:

East Airfield Option 2 Actions:

- Shift Taxiway Y 52 feet to the west to provide a 267-ft. separation from the Taxiway Z centerline (ADG-V standard).
- Shift Runway 12L/30R 102 feet to the west to provide a 400-ft. separation from the relocated Taxiway Y centerline (ADG–IV & V standard), resolving the existing 50-ft. separation deficiency.
- Shift Runway 12R/30L 102 feet to the west to retain the minimum required 700-ft. runway to runway centerline separation.
- Shift Taxiway W 102 feet to the west to retain the minimum required 400-ft. runway to taxiway centerline separation (ADG-IV & V standard).
- Shift Runway 11/29 (existing interim Taxiway W-1) and Taxiway V to the west by a to-be-determined distance depending on west side design alternatives considerations.
- Provide a 320-ft. wide Taxiway Z Object Free Area (160 feet on either side of centerline) and a 214-ft. Taxiway Z Safety Area (107 feet on either side of centerline) to conform to ADG-V standards.
- Relocate or install new runway and taxiway lighting systems, navigational aids, and signage for each reconfigured airfield facility, and modify/extend cross taxiways as needed to connect to relocated runway and parallel taxiway intersections.

East Airfield Option 2 Benefits:

- Provides the capability to accommodate simultaneous ADG-IV & V movements on Runway 12L/30R, Taxiway Y, and Taxiway Z.
- Eliminates the existing Modification to Standards for Runway 12L/30R-to-Taxiway Y centerline separation and associated ATCT operational restrictions on ADG-IV & V movements.

East Airfield Option 2 Impacts:

- Massive and costly reconstruction of airfield with significant years-long operational impacts.
- Relocation of Runway 12R/30L and Taxiway W requires off-Airport land acquisition and realignment of De La Cruz Boulevard, relocation of associated utilities and existing off-airport development improvements, and potential relocation of DVOR-DME equipment in order to conform to ADG-V Runway Object Free Area and Taxiway Object Free Area standards.
- Relocated Taxiway Z Object Free Area overlaps all but two ADG III/IV/V parking positions at terminal gates, as well as aircraft parking positions at the two cargo airline aprons, vehicle service road, and much of the east side aprons used for airline support equipment and remote aircraft parking, all of which are not allowed in a Taxiway Object Free Area.
- Potential elimination of much or most west side general aviation facilities depending on ultimate alignments or disposition of Runway 11/29 (existing Taxiway W-1) and Taxiway V with requisite Safety Area and Object Free Area standard.

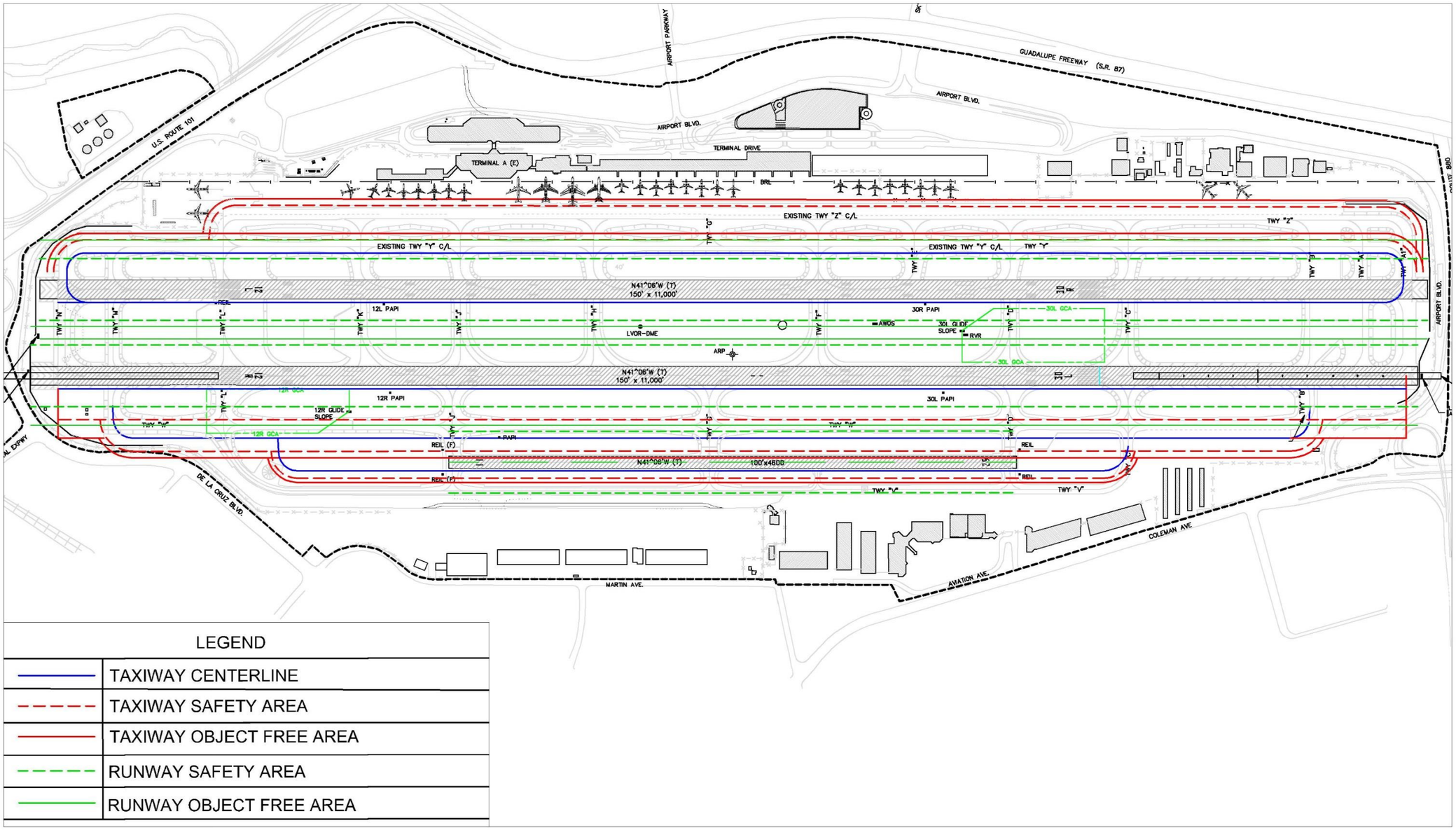


Figure EA-2

Shift Runways and Taxiways to West - ADG-V

Conclusion: While the separations between Runway 12L/30R, Taxiway Y, and Taxiway Z would meet ADG-IV & V separation standards, Option 2 would require a massive reconstruction of almost the entire airfield, yet still significantly preclude commercial aircraft parking along almost the entire terminal complex and the use of most of the cargo airline aprons and airline support aprons on the east side, all of which cannot in turn be relocated east, as well as the west side general aviation facilities, which cannot in turn be relocated west. The huge costs, operational impacts, and off-Airport acquisition/relocation requirements would not be considered feasible by both the FAA and City of San Jose.

East Airfield Option 3 – Shift Taxiways Y and Z to East, but Retain ADG-IV Conformity between Y and Z

Option 3 would relocate the alignment of Taxiway Y by 50 feet to provide a 400-ft. separation from Runway 12L/30R (ADG-IV & V standard) and relocate the alignment of Taxiway Z by the same 50 feet to retain the existing 215-ft. ADG-IV separation from Taxiway Y. The current operational restriction on simultaneous movements by ADG-IV & V aircraft on Taxiway Y and Taxiway Z would be retained. **Figure EA-3** depicts the location of the relocated taxiway centerline alignments and their associated Taxiway Safety Area and Taxiway Object Free Area boundaries. This alternative generates the following key actions, benefits, and impacts:

East Airfield Option 3 Actions:

- Shift Taxiway Y 50 feet to the east of its current centerline alignment to meet the 400-ft. ADG-IV & V separation standard from Runway 12L/30R.
- Shift Taxiway Z 50 feet to the east of its current centerline alignment to retain the existing 215 feet of separation from Taxiway Y (ADG-IV standard).
- Provide a 320-ft. wide Taxiway Y Object Free Area (160 feet on either side of centerline) and a 214-ft. Taxiway Y Safety Area (107 feet on either side of centerline) to conform to ADG-V standards.
- Provide a 259-ft. wide Taxiway Z Object Free Area (129.5 feet on either side of centerline) and a 171-ft. wide Taxiway Z Safety Area (85.5 feet on either side of centerline) to retain conformance with ADG-IV standards.

East Airfield Option 3 Benefits:

- Provides the capability to accommodate simultaneous ADG-IV & V aircraft movements on Runway 12L/30R and relocated Taxiway Y.
- Eliminates the existing Modification to Standards for Runway 12L/30R-to-Taxiway Y centerline separation and associated ATCT operational restrictions on ADG-IV & V movements.

East Airfield Option 3 Impacts:

- Relocated Taxiway Z Object Free Area overlaps all but three ADG III/IV/V parking positions at terminal gates (although some smaller ADG-III parking positions at Terminal B gates could be accommodated), as well as aircraft parking positions at the two cargo airline aprons, the vehicle service road, and the western edge of the apron areas used for airline support equipment and remote aircraft parking, all of which are not allowed in a Taxiway Object Free Area.

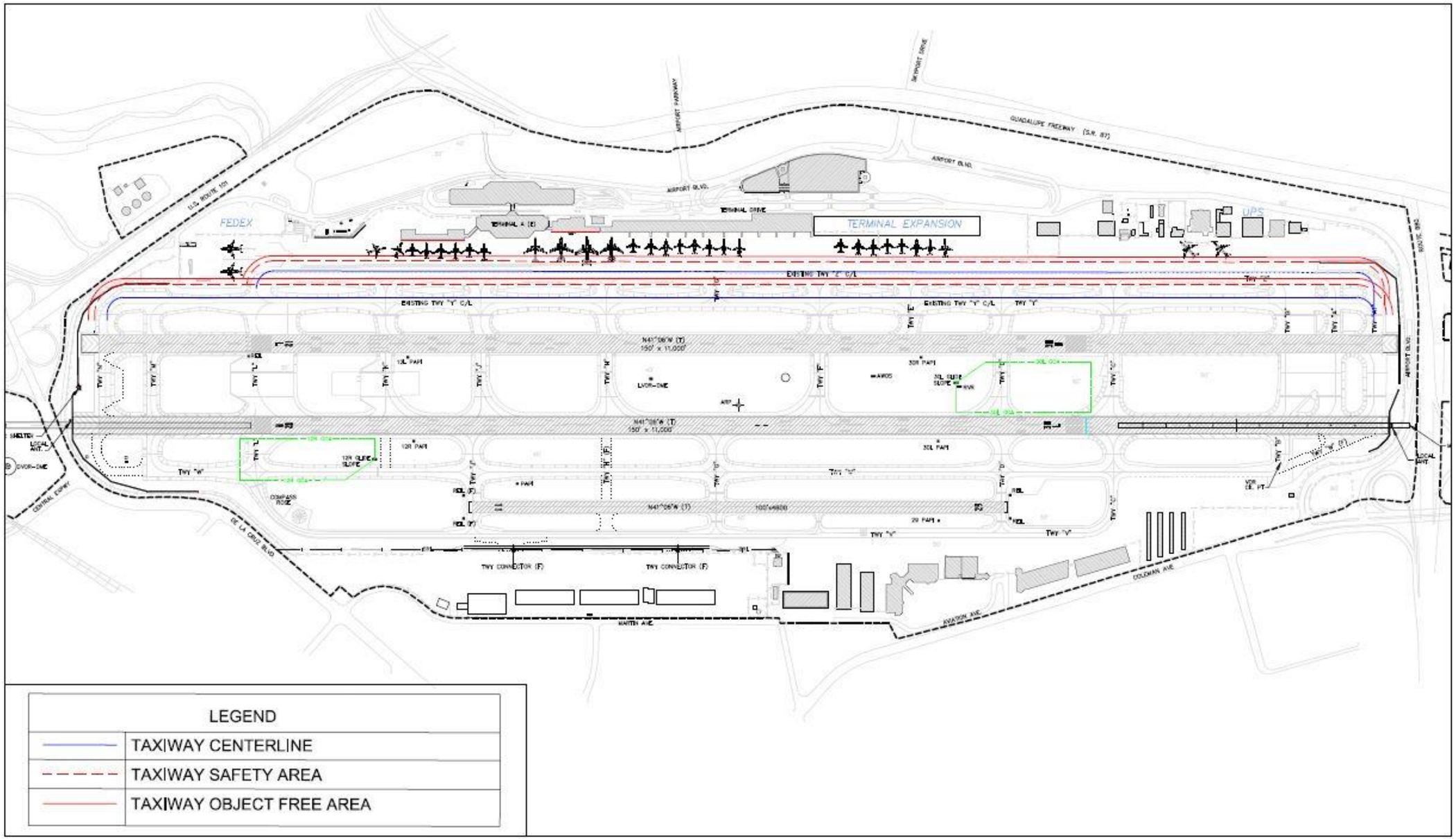


Figure EA-3

Shift Taxiway Y and Z to East, Retain Z as ADG IV Taxiway

- Relocated Taxiway Y Safety Area and Object Free Area overlap an approximately 750-foot section of blast fence on the northeast side, an extended section of the vehicle service road, and a portion of the north cargo airline apron.
- Potential significant operational impacts during construction of the taxiway relocations.

Conclusion: While the separation between Runway 12L/30R and Taxiway Y would meet ADG-IV & V standards, Option 3 is similar to Option 1, in that it would preclude (although to a lesser extent) the parking of most airline aircraft along almost the entire terminal complex, as well as on a portion of the cargo airline aprons and airline support aprons on the east side, all of which cannot in turn be relocated east.

East Airfield Option 4 - Shift Taxiways Y and Taxiway Z to East, but Re-Designate Taxiway Z as a Taxilane and Retain ADG-IV Conformity between Y and Z

Option 4 is a variant of Option 3 above, in that it would again relocate Taxiway Y by 50 feet to provide a 400-ft. separation from Runway 12L/30R (ADG-IV & V standard) and relocate the alignment of Taxiway Z by the same 50 feet to retain the existing 215-ft. ADG-IV separation from Taxiway Y, but would additionally downgrade Taxiway Z to a taxilane to reduce the Object Free Area impacts on aircraft parking at the terminal gates and cargo aprons. **Figure EA-4** depicts the location of relocated taxiway/taxilane centerline alignments and their associated Safety Area and Object Free Area boundaries. This alternative generates the following key actions, benefits, and impacts:

East Airfield Option 4 Actions:

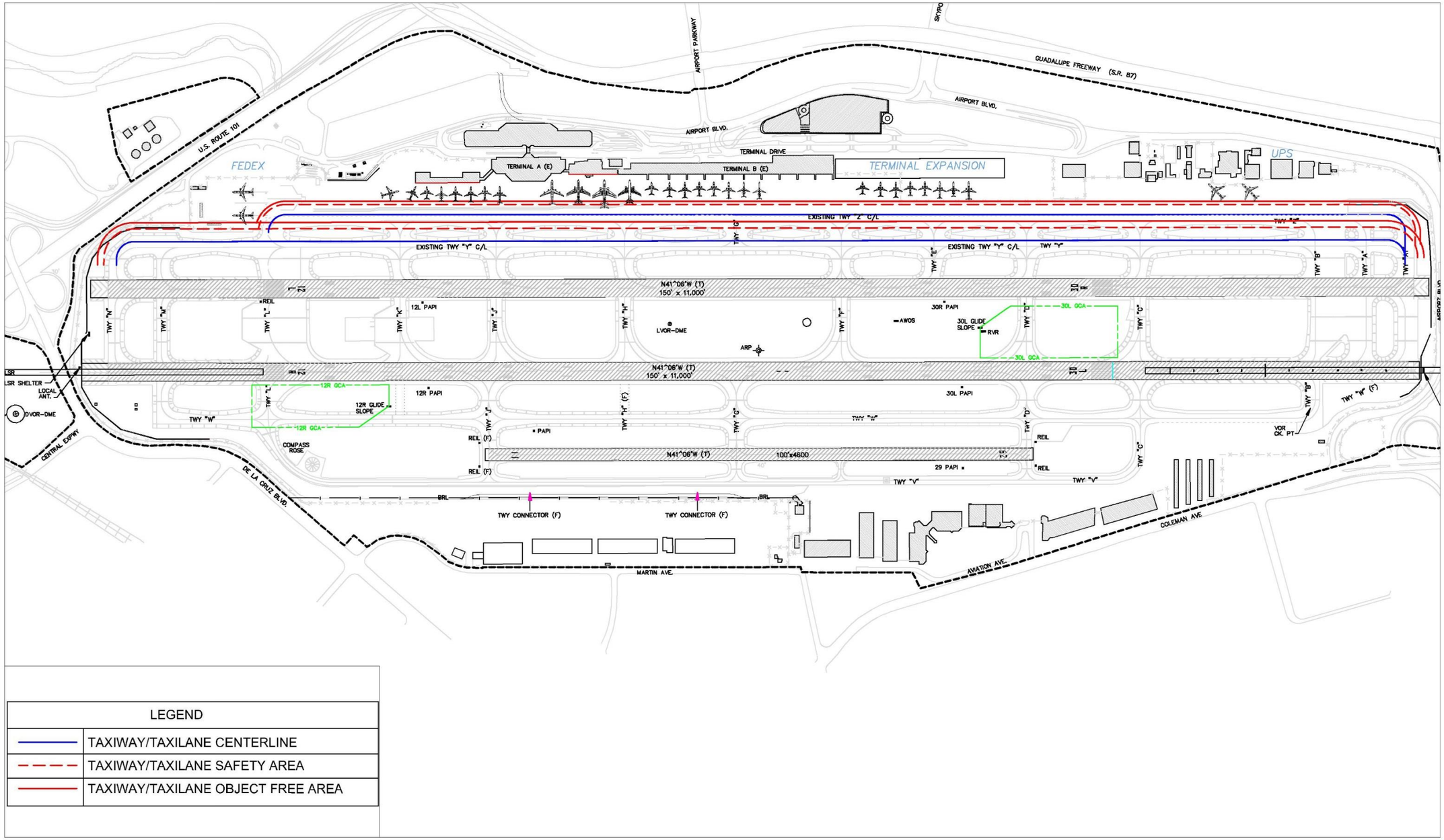
- Shift Taxiway Y 50 feet to the east of its current centerline alignment to meet the 400-ft. ADG-IV & V separation standard from Runway 12L/30R.
- Shift Taxiway Z 50 feet to the east of its current centerline alignment to retain the existing 215 feet of separation from Taxiway Y (ADG-IV standard), and re-designate (downgrade) Z as a taxilane.
- Provide a 225-ft. wide "Taxilane Z" Object Free Area (112.5 feet on either side of centerline) and a 171-ft. wide "Taxilane Z" Safety Area (85.5 feet on either side of centerline) to retain conformance with ADG-IV standards.

East Airfield Option 4 Benefits:

- Provides the capability to accommodate simultaneous ADG-IV & V aircraft movements on Runway 12L/30R and relocated Taxiway Y.
- Eliminates the existing Modification to Standards for Runway 12L/30R-to-Taxiway Y centerline separation and associated ATCT operational restrictions on ADG-IV & V movements.
- Reduces the magnitude of impacts on commercial aircraft parking compared to East Airfield Options 1-3.

East Airfield Option 4 Impacts:

- Relocated "Taxilane Z" Object Free Area, despite its reduced width vs a relocated Taxiway Z, overlaps most ADG-III/IV/V aircraft parking positions at Terminal A, all ADG-IV & V aircraft



LEGEND	
———	TAXIWAY/TAXILANE CENTERLINE
– – – –	TAXIWAY/TAXILANE SAFETY AREA
———	TAXIWAY/TAXILANE OBJECT FREE AREA

Figure EA-4

Convert Taxiway Z to ADG-IV Taxilane

parking positions at Terminal B, as well as the aircraft parking positions at the two cargo airline aprons, the vehicle service road, and the western edge of the apron areas used for airline support equipment and remote aircraft parking, all of which are not allowed in a Taxiway/Taxilane Object Free Area.
- Re-designation of Taxiway Z to a taxilane likely requires Airport or airline establishment and operation of apron control procedures to manage aircraft movements in and out of parking positions.
- Relocated Taxiway Y Safety Area and Object Free Area overlap an approximately 750-foot section of blast fence on the northeast side, an extended section of the vehicle service road, and a portion of the north cargo airline apron.
- Potential significant operational impacts during construction of the taxiway/taxilane relocations.

Conclusion: While the separation between Runway 12L/30R and Taxiway Y would meet ADG-IV & V standards, Option 4 would largely preclude, to a slightly lesser extent than Options 1 or 3, the parking of airline aircraft along almost the entire terminal complex, as well as on a portion of the cargo airline aprons and airline support aprons on the east side, all of which cannot in turn be relocated east.

East Airfield Option 5 – Shift Taxiway Y to East and Close Taxiway Z

Option 5 shifts Taxiway Y by 50 feet to provide a 400-ft. separation from Runway 12L/30R (ADG-IV & V standard) and converts Taxiway Z to additional apron space, thus eliminating the Taxiway Z Safety Area and Object Free Area impacts on commercial aircraft parking positions at the terminal gates and air cargo aprons. However, only one parallel taxiway (Y) would remain east of Runway 12L/30R, with the existing cross taxiways connecting existing Taxiways Y and Z becoming taxiway connectors between the expanded apron and relocated Taxiway Y. **Figure EA-5** depicts the location of the relocated Taxiway Y centerline alignment and its associated Safety Area and Object Free Area boundaries. This alternative generates the following key actions, benefits, and impacts:

East Airfield Option 5 Actions:

- Shift Taxiway Y 50 feet to the east of its current centerline alignment to meet the 400-ft. ADG-IV & V separation standard from Runway 12L/30R.
- Close the alignment of Taxiway Z and convert the pavement to expanded apron space.
- Provide a 320-ft. wide Taxiway Y Object Free Area (160 feet on either side of centerline) and a 214-ft. Taxiway Y Safety Area (107 feet on either side of centerline) to conform to ADG-V standards.
- Reconstruct, realign, or replace all existing cross taxiway connections between closed Taxiway Z and relocated Taxiway Y.

East Airfield Option 5 Benefits:

- Provides the capability to accommodate simultaneous ADG-IV & V aircraft movements on Runway 12L/30R and relocated Taxiway Y.
- Eliminates the existing Modification to Standards for Runway 12L/30R-to-Taxiway Y centerline separation and associated ATCT operational restrictions on ADG-IV & V movements.
- Provides an additional 135 feet of terminal area apron depth and does not limit size of aircraft parked at terminal gates (unlike Options 1-4).

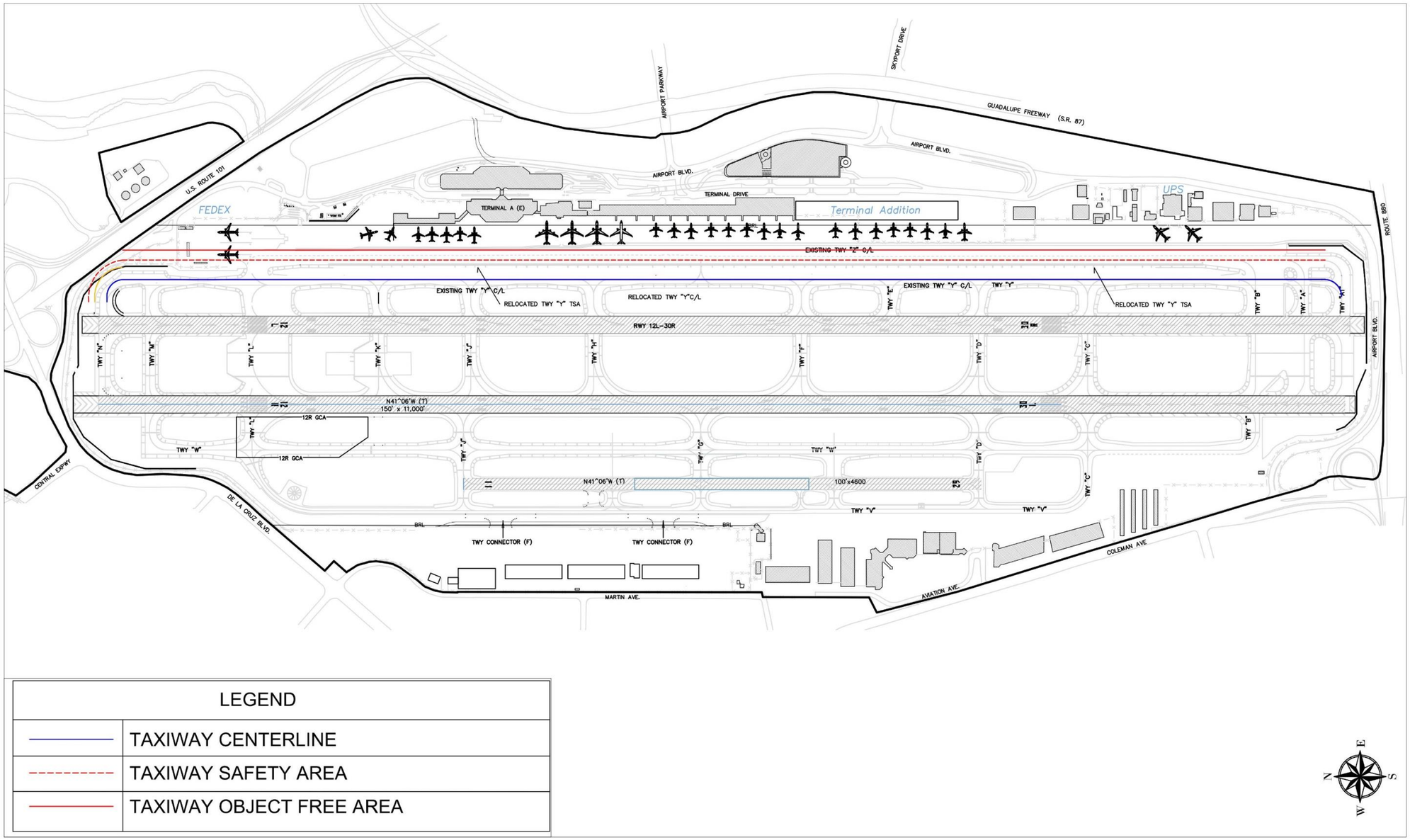


Figure EA- 5

Shift Taxiway Y to East, Close Taxiway Z

East Airfield Option 5 Impacts:

- Closure of Taxiway Z likely requires Airport or airline establishment and operation of apron control procedures to manage aircraft movements in and out of parking positions.
- All sorting and sequencing of departures would have to be accomplished at the gates, with significant constraints on ability to stage aircraft under a departure hold for quick sequencing onto the runway upon release (as currently done on Taxiway Z) or to taxi around an aircraft on Taxiway Y due to an unforeseen hold or mechanical issue.
- Potential increase in traffic management delays from arriving aircraft being held until an aircraft with a departure delay leaves a gate.
- Extensive reconstruction to convert cross taxiways currently connecting Taxiways Y and Z to taxiway connectors that would not allow direct access from Y to runways.
- Relocated Taxiway Y Safety Area and Object Free Area overlap an approximately 750-foot section of blast fence on the northeast side along with an extended section of vehicle service road and a small portion of the north cargo airline apron.

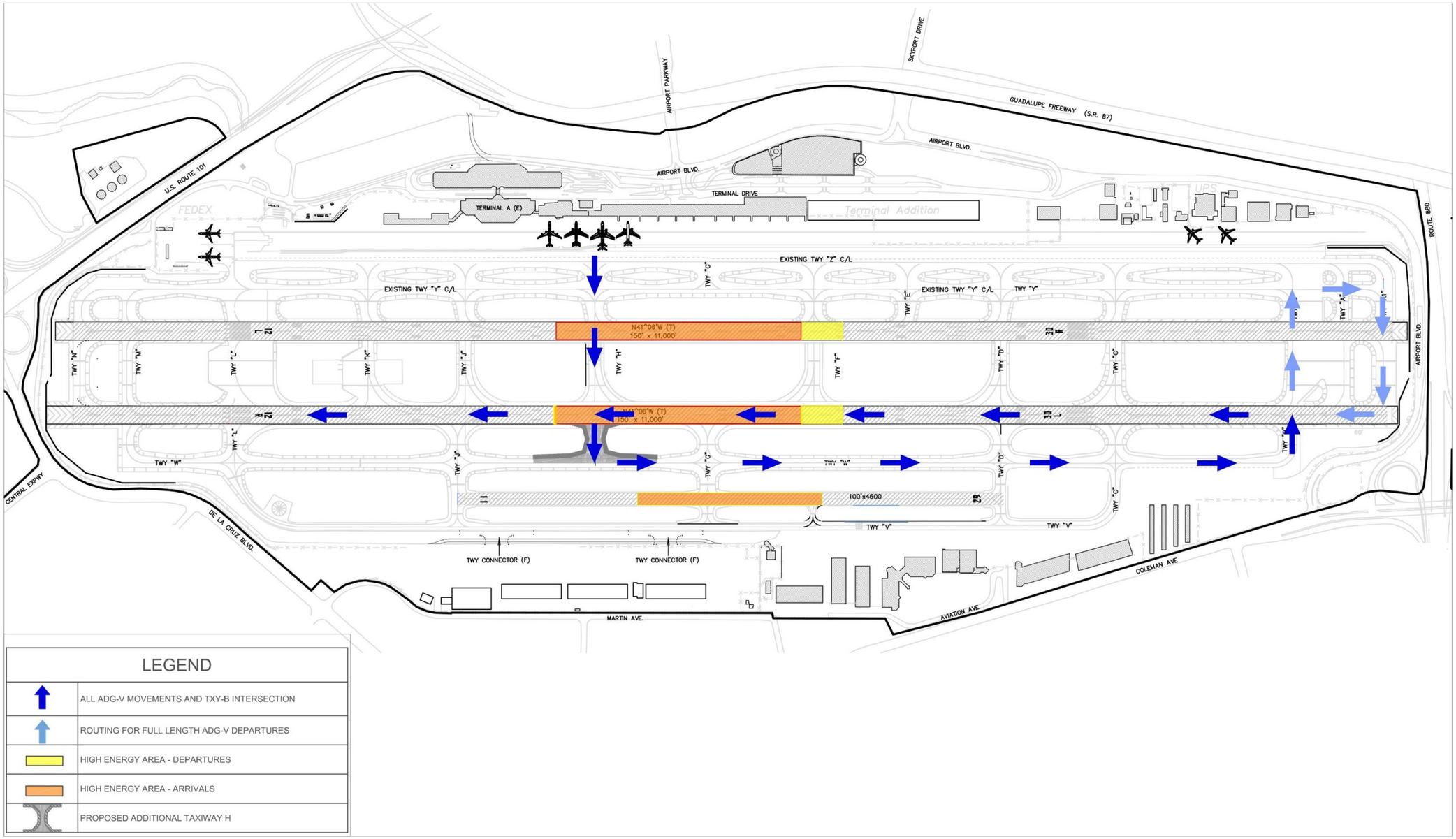
Conclusion: While the separation between Runway 12L/30R and Taxiway Y would meet ADG-IV & V standards, and all aircraft parking positions at terminal gates would be unaffected, the loss of Taxiway Z under Option 5 would likely have significant operational impacts on all commercial aircraft parking apron and taxi movements, resulting in frequent arrival and departure delays.

East Airfield Option 6 – Restrict all ADG-V Arrivals and Departures to Runway 12R/30L and Preclude ADG-V Use of Taxiways Y and Z

Option 6 mitigates the severity of the existing separation deficiencies between Runway 12L/30R, Taxiway Y, and Taxiway Z by restricting ADG-V operations to Runway 12R/30L. No realignment of runways or parallel taxiways would occur, but ADG-V operations would be forced to use Taxiway W as the only available parallel taxiway, with midfield crossings of both Runway 12L/30R and Runway 12R/30L in order to provide a routing to and from the terminal gates. Option 6 could conceptually be expanded to also preclude ADG-IV aircraft from using Runway 12L/30R and Taxiway Y (to fully resolve the 50-foot separation deficiency between 12L/30R and Y), but for purpose of analysis, Option 6 is limited to just ADG-V. **Figures EA-6A/6B/6C/6D** depict the set of conceptual ADG-V taxiway routings to and from Runway 12R/30L. This alternative generates the following key actions, benefits, and impacts:

East Airfield Option 6 Actions:

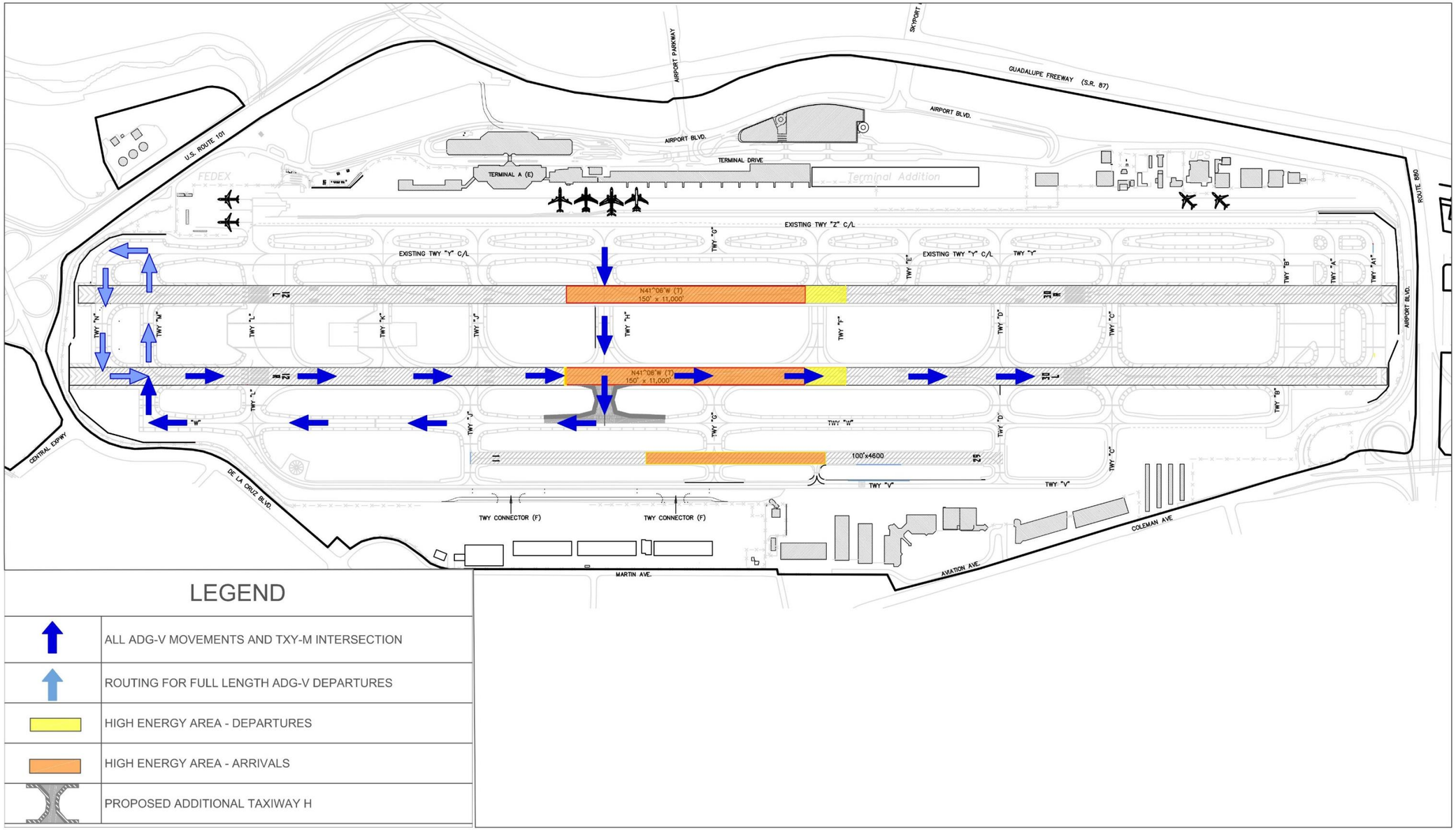
- Develop agreement between Airport and FAA ATCT to operationally restrict all arrivals and departures by ADG-V aircraft to Runway 12R/30L and preclude ADG-V use of Taxiways Y and Z.
- If international gates used by ADG-V aircraft remain at Gates 15-18, then construct an extension to cross Taxiway H from Runway 12R/30L to Taxiway W to allow ADG-V aircraft access to and from 12R/30L ends (in place of Taxiways Y & Z). If international gates used by ADG-V aircraft move to the future Terminal B south concourse, then extend either cross Taxiway E or F to Taxiway W for same purpose.
- If determined feasible, construct an extension of Taxiway W to connect to north and south ends of Runway 12R/30L to allow full length departures for ADG-V aircraft.



LEGEND	
↑	ALL ADG-V MOVEMENTS AND TXY-B INTERSECTION
↑	ROUTING FOR FULL LENGTH ADG-V DEPARTURES
	HIGH ENERGY AREA - DEPARTURES
	HIGH ENERGY AREA - ARRIVALS
	PROPOSED ADDITIONAL TAXIWAY H

Figure EA-6A

Restrict ADG V Operations to Runway 12R/30L (North Flow Departure)



LEGEND

	ALL ADG-V MOVEMENTS AND TXY-M INTERSECTION
	ROUTING FOR FULL LENGTH ADG-V DEPARTURES
	HIGH ENERGY AREA - DEPARTURES
	HIGH ENERGY AREA - ARRIVALS
	PROPOSED ADDITIONAL TAXIWAY H

Figure EA-6B

Restrict ADG - V Operations to Runway 12R/30L (South Flow Departures)

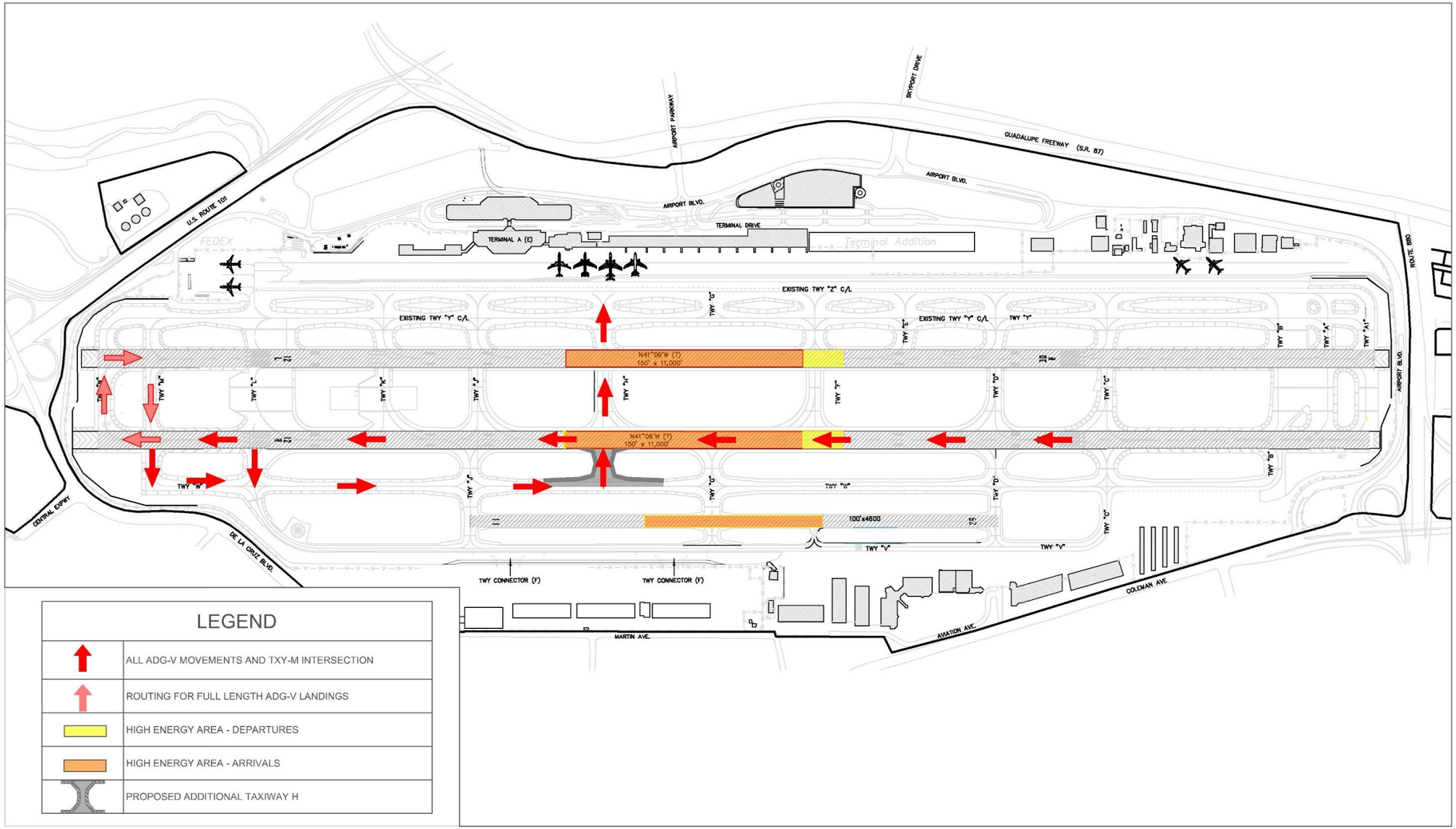


Figure EA-6C

Restrict ADG - V Operations to Runway 12R/30L (North Flow Arrivals)

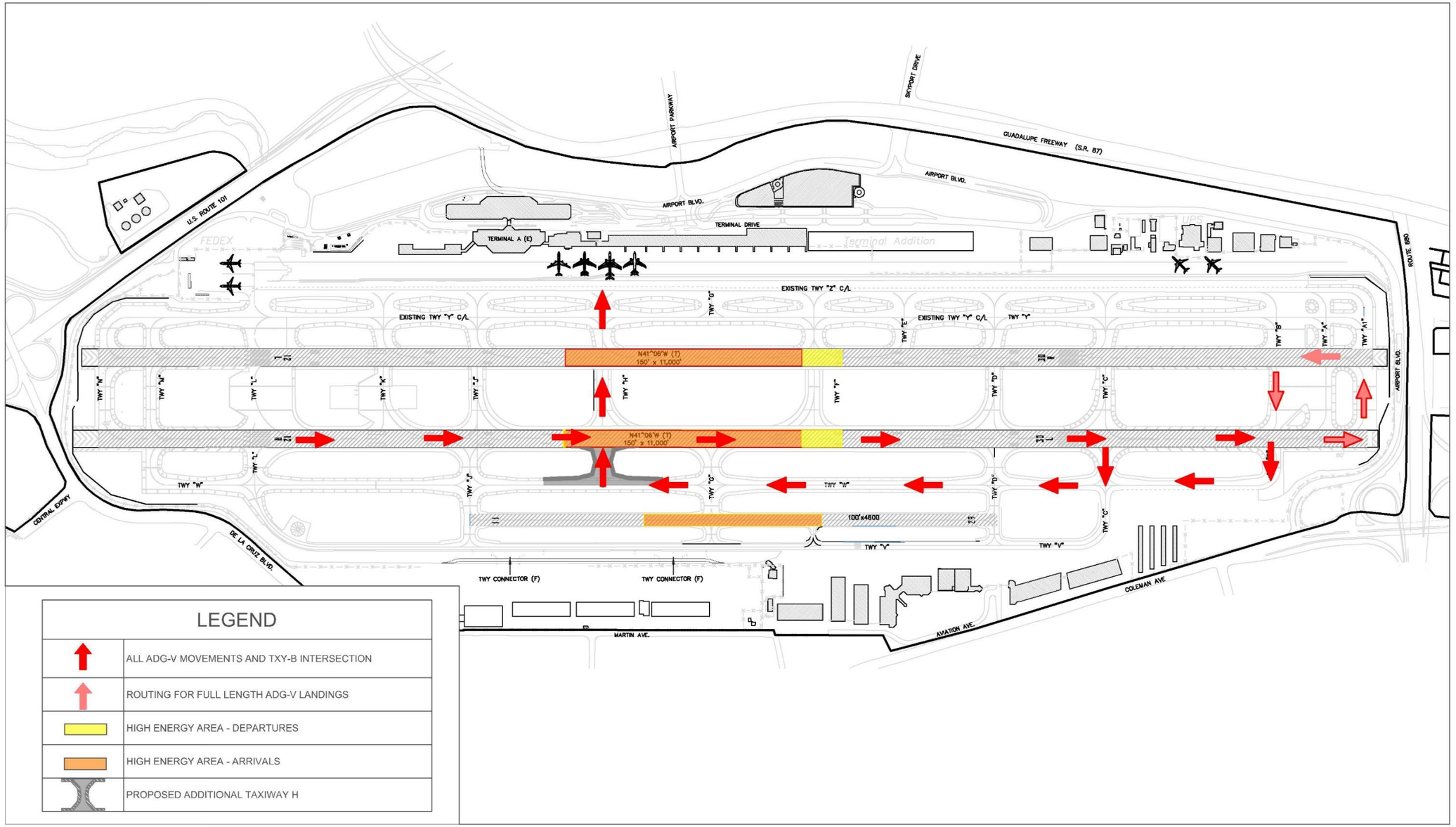


Figure EA-6D

Restrict ADG - V Operations to Runway 12R/30L (South Flow Arrivals)

East Airfield Option 6 Benefits:

- Eliminates the need for operational restrictions for ADG-V operations on Runway 12L/30R, Taxiway Y, and Taxiway Z.
- Reduces Taxiway Z Safety Area and Object Free Area overlap of aircraft parking positions at terminal gates and cargo airline aprons.

East Airfield Option 6 Impacts:

- Does not eliminate the existing Modification to Standards for Runway 12L/30R to Taxiway Y centerline separation and associated ATCT operational restrictions for D-IV aircraft.
- Midfield crossings of Runway 12L/30R and Runway 12R/30L by ADG-V aircraft for access to/from Taxiway W would conflict with FAA airfield safety guidance.
- If Taxiway W cannot be extended to connect to ends of Runway 12R/30L, then ADG-V aircraft would have to conduct additional crossings of runways if use of full length of 12R/30L were required. Multiple runway crossings by taxiing aircraft also conflict with FAA airfield safety guidance.
- Increases air traffic workload and potential operational delay for moving and positioning ADG-V aircraft to and from Runway 12R/30L.

Conclusion: The benefits of removing ADG-V aircraft operations from Runway 12L/30R and Taxiways Y and Z under Option 6 would be offset by a complicated taxi path to/from Runway 12R/30L that would conflict with FAA safety guidance while also not resolving the existing Modification to Standards for ADG-IV separation between Runway 12L/30R and Taxiway Y.

East Airfield Option 7 – Retain the Existing Airfield Configuration

Option 7 is essentially a "no-action" alternative. The existing Modification to Standards for the inadequate separation between Runway 12L/30R and Taxiway Y, and the existing operational procedures for controlling movements of ADG-IV & V aircraft, would remain in place. This alternative generates the following actions, benefits, and impacts:

East Airfield Option 7 Actions:

None

East Airfield Option 7 Benefits:

- Retains runways and parallel taxiways in their existing alignments and existing ADG-III, IV, & V aircraft parking positions at the terminal gates and cargo aprons.
- Does not significantly worsen existing, or create any new, design standards deficiencies.

East Airfield Option 7 Impacts:

- Continues the need for Modification to Standards for the inadequate separation between Runway 12L/30R and Taxiway Y and operational procedures for ADG-IV & V aircraft movements.

- Projected increase in ADG-IV & V aircraft operations may add to controller workload for managing ground movements, potentially leading to increased congestion and delay.

Conclusion: Given the difficulty and adverse impacts of widening the lateral separations between the two commercial runways, parallel taxiways, and aircraft parking aprons under the other conceptual options, Option 7's retention of the existing Modification to Standards for the 350-ft. separation between Runway 12L/30R and Taxiway Y and the associated operational procedures for ADG-IV & V aircraft movements may be the most realistic of all the options considered.

West Airfield Conceptual Design Standards Conformity Options

West Airfield Option 1 – Re-Open Runway 11/29 and Shift Taxiway V to West

Option 1 would convert interim Taxiway W-1 back to operation as Runway 11/29 and provide conformance with ADG-III design standards by realigning Taxiway V to the west. The Taxiway V centerline would be relocated up to 80 feet to the west to provide for a 300-foot separation from the Runway 11/29 centerline. **Figure WA-1** depicts the location of the relocated Taxiway V and its associated safety area and object free area boundaries. This alternative generates the following key actions, benefits, and impacts:

West Airfield Option 1 Actions:

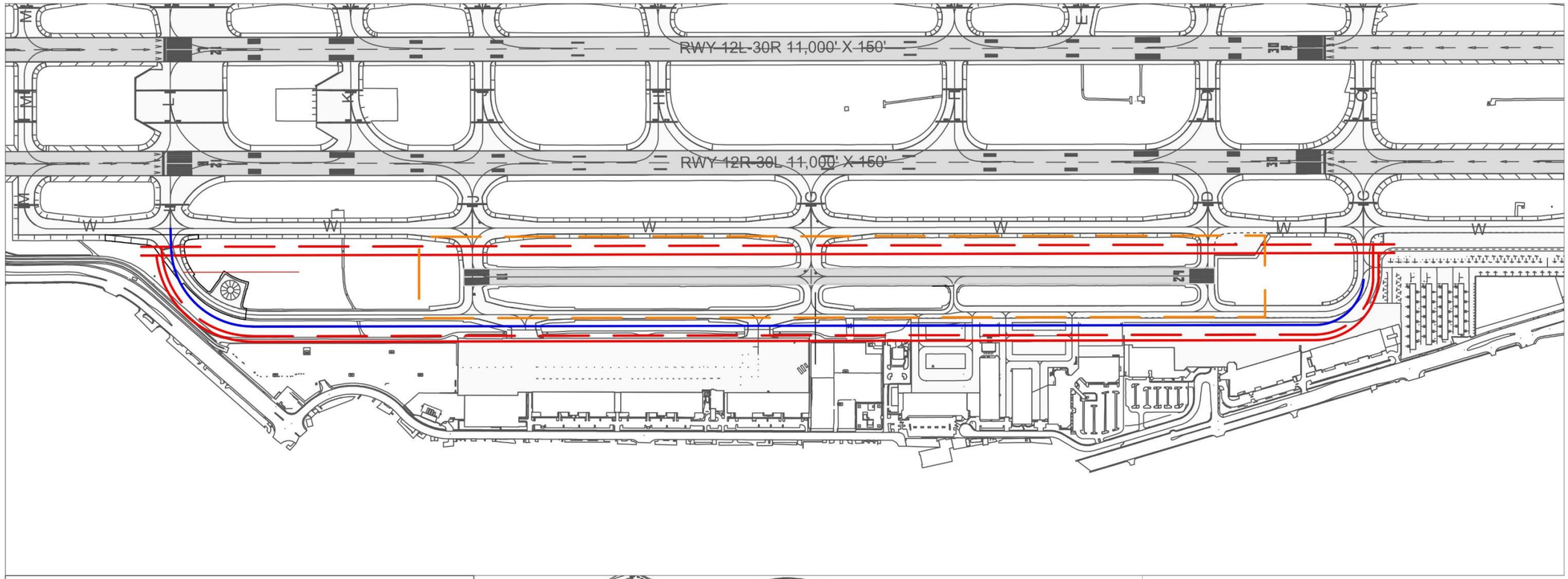
- Shift Taxiway V up to 80 feet to the west of its current centerline alignment with a full-length pavement to serve ADG-III aircraft and provide a consistent 300-ft. separation from Runway 11/29 (ADG-III standard).
- Provide a 118-ft. wide Taxiway V Safety Area, 59 feet on either side of centerline, and a 186-ft. wide Taxiway V Object Free Area, 93 feet on either side of centerline, to comply with ADG-III standards.
- Re-open Runway 11/29 in its existing alignment along with associated lighting, marking, signage, and NAVAID improvements.

West Airfield Option 1 Benefits:

- Returns Runway 11/29 to operation for aircraft up to ADG-II and Airport Approach Category B.
- Eliminates the existing Modification to Standards for Runway 11/29 to Taxiway V separation and ATCT operational restrictions on movements of ADG-III and larger ADG-II aircraft on Taxiway V during Runway 11/29 arrivals and departures.

West Airfield Option 1 Impacts:

- Relocated Taxiway V and its Safety Area and Object Free Area significantly overlap existing general aviation aprons/leaseholds, as well as the Air Traffic Control Tower, vehicle service road, and areas designated for future general aviation development, all of which are not allowed in a Taxiway Safety Area or Object Free Area.



LEGEND	
	TAXIWAY CENTERLINE
	TAXIWAY SAFETY AREA
	RUNWAY SAFETY AREA
	TAXIWAY OBJECT FREE AREA

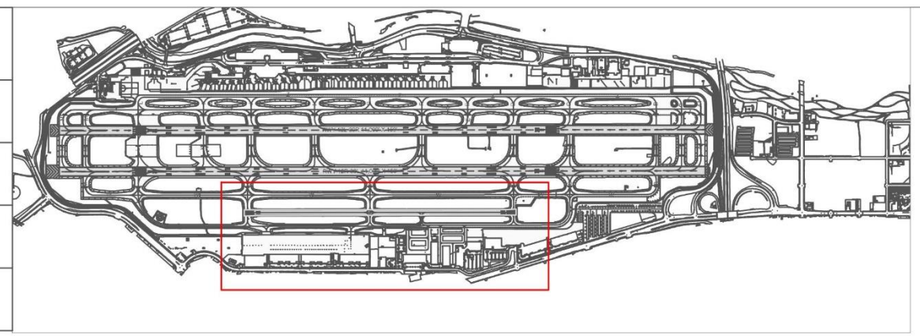


Figure WA-1

Re-Open Runway 11/29, Shift Taxiway V to West

- Potential airfield capacity improvements would be limited due to relatively low level of anticipated ADG-I & II aircraft operations on a re-opened Runway 11/29 as a result of fleet mix trends and FAA Air Traffic recategorization.
- Requires the relocation of the existing general aviation run-up pad at the intersection of Taxiway W at Taxiway D.
- Apron congestion and constrained movements generated as a result of this option could potentially contribute to increase in airfield incursion incidents.

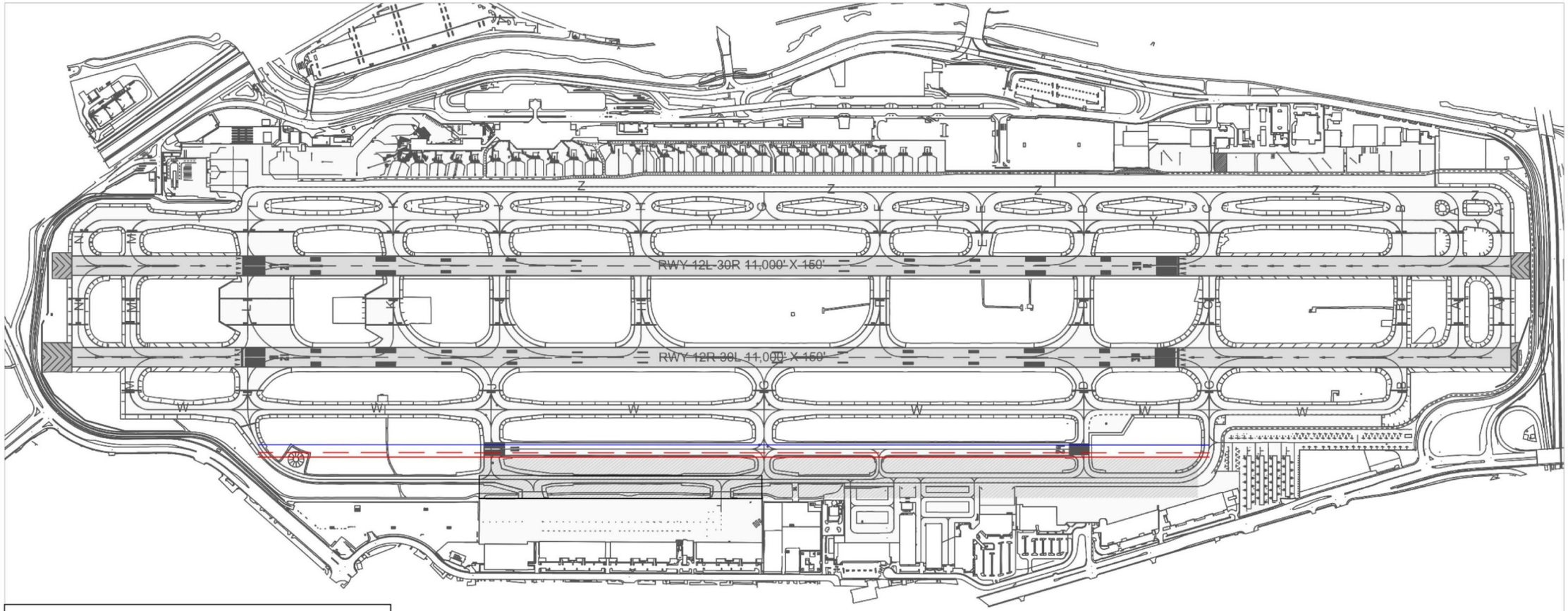
Conclusion: While the separation between Runway 11/29 and Taxiway V would meet ADG-III standards under Option 1, the displacement of a significant portion of general aviation aprons and operational facilities (which cannot be shifted to the west) would severely constrain the Airport's ability to serve general aviation demand. Note: a variation of Option 1 that shifts both Taxiway V and Runway 11/29 to the east, in order to preserve the existing general aviation aprons and operational facilities, would have huge impacts on the other runways and parallel taxiways (similar to East Airfield Option 2).

West Airfield Option 2 – Convert Runway 11/29 to a New ADG-III Taxiway V, Extend South to Taxiway C and North to Taxiway L, Close Existing Taxiway V, and Add an ADG-III Taxilane

Option 2 would permanently convert Runway 11/29 (currently interim Taxiway W-1) to a new Taxiway V that would be extended to Taxiway C to the south and to Taxiway L to the north. Existing Taxiway V would be closed and converted to a parallel taxilane adjacent to the existing and potentially expanded general aviation apron. The new Taxiway V and parallel taxilane alignments would be designed to ADG-III standards. This option would retain dual parallel taxiways west of Runway 12R/30L (existing Taxiway W and a new Taxiway V) and add a apron-edge taxilane to accommodate north/south aircraft movements adjacent to the parking aprons without having to enter onto an active taxiway. The vehicle service road would be relocated at the west boundary of the Taxilane Object Free Area. **Figure WA-2** depicts the location of the relocated and extended Taxiway V and new parallel taxilane. This alternative generates the following actions, benefits, and impacts:

West Airfield Option 2 Actions:

- Close existing Taxiway V and convert most of the existing Runway 11/29 alignment to a new ADG-III Taxiway V extended south to Taxiway C and north to Taxiway L. The new Taxiway V centerline would be set 267 feet west of the existing Taxiway W centerline (ADG-V separation standard).
- Provide a 118-ft. wide Taxiway V Safety Area, 59 feet on either side of the new centerline, and a 186-ft. wide Taxiway V Object Free Area, 93 feet on either side of the new centerline, in compliance with ADG-III standards.
- Replace existing Taxiway V with expanded apron pavement and a parallel ADG-III taxilane adjacent to the edge of the new Taxiway V Object Free Area.
- Align a 24-foot wide vehicle service road adjacent to the edge of the new Taxilane Object Free Area (81 feet from centerline).



LEGEND	
	PROPOSED APRON PAVEMENT
	TAXIWAY/TAXILANE CENTERLINE
	TAXIWAY/TAXILANE SAFETY AREA
	TAXIWAY/TAXILANE OBJECT FREE AREA

Figure WA-2

Convert Runway 11/29 to New Taxiway V, Replace Existing V with Taxilane & Expanded Apron

West Airfield Option 2 Benefits:

- Retains a dual parallel taxiway system west of Runway 12R/30L including a new Taxiway V meeting ADG-III criteria.
- Eliminates the existing Modification to Standards for Runway 11/29 to Taxiway V separation and associated ATCT operational restrictions on movements of ADG-III and larger ADG-II aircraft on the west side.
- Provides a separate ADG-III taxilane to allow north/south movements adjacent to the general aviation aprons without impacting an active taxiway.
- Potentially adds apron pavement depth on a portion of the west side for expanded general aviation aircraft parking/movement or other landside aviation use.

West Airfield Option 2 Impacts:

- Permanent closure of Runway 11/29 requires all general aviation operations to use the commercial runways (as they have since the interim closure of 11/29 was implemented in late 2009) with consequent impacts on in-trail separations and operational efficiency.
- Requires the relocation of the existing general aviation run-up pad at the intersection of Taxiway W at Taxiway D.
- Expanded apron pavement with relocated vehicle service road and new taxilane overlaps an existing drainage swale system parallel to the Signature Flight Support leasehold that would need to be addressed.

Conclusion: Option 2 would resolve the existing west side separation deficiencies between runways, taxiways, and aprons without significant adverse impacts on existing facilities and capacity. The additional taxilane and expanded general aviation apron would potentially improve operational efficiency and landside facility development to accommodate future aviation demand.

West Airfield Option 3 - Convert Runway 11/29 to a New ADG-III Taxiway V, Extend South to Taxiway C and North to Taxiway L, Close Existing Taxiway V and Replace with Expanded Apron

Option 3 would permanently convert Runway 11/29 (currently Taxiway W-1) to a new Taxiway V that would be extended to Taxiway C to the south and to Taxiway L to the north. Existing Taxiway V would be closed and converted to an expanded apron for existing and potential general aviation or other use. The new Taxiway V would be designed to ADG-III standards. This option would retain dual parallel taxiways west of Runway 12R/30L (Taxiway W and new Taxiway V). The principal difference from Option 2 is that instead of a new apron-edge taxilane, the apron pavement would be extended further to the east, with a relocated vehicle service road potentially located at the west boundary of the new Taxiway V Object Free Area. **Figure WA-3** depicts the location of the relocated/extended Taxiway V and expanded west side apron. This alternative generates the following actions, benefits, and impacts:

West Airfield Option 3 Actions:

- Close existing Taxiway V and convert most of the existing Runway 11/29 alignment to a new ADG-III Taxiway V and extend the new V alignment south to Taxiway C and north to Taxiway L. The new Taxiway V centerline would be set 267 feet west of the existing Taxiway W centerline (ADG-V separation standard).

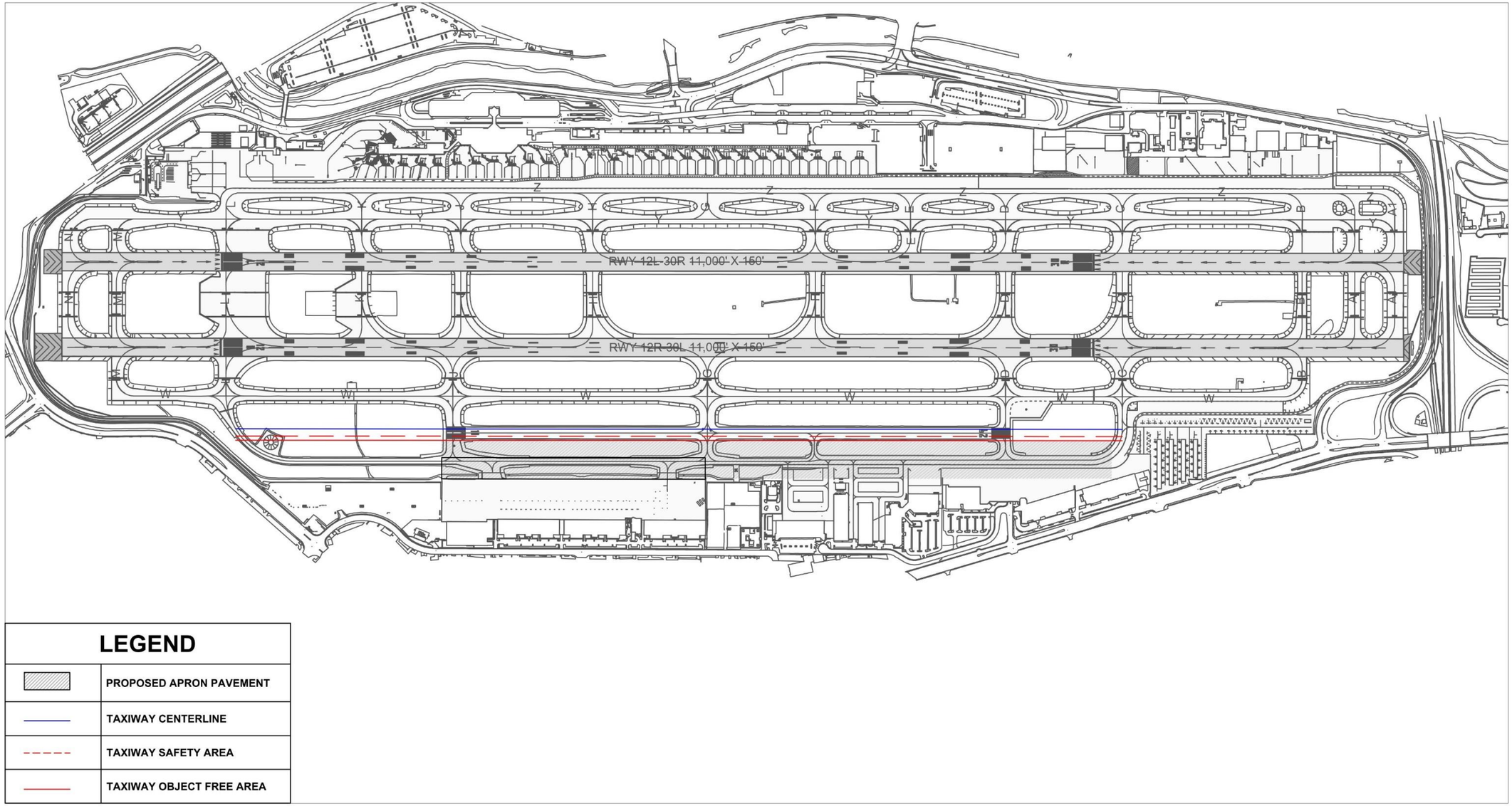


Figure WA-3

Convert Runway 11-29 to New Taxiway V, Replace Existing V with Expanded Apron

- Provide a 118-ft. wide Taxiway V Safety Area, 59 feet on either side of the new centerline, and a 186-ft. wide Taxiway V Object Free Area, 93 feet on either side of the new centerline, to comply with ADG-III standards.
- Replace existing Taxiway V with expanded apron pavement potentially out to the edge of the new Taxiway V Object Free Area (81 feet from centerline).
- Align a 24-foot wide vehicle service road along the edge of the expanded apron pavement.

West Airfield Option 3 Benefits:

- Retains a dual parallel taxiway system west of Runway 12R/30L including a new Taxiway V meeting ADG-III criteria.
- Eliminates the existing Modification to Standards for Runway 11/29 to Taxiway V separation and associated ATCT operational restrictions on movements of ADG-II aircraft over a certain wingspan and all ADG-III aircraft on the west side.
- Provides up to an estimated 120 feet of additional apron pavement depth for expanded general aviation aircraft parking/movement or other landside aviation use.

West Airfield Option 3 Impacts:

- Permanent closure of Runway 11/29 requires all general aviation operations to use the commercial runways (as they have since the interim closure of 11/29 was implemented in late 2009) with consequent impacts on in-trail separations and operational efficiency.
- Requires the relocation of the existing general aviation run-up pad at the intersection of Taxiway W at Taxiway D.
- Expanded apron pavement overlaps an existing drainage swale system parallel to the Signature Flight Support leasehold that would need to be addressed.
- To be determined whether expansion of apron pavement out to the edge of the new Taxiway V Object Free Area is needed to accommodate projected aviation demand.

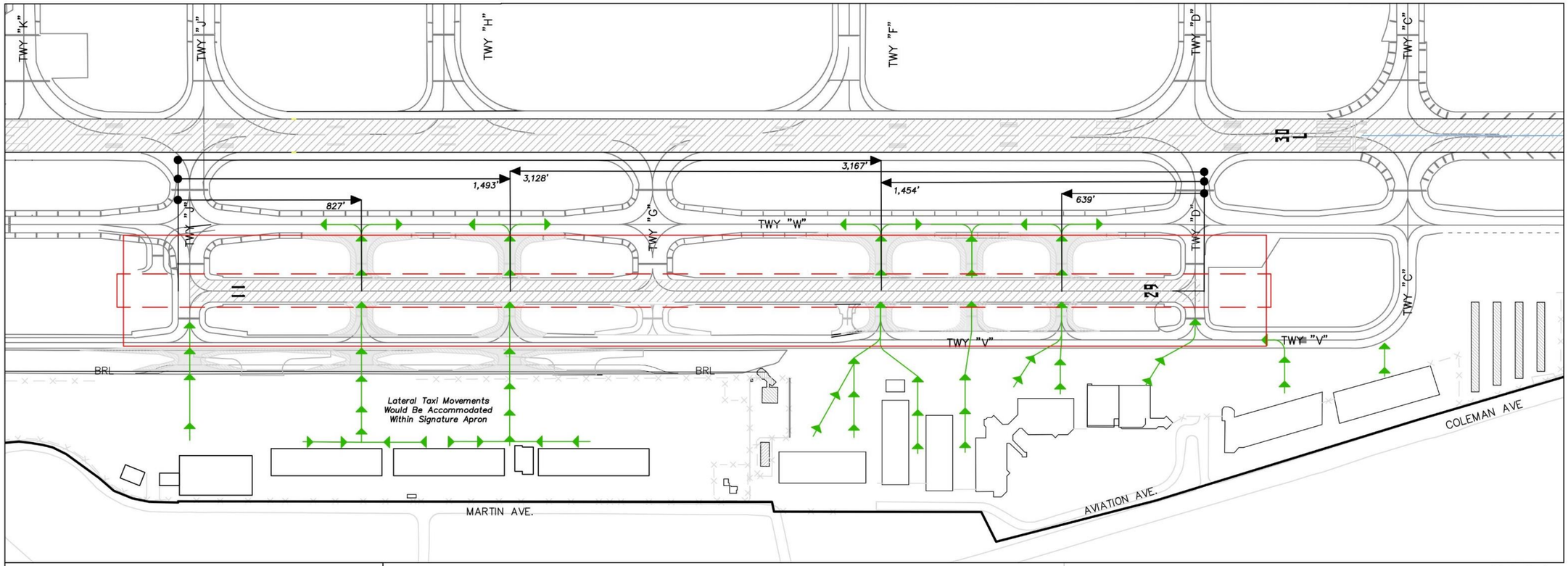
Conclusion: As in Option 2, Option 3 would resolve the existing west side separation deficiencies between runways, taxiways, and aprons without significant adverse impacts on existing facilities and capacity. The additional apron pavement would potentially improve operational efficiency and landside facility development to accommodate future aviation demand.

West Airfield Option 4 – Re-Open Runway 11/29 and Close Taxiway V

Option 4 would convert interim Taxiway W-1 back to operation as Runway 11/29 and provide conformance with ADG-III design standards by closing Taxiway V. All operations on Runway 11/29 would be required to use existing Taxiway W for movement between the runway and west side parking aprons. The existing alignment of Taxiway V would be replaced with a relocated vehicle service road and a small expansion of apron pavement. **Figure WA-4** depicts a conceptual set of aircraft routings to and from Taxiway W. This alternative generates the following actions, benefits, and impacts:

West Airfield Option 4 Actions:

- Re-open Runway 11/29 in its existing alignment along with associated lighting, marking, signage, and NAVAID improvements.



LEGEND	
	NEW TAXIWAY CONNECTOR
	AIRCRAFT MOVEMENT TRACKS
	RUNWAY SAFETY AREA
	RUNWAY OBJECT FREE AREA

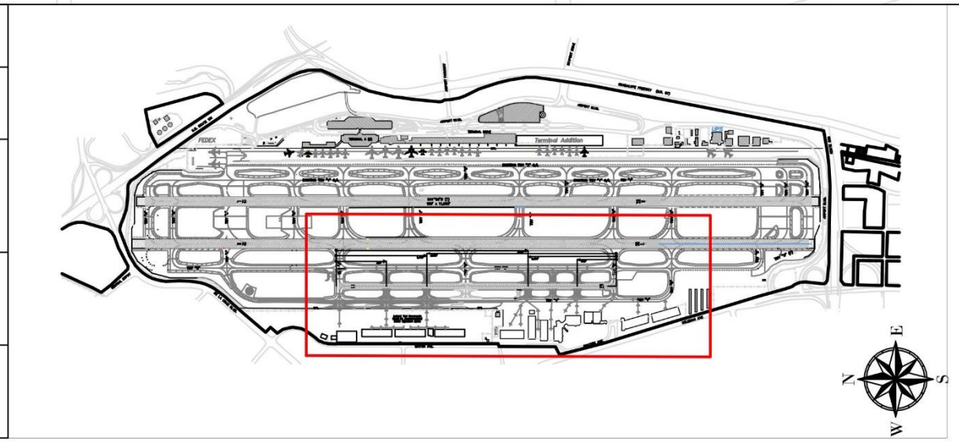


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Figure WA-4

Re-Open Runway 11/29 and Close Taxiway V

- Reconstruct or add new cross taxiway connections between closed Taxiway V and Runway 11/29 (preferably outside the high energy portion of the runway) in order to provide aircraft access to and from the runway via Taxiway W.

West Airfield Option 4 Benefits:

- Returns Runway 11/29 to operation for aircraft up to ADG-II and Airport Approach Category B.
- Eliminates the existing Modification to Standards for Runway 11/29 to Taxiway V separation and ATCT operational restrictions on movements of ADG-II aircraft over a certain wingspan and all ADG-III aircraft on Taxiway V during Runway 11/29 arrivals and departures.

West Airfield Option 4 Impacts:

- Potential airfield capacity improvements would be limited due to relatively low level of anticipated ADG-I & II aircraft operations on a re-opened Runway 11/29 as a result of fleet mix trends and FAA Air Traffic recategorization.
- No parallel taxiway available for aircraft movements between Runway 11/29 and general aviation aprons.
- Increases the number of cross taxiway crossings of Runway 11/29 for aircraft movements between FBO aprons and Taxiway W, in conflict with FAA airfield safety guidance.
- Triggers the potential for head to head taxi movements on Taxiway W with resultant impact to operational efficiency.
- Potentially constrains aircraft parking capability and apron movements on Signature Flight Support, Atlantic Aviation, and potential future FBO aprons.
- Requires the relocation of the existing general aviation run-up pad at the intersection of Taxiway W at Taxiway D.

Conclusion: While the west side design standard deficiencies would be resolved under Option 4, severe operational inefficiencies and safety risks would potentially result from the additional cross taxiway movements across an active Runway 11/29 (for access to/from Taxiway W) and from constrained north/south movements along the general aviation aprons.

West Airfield Option 5 – Re-Open Runway 11/29 and Retain the Existing Airfield Configuration

Option 5 is a "no-action" alternative as depicted on the SJC Airport Layout Plan. Interim Taxiway W-1 would be converted back to Runway 11/29. The existing Modification to Standards for the inadequate separation between Runway 11/29 and existing Taxiway V, and the associated operational procedures for controlling movements of certain ADG-I & II and all ADG-III aircraft, would be reactivated. In addition, given the historical and projected increase in ADG-III general aviation aircraft at SJC, the Modification to Standards would likely need to be expanded to include movements by ADG-III aircraft on Taxiway V.

West Airfield Option 5 Actions:

- Re-open Runway 11/29 in its existing alignment along with associated lighting, marking, signage, and NAVAID improvements.

West Airfield Option 5 Benefits:

- Returns Runway 11/29 to operation for aircraft up to ADG-II and Airport Approach Category B.

West Airfield Option 5 Impacts:

- Continues the need for the Modification to Standards and operational procedures for the inadequate separation between Runway 11/29 and Taxiway V, adding to controller workload for managing ground movements and, in turn, potential congestion and delay.
- Continues the design standards deficiencies associated with general aviation aircraft parking/movement and the vehicle service road within portions of the Taxiway V Safety Area and Object Free Area.
- Potential airfield capacity improvements would be limited due to relatively low level of anticipated ADG-I & II aircraft operations on a re-opened Runway 11/29 as a result of fleet mix trends and FAA Air Traffic recategorization.
- Potential increase in crossings of Runway 11/29 for aircraft movements between general aviation aprons and Taxiway W would conflict with FAA airfield safety guidance.
- High likelihood that FAA would not be agreeable to retain or expand the current Modification to Standards given increases in ADG-III general aviation operations.

Conclusion: Under Option 5, the design standard deficiencies associated with the operation of Runway 11/29 and Taxiway V would continue and be exacerbated by the growth in ADG-III general aviation aircraft, leading to potentially severe operational inefficiencies and safety risks from controlling aircraft ground movements on Taxiway V and crossings of an active Runway 11/29.

Other Design Standards Conformity Considerations

The conceptual alternatives presented above primarily focus on two of the noteworthy SJC design standards conformity issues, i.e., the existing lateral separation deficiencies between Runway 12L/30R and parallel Taxiway Y on the east airfield, and between Runway 11/29 (if reactivated) and parallel Taxiway V on the west airfield. The other design standards deficiencies associated with SJC's runways (identified earlier in this study) consist of the following:

- Runway 12R/30L Object Free Area Width
- Runway 12R/30L Centerline to Holding Position
- Runway 12L/30R Shoulder Width
- Runway 12L/30R Blast Pad Length and Width
- Runway 11/29 Centerline to Holding Position

Each of these design standards deficiencies is addressed below. As noted, most of the conceptual actions to achieve conformity with current standards are physically feasible, and can be incorporated as elements of the conceptual alternatives presented above without creating any additional viability impacts.

Runway 30L Object Free Area Width

For runways serving ADG-IV & V aircraft, the FAA design standard for width of the Runway Object Free Area (ROFA) is 800 feet (400 feet on either side of the runway centerline). The Runway 30L end has a ROFA width of 500 feet (250 feet on either side of centerline) which is an FAA-approved Modification to Standards listed on the current Airport Layout Plan for SJC. This non-conformity serves to accommodate multiple physical features at the south end of the Airport that fall within a full-width ROFA on the west side of the runway centerline, including the curve of the on-airport public roadway (Airport Boulevard), perimeter security fence, airfield vehicle service roadway, and jet blast deflector fence. The east side of the 30L centerline does provide for a standard 250-foot width.

Given the current alignment of the runway, the conceptual actions to provide for a full 400-foot ROFA width on the west side of the centerline on the 30L end would require an extensive relocation and reconfiguration of existing improvements, both on and off-airport. The critical feature is the curve of Airport Boulevard, an alignment needed to intersect Coleman Avenue a safe distance from the adjacent I-880/Coleman Avenue interchange. A closure and removal of this segment of Airport Boulevard to potentially allow a realignment of the perimeter security fence, airfield vehicle service road, and runway blast fence to physically resolve the ROFA deficiency would eliminate a key roadway entry/exit point for the Airport, in turn disrupting surface traffic movements to/from the passenger terminals and other commercial aviation facilities on the east side of SJC. An option of relocating the Airport Boulevard/Coleman Avenue intersection to the south (to eliminate the existing curve of Airport Boulevard) is not considered feasible as it would require relocating and reconstructing the freeway interchange, existing off-airport development, other roadways, and utilities.

A more practical option is to retain the existing ROFA width on the west side of 30L. Aircraft movements at the runway ends involve low speeds. Arrivals on 30L don't touch down until reaching the displaced threshold more than 2500 further down the runway; departures on 30L are just beginning takeoff roll; and arrivals on 12R have either already exited the runway or are taxiing at a slow speed (moreover, runway pavement at the south end is unavailable for south flow arrivals under SJC's declared distances). Given such operating conditions, an aircraft excursion from the runway pavement beyond the limits of the existing 30L ROFA is, at the very most, extremely improbable. Therefore, the difference in aircraft operational safety between the existing 500-foot wide ROFA and a design standard 800-foot wide ROFA at the 30L end appears to be minimal.

Runway 12R Object Free Area Width

The ROFA design standard deficiency at the Runway 12R end is only approximately 10 feet on the west side of the centerline (390 feet from centerline vs the 400-foot standard). Similar to the 30L end, this non-conformity serves to accommodate multiple physical features that curve around the north end of the Airport, with the jet blast deflector fence being the structure that slightly penetrates a 400-foot ROFA width from centerline.

The same operational considerations noted for the 30L end apply to the 12R end as well. Arrivals on 12R don't touch down until reaching the displaced threshold approximately 1300 feet further down the runway; departures on 12R are just beginning takeoff roll; and arrivals on 30L have either already exited the runway or are taxiing at a slow speed (with declared distances designating the northernmost section

of pavement as unavailable for north flow arrivals). Therefore, physical actions to move a portion of the runway blast fence another 10 feet to the northwest, which in turn would require shifts in the vehicle service roads, perimeter security fence, and potentially an off-airport public roadway (De La Cruz Boulevard) with consequent development and utility relocation implications, would not result in any measurable improvement to aircraft operational safety.

Runway 12R/30L Centerline to Holding Position

The FAA design standard for distance between a runway centerline and the hold line of an intersecting taxiway is based on the applicable Runway Design Code (RDC) and visibility minimums. The current hold positions for both Runway 12R/30L and Runway 12L/30R are placed 250 feet from the centerlines in conformance with a RDC D-IV standard and the current visibility minimums (¾ mile and above for Runway 12L/30R and less than ¾ mile for Runway 12R/30L).

For Runway 12L/30R, the existing 250-foot centerline to hold position distance also complies with the FAA design standard for ADG-V aircraft given its visibility minimums. For Runway 12R/30L, with its lower visibility minimums, conformance with the design standard for ADG-V aircraft would require lengthening the runway centerline to hold position distances by 30 feet to achieve the 280-foot standard. Relocation of the existing Runway 12R/30L hold positions, and their associated markings, signage, and lighting, an additional 30 feet outward from the centerline is feasible without impacting any other design standard or operational procedure.

Runway 12L/30R Shoulder Width

The FAA design standard for pavement width of runway shoulders is 25 feet for ADG-IV aircraft and 35 feet for ADG-V aircraft. The existing shoulder width along Runway 12R/30L is 35 feet, meeting the ADG-V standard. The shoulders along Runway 12L/30R are currently 25 feet wide. Widening the Runway 12L/30R shoulders is feasible without impacting any other design standard or operational procedure. However, the value of such additional pavement is questionable. Paved shoulders are required primarily to mitigate the impact of jet blast from departure thrust and arrival reverse thrust, with the 35-foot ADG-V design standard based on larger 4-engine aircraft, such as the B-747 and A-340, which are not projected to operate at SJC. Two-engine ADG-V aircraft such as the B-777 and A-350, which are in the projected SJC fleet, have their engines much more closely spaced and don't necessarily create a need for paved shoulders wider than 25 feet. Therefore, widening the Runway 12L/30R shoulders can be considered a low priority at best.

Runway 12L/30R Blast Pad Length and Width

Runway design standards for RDC D-V require runway blast pads off each end of a runway to be 220 feet in width by 400 feet in length. Runway 12R/30L currently complies with these standards at both ends, with the presence of the jet blast deflector fences mitigating the need for a full pavement length of 400 feet. Runway 12L/30R has a blast pad width of 200 feet at both ends (ADG-IV standard) at both ends, and the existing jet blast deflector fences mitigate the need for a full pavement length of 400 feet, although at the 12L end there is an approximately 30-foot gap between the end of the blast pad pavement and the blast fence. Widening the 12l/30R blast pads by 10 feet on either side of centerline to achieve the 220-foot ADG-V standard is feasible, as well as paving the small gap of bare ground between the existing pad and the base of the blast fence at the 12L end.

Runway 11/29 Centerline to Holding Position

Runway 11/29, when operational as a RDC B-II visual runway, had centerline to hold position distances of 125 feet, which is the FAA design standard for A-II and B-II aircraft under 12,500 lbs. If the runway is reactivated, the applicable distance standard would be 200 feet. Relocation of the former Runway 11/29 hold positions, and their associated markings, signage, and lighting, an additional 75 feet outward from the centerline to achieve the 200-foot standard for all A-II/B-II aircraft is physically feasible only on the east side of the runway. On the west side of the runway, assuming existing Taxiway V remains in its existing alignment, conformity with the 200-foot separation standard is not feasible operationally due to the deficient Runway 11/29 to Taxiway V centerline separations (220-232.5 feet). Aircraft would effectively be required to hold on Taxiway V rather than on a cross taxiway, or aircraft movements on Taxiway V would have to precluded while an aircraft was holding on a cross taxiway. An option of restricting use of a reactivated Runway 11/29 to A-II/B-II aircraft under 12,500 lbs. would allow retention of 125-foot hold line separation distances, but would reduce the utility of the runway to an even smaller segment of the projected operational fleet.

B. NON-STANDARD AIRFIELD GEOMETRY MITIGATION ALTERNATIVES

In addition to evaluating the reconfiguration of the airfield to provide improved compliance with current FAA design standards, a goal of this study is also to provide improved compliance with current FAA geometric criteria for mitigating potential runway incursions and surface incidents. From review conducted earlier in the study, the airfield at SJC was found to generally conform to current geometric criteria with three primary exceptions:

- **Avoid Direct Access from an Apron to a Runway**. Taxiways that lead directly from an apron to a runway create the potential for an aircraft to enter onto a runway mistaken for a parallel taxiway, or after missing a turn onto a parallel taxiway. The recommended mitigation is to provide only indirect access by offsetting cross taxiway intersections along the path between an apron and runway, thereby requiring an aircraft to make multiple 90-degree turns. Most of the existing cross taxiways on the east side of the SJC airfield, and several existing cross taxiways on the west side of the airfield, currently allow for direct access from an apron to a runway.

- **Avoid Wide Expanses of Pavement**. Wide taxiway pavements are problematic due to placement of signs and markings that might not be in direct view of a pilot and therefore can be missed. This is especially critical at runway entrance points. At SJC, two large expanses of airfield pavement exist on the easterly side of the airfield, one along cross Taxiway B between Runway 12L/30R and parallel Taxiway Z and one along cross Taxiway L between Runway 12R/30L and parallel Taxiway Y.

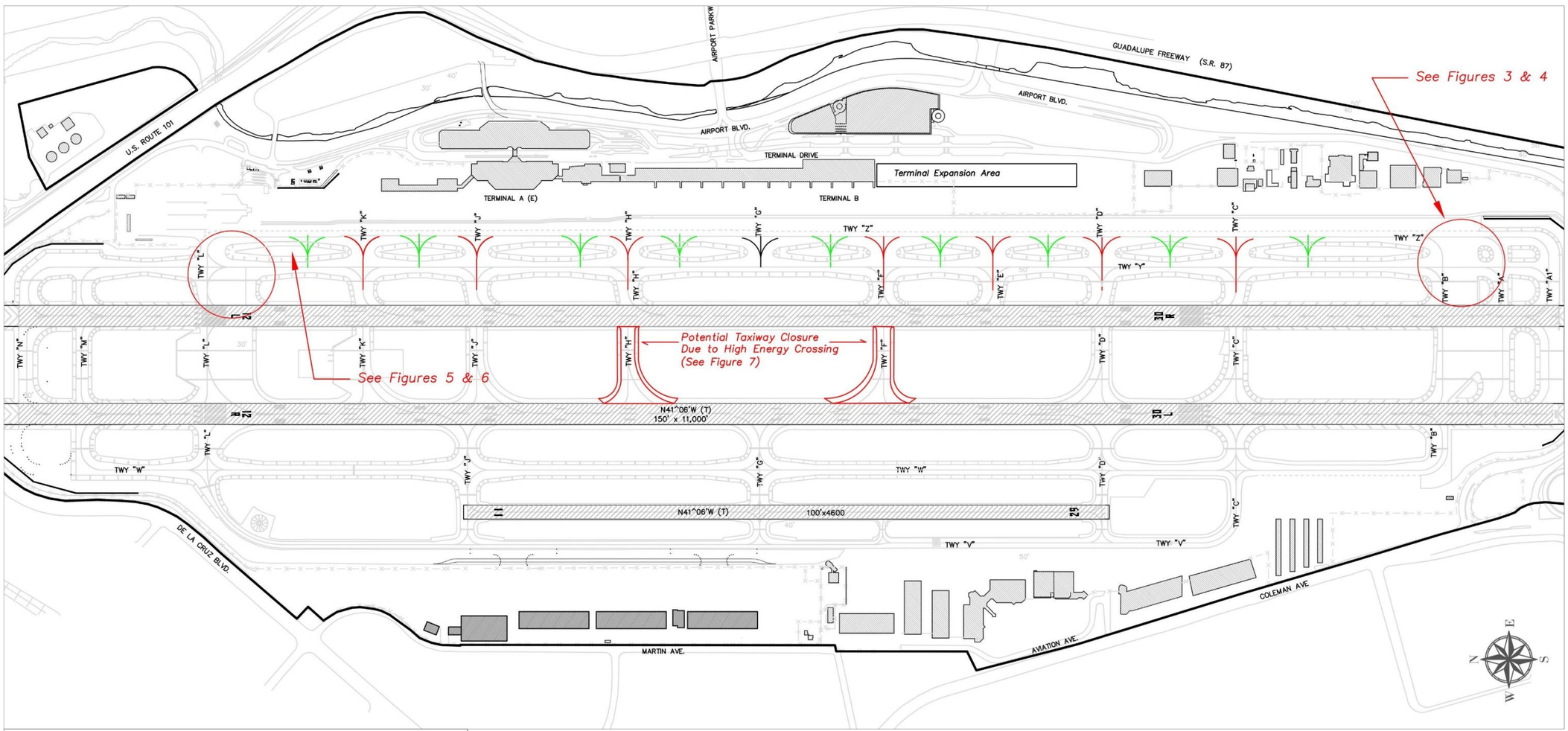
- **Avoid "High-Energy" Intersections.** The middle third of a runway is the portion where the speed of an arriving or departing aircraft makes it difficult to take evasive action to avoid a collision with another aircraft or vehicle that mistakenly enters onto the runway. Several of SJC's cross taxiways currently intersect one or more runways along the high-energy segment.

Conceptual mitigation actions at SJC for each of these criteria are presented below. For purposes of this analysis, the airfield at SJC is again divided into two areas: the "East Airfield" primarily utilized by commercial airlines, and the "West Airfield" primarily utilized by general aviation.

Mitigation for Direct Access from Aircraft Apron to a Runway

East Airfield Direct Apron to Runway Access, Option 1 – Full Conformity on all Cross Taxiways

Nine of the ten existing cross taxiways located along Taxiway Z provide direct access to Runway 12L/30R with no intervening turns. Option 1 offsets the connections between parallel Taxiways Z and Y on all nine cross taxiways (B, C, D, E, F, H, J, K, L) so that any aircraft taxiing from the apron to the runway would need to execute two 90-degree turns to reach the runway. **Figure 1** displays the conceptual adjustments to these cross taxiways between the aircraft apron and Runway 12L/30R. This mitigation alternative generates the following actions, benefits, and impacts:



LEGEND	
	TAXIWAY SEGMENT CLOSURE
	NEW TAXIWAY SEGMENTS
	POTENTIAL TAXIWAY CLOSURE - DUE TO HIGH ENERGY CROSSINGS

Not to Scale

Figure 1

East Airfield - Direct Apron to Runway Access - Option 1

East Airfield Option 1 Actions:

- Construct nine new taxiway connections between Taxiway Z and Taxiway Y (each approximately 145 feet in length with a varying width due to fillets) and relocate or install new associated lighting, markings, and signs.
- Remove the nine existing cross taxiway segments between Taxiway Z and Taxiway Y, associated lighting, markings, and signs, and replace with a pervious ground surface.

East Airfield Option 1 Benefits:

- Fully conforms with elimination of direct access from an apron to a runway on the east side of the airfield.
- Retains the operational capability to accommodate aircraft movements along Taxiways Y and Z.
- Intersection offsets on cross Taxiways B, F, H and L can be combined with actions that address other geometric criteria.

East Airfield Option 1 Impacts:

- Phasing of actions would likely require several years of construction activity, with operational impacts on aircraft movements on both Taxiway Z and Taxiway Y while improvements are underway.
- Involves relocation of cross taxiway segments where there is no history of an incursion event occurring and not identified in this study's baseline safety risk assessment as having an elevated likelihood or severity of a runway incursion.
- Potential for pilot and controller confusion during and immediately after implementation of improvements.

East Airfield Direct Apron to Runway Access Option 2 – Conformity on Selected Cross Taxiways (B, C, D, H, J, L)

Option 2 is a subset of Option 1 that reduces the number of cross taxiway relocations between Taxiways Z and Y to the six that were identified in this study's baseline safety risk assessment as having a credible likelihood or potential increase in severity of an incursion incident as determined by the FAA safety risk assessment methodology. The six selected cross taxiways (B, C, D, H, J, and L) would be reconfigured to preclude direct access as in Option 1. **Figure 1** displays the conceptual adjustments to these cross taxiways between the aircraft apron and Runway 12L/30R. This mitigation alternative generates the following actions, benefits, and impacts:

East Airfield Option 2 Actions:

- Construct six new taxiway connections between Taxiway Z and Taxiway Y (each approximately 145 feet in length with a varying width due to fillets) and relocate or install new associated lighting, markings, and signs.
- Remove the six existing taxiway connections between Taxiway Z and Taxiway Y, associated lighting, markings, and signs, and replace with a pervious ground surface.
- Monitor incident reports at the three cross taxiways not addressed in Option 2 to determine if similar mitigation should be conducted in the future.

East Airfield Option 2 Benefits:

- Eliminates direct access from an apron to a runway on the east side of the airport at the locations identified by the FAA safety risk assessment methodology as having either an increased likelihood or elevated severity potential for an incident.
- Retains the operational capability to accommodate aircraft movements along Taxiways Y and Z.
- Eliminating direct access to Runway 12L/30R from cross Taxiways B, H, and L can be combined with actions that address other geometric criteria.
- Cost and timeframe for implementation is less than Option 1 due to three fewer taxiway relocations/removals.

East Airfield Option 2 Impacts:

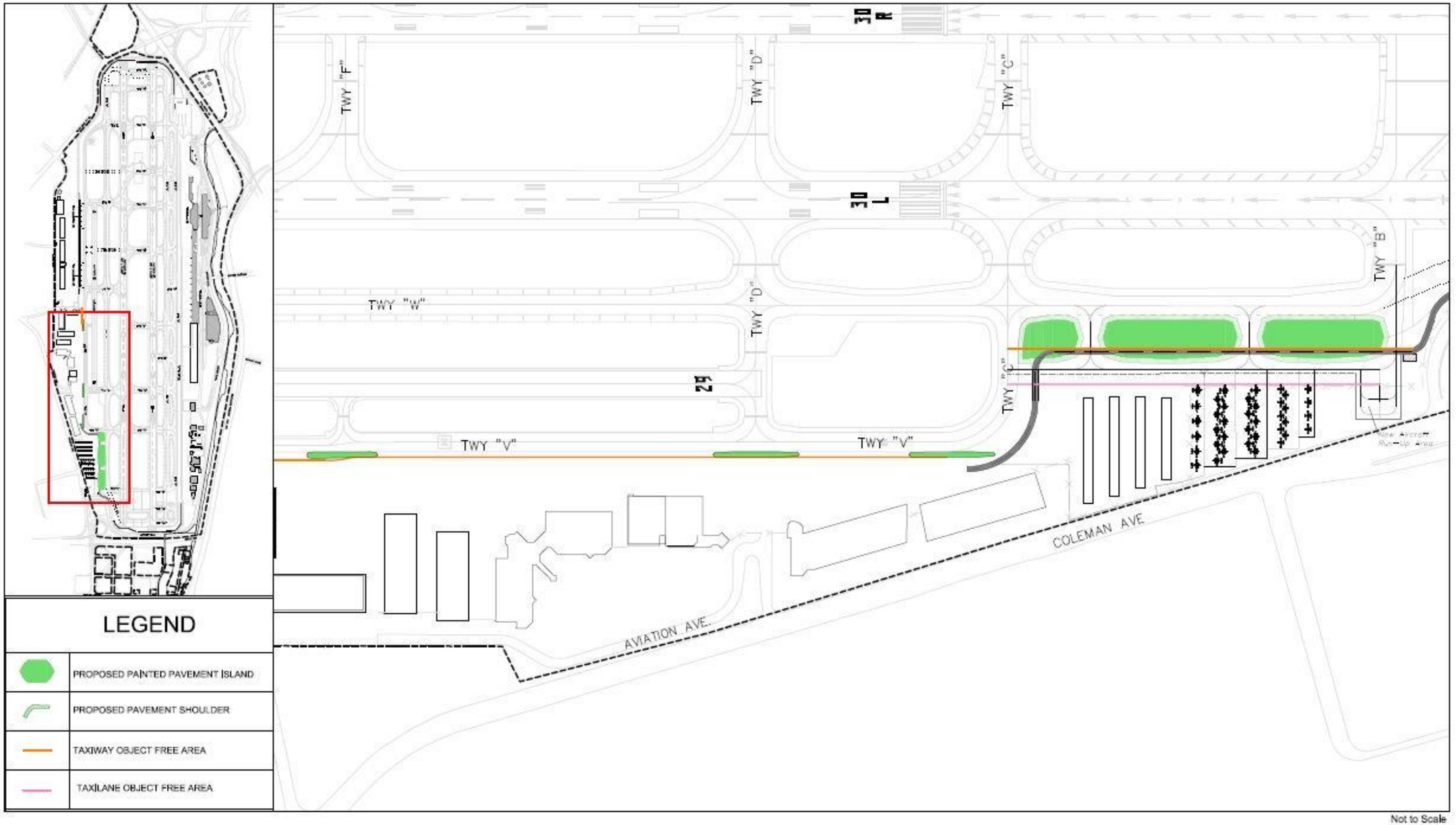
- Operational impacts on aircraft movements on both Taxiway Z and Taxiway Y while improvements are underway.
- Potential for pilot and controller confusion during and immediately after implementation of improvements.

West Airfield Direct Apron to Runway Access

On the west side of the airfield, direct access from parking aprons to Runway 12R/30L is provided by three existing cross taxiways (B, C, and D) and, if Runway 11/29 is re-opened, direct access from parking aprons would be provided by two existing cross taxiways (D and F). The one west airfield option to mitigate direct access is to block off those access locations in the form of pavement painting or pavement removal. Aircraft from the existing Atlantic Aviation, Hewlett Packard, and AvBase aprons would be required to turn onto parallel Taxiway V before turning onto a cross taxiway, while aircraft at the southwest tiedown/t-hangar apron would be required to turn onto parallel Taxiway W before turning onto a cross taxiway. To facilitate aircraft movements at the southwest apron, up to two access points would likely need to be provided to channel aircraft movements from the apron to Taxiway W between existing cross Taxiways B and C, along with a new parallel taxilane adjacent to the apron; additionally, a reconfiguration of the tiedown spaces to an east/west orientation would preserve parking capacity and perhaps allow for a relocated run-up pad. **Figure 2** displays the conceptual adjustments to provide indirect access from the general aviation aprons to Runway 12R/30L and a re-activated Runway 11/29. This mitigation alternative generates the following actions, benefits, and impacts:

West Airfield Actions:

- Remove or paint sections of apron edge pavement at existing entries to cross Taxiways B, C, D, and (if Runway 11/29 is re-activated) F.
- Construct one or two ADG-I & II taxiway connectors to Taxiway W from the southwest general aviation apron and a taxilane along the outer edge of the southwest apron to facilitate aircraft movement to and from the new Taxiway W connector(s).
- Reconfigure the southwest general aviation tiedown spaces to an east/west orientation to preserve parking capacity, facilitate aircraft movement, and allow for potential relocation of the general aviation run-up pad from its existing location at Taxiways W and D.



Not to Scale

Figure 2

West Airfield – Direct Apron to Runway Access

Mineta San Jose International Airport
Runway Incursion Mitigation/Design Standards Analysis

West Airfield Benefits:

- Fully conforms with elimination of direct access from an apron to a runway on the west side of the airfield.
- New taxilane and taxiway connectors to Taxiway W in the southwest general aviation area improves the safety of aircraft movements and also reduces the existing expanse of pavement adjacent to Taxiway W between cross Taxiways B and C.
- Potentially allows a relocated run-up pad in the southwest area, thus mitigating the potential for surface incidents at the Taxiway W and D intersection (FAA designated Hotspot 2).

West Airfield Impacts:

- Closure of direct access to cross Taxiway F (if Runway 11/29 is re-activated) impacts an access point to the northern portion of the Atlantic Aviation apron, while closure of direct access to cross Taxiway C may impact access to the southern portion of the AvBase apron.
- Potential for pilot and controller confusion during and immediately after implementation of improvements.

Mitigation for Expansive Airfield Pavement

East Airfield Expansive Airfield Pavement, Taxiway B, Option 1 - Shift Alignment of Taxiway B between Taxiways Z and Y, and Narrow Taxiway B between Taxiway Y and Runway 12L/30R

Existing cross Taxiway B between Taxiway Z and Runway 12L/30R is approximately 325 feet wide. It provides bypass capability to Runways 12L/30R and 12R/30L when access from Taxiways A-1 and A is impeded, and also serves as the southernmost taxiway for aircraft movements from/to the west side of the airfield. Option 1 reduces the wide expanse of Taxiway B pavement by shifting the segment of Taxiway Z and Y to the north and narrowing the width of the Taxiway B segment between Taxiway Y and Runway 12L/30R through expansion of the islands between Taxiways A and B. The realigned segments of Taxiway B would continue to accommodate ADG IV & V aircraft (minimum width of 75 feet) and also eliminate direct access from the east apron to the runways, consistent with the mitigation options presented earlier for that geometric criterion. **Figure 3** displays a conceptual layout of Taxiway B Option 1. This mitigation alternative generates the following actions, benefits, and impacts:

East Airfield Taxiway B Option 1 Actions:

- Construct a new Taxiway B connection between Taxiways Z and Y approximately 475 feet north of the existing taxiway segment, and relocate or install new associated lighting, markings, and signs.
- Remove the existing Taxiway B segment between Taxiways Z and Y, associated lighting, markings, and signs, and replace with an extension to the island separating Taxiways A and B.
- Remove an approximately 215-ft. wide southerly section of pavement on the existing Taxiway B segment between Taxiway Y and Runway 12L/30R, relocate associated lighting, markings, and signs as needed, and replace with painted pavement or a pervious ground surface that extends the existing island separating Taxiways A and B.

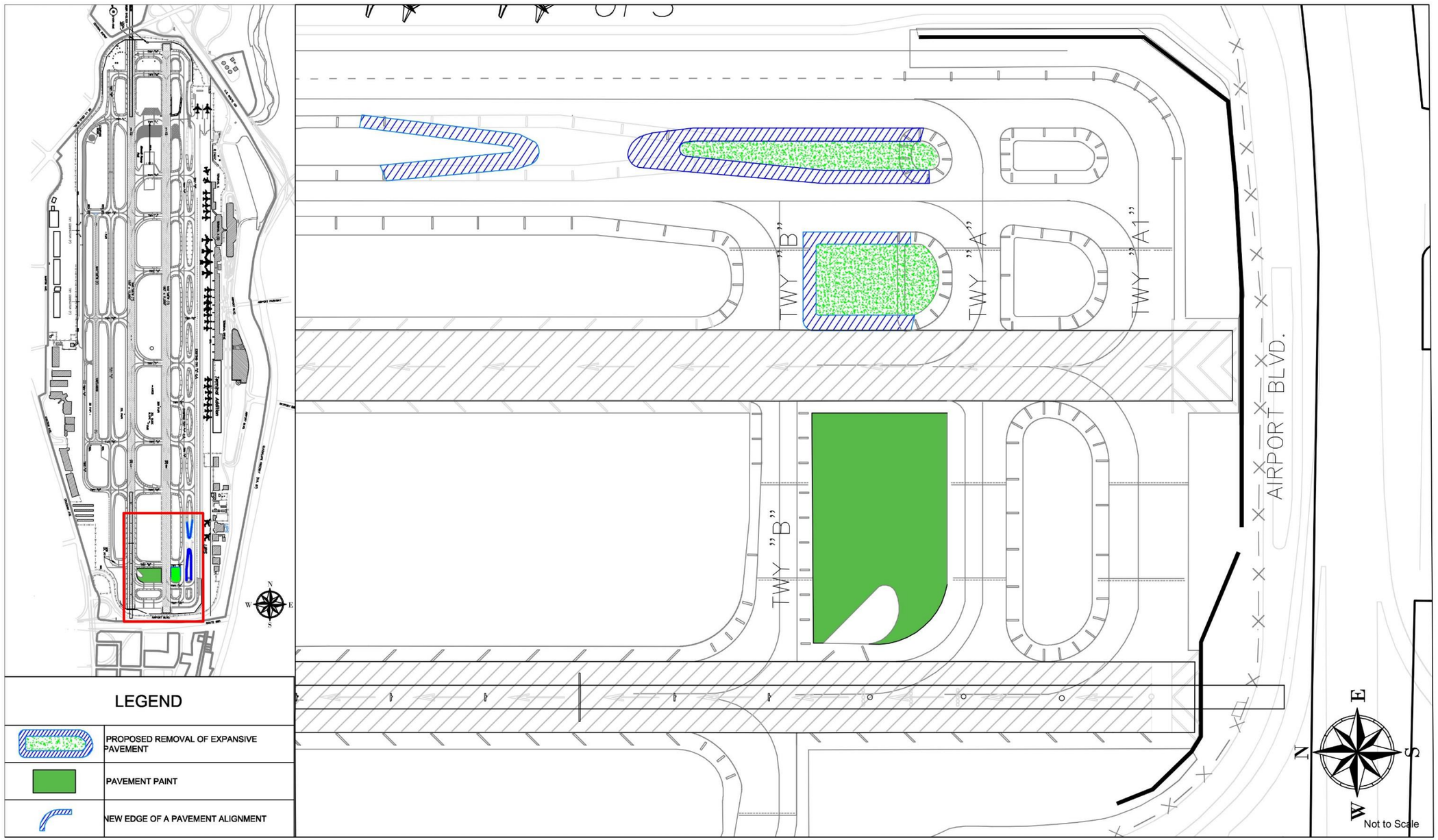


Figure 3

East Airfield - Expansive Airfield Pavement - Taxiway B Option 1

East Airfield Taxiway B Option 1 Benefits:

- Mitigates both the expanse of pavement and the direct access from apron to runway.
- Retains the viability of Taxiway B for movements between the west and east sides of the airfield.
- Does not adversely impact aircraft departure queuing.

East Airfield Taxiway B Option 1 Impacts:

- Operational impacts on aircraft movements on both Taxiway Z and Taxiway Y while improvements are underway.
- Potential for pilot and controller confusion during and immediately after implementation of improvements.

East Airfield Expansive Airfield Pavement, Taxiway B Option 2 - Retain Alignment of Taxiway B and Narrow Pavement between Taxiway Z and Runway 12L/30R

Option 2 focuses solely on addressing the wide expanse of Taxiway B pavement by expanding the islands separating Taxiways B and A between Taxiway Z and Runway 12L/30R. The existing direct access from the east side apron to the runways is retained (unlike in Option 1). **Figure 4** displays a conceptual layout of Taxiway B Option 2. This mitigation alternative generates the following actions, benefits, and impacts:

East Airfield Taxiway B Option 2 Actions:

- Remove an approximately 215-ft. wide southerly section of pavement on the existing Taxiway B segment between Taxiway Z and Runway 12L/30R, relocate associated lighting, markings, and signs as needed, and replace with painted pavement or a pervious ground surface that extends the existing islands separating Taxiways A and B.

East Airfield Taxiway B Option 2 Benefits:

- Addresses the expanse of pavement on Taxiway B with less construction activity and cost than Option 1.
- Retains the viability of Taxiway B for movements between the west and east sides of the airfield.
- Does not adversely impact aircraft departure queuing.
- Not likely to cause any potential pilot or controller confusion during and immediately after removal of the southerly section of Taxiway B pavement.

East Airfield Taxiway B Option 2 Impacts:

- Does not mitigate the additional issue of direct access from the east side apron area to the runways.
- Operational impacts on aircraft movements on both Taxiway Z and Taxiway Y while improvements are underway.

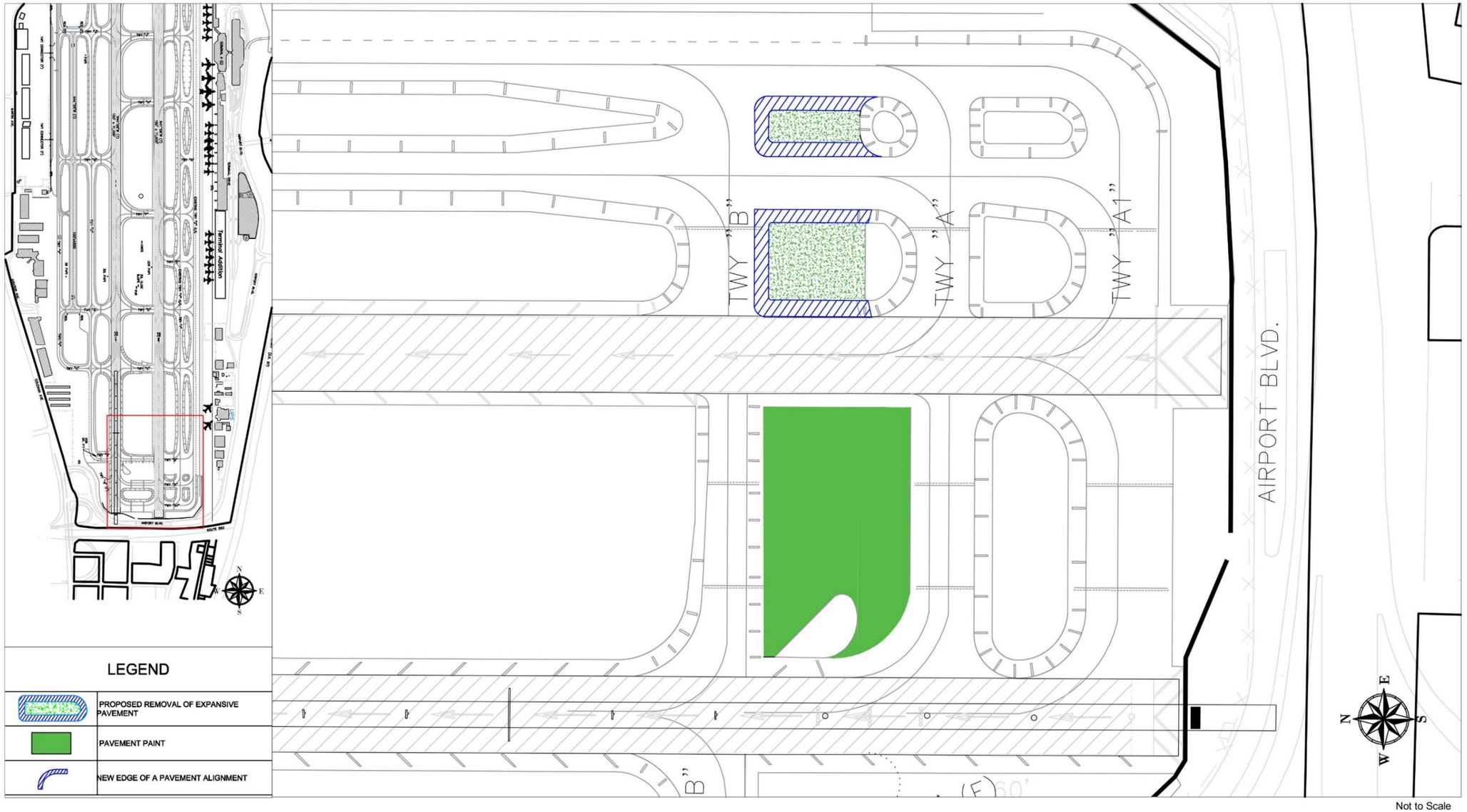


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Figure 4

East Airfield - Expansive Airfield Pavement - Taxiway B Option 2

East Airfield Expansive Airfield Pavement, Taxiway L Option 1 – Shift Alignment of Taxiway L between Taxiways Z and Y, and Narrow Taxiway L between Taxiway Y and Runway 12R/30L

Existing cross Taxiway L as currently aligned between Taxiway Y and Runway 12R/30L is approximately 375 feet in width, augmented on the north side by an aircraft hold pad located between the two runways that expands the pavement to approximately 535 feet. Taxiway L also provides direct access from the east side aircraft parking apron to the two runways. Option 1 narrows the pavement along the south side of the Taxiway L between Taxiway Y and Runway 12R/30L to serve ADG-IV & V aircraft (minimum width of 75 feet), removes the hold pad between the two runways, and shifts the alignment of the Taxiway L segment between Taxiways Z and Y to the south to provide an offset to mitigate the direct access from apron to runways.

The narrowing of Taxiway L between Taxiway Y and Runway 12R/30L would be achieved by replacing the pavement along the southerly side with extensions to the islands separating Taxiways L and K. In the Taxiway L segment between Taxiways Z and Y, the existing pavement would be replaced with an extension to the island separating Taxiways L and M, with a new taxiway segment constructed approximately 300 feet south of the existing centerline. **Figure 5** displays a conceptual layout of Option 1. This mitigation alternative generates the following actions, benefits, and impacts:

East Airfield Taxiway L Option 1 Actions:

- Construct a new Taxiway L connector between Taxiway Z and Taxiway Y approximately 300 feet to the south of the current Taxiway L segment and relocate or install new associated lighting, markings, and signs.
- Remove the existing Taxiway L pavement between Taxiway Z and Taxiway Y and replace with an extension to the island on the north side through painted pavement or a pervious ground surface.
- Remove up to a 300-ft. wide section of pavement along the south side of existing Taxiway L between Taxiway Y and Runway 12R/30L, relocate associated lighting, markings, and signs as needed, and replace with extensions to the islands on the south side through painted pavement or a pervious ground surface.
- Remove the existing hold pad on the north side of Taxiway L between Runways 12R/30L and 12L/30R and replace with painted pavement or a pervious ground surface.

East Airfield Taxiway L Option 1 Benefits:

- Mitigates both the expanse of pavement and the direct access from apron to runway.
- Provides a straight taxiway alignment between Taxiway Y and Taxiway W.
- Potentially improves operational efficiency of the north cargo apron by expanding its distance from realigned Taxiway L.
- Provides approximately 300 feet additional separation between the Taxiway K run-up pad and the nearest point of narrowed Taxiway L.

East Airfield Taxiway L Option 1 Impacts:

- Operational impacts on aircraft movements on both Taxiway Z and Taxiway Y while improvements are underway.
- Potential for pilot and controller confusion during and immediately after implementation of improvements.

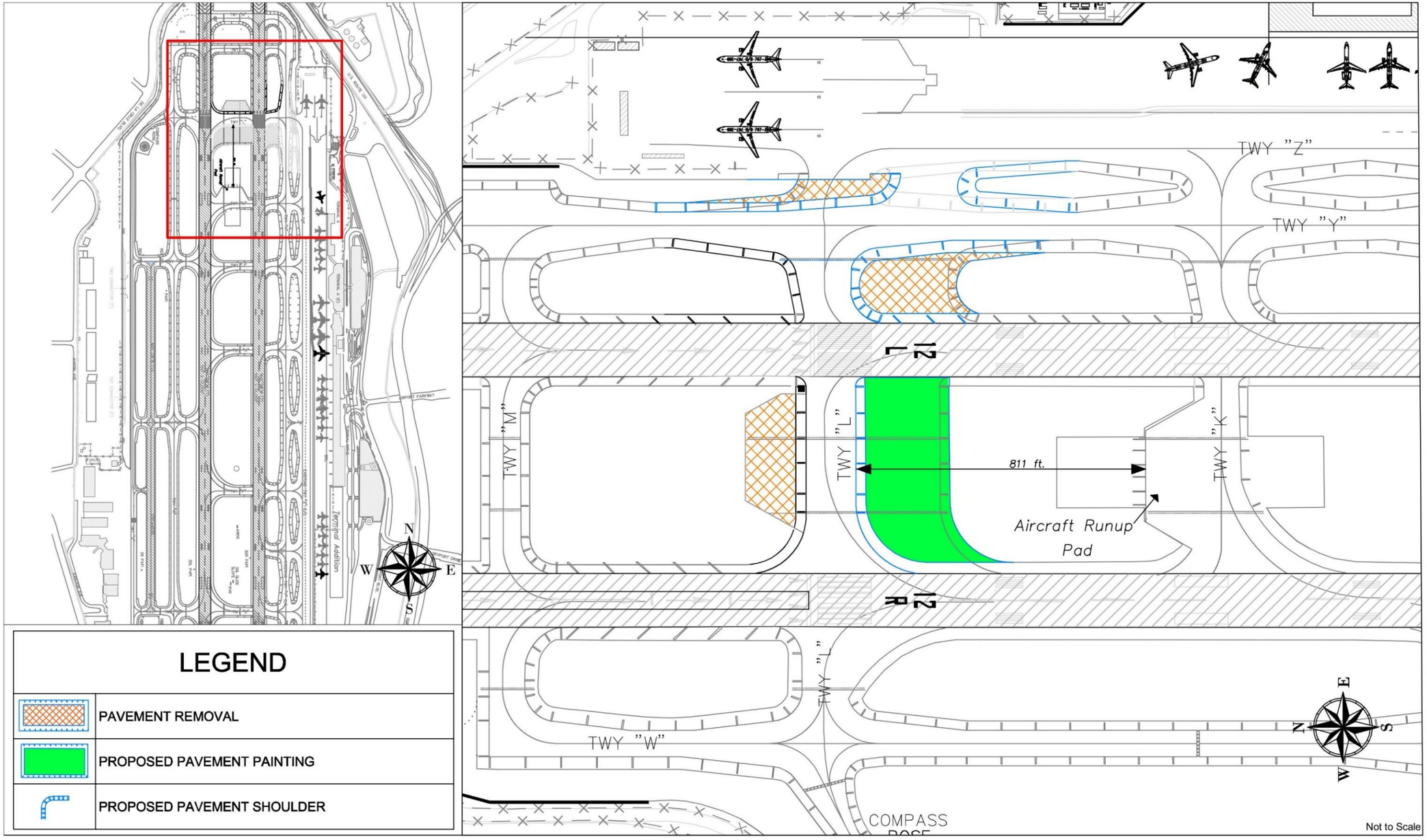


Figure 5

East Airfield - Expansive Airfield Pavement - Taxiway L Option 1

East Airfield Expansive Airfield Pavement, Taxiway L Option 2 – Retain Taxiway L between Taxiways Z and Y, and Narrow Taxiway L between Taxiway Y and Runway 12R/30L

Option 2 narrows the alignment of Taxiway L on the northerly side of the existing 375-foot wide pavement between Taxiway Y and Runway 12R/30L. Pavement on the northerly side of Taxiway L would be removed, along with the hold pad located between the two runways, and replaced with expanded islands separating Taxiways L and M. The current segment of Taxiway L between Taxiways Z and Y remains in its existing alignment, thereby providing an offset to mitigate the direct access from apron to runways. **Figure 6** displays a conceptual layout of Option 2. This mitigation alternative generates the following actions, benefits, and impacts:

East Airfield Taxiway L Option 2 Actions:

- Remove up to a 300-ft. wide section of pavement along the north side of existing Taxiway L between Taxiway Y and Runway 12R/30L, relocate associated lighting, markings, and signs as needed, and replace with extensions to the islands on the north side through painted pavement or a pervious ground surface.
- Remove the existing hold pad on the north side of Taxiway L between Runways 12R/30L and 12L/30R and replace with painted pavement or a pervious ground surface.

East Airfield Taxiway L Option 2 Benefits:

- Mitigates both the expanse of pavement and the direct access from apron to runway.
- No new pavement construction required.

East Airfield Taxiway L Option 2 Impacts:

- Operational impacts on aircraft movements on both Taxiway Z and Taxiway Y while improvements are underway.
- Places the centerline of narrowed Taxiway L closer to the Taxiway K aircraft run-up pad which could potentially result in jet blast impacts on Taxiway L when run-ups are conducted.
- Creates an offset to the Taxiway L segment connecting Runway 12R/30L and Taxiway W.
- Retaining the existing segment of Taxiway L between Taxiways Z and Y does not provide potential to improve operational efficiency of the north cargo ramp.
- Potential for pilot and controller confusion during and immediately after implementation of improvements.

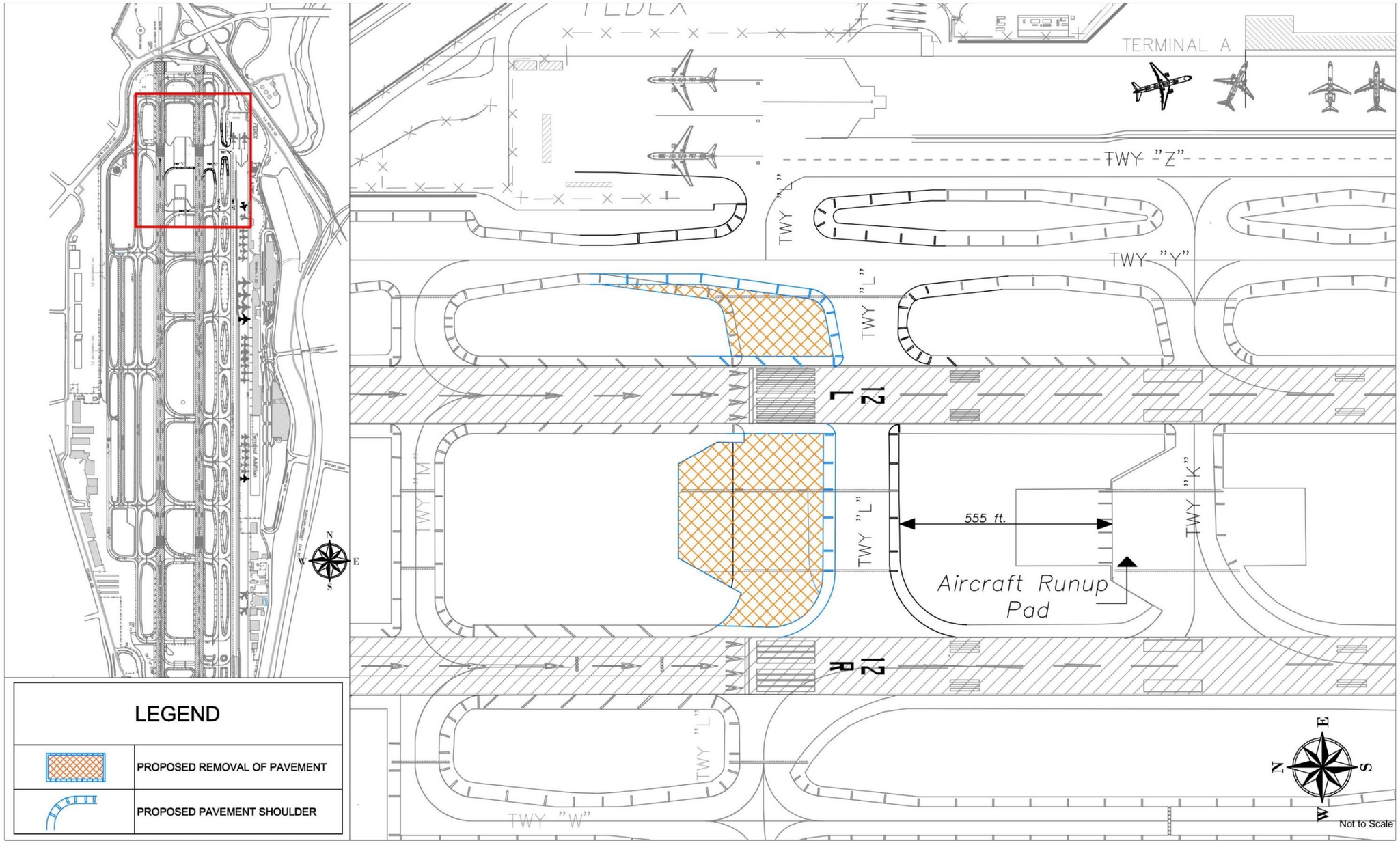


Figure 6

East Airfield - Expansive Airfield Pavement - Taxiway L Option 2

Mitigation for Crossings in the High-Energy Portion of a Runway

Figure 7 displays the location of the center third (high-energy portion) of the three SJC runways and the existing taxiways which cross those sections. For Runways 12R/30L and 12L/30R, the high-energy portion accounts for departures and the displaced thresholds for arrivals. Runway 12L/30R has two taxiways that cross the high-energy section (F and H), with Taxiway H located within both the arrival and departure high-energy sections and Taxiway F located within the departure high-energy section but just outside the arrival high-energy section. Taxiways F and H also intersect, but do not cross, Runway 12R/30L along its high-energy section. Runway 11/29, if returned to runway use, is crossed by Taxiway G within the high-energy section. The baseline safety risk assessment conducted earlier in this study determined that the Taxiway F and Taxiway H crossings of Runway 12L/30R, and the Taxiway G crossing of Runway 11/29, are in the high-risk category of potential incursion likelihood and severity, thereby warranting mitigation.

East Airfield High-Energy Runway Crossings Option 1 – Close and Remove Taxiways F and H between Runways 12L/30R and 12R/30L

Option 1 closes and removes the Taxiway F and Taxiway H segments connecting Runways 12L/30R and 12R/30L. Taxiway F serves as an east exit for Runway 12R arrivals, and Taxiway H serves as an east exit for Runway 30L arrivals, but both are utilized at a relatively low level due to the limited distances from the landing thresholds and the operational fleet at SJC. Under Option 1, aircraft landing on Runway 12R (south flow) that may have formerly used Taxiway F would roll out an additional 1,500 feet to exit at Taxiway D. Aircraft landing on Runway 30L (north flow) that may have formerly used Taxiway H would roll out an additional 1,000 feet to exit at Taxiway J. This mitigation alternative generates the following actions, benefits, and impacts:

East Airfield High Energy Runway Crossings Option 1 Actions:

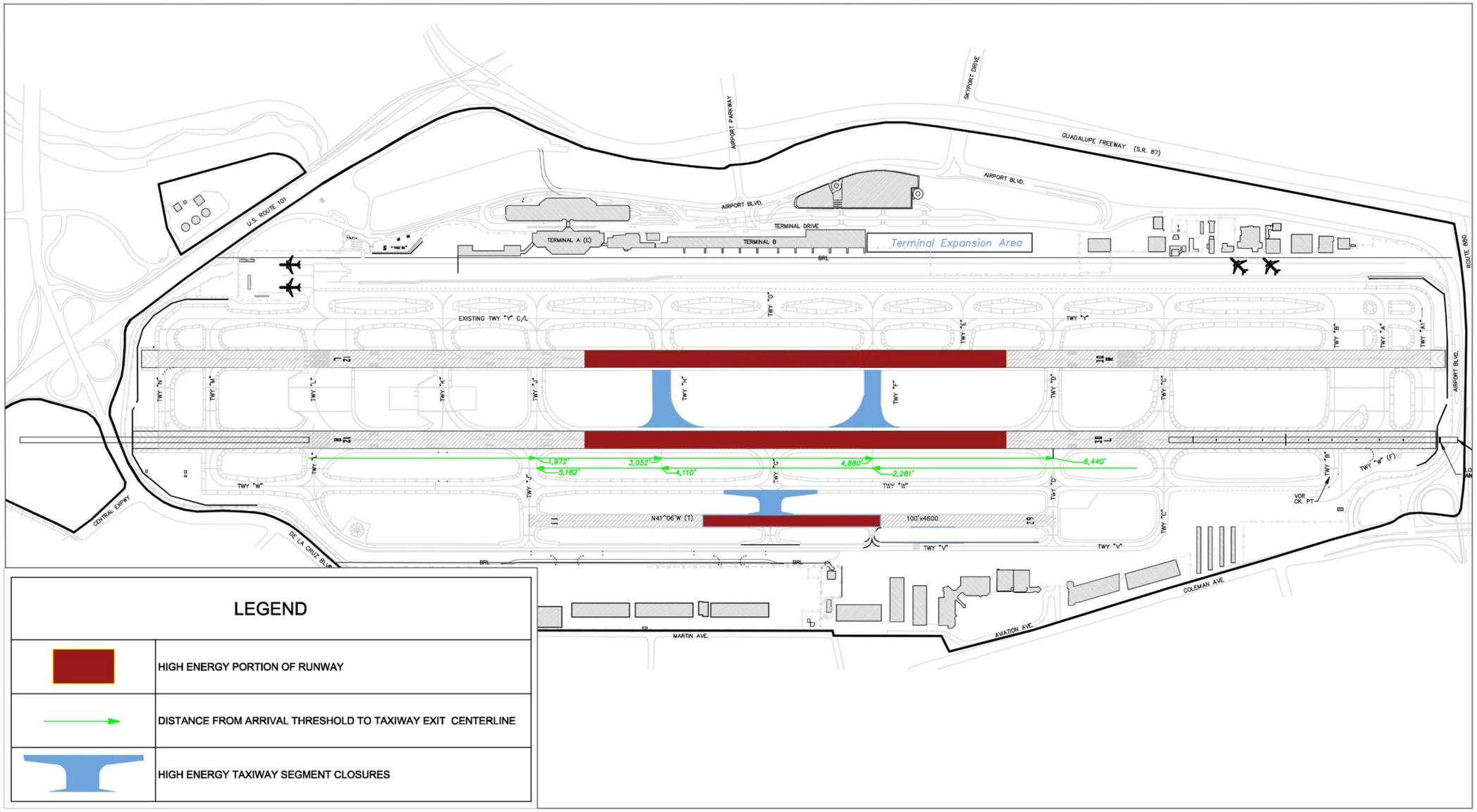
- Close Taxiway F and Taxiway H segments between Runways 12L/30R and 12R/30L, remove pavement and associated lighting, markings, and signs, and replace with pervious ground cover.
- If determined necessary to have exit capability within the high-energy section of Runway 12R/30L, construct one or two new exits to Taxiway W (to allow aircraft to cross to the east side parking aprons at a location outside the runway high-energy portion of both runways).

East Airfield High Energy Runway Crossings Option 1 Benefits:

- Fully conforms with elimination of high-energy crossings of Runway 12L/30R without apparent significant operational impacts.
- Doesn't preclude the possibility of adding exits from Runway 12R/30L to Taxiway W if runway occupancy times significantly increase due to closure of Taxiway F and H exits.

East Airfield High Energy Runway Crossings Option 1 Impacts:

- Temporary runway closures likely to occur during implementation of actions.
- Potential increase in runway occupancy times for those aircraft (primarily general aviation and smaller commercial aircraft) that currently use Taxiway F or H for exits from Runway 12R/30L.
- Potential for pilot and controller confusion during and immediately after implementation of pavement removal.



Not to Scale

Figure 7

Crossings in High Energy Runway Area

East Airfield High-Energy Runway Crossings Option 2 – Retain Taxiways F and H between Runways 12L/30R and 12R/30L and Add Runway Guard Lights

Option 2 retains the high-energy crossings but installs enhanced runway guard lighting at the hold bars on the east side of Runway 12L/30R. The enhanced lighting would consist of yellow in-pavement runway hold bar lights to augment the existing elevated runway guard lights on either side of the 12L/30R intersections at Taxiways F and H, and act as a positive visual identification of the location of the hold bar for pilots. Similar in-pavement lights are currently in place on several other cross taxiways (A-1, A, B, K, L, and N) along the west side of Runway 12L/30R. This mitigation alternative generates the following actions, benefits, and impacts:

East Airfield High-Energy Runway Crossings Option 2 Actions:

- Install in-pavement runway guard lights proximate to the hold bars of Taxiway F and Taxiway H on the east side of Runway 12L/30R.

East Airfield High-Energy Runway Crossings Option 2 Benefits:

- Does not require any change to the current physical configuration of the airfield.
- Enhances pilot situational awareness of the hold bar position, reducing the potential for an incursion.
- No change in runway occupancy times or airfield capability from current condition.
- Can be implemented in less time and cost than Option 1 and avoids potential pilot or controller confusion after completion.

East Airfield High Energy Runway Crossings Option 2 Impacts:

- Does not physically mitigate the high-energy crossings and the potential for a runway incursion incident.
- Retains two exits from Runway 12R/30L that are not frequently utilized.
- Minor operational impacts may occur during installation.

West Airfield High-Energy Runway Crossing Option 1 – Close and Remove Taxiway G between Runway 11/29 and Taxiway W

In the event that Runway 11/29 (currently operated as Taxiway W-1) is re-activated for ADG-I & II aircraft operations, Option 1 closes and removes the segment of existing Taxiway G between the runway and parallel Taxiway W. The segment of Taxiway G between Runway 11/29 and parallel Taxiway V is retained for use by light aircraft arrivals on Runway 29 that can exit at that point for taxiing to the general aviation parking aprons. A variation to this scenario that retains the Taxiway G segment between Runway 11/29 and Taxiway W, and instead closes and removes the segment between 11/29 and Taxiway V, would achieve the same objective but may be more operationally complicated. This mitigation alternative (presuming Runway 11/29 is re-activated) generates the following actions, benefits, and impacts:

West Airfield High Energy Runway Crossing Option 1 Actions:

- Close the Taxiway G segment between Runway 11/29 and Taxiway W, remove pavement and associated lighting, markings, and signs, and replace with pervious ground cover.

West Airfield High Energy Runway Crossing Option 1 Benefits:

- Fully conforms with elimination of high-energy crossings of Runway 11/29 without apparent significant operational impacts.
- Retains the exit off Runway 11/29 to Taxiway V.

West Airfield High Energy Runway Crossing Option 1 Impacts:

- Removes improved pavement constructed less than 10 years ago.
- Potentially increases aircraft movements along Taxiway D which at the Runway 29 end is an FAA-designated hotspot.

West Airfield High Energy Runway Crossing Option 2 – Retain Taxiway G and Add Runway Guard Lights

Again, presuming Runway 11/29 is re-activated, Option 2 retains the high-energy crossing but installs enhanced runway guard lights at the hold bars for Runway 11/29. The enhanced lighting would consist of elevated runway guard lights (commonly referred to as "wig wags") on either side of 11/29 at Taxiway G to act as a positive visual identification of the hold bars. This mitigation alternative generates the following actions, benefits, and impacts:

West Airfield High Energy Runway Crossing Option 2 Actions:

- Install above-ground runway guard lights on Taxiway G lateral to the hold bars on both sides of Runway 11/29.
- Consider installing similar above-ground runway guard lights lateral to the hold bars at other Runway 11/29 intersections (Taxiways D, F, and J).

West Airfield High Energy Runway Crossing Option 2 Benefits:

- Does not require any change to the configuration of the airfield once Runway 11/29 is re-opened.
- Enhances pilot situational awareness of the hold bar positions, reducing the potential for an incursion.
- No change in runway occupancy times or airfield capability once Runway 11/29 is re-opened.
- Avoids potential pilot or controller confusion that might occur with Option 1's taxiway pavement removal.

West Airfield High Energy Runway Crossing Option 2 Impacts:

- Does not physically mitigate the high-energy crossing and the potential for a runway incursion.
- Potential increases in aircraft movements along Taxiway G to/from west side general aviation aprons may elevate the risk of a runway incursion.
- Minor operational impacts may occur during installation.

Additional Mitigation Consideration: Taxiway Nomenclature

An issue not specifically related to FAA airfield geometric criteria is the naming of cross Taxiways A and Taxiway A-1 at the south end of the airfield. Currently, the southernmost cross taxiway at SJC is designated "A-1", with the next cross taxiway, in close proximity and used as a bypass, designated as "A". The more typical convention would have the southernmost taxiway named by a single letter (i.e., "A"), with the bypass taxiway named "A-1" (or "B"). SJC's non-typical naming has been identified as contributing to pilot confusion and potential incidents of entry onto the wrong taxiway. To address this non-standard nomenclature at SJC, the following three options are presented:

Option 1 - Reverse the naming of existing Taxiways A-1 and A. This is the simplest alternative in scope and implementation action. Existing Taxiway A-1 would become Taxiway A, and the existing bypass Taxiway A would become Taxiway A-1. All other cross taxiways would remain unchanged.

Option 2. Rename all SJC cross taxiways in progression from the south end. This is the most complex alternative in scope and implementation, as every cross taxiway would be renamed, with all identifier signs being relocated or replaced. Existing Taxiway A-1 would become Taxiway A, existing Taxiway A would become Taxiway B, continuing sequentially with the northernmost existing Taxiway N becoming Taxiway O. Operational impacts may occur during implementation, as well as potential short term pilot and controller confusion after implementation.

Option 3. Re-designate existing Taxiway A-1 as extended Taxiway Z and, for consistency purposes, re-designate existing Taxiway N at the north end as extended Taxiway Y. Extending the designation of a parallel taxiway that connects to the runway end is a convention used at some other airports. At SJC, existing Taxiway A-1 would be a continuation of Taxiway Z, and existing Taxiway N would be a continuation of Taxiway Y. All other cross taxiways (including existing Taxiway A) would remain unchanged.

C. PROPOSED CONSOLIDATED PROJECT ALTERNATIVES

The preceding analysis of conceptual airfield design standards and geometric criteria conformity options addressed a range of issues, some complex and challenging to resolve, and some relatively minor in terms of feasibility or significance. The most prominent issues addressed are the following:

Airfield Design Standards

- Deficient runway/taxiway/apron separations on the east airfield, most notably between Runway 12L/30R and Taxiway Y for Aircraft Design Group (ADG) IV and V operations.
- Deficient runway/taxiway/apron separations on the west airfield, most notably between former Runway 11/29 (if re-opened) and Taxiway V for ADG II and III operations.

Airfield Geometric Criteria

- Multiple points of direct access from aprons to runways on both sides of the airfield.
- Wide expanses of airfield pavement along Taxiways B and L.
- Airfield crossings in the center third (high energy) portion of Runway 12L/30R and former Runway 11/29 (if re-opened).

Based on the assessment of the conceptual options, a set of three consolidated "project alternatives" has been formulated for further, more detailed analysis and consideration in this study. The alternatives comprise combinations of the design standards and geometric criteria conformity options. A description of each consolidated alternative, plus a schematic exhibit displaying the proposed future airfield configuration, is presented on the following pages.

The three consolidated project alternatives differ primarily in how the two key airfield design standards issues identified above are addressed. All three alternatives include similar sets of actions addressing conformity with the three key airfield geometric criteria issues identified above. In addition, for comparative purposes, a "no action alternative" is also proposed for analysis.

Consolidated Project Alternative 1

Project Alternative 1 makes no major changes to the configuration of the east airfield due to the extensive adverse impacts that full conformity with runway/taxiway/apron separation standards would have on airline service, particularly the loss of numerous terminal gate parking positions. Instead, the existing approved Modifications to Standards for the deficient separation between Runway 12L/30R and Taxiway Y for ADG-IV aircraft, and deficient Runway 12R/30L Object Free Area width, are retained and expanded to include ADG-V aircraft, along with continued operational procedures for controlling wide-body aircraft movements on the airfield.

For the west airfield, Project Alternative 1 converts former Runway 11/29 (existing interim Taxiway W-1) to a new ADG-III Taxiway V and extends it to serve as a fuller length parallel taxiway. Existing Taxiway V is closed and replaced with a slightly expanded west side apron and an ADG-III taxilane. The existing Modification to Standards for the deficient separation between Runway 11/29 and Taxiway V is removed.

The key elements of Project Alternative 1 are listed below and are graphically depicted in **Figure 1**.

Design Standards Conformity Elements:

- Retain existing airfield configuration.
- Convert former Runway 11/29 to new ADG-III Taxiway V and extend south to Taxiway C and north to just short of Taxiway L.
- Close existing Taxiway V and replace with an expanded general aviation apron with an apron-edge ADG-III parallel taxilane.
- Increase the Runway 12R/30L centerline to aircraft hold position distance (from 250 feet to 280 feet) to meet ADG-V standards for Category II operations.
- Widen Runway 12L/30R blast pad at both runway ends to ADG-V standards and lengthen the blast pad at the 12L end to extend to the blast fence.

Geometric Criteria Conformity Elements:

- Mitigate direct access from the east side apron to Runway 12L/30R by realigning the segments of Taxiways B, C, D, H, J, and L between Taxiways Z and Y. Pavement removal or painted islands will replace the closed taxiway segments.
- Mitigate direct access from the west side apron to Runway 12R/30L through pavement removal or painted islands at entrances to Taxiways B, C, and D.
- Mitigate Taxiway B expansive pavement by narrowing the width on the south side between Taxiway Z and Runway 12L/30R. The excess pavement will either be removed or painted to show unavailability.
- Mitigate Taxiway L expansive pavement by narrowing the width on the south side between Taxiway Y and Runway 12R/30L, and closing the hold pad on the north side between the two runways. The excess pavement will either be removed or painted to show unavailability.
- Mitigate high-energy runway crossings on Runway 12L/30R at Taxiways F and H by either removing the pavement or painting the segments of F and H between the two runways to show unavailability.
- Relocate the existing general aviation run-up pad adjacent to the intersection of Taxiways D and W to a new site in the parking apron area southwest of Taxiways C and W.
- Modify cross taxiway nomenclature at the south end of the airfield by reversing the Taxiway A and A-1 designations.

Future Airfield Configuration: Project Alternative 1

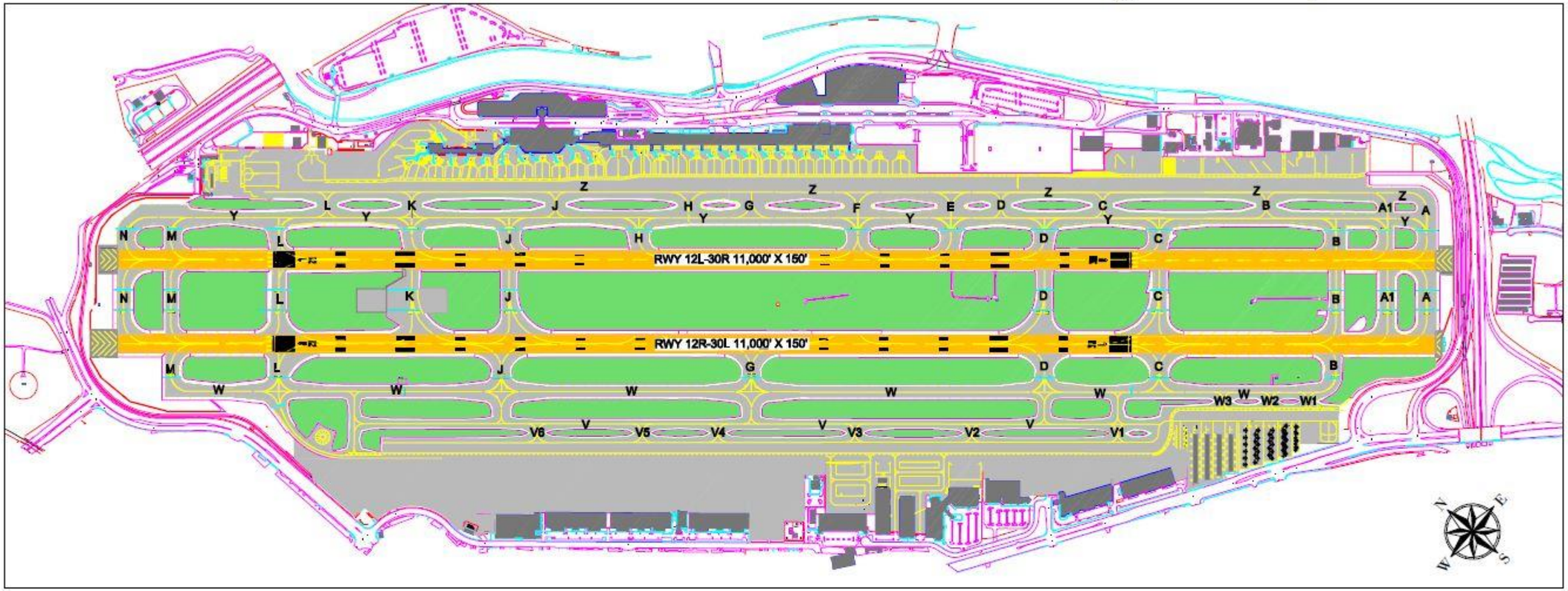


Figure 1

Design Standards Conformity Actions

- Existing east airfield runway and parallel taxiway configuration retained.
- Former Runway 11/29 converted to new ADG-III Taxiway V and extended.
- Existing Taxiway V removed and replaced by expanded apron and parallel taxilane.
- Runway 12R/30L centerline to aircraft hold position distance increased.
- Runway 12L/30R blast pad widened (both ends) and lengthened (12L end).

RIM Geometric Conformity Actions

- East airfield Taxiways B/C/D/H/J/L realigned between Taxiways Z and Y.
- Direct apron to runway access mitigated at west airfield Taxiways B/C/D.
- Taxiway B pavement reduced between Taxiway Z and Runway 12L/30R.
- Taxiway L pavement reduced between Taxiway Y and Runway 12R/30L.
- Taxiways F and H closed between Runways 12R/30L and 12L/30R.
- West airfield general aviation run-up pad relocated.
- Taxiways A and A-1 designations reversed.

Consolidated Project Alternative 2

Project Alternative 2 reconfigures both sides of the airfield. On the east airfield, Taxiway Y is relocated to the east to provide full separation conformity with Runway 12L/30R for ADG-IV & V aircraft. Existing Taxiway Z is closed and replaced by an expanded airline apron. The existing Modification to Standards for the deficient separation between Runway 12L/30R and Taxiway Y is removed, while the existing Modification to Standards for the deficient Runway 12R/30L Object Free Area width is retained.

For the west airfield, similar to Project Alternative 1, former Runway 11/29 (existing interim Taxiway W-1) is converted to a new ADG-III Taxiway V and extended to serve as a fuller length parallel taxiway. Existing Taxiway V is closed and replaced with a larger expanded west side apron that extends out to the new Taxiway V Object Free Area. The existing Modification to Standards for the deficient separation between Runway 11/29 and Taxiway V is removed.

The key elements of Project Alternative 2 are listed below and are graphically depicted in **Figure 2**.

Design Standards Conformity Elements:

- Shift Taxiway Y 50 feet to the east (to achieve 400-foot centerline-to-centerline separation with Runway 12L/30R).
- Close Taxiway Z and replace with an expanded airline apron that extends out to the east edge of the relocated Taxiway Y Object Free Area.
- Convert former Runway 11/29 to new ADG-III Taxiway V and extend south to Taxiway C and north to just short of Taxiway L.
- Close existing Taxiway V and replace with an expanded general aviation apron that extends out to the west edge of the new Taxiway V Object Free Area.
- Increase the Runway 12R/30L centerline to aircraft hold position distance (from 250 feet to 280 feet) to meet ADG-V standards for Category II operations.
- Widen Runway 12L/30R blast pad at both runway ends to ADG-V standards and lengthen the blast pad at the 12L end to extend to the blast fence.

Geometric Criteria Conformity Elements:

- Mitigate direct access from the east side apron to Runway 12L/30R by realigning the segments of Taxiways B, C, D, E, F, H, J, K, and L between Taxiways Z and Y. Pavement removal or painted islands will replace the closed taxiway segments.
- Mitigate direct access from the west side apron to Runway 12R/30L through pavement removal or painted islands at entrances to Taxiways B, C, and D.
- Mitigate Taxiway B expansive pavement by narrowing the width on the south side between Taxiway Y and Runway 12L/30R. The excess pavement will either be removed or painted to show unavailability.
- Mitigate Taxiway L expansive pavement by narrowing the width on the south side between Taxiway Y and Runway 12R/30L, and closing the hold pad on the north side between the two runways. The excess pavement will either be removed or painted to show unavailability.
- Mitigate high-energy runway crossings on Runway 12L/30R at Taxiways F and H by installing in-pavement Runway Guard Lights (RGLs) on the west side of the runway.

- Relocate the existing general aviation run-up pad adjacent to the intersection of Taxiways D and W to a new site in the parking apron area southwest of Taxiways C and W.
- Modify cross taxiway nomenclature by renaming the letter designations, starting with “A” at the south end.

Future Airfield Configuration: Project Alternative 2



Figure 2

Design Standards Conformity Actions

- Taxiway Y relocated to east.
- Taxiway Z closed and replaced by expanded apron.
- Former Runway 11/29 converted to new ADG-III Taxiway V and extended.
- Existing Taxiway V removed and replaced by expanded apron.
- Runway 12R/30L centerline to aircraft hold position distance increased.
- Runway 12L/30R blast pad widened (both ends) and lengthened (12L end).

RIM Geometric Conformity Actions

- East airfield Taxiways B/C/D/E/F/H/J/K/L realigned between Taxiways Z and Y.
- Direct apron to runway access mitigated at west airfield Taxiways B/C/D.
- Taxiway B pavement reduced between Taxiway Z and Runway 12L/30R.
- Taxiway L pavement reduced between Taxiway Y and Runway 12R/30L.
- In-pavement Runway Guard Lights installed on Taxiways F (Future G) and H at Runway 12L/30R.
- West airfield general aviation run-up pad relocated.
- All cross taxiway designations renamed.

Consolidated Project Alternative 3

Project Alternative 3 makes no major changes to the configuration of the east airfield as in Project Alternative 1. Instead, the existing approved Modifications to Standards for the deficient separation between Runway 12L/30R and Taxiway Y for ADG-IV aircraft, and deficient Runway 12R/30L Object Free Area width, are retained and expanded to include ADG-V aircraft, along with continued operational procedures for controlling wide-body aircraft movements on the airfield.

For the west airfield, Project Alternative 3 re-opens Runway 11/29 for use by non-jet ADG-I & II operations, as depicted in the current SJC Airport Master Plan and Airport Layout Plan, with no other major reconfiguration changes. The existing Modification to Standards for the deficient separation between Runway 11/29 and Taxiway V for ADG-II aircraft is retained and expanded to include ADG-III aircraft, along with operational measures to control the movements of larger and higher-performance general aviation aircraft on the west side similar to the procedures in place before the interim closure of Runway 11/29 in 2009.

The key elements of Project Alternative 3 are listed below and are graphically depicted in **Figure 3**.

Design Standards Conformity Elements:

- Retain existing airfield configuration.
- Re-activate Runway 11/29 for non-jet ADG-I & II operations, and retain the existing west airfield configuration.
- Increase the Runway 12R/30L centerline to aircraft hold position distance (from 250 feet to 280 feet) to meet ADG-V standards for Category II operations.
- Widen Runway 12L/30R blast pad at both runway ends to ADG-V standards and lengthen the blast pad at the 12L end to extend to the blast fence.

Geometric Criteria Conformity Elements:

- Mitigate direct access from the east side apron to Runway 12L/30R by realigning the segments of Taxiways B, C, D, H, J, and L between Taxiways Z and Y. Pavement removal or painted islands will replace the closed taxiway segments.
- Mitigate direct access from the west side apron to Runway 12R/30L and re-opened Runway 11/29 through pavement removal or painted islands at entrances to Taxiways B, C, D, and F.
- Mitigate Taxiway B expansive pavement by narrowing the width on the south side between Taxiway Z and Runway 12L/30R. The excess pavement will either be removed or painted to show unavailability.
- Mitigate Taxiway L expansive pavement by narrowing the width on the south side between Taxiway Y and Runway 12R/30L, and closing the hold pad on the north side between the two runways. The excess pavement will either be removed or painted to show unavailability.
- Mitigate high-energy runway crossings on Runway 12L/30R at Taxiways F and H by either removing the pavement or painting the segments of F and H between the two runways to show unavailability.
- Mitigate the high-energy runway crossing on re-activated Runway 11/29 at Taxiway G by either removing the pavement or painting the segment of Taxiway G between 11/29 and Taxiway W to show unavailability.

- Relocate the existing general aviation run-up pad adjacent to the intersection of Taxiways D and W to a new site in the parking apron area southwest of Taxiways C and W.
- Modify cross taxiway nomenclature by redesignating Taxiway A-1 at the south end as an extended segment of parallel Taxiway Z, and redesignating Taxiway N at the north end as an extended segment of parallel Taxiway Y.

Future Airfield Configuration: Project Alternative 3

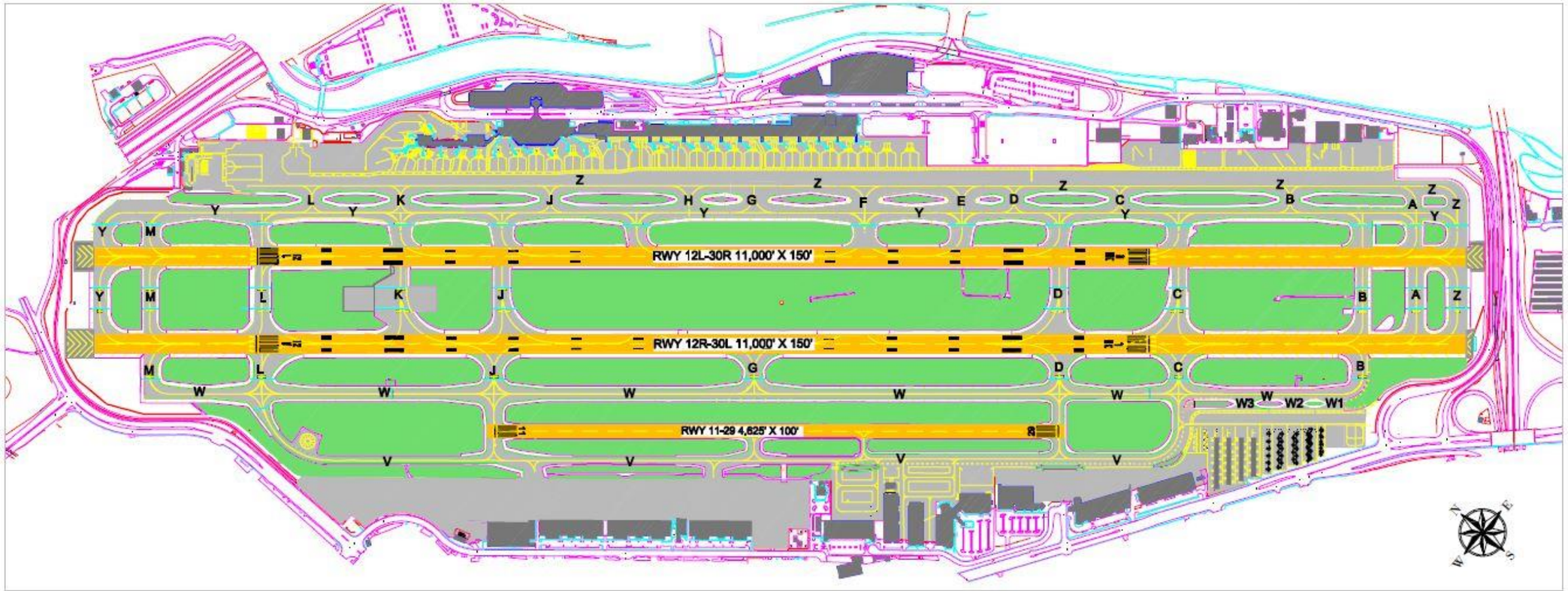


Figure 3

Design Standards Conformity Actions

- Existing east airfield runway and parallel taxiway configuration retained.
- Former Runway 11/29 re-activated and existing west airfield runway and parallel taxiway configuration retained.
- Runway 12R/30L centerline to aircraft hold position distance increased.
- Runway 12L/30R blast pad widened (both ends) and lengthened (12L end).

RIM Geometric Conformity Actions

- East airfield Taxiways B/C/D/H/J/L realigned between Taxiways Z and Y.
- Direct apron to runway access mitigated at west airfield Taxiways B/C/D/F.
- Taxiway B pavement reduced between Taxiway Z and Runway 12L/30R.
- Taxiway L pavement reduced between Taxiway Y and Runway 12R/30L.
- Taxiways F and H closed between Runways 12R/30L and 12L/30R.
- Taxiway G closed between Runway 11/29 and Taxiway W.
- West airfield general aviation run-up pad relocated.
- Taxiway A-1 re-designated as Z and Taxiway N re-designated as Y.

No Action Alternative

This alternative retains the existing airfield configuration and geometry while also re-opening Runway 11/29 for ADG-I & II use as depicted in the current SJC Airport Master Plan and Airport Layout Plan. The three existing Modifications to Standards are retained and expanded to include ADG-V operations on the east airfield and ADG-III operations on the west airfield.

Next Steps

The set of proposed project alternatives described above will undergo an extensive analysis including (a) an airfield simulation of each alternative at the projected year 2037 operations demand levels to determine impact, if any, on airfield capacity, (b) a Safety Risk Assessment of each alternative using the same FAA methodology utilized earlier in this study for the baseline condition, and (c) a cost, phasing, constructability, and operational assessment.

The analytical process will provide the basis for selection of a preferred project alternative. The preferred project alternative may be one of the three consolidated project alternatives as described above, a refined version of one of the three project alternatives, or a hybrid alternative that combines individual elements from multiple project alternatives.

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
RUNWAY INCURSION MITIGATION/AIRFIELD DESIGN STANDARDS ANALYSIS

TECHNICAL MEMORANDUM:

SUMMARY ANALYSIS OF PROJECT ALTERNATIVES

City of San Jose
April 3, 2018

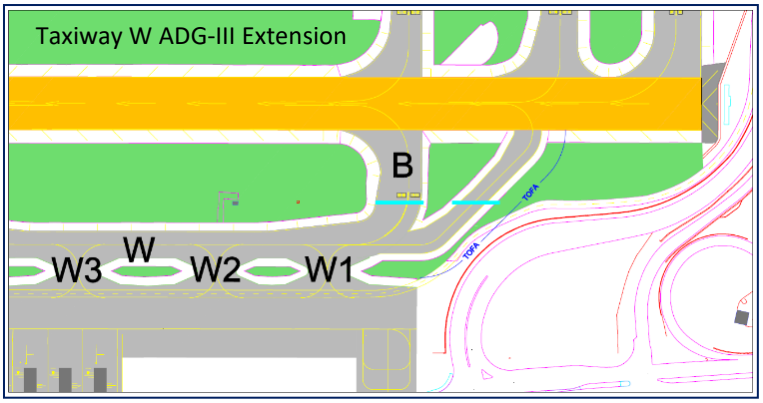
A. INTRODUCTION

The formulation and description of the proposed set of consolidated project alternatives was presented in the draft Technical Memorandum entitled "Potential Design Standards Conformity and Runway Incursion Mitigation (RIM) Alternatives" (November 27, 2017). The three project alternatives, plus a no-action alternative, have since undergone extensive analysis that considered design standards conformity, geometric criteria conformity, incursion/incident risk, mitigation of designated hot spots, capacity and operational efficiency, estimated capital costs, and construction phasing/operational impact issues.

The findings of this analysis, presented in the following sections of this draft technical memorandum, summarize lists of "attributes", "limitations", and "other characteristics" for each alternative. More detail is documented in a supporting set of technical appendices. These analyses conclude with a recommended project alternative.

Refinements to Project Alternatives

As the analysis of the project alternatives has commenced, three technical issues have been identified that warrant refinement to one or more alternatives. The first issue is the recent FAA implementation of "Wake Recategorization" at SJC, which essentially requires all aircraft departures to begin from the runway end, or within 500 feet of the runway end, to minimize delay due to wake turbulence considerations. This has triggered an increase in "back-taxi" movements on Runway 30L by aircraft taxiing from the west side that enter Runway 30L at cross Taxiway B, an intersection more than 500 feet from the runway end. This dual use of runway pavement does not conform to FAA geometric criteria, and neither does the alternative of directing those aircraft to cross Runways 12R/30L and 12L/30R on Taxiway B, turn right onto Taxiway Y, and then right again on Taxiway A or A-1 to access Runway 30R (or cross Runway 30R again to access Runway 30L). To mitigate these aircraft movements, the proposed construction of a Taxiway W extension to the south, to connect to Runway 12R/30L at Taxiway A (within 500 feet of the 30L end), is depicted in the accompanying illustration, and has been included in Alternative 1 and 2. This refinement has not been included in Project Alternative 3 because its benefit is largely negated by the re-opening of former Runway 11/29 for ADG I and II aircraft use.



The proposed south extension of Taxiway W would be designed to accommodate all aircraft up to ADG-III, although it would create a design standard deficiency due to the presence of the existing Vehicle Service Road (VSR) within the Taxiway Object Free Area (TOFA). The design standard deficiency is offset by the safety and operational benefits of moving aircraft from the west side into a departure position close to the end of Runway 30L, thereby eliminating back-taxiing on Runway 30L, multiple runway crossings or long hold delays for intersection departures at Taxiway B, benefits that far outweigh the VSR intrusion into the TOFA. Note: Back-taxiing at the Runway 12R end of for departures during South Flow conditions does not occur, as aircraft from the west side access the runway at Taxiway M, which is within 500 feet of the Runway 12R end.

The second refinement is specific to Project Alternative 2, a key element of which is the closing of Taxiway Z to accommodate the realignment of parallel Taxiway Y to the east by 50 feet (to eliminate the design standard deficiency for lateral separation from Runway 12L/30R). A resulting single parallel taxiway on the east side would prove to be unfeasible given the significant airline operational issues associated with delayed departure clearances, the inability to stage or bypass delayed aircraft, and arriving aircraft awaiting a gate occupied by a delayed aircraft, which are all currently mitigated by the availability of Taxiway Z. Therefore, in order to support the potential feasibility of Project Alternative 2, the creation of two hold aprons parallel to Taxiway Y, one south of Taxiway B and one north of Taxiway K, has been included to provide a limited capability for aircraft staging and bypass. Up to four ADG-III aircraft can be staged on the south hold apron and three ADG-III aircraft on the north hold apron.

The third refinement is the retention of the existing taxiway nomenclature, at least for analytical purposes, in the project alternatives. It became apparent that differences in taxiway identifiers would create considerable confusion in presenting and comparing specific intersections in the project alternatives, i.e., existing Taxiways A and A-1 are swapped in Project Alternative 1, every cross taxiway is renamed to a different identifier in Project Alternative 2, existing Taxiways A-1 and N are renamed “Z” and “Y”, respectively, in Project Alternative 3, and all taxiways remain as currently designated in the No Action Alternative. The taxiway nomenclature issue identified earlier in this study is instead addressed as an additional consideration in the “Recommendation” section of this technical memorandum.

B. Summary Analysis of Project Alternative 1

The key elements of Project Alternative 1 are listed and graphically depicted in **Figure 1**. Project Alternative 1 retains much of the existing airfield configuration on the east side, significantly modifies the configuration of the west airfield to conform to current design standards for ADG-III aircraft, and addresses many of the airfield's geometric criteria conformity issues

Attributes:

East Airfield

- Shift of aircraft hold positions along Runway 12R/30L to 280-foot separation from runway centerline eliminates the existing design standard deficiency for ADG-V aircraft.

- Widening of Runway 12L/30R blast pads to 220 feet at both ends, and lengthening the blast pad at the Runway 12L end to 400 feet, eliminates the existing design standard deficiency for ADG-V aircraft.

- Realignment of 6 cross taxiway segments (B, C, D, H, J, and L) between Taxiways Y and Z eliminates direct apron-to-runway access, in conformity with geometric criteria, for east side taxiways identified as having a historical incursion incident or a greater potential incident risk or likelihood.

- Narrowed width of Taxiway B between Taxiway Z and Runway 12L/30R, and narrowed width of Taxiway L between Taxiway Y and Runway 12R/30L, eliminates two existing large expanses of pavement in conformity with geometric conformity criteria.

- Closure/removal of segments of Taxiways F and H between Runways 12R/30L and 12L/30R eliminates the existing high-energy runway crossings of Runway 12L/30R in conformity with geometric criteria, with minimal impact on airfield operational capacity and efficiency.

Future Airfield Configuration: Project Alternative 1

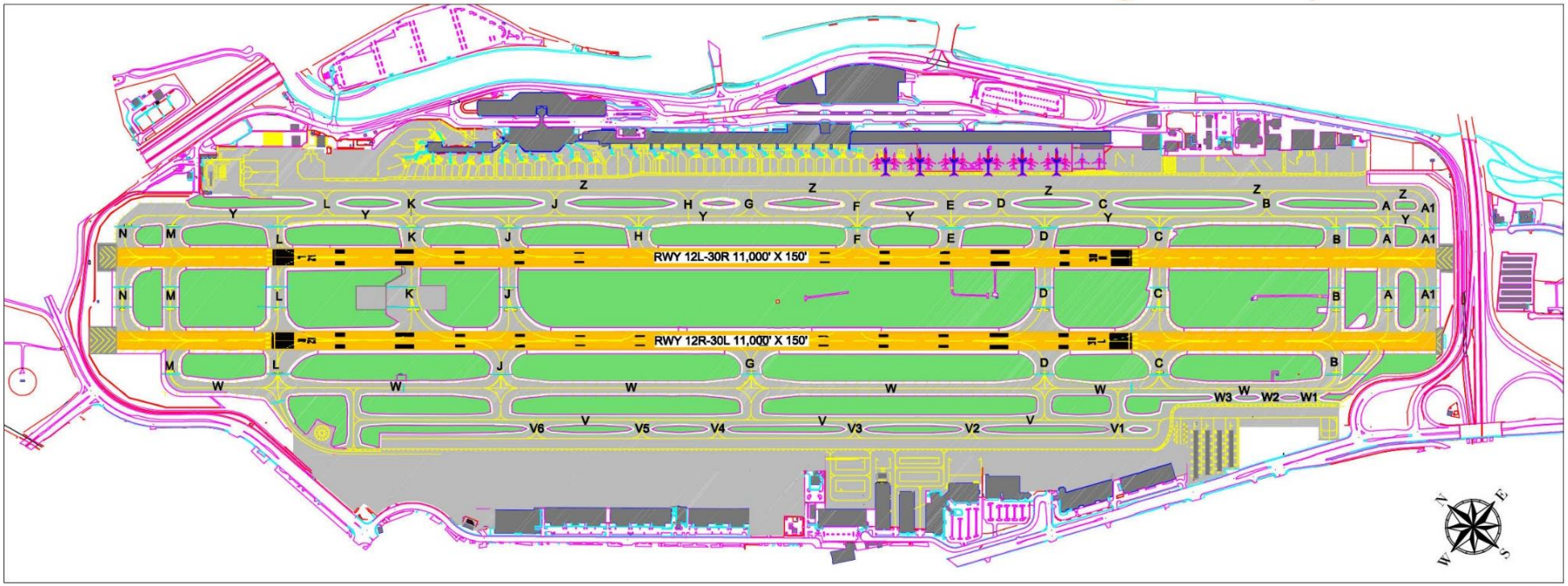


Figure 1

Design Standards Conformity Actions

- Existing east airfield runway and parallel taxiway configuration retained.
- Former Runway 11/29 converted to new ADG-III Taxiway V and extended.
- Existing Taxiway V removed and replaced by expanded apron and parallel taxilane.
- Runway 12R/30L centerline to aircraft hold position distance increased.
- Runway 12L/30R blast pad widened (both ends) and lengthened (12L end).

RIM Geometric Conformity Actions

- East airfield Taxiways B/C/D/H/J/L realigned between Taxiways Z and Y.
- Direct apron to runway access mitigated at west airfield Taxiways B/C/D.
- Taxiway B pavement reduced between Taxiway Z and Runway 12L/30R.
- Taxiway L pavement reduced between Taxiway Y and Runway 12R/30L.
- Taxiways F and H closed between Runways 12R/30L and 12L/30R.
- West airfield general aviation run-up pad relocated.

West Airfield

- Permanent closure of former Runway 11/29 and existing Taxiway V eliminates five design standards deficiencies on the west airfield. Most notably, the current Modification to Standard (MOS) for inadequate separation between the centerlines of Runway 11/29 and Taxiway V for all ADG-I and ADG-II aircraft, and associated operational restrictions on aircraft movements, is resolved. Also eliminated are the existing design standards deficiencies for aircraft hold positions along Runway 11/29 and the Taxiway V Safety Area (TSA) width, Object Free Area (TOFA) width, and separation from fixed or movable object for ADG-I/II/III aircraft.

- Conversion/extension of former Runway 11/29 to a new ADG-III Taxiway V retains two full-length parallel taxiways and conforms to taxiway design standards for ADG-III aircraft (currently and projected to remain the critical aircraft design group for the west airfield).

- Development of new Taxiway V as noted above allows for expansion of the west side apron and an ADG-III parallel taxilane along the east edge of the expanded apron. These actions improve aircraft operational movements for west side Fixed Base Operators (FBOs) and reduce controller workload by shifting some aircraft movements into an ATCT non-movement area. Additional apron space also allows for the improved accommodation of future general aviation demand.

- Permanent closure of former Runway 11/29 reduces the risk and likelihood of “wrong runway” arrival or departure events at SJC while having minimal impact on future airfield capacity due to the projected operating fleet and FAA wake recategorization that would restrict use of that runway.

- Permanent closure of former Runway 11/29, in combination with relocation of the existing general aviation run-up pad (adjacent to the intersection of Taxiways D & W) to the southwest area of the airfield, fully mitigates the two FAA-published hot spots at SJC.

- Permanent closure of former Runway 11/29, along with creating no-taxi islands (through pavement painting or removal) at existing apron access points to Taxiways B, C, and D, eliminates all direct apron-to-runway access from the west side, in conformance with geometric criteria, and reduces the corresponding risk and likelihood of runway incursion events.

- Extension of Taxiway W from Taxiway B to Runway 12R/30L at Taxiway A reduces wake recategorization-related departure delay for aircraft taxiing from the west side, eliminating the need for back-taxi movements (dual use of pavement) on Runway 12R/30L between Taxiways B and A/A-1, and reduces the corresponding risk and likelihood of runway incursion events in conformance with geometric criteria.

Limitations:

East Airfield

- Existing Modification to Standard for the non-conforming centerline separation between Runway 12L/30R and Taxiway Y for ADG-IV aircraft (400-foot standard versus 350 feet provided) is retained and will need to be updated to include ADG-V aircraft. This deficiency is partially mitigated by retention of ATCT operational restrictions on simultaneous movements by ADG-IV/V aircraft.

- Existing Modification to Standard for the non-conforming Runway 12R/30L ROFA width for ADG-IV aircraft (800-foot standard versus 500 feet provided at the Runway 30L end and 780 feet provided at the Runway 12R end) is retained and will need to be updated to include ADG-V aircraft. This deficiency is largely mitigated by displaced thresholds for arriving aircraft, and low speed of departing aircraft close to the runway ends, which minimizes the risk of a runway excursion.

- Existing design standard deficiency for Runway 12L/30R shoulder width for ADG-V aircraft (35-foot standard versus 25 feet provided) is retained. This deficiency is largely mitigated by the current and projected fleet mix that does not include ADG-V aircraft with outboard engines that extend beyond a 25-foot paved shoulder. The engines of a A330-200/300, which has the most critical engine placement, aligned on the runway centerline are 65 feet from the outer edge of the 25-foot paved shoulder, providing considerable protection from jet blast and deviation from centerline.

- Existing design standard deficiency for taxiway centerline separation between Taxiways Y and Z for ADG-V aircraft is retained. This deficiency is mitigated by retention of ATCT operational restrictions for movements by ADG-V aircraft.

- Existing design standard deficiencies for Taxiway Z TSA width, TOFA width, and separation from fixed or movable object for ADG-V aircraft, are retained. These deficiencies are mitigated by retention of ATCT operational restrictions on movements by ADG-V airport.

- Direct apron-to-runway access on cross Taxiways E, F, and K is retained. This continued geometric criteria non-conformance is based on the lack of any record of historical incursions at these locations, the availability of existing runway guard lights, and the study's Safety Risk Assessment (SRA) of low risk and limited likelihood of an event occurring in these areas. Conditions can be monitored to determine if future realignment of these taxiways becomes advisable.

- Expansive pavement (hold aprons) on Taxiway K between Runways 12R/30L and 12L/30R is retained for aircraft engine run-ups. This condition can be monitored to determine if future narrowing of pavement width becomes advisable.

- Closure/removal of Taxiway F between Runways 12R/30L and 12L/30R (to eliminate high-energy crossing of 12L/30R) would require that approximately 10 percent of south flow arrivals on Runway 12R that could exit at Taxiway F to instead roll further down the runway to Taxiway D to exit.

West Airfield

- Construction of an ADG-III Taxiway W extension from Taxiway B to Runway 12R/30L creates a design standard deficiency due to intrusion of the vehicle service road into the TOFA. However, the benefit of eliminating back-taxi aircraft movements on the south end of Runway 30L, or a considerable increase in runway crossings, significantly outweighs the risk from the relatively low volume and momentary passage of airport service vehicles through the TOFA with appropriate signage and vehicle movement procedures.

- Aircraft movements on Taxiway W remain unavailable in CAT II & III operating conditions when an ADG-V aircraft is on Runway 12R/30L.

Other Characteristics:

- Airfield operational capacity is retained and is higher in this alternative than the other project alternatives. Based on the simulation analysis conducted for the projected design day activity (average day of peak month) in 2037, airfield operational delay will average 2.0 minutes (2.04 minutes in north flow and 1.77 minutes in south flow). Total ground travel time per operation will average 6.09 minutes (6.15 minutes in north flow and 5.71 minutes in south flow).

- The estimated implementation cost of construction is $71.0 million. The largest cost elements include the conversion/extension of former Runway 11/29 to a new Taxiway V and the replacement of existing Taxiway V with an expanded apron and parallel taxilane. Implementation will need to be phased over several years to minimize the impact to operations.

C. Summary Analysis of Project Alternative 2

The key elements of Project Alternative 2 are listed and graphically depicted in **Figure 2**. Alternative 2 significantly modifies the configuration of the east airfield to provide improved conformity with current design standards for ADG-IV & V aircraft, significantly modifies the configuration of the west airfield to conform to design standards for ADG-III aircraft (similar to Project Alternative 1), and addresses many of the airfield's geometric criteria conformity issues.

Attributes:

East Airfield

- Shifting Taxiway Y 50 feet to the east eliminates the current Modification to Standard for the Runway 12L/30R to parallel taxiway centerline separation deficiency for ADG-IV and ADG-V aircraft. Existing operational restrictions for movements of ADG-IV and ADG-V aircraft on Runway 12L/30R and Taxiway Y are also eliminated.

- Closure of existing Taxiway Z and expansion of the terminal apron eliminates the existing design standard deficiency for centerline separation between Taxiways Y and Z for ADG-V aircraft.

- Creation of two hold aprons parallel to Taxiway Y (south of Taxiway B and north of Taxiway K) allows for limited airline departure staging/bypass functions for aircraft up to ADG-IV in size.

- Shift of aircraft hold positions along Runway 12R/30L to 280-foot separation from the runway centerline eliminates the existing design standard deficiency for ADG-V aircraft. *[same as in Alternative 1]*

- Widening of Runway 12L/30R blast pads to 220 feet at both ends, and lengthening the blast pad at the Runway 12L end to 400 feet, eliminates the existing design standard deficiency for ADG-V aircraft. *[same as in Alternative 1]*

- Realignment of 9 cross taxiway segments (B, C, D, E, F, H, J, K, and L) between Taxiways Y and Z eliminates direct apron-to-runway access, in conformity with geometric criteria, along all east side taxiways.

- Narrowed width of Taxiway B between Taxiway Z and Runway 12L/30R, and narrowed width of Taxiway L between Taxiway Y and Runway 12R/30L, eliminates two existing large expanses of pavement in conformity with geometric conformity criteria. *[same as in Alternative 1]*

- Installation of in-pavement Runway Guard Lights (RGLs) on Taxiways F and H between Runways 12R/30L and 12L/30R enhances pilot situational awareness of the existing high-energy runway crossings of Runway 12L/30R, potentially reducing the risk of additional incursions occurring in this area.

Future Airfield Configuration: Project Alternative 2

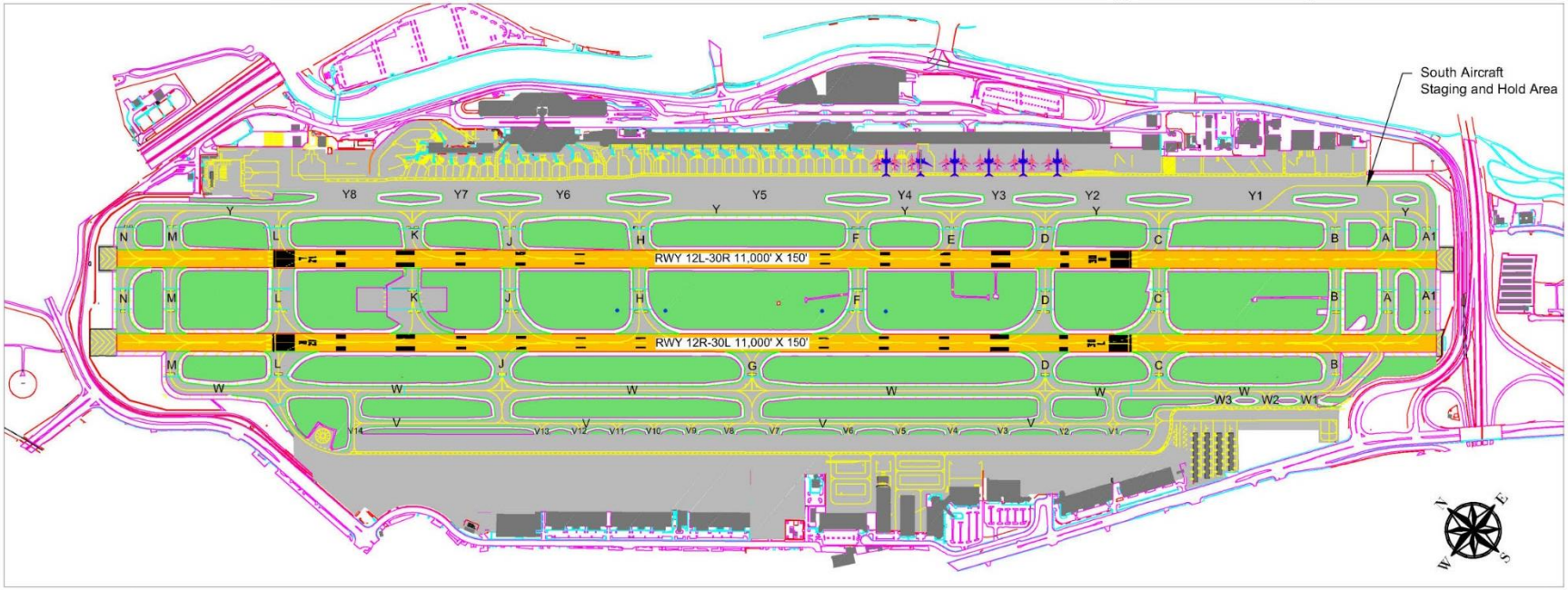


Figure 2

Design Standards Conformity Actions

- Taxiway Y relocated to east.
- Taxiway Z closed and replaced by expanded apron.
- Former Runway 11/29 converted to new ADG-III Taxiway V and extended.
- Existing Taxiway V removed and replaced by expanded apron.
- Runway 12R/30L centerline to aircraft hold position distance increased.
- Runway 12L/30R blast pad widened (both ends) and lengthened (12L end).

RIM Geometric Conformity Actions

- East airfield Taxiways B/C/D/E/F/H/J/K/L realigned between Taxiways Z and Y.
- Direct apron to runway access mitigated at west airfield Taxiways B/C/D.
- Taxiway B pavement reduced between Taxiway Z and Runway 12L/30R.
- Taxiway L pavement reduced between Taxiway Y and Runway 12R/30L.
- In-pavement Runway Guard Lights installed on Taxiways F and H at Runway 12L/30R.
- West airfield general aviation run-up pad relocated.

West Airfield

- Permanent closure of former Runway 11/29 and existing Taxiway V eliminates five design standards deficiencies on the west airfield. Most notably, the current Modification to Standard for inadequate separation between the centerlines of Runway 11/29 and Taxiway V for all ADG-I & II aircraft, and associated operational restrictions on aircraft movements, is resolved. Also eliminated are the existing design standards deficiencies for aircraft hold positions along Runway 11/29 and the Taxiway V Safety Area width, Object Free Area width, and separation from fixed or movable object for ADG-I/II/III aircraft. *[same as in Alternative 1]*

- Conversion/extension of former Runway 11/29 to a new ADG-III Taxiway V retains two full-length parallel taxiways and conforms to taxiway design standards for ADG-III aircraft (currently and projected to remain the critical aircraft design group for the west airfield). *[same as in Alternative 1]*

- Conversion of existing Taxiway V to an expanded west side apron improves aircraft operational movements for west side FBOs, and allows for improved accommodation of future general aviation demand and potentially other aviation-related facilities and uses.

- Permanent closure of former Runway 11/29 reduces the risk and likelihood of "wrong runway" arrival or departure events at SJC while having minimal impact on future airfield capacity due to the projected operating fleet and FAA wake recategorization that would restrict use of that runway. *[same as in Alternative 1]*

- Permanent closure of former Runway 11/29, in combination with relocation of the existing general aviation run-up pad (adjacent to the intersection of Taxiways D & W) to the southwest area of the airfield, fully mitigates the two FAA-published hot spots at SJC. *[same as in Alternative 1]*

- Permanent closure of former Runway 11/29, along with creating no-taxi islands (through pavement painting or removal) at existing apron access points to Taxiways B, C, and D, eliminates all direct apron-to-runway access from the west side, in conformance with geometric criteria, and reduces the corresponding risk and likelihood of runway incursion events. *[same as in Alternative 1]*

- Extension of Taxiway W from Taxiway B to Runway 12R/30L at Taxiway A reduces wake recategorization-related departure delay for aircraft taxiing from the west side, eliminating the need for back-taxi movements (dual use of pavement) on Runway 12R/30L between Taxiways B and A/A-1, and reduces the corresponding risk and likelihood of runway incursion events in conformance with geometric criteria. *[same as in Alternative 1]*

Limitations:

East Airfield

- The closure of existing Taxiway Z to accommodate the eastward realignment of Taxiway Y generates significant adverse operational issues.
    - The conversion of Taxiway Z to an expanded apron and non-movement area requires institution of an airport- or airline-led ramp control management system for pushbacks from the terminal gates and staging of aircraft on the apron. The limited depth of the apron between the airline parking positions at the terminal gates and realigned Taxiway Y will also likely result in aircraft delays due to lack of a bypass capability along the terminal aprons and when ADG-V aircraft are pushing back from the terminal gates. ADG-V aircraft pushbacks that occur at Terminal A would penetrate the realigned TOFA of Taxiway Y, creating a new design standard deficiency and adversely impact aircraft movements on Taxiway Y.
    - The taxiway connectors between the terminal apron and Taxiway Y will need to be wide (as indicated in Figure 2 at connectors Y-1, Y-2, Y-5, Y-6, and Y-8) due to the elimination of lateral taxiing on the aprons. These wide expanses of pavement conflict with geometric criteria and elevate the risk and likelihood of an incident involving aircraft entering or exiting Taxiway Y.

- The parallel hold aprons south of Taxiway B and north of Taxiway K are limited in length. When insufficient to fully provide staging or bypass capability, aircraft delay holds may still occur at the terminals gates, consequently causing arrival delay as well. When in use for aircraft staging or bypass purposes, the hold aprons may constrain aircraft movements on the adjacent air cargo airline aprons.

- Existing Modifications to Standard for the non-conforming Runway 12R/30L ROFA width for ADG-IV aircraft (800-foot standard versus 500 feet provided at the Runway 30L end and 780 feet provided at the Runway 12R end) is retained and will need to be updated to include ADG-V aircraft. This deficiency is largely mitigated by displaced thresholds for arriving aircraft, and the low speed of departing aircraft close to the runway ends, which minimize the risk of a runway excursion. *[same as in Alternative 1]*

- Existing design standard deficiency for Runway 12L/30R shoulder width for ADG-V aircraft (35-foot standard versus 25 feet provided) is retained. This deficiency is largely mitigated by the current and projected fleet mix that does not include ADG-V aircraft with outboard engines that extend beyond a 25-foot paved shoulder. The engines of a A330-200/300, which has the most critical engine placement, aligned on the runway centerline are 65 feet from the outer edge of the 25-foot paved shoulder, providing considerable protection from jet blast and deviation from centerline. *[same as in Alternative 1]*

- Retention of the existing segments of Taxiway F and H between Runways 12R/30L and 12L/30R, with in-pavement RGLs added, does not appear to reduce the current level of risk and likelihood of a runway incursion associated with the high-energy crossings of Runway 12L/30R.

- Expansive pavement (hold aprons) on Taxiway K between Runways 12R/30L and 12L/30R is retained for aircraft engine run-up use. This can be monitored to determine if future narrowing of pavement width becomes advisable. *[same as in Alternative 1]*

West Airfield

- Expansion of the west side apron will require multiple taxiway connectors between the apron and new Taxiway V (up to 13 as indicated in Figure 2).

- Lateral aircraft movements related to the west side FBO aprons must occur on new Taxiway V, potentially impacting its operational efficiency and increasing controller workload.

- Construction of an ADG-III Taxiway W extension from Taxiway B to Runway 12R/30L creates a design standard deficiency due to intrusion of the vehicle service road into the TOFA. However, the benefit of eliminating back-taxi aircraft movements on the south end of Runway 30L, or a considerable increase in runway crossings, significantly outweighs the risk from the relatively low volume and momentary passage of airport service vehicles through the TOFA with appropriate signage and vehicle movement procedures. *[same as in Alternative 1]*

- Aircraft movements on Taxiway W remain unavailable in CAT II & III operating conditions when an ADG-V aircraft is on Runway 12R/30L. *[same as in Alternative 1]*

Other Characteristics:

- Airfield operational capacity is retained at a slightly lower level of performance than Project Alternative 1. Based on the simulation analysis conducted for the projected design day activity (average day of peak month) in 2037, airfield operational delay will average 2.68 minutes (2.81 minutes in north flow and 1.89 minutes in south flow). Total ground travel time per operation will average 6.64 minutes (6.78 minutes in north flow and 5.81 minutes in south flow).

- Estimated implementation cost of construction is $150.0 million, more than twice the estimated cost of Alternative 1. The biggest cost elements are the construction of the realigned Taxiway Y, the conversion/extension of former Runway 11/29 to a new Taxiway V, and replacement of existing Taxiway V with an expanded apron. Phasing of improvements would also be the most complex of the project alternatives to implement, particularly on the east airfield where construction of the realigned Taxiway Y would likely severely impact operational use of existing Taxiways Y and Z, associated delay, and the potential for runway incursion and surface incidents.

D. Summary Analysis of Project Alternative 3

The key elements of Project Alternative 3 are listed and graphically depicted in **Figure 3**. Alternative 3 retains much of the existing airfield configuration on the east side (similar to Project Alternative 1) as well as the existing airfield configuration on the west side, and includes re-opening former Runway 11/29 for general aviation use, while addressing some of the airfield's geometric criteria conformity issues.

Attributes:

East Airfield

- Shift of aircraft hold positions along Runway 12R/30L to 280-foot separation from the runway centerline eliminates the existing design standard deficiency for ADG-V aircraft. *[same as in Alternatives 1 & 2]*

- Widening of Runway 12L/30R blast pads to 220 feet at both ends, and lengthening the blast pad at the 12L end to 400 feet, eliminates the existing design standard deficiency for ADG-V aircraft. *[same as in Alternatives 1 & 2]*

- Realignment of 6 cross taxiway segments (B, C, D, H, J, and L) between Taxiways Y and Z eliminates direct apron-to-runway access, in conformity with geometric criteria, for those east side taxiways identified as having an historical incursion incident or a greater potential incident risk or likelihood. *[same as in Alternative 1]*

- Narrowed width of Taxiway B between Taxiway Z and Runway 12L/30R, and narrowed width of Taxiway L between Taxiway Y and Runway 12R/30L, eliminates two existing large expanses of pavement in conformity with geometric conformity criteria. *[same as in Alternatives 1 & 2]*

- Closure/removal of segments of Taxiways F and H between Runways 12R/30L and 12L/30R eliminates the existing high-energy runway crossings of Runway 12L/30R in conformance with geometric criteria, with minimal impact on airfield operational capacity and efficiency. *[same as in Alternative 1]*

Future Airfield Configuration: Project Alternative 3

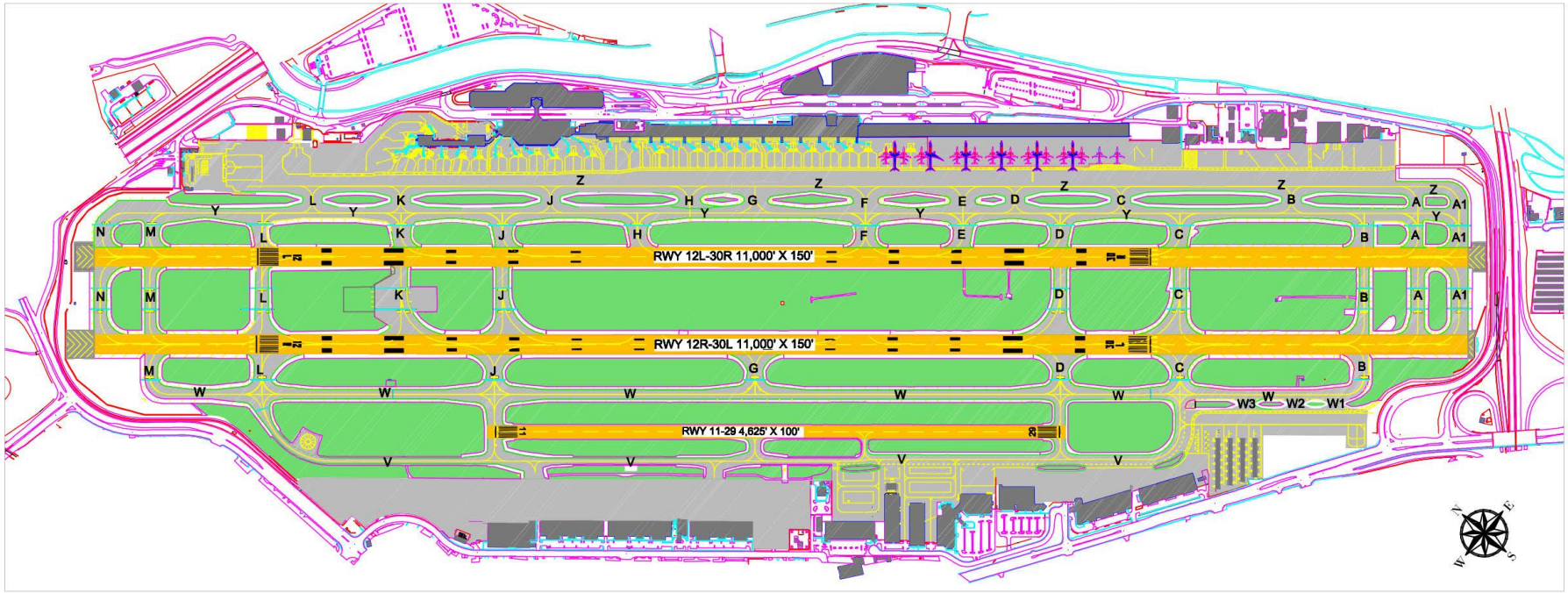


Figure 3

Design Standards Conformity Actions

- Existing east airfield runway and parallel taxiway configuration retained.
- Former Runway 11/29 re-activated and existing west airfield runway and parallel taxiway configuration retained.
- Runway 12R/30L centerline to aircraft hold position distance increased.
- Runway 12L/30R blast pad widened (both ends) and lengthened (12L end).

RIM Geometric Conformity Actions

- East airfield Taxiways B/C/D/H/J/L realigned between Taxiways Z and Y.
- Direct apron to runway access mitigated at west airfield Taxiways B/C/D/F.
- Taxiway B pavement reduced between Taxiway Z and Runway 12L/30R.
- Taxiway L pavement reduced between Taxiway Y and Runway 12R/30L.
- Taxiways F and H closed between Runways 12R/30L and 12L/30R.
- Taxiway G closed between Runway 11/29 and Taxiway W.
- West airfield general aviation run-up pad relocated.

West Airfield

- Re-opening of former Runway 11/29 provides a slight enhancement to airfield operational capacity and efficiency for smaller ADG-I & II aircraft departures.

- Creating taxi islands (through pavement painting or removal) at existing apron access points to Taxiways B, C, D, and F eliminates all direct apron-to-runway access from the west side, in conformity with geometric criteria, and reduces the corresponding risk and likelihood of runway incursion events.

- Relocation of the existing general aviation run-up pad (adjacent to the intersection of Taxiways D and W) to the southwest area of the airfield will largely mitigate the two FAA-published hot spots at SJC, although to a lesser extent than in Project Alternatives 1 & 2 due to the re-opening of former Runway 11/29.

- Closure of the segment of Taxiway G between re-opened Runway 11/29 and Taxiway W eliminates high-energy runway crossings of a re-opened 11/29, in conformity with geometric criteria.

Limitations:

East Airfield

- Existing Modifications to Standard for the non-conforming centerline separation between Runway 12L/30R and Taxiway Y for ADG-IV aircraft (400-foot standard versus 350 feet provided) is retained and will need to be updated to include ADG-V aircraft. This deficiency is partially mitigated by retention of ATCT operational restrictions on simultaneous movements by ADG-IV/V aircraft. *[same as in Alternative 1]*

- Existing Modifications to Standard for the non-conforming Runway 12R/30L ROFA width for ADG-IV aircraft (800-foot standard versus 500 feet provided at the Runway 30L end and 780 feet provided at the Runway 12R end) is retained and will need to be updated to include ADG-V aircraft. This deficiency is largely mitigated by displaced thresholds for arriving aircraft, and low speed of departing aircraft close to the runway ends, which minimize the risk of a runway excursion. *[same as in Alternatives 1 & 2]*

- Existing design standard deficiency for Runway 12L/30R shoulder width for ADG-V aircraft (35-foot standard versus 25 feet provided) is retained. This deficiency is largely mitigated by the current and projected fleet mix that does not include ADG-V aircraft with outboard engines that extend beyond a 25-foot paved shoulder. The engines of a A330-200/300, which has the most critical engine placement, aligned on the runway centerline are 65 feet from the outer edge of the 25-foot paved shoulder, providing considerable protection from jet blast and deviation from centerline.

- Existing design standard deficiency for taxiway centerline separation between Taxiways Y and Z for ADG-V aircraft is retained. This deficiency is partially mitigated by retention of ATCT operational restrictions for movements by ADG-V aircraft. *[same as in Alternative 1]*

- Existing design standard deficiencies for Taxiway Z TSA width, TOFA width, and separation from fixed or movable object for ADG-V aircraft, are retained. These deficiencies are mitigated by retention of ATCT operational restrictions on movements by ADG-V aircraft.

- Direct apron-to-runway access on cross Taxiways E, F, and K is retained. This continued geometric criteria non-conformance is based on the lack of any record of historical incursions at these locations, the availability of existing runway guard lights, and the study's Safety Risk Assessment (SRA) of low risk and limited likelihood of an event occurring in these areas. Conditions can be monitored to determine if future realignment of these taxiways becomes advisable. *[same as in Alternative 1]*

- Expansive pavement (hold aprons) on Taxiway K between Runways 12R/30L and 12L/30R is retained for aircraft engine run-up use. This condition can be monitored to determine if future narrowing of pavement width becomes advisable. *[same as in Alternatives 1 & 2]*

- Closure/removal of Taxiway F between Runways 12R/30L and 12L/30R (to eliminate high-energy crossing of Runway 12L/30R) would require the approximately 10 percent of south flow arrivals on 12R that could have exited at Taxiway F to instead roll further down the runway to Taxiway D to exit. *[same as in Alternative 1]*

<u>West Airfield</u>

- Existing Modifications to Standard for the non-conforming centerline separation between a re-opened Runway 11/29 and Taxiway V for larger ADG-I & II aircraft is retained and will need to be updated to include ADG-III aircraft. ATCT operational restrictions on simultaneous aircraft movements on Runway 11/29 and V will have to be applied to partially mitigate this design standard deficiency.

- Existing design standard deficiencies for aircraft hold positions along re-opened Runway 11/29 and the Taxiway V TSA width, TOFA width, and separation from fixed or movable object for ADG-I, II, & III aircraft are retained. Operational restrictions can potentially increase controller workload and adversely impact the capacity and efficiency of aircraft movements on the west airfield, particularly given the projected increase in ADG-III aircraft operations.

- Re-opening of former Runway 11/29 has very limited operational value. Due to wake recategorization, and the lateral proximity of Runway 12R/30L, a re-opened Runway 11/29 will likely accommodate little, if any, aircraft arrivals. Departures on a re-opened Runway 11/29 will be subject to hold delays due to wake recategorization.

- Re-opening of former Runway 11/29 potentially triggers an increase in "wrong runway" events given its proximity to Runway 12R/30L.

- Conditions at the two FAA-published hot spots on Taxiway D will not be fully mitigated with the re-opening of Runway 11/29 due to increased ADG-I and ADG-II aircraft movements and potential hold delays on Taxiway D for Runway 29 departure.

- Aircraft movements on Taxiway W remain unavailable in CAT II & III operating conditions when an ADG-V aircraft is operating on Runway 12R/30L. *[same as in Alternatives 1 & 2]*

Other Characteristics:

- Airfield operational capacity is retained but at a lower level of performance than Project Alternatives 1 or 2. Based on the simulation analysis conducted for the projected design day activity (average day of peak month) in 2037, airfield operational delay will average 3.26 minutes (3.23 minutes in north flow and 3.42 minutes in south flow). Total ground travel time per operation will average 7.53 minutes (7.54 minutes in north flow and 7.49 minutes in south flow).

- Estimated implementation cost of construction is $38.0 million, the lowest of the three project alternatives. The package of geometric criteria conformance improvements and the costs of restoring former Runway 11/29 for operational use are the biggest cost elements. Phasing of improvements would also be the least complex of the project alternatives to implement.

E. Summary Analysis of No Action Alternative

The No Action (or "No Project") Alternative reflects the airfield configuration proposed in the current SJC Airport Master Plan and depicted on the current Airport Layout Plan, which includes the re-opening of Runway 11/29 and construction of several taxiway extensions or widening/strengthening improvements on the west airfield that, to date, have not been implemented.

There are essentially no attributes to limiting the airfield to its existing configuration augmented by only a few taxiway improvements that potentially exacerbate the non-conformance conditions with current airfield design standards and geometric criteria. The major limitations of this alternative are:

- All current design standard deficiencies and Modifications to Standards are retained and will need to be updated to include ADG-V aircraft operations on the east airfield and ADG-III aircraft operations on the west airfield. Associated operational restrictions on both sides of the airfield will impact operational efficiency and controller workload.

- All current geometric criteria issues are retained, including multiple points of direct apron-to-runway access on both sides of the airfield, large expanses of pavement, and high-energy crossings of Runways 12L/30R and 11/29.

- The risk and likelihood of runway incursion and other airfield incidents identified in the baseline Safety Risk Assessment will remain and potentially increase as growth in aircraft operations occurs, with little or no mitigation to current hotspots or incident focus areas.

- The two FAA-published hot spots remain unmitigated with the re-opening of Runway 11/29, combined with no relocation of the existing general aviation run-up pad.

- As discussed under Project Alternative 3, the re-opening of Runway 11/29 has very limited operational value (due to wake recategorization departure delays and little, if any, arrivals) and potentially increases the risk of "wrong runway" events.

- The remaining taxiway improvements proposed in the Airport Layout Plan/Airport Master Plan will create additional design standard deficiencies and geometric criteria conflicts. For example, the extension to Taxiway W north from M to connect to the end of Runway 12R at Taxiway N would place the existing runway blast fence within the TSA, and the extension of Taxiways H and K from Runway 12R/30L to Taxiway V would create additional points of direct apron-to-runway access and high-energy runway crossings.

Airfield operational capacity is essentially the same as in Project Alternative 3 given the almost identical airfield configuration and usage. The estimated construction cost is $7.2 million, which includes restoring former Runway 11/29 for operational use and constructing the several remaining taxiway extensions and improvements identified in the current SJC Master Plan and Airport Layout Plan.

F. Recommendation

Based on the analyses summarized in the foregoing section, **Figure 4** presents an overall comparative matrix graphically indicating the relative performance of the project alternatives in achieving the study objectives.

In terms of conformity with current FAA airfield design standards, analysis conducted earlier in the study determined that achieving full conformity is not feasible due to the physical constraints at SJC. All three project alternatives work to resolve many of the 13 identified design standard deficiencies. On the west airfield, Project Alternatives 1 and 2 eliminate the deficient lateral separations associated with former Runway 11/29 and existing Taxiway V, while upgrading accommodation of ADG-III aircraft operations. On the east airfield, Project Alternative 2 additionally eliminates the deficient lateral separation between Runway 12L/30R and existing Taxiway Y for ADG-IV & V aircraft operations, but only by restricting the east airfield to a single parallel taxiway which creates significant operational problems that appear to offset the benefit of eliminating current Tower restrictions on simultaneous movements of ADG-IV & V aircraft. Project Alternative 3, in re-opening Runway 11/29 for light aircraft use, retains the west airfield design standard deficiencies, and generates little improvement to operational capacity and efficiency, particularly given FAA wake recategorization.

In terms of geometric criteria conformity and mitigation of potential runway incursions and hot spot incidents, all three project alternatives include actions that address these conditions to varying degrees, including eliminating or reducing direct apron-to-runway access, large expansive pavement, and high-energy runway crossings. Project Alternatives 1 and 2, by converting former Runway 11/29 to a new Taxiway V and relocating the general aviation run-up pad to the southwest apron area, fully mitigate the two FAA-published hot spot locations along Taxiway D.

Project Alternative 1 offers the best combination of addressing design standard deficiencies, geometric criteria conformity, runway incursion and surface incident mitigation, operational efficiency, and construction feasibility, while accommodating the projected growth in aviation demand. Project Alternative 1 should therefore be selected as the preferred alternative for inclusion in a formal update of the Airport Master Plan and Airport Layout Plan.

Figure 4: Project Alternatives Evaluation Summary Matrix

Objectives:	Project Alternative 1		Project Alternative 2		Project Alternative 3		No Action Alternative	
	East Airfield	West Airfield	East Airfield	West Airfield	East Airfield	West Airfield	East Airfield	West Airfield
Mitigation of Non-Standard Design Conditions								
Conformity with FAA RIM-Related Criteria								
Mitigation of Identified Hotspots								
Extent of Reduction in Safety Risk Achieved								
Airfield Capacity								
Operational Efficiency								
Ease of Implementation Phasing/Construction Impacts								
Development Costs								

	Best Performance
	Limited or Marginal Benefit
	Least or Negative Benefit

Additional Considerations

As mentioned in the introductory section of this technical memorandum, the alternatives analysis did not include the changes to taxiway nomenclature that were originally included in each of the three proposed project alternatives. The only non-standard taxiway nomenclature issue at SJC is the naming and order of the two southernmost cross taxiways (A-1 and A), and FAA records on runway incursions and airfield incidents have not identified taxiway designations as contributing factors to any documented incident. Moreover, input from aviation stakeholders during the course of this Runway Incursion Mitigation/Design Standards Analysis Study also suggest that revising taxiway designations could lead to confusion and situational awareness issues that could negate the benefit of changing taxiway designations, at least in the short term. Therefore, rather than recommend proceeding with any of the three taxiway nomenclature revision options as an element of the selected project alternative, it is recommended that the existing taxiway nomenclature be retained, yet monitored on an ongoing basis to determine if any action is warranted.

Another consideration is the potential for additional measures to minimize the potential occurrence of "wrong runway" incidents caused by the lateral proximity of Runways 12R/30L and 12L/30R and their parallel taxiways (W and Y). Historical incidents of wrong runway events at SJC involved general aviation and corporate operators, with many of the incidents associated with Runway 11/29 when it was operational. The permanent closure of Runway 11/29 as an element of recommended Project Alternative 1 fully mitigates the potential for wrong runway incidents involving that former runway. To reduce the potential for wrong runway incidents involving Runways 12L/30R and 12R/30L, educational tools could be provided to alert pilots to the need for situational awareness regarding runway proximity, such as through explicit notations in the Airport Facility Directory, informational materials distributed to FBOs and aircraft tenants, and controller attention to ensure correct pilot read-back of instructions identifying the assigned runway. Finally, to also mitigate the potential for mistaken arrivals or departures on a parallel taxiway, enhanced pavement markings can be implemented, a notable example from other airports (displayed in the photos below) being the painting of the word "TAXI" near each end of Taxiways W and Y at a point lateral to the displaced thresholds of 12L/30R and 12R/30L.





Appendices:

- Appendix A: Airfield Simulation Results
- Appendix B: Consolidated Alternatives Cost and Implementation Phasing Analysis
- Appendix C: Project Alternatives Safety Risk Assessment

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
RUNWAY INCURSION MITIGATION/AIRFIELD DESIGN STANDARDS ANALYSIS

TECHNICAL MEMORANDUM:

ANALYSIS OF PROJECT ALTERNATIVES SUMMARY

SUPPLEMENT

City of San Jose
June 1, 2018

Draft Technical Memorandum entitled “Summary Analysis of Project Alternatives” (April 3, 2018) concluded with the recommendation that Project Alternative 1 be selected as the preferred airfield configuration alternative to be included in the forthcoming update of the SJC Master Plan and Airport Layout Plan. The Technical Memorandum also noted that the selected alternative could be further refined to incorporate elements within other Project Alternatives or from the additional considerations presented for improving airfield safety.

Based on the input received from the study’s Technical Working Group, the following five refinements have been made to Project Alternative 1, and are reflected in the accompanying figure, to finalize what is henceforth termed the study’s “Recommended Alternative”:

- Realign the segments of Taxiways E and F between parallel Taxiways Y and Z to mitigate direct apron-to-runway access on the east airfield. These two taxiway segment realignments were previously proposed in Project Alternative 2, but not in Project Alternative 1 due to the lack of any incident history and, in turn, the relatively low incident likelihood and severity findings in the Safety Risk Assessment conducted as part of the alternatives analysis. However, upon further consideration, as Taxiways E and F intersect the high-energy portion of Runway 12L/30R, realigning the segments to prevent direct apron-to-runway access would improve overall conformity to FAA geometric criteria. Thus, the Recommended Alternative realigns 8 of the 9 existing east airfield taxiways which currently allow direct apron-to-runway access. Only Taxiway K, which intersects both runways outside the high-energy portion, would remain in its existing alignment to facilitate the large volume of Runway 30L and 30R airline arrivals that exit onto that taxiway for access to the terminal gates.

- Re-name all 8 realigned cross taxiway segments on the east airfield. This refinement would reduce potential pilot confusion that might occur if the same taxiway identifier was retained on pavement segments that no longer directly connect with each other. The realigned segment of Taxiway B between Taxiways Y and Z would be renamed “Z-1”, the realigned segment of Taxiway C would be renamed “Z-2”, etc. The realigned segment of Taxiway L would be re-named “Z-10”, reserving “Z-9” in case the segment of Taxiway K is determined in the future to warrant realignment. This set of nomenclature modifications conform to current FAA signage guidelines.

- Add the designation “V-7” to the new west airfield cross taxiway that would connect the north ends of the new taxilane and new Taxiway V to existing Taxiway W. In the previous Project Alternative 1, this new cross taxiway was inadvertently left un-named. Along with the other new taxiway pavements connecting the west airfield taxilane to new Taxiway V (“V-1” - “V-6”), these designations conform to current FAA signage guidelines.

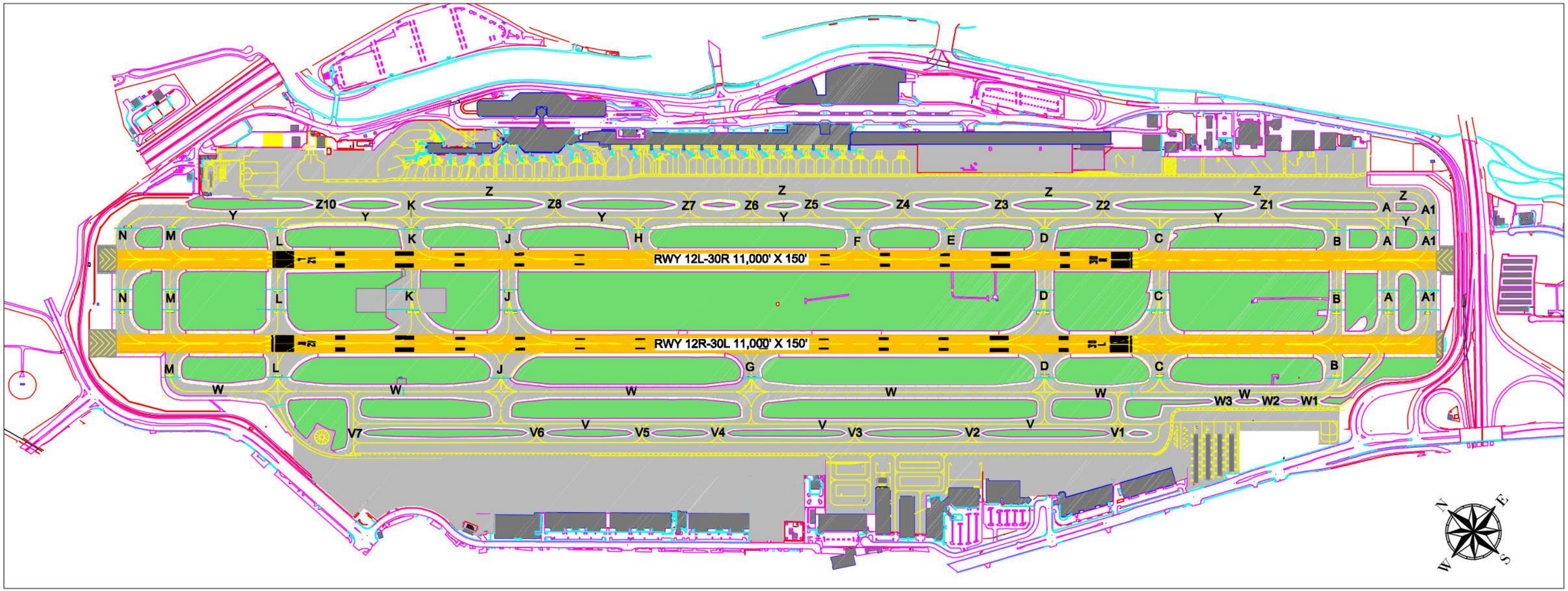
- Modify the Taxiway J west-bound exit from Runway 30L to allow higher-speed aircraft turnoffs. This modification, similar in configuration to the existing Taxiway J east-bound exit from Runway 30L, would facilitate the movement of Group III corporate jet aircraft arriving on Runway 30L which would exit at Taxiway J for access to the west side FBO ramps. This improvement is also included in SJC’s existing Airport Master Plan for future implementation. The improvement will reduce runway

occupancy time for those aircraft taking the west-bound Taxiway J exit from Runway 30L, which further reduces the potential for a loss of separation between arriving aircraft.

- Paint the word “TAXI” on the pavement of parallel Taxiways W and Y near each end, lateral to the displaced thresholds of Runways 12L/30R and 12R/30L. This proposed set of markings was presented in the analysis of Project Alternatives as an additional consideration for mitigating the potential for wrong-surface landings or departures on parallel taxiways by enhancing pilot awareness of the close runway/taxiway alignment proximity. This additional element is not explicitly depicted in the accompanying figure due to legibility considerations.

The recommended airfield configuration, as refined above, along with an associated set of landside facility improvements to accommodate projected 2037 demand, will comprise the proposed updates to the SJC Master Plan for City of San Jose formal review/approval and the Airport Layout Plan for FAA formal review/approval.

Future Airfield Configuration: Recommended Alternative



Design Standards Conformity Actions

- Existing east airfield runway and parallel taxiway configuration retained.
- Former Runway 11/29 converted to new ADG-III Taxiway V and extended.
- Existing Taxiway V removed and replaced by expanded apron and parallel taxilane.
- Runway 12R/30L centerline to aircraft hold position distance increased.
- Runway 12L/30R blast pad widened (both ends) and lengthened (12L end).

RIM Geometric Conformity Actions

- East airfield Taxiways B/C/D/E/F/H/J/L realigned between Taxiways Z and Y.
- Direct apron to runway access mitigated at west airfield Taxiways B/C/D.
- Taxiway W extended south from Taxiway B to Runway 12R/30L to mitigate back-taxiing on runway.
- Taxiway B pavement reduced between Taxiway Z and Runway 12L/30R.
- Taxiway L pavement reduced between Taxiway Y and Runway 12R/30L.
- Taxiways F and H closed between Runways 12R/30L and 12L/30R.
- West airfield general aviation run-up pad relocated.

AERONAUTICAL SURVEY/AIRPORT GEOGRAPHIC INFORMATION SYSTEM

SJC FINAL REPORT

Final Survey Report
Norman Y. Mineta San José International Airport (SJC)
San José, California

Towill, Inc. Project No. 14988

June 8, 2017

Work Performed

This FAA-AC 150/5300-18B obstruction survey took place at San José International Airport, San José, California. Survey work was done by Towill, Inc. and completed on December 22, 2016. This report documents the ground survey portion of the obstruction survey.

Two existing PACS monument, **SJC J (DF5164) & SJC ARP** (**HS5425)**, and one existing SACS monuments, **SJC H (AJ3416)**, was located on the airport. One of the PACS, **SJC J (DF5164)**, was found to be disturbed as noted on the NGS datasheet. A fast-static observation of each monument was observed, postprocessed and inversed to compared against record.
NOTE: SJC K (DF5168) was not found and is believed to be destroyed.

Photo post-ID locations for sixty-seven (67) photo control were established by RTK Virtual Survey Network (RTK-VSN) methods and verified with OPUS derived solutions of the (5) Check points.

RTK-VSN checks were made on NGS monuments included in the calibration at the start and end of each day. At each Photo ID point, two measurements were made and the results compared in the field for consistency and averaged for the final report.

A total of 5 check points were observed with static GPS and submitted to OPUS for adjustment. These checks were compared against the RTK-VSN survey values to validate the survey.

The Runway Ends, Widths, centerline profiles and NAVAIDS were surveyed with Real-Time Kinematic GPS methods with the base on **SJC H (AJ3416)**. The VOR/DME was surveyed by setting local control at the site with RTK and conventional observations.
Note: Runway 11-29 is a planned runway and is not active. At the time of survey PAPI-29 was not operational. Access to airport during day light hours was not always granted, so you will see several photos taken at night.

Runway profiles were surveyed with the antenna mounted on a vehicle and driven the length of the runway along the centerline and 10’ left and right of centerline of each runway, collecting points at 1 second intervals. The lines were later resampled for an interpolated 10-foot station profile of the runways.

Methodology

Towill located and observed Two existing PACS monument, **SJC J (DF5164) & SJC ARP** (**HS5425)**, and one existing SACS monuments, **SJC H (AJ3416). SJC J (DF5164)** was noted in the NGS DATASHEET that the monument was disturbed and our field efforts confirmed this. **SJC ARP** (**HS5425)** & **SJC H (AJ3416)** were observed in two independent fast static sessions of at least 20 minutes. These base lines were compared using Inverse 3D for verification of the SACS.

	Published HS5425 to Computed AJ3416	Published HS5425 to Published AJ3416	Difference
Ellipsoidal distance	4971.282 Ft	4971.279 Ft	0.003 Ft
Delta height	6.555 Ft	6.547 Ft	0.008 Ft
Mark-to-mark distance	4971.270 Ft	4971.268 Ft	0.002 Ft
DN	-3161.267 Ft	-3161.240 Ft	-0.027 Ft
DE	3836.649 Ft	3836.669 Ft	-0.019 Ft
DU	5.964 Ft	5.956 Ft	0.008 Ft

All photo ID points were surveyed by RTK Virtual Survey Network (RTK-VSN) methods. First a site calibration was made using NGS passive monuments with published values on the California Coordinate System of 1983 (2011)(epoch 2010.00), Zone 3 and the North American Vertical Datum of 1988 (NAVD88)(Geoid 12B), US Survey Feet. These monuments created an envelope enclosing the project. For the south side of the project where there are insufficient NGS control, OPUS values were determined on temporary control, CP01 and CP02, and made part of the site calibration. The Airport PACS was also made part of this calibration to provide consistency between the Airport Photo ID Survey, and the on-airport surveys.

The runway end points and Navigational Aids were surveyed using Real-Time Kinematic (RTK) GPS, with **SJC H (AJ3416)** as the base station and ties to the PACS before and after collection to confirm the Base Station was stable.

The runway profiles were performed with RTK GPS. The GPS antenna was mounted on a vehicle, accurately measured a vertical offset with a total station and then driven the length of the runway along the centerline and 10’ left and right of centerline of each runway. **SJC H (AJ3416)** was the base station with ties to the PACS before and after collection to confirm the Base Station was stable. Each runway was double run at 1 second intervals as a check to find any misreading. The survey positions of the runway profiles were interpolated to provide the final 10-foot stationing of the runway profiles.

Equipment

Survey Equipment			
Type	**Equipment**	**Manufacturer**	**Serial No.**
GPS (GNSS)	R8 Model 3	Trimble	5251421121
GPS (GNSS)	R8 Model 3	Trimble	5251421030
GPS (GNSS)	R10	Trimble	5614458831
Total Station	S6	Trimble	92110397
Data Collector	TSC3	Trimble	RS0DC06372
The GPS receivers do not have manufacturer calibration reports. Maintenance is completed through servicing as required. All conventional equipment is serviced regularly and calibration reports will be supplied for any equipment used for the project with the control data submissions.			

Software

The RTK network was processed using StarNET Version 8. The RTK-VSN Calibration was setup using Trimble Access version Survey PRO 5.1.1 on the TSC3. The Calibration was reviewed and verified in the office with Trimble Business center 3.7. Once the field measurements were verified they were imported into AutoCAD 2004, 2010, or 2013, or Global Mapper V17 for final processing.

Data Processing

Observations were processed using Trimble Business Center to compute the baseline vectors with precise ephemeris and clock corrections. All ambiguities were solved. All baselines were processed. The vectors were exported using a Trimble data exchange format and imported into StarNET where SJC ARP was held fixed to values published on NAD83(2011), (epoch 2010.00), Zone 3 and on NAVD 88(Geoid 12B), US Survey Feet.

Deviations from Scope of Work

TACAN – MOFFETT was not accessible at the time of the survey, since it was located on Military/Federal facility (Moffett Federal Airfield).

Final Statement

QSI did a review of field survey work and found that the two MALSR Last on 12R & 30L were misidentified, so QSI located the proper location photogrammetrically. We also annotated displaced threshold photos to show the location of both MALSR Last.

The data produced by this final survey report meets the project requirements as stated in FAA AC No. 150/5300-18B & 150/5300-17B specifications.

AIRPORT LAYOUT AMENDMENT AND IMPLEMENTATION ANALYSIS

ALP SPONSOR LETTER AND IMPLEMENTATION ANALYSIS

Airport Layout Plan (ALP) Narrative Letter

Norman Y. Mineta San Jose International Airport

This ALP set includes a total of 25 sheets, as listed below. The ALP package complies with FAA's SOP (2.00) checklist, which is attached to this narrative letter as **Appendix A**.

01 – Title Sheet
02 – Airport Data Sheet
03 – Existing Airport Layout Plan
04 – Future Airport Layout Plan
05 – Existing/Future Runway 12L-30R Declared Distances
06 – Existing/Future Runway 12R-30L Declared Distances
07 – Existing/Future Runway 12L Inner Approach Plan and Profile
08 – Existing/Future Runway 12L Inner Approach Plan and Profile Tables
09 – Existing/Future Runway 30R Inner Approach Plan and Profile
10 – Existing/Future Runway 30R Inner Approach Plan and Profile Tables
11 – Existing/Future Runway 12R Inner Approach Plan and Profile
12 – Existing/Future Runway 12R Inner Approach Plan and Profile Tables
13 – Existing/Future Runway 30L Inner Approach Plan and Profile
14 – Existing/Future Runway 30L Inner Approach Plan and Profile Tables
15 – Existing/Future Runway 12L-30R Departure Plan and Profile
16 – Existing/Future Runway 12L Departure Plan and Profile Tables
17 – Existing/Future Runway 30R Departure Plan and Profile Tables
18 – Existing/Future Runway 12R-30L Departure Plan and Profile
19 – Existing/Future Runway 12R Departure Plan and Profile Tables
20 – Existing/Future Runway 30L Departure Plan and Profile Tables
21 – Existing/Future Runway 12R-30L Obstacle Free Zone
22 – Existing/Future Part 77 Airport Airspace (Outer)
23 – Existing/Future Part 77 Airport Airspace (Inner)
24 – Existing/Future Part 77 Airport Airspace (Inner) Tables
25 – Future Land Use Plan

An updated Airport Property Map "Exhibit A" is not included since there are no changes to the Property Map/Exhibit A accepted by the FAA in April 2015.

The proposed airfield reconfiguration projects included in this ALP update have been reviewed by FAA Airports Division staff and other FAA and airport user stakeholders represented on the RIM Study's Technical Working Group.

Summary of Changes Made to the ALP

The improvements depicted in the ALP package drawings, are identified for the purpose of resolving RIM deficiencies by meeting the current FAA design standards and incorporating the strategic goals as envisioned by the Airport for long-term development. The following list is a summary of changes made to this ALP set from the currently-approved version:

- Comprehensively reconstructs the ALP set from a new topographic planimetric base map utilizing a single survey source (AGIS);
- Updated data to meet SOP requirements;
- Updated airfield coordinates and elevation data including runway ends, touchdown zone elevations, runway high and low points, profile data, and airport elevation;
- Clear identification of Runway Object Free Area (ROFA), Runway Safety Area (RSA), Runway Obstacle Free Zone (ROFZ), Precision Obstacle Free Zone (POFZ), Runway Protection Zone (RPZ), and Taxiway Object Free Area (TOFA), for all airfield pavement;
- Updated all on-airport building top elevations;
- Detailed obstructions analysis utilizing a new AC 150/5300-18B obstruction survey and a new Part 77 obstacle survey;
- Inclusion of dispositions for all obstructions that are identified on the obstruction sheets;
- Inclusion of Obstacle Free Zone Plan and Profile Sheet for Runway 12R-30L;
- Inclusion of Departure Surface Plan and Profile Sheets for all runways analyzing the TERPS Departure Surface (all runways have published instrument departure procedures);
- Inclusion of Approach Plan and Profile Sheets for all existing/future runway ends. Airspace surfaces analyzed include, where applicable:
    - Threshold Siting Surface (TSS)
    - Part 77 Approach Surface (P77)
    - Glidepath Qualification Surface (GQS)
    - Precision Approach Path Indicator (PAPI) Obstacle Clearance Surface (OCS)
- Inclusion of a land use map depicting proposed future land uses at the airport;
- Inclusion of comprehensive Part 77 ultimate airspace drawings (Outer, Inner, and Obstruction Tables);
- Depicted projects include the following:
    - Realignment of connector Taxiways B, C, D, E, F, H, J and L between Taxiway Y and Z. These are future connector Taxiways Z1-Z10, Taxiway K to remain as-is.
    - New signage for realigned connector Taxiways with new designations.
    - Taxiway W1 Airplane Design Group (ADG) III extension from Taxiway B south to intersect Runway 12R-30L at Taxiway A.
    - Remove or paint excess corner pavement to “round out” taxiway edge for the turn from Taxiway W into Taxiway M.
    - Relocate the Taxiway W/Taxiway D runup pad to the southwest quadrant of the airport.

- Permanently close Taxiway F and H between Runway 12R-30L and 12L-30R. Remove all existing taxiway lighting, signage, and markings.
- Remove or paint excess pavement on Taxiway B between Taxiway Y and Runway 12L-30R. Taxiway B between Taxiway Z and Y is shifted as mentioned above. Some painting may be needed depending upon timing of the shift.
- Remove or paint excess pavement on Taxiway L between Taxiway Y and Runway 12R-30L. Taxiway L between Taxiway Z and Y is shifted as mentioned above. Some painting may be needed depending upon timing of the shift.
- Remove or paint excess pavement on Taxiway L between Runway 12L-30R and Runway 12R-30L.
- Paint "TAXI" on the north and south ends of Taxiways W and Y to mitigate wrong runway events.
- Widen and lengthen the Runway 12L blast pad and widen the Runway 30R blast pad to conform to airport design standards.
- Shift hold lines on taxiways connecting to runway 12R-30L from 250' from runway centerline to 280' from runway centerline.
- Future Taxiways W2, W3, and W4 define three specific points of ingress and egress to the current GA tiedown and T-hangar apron from Taxiway W.
- Mitigate direct access from the west apron to Runway 12R-30L via Taxiway B, C and D.
- Permanently close and formally decommission Runway 11-29. (Note, despite its current temporary closure status, Runway 11-29 is depicted as an existing runway on the Existing ALP Sheet).
- Construct new ADG III Taxiway V extension from Taxiway C in the south, northward approximately 6,800' and then terminating at Taxiway V7. Maintain at least ADG IV centerline separation from Taxiway W.
- Close existing Taxiway V.
- Expand the existing FBO aprons to the east up to the future Vehicle Service Road (VSR).
- Incorporate a future apron taxilane meeting ADG III centerline separation from future Taxiway V.
- Construct 7 new connector Taxiways V1-V7 from the future apron taxilane to Taxiway V. Connector Taxiways V1 and V7 extend to Taxiway W.
- Delineate a future vehicle service road on the expanded apron adjacent, but outside of the future apron taxilane ADG III object free area.

- In addition to the airfield geometry improvements, various improvements are depicted in the ALP package that meet future aviation demand. These include:
  - Terminal B Expansion and Apron Construction Phases 1-4
  - Aircraft Rescue and Fire Fighting (ARFF) Facility
  - Signature Hangar A
  - Removal of Building Numbers (shown on the Future ALP Sheet 4):
    - 13 – Air Freight
    - 14 – City Hangars
    - 15 – City Hangars
    - 16 – Fire Station 20
    - 18 – City Maintenance

- 19 – City Maintenance
- 20 – City Maintenance
- 21 – City Building

- Airport Development Areas for:
  - Future Aviation Support / GA Facilities near future Taxiway W2 on the south end of the airfield
  - Future Aviation Support / GA Facilities near the future Signature Flight Support fuel farm
  - Future Aviation Support / Cargo Facilities near expanded Terminal B
  - Future Parking Garage near the Hourly Lot #3 (Terminal B garage) / Consolidated Rental Car Facility (CONRAC) and Economy Parking Lot #1

Critical Aircraft/Reference/Design Code

SJC's existing Airport Reference Code is D-V with a representative critical aircraft of the B787-9, however, the RIM Study's Aviation Activity Forecast identifies that the B777-300ER will become the future critical aircraft. The B777-300ER has the same Airport Reference Code (ARC) designation D-V. However, the B777-300ER has a different Taxiway Design Group (TDG) designation, TDG-6. A comparison of the existing and future critical aircraft is provided below:

Design Characteristics	Boeing 787-9 (Existing)	Boeing 777-300ER (Future)
Length	206.1'	242.5'
Wingspan	197.3'	212.6'
Tail Height	56.1'	61.8'
Maximum Take-off Weight (lbs)	561,500	777,000
Approach Speed (knots)	153	150
Aircraft Approach Category (AAC)	D	D
Aircraft Design Group (ADG)	V	V
Taxiway Design Group (TDG)	5	6

To accommodate TDG-6 aircraft, various taxiway intersections at the Airport have been re-designed to meet TDG-6 standards, as depicted in the ALP. These improvements will better accommodate the identified future critical aircraft.

Runway Data

The new Airports-GIS survey identified the runway lengths to be equivalent to the data previously published by the FAA. The following is a summary of the existing runway lengths and applicable displaced threshold lengths for SJC as determined from the Airports-GIS survey:

Runway	Length	Width	Displaced Threshold Length
11[1]	4,626’	100’	0’
29[1]	4,626’	100’	0’
12L	11,000’	150’	1,307’
30R	11,000’	150’	2,537’
12R	11,000’	150’	1,297’
30L	11,000’	150’	2,537’

(1) The recommended alternative proposes a formal closure and decommissioning of Runway 11-29.

Declared Distance

Declared distances are used by pilots and flight crews to determine the amount of runway length is suitable for landing and takeoffs. Sometimes these distances are limited due to an encumbrance of nearby infrastructure. The full runway length is listed for runways that are not limited due to site constraints. The following table summarizes these distances at SJC:

Runway	TORA	TODA	ASDA	LDA
12L	10,139’	11,000’	10,139’	8,831’
30R	10,134’	11,000’	10,134’	7,597’
12R	9,883’	11,000’	9,883’	8,587’
30L	10,152’	11,000’	10,152’	7,614’

Wind Coverage

Historical wind data are used to create a wind coverage diagram or wind rose which aids in determining the optimal runway direction. The wind rose reflects wind velocity, direction, and frequency of occurrences within a given time frame. The Airport Data Sheet (Sheet 2) depicts SJC’s wind coverage diagrams (roses) based on approximately 95,000 observations from the National Oceanographic and Atmospheric Administration’s (NOAA) National Climactic Data Center (NCDC) between 2008 and 2017. Wind coverage data are shown in the table below. Under VFR, SJC runways cover 100.00% of historical wind observations, and under IFR, the runways cover 100.00% of historical wind observations. Under both VFR and IFR (All Weather Coverage), the runways cover 100.00% of historical wind observations.

Crosswind Component	VFR Coverage	IFR Coverage	All Weather Coverage
10.5 Knots	99.18%	99.32%	99.18%
13 Knots	99.75%	99.72%	99.74%
16 Knots	99.97%	99.94%	99.97%
20 Knots	100.00%	100.00%	100.00%

Runway Safety Area (RSA)

The RSA is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershooting, overshooting or veering off the runway. The RSA must be graded, free of surface variations, and capable of supporting aircraft or rescue equipment on an emergency basis. The following table summarizes the dimensional standards at SJC:

Runway	RSA Width	RSA Beyond Stop End	Standard RSA Length
Existing 11-29	150’	300’	300’
Existing/Future 12L-30R	500’	1,000’	1,000’
Existing/Future 12R-30L	500’	1,000’	1,000’

All existing runway safety areas currently meet design standard dimensions except for a small portion near the Runway 30L end. This condition is operationally mitigated by the presence of the Runway 30L displaced threshold and approved declared distances in the Runway 12R direction of travel that account for this condition.

Runway Object Free Area (ROFA)

The ROFA is an area centered on the runway provided to enhance the safety of aircraft operations by being free of objects, except for those required for air navigation or aircraft ground maneuvering purposes. The following table summarizes the dimensional standards at SJC:

Runway	ROFA Width	ROFA Beyond Stop End	Standard ROFA Length
Existing 11-29	500’	300’	300’
Existing/Future 12L-30R	800’	1,000’	1,000’
Existing/Future 12R-30L	800’	1,000’	1,000’

See the Proposed Modification to Airport Design Standard Section below for more information about SJC penetrations to the ROFA.

Runway Obstacle Free Zone (ROFZ)

The ROFZ is the airspace above and adjacent to the runway but below the 150-foot floor of the horizontal surface as identified in Federal Aviation Regulation (FAR) Part 77. The OFZ is required to be clear of all objects, with the exception of frangible visual navigation aids that are required to provide clearance protection for aircraft landing or taking off and missed approaches.

Runway	ROFZ Width	ROFZ Beyond Stop End
Existing 11-29	400’	200’
Existing/Future 12L-30R	400’	200’
Existing/Future 12R-30L	400’	200’

All ROFZ obstacle penetrations are mitigated by FAA-approved declared distances that restrict the declared lengths of runways in certain types of operations.

Runway Protection Zones (RPZ)

The ALP, specifically the Existing and Future ALP sheets, depict both departure and arrival RPZs graphically. Given the level of development in the vicinity of the airport, further acquisition of property within the RPZ will be challenging. SJC has many avigation easements surrounding the airport and will continue to maintain them. All existing land uses meet RPZ criteria.

Obstructions

An aerial photogrammetry survey was conducted in support of the AGIS survey to identify object penetrations of established imaginary surfaces near SJC using the Stereo Compilation method. The survey was performed in compliance with FAA AC 150/5300-18B. In order to protect aircraft approaching and departing runways, FAA has established criteria for determining safe clearance between aircraft and objects on the ground including both structures and flora (trees). There are several sloped imaginary surfaces that extend outward and upward from the runways. Objects under these surfaces are, generally speaking, deemed not to have an impact on air navigation. Objects that penetrate these surfaces may require additional evaluation, action, or mitigation to prevent interference with air navigation in the vicinity of the airport. There are three primary FAA guidance documents that set criteria for establishing these surfaces around airports:

- Title 14 Code of Federal Regulations Part 77, Objects Affecting Navigable Airspace
- United States Standard for Terminal Instrument Procedures (TERPS), FAA Order 8260.3D
- Advisory Circular 150 / 5300-13A, Airport Design

Obstruction Analysis

Part 77 imaginary surfaces are generally lower than other airspace protection surfaces and are therefore more likely to be penetrated by objects in the airport vicinity. However, objects penetrating Part 77 surfaces may not be deemed to be hazards to air navigation and may only need to be lighted and marked. Those objects that penetrate TERPS surfaces, which are generally higher than Part 77 surfaces and therefore closer to aircraft, may require lowering, removal, relocation, or an alteration to the established approach or departure procedure. Obstructions to the Threshold Siting Surface (TSS) are more likely to require lowering or removal. Similarly, to the TSS, objects are generally not allowed to penetrate the Glidepath Qualification Surface (GQS), when it is applicable. This ALP set also includes a climb gradient calculation for the departure surface plan and profile sheets to determine the feet per nautical mile climb gradient needed to clear an obstacle per TERPS. This ALP set includes analyses of the Precision Approach Path Indicator (PAPI) Obstacle Clearance Surface (OCS). This set does not analyze the One-Engine Inoperative (OEI) surface, as the FAA removed the OEI requirement from AC 150/5300-13, Change 18, on December 30, 2011. FAA's National Flight Procedures Office typically makes a determination on obstructions on a case by case basis to determine where a given obstruction is considered a hazard to air navigation and requires mitigation. The evaluation includes the specific location of a given obstruction, its penetration height, the type of obstacle, and its proposed disposition. Many of the obstacles include reference to the Above Ground Elevation (AGL) of the obstacle, however, per AC 150/5300-18B, the surveyor is only required to provide AGLs for representative objects.

In the past, the FAA has requested that the ALP identify which TSS case number, as listed in Table 3-2 of AC 150/5300-13A Change 1, is being applied to each runway end. The following is a summary of the case numbers assigned to each runway end:

Runway	Case Number(s)	Slope	Description
12L, 30R	6	20:1	Approach end of runways expected to accommodate instrument approaches having visibility minimums ≥ ¾ but < 1 statue mile, day or night.
12R, 30L	7	34:1	Approach end of runways expected to accommodate instrument approaches having visibility minimums < ¾ statue mile.

On September 20, 2018, the FAA released Engineering Brief (EB) 99 which provides an interim update to Table 3-2 of AC 150/5300-13A Change 1. The table includes revisions to many of the TSS cases and their associated dimensions. A review and comparison of the TSS dimensions for both EB 99 and AC 150/5300-13A Change 1 found that the TSS inner and outer widths in the AC are more conservative than the revisions included in EB 99. Since the AC surfaces includes a larger area that fully contains the EB 99 surfaces for the applicable runway end coupled with the determination that there are no existing or proposed TSS penetrations, this ALP set includes the more conservative AC surfaces on the approach plan and profile sheets.

Existing Modification to Airport Design Standards

The following table summarizes the existing Modification to Airport Design Standards that have been approved or have been submitted and are pending approval by FAA.

Standard to Modify	Standard	Proposed	Impacted Rwy/Twy	Design Aircraft	Approval Date
Taxiway Sign Location (1)	129.5’	100’	12L-30R	ADG IV	Submitted
Runway Object Free Area	800’	Roads (2)	12R-30L	ADG IV	3/9/1992
Runway to Taxiway Centerline	400’	350’	12L-30R/Twy Y	ADG IV	8/18/1989
Runway Object Free Area	Clear	Windcone	12 L/R-30L/R	ADG IV	6/19/2016
Runway to Taxiway Centerline	79’	65’	11-29/Twy V (3)	ADG II	3/12/1988

(1) Covers 13 signs between Runway 12L-30R and Taxiway Y.
(2) De La Cruz and Airport Blvd within ROFA
(3) Runway 11-29 currently operates as Taxiway W1 and is not marked as a runway. It also does not operate as a runway. It is only listed on the datasheet for existing airspace purposes and is planned to be formally decommissioned in accordance with the recommendations in the SJC RIM Study.

Proposed Modification to Airport Design Standards

The following table summarizes the proposed Modification to Airport Design Standards that have been submitted and are pending approval by FAA.

Standard to Modify	Standard	Proposed	Impacted Rwy/Twy	Design Aircraft	Submittal Date
Runway Object Free Area	Clear	Varies	12R-30L	ADG V	01/16/2020
Runway Object Free Area	Clear	Varies	12L-30R	ADG V	01/16/2020

APPENDIX A. ALP REVIEW CHECKLIST

The following checklist shall be used in lieu of FAA AC 150/5070-6B, Appendix F, Airport Layout Plan Drawing set. This checklist is intended for use when submitting a new or updated ALP to the FAA for review and approval. Consultants and/or sponsors should indicate "Yes," "No" or "N/A" (not applicable) for every item on the checklist. The same checklist shall be provided to FAA for review and verification. For all reviewers: It is important that each item listed be shown on the respective plan.

Airport Identification (to be completed by Sponsor or Consultant)			
Airport	Norman Y. Mineta - San Jose International Airport		
City and State	San Jose, California	Location Identifier	SJC
Airport Owner	City of San Jose		

ALP Submission Information (to be completed by Sponsor or Consultant)		
ALP Prepared by	HNTB Corporation Name of Consulting Firm	
	Justin Bychek, P.E, Senior Aviation Planner Name of Individual	Jan. 2020 Date
	(310) 846-1812 Telephone	
	jbychek@HNTB.com Email address	
Consulting QA/QC Review	Justin Bychek, Todd Wright, Ken Poon, Jessica Wyatt, Eric Gilles, and Andy Guan (HNTB) Bob Hamilton (Kimley-Horn) Name and Title of Individual	Jan. 2020 Date
Sponsor Review	Cary Greene and Ryan Sheelen Name and Title of Individual	Jan. 2020 Date

FAA Review (to be completed by FAA)	
Name and Title of Individual	Date

Critical Design Aircraft or Family of Aircraft:

	Make	Model	Annual Itinerant Operations
Existing	B787	800/900	1,978
Future	B777	200/300ER	770

Forecasted Year: 2037

Airport Reference Code (ARC): D-V

Runway Design Code (RDC) & Runway Reference (RRC):

Runway	RDC	RRC
11-29	11 - B/II/VIS (Ex), CLSD (Fut) 29 - B/II/VIS (Ex.), CLSD (Fut)	APRC 11 - B/I/VIS (Ex), CLSD (Fut) APRC 29 - B/I/VIS (Ex), CLSD (Fut) DPRC 11 - B/I (Ex), CLSD (Fut) DPRC 29 - B/I (Ex), CLSD (Fut)
12L-30R	12L - D/V/4000 (Ex & Fut) 30R - D/V/4000 (Ex & Fut)	APRC 12L - B/III/4000 (Ex & Fut) APRC 30R - B/III/4000 (Ex & Fut) DPRC 12L - B/III, D/II (Ex & Fut) DPRC 30L - B/III, D/II (Ex & Fut)
12R-30L	12R - D/V/2400 (Ex & Fut) 30L - D/V/1200 (Ex & Fut)	APRC 12R - D/V/2400 (Ex & Fut) APRC 30L - D/V/2400 & D/IV/1600 (Ex & Fut) DPRC 12R - D/V (Ex & Fut) DPRC 30L - D/V (Ex & Fut)

Approach Minimums:

Rwy End	Minimum	Rwy End	Minimum
11	Visual (Ex), CLSD (Fut)	29	Visual (Ex), CLSD (Fut)
12L	294' – ¾ (Ex & Fut)	30R	255' – ¾ (Ex & Fut)
12R	251' – ½ (Ex & Fut)	30L	157' – 1200 RVR (Ex & Fut)

Runways (Existing and Future):

Runway	Existing		Future		Departure Surface (Y or N/A)
	Length (ft)	Width (ft)	Length (ft)	Width (ft)	
11-29	4,626 feet	100 feet	Closed	Closed	N/A
12L-30R	11,000 feet	150 feet	Same	Same	Y
12R-30L	11,000 feet	150 feet	Same	Same	Y

For the balance of the checklist, enter a mark (✔ or X) to confirm inclusion.

A.1. Narrative Report

Narrative Report (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Executive Summary – A concise summary of the findings/ recommendations of the master planning effort or changes to the ALP. This should include a description of planned projects, an implementation plan/timeline, and identification of benchmarks or actions that will be conducted to either verify the original planning assumptions or proceed with project implementation.	From AC 150/5070-6, Section 202: An accompanying ALP Narrative Report should explain and document those changes and contain at least the following elements: – Basic aeronautical forecasts. – Basis for the proposed items of development. – Rationale for unusual design features and/or modifications to FAA Airport Design Standards. – Summary of the various stages of airport development and layout sketches of the major items of development in each stage. – An environmental overview to document environmental conditions that should be considered in the identification and analysis of airport development alternatives and proposed projects.				The purpose of this ALP update is to obtain conditional approval for the proposed projects identified in the Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") and therefore does not include a separate narrative report. Please refer to the RIM Study's Technical Memoranda for the applicable background information.
1. Identify Projects along with description					
2. Create a Timeline for each Project					
3. Identify and List:					
a. Proposed Projects (e.g., Hangar development)					
b. Milestones/ Triggering Events (e.g., 1. All hangars are full, 2. There is a waiting list long enough to fill a new development, 3. Hangars have reached their useful life, etc.)					
c. Action items/Next Steps (e.g., 1. Maintain log and gather data, 2. Discuss plan with ADO, 3. Coordinate with ADO regarding potential for inclusion in FAA ACIP (Airports Capital Improvement Program), 4. Identify funding sources.)					
d. Funding Plan	Capital Improvement Plan for the forecast horizons. See AC 150/5070-6, Chapter 11. Only a rough, order-of-magnitude report is needed in the executive summary.				

Narrative Report (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
B. Basic aeronautical forecasts (0-5, 6-10, 11-20 years): Basic aeronautical forecasts (0-5, 6-10, 11-20 years):	Forecasts of future levels of aviation activity as approved by the FAA. These projections are used to determine the need for new or expanded facilities. See AC 150/5070-6, Chapter 7.				
1. Total annual operations	Total local and itinerant aircraft operations at the airport.				
2. Annual itinerant operations by all aircraft	Itinerant operations by aircraft that leaves the local airspace, generally 25 miles or more from the airport. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
3. Annual itinerant operations by current critical aircraft					
4. Annual itinerant operations by future critical aircraft					
5. Number of based aircraft	Aircraft that use the subject airport as a home base, i.e., have hangar or tie-down space agreements. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
6. Annual instrument approaches	Number of instrument approaches expected to be executed during a 12-month period. See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				
7. Number of enplanements	See AC 150/5070-6, Chapter 7, Section 702.a. and Figure 7-2.				

The purpose of this ALP update is to obtain conditional approval for the proposed projects identified in the Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") and therefore does not include a separate narrative report. Please refer to the RIM Study's Technical Memoranda for the applicable background information. FAA approval of forecasts not required for this ALP update (FAA letter June 18, 2018).

Narrative Report (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
8. Critical Aircraft (also referred as "design aircraft" or "critical design aircraft)	The critical aircraft is the most demanding aircraft identified in the forecast that will use the airport. Federally funded projects require that the critical aircraft will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations or scheduled service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft. Provide the aircraft, AAC, and ADG. (e.g. Boeing 737-400, C-III) See AC 150/5300-13A, Paragraph 105(b) and FAA Order 5090.3C, 3-4.				
9. Runway Design Code (RDC)	Describe the RDC for each runway. For the purpose of airport geometric design, each runway will contain a RDC which signifies the design standards to which the runway is to be built. The RDC consists of three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG) and the approach visibility minimums. These parameters represent the aircraft that are intended to be accommodated by the airport, regardless of substantial use. See AC 150/5300-13A, Paragraph 105(c).	The purpose of this ALP update is to obtain conditional approval for the proposed projects identified in the Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") and therefore does not include a separate narrative report. Please refer to the RIM Study's Technical Memoranda for the applicable background information.			
10. Runway Reference Code (RRC)	Describe the RRC for each runway. The RRC describes the current operational capabilities of a runway where no special operating procedures are necessary. The RRC consists of the same three components as the RDC, but is based on planned development and has no operational application. See AC 150/5300-13A, Paragraph 318.				
C. Alternatives/Proposed Development					

Narrative Report (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
11. Explanation of proposed development items	Specific projects can be described as project listings on a master table, on individual project data sheets, or in projects booklets.	The purpose of this ALP update is to obtain conditional approval for the proposed projects identified in the Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") and therefore does not include a separate narrative report. Please refer to the RIM Study's Technical Memoranda for the applicable background information.			
12. Discuss near-term and future Approach Procedure Requirements or effects (e.g., LPV, Circling, etc.)	Based on existing or forecast usage. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.				
13. Navigational Aids or Other Equipment Needs (e.g., Approach Lights, Wind Cones, AWOS, etc.)	The need for new or additional navigational aids is a function of the fleet mix, the percentage of time that poor weather conditions are present, and the cost to the users of not being able to use the airport while it is not accessible.				
14. Wind coverage. Is it adequate for existing and future runway layouts? Has wind data been updated?	This analysis determines if additional runways are needed to provide the necessary wind coverage. Reference AC 150/5300-13A, Appendix 2 for guidance on wind coverage analysis techniques.				
D. Modification to Standards.	Any approved nonconformance to FAA standards, other than dimensional standards for RSAs and OFZs, require FAA approval. A description of all approved modification to standards shall be provided. See AC 150/5300-13A, Paragraph 106(b) and FAA Order 5300.1.				
E. Obstruction Surfaces (14 CFR Part 77 and Threshold Siting Surface)	Reference 14 CFR Part 77 and AC 150/5300-13A, Paragraph 303.				

Narrative Report (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
F. Runway Protection Zone	A description of any incompatible land uses inside the RPZ shall be provided. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.				
G. Development summary (including sketches, schedules, and cost estimates) for stages of construction for: Development summary (including sketches, schedules, and cost estimates) for stages of construction for:	Documentation provided should include any electronic spreadsheets and files to facilitate in modifying the financial plan on an as-needed basis.				
15. Development Projects Completed Since Last ALP					
16. 0-5 years					
17. 6-10 years					
18. 11-20 years					
H. Shadow or line-of-sight study for towered airports (negative or positive statements are required).	Reference FAA Order 6480.4. This can be from the Airway Facilities Tower Integration Laboratory (AFTIL) or simpler GIS-generated studies.				
I. Letters of coordination with all levels of government, as needed.	Affected private and/or governmental groups, agencies, commissions, etc., that may have input on the plans. See AC 150/5070-6, Chapter 3.				
J. Wildlife Hazard Management Issues Review (in narrative).	Reference AC 150/5200-33.				

The purpose of this ALP update is to obtain conditional approval for the proposed projects identified in the Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") and therefore does not include a separate narrative report. Please refer to the RIM Study's Technical Memoranda for the applicable background information.

Narrative Report (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
K. Preliminary Identification of Environmental Features	Potential or known features only. Further environmental analysis will be necessary. Reference FAA Order 5050.4B. Begin framework for NEPA analysis.	The purpose of this ALP update is to obtain conditional approval for the proposed projects identified in the Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") and therefore does not include a separate narrative report. Please refer to the RIM Study's Technical Memoranda for the applicable background information.			
19. Major airport drainage ditches					
20. Wetlands					
21. Flood Zones					
22. Historic or Cultural features					
23. Section 4(f) features					
24. Flora/Fauna					
25. Natural Resources					
26. Etc. (other features identified in Order 5050.4B)					
L. Note Action Items from Runway Safety Program Office	List and note status of items from Runway Safety Program Office or Runway Safety Action Plan.				
M. Declared Distance (DD)	The narrative on declared distances is used to aid in understanding the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distances performance requirements for turbine powered aircraft. The narrative shall also provide clarification on why declared distances have been implemented. Declared distances data must be listed for all runway ends. The TORA, TODA, ASDA, and LDA will be equal to the runway length in cases where a runway does not have displaced thresholds, stopways, or clearway, and have standard RSAs, ROFAs, RPZs, and TSS. Reference AC 150/5300-13A, Paragraph 323.				

Narrative Report (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
Remarks					

A.2. Title Sheet

- The scale of the Title Sheet should be developed to include the items listed below.
- The minimum size for the final drawing set is 22" X 34" (ANSI D) and 24" X 36" (ARCH D). Coordinate use of 34" x 44" (ANSI E) and 26" X 48" (ARCH E) with FAA. Color drawings may be acceptable if they are still usable if reproduced in grey scale.

Title Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and revision blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	×			
B. Airport sponsor approval block	Provide an approval block for the sponsoring authority's representative to sign. Include space for name, title, and date.	×			
C. Date of ALP (date the airport sponsor signs the ALP)	The month and year of signature prominently shown near the title.	×			
D. Index of sheets (including revision date column)	Airport Layout Drawing, Airport Airspace Drawing, Inner Portion of the Approach Surface Drawing, Terminal Area Drawing, Land Use Drawing, Airport Property Map, Airport Departure Surface, etc.	×			
E. State Aeronautics Agency Approval Block (as needed)	Provide an approval block for the sponsoring authority's representative to sign. Include space for name, title, and date.			×	
F. State outline with county boundaries. County in which airport is located should be highlighted.	Provide as needed.	×			
G. Location map (general area)		×			

Title Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
H. Vicinity map (specific airport area)		×			
Remarks					

A.3. Airport Data Sheet

- For smaller airports, some of the ALP sheets may be combined if practical and approved FAA.

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	×			
B. Wind Rose (all weather and IFR) with appropriate airport reference code and runway orientation depicted, crosswind coverage, and combined coverage, source of wind information and time period covered (for IFR runways applicable minimums should be included):	Assembly and analysis of wind data to determine ultimate runway orientation and also provides the operational impact of winds on existing runways. If instrument procedures are present or will be requested then both all-weather and instrument meteorological condition wind roses are required. See AC 150/5300-13A, Appendix 2.	×			
1. 10.5, 13, 16, 20 knots wind rose (based on appropriate airport reference code)	When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
2. Percentage of wind coverage/crosswind	regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes A-I and B-I, 13 knots for Airport Reference Codes A-II and B-II, 16 knots for Airport Reference Codes A-III, B-III, and C-I through D-III, and 20 knots for Airport Reference Codes A-IV through D-VI. See also AC 150/5300-13A, Paragraph 302(c)(3) and AC 150/5300-13A, Appendix 2.	×			
3. Source of data	Wind data may be obtained from NOAA at http://www.ncdc.noaa.gov/ Reference AC 150/5300-13A, Appendix 2, Paragraph A2-5 and A2-6.	×			
4. Age of data (last 10 consecutive years of data with most current data no older than 10 years)	Data must be from the latest 10-year period from the reporting station closest to the airport. Reference AC 150/5300-13A, Appendix 2, Paragraph A2-5.	×			
C. Airport Data Table					
1. ARC for Airport	List the Airport Reference Code (ARC) for airport. 5300-13AARC is an airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. Reference AC 150/5300-13A.	×			
2. Mean maximum temperature of hottest month	List the mean maximum temperature and the hottest month for the airport location as listed in "Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree-Days" (Climatography of the United States No. 81). See AC 150/5325-4, 506.b.	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
3. Airport elevation (highest point of the landing areas, nearest 0.1 foot) – using North American Vertical Datum of 1988 (NAVD88)	List the Airport Elevation, the highest point on an airport's usable runway expressed in feet above mean sea level (MSL). Use NAVD88. Reference AC 150/5300-13A, Paragraph 102(g) All elevations shall be in NAVD88. A note shall be put on the Airport Layout Drawing that denotes that the NAVD88 vertical control datum was used.	×			
4. Airport Navigational Aids, including ownership (NDB, TVOR, ASR, Beacon, etc.)	List the electronic aids available at the airport.	×			
5. Airport reference point coordinates, nearest second (existing, future if appropriate, and ultimate) - NAD83	List the Airport Reference Point, the latitude and longitude of the approximate center of the airport. Use the North American Datum of 1983 (NAD83) coordinate system. See AC 150/5300-13A, Paragraph 207. All latitude/longitude coordinates shall be in NAD83. A note shall be put on the Airport Layout Drawing that denotes that the NAD83 coordinate system was used.	×			
6. Miscellaneous facilities (taxiway lighting, lighted wind cone(s), AWOS, etc.) [Including type/model and any facility critical areas]	List any other facilities available at the airport.	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
7. Airport Reference Code and Critical Aircraft (existing & future)	List the existing and ultimate Airport Reference Code and Critical Aircraft, the most demanding aircraft identified in the forecast that will use the airport. Federally funded projects require that critical design airplanes have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations) for an individual airplane or a family grouping of airplanes. See AC 150/5325-4, 102.a.(8) and AC 150/5070-6, 702.a. Indicated dimensions for wingspan and undercarriage, along with approach speed.	✕			
8. Airport magnetic variation, date and source	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	✕			
9. NPIAS service level (GA, RL, P, CS, etc.)	See FAA Order 5090.3C.	✕			
10. State equivalent service role	As applicable pursuant to State Aviation Department System Plan.	X			
D. Runway Data Table	The Runway Data Table should show information for both existing and ultimate runways.	✕			
1. Runway identification (Include identifying runways that are “utility”)	A column for each runway end should be present. List the runway end number and if pavement strength is less than 12,500 pounds (single-wheel), then note as utility.	✕			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
2. Runway Design Code (RDC)	5300-13AThe first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics); whichever is more restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1200, 1600, 2400, and 4000. List the RDC for each runway. See AC 150/5300-13A, Paragraph 105(c).	×			
3. Runway Reference Code (RRC)	The RRC describes the current operational capabilities of a runway where no special operating procedures are necessary. Like the RDC, it is composed of three components: AAC, ADG, and visibility minimums. List the RRC for each Runway. See AC 150/5300-13A, Paragraph 318.	×			
4. Pavement Strength & Material Type	Indicate the runway surface material type, e.g., turf, asphalt, concrete, water, etc.	×			
a. Strength by wheel loading	List the existing and ultimate design strength of the landing surface. See AC 150/5320-6, Chapter 3.	×			
b. Strength by PCN	See AC 150/5335-5.	×			
c. Surface treatment	Note any surface treatment: grooved, PFC, etc.	×			
5. Effective Runway Gradient (%) Author to note maximum grade within runway length. Note to included statement that the runway meets line of sight requirements	List the maximum longitudinal grade of each runway centerline. See AC 150/5300-13A, Paragraph 313.	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
6. Percent (%) Wind Coverage (each runway)	List the percent wind coverage for each runway for each Aircraft Approach Category. See AC 150/5300-13A, Appendix 2.	×			
7. Runway dimensions (length and width)	Dimensions determined for the Critical Design Aircraft by using graphical information in AC 150/5325-4.	×			
8. Displaced Threshold	Provide the pavement elevation of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(2).	×			
9. Runway safety area dimensions (actual existing and design standard)	List the existing and ultimate dimensions of the Runway Safety Area (RSA). See AC 150/5300-13A, Paragraph 307.	×			
10. Runway end coordinates (NAD83) (include displaced threshold coordinates, if applicable) to the nearest 0.01 second and 0.1 foot of elevation.	Show the latitude and longitude of the threshold center and end of pavement (if different) to the nearest .01 of a second and 0.1 foot of elevation.	×			
11. Runway lighting type (LIRL, MIRL, HIRL)	List the existing and ultimate type of runway lighting system for each runway, e.g., Reflectors, Low Intensity Runway Lighting (LIRL), Medium Intensity Runway Lighting (MIRL), or High Intensity Runway Lighting (HIRL). LIRLs will typically not be shown for new systems. See AC 150/5340-30, Ch. 2.	×			
12. Runway Protection Zone (RPZ) Dimensions	List the existing and ultimate Runway Protection Zone (RPZ) dimensions. See AC 150/5300-13A, Paragraph 310. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
13. Runway marking type (visual or basic, non-precision, precision)	Indicate the existing and ultimate pavement markings for each runway. See AC 150/5340-1, Section 2.	×			
14. 14 CFR Part 77 approach category (50:1; 34:1; 20:1) Existing and Future	List the existing and ultimate approach surface slope. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.	×			
15. Approach Type (precision, non-precision, visual)	List the existing and ultimate Part 77 Approach Use Types. See FAA Order 7400.2, Figures 6-6-3 and 6-3-9.	×			
16. Visibility minimums (existing and future)	List the existing and ultimate visibility minimums for each runway. See AC 150/5300-13A, Table 1-3.	×			
17. Type of Aeronautical Survey Required for Approach (Vertically Guided, not Vert. Guided)	List the type of aeronautical survey required for the visibility minimums given. See AC 150/5300-18, Section 2.7 and AC 150/5300-13A, Table 3-4 and Table 3-5.	×			
18. Runway Departure Surface (Yes or N/A)"	Determine applicability of 40:1 Departure Obstacle Clearance Surface (OCS) as defined in Paragraph 303(c) of AC 150/5300-13A.	×			
19. Runway Object Free Area	List the existing and ultimate dimensions of the Runway Object Free Area (OFA). See AC 150/5300-13A, Paragraph 309. Objects non-essential for air navigation or aircraft ground maneuvering purposes must not be placed in the ROFA, unless a modification to standard has been approved.	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
20. Obstacle Free Zone	The OFZ clearing standard precludes aircraft and other object penetrations, except for frangible NAVAIDs that need to be located in the OFZ because of their function. Modification to standards does not apply to the OFZ. List the Runway OFZ, Inner-approach OFZ, Inner-transitional OFZ, and Precision OFZ if applicable.	×			
21. Threshold siting surface (TSS)	List the existing and ultimate threshold siting surface (i.e. approach and departure surfaces). Identify any objects penetrating the surface. If none, state "No TSS Penetrations". Reference AC 150/5300-13A, Paragraph 303.	×			
22. Visual and instrument NAVAIDs (Localizer, GS, PAPI, etc.)	List the existing and ultimate visual navigational aids serving each runway.	×			
23. Touchdown Zone Elevation	List the highest runway centerline elevation in the existing and ultimate first 3000 feet from landing threshold. See FAA Order 8260.3, Appendix 1.	×			
23. Taxiway and Taxilane width	List the existing and ultimate width of the taxiways and taxilane. Reference AC 150/5300-13A, Paragraph 403 and Table 4-2.	×			
24. Taxiway and Taxilane Safety Area dimensions	List the existing and ultimate taxiway and taxilane safety area dimensions. Reference AC 150/5300-13A, Paragraph 404(c) and Table 4-1.	×			
25. Taxiway and Taxilane Object Free Area	List the existing and ultimate taxiway and taxilane object free area dimensions. Reference AC 150/5300-13A, Paragraph 404(b) and Table 4-1.	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
26. Taxiway and Taxilane Separation	List any objects located inside the Taxiway/Taxilane Safety Area and Taxiway/Taxilane Object Free Area. Also provide the distance from the taxiway/taxilane centerline to the fixed or movable object. Reference Paragraph 404(a) and Table 4-1.	×			
27. Taxiway/Taxilane lighting	List the existing and ultimate type of taxiway lighting system, e.g., Reflectors, Low Intensity Taxiway Lighting (LITL), Medium Intensity Taxiway Lighting (MITL), or High Intensity Taxiway Lighting (HITL). LITLs will typically not be shown for new systems. See AC 150/5340-30, Chapter 4.	×			
28. Identify the vertical and horizontal datum	All latitude/longitude coordinates shall be in North American Datum of 1983 (NAD 83). A note shall be put on the Airport Layout Drawing that denotes that the NAD 83 coordinate system was used. All elevations shall be NAVD88. A note shall be put on the Airport Layout Drawing that denotes that the NAVD88 vertical control datum was used.	×			
E. Modification to Standards Approval Table (if applicable, a separate written request, including justification, should accompany the modification to standards). Show: Approval Date/ Airspace Case No. / Standard to be Modified / Description	Provide a table to list all FAA approved Modifications to Standards. See AC 150/5300-13A, Paragraph 106(b), and FAA Order 5300.1. List “None Required” on the table if no Modifications have yet been proposed or approved.	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
F. Declared Distances Table	Required even if Declared Distances are not in effect. Declared distances are only to be used for runways with turbine-powered aircraft. The TORA, TODA, ASDA, and LDA will be equal to the runway length in cases where a runway does not have displaced thresholds, stopways, or clearways, and have standard RSAs, ROFAs, RPZs, and TSS. Reference AC 150/5300-13A, Paragraph 323.	×			
1. Take Off Run Available (TORA)	List the runway length declared available and suitable for the ground run of an airplane taking off, i.e., Take Off Run Available (TORA). The TORA may be reduced such that it ends prior to the runway to resolve incompatible land uses in the departure RPZ, and/or to mitigate environmental effects. Reference AC 150/5300-13A, Paragraph 323(d)(1).	×			
2. Take Off Distance Available (TODA)	List the length of remaining runway or clearway (CWY) beyond the far end of the TORA ADDED TO the TORA. The resulting sum is the Take Off Distance Available (TODA) for the runway. The TODA may be reduced to mitigate penetrations to the 40:1 instrument departure surface, if applicable. The TODA may also extend beyond the runway end through the use of a clearway Reference AC 150/5300-13A, Paragraph 323(d)(2).	×			
3. Accelerate Stop Distance Available (ASDA)	5300-13A List the length the length of runway plus stopway (if any) declared available and suitable for satisfying accelerate-stop distance requirements for a rejected takeoff. Additional RSA and ROFA can be obtained by reducing the ASDA. Reference AC 150/5300-13A, Paragraph 323(d)(3).	×			

Airport Data Sheet					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
4. Landing Distance Available (LDA)	5300-13A List the length of runway declared available and suitable for satisfying landing distance requirements. The LDA may be reduced to satisfy the approach RPZ, RSA, and ROFA requirements. Reference AC 150/5300-13A, Paragraph 323(e).	×			
G. Legend	Provide a Legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.	×			
Remarks					

A.4. Airport Layout Plan Drawing

- For smaller airports, some of the ALP sheets may be combined if practical and approved by FAA.
- Two, or more, sheets may be necessary for clarity, existing and proposed. The reviewer should be able to differentiate between existing, future, and ultimate development. If clarity is an issue, some features of this drawing may be placed in tabular format. North should be pointed towards the top of the page or to the left. (scale 1”=200’ to 1”=600’)

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	×			
B. Space for the FAA approval stamp	Leave a blank four-inch by four-inch area for the FAA approval stamp.	×			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
C. Layout of existing and proposed facilities and features:	To assure full consideration of future airport development in 14 CFR Part 77 studies, airport owners must have their plans on file with the FAA. The necessary plan data includes, as a minimum, planned runway end coordinates, elevation, and type of approach for any new runway or runway extension. See AC 150/5300-13A, Paragraph 106.	×			
1. True and magnetic North arrow with year of magnetic declination	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	×			
2. Airport reference point – locate by symbol a Lat./Long. To nearest second (existing, future, and ultimate) NAD 83	List the Airport Reference Point, the latitude and longitude of the approximate center of the airport. Use the NAD 83 coordinate system. See AC 150/5300-13A, Paragraph 207.	×			
3. Wind cones, segmented circle, beacon, AWOS, etc.	Show as applicable pursuant to AC 150/5300-13A, Chapter 6.	×			
4. Contours (showing only significant terrain differences)	Topography, budget, and future uses of the base mapping, will dictate what intervals of topographical contours to use on the maps. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used. See AC 150/5070-6, 1005.	×			
5. Elevations: All NAVD88	All latitude/longitude coordinates shall be in NAD83/NAVD88.	×			
a. Runway – existing, future, and ultimate ends (nearest 0.1 ft.)	Show the latitude and longitude of the threshold center and end of pavement.	×			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
b. Touchdown Zone Elevation (highest point in first 3,000 ft. of runway)	List the highest runway centerline elevation in the existing and ultimate first 3000 feet from landing threshold. See FAA Order 8260.3, Appendix 1.	×			
c. Runway high/low points (existing and future)	For all runways identify high and low points (centerline) and provide elevation information.	×			
d. Label runway/runway intersection elevations	Label the pavement elevation of runway intersections where the centerlines cross.			×	
e. Displaced Thresholds (if any)	Label the pavement elevation and coordinates of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(a)(2).	×			
f. Roadways & Railroads (where they intersect Approach surfaces, the extended runway centerline, and at the most critical points)	Provide elevation information for the traverse ways' centerline elevation where they intersect the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverseway elevation plus the traverseway adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.		×		
g. Structures, Buildings, and Facilities	All buildings on the Airport Layout Drawing should be identified by an alphanumeric character. List these identifiers in a table and give a description of the building. If no Terminal Area drawing is done, also include the top of structure elevation in MSL. If any of the structures violate any airport or approach surfaces give an ultimate disposition to remedy the violation. Don't forget navigation aid shelters, AWOS/ASOS, RVRs, PAPIs, Fueling systems, REILs, etc. Also identify the structure use (hangar, FBO, crew quarters, etc.), as needed. Some lesser objects may be identified by symbols in the legend.	×			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
h. Define features to include: trees streams, water bodies, etc.	Provide information and delineate trees, streams, water bodies, etc., on or near airport property and approach surfaces.	×			
6. Runway Details					
a. Runway Design – runway length, runway width, shoulder width, blast pad width, blast pad length, and cross wind component. (existing, future, and ultimate)	AC 150/5325-4 describes procedures for establishing the appropriate runway length. AC 150/5300-13A, Table 3-4 and Table 3-5 provides the minimum runway length. AC 150/5300-13A, Table 3-8 provides the standard dimensions of the runway width, shoulder width, blast pad width, blast pad length, and crosswind component based on RDC. Clearly denote the runway numbers at the thresholds. Show location of existing and future threshold lights.	×			
b. Orientation – true bearing to nearest 0.01 second (and runway numbers)	Show the true bearing to the nearest .01 of a degree of the runway centerline.	×			
c. End Coordinates – existing, future, and ultimate degrees, minutes, seconds (to the nearest 0.01 second)	Show the latitude and longitude of the threshold center and end of pavement (if different) to the nearest .01 of a second.	×			
d. Runway Safety Areas (RSA) – actual, existing, future, and ultimate (including dimensions)	Show the extents of the existing and ultimate RSA 5300-13A. Reference AC 150/5300-13A, Paragraph 307.	×			
e. Runway Object Free Areas (ROFA)	Show the extents of the existing and ultimate ROFA. Reference AC 150/5300-13A, Paragraph 309.	×			
f. Precision Obstacle Free Zone (POFZ)	Show the extents of the existing and ultimate POFZ. Reference AC 150/5300-13A, Paragraph 308(d).	×			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
g. Obstacle Free Zone (OFZ)	Show the extents of the existing and ultimate OFZ. Reference AC 150/5300-13A, Paragraph 308.	×			
h. Clearways and Stopways	Show any/all clearways and stopways/overruns and the markings used to denote these areas. See AC 150/5300-13A, Paragraph 311 and 312; and AC 150/5340-1, Section 2, Paragraph 14.			×	
i. Runway Protection Zone (RPZ) - Dimensions (existing, future, and ultimate)	Show existing and ultimate RPZ. See AC 150/5300-13A, Paragraph 310. Show the existing and ultimate protective area/zone type of ownership. Identify any incompatible objects and activities inside the RPZ. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310 and FAA memorandum dated September 27, 2012.	×			
j. 14 CFR Part 77 Approach Surfaces	Show the portion of the existing and ultimate approach surfaces that are over airport and adjacent property and identify the approach surface dimensions and slope. See FAA Order 7400.2, Figure 6-3-9.		×		
k. Threshold Siting Criteria: Approach/Departure Surface (existing, future, and ultimate) 5300-13A	Determine and identify pursuant to AC 150/5300-13A, Paragraph 303(b) and 303(c).		×		
l. Terminal Instrument Procedures (TERPS)surface and TERPS GQS, if applicable.	Determine and identify pursuant to AC 150/5300-13A, Paragraph 303(a)(4)(a), Table 3-4, and Table 3-5. Reference FAA Order 8260.3.		×		

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
m. Navigation Aids (NAVAIDS) – PAPI, ILS, GS, LOC, ALS, MALSR, REIL, etc., (plus facility critical area's)	Show all NAVAIDS and provide clearance distances from runways, taxiways, etc. Reference AC 150/5300-13A, Chapter 6.	×			
n. Marking – thresholds, hold lines, etc.	Show on the runway the type and location of markings, existing and ultimate. See AC 150/5340-1, Section 2.	×			
o. Displaced threshold coordinates and elevation	Show the latitude, longitude, and the pavement elevation of the runway pavement at any displaced threshold. See AC 150/5300-13A, Paragraph 303(a)(2).5300-13A.	×			
p. Runway centerline separation distances	Show the runway centerline separation distances to parallel runway centerline, holding position, parallel taxiway/taxilane centerline, aircraft parking area, and helicopter touchdown pad, if applicable. Reference AC 150/5300-13A, Paragraph 321 and Table 3-8.	×			
7. Taxiway Details	Show the taxiway centerline separation distances to parallel taxiway/taxilane centerlines, fixed or movable objects.	×			
a. Dimensions – width (existing & ultimate)	Taxiway width based on Taxiway Design Group (TDG). See AC 150/5300-13A, Table 4-2.	×			
b. Taxiway Edge Safety Margin (TESM)	TESM dimension based on TDG. See AC 150/5300-13A, Table 4-2.	×			
c. Taxiway Shoulder Width	Taxiway shoulder width based on TDG. See AC 150/5300-13A, Table 4-2.	×			
b. Taxiway/Taxilane Object Free Area (TOFA)	TOFA width based on Taxiway Design Group (TDG). TOFA extend the entire length of taxiway. See AC 150/5300-13A, Table 4-1.	×			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
c. Taxiway/Taxilane Safety Area (TSA)	TSA width based on TDG. TSA extend the entire length of taxiway. See AC 150/5300-13A, Table 4-1.	×			
d. Taxiway/Taxilane Centerline Separation from:					
i. Runway centerline	Show the distance from centerline of runway to centerline of taxiway. See AC 150/5300-13A, Table 4-1.	×			
ii. Parallel taxiway	Show the distance from centerline of taxiway to centerline of parallel taxiway. See AC 150/5300-13A, Table 4-1.	×			
iii. Aircraft parking	Show the distance from centerline of taxiway to marked aircraft parking/tie downs. See AC 150/5300-13A, Table 4-1.	×			
iv. Fixed or Movable Objects	Show the distance from centerline of taxiway to airport objects such as buildings, facilities, poles, etc. See AC 150/5300-13A, Table 4-1.	×			
8. Fences (identify height)	Show the location of existing and ultimate fences and identify height.	×			
9. Aprons					
a. Dimensions (square footage, dimension, or length and width)	Include dimensions of apron and distance from runway and taxiway centerlines. Apron should be sized using activity forecast and the apron design spreadsheet. See AC 150/5300-13A, Chapter 5 and FAA Engineering Brief No. 75.	×			
b. Identify aircraft tie-down layout	Show proposed tie-down layout on the apron area. See AC 150/5300-13A, Figure A5-1, AC 20-35, and AC 150/5340-1.	×			
c. Identify Special Use Areas (e.g., deicing or aerial application areas on or near apron)	Show as applicable and pursuant to representative ACs.	×			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
10. Roads	Label all roads.	×			
11. Legend	Provide a Legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.	×			
12. Items to be identified with distinct line types	Use distinct line types to identify different items and differentiate between existing and ultimate.	×			
a. NAVAID Critical Areas (Glide Slope, Localizer, AWOS, ASOS, VOR, RVR, etc.)	Show the critical area outline for all Instrument Landing System and other electronic Navigational Aids located on the airport. See AC 150/5300-13A, Chapter 6 for general guidance and FAA Order 5750.16 for critical area dimensions.	×			
b. Building Restriction Lines 5300-13A(BRL)	The BRL is the line indicating where airport buildings must not be located, limiting building proximity to aircraft movement areas. See AC 150/5300-13A, Paragraph 213(a).	×			
c. Runway Visibility Zone (RVZ)	Show the RVZ for the existing and ultimate airport configurations. See AC 150/5300-13A, 305(c).			×	
d. Airport Property Lines and Easements (existing, future, and ultimate)	Show the airport property boundaries, including easements, for the existing and ultimate airport configurations.	×			
13. Survey Documentation					
a. Survey Monuments (PACS/SACS, see AC 150/5300-16)	Show the location of all established survey monuments located on or near the airport property. Identify Primary and Secondary Airport Control Stations (PACS/SACS) if they exist. See AC 150/5300-16. Show the location of all section corners on or near the airport property.	×			

Airport Layout Plan Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
b. Offsets, stations, etc.	Show as applicable.	✕			
14. Any Air Traffic Control Tower (ATCT) line of sight/shadow study areas (use separate sheet if necessary)	Reference FAA Order 6480.4.		✕		
15. General Aviation development area (e.g., fuel facilities, FBO, hangars, etc.) – greater detail can be shown on the terminal area drawing	Show as applicable.	✕			
16. Facilities and movement areas that are to be phased out, if any, are described	Show as applicable.	✕			

Remarks

5.f. – This information is not provided on the ALP sheets for clarity purposes. It can instead be found on the approach plan and profile, airport airspace, and departure plan and profile sheets.

6.j. – This information is not provided on the ALP sheets for clarity purposes. See approach plan and profile and airport airspace sheets for P77 surfaces.

6.k. – This information is not provided on the ALP Sheets for clarity purposes, but please note the "TSS criteria met" label near each runway end. See approach plan and profile sheets for TSS surface identification and evaluation.

6.l. – This information is not provided on the ALP Sheets for clarity purposes. See approach plan and profile sheets for GQS surface identification and evaluation and departure plan and profile sheets for departure surface identification and evaluation.

7 – Taxiway dimensions were not provided on the ALP sheets for clarity purposes. Dimensional information is included on airport data sheet.

14 – LOS/ATC Shadow study not completed as a part of this ALP effort.

A.5. Airport Airspace Drawing

- A required drawing.
- Scale 1" = 2000' plan view, 1" = 1000' approach profiles, 1"=100' (vertical) for approach profiles.
- 14 CFR Part 77, Objects Affecting Navigable Airspace, defines this as a drawing depicting obstacle identification surfaces for the full extent of all airport development. It should also depict airspace obstructions for the portions of the surfaces excluded from the Inner Portion of the Approach Surface Drawing.

Airport Airspace Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Block	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	×			
B. Plan view (based on ultimate runway lengths) Include location of water or sewage facilities if inside horizontal surface.					
1. U.S. Geological Survey (USGS) Quad Sheet for base map	Use the most current USGS Quadrangle(s) as a base map for the airspace drawing.	×			
2. Runway end numbers	Show the ultimate runways and runway numbers. Contact the FAA before renumbering existing runways.	×			
3. Part 77 Surfaces (Horizontal, Conical, Transition, based on ultimate). Including elevations at the point where surfaces change.	Show the extents of the Part 77 imaginary surfaces. For airports that have precision approach runways show balance of the 40,000' approach on a second sheet, if necessary. See 14 CFR Part 77.19.	×			
4. 50' elevation contours on sloping surfaces (NAVD88)	Show contour lines on all sloping Part 77 imaginary surfaces. See 14 CFR Part 77.19.	×			
5. Top elevations of penetrating objects for the inner portion of the approach surface drawing	Identify by unique alphanumeric symbol all objects beyond the Runway Protection Zones that penetrate any of the Part 77 surfaces. See 14 CFR Part 77.	×			
6. Note specifying height restriction (ordinances/statutes)	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.		×		
7. North Arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	×			

Airport Airspace Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
C. Profile view					
1. Airport Elevation	List the Airport Elevation, the highest point on an airport's usable runway expressed in feet above mean sea level (MSL). Use NAVD88 datum. See AC 150/5300-13A, Chapter 1, Paragraph 102(g).		×		
2. Composite Ground Profile along extended Runway Centerline (Representing the composite profile, based on the highest terrain across the width and along the length of the approach surface)	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the approach surface.		×		
3. Significant objects (bluffs, rivers, roads, schools, towers, etc.) and elevations	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Use the objects' same alphanumeric identifier that was used on the plan view. Identify the top elevations of all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions.		×		
4. Existing, future, and ultimate runway ends and approach slopes	Show existing and ultimate runway ends and FAR Part 77 approach surface slopes. See 14 CFR Part 77.19.		×		
D. Obstruction Data Tables (identify obstacles not depicted on the Inner Portion of the Approach Surface Drawing)					
1. Object identification number	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Use the objects alphanumeric identifier that was used on the plan view.	×			

Airport Airspace Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
	Identify the top elevations of all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions.				
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Natural Gas Flare, etc.	✕			
3. Date of Obstruction Survey	Provide the date of latest obstruction survey.	✕			
4. Ground Surface Elevation	Provide the ground surface elevation (MSL) at the base of each object.		✕		
5. Object Elevation	List the above ground level (AGL) height and the top of object elevation (above mean sea level / AMSL / MSL) for each object.	✕			
6. Amount of surface penetration	List the surface that is penetrated and the amount the object protrudes above the surface. See 14 CFR Part 77.	✕			
7. Proposed or existing disposition of the obstruction	Provide a proposed or existing disposition of the object to remedy the penetration. See AC 70/7460-1.				
a. Proposed Disposition (existing)		✕			
b. Proposed Disposition (future)		✕			

Remarks

B.6 – At the time of this ALP development, information was unavailable. Emphasis of this ALP update is to obtain conditional approval of the project proposed in the RIM Study.

C, - The inner approach plan and profile sheets contain the profile views.

D.4. – Ground elevation can be derived by subtracting the object AGL from the top MSL in the obstruction data table.

A.6. Inner Portion of the Approach Surface Drawing

- A required drawing.

- Scale 1”=200’ Horizontal, 1”=20’ Vertical, two sheets may be necessary for clarity. Typically, the plan view is on the top half of the drawing and the profile view is on the bottom half. Views should be drawn from the runway threshold to a point on the approach slope 100 feet above the runway threshold elevation, at a minimum, or the limits of the RPZ, whichever is further.
- Drawings containing the plan and profile view of the inner portion of the approach surface to the runway and a tabular listing of all surface penetrations. The drawing will depict the obstacle identification approach surfaces contained in 14 CFR Part 77, Objects Affecting Navigable Airspace. The drawing may also depict other surfaces, including the threshold-siting surface, Glideslope Qualification Surface (GQS), those surfaces associated with United States Standards for Instrument Procedures (TERPS), or those required by the local FAA office or state agency. The extent of the approach surface and the number of airspace obstructions shown may restrict each sheet to only one runway end or approach.

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Block	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	×			
B. Plan View (existing, future, and ultimate)					
1. Inner portion of approach surface	Show the area from the runway threshold out to where the ultimate approach surface slope is 100 feet above the threshold elevation.		×		
2. Aerial photo for base map	Use an aerial photograph for the base map.	×			
3. Objects (identified by numbers)	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions using an alphanumeric character.	×			
4. Property line within approaches	Show the property lines that are within the area/portion of airport shown.	×			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
5. Road & railroad elevations, plus movable object heights	Provide elevation information for the traverse ways' centerline elevation where they intersect the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverse way elevation plus the traverse way adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.	×			
6. Part 77 Approach Surface clearance over Roads and Railroads at the most critical points, the Centerline and Edge of the surface.	Provide elevation information for the traverse ways where they intersect the edges and centerline of the Part 77 Approach surfaces (existing and ultimate). Note whether this elevation is the actual elevation or the traverseway elevation plus the traverseway adjustment (23' for railways, 17' for interstate highways, 15' for other public roads, or 10' for private roads). See also 14 CFR Part 77.	×			
7. Physical end of runway, end number, elevation (NAVD88) Nearest 0.1 foot	Show the existing and ultimate runway end, runway number, and the elevation of the threshold center.	×			
8. Airport Design Surfaces					
a. Runway Safety Area	Show the extents of the existing and ultimate Runway Safety Area (RSA). See AC 150/5300-13A, Paragraph 307 and Table 3-8.	×			
b. Runway Object Free Area	Show the extents of the existing and ultimate Object Free Area (OFA). See AC 150/5300-13A, Paragraph 309 and Table 3-8.	×			
c. Runway Obstacle Free Zone (OFZ)	Show the extents of the existing and ultimate OFZ which includes the inner-approach OFZ, inner-transitional OFZ, and the Precision OFZ (POFZ), if applicable. See AC 150/5300-13A, Paragraph 308.	×			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
d. Runway Protection Zone (RPZ)	Show the extents of the existing and ultimate RPZ. Prior to including new or modified land use in the RPZ, the Regional and ADO staff must consult with the National Airport Planning and Environmental Division, APP-400. This policy is exempt from existing land uses in the RPZ. See AC 150/5300-13A, Paragraph 310, Table 3-5 and FAA memorandum dated September 27, 2012.	×			
e. NAVAID critical area	Show the critical area outline for all Instrument Landing System and other electronic Navigational Aids located on the airport. See AC 150/5300-13A, Chapter 6 for general guidance and FAA Order 5750.16 for critical area dimensions.	×			
9. Ground contours	Show ground contour lines in 2', 5', or 10' intervals. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used. See AC 150/5070-6, Paragraph 1005.	×			
10. North arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, Chapter 2, Section 5, for further information.	×			
C. Profile view					
1. Existing and proposed runway centerline ground profile (list elevations at runway ends & at all points of grade changes) (representing the composite profile based on the highest terrain across the width and along the length of the approach surface)	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the approach surface to where the ultimate approach surface slope is 100 feet above the threshold elevation. A more effective presentation may be a rendering of a composite critical profile.		×		

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
2. Future development from plan view	Identify future development using same alphanumeric identifier that was used on the plan view.	×			
3. Part 77 Approach/transition surface; existing and future VASI/PAPI siting surface	Show the boundaries of the existing and ultimate Part 77 Approach Surface. See FAA Order 7400.2, Figure 6-3-9, See also 14 CFR Part 77.	×			
4. Threshold Siting Surface	Depict any applicable siting requirements pursuant to Table 3-2 of FAA AC 150/5300-13A.	×			
5. Terrain in approach area (fences, streams, etc.)	Show all significant terrain(fences, streams, mountains, etc.) within the approach surfaces, regardless of whether or not they are obstructions	×			
6. Objects – identify the controlling object (same numbers as plan view)	Show all significant objects (roads, rivers, railroads, towers, sign and power poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions. Identify the objects using same alphanumeric identifier that was used on the plan view.	×			
7. Cross section of road & railroad	Show the cross-section of any roads and/or railroads that cross the area shown. Indicate cross section elevations of roads and railroads at edges and extended centerlines that cross the area shown.	×			
8. Existing and proposed property and easement lines	Show the airport property boundaries, including easements, for the existing and ultimate airport configurations. AC 5300-13A Note easements for pipelines and residential through the fence gateways.	×			
D. Obstruction tables for each approach surface (surface should be identified). A separate table for each runway end must be used to enhance information clarity.					

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
1. Object identification number	List each object by the same alphanumeric symbol used in the plan view.	×			
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Natural Gas Flare, etc.	×			
3. Date of Obstruction Survey and Survey Accuracy	Provide the date of latest obstruction survey.	×			
4. Surface Penetrations	5300-13A For any object that penetrates the Part 77 surface, the approach surface, or the obstacle free zone, describe the vertical length the object protrudes.	×			
5. Proposed disposition of surface penetrations	Provide a proposed disposition of the object to remedy the penetration as described in item 4 above. See AC 70/7460-1 for Part 77 violations. "Removal" and/or "Lower" should be listed for any Airports safety area/zone violations. See AC 150/5300-13A, Paragraph 303 and 308.	×			
6. Object elevation	List the Above Ground Level (AGL) height and the top of object elevation in MSL for each object.		×		
7. Triggering Event (e.g., a runway extension) – Timeframe/expected date for removal	List the surface that is penetrated and the amount the object protrudes above the surface. See 14 CFR Part 77 and AC 150/5300-13A, Paragraphs 303 and 308.	×			
8. Allowable approach surface elevation (if applicable)		×			
9. Amount of approach surface penetration (if applicable)		×			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
10. Proposed disposition of approach surface obstruction (if applicable)	Provide a proposed disposition of the object to remedy the penetration. See AC 70/7460-1 for Part 77 violations. "Removal" and/or "Lower" should be listed for any Airports safety area/zone violations. See AC 150/5300-13A, Paragraph 303.	×			
11. Obstacle Free Zone (OFZ)	Determine and depict the applicable OFZ surfaces, see AC 150/5300-13A, Paragraph 308. Provide a proposed disposition of the object to remedy the penetration. Note: Modification to the OFZ standard is not permitted.	×			
E. Runway Centerline Profile	This may be shown on the Inner Portion of the Approach Surface drawing if there is space to show the runway and Runway Safety Area in sufficient detail otherwise a separate sheet may be necessary. At a minimum this drawing is to show the full length of the runway and Runway Safety Area including: runway elevations, runway and Runway Safety Area gradients, all vertical curves, and a line representing the 5' line-of-sight. See AC 150/5300-13A, Paragraph 305.	×			
1. Scale	The vertical scale of this drawing must be able to show the separation of the runway surface and the 5' Line-of-Sight line. See AC 150/5300-13A, Paragraph 305.	×			
2. Elevation	Show runway elevations, runway and Runway Safety Area gradients, and all vertical curve data. See AC 150/5300-13A, Paragraph 318.	×			
3. Line of Sight	The vertical scale of this drawing must be able to show the separation of the runway surface and the 5' Line-of-Sight line. See AC 150/5300-13A, Section 305.	×			

Inner Portion of the Approach Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
Remarks B.1./C.1. – Due to the length of the displaced thresholds at SJC, it is not possible to show the starting point of the PAPI OCS, maintain an acceptable sheet scale, and reach out to 100 feet of elevation above threshold for the P77 approach surface. D.7. – A triggering event is not provided because all of the obstacles have a disposition of "LEAVE AS IS".					

A.7. Runway Departure Surface Drawing

- Required where applicable. For each runway that is designated for instrument departures.
- This drawing depicts the applicable departure surfaces as defined in Paragraph 303 of FAA AC 150/5300-13A. The surfaces are shown for runway end(s) designated for instrument departures.
- 40:1 for Instrument Procedure Runways (Scale, 1" = 1000' Horizontal, 1" = 100' Vertical, Out to 10,200' beyond Runway threshold) 62.5:1 for Commercial Service Runways (Scale, 1" = 2000' Horizontal, 1" = 100' Vertical, Out to 50,000' beyond Runway threshold).
- Contact the FAA if the scale does not allow the entire area to fit on a single sheet. The depiction of the One Engine Inoperative (OEI) surface is optional; it is not currently required.

Runway Departure Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	×			
B. Plan view (existing & future)	See AC 150/5300-13A, Paragraph 303(c).	×			
1. Aerial Photo for base map	Use an aerial photograph for the base map. A USGS 7.5 minute series map is also acceptable.	×			
2. Runway end numbers and elevations (nearest 1/10 of a foot)	Show the existing and ultimate runway end, runway number, and the elevation of the threshold center. For runways that have a clearway, depict this surface and the relocated departure surface. Reference AC 150/5300-13A, Paragraph 303(c)(1).	×			

Runway Departure Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
3. 50' elevation contours on sloping surfaces (NAVD88)	Show contour lines on the Part 77 imaginary surfaces. See 14 CFR Part 77.19.	×			
4. Depict property line, including easements	Show the property line(s) that are within the area/portion of airport shown.	×			
5. Identify, by numbers, all traverse ways with elevations and computed vertical clearance in the departure surface	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the departure surfaces, regardless of whether or not they are obstructions using unique alphanumeric characters.	×			
6. Ground contours	Show ground contour lines in 2', 5', or 10' intervals. Topographic issues may be important in the alternatives analysis, which may require that reduced contour intervals be used.	×			
C. Profile view (existing & future)					
1. Ground profile	Depict the ground profile along the extended runway centerline representing the composite profile, based on the highest terrain across the width and along the length of the departure surface to extents of the surface dimensions.		×		
2. Significant objects (bluffs, rivers, roads, buildings, fences, structures, etc.)	Show all significant objects (roads, rivers, railroads, towers, poles, etc.) within the approach surfaces, regardless of whether or not they are obstructions using an alphanumeric character.	×			
3. Identify obstructions with numbers on the plan view	Identify the objects using same alphanumeric identifier that was used on the plan view.	×			
4. Show roads and railroads with dashed lines at edge of the departure surface	Show the cross-section of any roads and/or railroads that cross the area shown.	×			
D. Obstruction Data Tables					

Runway Departure Surface Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
1. Object identification number	Identify all significant objects (roads, rivers, railroads, towers, poles, etc.) within the departure surfaces, regardless of whether or not they are obstructions using unique alphanumeric characters. List each object by the same alphanumeric symbol used in the plan view.	×			
2. Description	Provide a brief description of the object, e.g., Power Pole, Cell Tower, Tree, Natural Gas Flare, etc.	×			
3. Object Elevation	List the Above Ground Level (AGL) height and the top of object elevation in MSL for each object.	×			
4. Amount of surface penetration	List the object protrudes above the departure surface. See AC 150/5300-13A, Paragraph 303(c).	×			
5. Proposed or existing disposition of the obstruction	Provide a proposed disposition of the object to remedy the penetration. See AC 150/5300-13A, Paragraph 303(c).	×			
6. Separate table for each departure surface	A separate table for each runway end must be used to enhance information clarity.	×			
Remarks C.1. – Due to the large volume of low, close-in obstacles, it was necessary to cut-off some of the departure surface on the departure plan and profile sheets. Any obstacles that fall outside of the view have been noted in the obstruction data table which contains the coordinates, elevations, types, and disposition information for all obstacles.					

A.8. Terminal Area Drawing

- Scale 1”=50’ or 1”=100’. Plan view of aprons, buildings, hangars, parking lots, roads.
- This plan consists of one or more drawings that present a large-scale depiction of areas with significant terminal facility development. Such a drawing is typically an enlargement of a portion of the ALP. At a commercial service airport, the drawing would include the passenger terminal area, but might also include general aviation facilities and cargo facilities. See AC 150/5300-13A, Appendix 5.
- Use scale that allows the extent of the terminal/FBO apron area to best fit the chosen sheet size, e.g., typical GA airports may be able to use 1”=50’ scale on a 22” X 34” sheet, but a complex hub airport with multiple terminal areas may require a 1”=100’ scale on a 36” X 48”

sheet. Contact FAA if an airport layout requires scaling or sheet sizing other than what is listed.

- This drawing is not needed at every airport type and is therefore optional.

Terminal Area Drawing (See Remarks Below)					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the current revision number and date of revision.	A Terminal Area Drawing (TAD) was not prepared as part of this ALP update.			
B. Building data table 1. Structure identification number 2. Top elevation of structures (AMSL) 3. Obstruction marking/lighting (existing/future)	All buildings on the Airport Layout Drawing should be identified by an alphanumeric character. List these identifiers in a table and give a description of the building. If no Terminal Area drawing is done, also include the top of structure elevation in MSL. Show the location of existing and ultimate hangars. Include dimensions of apron and distance from runway and taxiway centerlines. See AC 150/5300-13A, Appendix 5. Show the elevation of the highest point of each structure.				
C. Buildings to be removed or relocated noted	If any of the structures violate any airport or approach surfaces give an ultimate disposition to remedy the violation.				
D. Fueling facilities, existing and future	Show the location of existing and ultimate fueling facilities. Include dimensions of apron and distance from runway and taxiway centerlines.				
E. Air carrier gates positions shown (existing/future)	Show the existing and ultimate air carrier gate positions. See AC 150/5300-13A, Chapter 5.				
F. Existing and future security fencing with gates	Show the existing and ultimate security fencing and gates. See AC 150/5300-13A, Paragraph 606.				

Terminal Area Drawing (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
G. Building restriction line (BRL)	Show the Building Restriction Line (BRL) that is within the area/portion of airport shown. The BRL identifies suitable building area locations on airports. This should be located where the Part 77 surfaces are at 35' above the airport elevation unless a different height is coordinated with the FAA. See AC 150/5300-13A, Paragraph 213(a).	A Terminal Area Drawing (TAD) was not prepared as part of this ALP update.			
H. Taxiway or Taxilane centerlines designated	Show centerlines of all taxiway and taxilanes within the area/portion of airport shown.				
I. Dimensions					
1. Clearance Dimensions between runway, taxiway, and taxilane centerlines and hangars, buildings, aircraft parking, and other objects.	Show the location of existing and ultimate apron. Include dimensions of apron and distance from runway and taxiway centerlines. Apron should be sized using activity forecast and the apron design spreadsheet. See AC 150/5300-13A, Chapter 5 and FAA Engineering Brief No. 75.				
2. Dimensions of aprons, taxiways, etc. Apron/Hangar areas that do not meet dimensional standards of the critical aircraft should be identified and the wingspan/design group of the aircraft that can use that area depicted. Include tie down location with clearances	Show the dimensions between existing and ultimate runway, taxiway, and taxilane centerlines and existing and ultimate hangars, buildings, aircraft parking, and other fixed or movable objects. See AC 150/5300-13A, Chapter 3 and Chapter 4. Show proposed tie-down layout on the apron area as well as taxilane marking plan. See AC 150/5300-13A, Appendix 5, AC 20-35, and AC 150/5340-1.				
J. Property Line	Show the property line(s) that are within the area/portion of airport shown.				
K. Auto parking (existing & ultimate)	Show the existing and ultimate auto parking areas. See AC 150/5300-13A, Appendix 5.				

Terminal Area Drawing (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
L. Major airport drainage ditches or storm sewers	Show any significant airport drainage ditches or storm sewers within the area/portion of airport shown.	A Terminal Area Drawing (TAD) was not prepared as part of this ALP update.			
M. Special Use Area (e.g., Agricultural spraying support, Deicing, or Containment)	Show any special use areas within the area/portion of airport shown.				
N. North Arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.				
O. Fence	Show the existing and ultimate perimeter fencing or general area fencing.				
P. Entrance Road	Show the existing and ultimate entrance road. See 5300-13AFAA Order 5100.38, Chapter 6, Section 2.				
Remarks					

A.9. Land Use Drawing

- Scale 1”=200’ to 1”=600’.
- A drawing depicting on- and off-airport land uses and zoning in the area around the airport. At a minimum, the drawing must contain land within the 65 DNL noise contour. For medium or high activity commercial service airports, on-airport land use and off-airport land use may be on separate drawings. The Airport Layout Drawing should be used as a base map.
- Drawing optional. Need based on scope of work.

Land Use Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Title and Revision Blocks	Each drawing in the Airport Layout Plan drawing set shall have a Title and Revision Block. For drawings that have been updated, e.g., as-builts, the revision block should show the	×			

Land Use Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
	current revision number and date of revision.				
B. Airport boundaries/property, existing & future (fee and easement)	Show the existing and ultimate property lines. If known, show property lines for parcels surrounding the airport.	×			
C. Plan view of land uses by category (Agricultural, Aeronautical, Commercial, Residential, etc.). Use local land use categories.					
1. On-Airport (existing & future)	Label existing and ultimate on-airport property by usage, e.g., Terminal Area, Air Cargo, Public Ramp, Airfield - Movement, Airfield - Non-movement, etc. Include existing and future airport features (e.g., runways, taxiways, aprons, safety areas/zones, terminal buildings and navigational aids).	×			
2. Off-Airport (existing & future) [to the 65 DNL Contour at a minimum, if contour known]	Label existing and ultimate off-airport property by usage and zoning, e.g., Agricultural, Industrial, Residential, Commercial, etc.		×		
D. Boundaries of local government	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.	×			
E. Land use legend	Provide a legend that identifies all symbols and line types used on the drawing. Lines must be clear and readable with sufficient scale and quality to discern details.	×			
F. Public facilities (schools, hospitals, parks, churches etc.)	Identify public facilities, e.g., schools, parks, etc.	×			
G. Runway visibility zone for intersecting runways	Show the Runway Visibility Zone(s) for the existing and ultimate airport configurations. See AC 150/5300-13A, Section 305.			×	
H. Show off-airport property out to 65 DNL if available	Label existing and ultimate off-airport property by usage and zoning, e.g., Agricultural, Industrial, Residential, Commercial, etc.	×			

Land Use Drawing					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
I. Airport Overlay Zoning or Zoning Restrictions	List any local zoning restrictions that are in place to protect the airport and surrounding airspace. See AC 150/5190-4.			×	
J. North arrow with magnetic declination and year	Magnetic declination may be calculated at http://www.ngdc.noaa.gov/geomag-web/#declination. This model is using the latest World Magnetic Model which has an Epoch Year of 2010. See FAA Order 8260.19, "Flight Procedures and Airspace." Chapter 2, Section 5, for further information.	×			
K. Drawing details to include runways, taxiways, aprons, RPZ, terminal buildings and NAVAIDS	Show existing and future airport features (e.g., runways, taxiways, aprons, safety areas/zones, terminal buildings and navigational aids, etc.). See AC 150/5300-13A.	×			
L. Crop Restrictions	Show the Crop Restriction Line (CRL). See AC 150/5300-13A, Paragraph 322 and AC 150/5200-33.			×	
Remarks C.2. – The emphasis of this ALP update is to show on-airport land use.					

A.10. Airport Property Map / Exhibit A

- Scale 1”=200’ to 1”=600’.

Airport Property Map / Exhibit A (See Remarks Below)					
Item	Instructions	Sponsor/Consultant			FAA
		Yes	No	N/A	
A. Will Property Map serve as Exhibit A? – **If YES,** follow the directions to the right. – **If NO,** go to item B below.	If prepared in accordance with AC 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects, use ARP SOP no. 3.00 Exhibit A guidance instead of below checklist.	An Airport Property Map / Exhibit A was not included as part of this ALP update as there are no changes to the Property Map/Exhibit A accepted by the FAA in April 2015.			

Airport Property Map / Exhibit A (See Remarks Below)					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
If Property Map *will not* serve as Exhibit A: B. Title and Revision Blocks		An Airport Property Map / Exhibit A was not included as part of this ALP update as there are no changes to the Property Map/Exhibit A accepted by the FAA in April 2015.			
C. Plan view showing parcels of land (existing, future, and ultimate)					
1. Fee land interests (existing and future)					
2. Easement interests (existing and future)					
a. Part 77 protection					
b. Compatible Land Use					
c. RPZ protection					
3. Airport Property Line					
D. Legend – shading/cross hatching, survey monuments, etc.					
E. Data Table					
1. Depiction of various tracts of land acquired to develop airport	If any obligations were incurred as a result of obtaining property, or an interest therein, they should be noted. Obligations that stem from Federal grant or an FAA-administered land transfer program, such as surplus property programs, should also be noted. The drawing should also depict easements beyond the airport boundary.				
2. Method of acquisition or property status (fee simple, easement, etc.)					
3. Type of Acquisition Indicated	(e.g., AIP-noise, AIP-entitlement, PFC, surplus property, local purchase, local donation, condemnation, other)				
4. Acreage					

Airport Property Map / Exhibit A (See Remarks Below)					
Item	**Instructions**	**Sponsor/Consultant**			**FAA**
		Yes	**No**	**N/A**	
F. Access point(s) for through-the-fence arrangements including residential		An Airport Property Map / Exhibit A was not included as part of this ALP update as there are no changes to the Property Map/Exhibit A accepted by the FAA in April 2015.			
Remarks					

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

RUNWAY INCURSION MITIGATION / AIRFIELD DESIGN STANDARDS ANALYSIS

TECHNICAL MEMORANDUM

IMPLEMENTATION PHASING PLAN

CITY OF SAN JOSE

September 5, 2019

A . INTRODUCTION

The Analysis of Alternatives task completed earlier in this study concluded with a Recommended Project Alternative proposing a set of airfield configuration changes and other actions to reduce the potential for runway incursions and improve compliance with current FAA design standards, while also retaining capacity for projected operational growth. The elements of the Recommended Project Alternative, which have subsequently been conditionally approved by the FAA on an updated Airport Layout Plan for San Jose International in ___ 2019, can now be termed the "RIM Improvement Program". This Draft Technical Memorandum presents a proposed timeframe and preliminary cost estimates for implementation of the RIM Improvement Program.

The implementation phasing generally gives highest priority to those project elements that mitigate the FAA-designated "hot spots" and other identified airfield safety risks, while also accounting for capital costs and FAA grant funding availability, appropriate project sequencing or dependencies, operational factors, and concurrent landside development improvements. A 15-year implementation program is anticipated, beginning with an annual capital improvement program for each of the first five years, followed by a grouping of projects for Years 6-10 and Years 11-15. Implementation of the larger individual projects are assumed to be phased over multiple years. In the tables which follow, each individual project is assigned a unique project # (plus its corresponding Airport Master Plan proposed project # where applicable) and is annotated with a purpose statement.

The cost estimates for each project are based on an analysis of unit price bids for recent, relevant, and comparably-sized construction projects at SJC. All cost estimates presented are in 2018-dollar value and should be considered only a planning level opinion of probable construction cost (OPCC).

Three very minor refinements have been incorporated into the RIM Improvement Program from what was described in the Study's technical memoranda titled "Summary Analysis of Project Alternatives" (April 3, 2018) and "Analysis of Project Alternatives Summary Supplement" (June 1, 2018):

- Although not expressly addressed in the earlier Analysis of Alternatives task, the existing intersection of Taxiways W and M is squared off on the northwest side rather than rounded. Given Taxiway W's proximity to Runway 12R/30L, a small project to round off the northwest corner of the W/M intersection, through painting out excess pavement, was added to the Program to reduce a potential risk for wrong pavement operations.

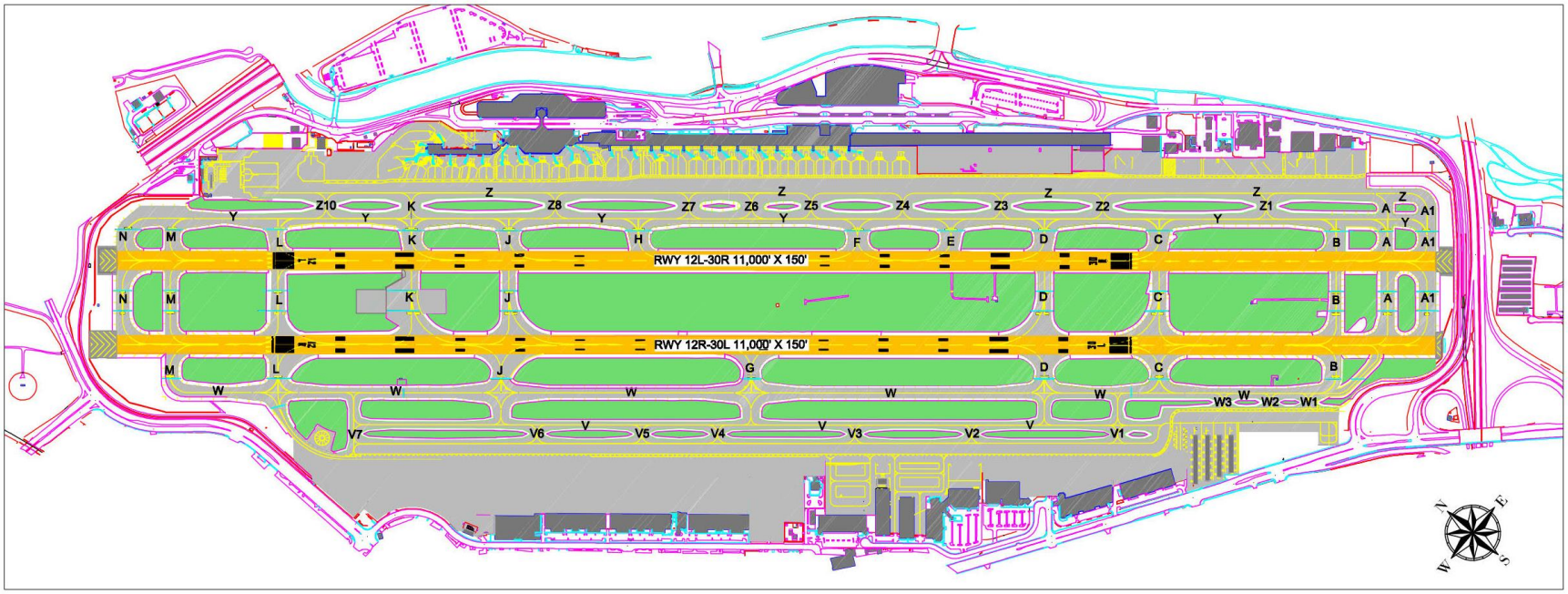
- The project element to paint the word "TAXI" in large block letters near each end of Taxiways W and Y (to more visually distinguish each taxiway from its nearby parallel runway, further mitigating the potential for wrong pavement arrivals/departures) had proposed those markings to be placed lateral to the displaced runway thresholds. However, given the

distance between the runway endpoints and thresholds, an adjustment was made to place those markings closer to the runway ends to enhance visibility to pilots. On Taxiway W, the markings would be just north of Taxiway B (south end) and south of Taxiway M (north end). On Taxiway Y, the markings would be midway between existing Taxiways A and A-1 (south end) and midway between Taxiways N and M (north end).

- A major element of the RIM Improvement Program is the realignment of 8 east side taxiway segments between Taxiways Z and Y to mitigate direct apron to runway access, with the realigned segments of Taxiways B/C/D/E/F/H/J/L renamed as Z-1 through Z-8 and Z-10, respectively. However, as these realignments may not begin implementation until years 6-10, and taxiway nomenclature practice can change over time, a study has been added to the Program to reassess the naming of these realigned taxiway segments prior to implementation.

The recommended future airfield configuration alternative is depicted in the following figure. Section B of this technical memorandum presents a project phasing/cost summary, with exhibits illustrating the phasing for graphical reference. Section C of this technical memorandum consists of individual project phasing and cost tables.

Future Airfield Configuration: Recommended Alternative



Design Standards Conformity Actions

- Existing east airfield runway and parallel taxiway configuration retained.
- Former Runway 11/29 converted to new ADG-III Taxiway V and extended.
- Existing Taxiway V removed and replaced by expanded apron and parallel taxilane.
- Runway 12R/30L centerline to aircraft hold position distance increased.
- Runway 12L/30R blast pad widened (both ends) and lengthened (12L end).

RIM Geometric Conformity Actions

- East airfield Taxiways B/C/D/E/F/H/J/L realigned between Taxiways Z and Y.
- Direct apron to runway access mitigated at west airfield Taxiways B/C/D.
- Taxiway W extended south from Taxiway B to Runway 12R/30L to mitigate back-taxiing on runway.
- Taxiway B pavement reduced between Taxiway Z and Runway 12L/30R.
- Taxiway L pavement reduced between Taxiway Y and Runway 12R/30L.
- Taxiways F and H closed between Runways 12R/30L and 12L/30R.
- West airfield general aviation run-up pad relocated.

B. PRELIMINARY PROJECT PHASING AND COST SUMMARY

Preliminary Project Phasing / Cost Summary

Project No.	Master Plan Reference No.	Project Title / Description	Purpose	Project Related Costs
YEAR ONE				
RIM-Y1-P01 (Administrative)	**A-26**	**Administrative Actions**: 1) Formally close Runway 11/29; 2) Update MOS for Runway 12L/30R & TWY Y separation; 3) Update MOS for Runway 12R/30L ROFA width.	1) Mitigates Hotspot 1 and 2/ addresses direct access from apron to 11/29; 2) Addresses and existing non-standard airfield design issue; and 3) Addresses non-standard airfield design issues noted on Updated ALP.	**$ -**
RIM-Y1-P02	**A-49**	**"TAXI" Painting on Taxiways Y & W.** Paint TAXI on both ends of Taxiway Y and Taxiway W and round the northwest corner of Taxiway W at Taxiway M by painting over pavement to aid in differentiatinig TWY W from Runway 12R.	Mitigation of wrong runway events/addresses major FAA concern regarding closely spaced parallel runways / taxiways.	**$ 35,000**
RIM-Y1-P03	**A-41**	**Relocate GA Runup Pad:** 1) Construct new GA runup pad in southwest quadrant of the airport; 2) Remove run-up area pavement at Taxiway W and D.	Mitigates Hotspot 1 and 2.	**$ 1,556,000**
RIM-Y1-P04 (Design Only)	**A-26, A-27, A-38**	**Design: New Taxiway V.** Design new ADG-III TWY V (6,787' in length) including new cross TWY V1 between the GA apron & TWY W near south end, new cross TWY V7 between GA apron & TWY W at north end, and 5 additional connectors (TWY V2-V6) between new TWY V & future apron-edge taxilane.	Initiates mitigation of deficient TOFA issue on the west airfield. Facilitates the ability to accommodate ADG-III aircraft demand on west side GA areas. Addresses direct access from apron to runway.	**$ 3,214,000**
		Total Year One		**$ 4,805,000**
YEAR TWO				
RIM-Y2-P01	**A-26, A-27, A-38**	**New Taxiway V - Phase 1.** Construct Phase 1 of new TWY V and associated connector taxiways (V7, V6, and V5). Construction of connector taxiways along the west side of new Taxiway V will extend to the future location of the ramp edge taxilane.	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and provides room for expanded apron.	**$ 23,951,000**
RIM-Y2-P02	**A-48**	**Close Taxiway F.** Paint over existing Taxiway F pavement between Runway 12R/30L and 12L/30R. Project includes modification of guidance sign panels, removal of excess guidance signs, and removal of excess taxiway edge lights.	Addresses RIM criteria issue associated with high energy runway crossings.	**$ 483,000**
RIM-Y2-P03	**A-48**	**Close Taxiway H.** Paint over existing Taxiway H pavement between Runway 12R/30L and 12L/30R. Project includes modification of guidance sign panels, removal of excess guidance signs, and removal of excess taxiway edge lights.	Addresses RIM criteria issue associated with high energy runway crossings.	**$ 485,000**
RIM-Y2-P04	**A-40**	**Taxiways W2 and W3 Improvements.** Delineate two defined ingress and egress points to GA tiedown/T-hangars from TWY W with painted islands, markings. Designate the access points as TWY W2 and W3.	Address RIM criteria issue associated with expansive pavement.	**$ 273,000**
		Total Year Two		**$ 25,192,000**
YEAR THREE				
RIM-Y3-P01	**A-26, A-27, A-38**	**New Taxiway V - Phase 2.** Construct Phase 2 of new TWY V and associated connector taxiways (V4 and V3). Construction of connector taxiways along the west side of new Taxiway V will extend to the future location of the ramp edge taxilane.	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and provides room for expanded apron.	**$ 17,262,000**
RIM-Y3-P02 (Design Only)	**A-17**	**Design: Taxiway W Southern Extension.** Design the ADG III section of Taxiway W extension to vicinity of 30L/TWY B intersection. Designate as TWY W1.	Addresses dual use of pavement and potential incursion issues and aircraft interactions on Ruwnay 30L.	**$ 172,000**
		Total Year Three		**$ 17,434,000**

Preliminary Project Phasing / Cost Summary

Project No.	Master Plan Reference No.	Project Title / Description	Purpose	Project Related Costs
YEAR FOUR				
RIM-Y4-P01	**A-17**	**Taxiway W Southern Extension.** Extend Taxiway W to connect to Runway 12R/30L in vicinity of TWY B, Designate as Taxiway W1.	Addresses dual use of pavement and potential incursion issues and aircraft interactions on Runway 30L.	**$ 2,951,000**
RIM-Y4-P02 (Design Only)	**A-42**	**Design: Runway 12R/30L Hold Bar Relocations.** Design relocation of hold bars (markings, signs and lighting) on both sides of Runway 12R/30L.	Precursor to addressing an ADG-V nonstandard design issue.	**$ 75,000**
RIM-Y4-P03	**A-26, A-27, A-38**	**New Taxiway V - Phase 3.** Construct Phase Three of new TWY V that includes connector taxiway V1 between the GA apron and TWY W (north of Taxiway C extended centerline), and a new TWY connector V2 between the GA apron and TWY V.	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and provides room for expanded apron.	**$ 13,879,000**
RIM-Y4-P04 (Design Only)	**A-37**	**Design: ADG-III Taxilane West of (and parallel to) Taxiway V.** Design the parallel ADG-III taxilane to the alignment of new Taxiway V at a location along the eastern edge of the proposed GA apron expansion. The design includes seven connectors that will extend from the west side of new taxilane to the eastern edge of the proposed GA ramp expansion that will provide specific points of ingress and egress from the apron to the taxilane.	Brings the west GA area into conformity with ADG-III standards and significantly improves lateral movements both in the movement and non-movement areas. Reduces controller workload and improves operational safety.	**$ 1,534,000**
RIM-Y4-P05 (Design Only)	**G-9**	**Design: General Aviation Apron Expansion.** Design GA apron expansion out to west edge of new parallel taxilane OFA.	Component for addressing west side ADG III conformity. Enhances accomodation of current and projected demand.	**$ 2,963,000**
		Total Year Four		**$ 21,402,000**
YEAR FIVE				
RIM-Y5-P01	**A-42**	**Runway 12R/30L Hold Bar Relocations.** Relocate hold bars (guard lighting, signs and markings) on Runway 12R/30L to conform to ADG V Cat II standard separation of 280'.	Addresses a non-standard ADG-V issue.	**$ 1,341,000**
RIM-Y5-P02	**A-47**	**Taxiway L - Excess Pavement Painting (Green).** Paint out excess Taxiway L pavement between Runway 30L and TWY Y.	Mitigation of expanse of pavement issue.	**$ 1,027,000**
RIM-Y5-P03	**A-46**	**Taxiway B - Excess Pavement Painting (Green).** Paint out excess Taxiway B pavement between Runway 12L/30R and TWY Z.	Mitigation of expanse of pavement issue.	**$ 537,000**
RIM-Y5-P04	**A-37**	**New ADG-III Taxilane - Phase 1.** Close existing TWY V and construct Phase 1 of parallel ADG-III taxilane.	Brings the GA west area into conformity with ADG-III standards and significantly improves lateral movements in both the movement and non-movement areas. Reduces controller workload and improves operational safety.	**$ 12,164,000**
RIM-Y5-P05	**G-9**	**General Aviation Apron Expansion - Phase 1.** Construct Phase 1 of GA apron expansion out to west edge of new parallel taxilane OFA.	Component for addressing west side ADG-III conformity. Enhances accomodation of current and projected demand.	**$ 25,129,000**
		Total Year Five		**$ 40,198,000**

Preliminary Project Phasing / Cost Summary				
Project No.	**Master Plan Reference No.**	**Project Title / Description**	**Purpose**	**Project Related Costs**
YEAR SIX TO TEN				
RIM-Y6-10-P01 (Administrative)	**A-44**	**Taxiway Designation Study.** Conduct study of connector taxiway naming for east side airfield realignments.	Improvement to situational awareness and conformity with signage guidance.	**$ -**
RIM-Y6-10-P02 (Design Only)	**A-44**	**Design: Realign Taxiways B, D, H, and L Between Taxiways Y & Z.** Design offset connectors between Taxiway Y and Z for Taxiways B, D, H, and L.	Mitigates RIM criteria issue of direct apron access to runway.	**$ 556,000**
RIM-Y6-10-P03	**A-44**	**Realign Taxiways B, D, H, and L Between Taxiways Y & Z.** Construct offset connectors between Taxiway Y and Z for Taxiways B, D, H, and L.	Mitigates RIM criteria issue of direct apron access to runway.	**$ 9,079,000**
RIM-Y6-10-P04	**A-45**	**Remove Taxiways B, D, H, and L Between Taxiways Y & Z.** Remove pavement associated with former Taxiway connectors at Taxiways B, D, H, and L between Taxiway Z and Taxiway Y.	Mitigates RIM criteria issue of direct apron access to runway.	**$ 442,000**
RIM-Y6-10-P05	**A-43**	**Blast Pad Improvements.** Widen blast pads on RWY 12L/30R and lengthen 12L blast pad to abut runway side of blast fence.	Addresses a non-standard ADG V blast pad issue.	**$ 589,000**
RIM-Y6-10-P06	**A-37**	**New ADG-III Taxilane - Phase 2.** Construct Phase 2 of parallel ADG-III taxilane.	Brings the west GA area into conformity with ADG-III standards and significantly improves lateral movements both in the movement and non-movement areas. Reduces controller workload and improves operational safety.	**$ 8,353,000**
RIM-Y6-10-P07	**G-9**	**General Aviation Apron Expansion - Phase 2.** Construct Phase 2 of the west side apron expansion.	Component for addressing west side ADG III conformity. Enhances accomodation of current and projected demand.	**$ 13,640,000**
RIM-Y6-10-P08 (Design Only)	**A-44**	**Design: Realign Taxiways C, E, F, and J Between Taxiways Y & Z.** Design offset connector taxiways between Taxiway Y and Z for Taxiways C, E, F, and J.	Mitigates RIM criteria issue of direct apron access to runway.	**$ 480,000**
RIM-Y6-10-P09	**A-44**	**Realign Taxiways C, E, F, and J Between Taxiways Y & Z.** Construct offset connectors between Taxiway Y and Z for Taxiways C, E, F, and J.	Mitigates RIM criteria issue of direct apron access to runway.	**$ 7,939,000**
RIM-Y6-10-P10	**A-45**	**Remove Taxiways C, E, F, and J Between Taxiways Y & Z.** Remove pavement associated with former Taxiway connectors at Taxiways C, E, F, and J.	Mitigates RIM criteria issue of direct apron access to runway.	**$ 414,000**
		Total Years Six To Ten		**$ 41,492,000**

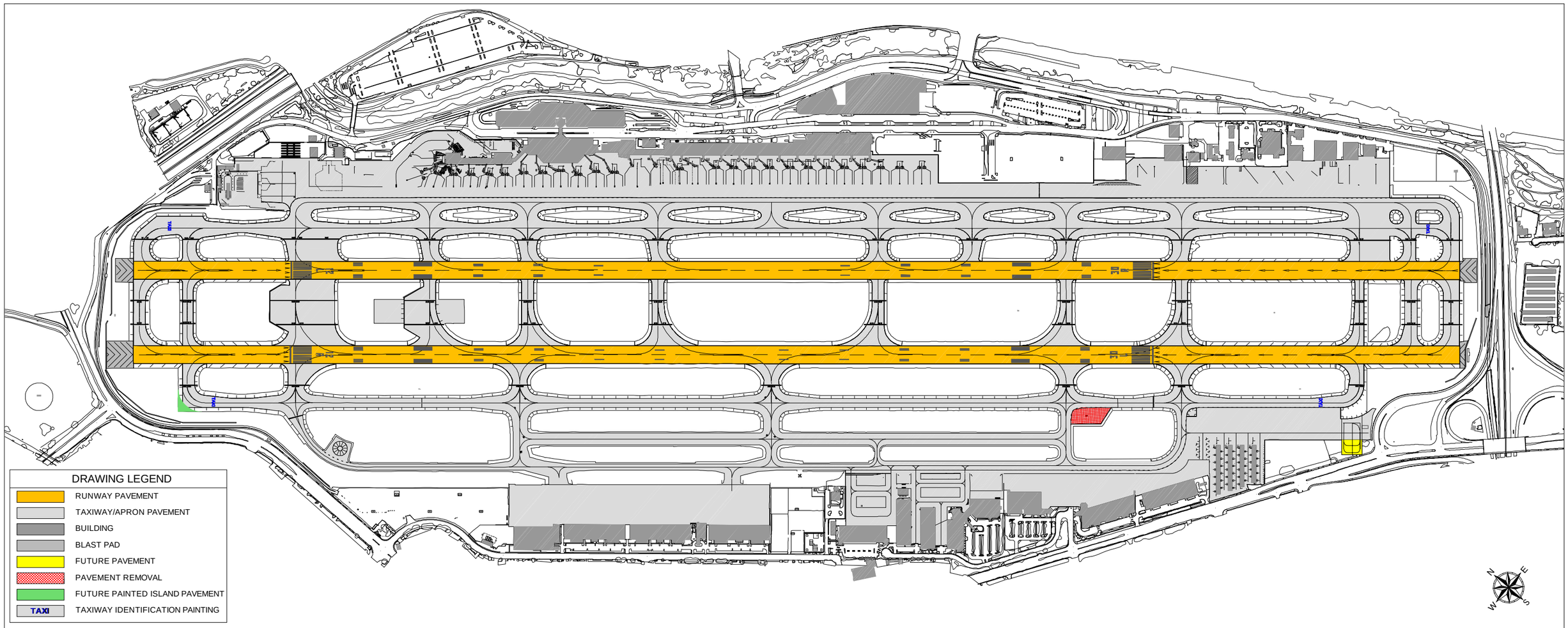
Preliminary Project Phasing / Cost Summary

Project No.	Master Plan Reference No.	Project Title / Description	Purpose	Project Related Costs
YEAR ELEVEN TO FIFTEEN				
RIM-Y11-15-P01	**A-37**	**New ADG-III Taxilane - Phase 3.** Construct Phase Three of parallel ADG-III taxilane.	Brings the west GA area into conformity with ADG-III standards and significantly improves lateral movements both in the movement and non-movement areas. Reduces controller workload and improves operational safety.	**$ 7,166,000**
RIM-Y11-15-P02	**G-9**	**General Aviation Apron Expansion - Phase 3.** Construct Phase Three of west side apron expansion.	Component for addressing west side ADG III conformity. Enhances accomodation of current and projected demand.	**$ 11,974,000**
RIM-Y11-15-P03	**A-23**	**Taxiway J Fillet Widening Between Runway 30L and Taxiway W.** Expand the Taxiway J fillet for arrivals on Runway 30L exits to TWY W.	Fillet widening will facilitate movment for aircraft landing on Runway 30L, exiting at Taxiway J.	**$ 1,137,000**
		Total Years Eleven to Twenty		**$ 20,277,000**

TOTAL PROJECT RELATED COSTS*	**$ 170,800,000**

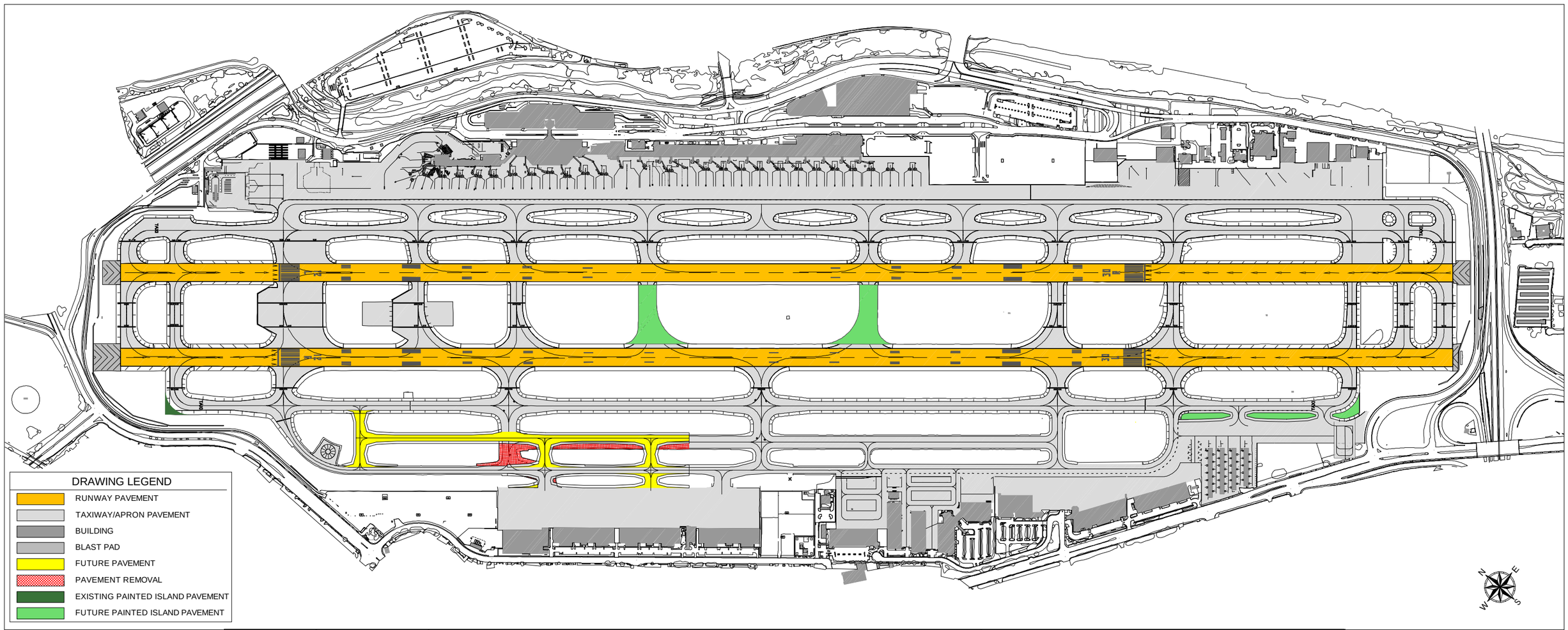
*Soft Costs are included in the above listed Project Related Costs

TOTAL PROJECT RELATED COSTS BY COMPONENTS		
TOTAL CONSTRUCTION COST ESTIMATE		**$ 117,923,000**
PROJECT SOFT COSTS		
8%	Design (approximate % of Construction)	**$ 9,339,000**
12%	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)	**$ 14,152,000**
25%	Contingency (approximate % of Construction)	**$ 29,486,000**
TOTAL SOFT COST ESTIMATE		**$ 52,977,000**



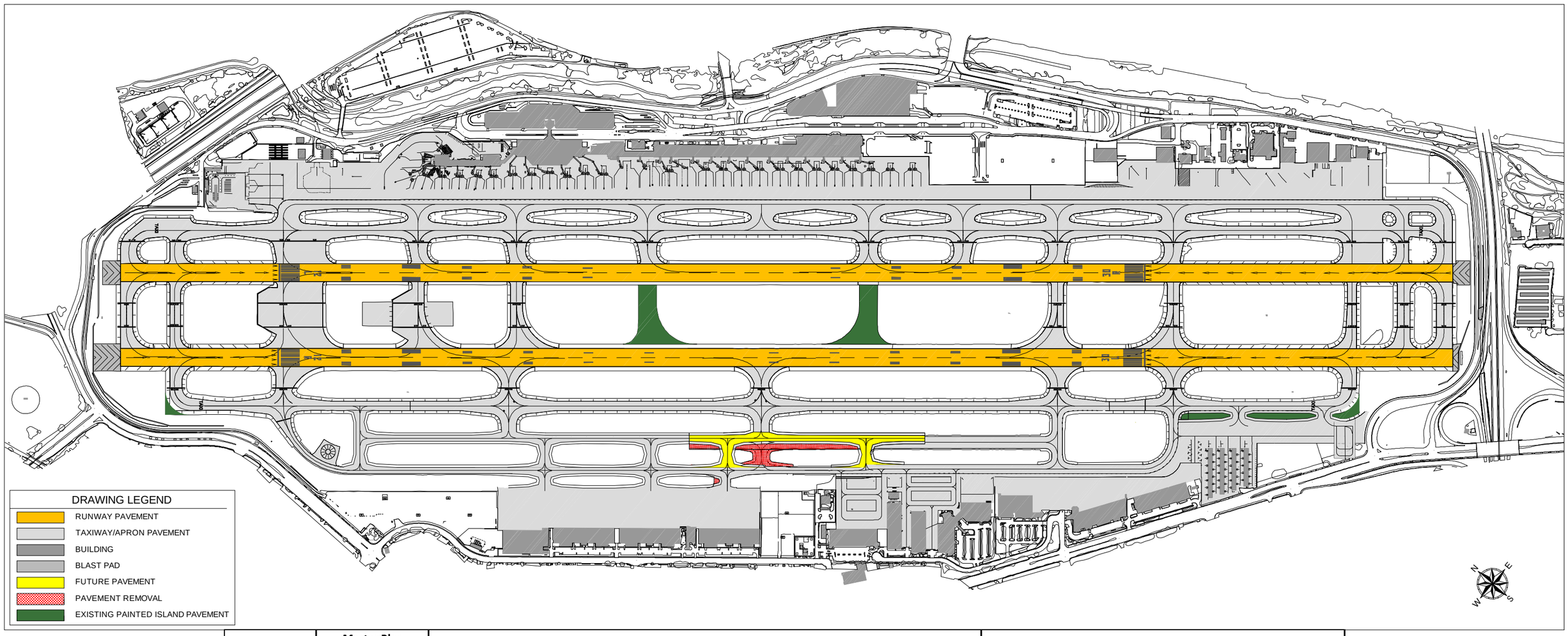
SJC Project No.	Master Plan Amendment reference No.	Project Description	Purpose
RIM-Y1-P01	A-26	**Administrative Actions:** 1) Formally close Runway 11/29; 2) Update MOS for Runway 12L/30R & TWY Y separation; 3) Update MOS for Runway 12R/30L ROFA width.	1) Mitigates Hotspot 1 and 2/ addresses direct access from apron to 11/29; 2) Addresses and existing non-standard airfield design issue; and 3) Addresses non-standard airfield design issues noted on Updated ALP.
RIM-Y1-P02	A-49	**"TAXI" Painting on Taxiways Y & W.** Paint TAXI on both ends of Taxiway Y and Taxiway W and round the northwest corner of Taxiway W at Taxiway M by painting over pavement to aid in differentiatinig TWY W from Runway 12R.	Mitigation of wrong runway events/addresses major FAA concern regarding closely spaced parallel runways.
RIM-Y1-P03	A-41	**Relocate GA Runup Pad:** 1) Construct new GA runup pad in southwest quadrant of the airport; 2) Remove run-up area pavement at Taxiway W and D.	1) Aids in mitigating Hotspot 1 and 2; 2) Mitigates Hotspot 1 and 2.
RIM-Y1-P04	A-26, A-27, A-38	**Design: New Taxiway V.** Design new ADG-III TWY V (6,787' in length) including new cross TWY V1 between the GA apron & TWY W near south end, new cross TWY V7 between GA apron & TWY W at north end, and 5 additional connectors (TWY V2-V6) between new TWY V & future apron-edge taxilane.	Initiates mitigation of deficient TOFA issue on the west airfield. Facilitates the ability to accommodate ADG-III aircraft demand on west side GA areas. Addresses direct access from apron to runway.

Project Phasing Plan
Year 1

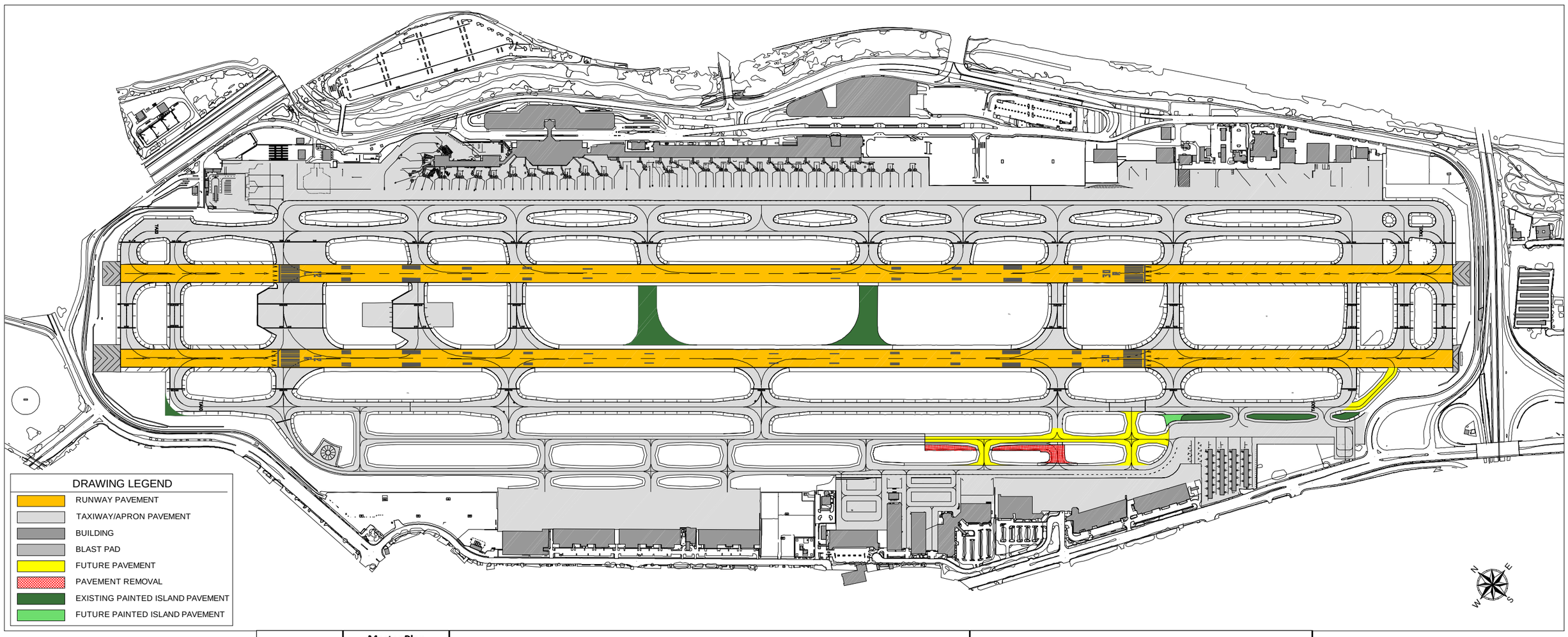


SJC Project No.	Master Plan Amendment reference No.	Project Description	Purpose
RIM Y2-P01	A-26, A-27, A-38	**New Taxiway V - Phase 1.** Construct Phase 1 of new TWY V and associated connector taxiways (V7, V6, and V5). Construction of connector taxiways along the west side of new Taxiway V will extend to the future location of the ramp edge taxilane.	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and providesroom for expanded apron to meet current and future needs.
RIM Y2-P02	A-48	**Close Taxiway F.** Paint over existing Taxiway F pavement between Runway 12R/30L and 12L/30R. Project includes modification of guidance sign panels, removal of excess guidance signs, and removal of excess taxiway edge lights.	Addresses RIM criteria issue associated with High Energy Runway Crossings.
RIM Y2-P03	A-48	**Close Taxiway H.** Paint over existing Taxiway H pavement between Runway 12R/30L and 12L/30R. Project includes modification of guidance sign panels, removal of excess guidance signs, and removal of excess taxiway edge lights.	Addresses RIM criteria issue associated with High Energy Runway Crossings.
RIM Y2-P04	A-40	**Taxiways W2 and W3 Improvements.** Delineate two defined ingress and egress points to GA tiedown/T-hangars from TWY W with painted islands, markings. Designate the access points as TWY W2 and W3.	This address expansive pavement RIM concern, but will be dependent upon support facility development.

Project Phasing Plan
Year 2



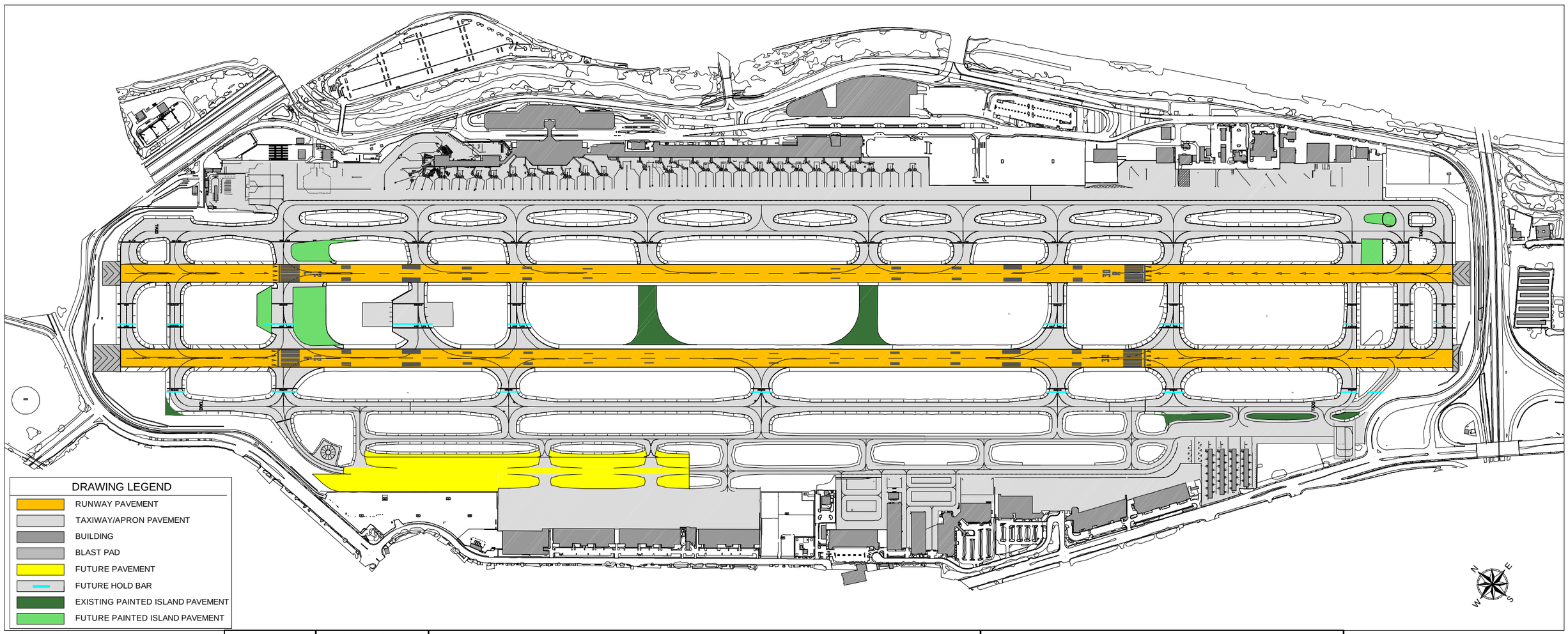
SJC Project No.	Master Plan Amendment reference No.	Project Description	Purpose
RIM-Y3-P01	A-26, A-27, A-38	**New Taxiway V - Phase 2.** Construct Phase 2 of new TWY V and associated connector taxiways (V4 and V3). Construction of connector taxiways along the west side of new Taxiway V will extend to the future location of the ramp edge taxilane.	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and providesroom for expanded apron to meet current and future needs.
RIM-Y3-P02	A-17	**Design: Taxiway W Southern Extension.** Design the ADG III section of Taxiway W extension to vicinity of 30L/TWY B intersection. Designate as TWY W1.	Addresses dual use of pavement and potential incursion issues and aircraft interactions on Ruwnay 30L.



SJC Project No.	Master Plan Amendment reference No.	Project Description	Purpose
RIM-Y4-P01	A-17	**Taxiway W Southern Extension.** Extend Taxiway W to connect to Runway 12R/30L in vicinity of TWY B, Designate as Taxiway W1.	Addresses dual use of pavement and potential incursion issues and aircraft interactions on Runway 30L.
RIM-Y4-P02	A-42	**Design: Runway 12R/30L Hold Bar Relocations.** Design relocation of hold bars (markings, signs and lighting) on both sides of Runway 12R/30L.	Precursor to addressing an ADG-V nonstandard design issue.
RIM-Y4-P03	A-26, A-27, A-38	**New Taxiway V - Phase 3.** Construct Phase Three of new TWY V that includes connector taxiway V1 between the GA apron and TWY W (north of Taxiway C extended centerline), and a new TWY connector V2 between the GA apron and TWY V.	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and providesroom for expanded apron to meet current and future needs.
RIM-Y4-P04	A-37	**Design: ADG-III Taxilane West of (and parallel to) Taxiway V.** Design the parallel ADG-III taxilane to the alignment of new Taxiway V at a location along the eastern edge of the proposed GA apron expansion. The design includes seven connectors that will extend from the west side of new taxilane to the eastern edge of the proposed GA ramp expansion that will provide specific points of ingress and egress from the apron to the taxilane.	Brings the west GA area into conformity with ADG-III standards and significantly improves lateral movements both in the movement and non-moement areas. The taxilane is supported by ATCT as a key improvement that aids in reducing controller workload and improves operational safety.
RIM-Y4-P05	G-9	**Design: General Aviation Apron Expansion.** Design GA apron expansion out to west edge of new parallel taxilane OFA.	Component for addressing west side ADG III conformity.

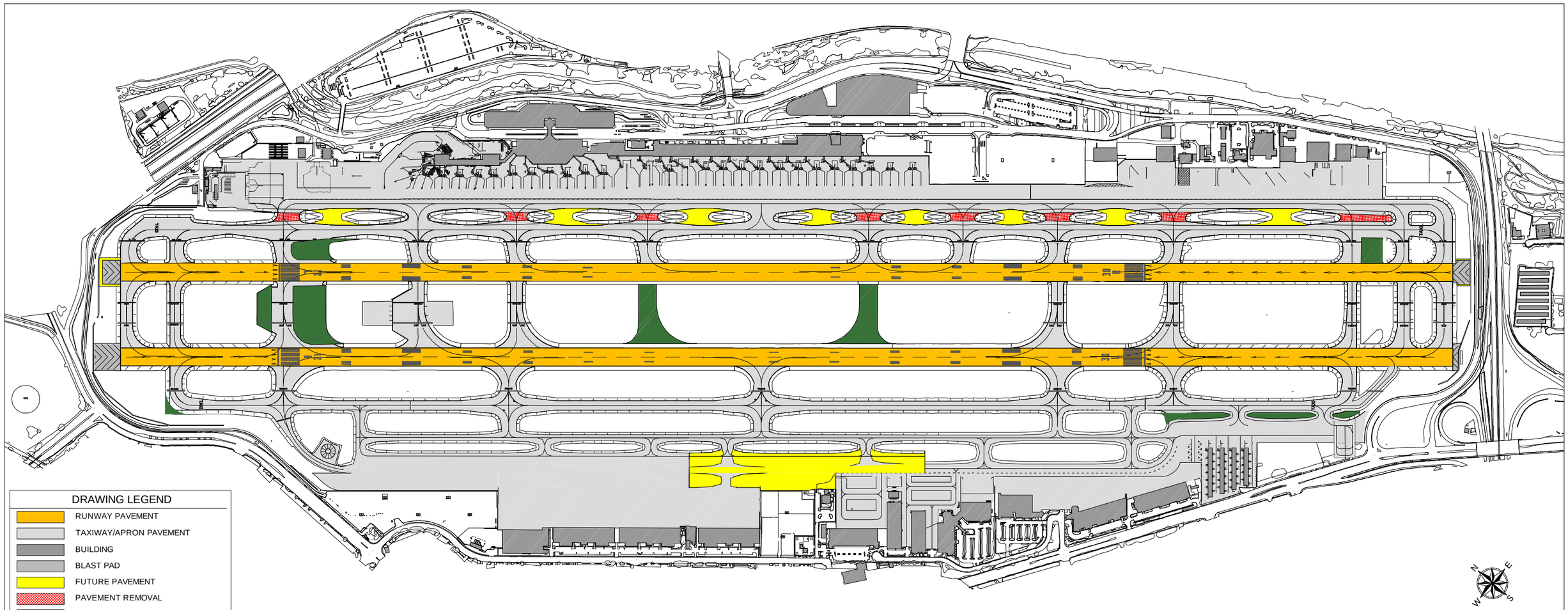
Project Phasing Plan
Year 4

San Jose International
Runway Incursion Mitigation/Design Standards Analysis



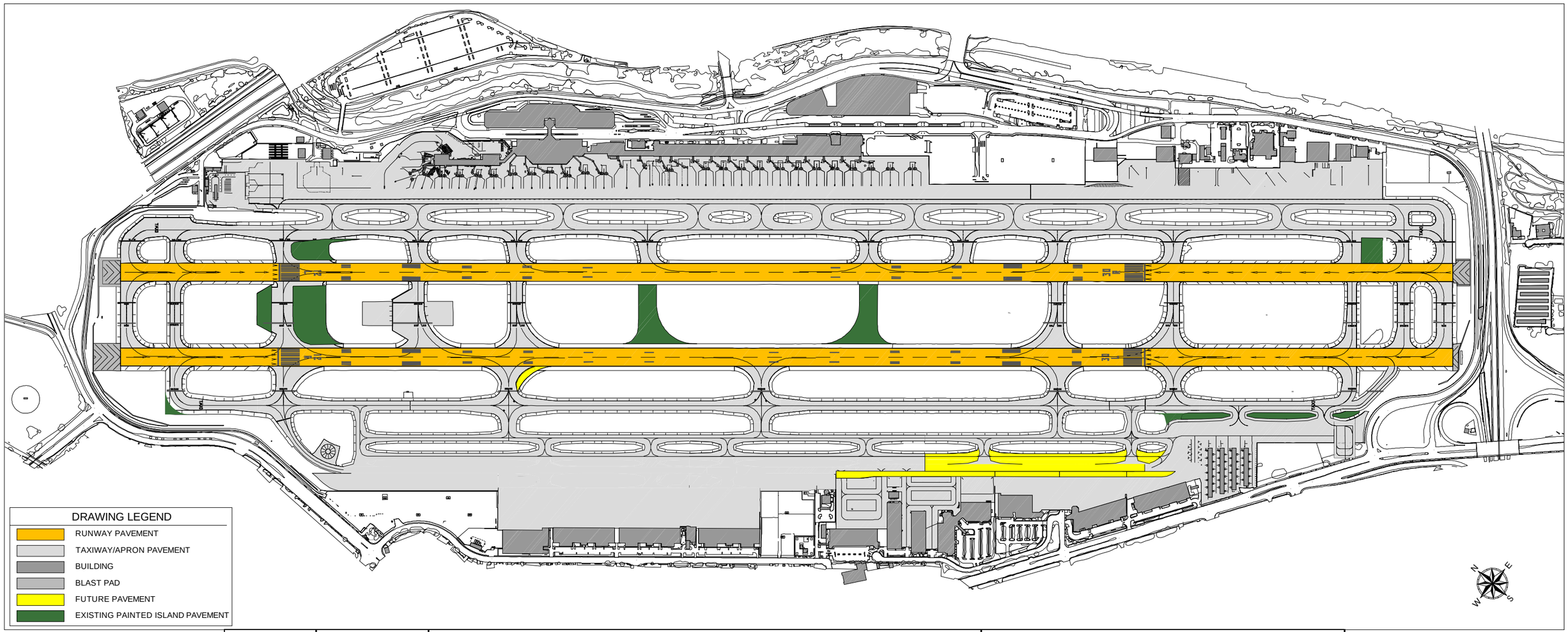
SJC Project No.	Master Plan Amendment reference No.	Project Description	Purpose
RIM-Y5-P01	A-42	**Runway 12R/30L Hold Bar Relocations.** Relocate hold bars (guard lighting, signs and markings) on Runway 12R/30L to conform to ADG V Cat II standard separation of 280'.	Addresses a non-standard ADG-V issue.
RIM-Y5-P02	A-47	**Taxiway L - Excess Pavement Painting (Green).** Paint out excess Taxiway L pavement between Runway 30L and TWY Y.	Mitigation of expanse of pavement issue.
RIM-Y5-P03	A-46	**Taxiway B - Excess Pavement Painting (Green).** Paint out excess Taxiway B pavement between Runway 12L/30R and TWY Z.	Mitigation of expanse of pavement issue.
RIM-Y5-P04	A-37	**New ADG-III Taxilane - Phase 1.** Close existing TWY V and construct Phase 1 of parallel ADG-III taxilane.	Brings the GA west area into conformity with ADG-III standards and significantly improves lateral movements in both the movement and non-moement areas. The taxilane is supported by ATCT as a key improvement that aids in reducing controller workload and improves operational safety.
RIM-Y5-P05	G-9	**General Aviation Apron Expansion - Phase 1.** Construct Phase 1 of GA apron expansion out to west edge of new parallel taxilane OFA.	Addresses ADG-III conformity issue along west side of the airfield.

Project Phasing Plan
Year 5



SJC Project No.	Master Plan Amendment reference No.	Project Description	Purpose
RIM-Y6-10-P01	A-44	**Taxiway Designation Study.** Initiate study of connector Taxiway naming for east side airfield taxiway connector relocations at SJC.	Improvement to situational awareness and conformity with signage guidance.
RIM-Y6-10-P02	A-44	**Design: Taxiways B, D, H, and L Between Taxiways Y & Z.** Design offset connectors between Taxiway Y and Z for Taxiways B, D, H, and L.	Mitigates direct apron access to runway issue. (Taxiways L and B wide expanse of pavement issue addressed in RIM-Y5-P02 & RIM-Y5-P03, respectively.)
RIM-Y6-10-P03	A-44	**Taxiways B, D, H, and L Between Taxiways Y & Z.** Construct offset connectors between Taxiway Y and Z for Taxiways B, D, H, and L.	Mitigates direct apron access to runway issue. (Taxiways L and B wide expanse of pavement issue addressed in RIM-Y5-P02 & RIM-Y5-P03, respectively.)
RIM-Y6-10-P04	A-45	**Taxiways B, D, H, and L Pavement Removal Between Taxiways Y & Z.** Remove pavement associated with former Taxiway connectors at Taxiways B, D, H, and L between Taxiway Z and Taxiway Y.	Mitigates direct apron access to runway issue. (Taxiways L and B wide expanse of pavement issue addressed in RIM-Y5-P02 & RIM-Y5-P03, respectively.)
RIM-Y6-10-P05	A-43	**Blast Pad Improvements.** Widen blast pads on RWY 12R/30L and lengthen 12R blast pad to abut runway side of blast fence.	Addresses a non-standard ADG V blast pad issue.
RIM-Y6-10-P06	A-37	**New ADG-III Taxilane - Phase 2.** Construct Phase 2 of parallel ADG-III taxilane.	The taxilane is supported by ATCT as a key improvement that aids in reducing controller workload and improves operational safety.
RIM-Y6-10-P07	G-9	**General Aviation Apron Expansion - Phase 2.** Construct Phase Two of the west side apron expansion.	Further addresses ADG III conformity and enhances traffic movements.
RIM-Y6-10-P08	A-44	**Design: Taxiways C, E, F, and J Between Taxiways Y & Z.** Design offset connector taxiways between Taxiway Y and Z for Taxiways C, E, F, and J.	Mitigates direct apron access to runway issue.
RIM-Y6-10-P09	A-44	**Taxiways C, E, F, and J Between Taxiways Y & Z.** Construct offset connectors between Taxiway Y and Z for Taxiways C, E, F, and J.	Mitigates direct apron access to runway issue.
RIM-Y6-10-P010	A-45	Taxiways C, E, F, and J Pavement Removal Between Taxiways Y & Z. Remove pavement associated with formerTaxiway connectors at Taxiways C, E, F, and J.	Mitigates direct apron access to runway issue.

Project Phasing Plan
Years 6-10



SJC Project No.	Master Plan Amendment reference No.	Project Description	Purpose
RIM-Y11-15-P01	A-37	**New ADG-III Taxilane - Phase 3.** Construct Phase Three of parallel ADG-III taxilane.	The taxilane is supported by ATCT as a key improvement that aids in reducing controller workload and improves operational safety.
RIM-Y11-15-P02	G-9	**General Aviation Apron Expansion - Phase 3.** Construct Phase Three of west side apron expansion.	Final phase of meeting ADG-III conformity on west side FBO and corporate tenant development area.
RIM-Y11-15-P03	A-23	**Taxiway J Fillet Widening Between Runway 30L and Taxiway W.** Expand the Taxiway J fillet for arrivals on Runway 30L exits to TWY W.	Fillet widening will facilitate movment for aircraft landing on Runway 30L, exiting at Taxiway J.

DRAWING LEGEND

- RUNWAY PAVEMENT
- TAXIWAY/APRON PAVEMENT
- BUILDING
- BLAST PAD
- PAINTED ISLAND PAVEMENT

Project Phasing Plan
Final Airfield Layout

San Jose International
Runway Incursion Mitigation/Design Standards Analysis

C. PRELIMINARY PROJECT PHASING AND COST DETAILS

Project No.	RIM-Y1-P01 (Administrative)	Master Plan Reference No.	A-26
Project Title / Description	Administrative Actions: 1) Formally close Runway 11/29; 2) Update MOS for Runway 12L/30R & TWY Y separation; 3) Update MOS for Runway 12R/30L ROFA width.		
Purpose	1) Mitigates Hotspot 1 and 2/ addresses direct access from apron to 11/29; 2) Addresses and existing non-standard airfield design issue; and 3) Addresses non-standard airfield design issues noted on Updated ALP.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700	$ -
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ -**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ -
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ -
	Contingency (approximate % of Construction)		25	%		$ -
TOTAL SOFT COST ESTIMATE (DESIGN ONLY)						**$ -**
TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)						**$ -**

Project No.	RIM-Y1-P02	Master Plan Reference No.	A-49
Project Title / Description	"TAXI" Painting on Taxiways Y & W. Paint TAXI on both ends of Taxiway Y and Taxiway W and round the northwest corner of Taxiway W at Taxiway M by painting over pavement to aid in differentiatinig TWY W from Runway 12R.		
Purpose	Mitigation of wrong runway events/addresses major FAA concern regarding closely spaced parallel runways / taxiways.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700	$ -
P-620	Surface Paint	n/a	7,880	SF	$ 3.10	$ 24,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 24,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 2,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 3,000
	Contingency (approximate % of Construction)		25	%		$ 6,000
TOTAL SOFT COST ESTIMATE						**$ 11,000**
TOTAL PROJECT COST ESTIMATE						**$ 35,000**

Project No.	RIM-Y1-P03	Master Plan Reference No.	A-41
Project Title / Description	Relocate GA Runup Pad: 1) Construct new GA runup pad in southwest quadrant of the airport; 2) Remove run-up area pavement at Taxiway W and D.		
Purpose	Mitigates Hotspot 1 and 2.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	38,292	SF	$ 5.00	$ 191,000
P-152	Unclassified Excavation (SF-in)	22	21,122	SF	$ 5.10	$ 108,000
P-155	Lime-Treated Subgrade (SF-in)	12	21,122	SF	$ 2.00	$ 42,000
P-202	Aggregate Base Course (SF-in)	6	21,122	SF	$ 4.20	$ 89,000
P-403	Prime Coat	n/a	21,122	SF	$ 1.40	$ 30,000
P-306	Econocrete (SF-in)	6	21,122	SF	$ 6.70	$ 142,000
P-403	Asphalt Bond Breaker	n/a	21,122	SF	$ 1.40	$ 30,000
P-501	PCC Pavement (SF-in)	16	21,122	SF	$ 18.20	$ 384,000
P-604	PCC Joint Seal (SF)	n/a	21,122	SF	$ 2.50	$ 53,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700	$ -
P-620	Paint	n/a	1,348	SF	$ 3.10	$ 4,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 1,073,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 86,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 129,000
	Contingency (approximate % of Construction)		25	%		$ 268,000
TOTAL SOFT COST ESTIMATE						**$ 483,000**
TOTAL PROJECT COST ESTIMATE						**$ 1,556,000**

Preliminary Project Phasing and Cost Details (Opinion of Probable Construction Costs)

Project No.	RIM-Y1-P04 (Design Only)	**Master Plan Reference No.**	A-26, A-27, A-38
Project Title / Description	Design: New Taxiway V. Design new ADG-III TWY V (6,787' in length) including new cross TWY V1 between the GA apron & TWY W near south end, new cross TWY V7 between GA apron & TWY W at north end, and 5 additional connectors (TWY V2-V6) between new TWY V & future apron-edge taxilane.		
Purpose	Initiates mitigation of deficient TOFA issue on the west airfield. Facilitates the ability to accommodate ADG-III aircraft demand on west side GA areas. Addresses direct access from apron to runway.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	252,759	SF	$ 3.50	$ 885,000
P-152	Unclassified Excavation (SF-in)	28	-	SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18	-	SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12	-	SF	$ 8.40	$ -
P-403	Prime Coat	n/a	-	SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6	-	SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4	-	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	354,013	SF	$ 2.30	$ 814,000
P-202	Aggregate Base Course (SF-in)	10	354,013	SF	$ 7.00	$ 2,478,000
P-403	Prime Coat	n/a	354,013	SF	$ 1.40	$ 496,000
P-404	Asphalt Surface Course (SF-in)	4	354,013	SF	$ 11.00	$ 3,894,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	48,500	SF	$ 3.10	$ 150,000
L-108	Electrical Conduit and Cabling	n/a	19,400	LF	$ 3.50	$ 68,000
L-125	Edge Light Fixtures	n/a	132	EA	$ 3,200	$ 422,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	521,635	SF	$ 5.00	$ 2,608,000
P-152	Unclassified Excavation (SF-in)	22	602,374	SF	$ 5.10	$ 3,072,000
P-155	Lime-Treated Subgrade (SF-in)	12	602,374	SF	$ 2.00	$ 1,205,000
P-202	Aggregate Base Course (SF-in)	6	602,374	SF	$ 4.20	$ 2,530,000
P-403	Prime Coat	n/a	602,374	SF	$ 1.40	$ 843,000
P-306	Econocrete (SF-in)	6	602,374	SF	$ 6.70	$ 4,036,000
P-403	Asphalt Bond Breaker	n/a	602,374	SF	$ 1.40	$ 843,000
P-501	PCC Pavement (SF-in)	16	602,374	SF	$ 18.20	$ 10,963,000
P-604	PCC Joint Seal (SF)	n/a	602,374	SF	$ 2.50	$ 1,506,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	19,400	SF	$ 4.00	$ 78,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	68	EA	$ 11,700.00	$ 796,000
D-701	Storm Drain Pipe	n/a	9,300	LF	$ 229.00	$ 2,130,000
D-751	Drainage Structures	n/a	17	EA	$ 21,200.00	$ 360,000
TOTAL CONSTRUCTION COST ESTIMATE **(FOR USE ESTIMATING DESIGN COST ONLY)**						$ 40,177,000
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 3,214,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 4,821,000
	Contingency (approximate % of Construction)		25	%		$ 10,044,000
TOTAL SOFT COST ESTIMATE (DESIGN ONLY)						**$ 3,214,000**
TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)						**$ 3,214,000**

Project No.	RIM-Y2-P01	**Master Plan Reference No.**	A-26, A-27, A-38
Project Title / Description	New Taxiway V - Phase 1. Construct Phase 1 of new TWY V and associated connector taxiways (V7, V6, and V5). Construction of connector taxiways along the west side of new Taxiway V will extend to the future location of the ramp edge taxilane.		
Purpose	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and provides room for expanded apron.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	127,464	SF	$ 3.50	$ 446,000
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	209,081	SF	$ 2.30	$ 481,000
P-202	Aggregate Base Course (SF-in)	10	209,081	SF	$ 7.00	$ 1,464,000
P-403	Prime Coat	n/a	209,081	SF	$ 1.40	$ 293,000
P-404	Asphalt Surface Course (SF-in)	4	209,081	SF	$ 11.00	$ 2,300,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	20,500	SF	$ 3.10	$ 64,000
L-108	Electrical Conduit and Cabling	n/a	8,200	LF	$ 3.50	$ 29,000
L-125	Edge Light Fixtures	n/a	56	EA	$ 3,200	$ 179,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	127,464	SF	$ 5.00	$ 637,000
P-152	Unclassified Excavation (SF-in)	22	245,395	SF	$ 5.10	$ 1,252,000
P-155	Lime-Treated Subgrade (SF-in)	12	245,395	SF	$ 2.00	$ 491,000
P-202	Aggregate Base Course (SF-in)	6	245,395	SF	$ 4.20	$ 1,031,000
P-403	Prime Coat	n/a	245,395	SF	$ 1.40	$ 344,000
P-306	Econocrete (SF-in)	6	245,395	SF	$ 6.70	$ 1,644,000
P-403	Asphalt Bond Breaker	n/a	245,395	SF	$ 1.40	$ 344,000
P-501	PCC Pavement (SF-in)	16	245,395	SF	$ 18.20	$ 4,466,000
P-604	PCC Joint Seal (SF)	n/a	245,395	SF	$ 2.50	$ 613,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	8,200	SF	$ 4.00	$ 33,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	28	EA	$ 11,700	$ 328,000
D-701	Storm Drain Pipe	n/a	4,000	LF	$ 229	$ 916,000
D-751	Drainage Structures	n/a	6	EA	$ 21,200	$ 127,000
TOTAL CONSTRUCTION COST ESTIMATE						**$ 17,482,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y1-P04		incl. in RIM-Y1-P04	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 2,098,000
	Contingency (approximate % of Construction)		25	%		$ 4,371,000
TOTAL SOFT COST ESTIMATE						**$ 6,469,000**
TOTAL PROJECT COST ESTIMATE						**$ 23,951,000**

Project No.	RIM-Y2-P02	**Master Plan Reference No.**	A-48
Project Title / Description	Close Taxiway F. Paint over existing Taxiway F pavement between Runway 12R/30L and 12L/30R. Project includes modification of guidance sign panels, removal of excess guidance signs, and removal of excess taxiway edge lights.		
Purpose	Addresses RIM criteria issue associated with high energy runway crossings.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs and TWY Lights - Modifications and Removals	n/a	1	ALLOW	$ 25,000	$ 25,000
P-620	Surface Paint	n/a	99,446	SF	$ 3.10	$ 308,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 333,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 27,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 40,000
	Contingency (approximate % of Construction)		25	%		$ 83,000
TOTAL SOFT COST ESTIMATE						**$ 150,000**
TOTAL PROJECT COST ESTIMATE						**$ 483,000**

Project No.	RIM-Y2-P03	Master Plan Reference No.	A-48
Project Title / Description	Close Taxiway H. Paint over existing Taxiway H pavement between Runway 12R/30L and 12L/30R. Project includes modification of guidance sign panels, removal of excess guidance signs, and removal of excess taxiway edge lights.		
Purpose	Addresses RIM criteria issue associated with high energy runway crossings.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs and TWY Lights - Modifications and Removals	n/a	1	ALLOW	$ 25,000	$ 25,000
P-620	Surface Paint	n/a	99,637	SF	$ 3.10	$ 309,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 334,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 27,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 40,000
	Contingency (approximate % of Construction)		25	%		$ 84,000
TOTAL SOFT COST ESTIMATE						**$ 151,000**
TOTAL PROJECT COST ESTIMATE						**$ 485,000**

Project No.	RIM-Y2-P04	**Master Plan Reference No.**	A-40
Project Title / Description	Taxiways W2 and W3 Improvements. Delineate two defined ingress and egress points to GA tiedown/T-hangars from TWY W with painted islands, markings. Designate the access points as TWY W2 and W3.		
Purpose	Address RIM criteria issue associated with expansive pavement.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	800	SF	$ 3.10	$ 2,000.00
L-108	Electrical Conduit and Cabling	n/a	800	LF	$ 3.50	$ 3,000.00
L-125	Edge Light Fixtures	n/a	16	EA	$ 3,200	$ 51,000.00
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	4	EA	$ 11,700	$ 47,000
P-620	Surface Paint	n/a	27,454	SF	$ 3.10	$ 85,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 188,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 15,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 23,000
	Contingency (approximate % of Construction)		25	%		$ 47,000
TOTAL SOFT COST ESTIMATE						**$ 85,000**
TOTAL PROJECT COST ESTIMATE						**$ 273,000**

Project No.	RIM-Y3-P01	**Master Plan Reference No.**	A-26, A-27, A-38
Project Title / Description	New Taxiway V - Phase 2. Construct Phase 2 of new TWY V and associated connector taxiways (V4 and V3). Construction of connector taxiways along the west side of new Taxiway V will extend to the future location of the ramp edge taxilane.		
Purpose	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and provides room for expanded apron.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	128,134	SF	$ 2.30	$ 295,000
P-202	Aggregate Base Course (SF-in)	10	128,134	SF	$ 7.00	$ 897,000
P-403	Prime Coat	n/a	128,134	SF	$ 1.40	$ 179,000
P-404	Asphalt Surface Course (SF-in)	4	128,134	SF	$ 11.00	$ 1,409,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	13,500	SF	$ 3.10	$ 42,000
L-108	Electrical Conduit and Cabling	n/a	5,400	LF	$ 3.50	$ 19,000
L-125	Edge Light Fixtures	n/a	36	EA	$ 3,200	$ 115,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	352,406	SF	$ 5.00	$ 1,762,000
P-152	Unclassified Excavation (SF-in)	22	164,672	SF	$ 5.10	$ 840,000
P-155	Lime-Treated Subgrade (SF-in)	12	164,672	SF	$ 2.00	$ 329,000
P-202	Aggregate Base Course (SF-in)	6	164,672	SF	$ 4.20	$ 692,000
P-403	Prime Coat	n/a	164,672	SF	$ 1.40	$ 231,000
P-306	Econocrete (SF-in)	6	164,672	SF	$ 6.70	$ 1,103,000
P-403	Asphalt Bond Breaker	n/a	164,672	SF	$ 1.40	$ 231,000
P-501	PCC Pavement (SF-in)	16	164,672	SF	$ 18.20	$ 2,997,000
P-604	PCC Joint Seal (SF)	n/a	164,672	SF	$ 2.50	$ 412,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	5,400	SF	$ 4.00	$ 22,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	20	EA	$ 11,700	$ 234,000
D-701	Storm Drain Pipe	n/a	2,900	LF	$ 229	$ 664,000
D-751	Drainage Structures	n/a	6	EA	$ 21,200	$ 127,000
TOTAL CONSTRUCTION COST ESTIMATE						**$ 12,600,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y1-P04		incl. in RIM-Y1-P04	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 1,512,000
	Contingency (approximate % of Construction)		25	%		$ 3,150,000
TOTAL SOFT COST ESTIMATE						**$ 4,662,000**
TOTAL PROJECT COST ESTIMATE						**$ 17,262,000**

Project No.	RIM-Y3-P02 (Design Only)	**Master Plan Reference No.**	A-17
Project Title / Description	Design: Taxiway W Southern Extension. Design the ADG III section of Taxiway W extension to vicinity of 30L/TWY B intersection. Designate as TWY W1.		
Purpose	Addresses dual use of pavement and potential incursion issues and aircraft interactions on Ruwnay 30L.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction [NOT USED]						
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4	-	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	19,970	SF	$ 2.30	$ 46,000
P-202	Aggregate Base Course (SF-in)	10	19,970	SF	$ 7.00	$ 140,000
P-403	Prime Coat	n/a	19,970	SF	$ 1.40	$ 28,000
P-404	Asphalt Surface Course (SF-in)	4	19,970	SF	$ 11.00	$ 220,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	1,055	SF	$ 3.10	$ 3,000
L-108	Electrical Conduit and Cabling	n/a	1,270	LF	$ 3.50	$ 4,000
L-125	Edge Light Fixtures	n/a	21	EA	$ 3,200	$ 67,000
Asphalt Concrete Road						
	AC Pavement Removal (SF-in)	4	-	SF	$ 3.50	$ -
	Unclassified Excavation (SF-in)	10	13,700	SF	$ 2.30	$ 32,000
	Lime-Treated Subgrade (SF-in)	12	13,700	SF	$ 3.00	$ 41,000
	Aggregate Base Course (SF-in)	10	13,700	SF	$ 7.00	$ 96,000
	Prime Coat	n/a	13,700	SF	$ 1.40	$ 19,000
	Asphalt Surface Course (SF-in)	4	13,700	SF	$ 6.80	$ 93,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	-	SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22	32,626	SF	$ 5.10	$ 166,000
P-155	Lime-Treated Subgrade (SF-in)	12	32,626	SF	$ 2.00	$ 65,000
P-202	Aggregate Base Course (SF-in)	6	32,626	SF	$ 4.20	$ 137,000
P-403	Prime Coat	n/a	32,626	SF	$ 1.40	$ 46,000
P-306	Econocrete (SF-in)	6	32,626	SF	$ 6.70	$ 219,000
P-403	Asphalt Bond Breaker	n/a	32,626	SF	$ 1.40	$ 46,000
P-501	PCC Pavement (SF-in)	16	32,626	SF	$ 18.20	$ 594,000
P-604	PCC Joint Seal (SF)	n/a	32,626	SF	$ 2.50	$ 82,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	-	EA	$ 11,700	$ -
L-125	RGL	n/a	2	EA	$ 4,600.00	$ 9,000
D-701	Storm Drain Pipe	n/a	-	LF	$ 229	$ -
D-751	Drainage Structures	n/a	-	EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE **(FOR USE ESTIMATING DESIGN COST ONLY)**						$ 2,153,000
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 172,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 258,000
	Contingency (approximate % of Construction)		25	%		$ 538,000
TOTAL SOFT COST ESTIMATE (DESIGN ONLY)						**$ 172,000**
TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)						**$ 172,000**

Project No.	RIM-Y4-P01	Master Plan Reference No.	A-17
Project Title / Description	Taxiway W Southern Extension. Extend Taxiway W to connect to Runway 12R/30L in vicinity of TWY B, Designate as Taxiway W1.		
Purpose	Addresses dual use of pavement and potential incursion issues and aircraft interactions on Runway 30L.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction [NOT USED]						
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	19,970	SF	$ 2.30	$ 46,000
P-202	Aggregate Base Course (SF-in)	10	19,970	SF	$ 7.00	$ 140,000
P-403	Prime Coat	n/a	19,970	SF	$ 1.40	$ 28,000
P-404	Asphalt Surface Course (SF-in)	4	19,970	SF	$ 11.00	$ 220,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	1055	SF	$ 3.10	$ 3,000
L-108	Electrical Conduit and Cabling	n/a	1270	LF	$ 3.50	$ 4,000
L-125	Edge Light Fixtures	n/a	21	EA	$ 3,200	$ 67,000
Asphalt Concrete Road						
	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
	Unclassified Excavation (SF-in)	10	13,700	SF	$ 2.30	$ 32,000
	Lime-Treated Subgrade (SF-in)	12	13,700	SF	$ 3.00	$ 41,000
	Aggregate Base Course (SF-in)	10	13,700	SF	$ 7.00	$ 96,000
	Prime Coat	n/a	13,700	SF	$ 1.40	$ 19,000
	Asphalt Surface Course (SF-in)	4	13,700	SF	$ 6.80	$ 93,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22	32,626	SF	$ 5.10	$ 166,000
P-155	Lime-Treated Subgrade (SF-in)	12	32,626	SF	$ 2.00	$ 65,000
P-202	Aggregate Base Course (SF-in)	6	32,626	SF	$ 4.20	$ 137,000
P-403	Prime Coat	n/a	32,626	SF	$ 1.40	$ 46,000
P-306	Econocrete (SF-in)	6	32,626	SF	$ 6.70	$ 219,000
P-403	Asphalt Bond Breaker	n/a	32,626	SF	$ 1.40	$ 46,000
P-501	PCC Pavement (SF-in)	16	32,626	SF	$ 18.20	$ 594,000
P-604	PCC Joint Seal (SF)	n/a	32,626	SF	$ 2.50	$ 82,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700	$ -
L-125	RGL	n/a	2	EA	$ 4,600.00	$ 9,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 2,153,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y3-P02		incl. in RIM-Y3-P02	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 259,000
	Contingency (approximate % of Construction)		25	%		$ 539,000
TOTAL SOFT COST ESTIMATE						**$ 798,000**
TOTAL PROJECT COST ESTIMATE						**$ 2,951,000**

Project No.	RIM-Y4-P02(Design Only)	**Master Plan Reference No.**	A-42
Project Title / Description	Design: Runway 12R/30L Hold Bar Relocations. Design relocation of hold bars (markings, signs and lighting) on both sides of Runway 12R/30L.		
Purpose	Precursor to addressing an ADG-V nonstandard design issue.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	0	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28	0	SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18	0	SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12	0	SF	$ 8.40	$ -
P-403	Prime Coat	n/a	0	SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6	0	SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4	0	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	0	SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10	0	SF	$ 7.00	$ -
P-403	Prime Coat	n/a	0	SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4	0	SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a	0	LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	0	SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22	0	SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12	0	SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6	0	SF	$ 4.20	$ -
P-403	Prime Coat	n/a	0	SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6	0	SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a	0	SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16	0	SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a	0	SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	26	EA	$ 11,700	$ 304,000
P-620	Hold Bar Paint Removal	n/a	29223	SF	$ 13.30	$ 389,000
P-620	Paint Signs Removal	n.a	9804	SF	$ 13.30	$ 130,000
P-620	New Hold Bar Paint	n/a	29223	SF	$ 2.80	$ 82,000
P-620	New Painted Signs	n/a	9804	SF	$ 2.80	$ 27,000
D-701	Storm Drain Pipe	n/a	0	LF	$ 229	$ -
D-751	Drainage Structures	n/a	0	EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE (FOR USE ESTIMATING DESIGN COST ONLY)						**$ 932,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 75,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 112,000
	Contingency (approximate % of Construction)		25	%		$ 233,000
TOTAL SOFT COST ESTIMATE (DESIGN ONLY)						**$ 75,000**
TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)						**$ 75,000**

Preliminary Project Phasing and Cost Details (Opinion of Probable Construction Costs)

Project No.	RIM-Y4-P03	**Master Plan Reference No.**	A-26, A-27, A-38
Project Title / Description	New Taxiway V - Phase 3. Construct Phase Three of new TWY V that includes connector taxiway V1 between the GA apron and TWY W (north of Taxiway C extended centerline), and a new TWY connector V2 between the GA apron and TWY V.		
Purpose	Addresses design standard deficiencies along GA apron and Current Taxiway V, improves airfield flow and ground taxi movements, and provides room for expanded apron.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	125,295	SF	$ 3.50	$ 439,000
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	16,798	SF	$ 2.30	$ 39,000
P-202	Aggregate Base Course (SF-in)	10	16,798	SF	$ 7.00	$ 118,000
P-403	Prime Coat	n/a	16,798	SF	$ 1.40	$ 24,000
P-404	Asphalt Surface Course (SF-in)	4	16,798	SF	$ 11.00	$ 185,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	14,500	SF	$ 3.10	$ 45,000
L-108	Electrical Conduit and Cabling	n/a	5,800	LF	$ 3.50	$ 20,000
L-125	Edge Light Fixtures	n/a	40	EA	$ 3,200	$ 128,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	41,765	SF	$ 5.00	$ 209,000
P-152	Unclassified Excavation (SF-in)	22	192,307	SF	$ 5.10	$ 981,000
P-155	Lime-Treated Subgrade (SF-in)	12	192,307	SF	$ 2.00	$ 385,000
P-202	Aggregate Base Course (SF-in)	6	192,307	SF	$ 4.20	$ 808,000
P-403	Prime Coat	n/a	192,307	SF	$ 1.40	$ 269,000
P-306	Econocrete (SF-in)	6	192,307	SF	$ 6.70	$ 1,288,000
P-403	Asphalt Bond Breaker	n/a	192,307	SF	$ 1.40	$ 269,000
P-501	PCC Pavement (SF-in)	16	192,307	SF	$ 18.20	$ 3,500,000
P-604	PCC Joint Seal (SF)	n/a	192,307	SF	$ 2.50	$ 481,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	5,800	SF	$ 4.00	$ 23,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	20	EA	$ 11,700	$ 234,000
P-620	Surface Point	n/a	9,205	SF	$ 3.10	$ 29,000
D-701	Storm Drain Pipe	n/a	2,400	LF	$ 229	$ 550,000
D-751	Drainage Structures	n/a	5	EA	$ 21,200	$ 106,000
TOTAL CONSTRUCTION COST ESTIMATE						**$ 10,130,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y1-P04		incl. in RIM-Y1-P04	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 1,216,000
	Contingency (approximate % of Construction)		25	%		$ 2,533,000
TOTAL SOFT COST ESTIMATE						**$ 3,749,000**
TOTAL PROJECT COST ESTIMATE						**$ 13,879,000**

Project No.	RIM-Y4-P04(Design Only)	**Master Plan Reference No.**	A-37
Project Title / Description	Design: ADG-III Taxilane West of (and parallel to) Taxiway V. Design the parallel ADG-III taxilane to the alignment of new Taxiway V at a location along the eastern edge of the proposed GA apron expansion. The design includes seven connectors that will extend from the west side of new taxilane to the eastern edge of the proposed GA ramp expansion that will provide specific points of ingress and egress from the apron to the taxilane.		
Purpose	Brings the west GA area into conformity with ADG-III standards and significantly improves lateral movements both in the movement and non movement areas. Reduces controller workload and improves operational safety.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	-	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28	390,203	SF	$ 6.50	$ 2,536,000
P-155	Lime-Treated Subgrade (SF-in)	18	390,203	SF	$ 3.00	$ 1,171,000
P-202	Aggregate Base Course (SF-in)	12	390,203	SF	$ 8.40	$ 3,278,000
P-403	Prime Coat	n/a	390,203	SF	$ 1.40	$ 546,000
P-401	Asphalt Surface Course (SF-in)	6	390,203	SF	$ 10.20	$ 3,980,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	13400	SF	$ 4.00	$ 54,000
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4	-	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	258,741	SF	$ 2.30	$ 595,000
P-202	Aggregate Base Course (SF-in)	10	258,741	SF	$ 7.00	$ 1,811,000
P-403	Prime Coat	n/a	258,741	SF	$ 1.40	$ 362,000
P-404	Asphalt Surface Course (SF-in)	4	258,741	SF	$ 11.00	$ 2,846,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	33,500	SF	$ 3.10	$ 104,000
L-108	Electrical Conduit and Cabling	n/a	12,200	LF	$ 3.50	$ 43,000
L-125	Edge Light Fixtures	n/a	82	EA	$ 3,200	$ 262,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	-	SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22	-	SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12	-	SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6	-	SF	$ 4.20	$ -
P-403	Prime Coat	n/a	-	SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6	-	SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a	-	SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16	-	SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a	-	SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	16	EA	$ 11,700	$ 187,000
D-701	Storm Drain Pipe	n/a	4,812	LF	$ 229	$ 1,102,000
D-751	Drainage Structures	n/a	14	EA	$ 21,200	$ 297,000

TOTAL CONSTRUCTION COST ESTIMATE **(FOR USE ESTIMATING DESIGN COST ONLY)**	$ 19,174,000

Project Soft Costs				
	Design (approximate % of Construction)	8	%	$ 1,534,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)	12	%	$ 2,301,000
	Contingency (approximate % of Construction)	25	%	$ 4,794,000

TOTAL SOFT COST ESTIMATE (DESIGN ONLY)	**$ 1,534,000**

TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)	**$ 1,534,000**

Project No.	RIM-Y4-P05(Design Only)	**Master Plan Reference No.**	G-9
Project Title / Description	Design: General Aviation Apron Expansion. Design GA apron expansion out to west edge of new parallel taxilane OFA.		
Purpose	Component for addressing west side ADG III conformity. Enhances accomodation of current and projected demand.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	362,390	SF	$ 3.50	$ 1,268,000
P-152	Unclassified Excavation (SF-in)	28	1,209,637	SF	$ 6.50	$ 7,863,000
P-155	Lime-Treated Subgrade (SF-in)	18	1,209,637	SF	$ 3.00	$ 3,629,000
P-202	Aggregate Base Course (SF-in)	12	1,209,637	SF	$ 8.40	$ 10,161,000
P-403	Prime Coat	n/a	1,212,637	SF	$ 1.40	$ 1,698,000
P-401	Asphalt Surface Course (SF-in)	6	1,209,637	SF	$ 10.20	$ 12,338,000
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4	-	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	-	SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10	-	SF	$ 7.00	$ -
P-403	Prime Coat	n/a	-	SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4	-	SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	-	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a	1,400	LF	$ 3.50	$ 5,000
L-125	Edge Light Fixtures	n/a	3	EA	$ 3,200	$ 10,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	-	SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22	-	SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12	-	SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6	-	SF	$ 4.20	$ -
P-403	Prime Coat	n/a	-	SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6	-	SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a	-	SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16	-	SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a	-	SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	5	EA	$ 11,700	$ 59,000
P-620	Surface Paint	n/a	1,500	SF	$ 4.00	$ 6,000
D-701	Storm Drain Pipe	n/a	-	LF	$ 229	$ -
D-751	Drainage Structures	n/a	-	EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE **(FOR USE ESTIMATING DESIGN COST ONLY)**						$ 37,037,000
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 2,963,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 4,444,000
	Contingency (approximate % of Construction)		25	%		$ 9,259,000
TOTAL SOFT COST ESTIMATE (DESIGN ONLY)						**$ 2,963,000**
TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)						**$ 2,963,000**

Project No.	RIM-Y5-P01	**Master Plan Reference No.**	A-42
Project Title / Description	Runway 12R/30L Hold Bar Relocations. Relocate hold bars (guard lighting, signs and markings) on Runway 12R/30L to conform to ADG V Cat II standard separation of 280'.		
Purpose	Addresses a non-standard ADG-V issue.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	26	EA	$ 11,700	$ 304,000
P-620	Hold Bar Paint Removal	n/a	29,223	SF	$ 13.30	$ 389,000
P-620	Paint Signs Removal	n.a	9,804	SF	$ 13.30	$ 130,000
P-620	New Hold Bar Paint	n/a	29,223	SF	$ 4.00	$ 117,000
P-620	New Painted Signs	n/a	9,804	SF	$ 4.00	$ 39,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 979,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y4-P02		incl. in RIM-Y4-P02	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 117,000
	Contingency (approximate % of Construction)		25	%		$ 245,000
TOTAL SOFT COST ESTIMATE						**$ 362,000**
TOTAL PROJECT COST ESTIMATE						**$ 1,341,000**

Project No.	RIM-Y5-P02	Master Plan Reference No.	A-47
Project Title / Description	Taxiway L - Excess Pavement Painting (Green). Paint out excess Taxiway L pavement between Runway 30L and TWY Y.		
Purpose	Mitigation of expanse of pavement issue.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	1328	SF	$ 3.10	$ 4,000
L-108	Electrical Conduit and Cabling	n/a	1,328	LF	$ 3.50	$ 5,000
L-125	Edge Light Fixtures	n/a	9	EA	$ 3,200	$ 29,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	8	EA	$ 11,700	$ 94,000
L-125	Stake-Mounted Lights	n/a		EA	$ 3,200	$ -
P-620	Surface Paint	n/a	185,648	SF	$ 3.10	$ 576,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 708,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 57,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 85,000
	Contingency (approximate % of Construction)		25	%		$ 177,000
TOTAL SOFT COST ESTIMATE						**$ 319,000**
TOTAL PROJECT COST ESTIMATE						**$ 1,027,000**

Project No.	RIM-Y5-P03	**Master Plan Reference No.**	A-46
Project Title / Description	Taxiway B - Excess Pavement Painting (Green). Paint out excess Taxiway B pavement between Runway 12L/30R and TWY Z.		
Purpose	Mitigation of expanse of pavement issue.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	1236	SF	$ 3.10	$ 4,000
L-108	Electrical Conduit and Cabling	n/a	1,236	LF	$ 3.50	$ 4,000
L-125	Edge Light Fixtures	n/a		EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	4	EA	$ 11,700	$ 47,000
L-125	Stake-Mounted Lights	n/a	22	EA	$ 3,200	$ 70,000
L-858	Panel	n/a	2	EA	$ 3,700	$ 7,000
P-620	Surface Paint	n/a	76,821	SF	$ 3.10	$ 238,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 370,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 30,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 44,000
	Contingency (approximate % of Construction)		25	%		$ 93,000
TOTAL SOFT COST ESTIMATE						**$ 167,000**
TOTAL PROJECT COST ESTIMATE						**$ 537,000**

Project No.	RIM-Y5-P04	Master Plan Reference No.	A-37
Project Title / Description	New ADG-III Taxilane - Phase 1. Close existing TWY V and construct Phase 1 of parallel ADG-III taxilane.		
Purpose	Brings the GA west area into conformity with ADG-III standards and significantly improves lateral movements in both the movement and non movement areas. Reduces controller workload and improves operational safety.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28	169,933	SF	$ 6.50	$ 1,105,000
P-155	Lime-Treated Subgrade (SF-in)	18	169,933	SF	$ 3.00	$ 510,000
P-202	Aggregate Base Course (SF-in)	12	169,933	SF	$ 8.40	$ 1,427,000
P-403	Prime Coat	n/a	169,933	SF	$ 1.40	$ 238,000
P-401	Asphalt Surface Course (SF-in)	6	169,933	SF	$ 10.20	$ 1,733,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	5,400	SF	$ 4.00	$ 22,000
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	115,913	SF	$ 2.30	$ 267,000
P-202	Aggregate Base Course (SF-in)	10	115,913	SF	$ 7.00	$ 811,000
P-403	Prime Coat	n/a	115,913	SF	$ 1.40	$ 162,000
P-404	Asphalt Surface Course (SF-in)	4	115,913	SF	$ 11.00	$ 1,275,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	13,500	SF	$ 3.10	$ 42,000
L-108	Electrical Conduit and Cabling	n/a	5,000	LF	$ 3.50	$ 18,000
L-125	Edge Light Fixtures	n/a	34	EA	$ 3,200	$ 109,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	12	EA	$ 11,700	$ 140,000
D-701	Storm Drain Pipe	n/a	3,900	LF	$ 229	$ 893,000
D-751	Drainage Structures	n/a	6	EA	$ 21,200	$ 127,000
TOTAL CONSTRUCTION COST ESTIMATE						**$ 8,879,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y4-P04		incl. in RIM-Y4-P04	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 1,065,000
	Contingency (approximate % of Construction)		25	%		$ 2,220,000
TOTAL SOFT COST ESTIMATE						**$ 3,285,000**
TOTAL PROJECT COST ESTIMATE						**$ 12,164,000**

Preliminary Project Phasing and Cost Details (Opinion of Probable Construction Costs)

Project No.	RIM-Y5-P05	**Master Plan Reference No.**	G-9
Project Title / Description	General Aviation Apron Expansion - Phase 1. Construct Phase 1 of GA apron expansion out to west edge of new parallel taxilane OFA.		
Purpose	Component for addressing west side ADG-III conformity. Enhances accomodation of current and projected demand.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	144,775	SF	$ 3.50	$ 507,000
P-152	Unclassified Excavation (SF-in)	28	601,845	SF	$ 6.50	$ 3,912,000
P-155	Lime-Treated Subgrade (SF-in)	18	601,845	SF	$ 3.00	$ 1,806,000
P-202	Aggregate Base Course (SF-in)	12	601,845	SF	$ 8.40	$ 5,055,000
P-403	Prime Coat	n/a	601,845	SF	$ 1.40	$ 843,000
P-401	Asphalt Surface Course (SF-in)	6	601,845	SF	$ 10.20	$ 6,139,000
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a		SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a	1,400	LF	$ 3.50	$ 5,000
L-125	Edge Light Fixtures	n/a	3	EA	$ 3,200	$ 10,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	5	EA	$ 11,700	$ 59,000
P-620	Surface Paint	n/a	1,500	SF	$ 4.00	$ 6,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 18,342,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y4-P05		incl. in RIM-Y4-P05	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 2,201,000
	Contingency (approximate % of Construction)		25	%		$ 4,586,000
TOTAL SOFT COST ESTIMATE						**$ 6,787,000**
TOTAL PROJECT COST ESTIMATE						**$ 25,129,000**

Project No.	RIM-Y6-10-P01(Administrative)	**Master Plan Reference No.**	A-44
Master Plan Ammendment Reference No.	A-44		
Project Title / Description	Taxiway Designation Study. Conduct study of connector taxiway naming for east side airfield realignments.		
Purpose	Improvement to situational awareness and conformity with signage guidance.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200.00	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700.00	$ -
D-701	Storm Drain Pipe	n/a		LF	$ 229.00	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200.00	$ -
TOTAL CONSTRUCTION COST ESTIMATE (FOR REFERENCE)						**$ -**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ -
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ -
	Contingency (approximate % of Construction)		25	%		$ -
TOTAL SOFT COST ESTIMATE (DESIGN ONLY)						**$ -**
TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)						**$ -**

Project No.	RIM-Y6-10-P02(Design Only)	**Master Plan Reference No.**	A-44
Project Title / Description	Design: Realign Taxiways B, D, H, and L Between Taxiways Y & Z. Design offset connectors between Taxiway Y and Z for Taxiways B, D, H, and L.		
Purpose	Mitigates RIM criteria issue of direct apron access to runway.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	0	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28	0	SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18	0	SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12	0	SF	$ 8.40	$ -
P-403	Prime Coat	n/a	0	SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6	0	SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4	0	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	40,487	SF	$ 2.30	$ 93,000
P-202	Aggregate Base Course (SF-in)	10	40,487	SF	$ 7.00	$ 283,000
P-403	Prime Coat	n/a	40,487	SF	$ 1.40	$ 57,000
P-404	Asphalt Surface Course (SF-in)	4	40,487	SF	$ 11.00	$ 445,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	7,192	SF	$ 3.10	$ 22,000
L-108	Electrical Conduit and Cabling	n/a	7,192	LF	$ 3.50	$ 25,000
L-125	Edge Light Fixtures	n/a	48	EA	$ 3,200	$ 153,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	64,388	SF	$ 5.00	$ 322,000
P-152	Unclassified Excavation (SF-in)	22	131,270	SF	$ 5.10	$ 669,000
P-155	Lime-Treated Subgrade (SF-in)	12	131,270	SF	$ 2.00	$ 263,000
P-202	Aggregate Base Course (SF-in)	6	131,270	SF	$ 4.20	$ 551,000
P-403	Prime Coat	n/a	131,270	SF	$ 1.40	$ 184,000
P-306	Econocrete (SF-in)	6	131,270	SF	$ 6.70	$ 880,000
P-403	Asphalt Bond Breaker	n/a	131,270	SF	$ 1.40	$ 184,000
P-501	PCC Pavement (SF-in)	16	131,270	SF	$ 18.20	$ 2,389,000
P-604	PCC Joint Seal (SF)	n/a	131,270	SF	$ 2.50	$ 328,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	1,800	SF	$ 4.00	$ 7,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	8	EA	$ 11,700	$ 94,000
D-701	Storm Drain Pipe	n/a	0	LF	$ 229	$ -
D-751	Drainage Structures	n/a	0	EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE **(FOR USE ESTIMATING DESIGN COST ONLY)**						$ 6,949,000
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 556,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 834,000
	Contingency (approximate % of Construction)		25	%		$ 1,737,000
TOTAL SOFT COST ESTIMATE (DESIGN ONLY)						**$ 556,000**
TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)						**$ 556,000**

Project No.	RIM-Y6-10-P03	**Master Plan Reference No.**	A-44
Project Title / Description	Realign Taxiways B, D, H, and L Between Taxiways Y & Z. Construct offset connectors between Taxiway Y and Z for Taxiways B, D, H, and L.		
Purpose	Mitigates RIM criteria issue of direct apron access to runway.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	40,487	SF	$ 2.30	$ 93,000
P-202	Aggregate Base Course (SF-in)	10	40,487	SF	$ 7.00	$ 283,000
P-403	Prime Coat	n/a	40,487	SF	$ 1.40	$ 57,000
P-404	Asphalt Surface Course (SF-in)	4	40,487	SF	$ 11.00	$ 445,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	7,192	SF	$ 3.10	$ 22,000
L-108	Electrical Conduit and Cabling	n/a	7,192	LF	$ 3.50	$ 25,000
L-125	Edge Light Fixtures	n/a	48	EA	$ 3,200	$ 153,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22	131,270	SF	$ 5.10	$ 669,000
P-155	Lime-Treated Subgrade (SF-in)	12	131,270	SF	$ 2.00	$ 263,000
P-202	Aggregate Base Course (SF-in)	6	131,270	SF	$ 4.20	$ 551,000
P-403	Prime Coat	n/a	131,270	SF	$ 1.40	$ 184,000
P-306	Econocrete (SF-in)	6	131,270	SF	$ 6.70	$ 880,000
P-403	Asphalt Bond Breaker	n/a	131,270	SF	$ 1.40	$ 184,000
P-501	PCC Pavement (SF-in)	16	131,270	SF	$ 18.20	$ 2,389,000
P-604	PCC Joint Seal (SF)	n/a	131,270	SF	$ 2.50	$ 328,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	1,800	SF	$ 4.00	$ 7,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	8	EA	$ 11,700	$ 94,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -

TOTAL CONSTRUCTION COST ESTIMATE	**$ 6,627,000**

Project Soft Costs					
	Design (approximate % of Construction)	incl. in RIM-Y6-P02		incl. in RIM-Y6-P02	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)	12	%		$ 795,000
	Contingency (approximate % of Construction)	25	%		$ 1,657,000

TOTAL SOFT COST ESTIMATE	**$ 2,452,000**

TOTAL PROJECT COST ESTIMATE	**$ 9,079,000**

Project No.	RIM-Y6-10-P04	Master Plan Reference No.	A-45
Project Title / Description	Remove Taxiways B, D, H, and L Between Taxiways Y & Z. Remove pavement associated with former Taxiway connectors at Taxiways B, D, H, and L between Taxiway Z and Taxiway Y.		
Purpose	Mitigates RIM criteria issue of direct apron access to runway.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a		SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a		EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	64,388	SF	$ 5.00	$ 322,000
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700.00	$ -
D-701	Storm Drain Pipe	n/a		LF	$ 229.00	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200.00	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 322,000**

Project Soft Costs					
	Design (approximate % of Construction)	incl. in RIM-Y6-P02		incl. in RIM-Y6-P02	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)	12	%		$ 39,000
	Contingency (approximate % of Construction)	25	%		$ 81,000
TOTAL SOFT COST ESTIMATE					**$ 120,000**
TOTAL PROJECT COST ESTIMATE					**$ 442,000**

Project No.	RIM-Y6-10-P05	Master Plan Reference No.	A-43
Project Title / Description	Blast Pad Improvements. Widen blast pads on RWY 12L/30R and lengthen 12L blast pad to abut runway side of blast fence.		
Purpose	Addresses a non-standard ADG V blast pad issue.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction [NOT USED]						
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
Asphalt Concrete Blastpad Reconstruction						
	AC Pavement Removal (SF-in)	4		SF		$ -
	Unclassified Excavation (SF-in)	10	10,715	SF	$ 2.30	$ 25,000
	Aggregate Base Course (SF-in)	10	10,715	SF	$ 7.00	$ 75,000
	Prime Coat	n/a	10,715	SF	$ 1.40	$ 15,000
	Asphalt Surface Course (SF-in)	4	10,715	SF	$ 8.20	$ 88,000
	Pavement Marking	n/a		SF		$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 4.60	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 11.30	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 21.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 2.10	$ -
P-403	Prime Coat	n/a		SF	$ 13.30	$ -
P-306	Econocrete (SF-in)	6		SF	$ 8.20	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 13.30	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 3.50	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 3,700	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700	$ -
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 406,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 32,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 49,000
	Contingency (approximate % of Construction)		25	%		$ 102,000
TOTAL SOFT COST ESTIMATE						**$ 183,000**
TOTAL PROJECT COST ESTIMATE						**$ 589,000**

Project No.	RIM-Y6-10-P06	**Master Plan Reference No.**	A-37
Project Title / Description	New ADG-III Taxilane - Phase 2. Construct Phase 2 of parallel ADG-III taxilane.		
Purpose	Brings the west GA area into conformity with ADG-III standards and significantly improves lateral movements both in the movement and non movement areas. Reduces controller workload and improves operational safety.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28	113,653	SF	$ 6.50	$ 739,000
P-155	Lime-Treated Subgrade (SF-in)	18	113,653	SF	$ 3.00	$ 341,000
P-202	Aggregate Base Course (SF-in)	12	113,653	SF	$ 8.40	$ 955,000
P-403	Prime Coat	n/a	113,653	SF	$ 1.40	$ 159,000
P-401	Asphalt Surface Course (SF-in)	6	113,653	SF	$ 10.20	$ 1,159,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	4,000	SF	$ 4.00	$ 16,000
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	80,350	SF	$ 2.30	$ 185,000
P-202	Aggregate Base Course (SF-in)	10	80,350	SF	$ 7.00	$ 562,000
P-403	Prime Coat	n/a	80,350	SF	$ 1.40	$ 112,000
P-404	Asphalt Surface Course (SF-in)	4	80,350	SF	$ 11.00	$ 884,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	10,000	SF	$ 3.10	$ 31,000
L-108	Electrical Conduit and Cabling	n/a	3,600	LF	$ 3.50	$ 13,000
L-125	Edge Light Fixtures	n/a	24	EA	$ 3,200	$ 77,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	8	EA	$ 11,700	$ 94,000
D-701	Storm Drain Pipe	n/a	2,900	LF	$ 229	$ 664,000
D-751	Drainage Structures	n/a	5	EA	$ 21,200	$ 106,000

TOTAL CONSTRUCTION COST ESTIMATE	**$ 6,097,000**

Project Soft Costs					
	Design (approximate % of Construction)	incl. in RIM-Y4-P04		incl. in RIM-Y4-P04	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)	12	%		$ 732,000
	Contingency (approximate % of Construction)	25	%		$ 1,524,000

TOTAL SOFT COST ESTIMATE	**$ 2,256,000**

TOTAL PROJECT COST ESTIMATE	**$ 8,353,000**

Project No.	RIM-Y6-10-P07	**Master Plan Reference No.**	G-9
Project Title / Description	General Aviation Apron Expansion - Phase 2. Construct Phase 2 of the west side apron expansion.		
Purpose	Component for addressing west side ADG III conformity. Enhances accomodation of current and projected demand.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	111,568	SF	$ 3.50	$ 390,000
P-152	Unclassified Excavation (SF-in)	28	324,245	SF	$ 6.50	$ 2,108,000
P-155	Lime-Treated Subgrade (SF-in)	18	324,245	SF	$ 3.00	$ 973,000
P-202	Aggregate Base Course (SF-in)	12	324,245	SF	$ 8.40	$ 2,724,000
P-403	Prime Coat	n/a	324,245	SF	$ 1.40	$ 454,000
P-401	Asphalt Surface Course (SF-in)	6	324,245	SF	$ 10.20	$ 3,307,000
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700	$ -
P-620	Surface Paint	n/a		SF	$ 4.00	$ -
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -

TOTAL CONSTRUCTION COST ESTIMATE	**$ 9,956,000**

Project Soft Costs					
	Design (approximate % of Construction)	incl. in RIM-Y4-P05		incl. in RIM-Y4-P05	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)	12	%		$ 1,195,000
	Contingency (approximate % of Construction)	25	%		$ 2,489,000

TOTAL SOFT COST ESTIMATE	**$ 3,684,000**

TOTAL PROJECT COST ESTIMATE	**$ 13,640,000**

Project No.	RIM-Y6-10-P08(Design Only)	**Master Plan Reference No.**	A-44
Project Title / Description	Design: Realign Taxiways C, E, F, and J Between Taxiways Y & Z. Design offset connector taxiways between Taxiway Y and Z for Taxiways C, E, F, and J.		
Purpose	Mitigates RIM criteria issue of direct apron access to runway.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	0	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28	0	SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18	0	SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12	0	SF	$ 8.40	$ -
P-403	Prime Coat	n/a	0	SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6	0	SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4	0	SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	30,403	SF	$ 2.30	$ 70,000
P-202	Aggregate Base Course (SF-in)	10	30,403	SF	$ 7.00	$ 213,000
P-403	Prime Coat	n/a	30,403	SF	$ 1.40	$ 43,000
P-404	Asphalt Surface Course (SF-in)	4	30,403	SF	$ 11.00	$ 334,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	7,192	SF	$ 3.10	$ 22,000
L-108	Electrical Conduit and Cabling	n/a	7,192	LF	$ 3.50	$ 25,000
L-125	Edge Light Fixtures	n/a	48	EA	$ 3,200	$ 154,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	60,452	SF	$ 5.00	$ 302,000
P-152	Unclassified Excavation (SF-in)	22	116,461	SF	$ 5.10	$ 594,000
P-155	Lime-Treated Subgrade (SF-in)	12	116,461	SF	$ 2.00	$ 233,000
P-202	Aggregate Base Course (SF-in)	6	116,461	SF	$ 4.20	$ 489,000
P-403	Prime Coat	n/a	116,461	SF	$ 1.40	$ 163,000
P-306	Econocrete (SF-in)	6	116,461	SF	$ 6.70	$ 780,000
P-403	Asphalt Bond Breaker	n/a	116,461	SF	$ 1.40	$ 163,000
P-501	PCC Pavement (SF-in)	16	116,461	SF	$ 18.20	$ 2,120,000
P-604	PCC Joint Seal (SF)	n/a	116,461	SF	$ 2.50	$ 291,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	1,800	SF	$ 4.00	$ 7,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700	$ -
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE **(FOR USE ESTIMATING DESIGN COST ONLY)**						$ 6,003,000
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 480,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 720,000
	Contingency (approximate % of Construction)		25	%		$ 1,501,000
TOTAL SOFT COST ESTIMATE (DESIGN ONLY)						**$ 480,000**
TOTAL PROJECT COST ESTIMATE (DESIGN ONLY)						**$ 480,000**

Preliminary Project Phasing and Cost Details (Opinion of Probable Construction Costs)

Project No.	RIM-Y6-10-P09	**Master Plan Reference No.**	A-44
Project Title / Description	Realign Taxiways C, E, F, and J Between Taxiways Y & Z. Construct offset connectors between Taxiway Y and Z for Taxiways C, E, F, and J.		
Purpose	Mitigates RIM criteria issue of direct apron access to runway.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	30,403	SF	$ 2.30	$ 70,000
P-202	Aggregate Base Course (SF-in)	10	30,403	SF	$ 7.00	$ 213,000
P-403	Prime Coat	n/a	30,403	SF	$ 1.40	$ 43,000
P-404	Asphalt Surface Course (SF-in)	4	30,403	SF	$ 11.00	$ 334,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	7,192	SF	$ 3.10	$ 22,000
L-108	Electrical Conduit and Cabling	n/a	7,192	LF	$ 3.50	$ 25,000
L-125	Edge Light Fixtures	n/a	48	EA	$ 3,200	$ 154,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22	116,461	SF	$ 5.10	$ 594,000
P-155	Lime-Treated Subgrade (SF-in)	12	116,461	SF	$ 2.00	$ 233,000
P-202	Aggregate Base Course (SF-in)	6	116,461	SF	$ 4.20	$ 489,000
P-403	Prime Coat	n/a	116,461	SF	$ 1.40	$ 163,000
P-306	Econocrete (SF-in)	6	116,461	SF	$ 6.70	$ 780,000
P-403	Asphalt Bond Breaker	n/a	116,461	SF	$ 1.40	$ 163,000
P-501	PCC Pavement (SF-in)	16	116,461	SF	$ 18.20	$ 2,120,000
P-604	PCC Joint Seal (SF)	n/a	116,461	SF	$ 2.50	$ 291,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	1,800	SF	$ 4.00	$ 7,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	8	EA	$ 11,700	$ 94,000
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 5,795,000**

Project Soft Costs					
	Design (approximate % of Construction)	incl. in RIM-Y6-P08		incl. in RIM-Y6-P08	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)	12	%		$ 695,000
	Contingency (approximate % of Construction)	25	%		$ 1,449,000
TOTAL SOFT COST ESTIMATE					**$ 2,144,000**
TOTAL PROJECT COST ESTIMATE					**$ 7,939,000**

Project No.	RIM-Y6-10-P10	**Master Plan Reference No.**	A-45
Project Title / Description	Remove Taxiways C, E, F, and J Between Taxiways Y & Z. Remove pavement associated with former Taxiway connectors at Taxiways C, E, F, and J.		
Purpose	Mitigates RIM criteria issue of direct apron access to runway.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a		SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a		EA	$ 3,200	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	60,452	SF	$ 5.00	$ 302,000
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700	$ -
D-701	Storm Drain Pipe	n/a		LF	$ 229	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 302,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y6-P08		incl. in RIM-Y6-P08	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 36,000
	Contingency (approximate % of Construction)		25	%		$ 76,000
TOTAL SOFT COST ESTIMATE						**$ 112,000**
TOTAL PROJECT COST ESTIMATE						**$ 414,000**

Project No.	RIM-Y11-15-P01	Master Plan Reference No.	A-37
Project Title / Description	New ADG-III Taxilane - Phase 3. Construct Phase Three of parallel ADG-III taxilane.		
Purpose	Brings the west GA area into conformity with ADG-III standards and significantly improves lateral movements both in the movement and non movement areas. Reduces controller workload and improves operational safety.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28	106,617	SF	$ 6.50	$ 693,000
P-155	Lime-Treated Subgrade (SF-in)	18	106,617	SF	$ 3.00	$ 320,000
P-202	Aggregate Base Course (SF-in)	12	106,617	SF	$ 8.40	$ 896,000
P-403	Prime Coat	n/a	106,617	SF	$ 1.40	$ 149,000
P-401	Asphalt Surface Course (SF-in)	6	106,617	SF	$ 10.20	$ 1,087,000
P-620	Taxilane Centerline Stripe Marking, 12"	n/a	4,000	SF	$ 4.00	$ 16,000
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10	62,478	SF	$ 2.30	$ 144,000
P-202	Aggregate Base Course (SF-in)	10	62,478	SF	$ 7.00	$ 437,000
P-403	Prime Coat	n/a	62,478	SF	$ 1.40	$ 87,000
P-404	Asphalt Surface Course (SF-in)	4	62,478	SF	$ 11.00	$ 687,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	10,000	SF	$ 3.10	$ 31,000
L-108	Electrical Conduit and Cabling	n/a	3,600	LF	$ 3.50	$ 13,000
L-125	Edge Light Fixtures	n/a	24	EA	$ 3,200	$ 77,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	8	EA	$ 11,700	$ 94,000
D-701	Storm Drain Pipe	n/a	1,900	LF	$ 229	$ 435,000
D-751	Drainage Structures	n/a	3	EA	$ 21,200	$ 64,000
TOTAL CONSTRUCTION COST ESTIMATE						**$ 5,230,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y4-P04		incl. in RIM-Y4-P04	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 628,000
	Contingency (approximate % of Construction)		25	%		$ 1,308,000
TOTAL SOFT COST ESTIMATE						**$ 1,936,000**
TOTAL PROJECT COST ESTIMATE						**$ 7,166,000**

Project No.	RIM-Y11-15-P02	Master Plan Reference No.	G-9
Project Title / Description	General Aviation Apron Expansion - Phase 3. Construct Phase Three of west side apron expansion.		
Purpose	Component for addressing west side ADG III conformity. Enhances accomodation of current and projected demand.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8	106,047	SF	$ 3.50	$ 371,000
P-152	Unclassified Excavation (SF-in)	28	283,547	SF	$ 6.50	$ 1,843,000
P-155	Lime-Treated Subgrade (SF-in)	18	283,547	SF	$ 3.00	$ 851,000
P-202	Aggregate Base Course (SF-in)	12	283,547	SF	$ 8.40	$ 2,382,000
P-403	Prime Coat	n/a	286,547	SF	$ 1.40	$ 401,000
P-401	Asphalt Surface Course (SF-in)	6	283,547	SF	$ 10.20	$ 2,892,000
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	10		SF	$ 2.30	$ -
P-202	Aggregate Base Course (SF-in)	10		SF	$ 7.00	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-404	Asphalt Surface Course (SF-in)	4		SF	$ 11.00	$ -
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	0	SF	$ 3.10	$ -
L-108	Electrical Conduit and Cabling	n/a		LF	$ 3.50	$ -
L-125	Edge Light Fixtures	n/a	0	EA	$ 3,200.00	$ -
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18		SF	$ 5.00	$ -
P-152	Unclassified Excavation (SF-in)	22		SF	$ 5.10	$ -
P-155	Lime-Treated Subgrade (SF-in)	12		SF	$ 2.00	$ -
P-202	Aggregate Base Course (SF-in)	6		SF	$ 4.20	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-306	Econocrete (SF-in)	6		SF	$ 6.70	$ -
P-403	Asphalt Bond Breaker	n/a		SF	$ 1.40	$ -
P-501	PCC Pavement (SF-in)	16		SF	$ 18.20	$ -
P-604	PCC Joint Seal (SF)	n/a		SF	$ 2.50	$ -
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a		EA	$ 11,700.00	$ -
P-620	Surface Paint	n/a		SF	$ 4.00	$ -
D-701	Storm Drain Pipe	n/a		LF	$ 229.00	$ -
D-751	Drainage Structures	n/a		EA	$ 21,200.00	$ -

TOTAL CONSTRUCTION COST ESTIMATE						**$ 8,740,000**
Project Soft Costs						
	Design (approximate % of Construction)		incl. in RIM-Y4-P05		incl. in RIM-Y4-P05	
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 1,049,000
	Contingency (approximate % of Construction)		25	%		$ 2,185,000
TOTAL SOFT COST ESTIMATE						**$ 3,234,000**
TOTAL PROJECT COST ESTIMATE						**$ 11,974,000**

Project No.	RIM-Y11-15-P03	Master Plan Reference No.	A-23
Project Title / Description	Taxiway J Fillet Widening Between Runway 30L and Taxiway W. Expand the Taxiway J fillet for arrivals on Runway 30L exits to TWY W.		
Purpose	Fillet widening will facilitate movment for aircraft landing on Runway 30L, exiting at Taxiway J.		

Item No.	Description	Assumed Depth (in.)	Quantity	Units	Unit Cost	Item Total (nearest $1,000)
Asphalt Concrete Full Reconstruction						
P-102	AC Pavement Removal (SF-in)	8		SF	$ 3.50	$ -
P-152	Unclassified Excavation (SF-in)	28		SF	$ 6.50	$ -
P-155	Lime-Treated Subgrade (SF-in)	18		SF	$ 3.00	$ -
P-202	Aggregate Base Course (SF-in)	12		SF	$ 8.40	$ -
P-403	Prime Coat	n/a		SF	$ 1.40	$ -
P-401	Asphalt Surface Course (SF-in)	6		SF	$ 10.20	$ -
Asphalt Concrete Shoulder Reconstruction						
P-102	AC Pavement Removal (SF-in)	4	5,882	SF	$ 3.50	$ 21,000
P-152	Unclassified Excavation (SF-in)	10	5,882	SF	$ 2.30	$ 14,000
P-202	Aggregate Base Course (SF-in)	10	5,882	SF	$ 7.00	$ 41,000
P-403	Prime Coat	n/a	5,882	SF	$ 1.40	$ 8,000
P-404	Asphalt Surface Course (SF-in)	4	5,882	SF	$ 11.00	$ 65,000
P-620	Pavement Marking - Dual 6-inch Edge Lines	n/a	850	SF	$ 3.10	$ 3,000
L-108	Electrical Conduit and Cabling	n/a	340	LF	$ 3.50	$ 1,000
L-125	Edge Light Fixtures	n/a	3	EA	$ 3,200	$ 10,000
PCC Full Reconstruction						
P-104	PCC Pavement Removal (SF-in)	18	13,332	SF	$ 5.00	$ 67,000
P-152	Unclassified Excavation (SF-in)	22	13,332	SF	$ 5.10	$ 68,000
P-155	Lime-Treated Subgrade (SF-in)	12	13,332	SF	$ 2.00	$ 27,000
P-202	Aggregate Base Course (SF-in)	6	13,332	SF	$ 4.20	$ 56,000
P-403	Prime Coat	n/a	13,332	SF	$ 1.40	$ 19,000
P-306	Econocrete (SF-in)	6	13,332	SF	$ 6.70	$ 89,000
P-403	Asphalt Bond Breaker	n/a	13,332	SF	$ 1.40	$ 19,000
P-501	PCC Pavement (SF-in)	16	13,332	SF	$ 18.20	$ 243,000
P-604	PCC Joint Seal (SF)	n/a	13,332	SF	$ 2.50	$ 33,000
Project Specific Miscellaneous Costs						
L-858	Guidance Signs	n/a	0	EA	$ 11,700	$ -
D-701	Storm Drain Pipe	n/a	0	LF	$ 229	$ -
D-751	Drainage Structures	n/a	0	EA	$ 21,200	$ -
TOTAL CONSTRUCTION COST ESTIMATE						**$ 784,000**
Project Soft Costs						
	Design (approximate % of Construction)		8	%		$ 63,000
	Admin./Const. Mgmt./Inspection/Testing (approximate % of Construction)		12	%		$ 94,000
	Contingency (approximate % of Construction)		25	%		$ 196,000
TOTAL SOFT COST ESTIMATE						**$ 353,000**
TOTAL PROJECT COST ESTIMATE						**$ 1,137,000**

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
RUNWAY INCURSION MITIGATION/AIRFIELD DESIGN STANDARDS ANALYSIS

NEPA DOCUMENTATION
CATEX

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

SILICON VALLEY'S AIRPORT

Via Email

April 14, 2020

Mr. Douglas Pomeroy
Airports District Office
Federal Aviation Administration
1000 Marina Boulevard, Suite 220
Brisbane, CA 94005

Subject: NEPA Categorical Exclusion Evaluation for SJC Runway Incursion Mitigation (RIM) Improvements, Years 1-5

Dear Douglas:

Enclosed is a draft Documented Categorical Exclusion (CatEx) for the first 5-year program of airfield improvements recommended in the AIP-funded SJC Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study"). This first phase of improvements (the "project") consists of 11 specific airfield reconfiguration elements which SJC may propose for eligible federal design/construction funding.

The environmental evaluation is presented as inserts and supporting attachments to the SOP 5.1 report form with the technical assistance of David J. Powers & Associates, SJC's longstanding NEPA services consultant.

The requested issuance of a CatEx determination for the subject project, along with the pending ADO approval of the updated SJC Airport Layout Plan delivered on January 28, 2020, will complete the RIM Study initiated in 2016 to improve airfield safety and compliance with current design standards.

For any questions or comments regarding the enclosed document, please contact either me at cgreene@sjc.org (408-392-3623) or Ryan Sheelen at rsheelen@sjc.org (408-392-1193) of SJC's Planning Section.

Sincerely,

Cary Greene

Cary Greene
Airport Planner

Enclosure

cc: 9-AWP-SFO-ADO-Communications@faa.gov
Ryan Sheelen (SJC)

APPENDIX A. DOCUMENTED CATEX

Airport sponsors may use this form for projects eligible for a categorical exclusion (CATEX) that have greater potential for extraordinary circumstances or that otherwise require additional documentation, as described in the Environmental Orders (FAA Order 1050.1F and FAA Order 5050.4B).

To request a CATEX determination from the FAA, the sponsor should review potentially affected environmental resources, review the requirements of the applicable special purpose laws, and **consult with the Airports District Office or Regional Airports Division Office staff** about the type of information needed. The form and supporting documentation should be completed in accordance with the provisions of FAA Order 5050.4B, paragraph 302b, and submitted to the appropriate FAA Airpor5ts District/Division Office. The CATEX cannot be approved until all information/documentation is received and all requirements have been fulfilled.

Name of Airport, LOC ID, and location:

Norman Y. Mineta San Jose International Airport (SJC), San Jose, California

Project Title:

Runway Incursion Mitigation Improvements, Years 1-5

Give a brief, but complete description of the proposed project, including all project components, justification, estimated start date, and duration of the project. Include connected actions necessary to implement the proposed project (including but not limited to moving NAVAIDs, change in flight procedures, haul routes, new material or expanded material sources, staging or disposal areas). Attach a sketch or plan of the proposed project. Photos can also be helpful.

The project proposes to modify certain components of the Norman Y. Mineta San José International Airport (SJC) airfield configuration and geometry to reduce the potential for runway incursions and to improve compliance with current FAA design standards. Construction of the project would begin in 2021 and end approximately in 2025. The proposed modifications to the airfield are listed below.

PROJECT PURPOSE AND NEED

The purpose and need for the project is to reduce the potential for runway incursions, and related deficiencies in terms of compliance with current FAA airfield design standards and geometric criteria, at SJC. A "runway incursion" is defined as the unauthorized presence of an aircraft, vehicle or person on a surface designated for the landing and take-off of aircraft. Runway incursions are a signifcant safety concern, the most serious of which have led to collisions, injuries, and fatalities.

SJC has a history of runway and other airfield incursions, which led to the FAA-funded Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") conducted in 2016-2019. The RIM Study formulated a package of modifications to SJC's airfield configuration to improve operational safety and design standards compliance, the first phase of which comprises this project. Formal FAA approval of an updated Airport Layout Plan set incorporating the full package of RIM Study improvements and completion of this Documented CATEX for the first phase of implementation are the final tasks of the RIM Study.

PROJECT DESCRIPTION

The project consists of the following 11 specific modifications to the airfield at SJC. The overall locations for the modifications at SJC are shown on Exhibit 2, and individually on Exhibits 3-13.

1. General Aviation Run-up Pad Relocation: The existing run-up pad adjacent to the southwest corner of the Taxiway D/Taxiway W intersection would be removed. A new run-up pad would be located within the existing apron at the southwest corner of the airfield, as shown on Exhibit 3, outside the Taxiway W Object Free Area and close to the t-hangars and tiedowns utilized by the majority of SJC's piston-powered based aircraft. Improvements would consist of pavement markings, strengthening, and potentially a blast fence. The run-up pad relocation would mitigate the FAA-designated runway incursion "hotspots".

2. "Taxi" Markings on Taxiways Y and W: As shown on Exhibit 4, pavement markings would be added near each end of existing parallel Taxiways W and Y to visually denote their use as taxiways, thereby reducing the potential for errant aircraft landings or takeoffs on these taxiways. No construction or demolition would be required.

3. Taxiway W/M Intersection Modification: As shown on Exhibit 5, the existing northwest corner of the intersection would be rounded off to visually affirm Taxiway W as a parallel taxiway rather than a runway. A portion of the excess pavement would be converted to shoulder, with the remainder closed off through painting.

4. New Taxiway V: As shown on Exhibit 6, former Runway 11-29 (closed in 2009 and currently used as Taxiway W1) would be permanently decommissioned and reconstructed as a new parallel Taxiway V for Group III aircraft, with extensions south to existing cross Taxiway C and north to a new cross Taxiway V7 connecting the end of new Taxiway V to parallel Taxiway W. Total length would be 6,790 feet. Construction would also include up to seven new Group III taxiway connectors (V1-V7) along new Taxiway V to connect to a future parallel taxilane to the west (project element 9 below). Upon completion, existing Taxiway V abutting the general aviation aprons on the west side of SJC would be closed. This airfield modification would result in two Group III parallel taxiways serving SJC's existing and projected general aviation aircraft

fleet, and resolve the longstanding Modification to Standards for the deficient separation between former Runway 11-29 and existing Taxiway V.

5. Taxiways F and H Closure between Runways: As shown on Exhibit 7, the existing segments of cross Taxiways F and H between Runway 12R-30L and Runway 12L-30R would be closed through pavement painting and lighting/marking removal. This airfield modification would comply with FAA geometric criteria by eliminating the two existing high-energy crossings of Runway 12L-30R. Almost all airline arrivals on Runway 30L exit north of Taxiway H before crossing 12L-30R to access the east side aprons, while almost all airline arrivals on Runway 12R exit south of Taxiway F before crossing 12L-30R.

6. New taxiway Connectors W2 and W3 at Southwest Apron: As shown on Exhibit 8, two new Group II taxiway connectors (W2-W3) would be created within the southwest apron through pavement marking/painting to channel general aviation aircraft movement to/from parallel Taxiway W. This airfield modification would comply with FAA geometric criteria to avoid large expanses of movement area pavement.

7. Taxiway W Extension: As shown on Exhibit 9, parallel Taxiway W would be extended south from Taxiway B to Runway 12R-30L as Taxiway W1 (for ADG-III aircraft) through construction of new pavement and associated shoulders and lighting/marking. This extension of Taxiway W would comply with FAA geometric criteria by mitigating the existing practice of general aviation aircraft entering Runway 12R-30L at Taxiway B and having to back-taxi on the runway to get into position for departure. The new runway intersection at extended Taxiway W would be within 500 feet of the runway end, thus eliminating the need for back-taxiing.

8. Runway 12R-30L Hold Bar Relocation: As shown on Exhibit 10, the Runway 12R-30L aircraft hold positions would be relocated 30 feet farther from the runway centerline to comply with Group V aircraft standards.

9. New West Side Parallel Taxilane: As shown on Exhibit 11, upon closure of existing Taxiway V (part of project element 4 above), the pavement would be replaced with an apron-edge parallel taxilane for Group III aircraft. Conversion of the taxiway to a taxilane would resolve multiple separation deficiencies associated with existing Taxiway V, while a new taxilane would improve lateral movement of west side aircraft and reduce controller workload.

10. Taxiway B and Taxiway L Width Reduction: As shown on Exhibit 12, a segment of the existing cross Taxiway B between Taxiway Z and Runway 12L-30R, and a segment of the existing cross Taxiway L between Taxiway Y and Runway 12R-30L, would be reduced in width through painted pavement closure. This airfield modification would comply with FAA geometric criteria to avoid large expanses of aircraft movement area.

11. Runway 12L-30R Blast Pad Improvements: As shown on Exhibit 13, the Runway 12L-30R blast bads would be widened, and the blast pad at the 12L end also lengthened, through pavement construction and markings to comply with Group V aircraft standards.

Technical analysis conducted during the RIM Study, vetted through a technical working group of 17 FAA regulatory and airport user representatives, determined that the above-described set of airfield modifications would improve operational safety, reduce several existing design standards deficiencies that potentially contribute to runway incursions, and maintain operational capacity for projected demand. No changes would be made to the configuration or operation of Runways 12R-30L and 12L-30R, and all construction associated with the project improvements would occur within the existing airfield.

Give a brief, but complete, description of the proposed project area. Include any unique or natural features within or surrounding airport property.

SJC is located in an urbanized portion of the Cities of San Jose and Santa Clara. As shown on Exhibit 1, SJC is bordered by the U.S. 101 freeway on the north, commercial/industrial uses on the west, the I-880 freeway on the south, and the Guadalupe River on the east. SJC's airfield is separated from the Guadalupe River by a combination of passenger terminals, parking garages, surface parking lots, Airport support facilities, and Airport Boulevard.

Identify the appropriate CATEX paragraph(s) from Order 1050.1F (paragraph 5-6.1 through 5-6.6) or 5050.4B (Tables 6-1 and 6-2) that apply to the project. Describe if the project differs in any way from the specific language of the CATEX or examples given as described in the Order.

The following language from Table 6-2 of Order 5050.4B applies to the proposed Runway Incursion Mitigation Project: "Build or extend aircraft operating area fencing, or jet blast facilities" and "Build, repair, or extend an existing airport's aprons, loading ramps, taxiway, or taxi lane provided they have only on-airport impacts."

The circumstances one must consider when documenting a CATEX are listed below along with each of the impact categories related to the circumstance. Use FAA Environmental Orders 1050.1F, 5050.4B, and the Desk Reference for Airports Actions, as well as other guidance documents to assist you in determining what information needs to be provided about these resource topics to address potential impacts. Keep in mind that both construction and operational impacts must be included. Indicate whether or not there would be any effects under the particular resource topic and, **if needed**, cite available references to support these conclusions. Additional analyses and inventories can be attached or cited as needed.

5-2.b(1) National Historic Preservation Act (NHPA) resources

	YES	NO
Are there historic/cultural resources listed (or eligible for listing) on the National Register of Historic Places located in the Area of Potential Effect? If yes, provide a record of the historic and/or cultural resources located therein and check with your local Airports Division/District Office to determine if a Section 106 finding is required. There are no buildings or structures located in the area of the proposed projects. Therefore, the project would not impact any historic structures. To determine the potential for the improvements to impact buried archaeological resources, an extensive archaeological subsurface testing program was undertaken at the Airport. The testing included the digging of 237 trenches at various locations on the Airport. As a result of that testing, sensitive areas were identified where there is likelihood for encountering buried archaeological materials during the construction of future airport improvement projects (see Exhibit 14). A portion of the proposed improvements are located in areas determined to be archaeologically sensitive. Therefore, as recommended by the archaeologist who conducted the testing program, the City would retain an archaeologist to monitor subsurface construction activities within these areas. Any resources that are encountered would be evaluated and mitigated. [Note: All monitoring of on-Airport projects that have been constructed over the past two decades have not encountered cultural resources.] Based on this information, the project would not result in impacts to any known historic, architectural, archaeological, or cultural resources. Further, in the even that cultural resources are discovered during construction, the impacts would be mitigated in accordance with federal and state laws that govern such discoveries.	☐	☒
Does the project have the potential to cause effects? If yes, describe the nature and extent of the effects. A portion of the proposed improvements are located in areas determined to be archaeologically sensitive. The City would retain an archaeologist to monitor subsurface construction activities within these areas. Any resources that are encountered would be evaluated and mitigated, therefore the project would be mitigated to not cause adverse effects on historical or cultural resources.	☐	☒

	YES	NO
Is the project area undisturbed? If not, provide information on the prior disturbance (including type and depth of disturbance, if available) The proposed modifications to various components of the airfield are largely at locations where previous disturbance has occurred to construct the existing runways, taxiways, blast pads, etc. To ensure that no previously undiscovered archaeological resources - if any are present - are impacted, archaeological monitoring will be undertaken as described above.	☐	☒
Will the project impact tribal land or land of interest to tribes? If yes, describe the nature and extent of the effects and provide information on the tribe affected. Consultation with their THPO or a tribal representative along with the SHPO may be required.	☐	☒

5-2.b(2) Department of Transportation Act Section 4(f) and 6(f) resources

	YES	NO
Are there any properties protected under Section 4(f) (as defined by FAA Order 1050.1F) in or near the project area? This includes publicly owned parks, recreation areas, and wildlife or waterfowl refuges of national, state or local significance or land from a historic site of national, state or local significance. There are no Section 4(f) lands in or near the project area.	☐	☒
Will project construction or operation physically or constructively "use" any Section 4(f) resource? If yes, describe the nature and extent of the use and/or impacts, and why there are no prudent and feasible alternatives. See 5050.4B Desk Reference Chapter 7. There are no Section 4(f) lands in or near the project area.	☐	☒
Will the project affect any recreational or park land purchased with Section 6(f) Land and Water Conservation Funds? If so, please explain, if there will be impacts to those properties. There are no Section 6(f) lands in or near the project area.	☐	☒

5-2.b(3) Threatened or Endangered Species

	YES	NO
Are there any federal or state listed endangered, threatened, or candidate species or designated critical habitat in or near the project area? This includes species protected by individual statute, such as the Bald Eagle. Threatened steelhead fish are present in the Guadalupe River, which is adjacent to SJC. However, at its closest point, the airfield is more than 750 feet from the River and there are roadways and buildings between the River and the airfield. The project would not encroach within the City's Riparian Corridor Buffer Zone that was established to protect resources associated with the River. Due to these facts, the project would have no direct or indirect impacts on the Guadalupe River or fisheries resources.	☐	☒
Does the project affect or have the potential to affect, directly or indirectly, any federal or state-listed, threatened, endangered or candidate species, or designated habitat under the Endangered Species Act? If yes, Section 7 consultation between the FAA and the US Fish & Wildlife Service, National Marine Fisheries Service, and/or the appropriate state agency will be necessary. Provide a description of the impacts and how impacts will be avoided, minimized, or mitigated. Provide the Biological Assessment and Biological Opinion, if required. The project would not result in a loss of habitat for any federally or state listed or candidate threatened or endangered species.	☐	☒

	YES	NO
Does the project have the potential to take birds protected by the Migratory Bird Treaty Act? Describe steps to avoid, minimize, or mitigate impacts (such as timing windows determined in consultation with the US Fish & Wildlife Service). There are no trees on the airfield. Further, no habitat suitable for use by any listed or candidate federal or state threatened or endangered species is present. However, the proposed improvements would impact approximately 26.5 acres of on-Airport burrowing owl nesting habitat. Both natural and artificial burrows are present in this area. Although burrowing owls are not a listed or candidate endangered or threatened species under the Federal or State Endangered Species Acts, they are a California Species of Special Concern. The loss of this habitat was anticipated and accounted for in the City of San Jose's Amendment to the SJC Master Plan EIR (2020). The Airport will provide compensatory mitigation in the form of fee payments per the Santa Clara Valley Habitat Conservation Plan (HCP) for impacts to burrowing owl habitat. The HCP has been approved by both the US Fish & Wildlife Service (USFWS) and the California Department of Fish & Wildlife (CDFW). Compensatory payments would be consistent with the Voluntary Fee Payments Policy of the Santa Clara Valley Habitat Agency, which states that voluntary burrowing owl fees paid as mitigation "will be applied toward burrowing owl management agreements, burrowing owl habitat management and monitoring, as well as burrowing owl habitat restoration and land acquisition."	☒	☐

5-2.b (4) Other Resources

Items to consider include:

a. Fish and Wildlife Coordination Act	YES	NO
Does the project area contain resources protected by the Fish and Wildlife Coordination Act? If yes, describe any impacts and steps taken to avoid, minimize, or mitigate impacts. No resources protected by the Fish & Wildlife Coordination Act are present in the project area.	☐	☒
b. Wetlands and Other Waters of the U.S.	**YES**	**NO**
Are there any wetlands or other waters of the U.S. in or near the project area? Based on biological surveys, there are no wetlands anywhere on SJC.	☐	☒
Has wetland delineation been completed within the proposed project area? If yes, please provide U.S. Army Corps of Engineers (USACE) correspondence and jurisdictional determination. If delineation was not completed, was a field check done to confirm the presence/absence of wetlands or other waters of the U.S.? If no to both, please explain what methods were used to determine the presence/absence of wetlands. None of the unpaved areas at SJC have vegetative or hydrologic conditions that would indicate a potential wetland. Therefore, no delineation was warranted.	☐	☒
If wetlands are present, will the project result in impacts, directly or indirectly (including tree clearing)? Describe any steps taken to avoid, minimize or mitigate the impact. As noted above, no wetlands are present and therefore no avoidance, minimization, or mitigation measures are needed.	☐	☒
Is a USACE Clean Water Act Section 404 permit required? If yes, does the project fall within the parameters of a general permit? If so, which general permit? No components of the project are located within or adjacent to areas that are under the jurisdiction of the USACE. Therefore, no Section 404 permit would be required.	☐	☒
c. Floodplains	**YES**	**NO**
Will the project be located in, encroach upon or otherwise impact a floodplain? If yes, describe impacts and any agency coordination or public review completed including coordination with the local floodplain administrator. Attach the FEMA map if applicable and any documentation.	☒	☐

Based on FEMA floodplain maps, areas of localized ponding are present at SJC. These localized ponding zones, shown in Exhibit 15, occur primarily in the unpaved pockets between the runways and taxiways. A number of the proposed modifications to the taxiways will include work within the localized ponding areas. However, the modifications will not cause nearby structures or buildings to flood. Further, the improvements will be designed to comply with FAA guidance pertaining to the avoidance/minimzation of ponding on runways and taxiways during the 100-Year Flood event.		
d. Coastal Resources	**YES**	**NO**
Will the project occur in or impact a coastal zone as defined by the State's Coastal Zone Management Plan? If yes, discuss the project's consistency with the State's CZMP. Attach the consistency determination if applicable. SJC is not located within or near a Coastal Zone.	☐	☒
Will the project occur in or impact the Coastal Barrier Resource System as defined by the US Fish and Wildlife Service? SJC is not located within or near the USFWS' Coastal Barrier Resource System.	☐	☒
e. National Marine Sanctuaries	**YES**	**NO**
Is a National Marine Sanctuary located in the project area? If yes, discuss the potential for the project to impact that resource. SJC is not located within or near a National Marine Sanctuary.	☐	☒
f. Wilderness Areas	**YES**	**NO**
Is a Wilderness Area located in the project area? If yes, discuss the potential for the project to impact that resource. There are no Wilderness Areas located within the region.	☐	☒
g. Farmland	**YES**	**NO**
Is there prime, unique, state, or locally important farmland in/near the project area? Describe any significant impacts from the project. There are no farmlands on or adjacent to SJC. Therefore, the project would not convert any farmland to non-agricultural uses.	☐	☒
Does the project include the acquisition and conversion of farmland? If farmland will be converted, describe coordination with the US Natural Resources Conservation and attach the completed Form AD-1006. No farmland is present at SJC or in the vicinity.	☐	☒

h. Energy Supply and Natural Resources	YES	NO
Will the project change energy requirements or use consumable natural resources either during construction or during operations? The project would use consumable natural resources to power construction equipment during construction. The project would not use consumable natural resources during operation. There are no unusual project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities, or equipment that would not conform to current emissions standards (and related fuel activities). The construction plan is designed to minimize fuel usage.	☒	☐
Will the project change aircraft/vehicle traffic patterns that could alter fuel usage either during construction or operations? The project would have no impact on aircraft flight tracks/patterns, airfield capacity, or roadway traffic. All construction would occur within the existing airfield and be phased and coordinated with the Control Tower and airport users to minimize temporary impacts on aircraft ground movements.	☐	☒
i. Wild and Scenic Rivers	**YES**	**NO**
Is there a river on the Nationwide Rivers Inventory, a designated river in the National System, or river under State jurisdiction (including study or eligible segments) near the project? No rivers on the National Rivers Inventory or rivers designated as Wild & Scenic are located in the region.	☐	☒
Will the project directly or indirectly affect the river or an area within ¼ mile of its ordinary high water mark? Improvements proposed within .25 miles of the Guadalupe River will be limited to the painting of pavement and would not affect the River.	☐	☒
j. Solid Waste Management	**YES**	**NO**
Does the project (either the construction activity or the completed, operational facility) have the potential to generate significant levels of solid waste? If so, discuss how these will be managed. As standard practice, the City requires the recycling of construction-related waste (e.g., concrete and building materials). Asphalt and concrete removed as part of the project will be recycled..	☐	☒

5-2.b(5) Disruption of an Established Community

	YES	NO
Will the project disrupt a community, planned development or be inconsistent with plans or goals of the community? The project is located entirely within the boundaries of SJC and would not be inconsistent with plans or goals of the community.	☐	☒
Are residents or businesses being relocated as part of the project? The project is located entirely within the boundaries of SJC and would not be inconsistent with plans or goals of the community.	☐	☒

5-2.b(6) Environmental Justice

	YES	NO
Are there minority and/or low-income populations in/near the project area?	☐	☒
Will the project cause any disproportionately high and adverse impacts to minority and/or low-income populations? Attach census data if warranted. The construction would be limited to work on the existing airfield at the Airport.	☐	☒

5-2.b(7) Surface Transportation

	YES	NO
Will the project cause a significant increase in surface traffic congestion or cause a degradation of level of service provided? Surface traffic will not be impacted either during construction or after. All construction activity will occur within the existing airfield. The project improves airfield safety and is not capacity-enhancing.	☐	☒
Will the project require a permanent road relocation or closure? If yes, describe the nature and extent of the relocation or closure and indicate if coordination with the agency responsible for the road and emergency services has occurred. The project would not require a permanent road relocation or closure.	☐	☒

5-2.b(8) Noise

	YES	NO
Will the project result in an increase in aircraft operations, nighttime operations, or change aircraft fleet mix? The project would not result in any temporary or permanent increase in aircraft operations at any time of the day and would have no effect on aircraft fleet mix.	☐	☒
Will the project cause a change in airfield configuration, runway use, or flight patterns either during construction or after the project is implemented? The purpose of the project is to modify the airfield configuration to improve operational safety and compliance with FAA design standards and geometric criteria. The improvements are not capacity enhancing. Aircraft operations and flight patterns would not be affected. Construction will be phased and coordinated to minimize temporary impacts on aircraft ground movements.	☒	☐
Does the forecast exceed 90,000 annual propeller operations, 700 annual jet operations or 10 daily helicopter operations or a combination of the above? If yes, a noise analysis may be required if the project would result in a change in operations. The project would have no impact on existing or projected flight operations of any type.	☐	☒
Has a noise analysis been conducted, including but not limited to generated noise contours, a specific point analysis, area equivalent method analysis, or other screening method. If yes, provide that documentation.	☐	☒
Could the project have a significant impact (DNL 1.5 dB or greater increase) on noise levels over noise sensitive areas within the 65+ DNL noise contour? No changes in noise levels would result as the project would not change aircraft operations or flight patterns.	☐	☒

5-2.b(9) Air Quality

	YES	NO
Is the project located in a Clean Air Act non-attainment or maintenance area? SJC is located in the San Francisco Bay Area Air Basin, which is a non-attainment area for ozone and fine particulate matter (PM2.5). The region is a maintenance area for carbon monoxide (CO).	☒	☐

	YES	NO
If yes, is it listed as exempt, presumed to conform or will emissions (including construction emissions) from the project be below *de minimis* levels (provide the paragraph citation for the exemption or presumed to conform list below, if applicable) Is the project accounted for in the State Implementation Plan or specifically exempted? Attach documentation. The runway incursion improvements would be presumed to conform, as stated in 72 Federal Register 41565-41580 and cited in FAA Order 1050.1 F. The proposed improvements are covered by the following presumptions of conformance: 1. Pavement markings 3. Non-runway pavement work 9. Airport safety	☒	☐
Does the project have the potential to increase landside or airside capacity, including an increase of surface vehicles? The project would not have any effect on either airside or landside traffic volumes.	☐	☒
Could the project impact air quality or violate local, State, Tribal or Federal air quality standards under the Clean Air Act Amendments of 1990 either during construction or operations? The project would have no effect on the number of aircraft operations or activity levels at SJC. Therefore, pollution emissions would not increase and violations of air quality standards would not occur.	☐	☒

5-2.b (10) Water Quality

	YES	NO
Are there water resources within or near the project area? These include groundwater, surface water (lakes, rivers, etc.), sole source aquifers, and public water supply. If yes, provide a description of the resource, including the location (distance from project site, etc.). The Guadalupe River is located adjacent to SJC (see Exhibit 1). The River is approximately 750 feet from the project site at its closest point.	☒	☐
Will the project impact any of the identified water resources either during construction or operations? Describe any steps that will be taken to protect water resources during and after construction. The project would comply with the requirements of the NPDES permit for the City of San José, including implementing best management practice treatments to reduce the amount of pollutants contained in stormwater runoff.	☐	☒

	YES	NO
Will the project increase the amount or rate of stormwater runoff either during construction or during operations? Describe any steps that will be taken to ensure it will not impact water quality. The project would comply with the requirements of the NPDES permit for the City of San José, including implementing best management practice treatments to reduce the amount of pollutants contained in stormwater runoff.	☐	☒
Does the project have the potential to violate federal, state, tribal or local water quality standards established under the Clean Water and Safe Drinking Water Acts?	☐	☒
Are any water quality related permits required? If yes, list the appropriate permits.	☐	☒

5-2.b(11) Highly Controversial on Environmental Grounds

	YES	NO
Is the project highly controversial? The term "highly controversial" means a substantial dispute exists as to the size, nature, or effect of a proposed federal action. The effects of an action are considered highly controversial when reasonable disagreement exists over the project's risks of causing environmental harm. Mere opposition to a project is not sufficient to be considered highly controversial on environmental grounds. Opposition on environmental grounds by a federal, state, or local government agency or by a tribe or a substantial number of the persons affected by the action should be considered in determining whether or not reasonable disagreement exists regarding the effects of a proposed action.	☐	☒

5-2.b(12) Inconsistent with Federal, State, Tribal or Local Law

	YES	NO
Will the project be inconsistent with plans, goals, policy, zoning, or local controls that have been adopted for the area in which the airport is located? The project supports the safe and efficient operation of the aviation facilities at SJC, which is consistent with the policies of the San Jose General Plan, Airport Master Plan, and the County Airport Land Use Commission's Comprehensive Land Use Compatibility Plan for SJC.	☐	☒

	YES	NO
Is the project incompatible with surrounding land uses? The project would occur within SJC and would not result in off-Airport impacts. Therefore, the project would not be incompatible with surrounding land uses.	☐	☒

5-2 .b (13) Light Emissions, Visual Effects, and Hazardous Materials

a. Light Emissions and Visual Effects	YES	NO
Will the proposed project produce light emission impacts? The project would not result in light emission impacts. Outdoor lighting would be limited to low-intensity taxiway and airfield light fixtures. There are no adjacent sensitive receptors (e.g., residences or schools) to the proposed sites that would be adversely affected by the construction of the project.	☐	☒
Will there be visual or aesthetic impacts as a result of the proposed project and/or have there been concerns expressed about visual/aesthetic impacts? The project would not result in visual or aesthetic impacts, as it is limited to pavement marking improvements, blast pads, and taxiway modifications/additions. The area is urbanized and the Airport is boarded by major highways and freeways. No concerns pertaining to visual/aesthetic impacts have been raised by the public.	☐	☒
b. Hazardous Materials	**YES**	**NO**
Does the project involve or affect hazardous materials? The proposed pavement markings, blast pads, and taxiway modifications would not expose construction workers or the public to site contaminated with hazardous materials. The project would not generate hazardous substances.	☐	☒
Will construction take place in an area that contains or previously contained hazardous materials? There is no known or suspected contamination on the airfield.	☐	☒
If the project involves land acquisition, is there a potential for this land to contain hazardous materials or contaminants? The project does not involve land acquisition.	☐	☒

Will the proposed project produce hazardous and/or solid waste either during construction or after? If yes, how will the additional waste be handled? The proposed project would not result in an increased use or storage of any hazardous substances. The project would remove and dispose of a small portion of pavement from the airfield. As standard practice, the City requires the recycling of construction-related waste (e.g., concrete and building materials). For this project, all asphalt and concrete removed during the construction of the proposed improvements will be recycled.	☒	☐

5-2 .b (14) Public Involvement

	YES	NO
Was there any public notification or involvement? If yes, provide documentation. The project was formulated through the FAA-funded RIM Study which included participation of a 17-member technical working group comprised of FAA regulatory and SJC user representatives. The project was also presented and discussed at numerous public meetings from 2016 through early 2020, including the Santa Clara County Airport Land Use Commission, San Jose Airport Commission, San Jose Planning Commission, and San Jose City Council and its Transportation and Environment subcommittee. In addition, the Environmental Impact Report (EIR) prepared by the City for the amended SJC Master Plan (of which the project is a part) included requisite public outreach and notification components.	☒	☐

5-2 .b (15) Indirect/Secondary/Induced Impacts

	YES	NO
Will the project result in indirect/secondary/induced impacts? The project would not result in secondary or induced impacts.	☐	☒
When considered with other past, present, and reasonably foreseeable future projects, on or off airport property and regardless of funding source, would the proposed project result in a significant cumulative impact? The impacts of the project would be negligible and would not materially contribute to any cumulative impacts.	☐	☒

Permits

List any permits required for the proposed project that have not been previously discussed. Provide details on the status of permits.

None.

Environmental Commitments

List all measures and commitments made to avoid, minimize, mitigate, and compensate for impacts on the environment, which are needed for this project to qualify for a CATEX.

1. To prevent any degradation of water quality during ground-disturbing activities, the Airport will implement standard BMPs.

2. The Airport would provide compensatory mitigation in the form of fee payments for impacts on burrowing owl nesting habitat per the Santa Clara Valley Habitat Conservation Plan (HCP). Compensatory payments would be consistent with the Voluntary Fee Payments Policy of the Santa Clara Valley Habitat Agency, which states that voluntary burrowing owl fees paid as mitigation "will be applied toward burrowing owl management agreements, burrowing owl habitat management and monitoring, as well as burrowing owl habitat restoration and land acquisition."

3. The City would retain an archaeologist to monitor subsurface construction activities within these areas. Any resources that are encountered would be evaluated and mitigated in order to avoid effects on historical or cultural resources.

Preparer Information

Point of Contact: Michael Lisenbee, David J. Powers & Associates, Inc.		
Address: 1871 The Alameda - Suite 200		
City: San Jose	**State:** CA	**Zip Code:** 95126
Phone: 408-454-3401	**Email Address:** mlisenbee@davidjpowers.com	

Signature: _____ Date: April 10, 2020

Airport Sponsor Information and Certification (may not be delegated to consultant)

Provide contact information for the designated sponsor point of contact and any other individuals requiring notification of the FAA decision.

Point of Contact: Cary Greene		
Address: San Jose International Airport, 1701 Airport Boulevard, Suite B-1130		
City: San Jose	**State:** CA	**Zip Code:** 95110-1206
Phone Number: 408-392-3623	**Email Address**: cgreene@sjc.org	
Additional Name(s): Ryan Sheelen	**Additional Email Address(es):** rsheelen@sjc.org	

I certify that the information I have provided above is, to the best of my knowledge, correct. I also recognize and agree that no construction activity, including but not limited to site preparation, demolition, or land disturbance, shall proceed for the above proposed project(s) until FAA issues a final environmental decision for the proposed project(s) and until compliance with all other applicable FAA approval actions (e.g., ALP approval, airspace approval, grant approval) has occurred.

Signature: _____ Date: 4/13/2020

FAA Decision

Having reviewed the above information, it is the FAA's decision that the proposed project (s) or development warrants environmental processing as indicated below.

Name of Airport, LOC ID, and location:

Project Title:

☐ No further NEPA review required. Project is categorically excluded per (cite applicable 1050.1.F CATEX that applies:)

☐..An Environmental Assessment (EA) is required.

☐..An Environmental Impact Statement (EIS) is required.

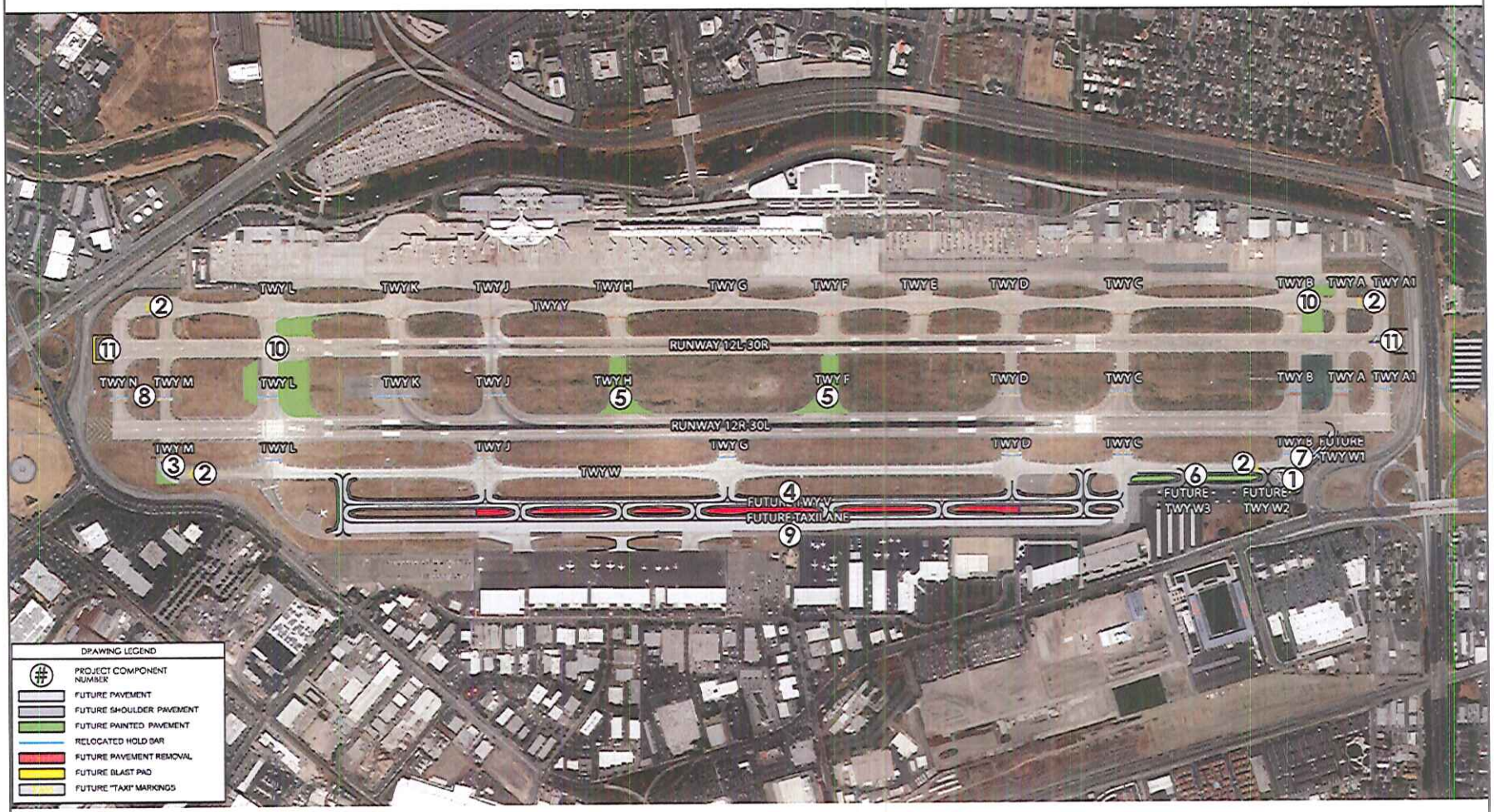
☐..The following additional documentation is necessary for FAA to perform a complete environmental evaluation of the proposed project.

Name: Title:

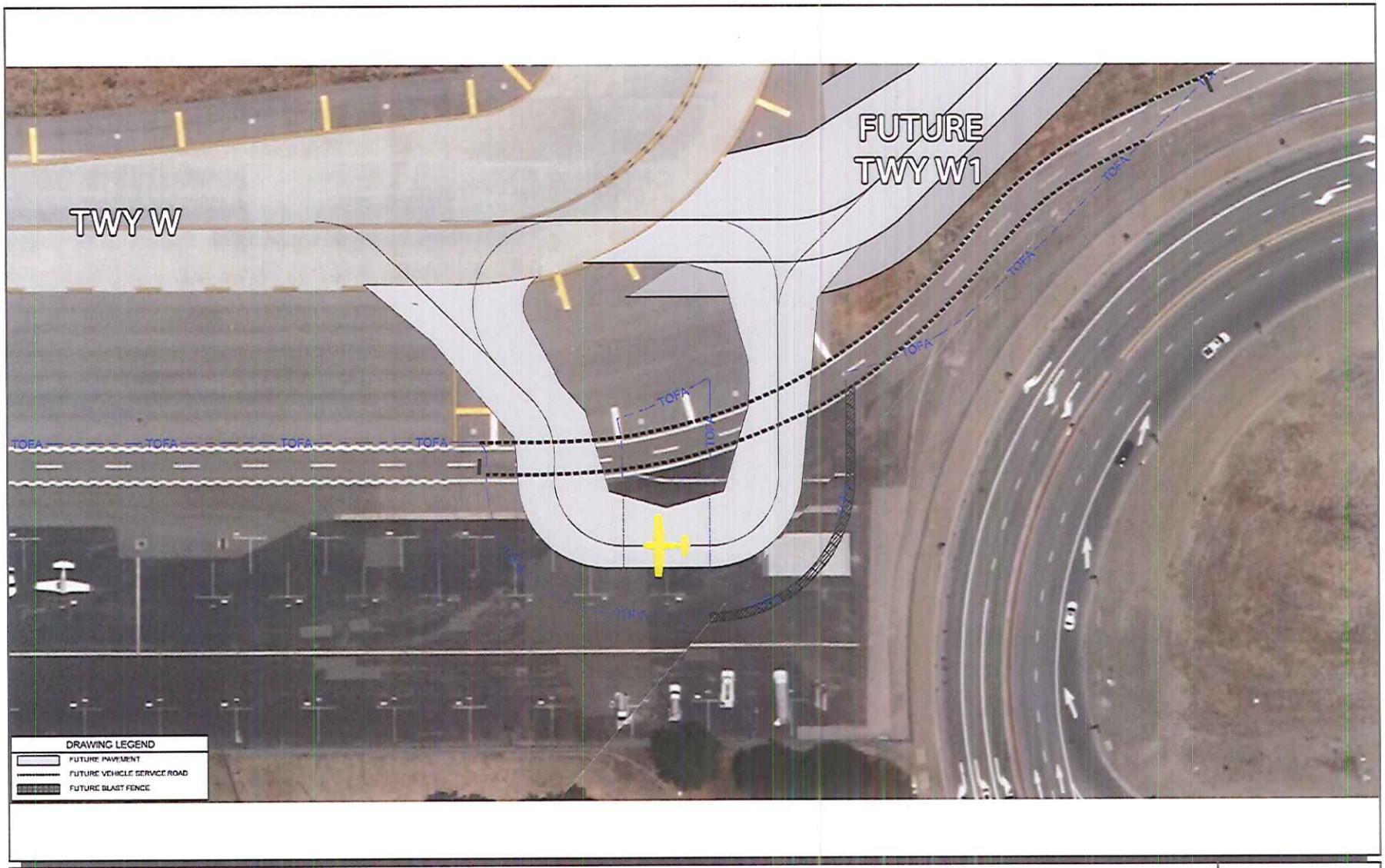
Responsible FAA Official

Signature: _____ Date:

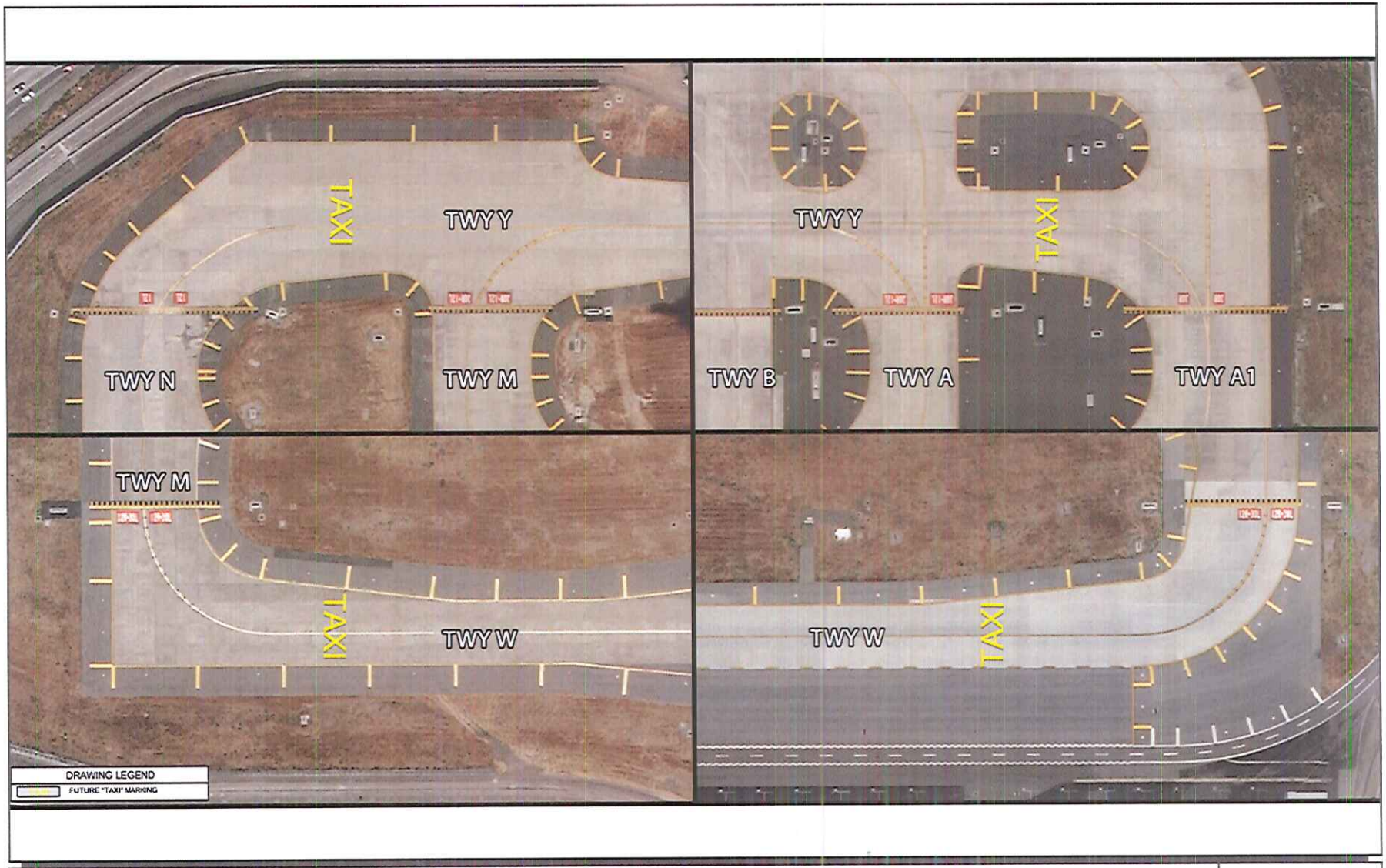
EXHIBIT 1
VICINITY MAP
Norman Y. Mineta
San Jose International Airport
De La Cruz Boulevard
Coleman Avenue
Guadalupe River
Guadalupe River
101
87
880
0 250 1000 2000 Feet



AERIAL PHOTOGRAPH DEPICTING PROPOSED AIRFIELD IMPROVEMENTS | EXHIBIT 2

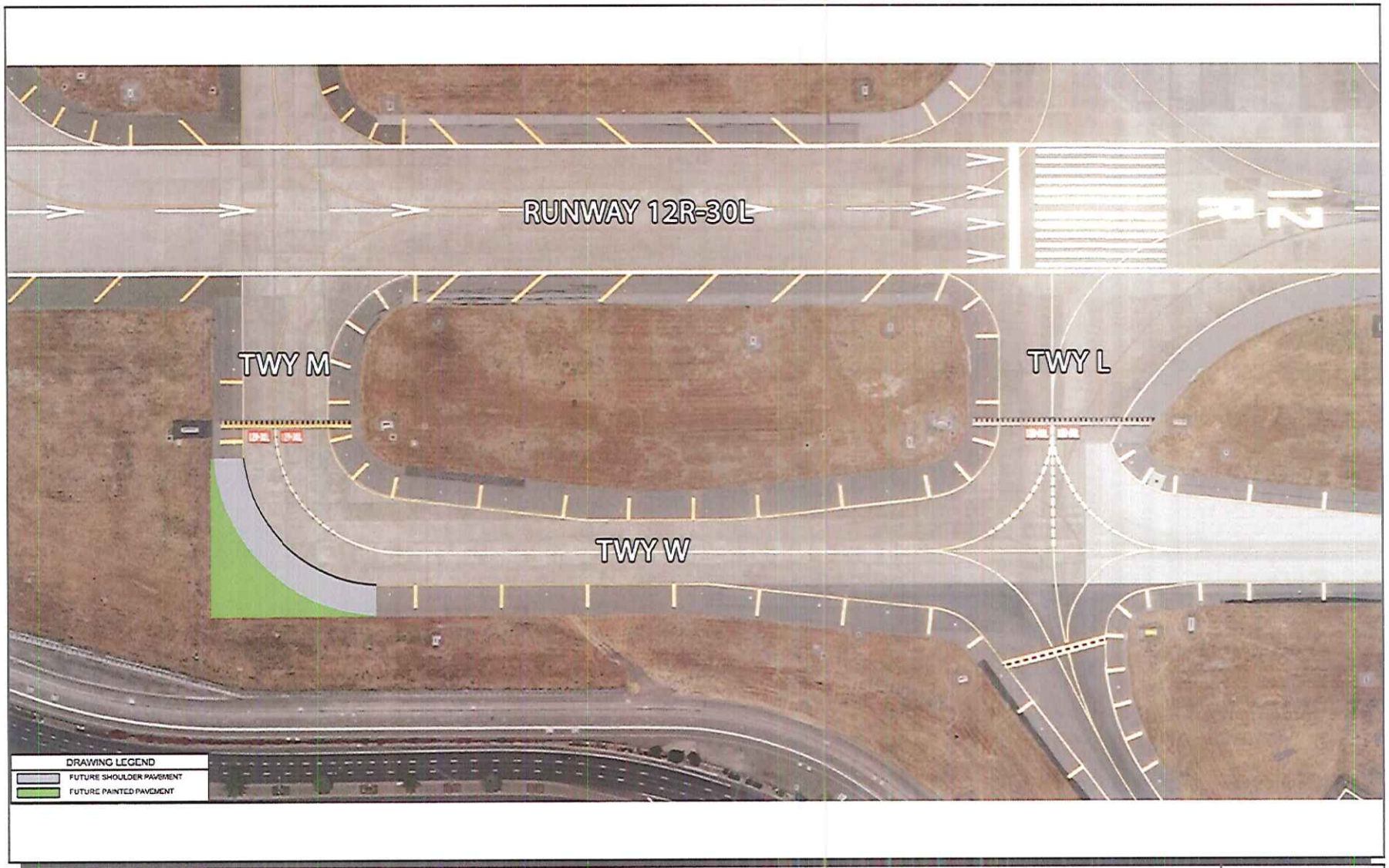


PROJECT COMPONENT #1: GENERAL AVIATION RUN-UP PAD RELOCATION | EXHIBIT 3

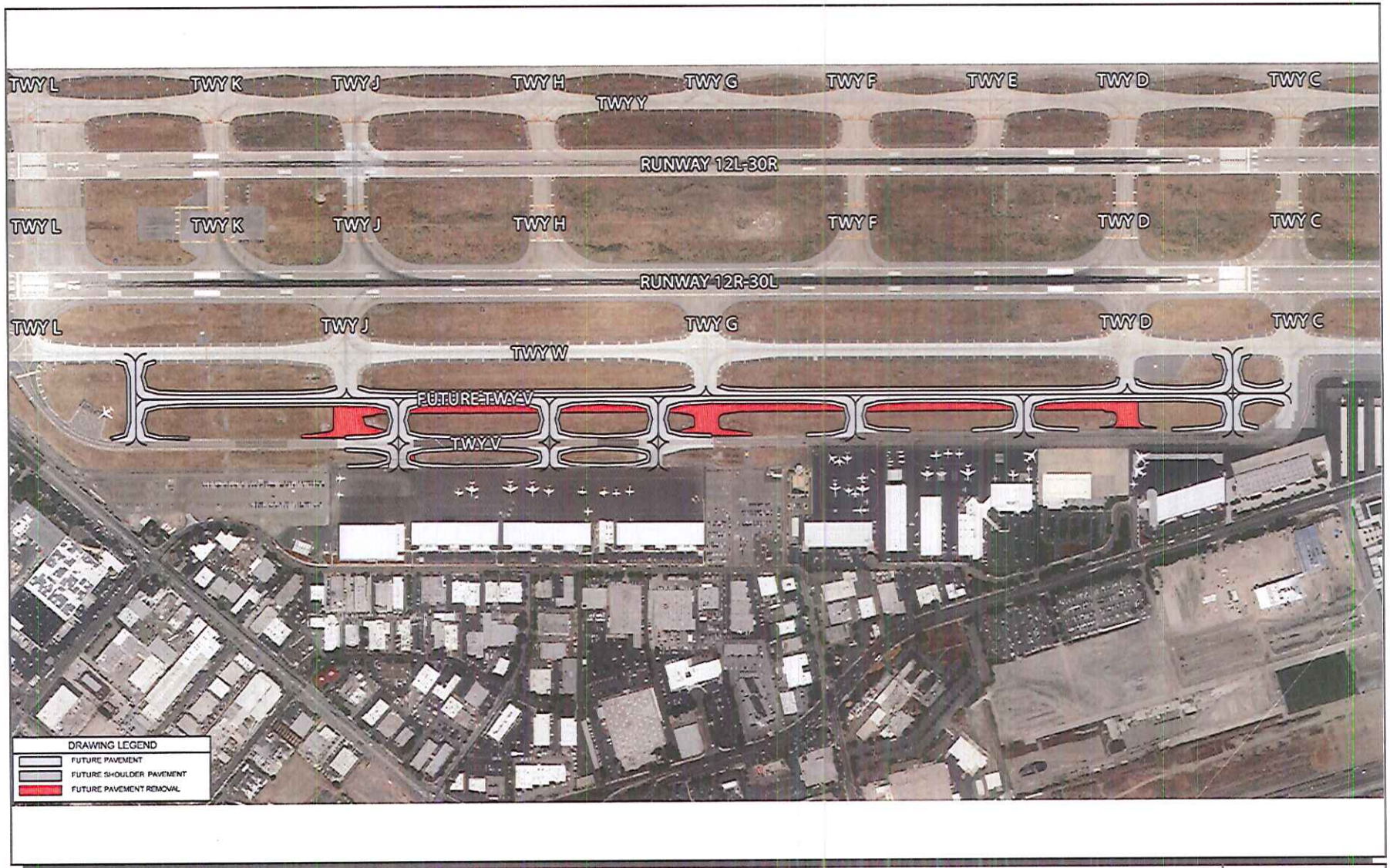


PROJECT COMPONENT #2: "TAXI" MARKINGS ON TAXIWAYS Y AND W

EXHIBIT 4



PROJECT COMPONENT #3: TAXIWAY W/M INTERSECTION MODIFICATION | EXHIBIT 5

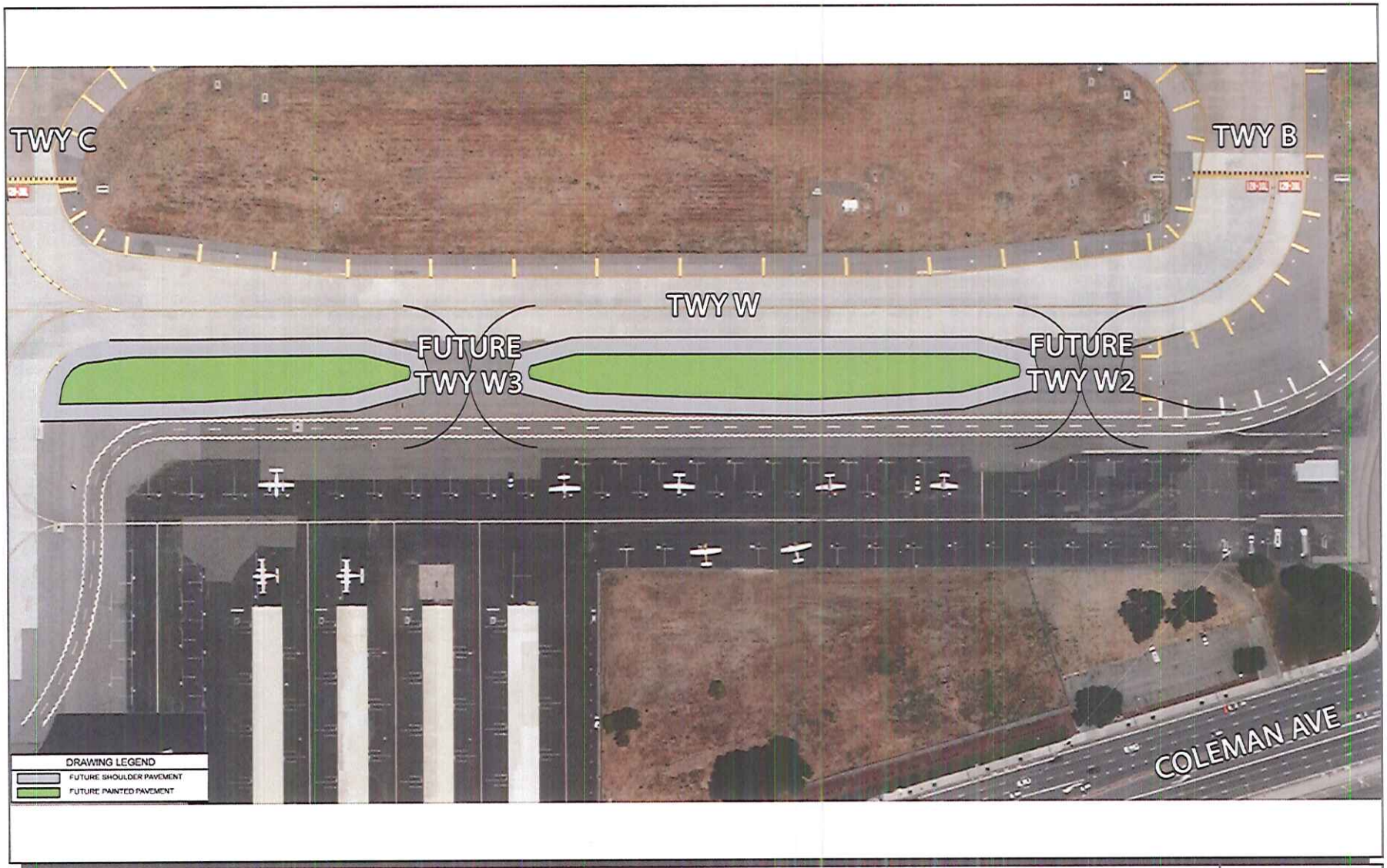


PROJECT COMPONENT #4: NEW TAXIWAY V

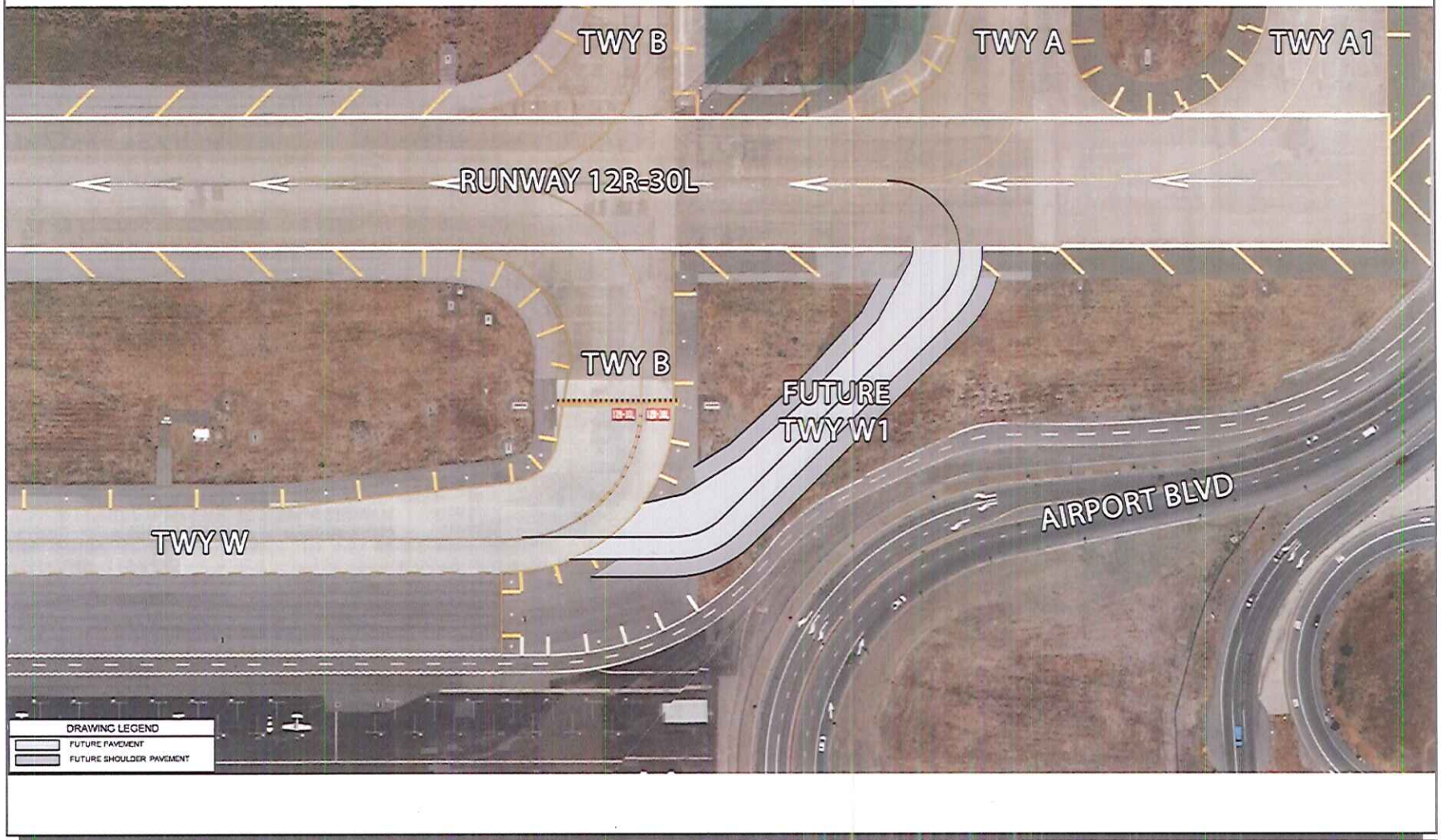
EXHIBIT 6



PROJECT COMPONENT #5: TAXIWAY F AND H CLOSURE BETWEEN RUNWAYS | EXHIBIT 7



PROJECT COMPONENT #6: NEW TAXIWAY CONNECTORS W2 AND W3 AT SOUTHWEST APRON | EXHIBIT 8

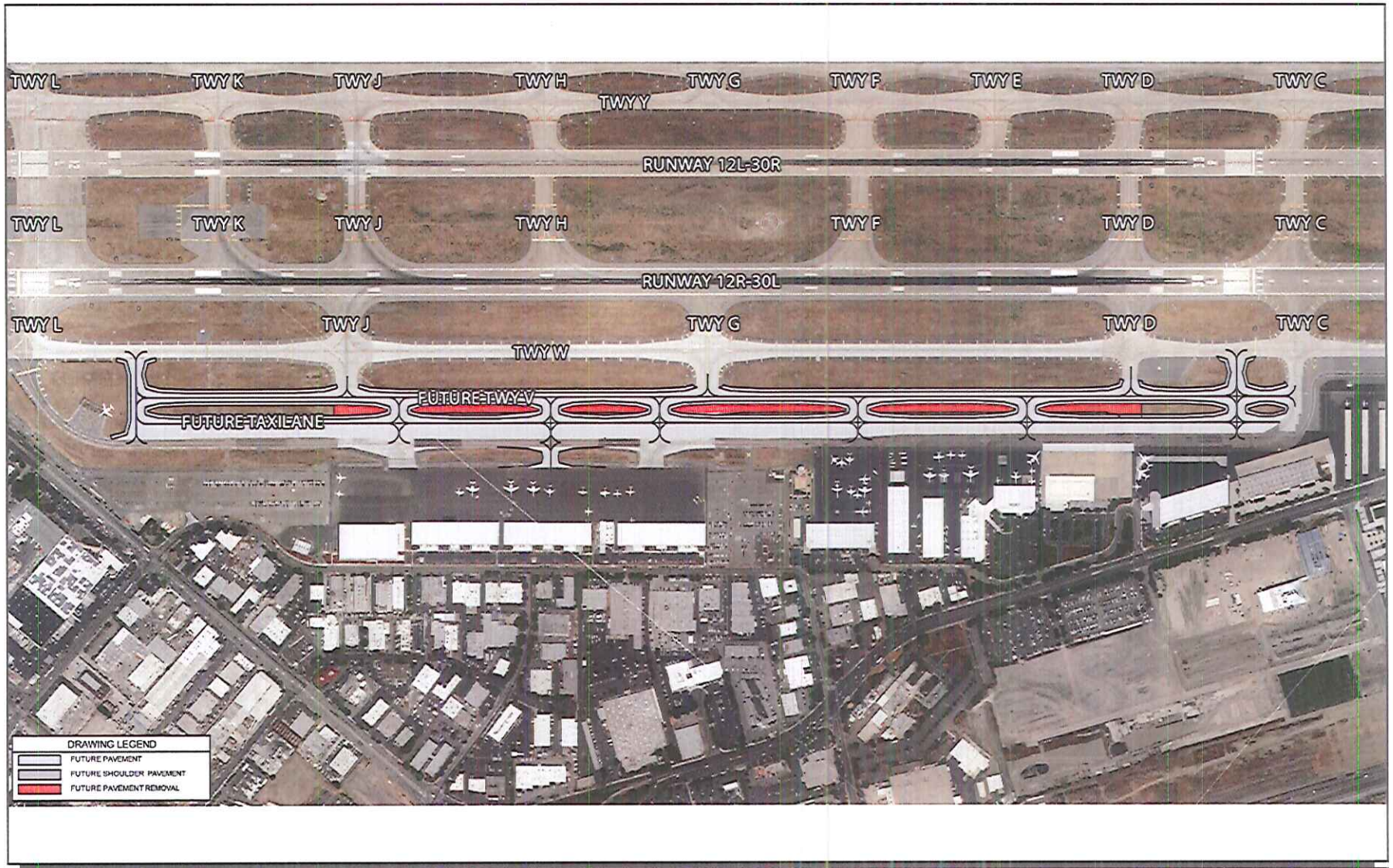


PROJECT COMPONENT #7: TAXIWAY W1 EXTENSION | EXHIBIT 9

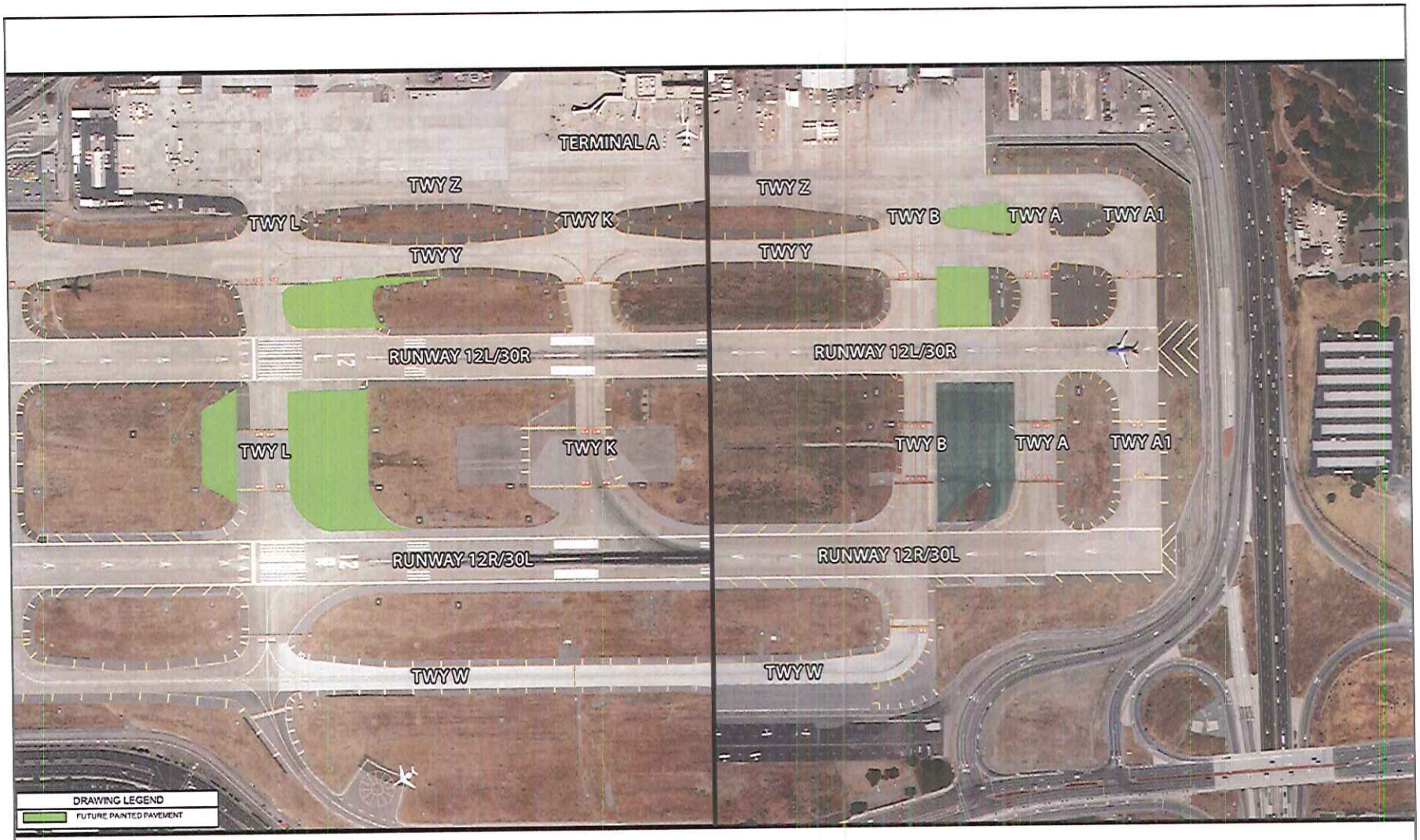


PROJECT COMPONENT #8: RUNWAY 12R/30L HOLD BARS RELOCATION

EXHIBIT 10

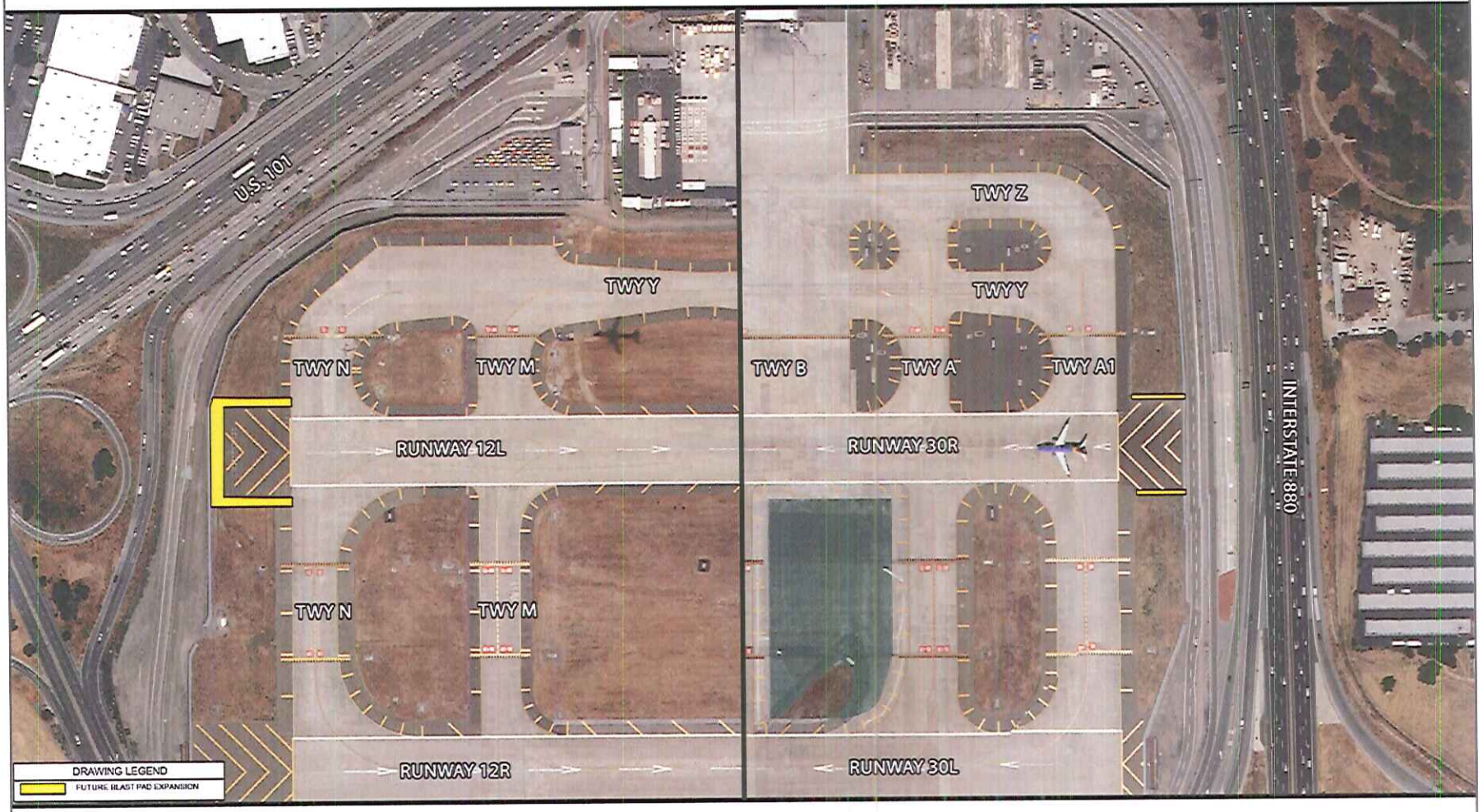


PROJECT COMPONENT #9: NEW WEST SIDE PARALLEL TAXILANE | EXHIBIT 11

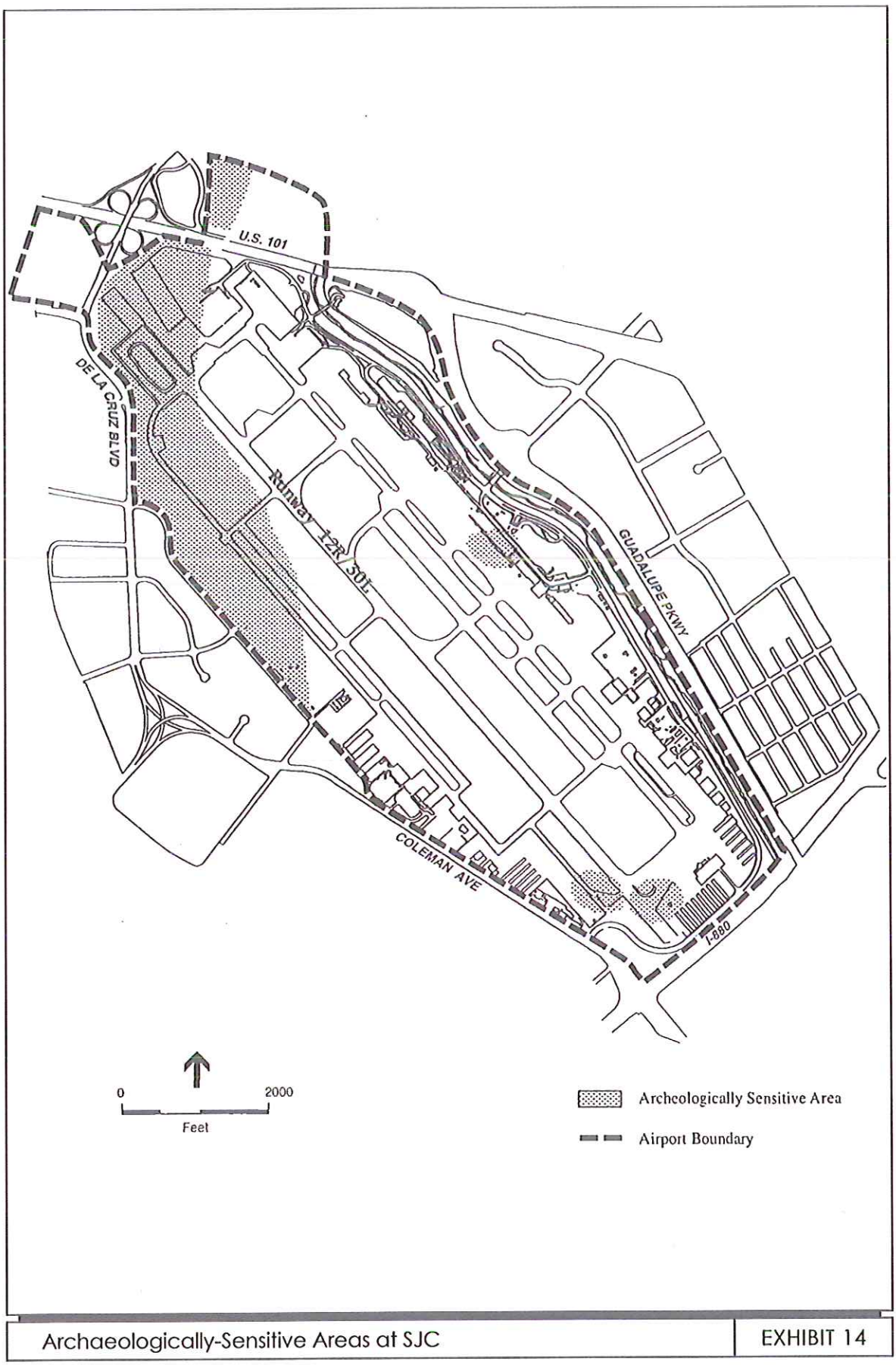


PROJECT COMPONENT #10: TAXIWAY B AND TAXIWAY L WIDTH REDUCTION

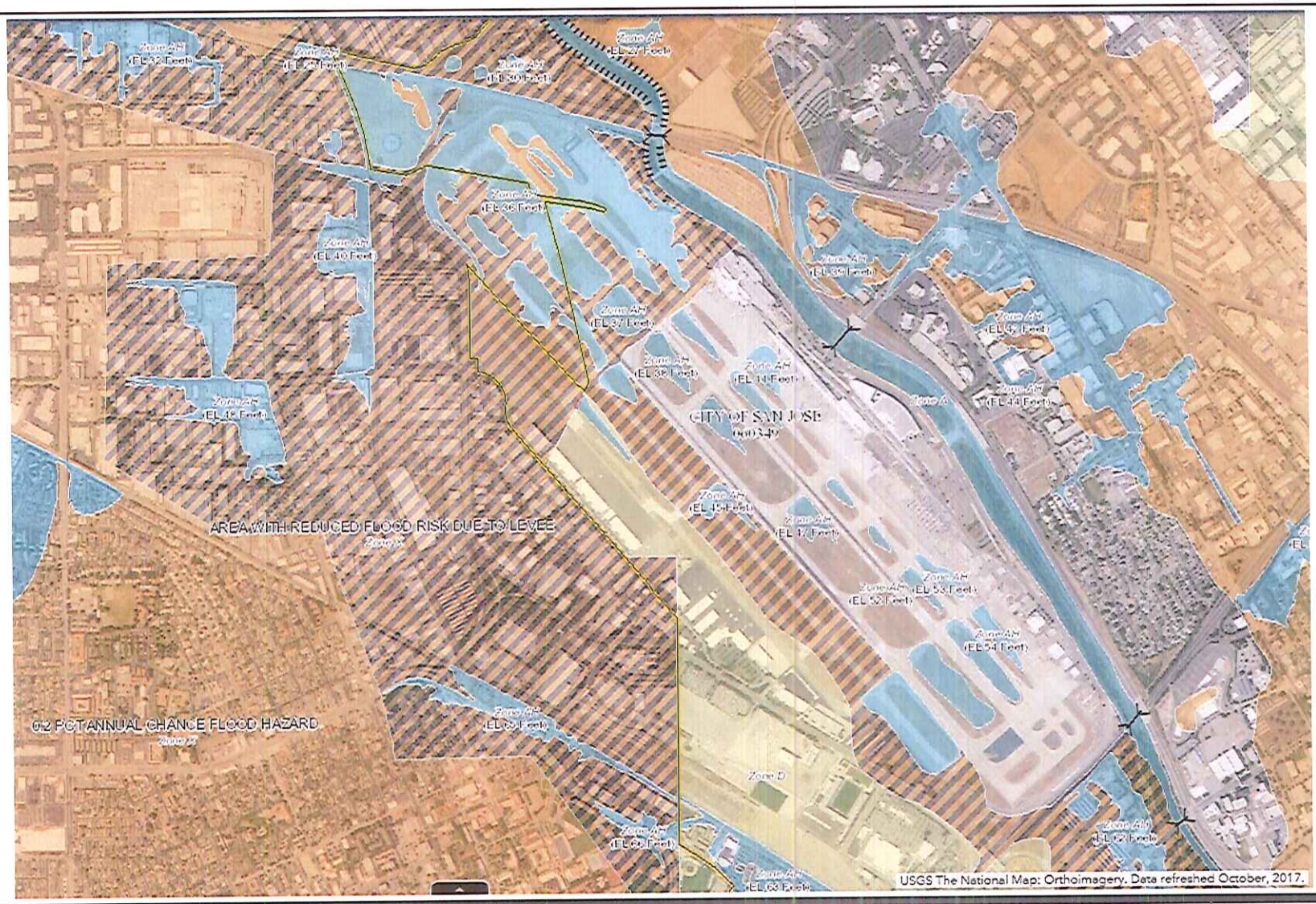
EXHIBIT 12



PROJECT COMPONENT #11: RUNWAY 12L/30R BLAST PAD IMPROVEMENTS | EXHIBIT 13



Archaeologically-Sensitive Areas at SJC | EXHIBIT 14



AREAS SUBJECT TO FLOODING DURING THE 100-YEAR STORM

EXHIBIT 15

DAVID J. POWERS & ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS & PLANNERS

M E M O R A N D U M

TO: Ryan Sheelen, SJC

FROM: John Hesler, Senior Environmental Specialist

DATE: January 19, 2021

SUBJECT: **Taxiway W/M Intersection Modifications Project**
At the Norman Y. Mineta San José International Airport

Project Description

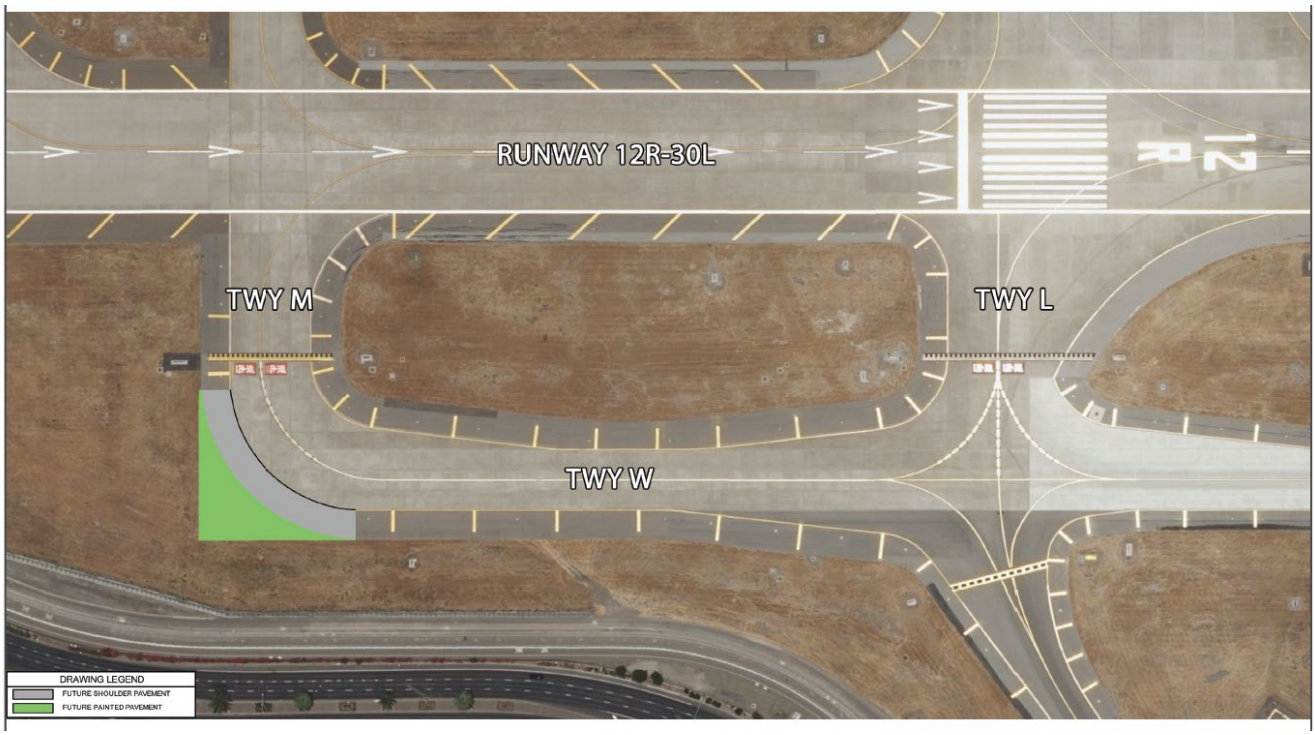
As shown on the following page, the existing northwest paved corner of the Taxiway W/M intersection would be rounded off to visually affirm Taxiway W as a parallel taxiway rather than a runway. A portion of the excess pavement would be converted to shoulder with the remainder closed off. These changes would involve surface markings and painting. No pavement modifications, soil disturbance, or subsurface work would occur.

Applicable FAA Categorical Exclusion

FAA Order 1050.1F - Categorical Exclusion #5-6.4e: "Construction, repair, reconstruction, resurfacing, extending, strengthening, or widening of a taxiway, apron, loading ramp, or runway safety area (RSA), including an RSA using Engineered Material Arresting System (EMAS)."

Extraordinary Circumstances

There are no extraordinary circumstances associated with the proposed project as the work would be limited to the painting and marking of existing pavement surfaces. The project would not increase the capacity of the airfield and would have no effect on existing or future aircraft operations.



Taxiway W/M Intersection Modification

APPENDIX A. DOCUMENTED CATEX

Airport sponsors may use this form for projects eligible for a categorical exclusion (CATEX) that have greater potential for extraordinary circumstances or that otherwise require additional documentation, as described in the Environmental Orders (FAA Order 1050.1F and FAA Order 5050.4B).

To request a CATEX determination from the FAA, the sponsor should review potentially affected environmental resources, review the requirements of the applicable special purpose laws, and **consult with the Airports District Office or Regional Airports Division Office staff** about the type of information needed. The form and supporting documentation should be completed in accordance with the provisions of FAA Order 5050.4B, paragraph 302b, and submitted to the appropriate FAA Airpor5ts District/Division Office. The CATEX cannot be approved until all information/documentation is received and all requirements have been fulfilled.

Name of Airport, LOC ID, and location:

Norman Y. Mineta San Jose International Airport (SJC), San Jose, California

Project Title:

Runway Incursion Mitigation Improvements: New Taxiway V and Adjacent Taxilane

Give a brief, but complete description of the proposed project, including all project components, justification, estimated start date, and duration of the project. Include connected actions necessary to implement the proposed project (including but not limited to moving NAVAIDs, change in flight procedures, haul routes, new material or expanded material sources, staging or disposal areas). Attach a sketch or plan of the proposed project. Photos can also be helpful.

The project proposes to modify certain components of the Norman Y. Mineta San José International Airport (SJC) airfield configuration and geometry to reduce the potential for runway incursions and to improve compliance with current FAA design standards. Construction of the project would begin in 2022 and end approximately in 2026. The proposed modifications to the airfield are listed below.

PROJECT PURPOSE AND NEED

The purpose and need for the project is to reduce the potential for runway incursions, and related deficiencies in terms of compliance with current FAA airfield design standards and geometric criteria, at SJC. A "runway incursion" is defined as the unauthorized presence of an aircraft, vehicle or person on a surface designated for the landing and take-off of aircraft. Runway incursions are a signifcant safety concern, the most serious of which have led to collisions, injuries, and fatalities.

SJC has a history of runway and other airfield incursions, which led to the FAA-funded Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") conducted in 2016-2019. The RIM Study formulated a package of modifications to SJC's airfield configuration to improve operational safety and design standards compliance, the first phase of which comprises this project. Formal FAA approval of an updated Airport Layout Plan set incorporating the full package of RIM Study improvements and completion of this Documented CATEX for the first phase of implementation are the final tasks of the RIM Study.

PROJECT DESCRIPTION

New Taxiway V and Adjacent Taxilane: As shown on Exhibit 2, former Runway 11-29 (closed in 2009 and currently used as Taxiway W1) would be permanently decommissioned and reconstructed as a new parallel Taxiway V, with extensions south to existing cross Taxiway C and north to a new cross Taxiway V7 connecting the end of new Taxiway V to parallel Taxiway W. Total length would be 6,790 feet. Construction would also include up to seven new taxiway connectors (V1-V7) along new Taxiway V to connect to a future parallel taxilane to the west. Upon completion, existing Taxiway V abutting the general aviation aprons on the west side of the Airport would be closed. Upon closure of existing Taxiway V, a new parallel taxilane would be constructed.

Technical analysis conducted during the RIM Study, vetted through a technical working group of 17 FAA regulatory and airport user representatives, determined that the above-described set of airfield modifications would improve operational safety, reduce several existing design standards deficiencies that potentially contribute to runway incursions, and maintain operational capacity for projected demand. No changes would be made to the configuration or operation of Runways 12R-30L and 12L-30R, and all construction associated with the project improvements would occur within the existing airfield.

Give a brief, but complete, description of the proposed project area. Include any unique or natural features within or surrounding airport property.

SJC is located in an urbanized portion of the Cities of San Jose and Santa Clara. As shown on Exhibit 1, SJC is bordered by the U.S. 101 freeway on the north, commercial/industrial uses on the west, the I-880 freeway on the south, and the Guadalupe River on the east. SJC's airfield is separated from the Guadalupe River by a combination of passenger terminals, parking garages, surface parking lots, Airport support facilities, and Airport Boulevard.

Identify the appropriate CATEX paragraph(s) from Order 1050.1F (paragraph 5-6.1 through 5-6.6) or 5050.4B (Tables 6-1 and 6-2) that apply to the project. Describe if the project differs in any way from the specific language of the CATEX or examples given as described in the Order.

The following language from Table 6-2 of Order 5050.4B applies to the proposed project: "Build, repair, or extend an existing airport's aprons, loading ramps, taxiway, or taxi lane provided they have only on-airport impacts."

The circumstances one must consider when documenting a CATEX are listed below along with each of the impact categories related to the circumstance. Use FAA Environmental Orders 1050.1F, 5050.4B, and the Desk Reference for Airports Actions, as well as other guidance documents to assist you in determining what information needs to be provided about these resource topics to address potential impacts. Keep in mind that both construction and operational impacts must be included. Indicate whether or not there would be any effects under the particular resource topic and, **if needed**, cite available references to support these conclusions. Additional analyses and inventories can be attached or cited as needed.

5-2.b(1) National Historic Preservation Act (NHPA) resources

	YES	NO
Are there historic/cultural resources listed (or eligible for listing) on the National Register of Historic Places located in the Area of Potential Effect? If yes, provide a record of the historic and/or cultural resources located therein and check with your local Airports Division/District Office to determine if a Section 106 finding is required. An Area of Potential Effect (APE) for the proposed airfield improvements was established. A records search and review was undertaken by a qualified archaeologist to determine if historic/cultural resources are present within the APE. Local Native American tribes were also consulted and no responses were received. This effort determined that no historic properties have been identified within the APE and that the potential for discovering archaeological resources during construction of the proposed improvements is low. Based on this conclusion, the FAA reached a "finding of no historic properties affected" pursuant to Section 106. This finding was forwarded to the SHPO with a request for concurrence on April 22, 2021. In a letter to the FAA dated June 7, 2021, the SHPO concurred with this finding. Based on this information, the project would not result in impacts to any known historic, architectural, archaeological, or cultural resources. Further, in the even that cultural resources are discovered during construction, the impacts would be mitigated in accordance with federal and state laws that govern such discoveries.	☐	☒

	YES	NO
Does the project have the potential to cause effects? If yes, describe the nature and extent of the effects.	☐	☒
Is the project area undisturbed? If not, provide information on the prior disturbance (including type and depth of disturbance, if available) The proposed modifications to various components of the airfield are at locations where previous disturbance has occurred to construct the existing runways, taxiways, blast pads, etc.	☐	☒
Will the project impact tribal land or land of interest to tribes? If yes, describe the nature and extent of the effects and provide information on the tribe affected. Consultation with their THPO or a tribal representative along with the SHPO may be required.	☐	☒

5-2.b(2) Department of Transportation Act Section 4(f) and 6(f) resources

	YES	NO
Are there any properties protected under Section 4(f) (as defined by FAA Order 1050.1F) in or near the project area? This includes publicly owned parks, recreation areas, and wildlife or waterfowl refuges of national, state or local significance or land from a historic site of national, state or local significance. There are no Section 4(f) lands in or near the project area.	☐	☒
Will project construction or operation physically or constructively "use" any Section 4(f) resource? If yes, describe the nature and extent of the use and/or impacts, and why there are no prudent and feasible alternatives. See 5050.4B Desk Reference Chapter 7. There are no Section 4(f) lands in or near the project area.	☐	☒
Will the project affect any recreational or park land purchased with Section 6(f) Land and Water Conservation Funds? If so, please explain, if there will be impacts to those properties. There are no Section 6(f) lands in or near the project area.	☐	☒

5-2.b(3) Threatened or Endangered Species

	YES	NO
Are there any federal or state listed endangered, threatened, or candidate species or designated critical habitat in or near the project area? This includes species protected by individual statute, such as the Bald Eagle. Threatened steelhead fish are present in the Guadalupe River, which is adjacent to SJC. However, at its closest point, the airfield is more than 750 feet from the River and there are roadways and buildings between the River and the airfield. The project would not encroach within the City's Riparian Corridor Buffer Zone that was established to protect resources associated with the River. Due to these facts, the project would have no direct or indirect impacts on the Guadalupe River or fisheries resources.	☐	☒
Does the project affect or have the potential to affect, directly or indirectly, any federal or state-listed, threatened, endangered or candidate species, or designated habitat under the Endangered Species Act? If yes, Section 7 consultation between the FAA and the US Fish & Wildlife Service, National Marine Fisheries Service, and/or the appropriate state agency will be necessary. Provide a description of the impacts and how impacts will be avoided, minimized, or mitigated. Provide the Biological Assessment and Biological Opinion, if required. The project would not result in a loss of habitat for any federally or state listed or candidate threatened or endangered species.	☐	☒

	YES	NO
Does the project have the potential to take birds protected by the Migratory Bird Treaty Act? Describe steps to avoid, minimize, or mitigate impacts (such as timing windows determined in consultation with the US Fish & Wildlife Service). There are no trees on the airfield. Further, no habitat suitable for use by any listed or candidate federal or state threatened or endangered species is present. However, the proposed improvements would impact approximately 24.5 acres of on-Airport burrowing owl nesting habitat. Both natural and artificial burrows are present in this area. Although burrowing owls are not a listed or candidate endangered or threatened species under the Federal or State Endangered Species Acts, they are a California Species of Special Concern. The loss of this habitat was anticipated and accounted for in the City of San Jose's Amendment to the SJC Master Plan EIR (2020). The Airport will provide compensatory mitigation in the form of fee payments per the Santa Clara Valley Habitat Conservation Plan (HCP) for impacts to burrowing owl habitat. The HCP has been approved by both the US Fish & Wildlife Service (USFWS) and the California Department of Fish & Wildlife (CDFW). Compensatory payments would be consistent with the Voluntary Fee Payments Policy of the Santa Clara Valley Habitat Agency, which states that voluntary burrowing owl fees paid as mitigation "will be applied toward burrowing owl management agreements, burrowing owl habitat management and monitoring, as well as burrowing owl habitat restoration and land acquisition."	☒	☐

5-2.b (4) Other Resources

Items to consider include:

a. Fish and Wildlife Coordination Act	**YES**	**NO**
Does the project area contain resources protected by the Fish and Wildlife Coordination Act? If yes, describe any impacts and steps taken to avoid, minimize, or mitigate impacts. No resources protected by the Fish & Wildlife Coordination Act are present in the project area.	☐	☒
b. Wetlands and Other Waters of the U.S.	**YES**	**NO**
Are there any wetlands or other waters of the U.S. in or near the project area? Based on biological surveys, there are no wetlands anywhere on SJC.	☐	☒
Has wetland delineation been completed within the proposed project area? If yes, please provide U.S. Army Corps of Engineers (USACE) correspondence and jurisdictional determination. If delineation was not completed, was a field check done to confirm the presence/absence of wetlands or other waters of the U.S.? If no to both, please explain what methods were used to determine the presence/absence of wetlands. None of the unpaved areas at SJC have vegetative or hydrologic conditions that would indicate a potential wetland. Therefore, no delineation was warranted.	☐	☒
If wetlands are present, will the project result in impacts, directly or indirectly (including tree clearing)? Describe any steps taken to avoid, minimize or mitigate the impact. As noted above, no wetlands are present and therefore no avoidance, minimization, or mitigation measures are needed.	☐	☒
Is a USACE Clean Water Act Section 404 permit required? If yes, does the project fall within the parameters of a general permit? If so, which general permit? No components of the project are located within or adjacent to areas that are under the jurisdiction of the USACE. Therefore, no Section 404 permit would be required.	☐	☒
c. Floodplains	**YES**	**NO**
Will the project be located in, encroach upon or otherwise impact a floodplain? If yes, describe impacts and any agency coordination or public review completed including coordination with the local floodplain administrator. Attach the FEMA map if applicable and any documentation.	☒	☐

Based on FEMA floodplain maps, areas of localized ponding are present at SJC. These localized ponding zones, shown in Exhibit 3, occur primarily in the unpaved pockets between the runways and taxiways. The project will include work within the localized ponding areas. The proposed project is limited to surface improvements that will affect the boundaries of the ponding between the taxiways and runways but will not cause nearby structures or buildings to flood during the 100-year flood event. Ponding will not encroach onto the runways or taxiways during the design storm event. Further, the improvements will be designed to comply with FAA guidance pertaining to the avoidance/minimization of ponding on runways and taxiways during the 100-Year Flood event. In compliance with Executive Order 11988, Floodplain Management, and DOT Order 5650.2, Floodplain Management and Protection, it is concluded that there is no practicable alternative to the above-described improvements within the identified areas subject to ponding/flooding. The improvements would not, however, involve a significant encroachment in a floodplain because: 1) the encroachment would not result in loss of human life, 2) the encroachment would not lead to damage that could be substantial in cost or extent, including interruption of service on or loss of a vital transportation facility, and 3) the encroachment would not result in a notable adverse impact on natural and beneficial floodplain values.		
d. Coastal Resources	**YES**	**NO**
Will the project occur in or impact a coastal zone as defined by the State's Coastal Zone Management Plan? If yes, discuss the project's consistency with the State's CZMP. Attach the consistency determination if applicable. SJC is not located within or near a Coastal Zone.	☐	☒
Will the project occur in or impact the Coastal Barrier Resource System as defined by the US Fish and Wildlife Service? SJC is not located within or near the USFWS' Coastal Barrier Resource System.	☐	☒
e. National Marine Sanctuaries	**YES**	**NO**
Is a National Marine Sanctuary located in the project area? If yes, discuss the potential for the project to impact that resource. SJC is not located within or near a National Marine Sanctuary.	☐	☒

f. Wilderness Areas	**YES**	**NO**
Is a Wilderness Area located in the project area? If yes, discuss the potential for the project to impact that resource. There are no Wilderness Areas located within the region.	☐	☒
g. Farmland	**YES**	**NO**
Is there prime, unique, state, or locally important farmland in/near the project area? Describe any significant impacts from the project. There are no farmlands on or adjacent to SJC. Therefore, the project would not convert any farmland to non-agricultural uses.	☐	☒
Does the project include the acquisition and conversion of farmland? If farmland will be converted, describe coordination with the US Natural Resources Conservation and attach the completed Form AD-1006. No farmland is present at SJC or in the vicinity.	☐	☒
h. Energy Supply and Natural Resources	**YES**	**NO**
Will the project change energy requirements or use consumable natural resources either during construction or during operations? The project would use consumable natural resources to power construction equipment during construction. The project would not use consumable natural resources during operation. There are no unusual project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities, or equipment that would not conform to current emissions standards (and related fuel activities). The construction plan is designed to minimize fuel usage.	☒	☐
Will the project change aircraft/vehicle traffic patterns that could alter fuel usage either during construction or operations? The project would have no impact on aircraft flight tracks/patterns, airfield capacity, or roadway traffic. All construction would occur within the existing airfield and be phased and coordinated with the Control Tower and airport users to minimize temporary impacts on aircraft ground movements.	☐	☒
i. Wild and Scenic Rivers	**YES**	**NO**
Is there a river on the Nationwide Rivers Inventory, a designated river in the National System, or river under State jurisdiction (including study or eligible segments) near the project?	☐	☒

No rivers on the National Rivers Inventory or rivers designated as Wild & Scenic are located in the region.		
Will the project directly or indirectly affect the river or an area within ¼ mile of its ordinary high water mark? No rivers on the National Rivers Inventory or rivers designated as Wild & Scenic are located in the region.	☐	☒
j. Solid Waste Management	**YES**	**NO**
Does the project (either the construction activity or the completed, operational facility) have the potential to generate significant levels of solid waste? If so, discuss how these will be managed. As standard practice, the City requires the recycling of construction-related waste (e.g., concrete and building materials). Asphalt and concrete removed as part of the project will be recycled..	☐	☒

5-2.b(5) Disruption of an Established Community

	YES	NO
Will the project disrupt a community, planned development or be inconsistent with plans or goals of the community? The project is located entirely within the boundaries of SJC and would not be inconsistent with plans or goals of the community.	☐	☒
Are residents or businesses being relocated as part of the project? The project is located entirely within the boundaries of SJC. No residents or businesses would be relocated due to the project..	☐	☒

5-2.b(6) Environmental Justice

	YES	NO
Are there minority and/or low-income populations in/near the project area?	☐	☒
Will the project cause any disproportionately high and adverse impacts to minority and/or low-income populations? Attach census data if warranted. The construction would be limited to work on the existing airfield at the Airport.	☐	☒

5-2.b(7) Surface Transportation

	YES	NO
Will the project cause a significant increase in surface traffic congestion or cause a degradation of level of service provided? Surface traffic will not be impacted either during construction or after. All construction activity will occur within the existing airfield. The project improves airfield safety and is not capacity-enhancing.	☐	☒
Will the project require a permanent road relocation or closure? If yes, describe the nature and extent of the relocation or closure and indicate if coordination with the agency responsible for the road and emergency services has occurred. The project would not require a permanent road relocation or closure.	☐	☒

5-2.b(8) Noise

	YES	NO
Will the project result in an increase in aircraft operations, nighttime operations, or change aircraft fleet mix? The project would not result in any temporary or permanent increase in aircraft operations at any time of the day and would have no effect on aircraft fleet mix.	☐	☒
Will the project cause a change in airfield configuration, runway use, or flight patterns either during construction or after the project is implemented? The purpose of the project is to modify the airfield configuration to improve operational safety and compliance with FAA design standards and geometric criteria. The improvements are not capacity enhancing. Aircraft operations and flight patterns would not be affected. Construction will be phased and coordinated to minimize temporary impacts on aircraft ground movements.	☒	☐
Does the forecast exceed 90,000 annual propeller operations, 700 annual jet operations or 10 daily helicopter operations or a combination of the above? If yes, a noise analysis may be required if the project would result in a change in operations. The project would have no impact on existing or projected flight operations of any type.	☐	☒
Has a noise analysis been conducted, including but not limited to generated noise contours, a specific point analysis, area equivalent method analysis, or other screening method. If yes, provide that documentation.	☐	☒

	YES	NO
Could the project have a significant impact (DNL 1.5 dB or greater increase) on noise levels over noise sensitive areas within the 65+ DNL noise contour? No changes in noise levels would result as the project would not change aircraft operations or flight patterns.	☐	☒

5-2.b(9) Air Quality

	YES	NO
Is the project located in a Clean Air Act non-attainment or maintenance area? SJC is located in the San Francisco Bay Area Air Basin, which is a non-attainment area for ozone and fine particulate matter (PM2.5). The region is a maintenance area for carbon monoxide (CO).	☒	☐
If yes, is it listed as exempt, presumed to conform or will emissions (including construction emissions) from the project be below *de minimis* levels (provide the paragraph citation for the exemption or presumed to conform list below, if applicable) Is the project accounted for in the State Implementation Plan or specifically exempted? Attach documentation. The runway incursion improvements would be presumed to conform, as stated in 72 Federal Register 41565-41580 and cited in FAA Order 1050.1 F. The proposed improvements are covered by the following presumptions of conformance: 1. Pavement markings 3. Non-runway pavement work 9. Airport safety	☒	☐
Does the project have the potential to increase landside or airside capacity, including an increase of surface vehicles? The project would not have any effect on either airside or landside traffic volumes.	☐	☒
Could the project impact air quality or violate local, State, Tribal or Federal air quality standards under the Clean Air Act Amendments of 1990 either during construction or operations? The project would have no effect on the number of aircraft operations or activity levels at SJC. Therefore, pollution emissions would not increase and violations of air quality standards would not occur.	☐	☒

5-2.b (10) Water Quality

	YES	NO
Are there water resources within or near the project area? These include groundwater, surface water (lakes, rivers, etc.), sole source aquifers, and public water supply. If yes, provide a description of the resource, including the location (distance from project site, etc.). The Guadalupe River is located adjacent to SJC (see Exhibit 1). The River is approximately 1,900 feet from the project site at its closest point.	☒	☐
Will the project impact any of the identified water resources either during construction or operations? Describe any steps that will be taken to protect water resources during and after construction. The project would comply with the requirements of the NPDES permit for the City of San José, including implementing best management practice treatments to reduce the amount of pollutants contained in stormwater runoff.	☐	☒
Will the project increase the amount or rate of stormwater runoff either during construction or during operations? Describe any steps that will be taken to ensure it will not impact water quality. The project would comply with the requirements of the NPDES permit for the City of San José, including implementing best management practice treatments to reduce the amount of pollutants contained in stormwater runoff.	☐	☒
Does the project have the potential to violate federal, state, tribal or local water quality standards established under the Clean Water and Safe Drinking Water Acts?	☐	☒
Are any water quality related permits required? If yes, list the appropriate permits.	☐	☒

5-2.b(11) Highly Controversial on Environmental Grounds

	YES	NO
Is the project highly controversial? The term "highly controversial" means a substantial dispute exists as to the size, nature, or effect of a proposed federal action. The effects of an action are considered highly controversial when reasonable disagreement exists over the project's risks of causing environmental harm. Mere opposition to a project is not sufficient to be considered highly controversial on environmental grounds. Opposition on environmental grounds by a federal, state, or local government agency or by a tribe or a substantial number of the persons affected by the action should be considered in determining whether or not reasonable disagreement exists regarding the effects of a proposed action. There is no known controversy associated with the proposed improvements.	☐	☒

5-2.b(12) Inconsistent with Federal, State, Tribal or Local Law

	YES	NO
Will the project be inconsistent with plans, goals, policy, zoning, or local controls that have been adopted for the area in which the airport is located? The project supports the safe and efficient operation of the aviation facilities at SJC, which is consistent with the policies of the San Jose General Plan, Airport Master Plan, and the County Airport Land Use Commission's Comprehensive Land Use Compatibility Plan for SJC.	☐	☒
Is the project incompatible with surrounding land uses? The project would occur within SJC and would not result in off-Airport impacts. Therefore, the project would not be incompatible with surrounding land uses.	☐	☒

5-2 .b (13) Light Emissions, Visual Effects, and Hazardous Materials

a. Light Emissions and Visual Effects	YES	NO
Will the proposed project produce light emission impacts? The project would not result in light emission impacts. Outdoor lighting would be limited to low-intensity taxiway and airfield light fixtures. There are no adjacent sensitive receptors (e.g., residences or schools) to the proposed sites that would be adversely affected by the construction of the project.	☐	☒

Will there be visual or aesthetic impacts as a result of the proposed project and/or have there been concerns expressed about visual/aesthetic impacts? The project would not result in visual or aesthetic impacts, as it is limited to taxiway modifications/additions. The area is urbanized and the Airport is boarded by major highways and freeways. No concerns pertaining to visual/aesthetic impacts have been raised by the public.	☐	☒
b. Hazardous Materials	**YES**	**NO**
Does the project involve or affect hazardous materials? The proposed taxiway modifications would not expose construction workers or the public to site contaminated with hazardous materials. The project would not generate hazardous substances.	☐	☒
Will construction take place in an area that contains or previously contained hazardous materials? There is no known or suspected contamination on the airfield.	☐	☒
If the project involves land acquisition, is there a potential for this land to contain hazardous materials or contaminants? The project does not involve land acquisition.	☐	☒
Will the proposed project produce hazardous and/or solid waste either during construction or after? If yes, how will the additional waste be handled? The proposed project would not result in an increased use or storage of any hazardous substances. The project would remove and dispose of a small portion of pavement from the airfield. As standard practice, the City requires the recycling of construction-related waste (e.g., concrete and building materials). For this project, all asphalt and concrete removed during the construction of the proposed improvements will be recycled.	☒	☐

5-2 .b (14) Public Involvement

	YES	NO
Was there any public notification or involvement? If yes, provide documentation. The project was formulated through the FAA-funded RIM Study which included participation of a 17-member technical working group comprised of FAA regulatory and SJC user representatives. The project was also presented and discussed at numerous public meetings from 2016 through early 2020, including the Santa Clara County Airport Land Use Commission, San Jose Airport Commission, San Jose Planning Commission, and San Jose City Council and its Transportation and Environment subcommittee. In addition, the Environmental Impact Report (EIR) prepared by the City for the amended SJC Master Plan (of which the project is a part) included requisite public outreach and notification components.	☒	☐

5-2 .b (15) Indirect/Secondary/Induced Impacts

	YES	NO
Will the project result in indirect/secondary/induced impacts? The project would not result in secondary or induced impacts.	☐	☒
When considered with other past, present, and reasonably foreseeable future projects, on or off airport property and regardless of funding source, would the proposed project result in a significant cumulative impact? The impacts of the project would be negligible and would not materially contribute to any cumulative impacts.	☐	☒

Permits

List any permits required for the proposed project that have not been previously discussed. Provide details on the status of permits.

None.

Environmental Commitments

List all measures and commitments made to avoid, minimize, mitigate, and compensate for impacts on the environment, which are needed for this project to qualify for a CATEX.

1. To prevent any degradation of water quality during ground-disturbing activities, the Airport will implement standard BMPs.

2. The Airport would provide compensatory mitigation in the form of fee payments for impacts on burrowing owl nesting habitat per the Santa Clara Valley Habitat Conservation Plan (HCP). Compensatory payments would be consistent with the Voluntary Fee Payments Policy of the Santa Clara Valley Habitat Agency, which states that voluntary burrowing owl fees paid as mitigation "will be applied toward burrowing owl management agreements, burrowing owl habitat management and monitoring, as well as burrowing owl habitat restoration and land acquisition."

Preparer Information

Point of Contact: John Hesler, David J. Powers & Associates, Inc.		
Address: 1871 The Alameda - Suite 200		
City: San Jose	**State:** CA	**Zip Code:** 95126
Phone: 408-454-3424	**Email Address:** jhesler@davidjpowers.com	

Signature: John Hesler Date: June 10, 2021

Airport Sponsor Information and Certification (may not be delegated to consultant)

Provide contact information for the designated sponsor point of contact and any other individuals requiring notification of the FAA decision.

Point of Contact: Ryan Sheelen		
Address: San Jose International Airport, 1701 Airport Boulevard, Suite B-1130		
City: San Jose	**State:** CA	**Zip Code:** 95110-1206
Phone Number: 408-392-1193	**Email Address**: rsheelen@sjc.org	
Additional Name(s):	**Additional Email Address(es):**	

I certify that the information I have provided above is, to the best of my knowledge, correct. I also recognize and agree that no construction activity, including but not limited to site preparation, demolition, or land disturbance, shall proceed for the above proposed project(s) until FAA issues a final environmental decision for the proposed project(s) and until compliance with all other applicable FAA approval actions (e.g., ALP approval, airspace approval, grant approval) has occurred.

Signature: Ryan Sheelen Date: 06/11/2021

FAA Decision

Having reviewed the above information, it is the FAA's decision that the proposed project (s) or development warrants environmental processing as indicated below.

Name of Airport, LOC ID, and location:

Project Title:

☐ No further NEPA review required. Project is categorically excluded per (cite applicable 1050.1.F CATEX that applies:)

☐..An Environmental Assessment (EA) is required.

☐..An Environmental Impact Statement (EIS) is required.

☐..The following additional documentation is necessary for FAA to perform a complete environmental evaluation of the proposed project.

Name: Title:

Responsible FAA Official

Signature: _____ Date:



VICINITY MAP | EXHIBIT 1

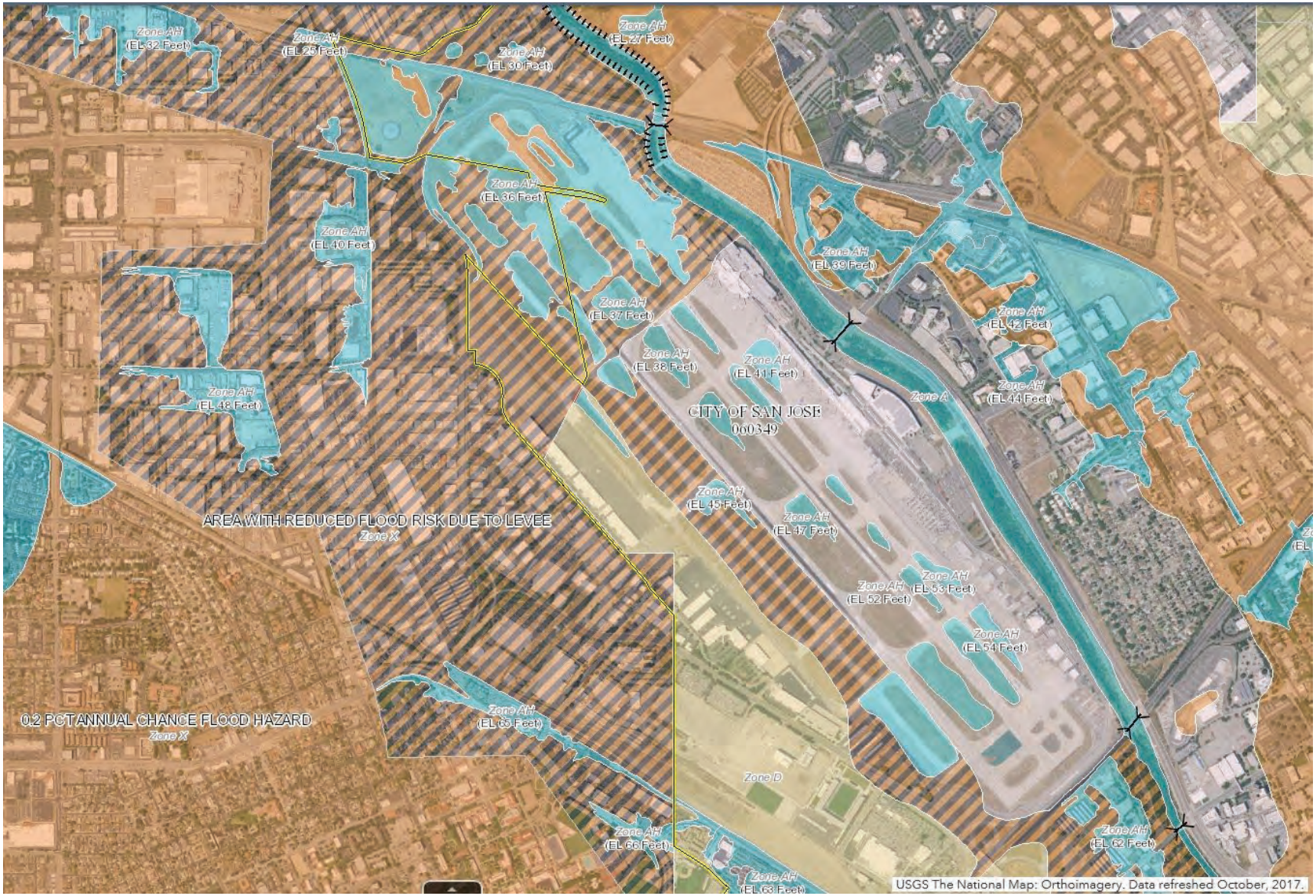


NEW TAXIWAY V



NEW WESTSIDE PARALLEL TAXILANE

NEW TAXIWAY V AND ADJACENT TAXILANE	EXHIBIT 2



AREAS SUBJECT TO FLOODING DURING THE 100-YEAR STORM	EXHIBIT 3

APPENDIX A. DOCUMENTED CATEX

Airport sponsors may use this form for projects eligible for a categorical exclusion (CATEX) that have greater potential for extraordinary circumstances or that otherwise require additional documentation, as described in the Environmental Orders (FAA Order 1050.1F and FAA Order 5050.4B).

To request a CATEX determination from the FAA, the sponsor should review potentially affected environmental resources, review the requirements of the applicable special purpose laws, and **consult with the Airports District Office or Regional Airports Division Office staff** about the type of information needed. The form and supporting documentation should be completed in accordance with the provisions of FAA Order 5050.4B, paragraph 302b, and submitted to the appropriate FAA Airpor5ts District/Division Office. The CATEX cannot be approved until all information/documentation is received and all requirements have been fulfilled.

Name of Airport, LOC ID, and location:

Norman Y. Mineta San Jose International Airport (SJC), San Jose, California

Project Title:

Runway Incursion Mitigation Improvements: Taxiway W Extension

Give a brief, but complete description of the proposed project, including all project components, justification, estimated start date, and duration of the project. Include connected actions necessary to implement the proposed project (including but not limited to moving NAVAIDs, change in flight procedures, haul routes, new material or expanded material sources, staging or disposal areas). Attach a sketch or plan of the proposed project. Photos can also be helpful.

The project proposes to modify certain components of the Norman Y. Mineta San José International Airport (SJC) airfield configuration and geometry to reduce the potential for runway incursions and to improve compliance with current FAA design standards. Construction of the project would begin in 2022 and end approximately in 2026. The proposed modifications to the airfield are listed below.

PROJECT PURPOSE AND NEED

The purpose and need for the project is to reduce the potential for runway incursions, and related deficiencies in terms of compliance with current FAA airfield design standards and geometric criteria, at SJC. A "runway incursion" is defined as the unauthorized presence of an aircraft, vehicle or person on a surface designated for the landing and take-off of aircraft. Runway incursions are a signifcant safety concern, the most serious of which have led to collisions, injuries, and fatalities.

SJC has a history of runway and other airfield incursions, which led to the FAA-funded Runway Incursion Mitigation/Design Standards Analysis Study ("RIM Study") conducted in 2016-2019. The RIM Study formulated a package of modifications to SJC's airfield configuration to improve operational safety and design standards compliance, the first phase of which comprises this project. Formal FAA approval of an updated Airport Layout Plan set incorporating the full package of RIM Study improvements and completion of this Documented CATEX for the first phase of implementation are the final tasks of the RIM Study.

PROJECT DESCRIPTION

Taxiway W Extension: As shown on Exhibit 2, parallel Taxiway W would be extended south from Taxiway B to Runway 12R-30L as Taxiway W1 through construction of new pavement and associated shoulders and lighting/marking.

Technical analysis conducted during the RIM Study, vetted through a technical working group of 17 FAA regulatory and airport user representatives, determined that the above-described set of airfield modifications would improve operational safety, reduce several existing design standards deficiencies that potentially contribute to runway incursions, and maintain operational capacity for projected demand. No changes would be made to the configuration or operation of Runways 12R-30L and 12L-30R, and all construction associated with the project improvements would occur within the existing airfield.

Give a brief, but complete, description of the proposed project area. Include any unique or natural features within or surrounding airport property.

SJC is located in an urbanized portion of the Cities of San Jose and Santa Clara. As shown on Exhibit 1, SJC is bordered by the U.S. 101 freeway on the north, commercial/industrial uses on the west, the I-880 freeway on the south, and the Guadalupe River on the east. SJC's airfield is separated from the Guadalupe River by a combination of passenger terminals, parking garages, surface parking lots, Airport support facilities, and Airport Boulevard.

Identify the appropriate CATEX paragraph(s) from Order 1050.1F (paragraph 5-6.1 through 5-6.6) or 5050.4B (Tables 6-1 and 6-2) that apply to the project. Describe if the project differs in any way from the specific language of the CATEX or examples given as described in the Order.

The following language from Table 6-2 of Order 5050.4B applies to the proposed project: "Build, repair, or extend an existing airport's aprons, loading ramps, taxiway, or taxi lane provided they have only on-airport impacts."

The circumstances one must consider when documenting a CATEX are listed below along with each of the impact categories related to the circumstance. Use FAA Environmental Orders 1050.1F, 5050.4B, and the Desk Reference for Airports Actions, as well as other guidance documents to assist you in determining what information needs to be provided about these resource topics to address potential impacts. Keep in mind that both construction and operational impacts must be included.

Indicate whether or not there would be any effects under the particular resource topic and, **if needed**, cite available references to support these conclusions. Additional analyses and inventories can be attached or cited as needed.

5-2.b(1) National Historic Preservation Act (NHPA) resources

	YES	NO
Are there historic/cultural resources listed (or eligible for listing) on the National Register of Historic Places located in the Area of Potential Effect? If yes, provide a record of the historic and/or cultural resources located therein and check with your local Airports Division/District Office to determine if a Section 106 finding is required. An Area of Potential Effect (APE) for the proposed airfield improvements was established. A records search and review was undertaken by a qualified archaeologist to determine if historic/cultural resources are present within the APE. Local Native American tribes were also consulted and no responses were received. This effort determined that no historic properties have been identified within the APE and that the potential for discovering archaeological resources during construction of the proposed improvements is low. Based on this conclusion, the FAA reached a "finding of no historic properties affected" pursuant to Section 106. This finding was forwarded to the SHPO with a request for concurrence on April 22, 2021. In a letter to the FAA dated June 7, 2021, the SHPO concurred with this finding. Based on this information, the project would not result in impacts to any known historic, architectural, archaeological, or cultural resources. Further, in the even that cultural resources are discovered during construction, the impacts would be mitigated in accordance with federal and state laws that govern such discoveries.	☐	☒
Does the project have the potential to cause effects? If yes, describe the nature and extent of the effects.	☐	☒
Is the project area undisturbed? If not, provide information on the prior disturbance (including type and depth of disturbance, if available) The proposed modifications to various components of the airfield are at locations where previous disturbance has occurred to construct the existing runways, taxiways, blast pads, etc.	☐	☒

	YES	NO
Will the project impact tribal land or land of interest to tribes? If yes, describe the nature and extent of the effects and provide information on the tribe affected. Consultation with their THPO or a tribal representative along with the SHPO may be required.	☐	☒

5-2.b(2) Department of Transportation Act Section 4(f) and 6(f) resources

	YES	NO
Are there any properties protected under Section 4(f) (as defined by FAA Order 1050.1F) in or near the project area? This includes publicly owned parks, recreation areas, and wildlife or waterfowl refuges of national, state or local significance or land from a historic site of national, state or local significance. There are no Section 4(f) lands in or near the project area.	☐	☒
Will project construction or operation physically or constructively "use" any Section 4(f) resource? If yes, describe the nature and extent of the use and/or impacts, and why there are no prudent and feasible alternatives. See 5050.4B Desk Reference Chapter 7. There are no Section 4(f) lands in or near the project area.	☐	☒
Will the project affect any recreational or park land purchased with Section 6(f) Land and Water Conservation Funds? If so, please explain, if there will be impacts to those properties. There are no Section 6(f) lands in or near the project area.	☐	☒

5-2.b(3) Threatened or Endangered Species

	YES	NO
Are there any federal or state listed endangered, threatened, or candidate species or designated critical habitat in or near the project area? This includes species protected by individual statute, such as the Bald Eagle. Threatened steelhead fish are present in the Guadalupe River, which is adjacent to SJC. However, at its closest point, the airfield is more than 750 feet from the River and there are roadways and buildings between the River and the airfield. The project would not encroach within the City's Riparian Corridor Buffer Zone that was established to protect resources associated with the River. Due to these facts, the project would have no direct or indirect impacts on the Guadalupe River or fisheries resources.	☐	☒
Does the project affect or have the potential to affect, directly or indirectly, any federal or state-listed, threatened, endangered or candidate species, or designated habitat under the Endangered Species Act? If yes, Section 7 consultation between the FAA and the US Fish & Wildlife Service, National Marine Fisheries Service, and/or the appropriate state agency will be necessary. Provide a description of the impacts and how impacts will be avoided, minimized, or mitigated. Provide the Biological Assessment and Biological Opinion, if required. The project would not result in a loss of habitat for any federally or state listed or candidate threatened or endangered species.	☐	☒

	YES	NO
Does the project have the potential to take birds protected by the Migratory Bird Treaty Act? Describe steps to avoid, minimize, or mitigate impacts (such as timing windows determined in consultation with the US Fish & Wildlife Service). There are no trees on the airfield. Further, no habitat suitable for use by any listed or candidate federal or state threatened or endangered species is present. However, the proposed improvements would impact approximately two acres of on-Airport burrowing owl nesting habitat. Both natural and artificial burrows are present in this area. Although burrowing owls are not a listed or candidate endangered or threatened species under the Federal or State Endangered Species Acts, they are a California Species of Special Concern. The loss of this habitat was anticipated and accounted for in the City of San Jose's Amendment to the SJC Master Plan EIR (2020). The Airport will provide compensatory mitigation in the form of fee payments per the Santa Clara Valley Habitat Conservation Plan (HCP) for impacts to burrowing owl habitat. The HCP has been approved by both the US Fish & Wildlife Service (USFWS) and the California Department of Fish & Wildlife (CDFW). Compensatory payments would be consistent with the Voluntary Fee Payments Policy of the Santa Clara Valley Habitat Agency, which states that voluntary burrowing owl fees paid as mitigation "will be applied toward burrowing owl management agreements, burrowing owl habitat management and monitoring, as well as burrowing owl habitat restoration and land acquisition."	☒	☐

5-2.b (4) Other Resources

Items to consider include:

a. Fish and Wildlife Coordination Act	**YES**	**NO**
Does the project area contain resources protected by the Fish and Wildlife Coordination Act? If yes, describe any impacts and steps taken to avoid, minimize, or mitigate impacts. No resources protected by the Fish & Wildlife Coordination Act are present in the project area.	☐	☒
b. Wetlands and Other Waters of the U.S.	**YES**	**NO**
Are there any wetlands or other waters of the U.S. in or near the project area? Based on biological surveys, there are no wetlands anywhere on SJC.	☐	☒
Has wetland delineation been completed within the proposed project area? If yes, please provide U.S. Army Corps of Engineers (USACE) correspondence and jurisdictional determination. If delineation was not completed, was a field check done to confirm the presence/absence of wetlands or other waters of the U.S.? If no to both, please explain what methods were used to determine the presence/absence of wetlands. None of the unpaved areas at SJC have vegetative or hydrologic conditions that would indicate a potential wetland. Therefore, no delineation was warranted.	☐	☒
If wetlands are present, will the project result in impacts, directly or indirectly (including tree clearing)? Describe any steps taken to avoid, minimize or mitigate the impact. As noted above, no wetlands are present and therefore no avoidance, minimization, or mitigation measures are needed.	☐	☒
Is a USACE Clean Water Act Section 404 permit required? If yes, does the project fall within the parameters of a general permit? If so, which general permit? No components of the project are located within or adjacent to areas that are under the jurisdiction of the USACE. Therefore, no Section 404 permit would be required.	☐	☒
c. Floodplains	**YES**	**NO**
Will the project be located in, encroach upon or otherwise impact a floodplain? If yes, describe impacts and any agency coordination or public review completed including coordination with the local floodplain administrator. Attach the FEMA map if applicable and any documentation.	☒	☐

Based on FEMA floodplain maps, areas of localized ponding are present at SJC. These localized ponding zones, shown in Exhibit 3, occur primarily in the unpaved pockets between the runways and taxiways. The project will include work within the localized ponding areas. The proposed project is limited to surface improvements that will affect the boundaries of the ponding between the taxiways and runways but will not cause nearby structures or buildings to flood during the 100-year flood event. Ponding will not encroach onto the runways or taxiways during the design storm event. Further, the improvements will be designed to comply with FAA guidance pertaining to the avoidance/minimization of ponding on runways and taxiways during the 100-Year Flood event. In compliance with Executive Order 11988, Floodplain Management, and DOT Order 5650.2, Floodplain Management and Protection, it is concluded that there is no practicable alternative to the above-described improvements within the identified areas subject to ponding/flooding. The improvements would not, however, involve a significant encroachment in a floodplain because: 1) the encroachment would not result in loss of human life, 2) the encroachment would not lead to damage that could be substantial in cost or extent, including interruption of service on or loss of a vital transportation facility, and 3) the encroachment would not result in a notable adverse impact on natural and beneficial floodplain values.		
d. Coastal Resources	**YES**	**NO**
Will the project occur in or impact a coastal zone as defined by the State's Coastal Zone Management Plan? If yes, discuss the project's consistency with the State's CZMP. Attach the consistency determination if applicable. SJC is not located within or near a Coastal Zone.	☐	☒
Will the project occur in or impact the Coastal Barrier Resource System as defined by the US Fish and Wildlife Service? SJC is not located within or near the USFWS' Coastal Barrier Resource System.	☐	☒
e. National Marine Sanctuaries	**YES**	**NO**
Is a National Marine Sanctuary located in the project area? If yes, discuss the potential for the project to impact that resource. SJC is not located within or near a National Marine Sanctuary.	☐	☒

f. Wilderness Areas	**YES**	**NO**
Is a Wilderness Area located in the project area? If yes, discuss the potential for the project to impact that resource. There are no Wilderness Areas located within the region.	☐	☒
g. Farmland	**YES**	**NO**
Is there prime, unique, state, or locally important farmland in/near the project area? Describe any significant impacts from the project. There are no farmlands on or adjacent to SJC. Therefore, the project would not convert any farmland to non-agricultural uses.	☐	☒
Does the project include the acquisition and conversion of farmland? If farmland will be converted, describe coordination with the US Natural Resources Conservation and attach the completed Form AD-1006. No farmland is present at SJC or in the vicinity.	☐	☒
h. Energy Supply and Natural Resources	**YES**	**NO**
Will the project change energy requirements or use consumable natural resources either during construction or during operations? The project would use consumable natural resources to power construction equipment during construction. The project would not use consumable natural resources during operation. There are no unusual project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities, or equipment that would not conform to current emissions standards (and related fuel activities). The construction plan is designed to minimize fuel usage.	☒	☐
Will the project change aircraft/vehicle traffic patterns that could alter fuel usage either during construction or operations? The project would have no impact on aircraft flight tracks/patterns, airfield capacity, or roadway traffic. All construction would occur within the existing airfield and be phased and coordinated with the Control Tower and airport users to minimize temporary impacts on aircraft ground movements.	☐	☒
i. Wild and Scenic Rivers	**YES**	**NO**
Is there a river on the Nationwide Rivers Inventory, a designated river in the National System, or river under State jurisdiction (including study or eligible segments) near the project?	☐	☒

No rivers on the National Rivers Inventory or rivers designated as Wild & Scenic are located in the region.		
Will the project directly or indirectly affect the river or an area within ¼ mile of its ordinary high water mark? No rivers on the National Rivers Inventory or rivers designated as Wild & Scenic are located in the region.	☐	☒
j. Solid Waste Management	**YES**	**NO**
Does the project (either the construction activity or the completed, operational facility) have the potential to generate significant levels of solid waste? If so, discuss how these will be managed. As standard practice, the City requires the recycling of construction-related waste (e.g., concrete and building materials). Asphalt and concrete removed as part of the project will be recycled..	☐	☒

5-2.b(5) Disruption of an Established Community

	YES	NO
Will the project disrupt a community, planned development or be inconsistent with plans or goals of the community? The project is located entirely within the boundaries of SJC and would not be inconsistent with plans or goals of the community.	☐	☒
Are residents or businesses being relocated as part of the project? The project is located entirely within the boundaries of SJC. No residents or businesses would be relocated due to the project..	☐	☒

5-2.b(6) Environmental Justice

	YES	NO
Are there minority and/or low-income populations in/near the project area?	☐	☒
Will the project cause any disproportionately high and adverse impacts to minority and/or low-income populations? Attach census data if warranted. The construction would be limited to work on the existing airfield at the Airport.	☐	☒

5-2.b(7) Surface Transportation

	YES	NO
Will the project cause a significant increase in surface traffic congestion or cause a degradation of level of service provided? Surface traffic will not be impacted either during construction or after. All construction activity will occur within the existing airfield. The project improves airfield safety and is not capacity-enhancing.	☐	☒
Will the project require a permanent road relocation or closure? If yes, describe the nature and extent of the relocation or closure and indicate if coordination with the agency responsible for the road and emergency services has occurred. The project would not require a permanent road relocation or closure.	☐	☒

5-2.b(8) Noise

	YES	NO
Will the project result in an increase in aircraft operations, nighttime operations, or change aircraft fleet mix? The project would not result in any temporary or permanent increase in aircraft operations at any time of the day and would have no effect on aircraft fleet mix.	☐	☒
Will the project cause a change in airfield configuration, runway use, or flight patterns either during construction or after the project is implemented? The purpose of the project is to modify the airfield configuration to improve operational safety and compliance with FAA design standards and geometric criteria. The improvements are not capacity enhancing. Aircraft operations and flight patterns would not be affected. Construction will be phased and coordinated to minimize temporary impacts on aircraft ground movements.	☒	☐
Does the forecast exceed 90,000 annual propeller operations, 700 annual jet operations or 10 daily helicopter operations or a combination of the above? If yes, a noise analysis may be required if the project would result in a change in operations. The project would have no impact on existing or projected flight operations of any type.	☐	☒
Has a noise analysis been conducted, including but not limited to generated noise contours, a specific point analysis, area equivalent method analysis, or other screening method. If yes, provide that documentation.	☐	☒

	YES	NO
Could the project have a significant impact (DNL 1.5 dB or greater increase) on noise levels over noise sensitive areas within the 65+ DNL noise contour? No changes in noise levels would result as the project would not change aircraft operations or flight patterns.	☐	☒

5-2.b(9) Air Quality

	YES	NO
Is the project located in a Clean Air Act non-attainment or maintenance area? SJC is located in the San Francisco Bay Area Air Basin, which is a non-attainment area for ozone and fine particulate matter (PM2.5). The region is a maintenance area for carbon monoxide (CO).	☒	☐
If yes, is it listed as exempt, presumed to conform or will emissions (including construction emissions) from the project be below *de minimis* levels (provide the paragraph citation for the exemption or presumed to conform list below, if applicable) Is the project accounted for in the State Implementation Plan or specifically exempted? Attach documentation. The runway incursion improvements would be presumed to conform, as stated in 72 Federal Register 41565-41580 and cited in FAA Order 1050.1 F. The proposed improvements are covered by the following presumptions of conformance: 1. Pavement markings 3. Non-runway pavement work 9. Airport safety	☒	☐
Does the project have the potential to increase landside or airside capacity, including an increase of surface vehicles? The project would not have any effect on either airside or landside traffic volumes.	☐	☒
Could the project impact air quality or violate local, State, Tribal or Federal air quality standards under the Clean Air Act Amendments of 1990 either during construction or operations? The project would have no effect on the number of aircraft operations or activity levels at SJC. Therefore, pollution emissions would not increase and violations of air quality standards would not occur.	☐	☒

5-2.b (10) Water Quality

	YES	NO
Are there water resources within or near the project area? These include groundwater, surface water (lakes, rivers, etc.), sole source aquifers, and public water supply. If yes, provide a description of the resource, including the location (distance from project site, etc.). The Guadalupe River is located adjacent to SJC (see Exhibit 1). The River is approximately 1,900 feet from the project site at its closest point.	☒	☐
Will the project impact any of the identified water resources either during construction or operations? Describe any steps that will be taken to protect water resources during and after construction. The project would comply with the requirements of the NPDES permit for the City of San José, including implementing best management practice treatments to reduce the amount of pollutants contained in stormwater runoff.	☐	☒
Will the project increase the amount or rate of stormwater runoff either during construction or during operations? Describe any steps that will be taken to ensure it will not impact water quality. The project would comply with the requirements of the NPDES permit for the City of San José, including implementing best management practice treatments to reduce the amount of pollutants contained in stormwater runoff.	☐	☒
Does the project have the potential to violate federal, state, tribal or local water quality standards established under the Clean Water and Safe Drinking Water Acts?	☐	☒
Are any water quality related permits required? If yes, list the appropriate permits.	☐	☒

5-2.b(11) Highly Controversial on Environmental Grounds

	YES	NO
Is the project highly controversial? The term "highly controversial" means a substantial dispute exists as to the size, nature, or effect of a proposed federal action. The effects of an action are considered highly controversial when reasonable disagreement exists over the project's risks of causing environmental harm. Mere opposition to a project is not sufficient to be considered highly controversial on environmental grounds. Opposition on environmental grounds by a federal, state, or local government agency or by a tribe or a substantial number of the persons affected by the action should be considered in determining whether or not reasonable disagreement exists regarding the effects of a proposed action. There is no known controversy associated with the proposed improvements.	☐	☒

5-2.b(12) Inconsistent with Federal, State, Tribal or Local Law

	YES	NO
Will the project be inconsistent with plans, goals, policy, zoning, or local controls that have been adopted for the area in which the airport is located? The project supports the safe and efficient operation of the aviation facilities at SJC, which is consistent with the policies of the San Jose General Plan, Airport Master Plan, and the County Airport Land Use Commission's Comprehensive Land Use Compatibility Plan for SJC.	☐	☒
Is the project incompatible with surrounding land uses? The project would occur within SJC and would not result in off-Airport impacts. Therefore, the project would not be incompatible with surrounding land uses.	☐	☒

5-2 .b (13) Light Emissions, Visual Effects, and Hazardous Materials

a. Light Emissions and Visual Effects	YES	NO
Will the proposed project produce light emission impacts? The project would not result in light emission impacts. Outdoor lighting would be limited to low-intensity taxiway and airfield light fixtures. There are no adjacent sensitive receptors (e.g., residences or schools) to the proposed sites that would be adversely affected by the construction of the project.	☐	☒

Will there be visual or aesthetic impacts as a result of the proposed project and/or have there been concerns expressed about visual/aesthetic impacts? The project would not result in visual or aesthetic impacts, as it is limited to taxiway modifications/additions. The area is urbanized and the Airport is boarded by major highways and freeways. No concerns pertaining to visual/aesthetic impacts have been raised by the public.	☐	☒
b. Hazardous Materials	**YES**	**NO**
Does the project involve or affect hazardous materials? The proposed taxiway modifications would not expose construction workers or the public to site contaminated with hazardous materials. The project would not generate hazardous substances.	☐	☒
Will construction take place in an area that contains or previously contained hazardous materials? There is no known or suspected contamination on the airfield.	☐	☒
If the project involves land acquisition, is there a potential for this land to contain hazardous materials or contaminants? The project does not involve land acquisition.	☐	☒
Will the proposed project produce hazardous and/or solid waste either during construction or after? If yes, how will the additional waste be handled? The proposed project would not result in an increased use or storage of any hazardous substances. The project would remove and dispose of a small portion of pavement from the airfield. As standard practice, the City requires the recycling of construction-related waste (e.g., concrete and building materials). For this project, all asphalt and concrete removed during the construction of the proposed improvements will be recycled.	☒	☐

5-2 .b (14) Public Involvement

	YES	NO
Was there any public notification or involvement? If yes, provide documentation. The project was formulated through the FAA-funded RIM Study which included participation of a 17-member technical working group comprised of FAA regulatory and SJC user representatives. The project was also presented and discussed at numerous public meetings from 2016 through early 2020, including the Santa Clara County Airport Land Use Commission, San Jose Airport Commission, San Jose Planning Commission, and San Jose City Council and its Transportation and Environment subcommittee. In addition, the Environmental Impact Report (EIR) prepared by the City for the amended SJC Master Plan (of which the project is a part) included requisite public outreach and notification components.	☒	☐

5-2 .b (15) Indirect/Secondary/Induced Impacts

	YES	NO
Will the project result in indirect/secondary/induced impacts? The project would not result in secondary or induced impacts.	☐	☒
When considered with other past, present, and reasonably foreseeable future projects, on or off airport property and regardless of funding source, would the proposed project result in a significant cumulative impact? The impacts of the project would be negligible and would not materially contribute to any cumulative impacts.	☐	☒

Permits

List any permits required for the proposed project that have not been previously discussed. Provide details on the status of permits.

None.

Environmental Commitments

List all measures and commitments made to avoid, minimize, mitigate, and compensate for impacts on the environment, which are needed for this project to qualify for a CATEX.

1. To prevent any degradation of water quality during ground-disturbing activities, the Airport will implement standard BMPs.

2. The Airport would provide compensatory mitigation in the form of fee payments for impacts on burrowing owl nesting habitat per the Santa Clara Valley Habitat Conservation Plan (HCP). Compensatory payments would be consistent with the Voluntary Fee Payments Policy of the Santa Clara Valley Habitat Agency, which states that voluntary burrowing owl fees paid as mitigation "will be applied toward burrowing owl management agreements, burrowing owl habitat management and monitoring, as well as burrowing owl habitat restoration and land acquisition."

Preparer Information

Point of Contact: John Hesler, David J. Powers & Associates, Inc.		
Address: 1871 The Alameda - Suite 200		
City: San Jose	**State:** CA	**Zip Code:** 95126
Phone: 408-454-3424	**Email Address:** jhesler@davidjpowers.com	

Signature: John Hesler Date: June 10, 2021

Airport Sponsor Information and Certification (may not be delegated to consultant)

Provide contact information for the designated sponsor point of contact and any other individuals requiring notification of the FAA decision.

Point of Contact: Ryan Sheelen		
Address: San Jose International Airport, 1701 Airport Boulevard, Suite B-1130		
City: San Jose	**State:** CA	**Zip Code:** 95110-1206
Phone Number: 408-392-1193	**Email Address**: rsheelen@sjc.org	
Additional Name(s):	**Additional Email Address(es):**	

I certify that the information I have provided above is, to the best of my knowledge, correct. I also recognize and agree that no construction activity, including but not limited to site preparation, demolition, or land disturbance, shall proceed for the above proposed project(s) until FAA issues a final environmental decision for the proposed project(s) and until compliance with all other applicable FAA approval actions (e.g., ALP approval, airspace approval, grant approval) has occurred.

Signature: Ryan Sheelen Date: 06/11/2021

FAA Decision

Having reviewed the above information, it is the FAA's decision that the proposed project (s) or development warrants environmental processing as indicated below.

Name of Airport, LOC ID, and location:

Project Title:

☐ No further NEPA review required. Project is categorically excluded per (cite applicable 1050.1.F CATEX that applies:)

☐..An Environmental Assessment (EA) is required.

☐..An Environmental Impact Statement (EIS) is required.

☐..The following additional documentation is necessary for FAA to perform a complete environmental evaluation of the proposed project.

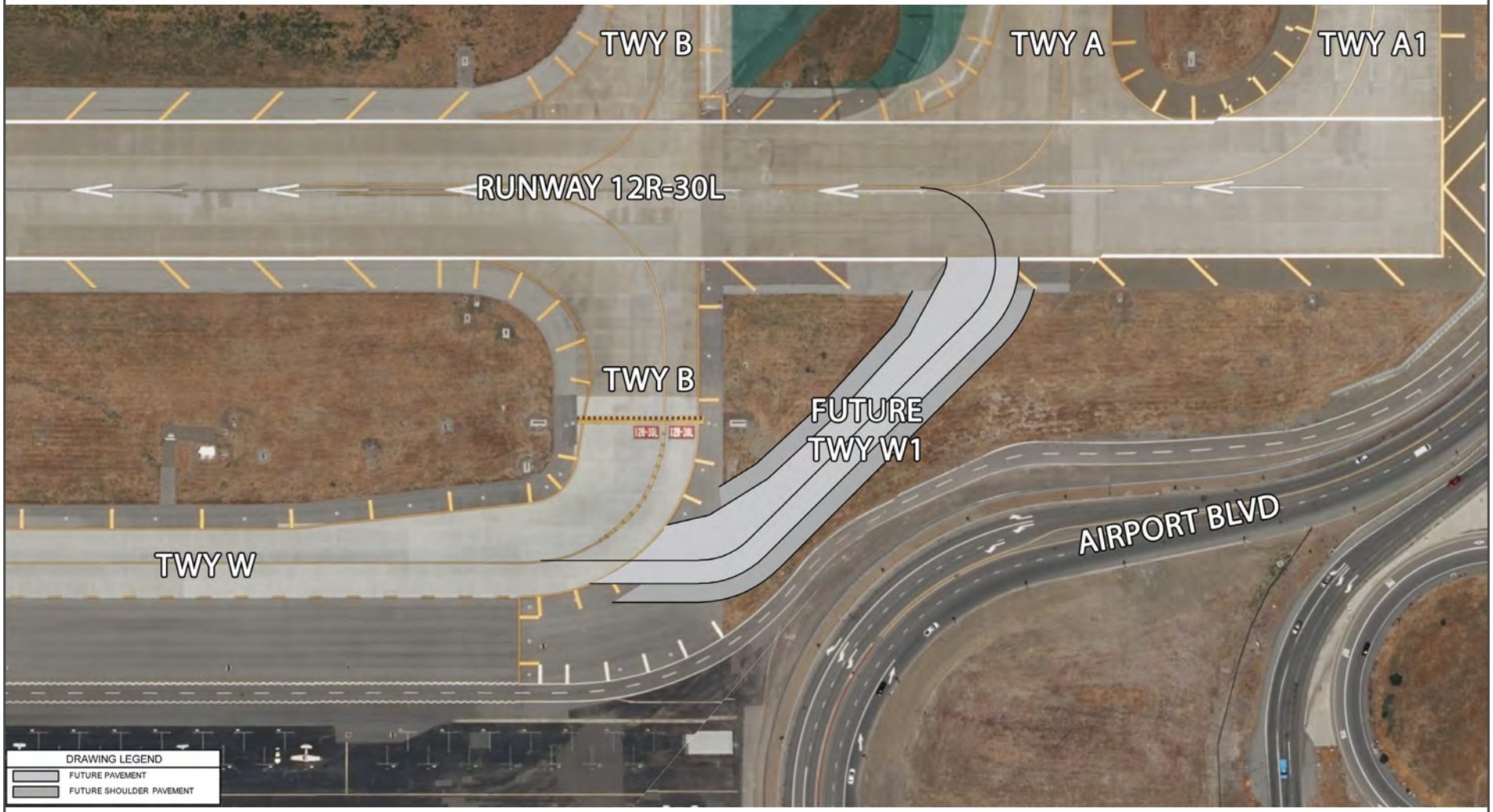
Name: Title:

Responsible FAA Official

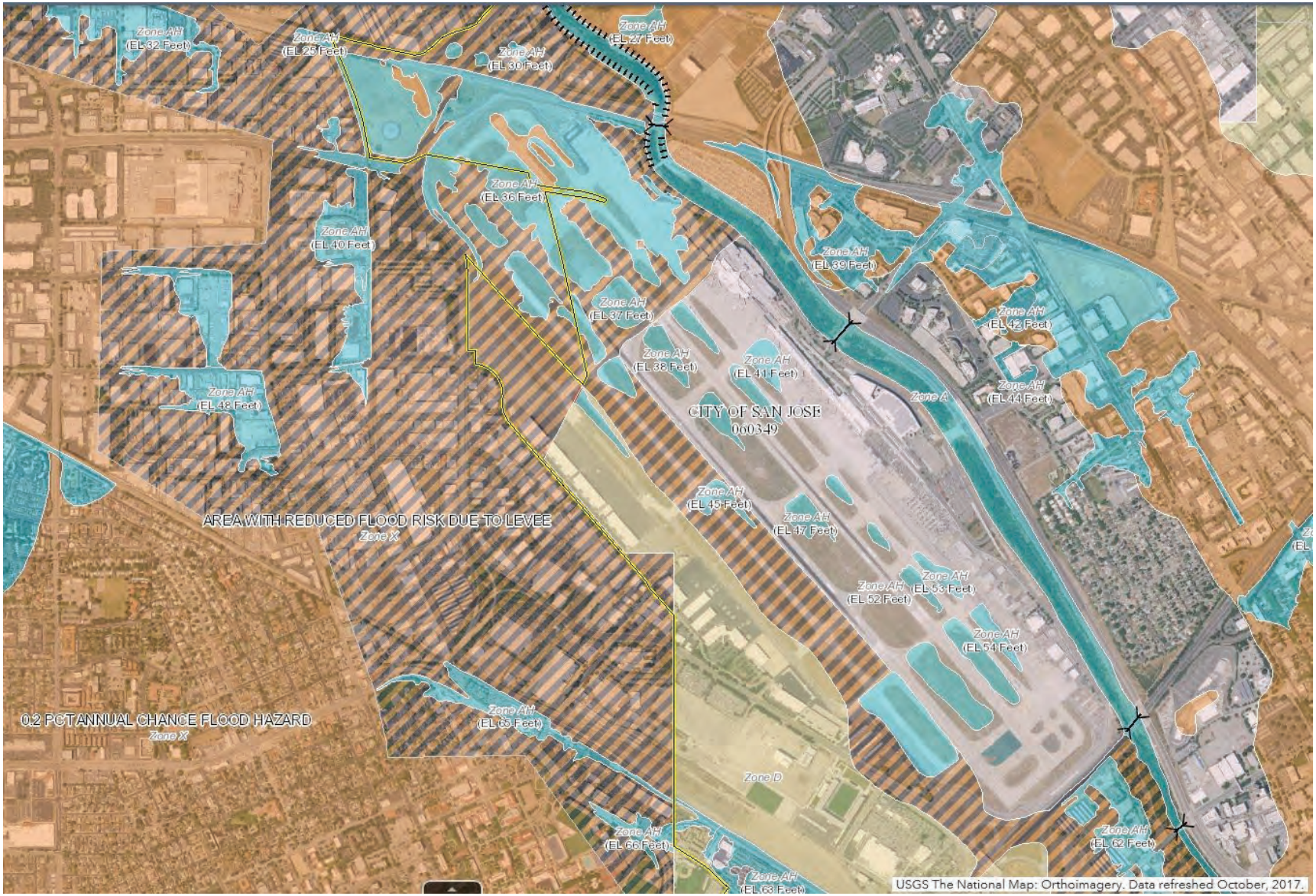
Signature: _____ Date:



VICINITY MAP | EXHIBIT 1



TAXIWAY W EXTENSION | EXHIBIT 2



AREAS SUBJECT TO FLOODING DURING THE 100-YEAR STORM	EXHIBIT 3

NEPA DOCUMENTATION
SHPO

U.S. Department of Transportation
Federal Aviation Administration

Western-Pacific Region
Airports Division

San Francisco Airports District Office
1000 Marina Boulevard, Suite 220
Brisbane, CA 94005

Via E-mail

October 21, 2020

Ms. Julianne Polanco
State Historic Preservation Officer
California Office of Historic Preservation
Attention: Tristan Tozer
1725 23rd Street – Suite 100
Sacramento, California 95816

Subject: Norman Y. Mineta San Jose International Airport (SJC), Runway Incursion Mitigation (RIM) Projects: Submittal of Determination of No Historic Properties Affected by Proposed Projects in Accordance with the National Historic Preservation Act (NHPA), Section 106 Consultation Process

Dear Ms. Polanco:

The City of San Jose, airport sponsor of the Norman Y. Mineta San Jose International Airport (SJC), is proposing 11 Runway Incursion Mitigation (RIM) project actions at SJC. With submittal of this letter the Federal Aviation Administration (FAA) is initiating National Historic Preservation Act (NHPA), Section 106, consultation for these projects at this time.

A "runway incursion" is defined as the unauthorized presence of an aircraft, vehicle or person on a surface designated for the landing and take-off of aircraft. Runway incursions are a significant safety concern. Runway incursions at airports have led to collisions, injuries, and fatalities.

The 11 RIM projects include:

- Project 1: General Aviation Run-up Pad Relocation
- Project 2: "Taxi" Markings on Taxiways Y and W
- Project 3: Taxiway W/M Intersection Modification
- Project 4: New Taxiway V
- Project 5 Taxiways F and H Closure between Runways
- Project 6: New Taxiway Connectors W2 and W3 at Southwest Apron
- Project 7: Taxiway W Extension
- Project 8: Runway 12R-30L Hold Bar Relocation
- Project 9: New West Side Parallel Taxilane
- Project 10: Taxiway B and Taxiway L Width Reduction
- Project 11: Runway 12L-30R Blast Pad Improvements

The attached memorandum prepared by a consultant for the City of San Jose describes the 11 projects, depicts the Area of Potential Effect (APE) for the projects, and evaluates

the effects of the proposed projects on historic properties on or eligible for the National Register of Historic Places (NRHP). The memorandum is briefly summarized below.

There are two known archaeological sites on SJC eligible for the NRHP. Site SCL-311H is related to the settlement and occupation of Mission Santa Clara. Site SCL-311H is located outside of the APE but is within the northwest portion of SJC property. Site SCL-311H will not be affected by the construction of the RIM projects as it is located outside of the APE.

Site SCL-430 is a site that has been recorded in the center of the southwest edge of SJC. Site SCL-430 included historic artifacts found dating to the mid-1800's, assumed to be related to the turn-of-the-20th century residences that were removed for the expansion of SJC. In addition, projectile points estimated at more than 2,000 years old were found on this site. The portion of Site SCL-430 that would be affected by the construction of the RIM projects was previously subjected to earthmoving activities when Taxiway W was constructed. Archaeological monitoring was conducted as part of the Taxiway W project and no archaeological resources were encountered.

Due to the presence of SCL-311H and SCL-430, as well as the general sensitivity of the area due to its proximity to the Guadalupe River, a detailed cultural resources assessment of SJC was prepared as part of the preparation of the California Environmental Quality Act, Environmental Impact Report for the 1980 Airport Master Plan. That assessment, which is attached to the memorandum enclosed for the SJC RIM project, included extensive subsurface testing over the entire SJC property. The 1980 cultural resources assessment identified archaeologically sensitive areas at SJC where the likelihood of encountering buried archaeological materials during construction of future SJC project was greatest. As recommended by the 1980 cultural resources assessment, an archaeological monitoring program was established at SJC whereby a qualified archaeologist monitors subsurface construction activity within areas identified as archaeologically sensitive as depicted in Figure 2 of the attached memorandum. SJC has continued that archaeological monitoring program for construction projects in the identified archaeologically sensitive area since 1980.

The FAA consulted with the State Historic Preservation Office (SHPO) regarding the archaeological monitoring program as part of a NHPA, Section 106 consultation, during preparation of a National Environmental Policy Act, Environmental Impact Statement for the 1999 SJC Master Plan Update. SJC has conducted archaeological monitoring during all earthmoving activity in designated archaeologically sensitive areas since that time.

The proposed set of RIM projects are refinements to, and in some cases overlap the location of, the proposed SJC airfield projects that were analyzed in the 1999 Airport Master Plan EIS. The archaeological monitoring program in place at SJC since 1980 will continue to be applied to the construction of the following RIM projects located wholly or partially within the archaeologically sensitive areas (depicted on Figure 3 of the attached memorandum): Projects 3, 4, 6, 7, 8, 9, 10 and 11. Although RIM Project 2 is located within an archaeologically-sensitive area, no monitoring is required because that project is limited to the painting of markings on existing pavement.

The FAA has independently reviewed the attached memorandum prepared on behalf of the City of San Jose. For the reasons described above, and further discussed in the attached memorandum, the FAA concludes that the proposed RIM projects will not affect any historic properties. In accordance with 36 Code of Federal Regulations Part 800 *Protection of Historic Properties*, specifically 36 CFR § 800.4 (d)(1) *No Historic Properties Affected*, the SHPO has 30 days from the receipt of this notification to object to this determination, after which the FAA can consider its consultation responsibilities under the NHPA, Section 106, to have been fulfilled.

Concurrent with the submittal of this letter to the SHPO, the FAA is contacting nine tribal points-of-contact identified by the California Native American Heritage Commission as tribal points-of-contact for Santa Clara County. The tribal points-of-contact are copied on this letter. The FAA is determining if any of the tribes have concerns regarding the SJC RIM projects or an interest being involved with the archaeological monitoring of these projects.

Should you have questions regarding this letter, please telephone me at (650) 827-7612, e-mail me at douglas.pomeroy@faa.gov, or contact me by mail at the letterhead address. Due to the COVID-19 public health emergency, e-mail is the preferred method of communication at this time our office is teleworking to the maximum extent possible and has limited access to our office.

Sincerely,

10/21/2020

X Douglas R. Pomeroy

Douglas R. Pomeory
Environmental Protection Specialist
Signed by: 438514

Douglas R. Pomeroy
Environmental Protection Specialist

Attachment

Copy to:
Cary Greene, Airport Planner, Norman Y. Mineta San Jose International Airport w/o attachment

Valentin Lopez, Chairperson, Amah Mutsun Tribal Band, w/ attachment

Irenne Zwierlein, Chairperson, Amah Mutsun Tribal Band of Mission San Juan Bautista w/ attachment

Kanyon Sayers-Roods, MLD, KanyonKonsulting w/attachment

Ann Marie Sayers, Chairperson, Indian Canyon Mutsun Band of Costanoan w/attachment

Charlene Nijmeh, Chairperson, Muwekma Ohlone Indian Tribe of the SF Bay Area, w/attachment

Monica Arellano, Muwekma Ohlone Indian Tribe of the SF Bay Area, w/attachment

Timothy Perez, MLD Contact, North Valley Yokuts Tribe w/attachment

Katherine Perez, Chairperson, North Valley Yokuts Tribe w/attachment

Andrew Galvan, The Ohlone Indian Tribe w/attachment

Attachment 1

U.S. Department of Transportation
Federal Aviation Administration

Western-Pacific Region
Airports Division

San Francisco Airports District Office
1000 Marina Boulevard, Suite 220
Brisbane, CA 94005

Via E-mail

October 21, 2020

Ms. Julianne Polanco
State Historic Preservation Officer
California Office of Historic Preservation
Attention: Tristan Tozer
1725 23rd Street – Suite 100
Sacramento, California 95816

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- Project 10: Taxiway B and Taxiway L Width Reduction
- Project 11: Runway 12L-30R Blast Pad Improvements

The attached memorandum prepared by a consultant for the City of San Jose describes the 11 projects, depicts the Area of Potential Effect (APE) for the projects, and evaluates

the effects of the proposed projects on historic properties on or eligible for the National Register of Historic Places (NRHP). The memorandum is briefly summarized below.

There are two known archaeological sites on SJC eligible for the NRHP. Site SCL-311H is related to the settlement and occupation of Mission Santa Clara. Site SCL-311H is located outside of the APE but is within the northwest portion of SJC property. Site SCL-311H will not be affected by the construction of the RIM projects as it is located outside of the APE.

Site SCL-430 is a site that has been recorded in the center of the southwest edge of SJC. Site SCL-430 included historic artifacts found dating to the mid-1800's, assumed to be related to the turn-of-the-20th century residences that were removed for the expansion of SJC. In addition, projectile points estimated at more than 2,000 years old were found on this site. The portion of Site SCL-430 that would be affected by the construction of the RIM projects was previously subjected to earthmoving activities when Taxiway W was constructed. Archaeological monitoring was conducted as part of the Taxiway W project and no archaeological resources were encountered.

Due to the presence of SCL-311H and SCL-430, as well as the general sensitivity of the area due to its proximity to the Guadalupe River, a detailed cultural resources assessment of SJC was prepared as part of the preparation of the California Environmental Quality Act, Environmental Impact Report for the 1980 Airport Master Plan. That assessment, which is attached to the memorandum enclosed for the SJC RIM project, included extensive subsurface testing over the entire SJC property. The 1980 cultural resources assessment identified archaeologically sensitive areas at SJC where the likelihood of encountering buried archaeological materials during construction of future SJC project was greatest. As recommended by the 1980 cultural resources assessment, an archaeological monitoring program was established at SJC whereby a qualified archaeologist monitors subsurface construction activity within areas identified as archaeologically sensitive as depicted in Figure 2 of the attached memorandum. SJC has continued that archaeological monitoring program for construction projects in the identified archaeologically sensitive area since 1980.

The FAA consulted with the State Historic Preservation Office (SHPO) regarding the archaeological monitoring program as part of a NHPA, Section 106 consultation, during preparation of a National Environmental Policy Act, Environmental Impact Statement for the 1999 SJC Master Plan Update. SJC has conducted archaeological monitoring during all earthmoving activity in designated archaeologically sensitive areas since that time.

The proposed set of RIM projects are refinements to, and in some cases overlap the location of, the proposed SJC airfield projects that were analyzed in the 1999 Airport Master Plan EIS. The archaeological monitoring program in place at SJC since 1980 will continue to be applied to the construction of the following RIM projects located wholly or partially within the archaeologically sensitive areas (depicted on Figure 3 of the attached memorandum): Projects 3, 4, 6, 7, 8, 9, 10 and 11. Although RIM Project 2 is located within an archaeologically-sensitive area, no monitoring is required because that project is limited to the painting of markings on existing pavement.

The FAA has independently reviewed the attached memorandum prepared on behalf of the City of San Jose. For the reasons described above, and further discussed in the attached memorandum, the FAA concludes that the proposed RIM projects will not affect any historic properties. In accordance with 36 Code of Federal Regulations Part 800 *Protection of Historic Properties*, specifically 36 CFR § 800.4 (d)(1) *No Historic Properties Affected*, the SHPO has 30 days from the receipt of this notification to object to this determination, after which the FAA can consider its consultation responsibilities under the NHPA, Section 106, to have been fulfilled.

Concurrent with the submittal of this letter to the SHPO, the FAA is contacting nine tribal points-of-contact identified by the California Native American Heritage Commission as tribal points-of-contact for Santa Clara County. The tribal points-of-contact are copied on this letter. The FAA is determining if any of the tribes have concerns regarding the SJC RIM projects or an interest being involved with the archaeological monitoring of these projects.

Should you have questions regarding this letter, please telephone me at (650) 827-7612, e-mail me at douglas.pomeroy@faa.gov, or contact me by mail at the letterhead address. Due to the COVID-19 public health emergency, e-mail is the preferred method of communication at this time our office is teleworking to the maximum extent possible and has limited access to our office.

Sincerely,

10/21/2020

X Douglas R. Pomeroy

Douglas R. Pomeory
Environmental Protection Specialist
Signed by: 438514

Douglas R. Pomeroy
Environmental Protection Specialist

Attachment

Copy to:
Cary Greene, Airport Planner, Norman Y. Mineta San Jose International Airport w/o attachment

Valentin Lopez, Chairperson, Amah Mutsun Tribal Band, w/ attachment

Irenne Zwierlein, Chairperson, Amah Mutsun Tribal Band of Mission San Juan Bautista w/ attachment

Kanyon Sayers-Roods, MLD, KanyonKonsulting w/attachment

Ann Marie Sayers, Chairperson, Indian Canyon Mutsun Band of Costanoan w/attachment

Charlene Nijmeh, Chairperson, Muwekma Ohlone Indian Tribe of the SF Bay Area, w/attachment

Monica Arellano, Muwekma Ohlone Indian Tribe of the SF Bay Area, w/attachment

Timothy Perez, MLD Contact, North Valley Yokuts Tribe w/attachment

Katherine Perez, Chairperson, North Valley Yokuts Tribe w/attachment

Andrew Galvan, The Ohlone Indian Tribe w/attachment

DAVID J. POWERS & ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS & PLANNERS

M E M O R A N D U M

TO: Cary Greene, SJC

FROM: John Hesler, Senior Environmental Specialist

DATE: October 21, 2020

SUBJECT: **Archaeological Issues Associated with Runway Incursion Mitigation (RIM) Improvements At the Norman Y. Mineta San José International Airport**

The purposes of this memorandum are to 1) describe the proposed RIM modifications to the airfield at the Norman Y. Mineta San José International Airport (SJC), 2) describe the archaeological resources that are present, and 3) describe the effects of those proposed modifications on the archaeological resources.

PROJECT DESCRIPTION

The project proposes to modify certain components of the airfield at SJC to reduce the potential for runway incursions and to improve compliance with current FAA design standards. A "runway incursion" is defined as the unauthorized presence of an aircraft, vehicle or person on a surface designated for the landing and take-off of aircraft. Runway incursions are a significant safety concern, the most serious of which have led to collisions, injuries, and fatalities.

The following modifications to the existing airfield at SJC are proposed. The locations of the proposed modifications are shown on Figure 1.

Project #1 - General Aviation Run-up Pad Relocation: The existing run-up pad adjacent to the southwest corner of the Taxiway D/Taxiway W intersection would be removed. A new run-up pad would be located within the existing apron at the southwest corner of the airfield. Improvements would consist of pavement markings, strengthening, and potentially a blast fence.

Project #2 - "Taxi" Markings on Taxiways Y and W: Pavement markings would be added near each end of existing parallel Taxiways W and Y to visually denote their use as taxiways. No construction or demolition would be required.

Project #3 - Taxiway W/M Intersection Modification: The existing northwest corner of the intersection would be rounded off to visually affirm Taxiway W as a parallel taxiway rather than a runway. A portion of the excess pavement would be converted to shoulder, with the remainder closed off through painting.

Project #4 - New Taxiway V: Former Runway 11-29 (closed in 2009 and currently used as Taxiway W1) would be permanently decommissioned and reconstructed as a new parallel Taxiway V, with extensions south to existing cross Taxiway C and north to a new cross Taxiway V7 connecting the end of new Taxiway V to parallel Taxiway W. Total length would be 6,790 feet. Construction would also include up to seven new taxiway connectors (V1-V7) along new Taxiway V to connect to a future parallel taxilane to the west (project element 9 below). Upon completion, existing Taxiway V abutting the general aviation aprons on the west side of SJC would be closed.

Project #5 - Taxiways F and H Closure between Runways: The existing segments of cross Taxiways F and H between Runway 12R-30L and Runway 12L-30R would be closed through pavement painting and lighting/marking removal.

Project #6 - New taxiway Connectors W2 and W3 at Southwest Apron: Two new taxiway connectors (W2-W3) would be created within the southwest apron through pavement marking/painting to channel general aviation aircraft movement to/from parallel Taxiway W.

Project #7 - Taxiway W Extension: Parallel Taxiway W would be extended south from Taxiway B to Runway 12R-30L as Taxiway W1 through construction of new pavement and associated shoulders and lighting/marking.

Project #8 - Runway 12R-30L Hold Bar Relocation: The Runway 12R-30L aircraft hold positions would be relocated 30 feet farther from the runway centerline.

Project #9 - New West Side Parallel Taxilane: Upon closure of existing Taxiway V (part of project element 4 above), the pavement would be replaced with an apron-edge parallel taxilane.

Project #10 - Taxiway B and Taxiway L Width Reduction: A segment of the existing cross Taxiway B between Taxiway Z and Runway 12L-30R, and a segment of the existing cross Taxiway L between Taxiway Y and Runway 12R-30L, would be reduced in width through painted pavement closure.

Project #11 - Runway 12L-30R Blast Pad Improvements: The Runway 12L-30R blast pads would be widened, and the blast pad at the 12L end also lengthened, through pavement construction and markings.

AREA OF POTENTIAL EFFECTS

The area of potential effects (APE) consists of the portions of the airfield at SJC where the above-described RIM improvements will occur; see Figure 1.

EXISTING HISTORIC RESOURCES

There are no existing buildings or structures on the airfield.

EXISTING ARCHAEOLOGICAL RESOURCES

Archaeological investigations conducted for SJC included a detailed survey of the entire Airport property, research on the cultural resources in the Airport vicinity, and an archival search of State records. This research was performed to determine the presence or absence of cultural resources at the Airport and in the Airport vicinity, and to determine the significance of any archaeological resources.

Archival research, which was conducted at the Northwest Information Center of the California Archeological Site Inventory, revealed a number of previous archeological surveys conducted in the Airport vicinity. The existing research has identified two recorded archaeological sites that are known to exist at the Airport: SCL-311H and SCL-430.

SCL-311H

Site SCL-311H is located outside of the APE but is within the northwest portion of SJC and stretches along what was once Mission Road (now called Trimble Road) from the Guadalupe River to North First Street. Research indicates that the site of the route was established in the 1770s as the original access to Mission Santa Clara, which was reported to lie on the east side of the Guadalupe River. In addition, the area may have contained the original adobe structures that housed inhabitants adjacent to the Mission.

In 1999, the FAA determined that SCL-311H is eligible for inclusion on the *National Register of Historic Places* under Criteria A and D. Under Criterion A, this archaeological resource is associated with the Mission Santa Clara. The settlement and occupation of Mission Santa Clara were important events in the history of San José and the Santa Clara Valley and any archaeological resources associated with these events would be considered significant. In addition, this archaeological resource is eligible under Criterion D because it has the potential to yield information associated with the Mission Santa Clara and to provide a greater understanding of the lifeways at the Mission Santa Clara.[1]

SCL-430

SCL-430 is a site that has been recorded in the center of the southwest edge of SJC. Survey of the site surface revealed both historic and pre-historic artifacts. Historic artifacts found dating from the mid-1800s included bottle fragments, ceramics, and metal objects, assumed to be related to turn-of-the-century residences that were removed for Airport expansion (Cartier and Detlefs, 1980). In addition, the site was noted to be on the edge of the old location of the early Santa Clara Mission site. Pre-historic elements encountered included projectile points, three chipped lithics, six fire cracked rocks, and two pieces of possible groundstone within a 300-acre area. The projectile points appeared to be early Middle Horizon or Early Horizon in age (more than 2,000 years old). The area appeared to be associated with hunting/butchering activities.

[1] FAA, Environmental Impact Statement for SJC Master Plan Update, Appendix J: Archaeological, Historical, and Cultural Resources Report, 1999.

In 1999, the FAA determined that SCL-430 is eligible for the *National Register of Historic Places* under Criterion D. This archeological resource is associated with the turn-of-the-century houses that were removed for development of the Airport and this resource is eligible under Criterion D because it has the potential to yield information associated with the lifeways of residents in San José at the turn of the century. [2]

1980 Archaeological Investigation at SJC

Due to the presence of SCL-311H and SCL-430, as well as the general sensitivity of the area due to its proximity to the Guadalupe River, a detailed cultural resources assessment of SJC was prepared as part of the preparation of the EIR for the 1980 Airport Master Plan. This assessment, which is attached to this memorandum as Appendix A, included extensive subsurface testing over the entire Airport site. A total of 237 test trenches were excavated to a maximum depth of 300 cm (approximately three feet). Only three trenches yielded findings of historic nature (cut bone, glass, and metal). None of the trenches yielded prehistoric resources. The 1980 assessment also identified archaeologically sensitive areas at the Airport where the likelihood of encountering buried archaeological materials during the construction of future Airport-related projects is the greatest, as shown on Figure 2.

Archaeological Monitoring at SJC: 1980 - Present

As recommended by the 1980 cultural resources assessment, an archaeological monitoring program was established at the Airport whereby a qualified archaeologist monitors subsurface construction activity within the areas depicted on Figure 2. The program authorizes the monitoring archaeologist to discontinue work within a 100-foot radius of encountering any prehistoric or historic resources. The program also requires the archaeologist to prepare a report evaluating the find and identifying mitigation for impacts. The report is submitted to the City's Director of Planning, Building, and Code Enforcement and the Director of the Airport.

Since 1980, qualified archaeologists have been retained to monitor all earthmoving activities for projects located in the designated archaeological sensitive areas at the Airport. Major construction projects that have been undertaken at the Airport within these archaeological sensitive areas include the Runway 12R/30L extension, Runway 11/29 extension/widening, Taxiways W and L extensions, Taxiways M and V, Yellow Long-Term Parking Lot, Southwest Tiedown Ramp, Passenger Terminal B Construction, westside general aviation facilities, storm and sanitary sewer lines, and employee parking lot and perimeter road. During earthmoving activities associated with these projects, no archaeological resources were observed by the monitoring archaeologist.

Per City policy, archaeological monitoring will continue to occur for all future on-Airport projects that are located within the archaeologically sensitive areas, as depicted on Figure 2.

PREVIOUS SECTION 106 CONSULTATION FOR PROJECTS AT SJC

In 1999, during the preparation of an Environmental Impact Statement (EIS) for the SJC Master Plan Update, the FAA undertook consultation with the State Historic Preservation Officer (SHPO), as required under Section 106 of the National Historic Preservation Act. In a July 1, 1999 letter to the FAA, the SHPO concurred

[2] FAA, Environmental Impact Statement for SJC Master Plan Update, Appendix J: Archaeological, Historical, and Cultural Resources Report, 1999.

that the implementation of the projects listed in the Airport Master Plan Update "will not affect any historic properties." SHPO's concurrence with this conclusion was based on two facts:

- FAA will implement an archeological monitoring program that will require the presence of a qualified archeologist during all earthmoving activities in designated archeologically sensitive areas.
- SCL-311H and SCL-430 will be completely avoided during implementation of the undertaking.[3]

IMPACT OF PROPOSED RIM IMPROVEMENTS ON ARCHAEOLOGICAL RESOURCES

The proposed set of RIM improvements (depicted in Figure 1) are refinements to, and some cases overlap the locations of, the proposed SJC airfield projects that were analyzed in the 1999 Airport Master Plan EIS. The archaeological monitoring program in place at SJC since 1980 would continue to be applied to the construction of the following RIM projects located wholly or partially within the archaeologically sensitive areas (depicted on Figure 3): #1, #3, #4, #6, #7, #8, #9, #10, and #11. Although RIM Project #2 is located within an archaeologically-sensitive area, no monitoring will be required because that project is limited to the painting of markings on existing pavement.

SCL-311H will not be affected by the construction of the RIM projects as it is located outside of the APE. SCL-430 will not be affected since earthmoving activities associated with the RIM projects would be within areas previously subjected to earthmoving activities when Taxiway W was constructed (no archaeological resources were encountered during that taxiway project construction).

CONCLUSION

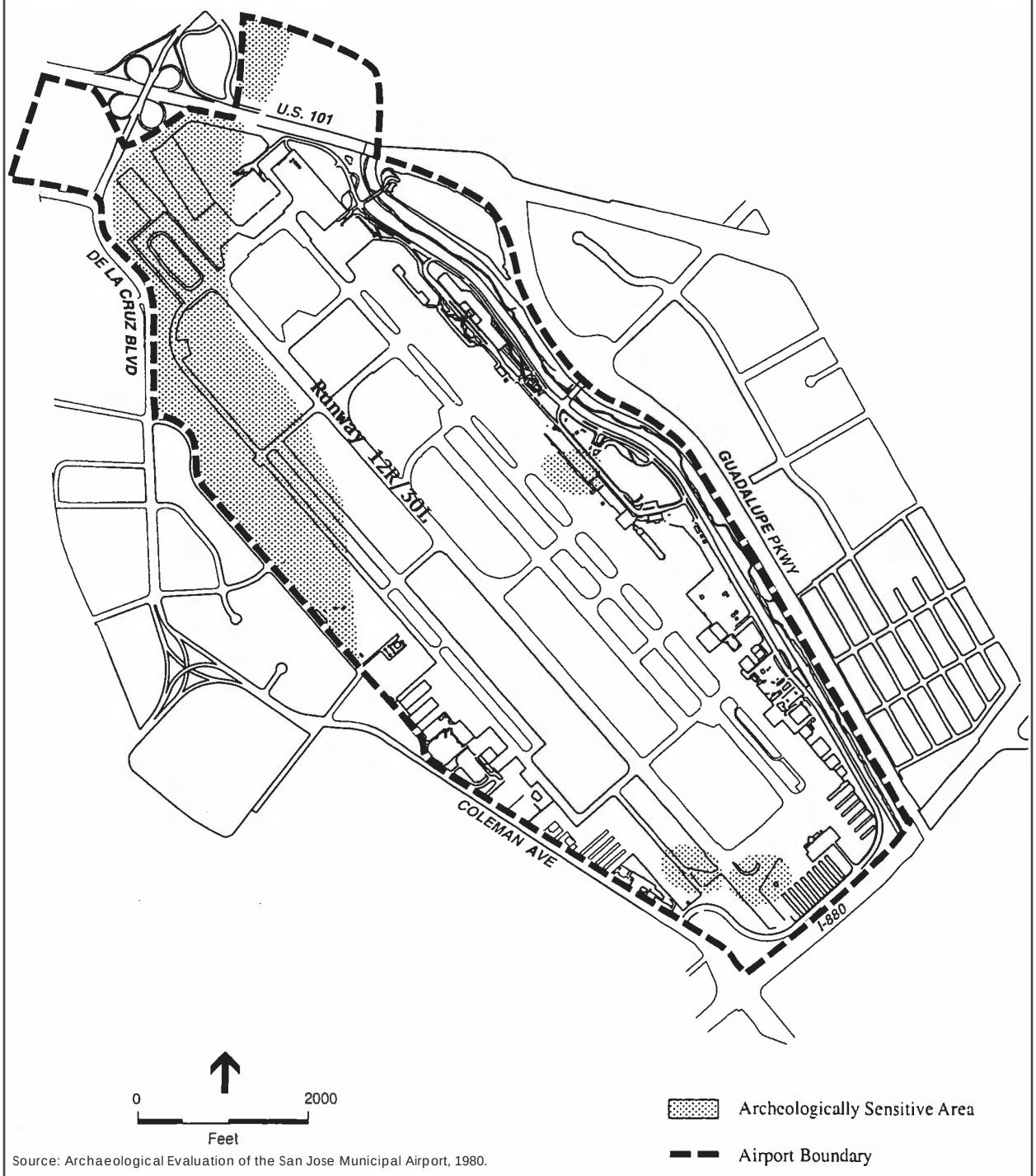
Based on the information contained in this memorandum, it is our conclusion that the proposed RIM improvements will not affect any historic properties. For Section 106 compliance purposes, the City should request FAA to adopt this finding and that FAA should request concurrence from SHPO.

Attachments: Figure 1: Locations of Proposed RIM Improvements
Figure 2: Archaeologically Sensitive Areas at SJC
Figure 3: Locations of RIM Improvements Within Archaeologically-Sensitive Areas
Appendix A: 1980 SJC Cultural Resources Assessment

[3] Source: Letter dated July 1, 1999 from Daniel Abeyta, Acting State Historic Preservation Officer, to Joseph Rodriguez, Supervisor, FAA Airports District Office, Burlingame, CA.

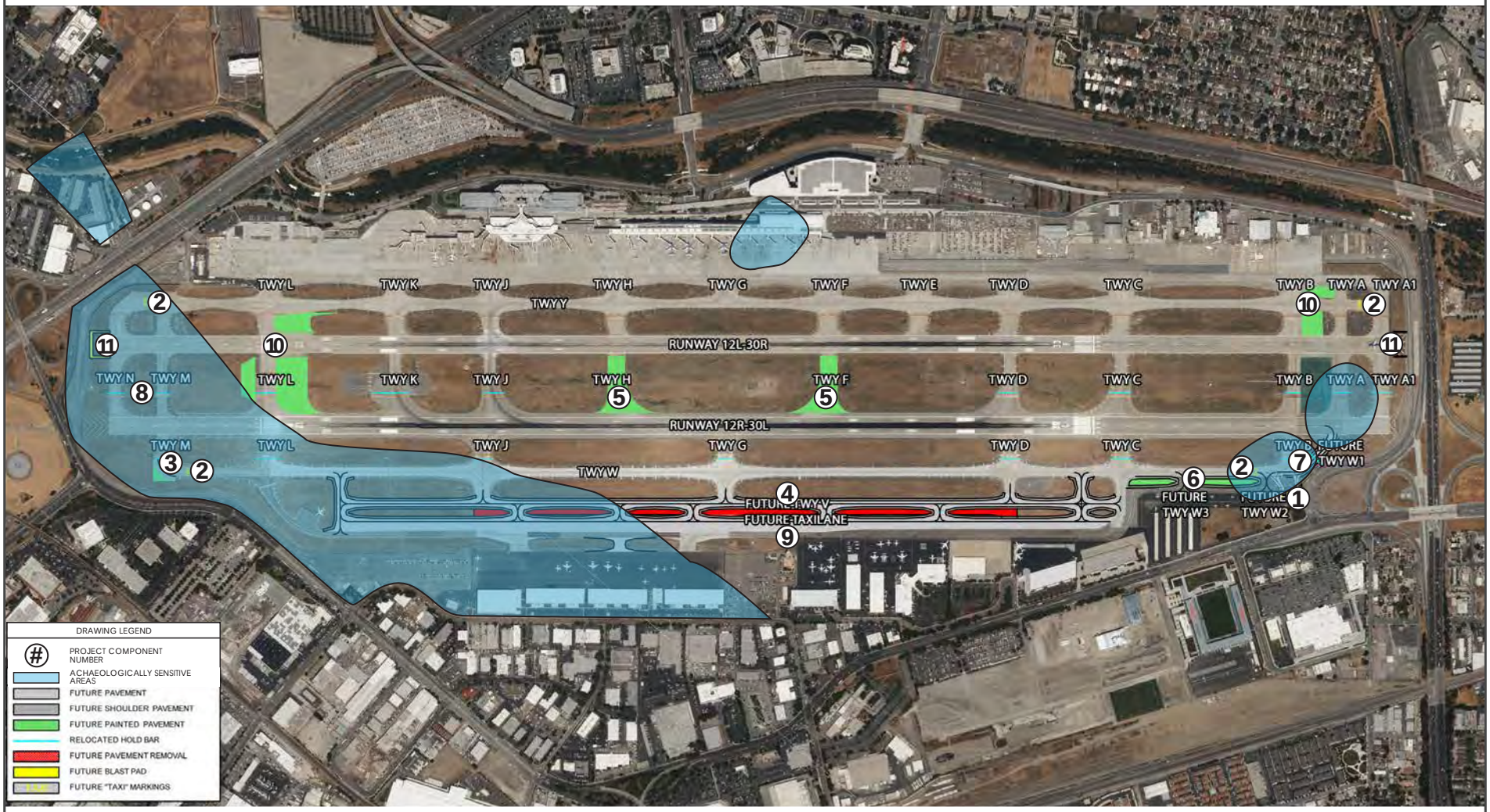


AERIAL PHOTOGRAPH DEPICTING PROPOSED AIRFIELD IMPROVEMENTS | FIGURE 1



Source: Archaeological Evaluation of the San Jose Municipal Airport, 1980.

Archaeologically-Sensitive Areas at SJC | FIGURE 2



LOCATIONS OF PROPOSED IMPROVEMENTS WITHIN ARCHAEOLOGICALLY-SENSITIVE AREAS | FIGURE 3

ARCHEOLOGICAL EVALUATION OF THE SAN JOSE MUNICIPAL AIRPORT

FOR
THE CITY OF SAN JOSE

BY
ARCHEOLOGICAL RESOURCE MANAGEMENT
ROBERT CARTIER, PRINCIPAL

WITH SECTIONS BY:
ROBERT CARTIER
CHARLENE DETLEFS

ADMONITION

Certain information contained in this report is not intended for general public distribution. Portions of this report locate significant archeological sites in the region of the project area, and indiscriminant distribution of these data could result in the desecration and destruction of invaluable cultural resources. In order to insure the security of the critical data in this report, certain maps and passages may be deleted in copies not delivered directly into the hands of environmental personnel and qualified archeologists.

The Principal Investigator

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ABSTRACT

Archeological research was carried out for the property of the San Jose Municipal Airport, San Jose, CA. The research included an archival study of historic literature, an archival check of prehistoric site records, a surface survey, and subsurface testing. Cultural resources were reported in the historic literature and several prehistoric and historic artifacts were recovered in the field survey and testing. No prehistoric resources were located in the subsurface sample testing but some historic artifacts were found in relatively deep deposits near the Guadalupe River. Five projectile points and/or knives of the Middle Horizon or Early Horizon prehistoric eras were recovered from the west side of the study area near the second recorded site of the Mission Santa Clara. Based on the archival and field findings, it is recommended that a trained archeological observer be present if any subsurface construction is considered in the locations indicated on the map attached to this report. The archeological observer would watch for the possible unearthing of any buried deposits or artifacts that the sample testing may not have located and make on-site recommendations for their recovery or preservation.

LOCATION AND DESCRIPTION OF THE SUBJECT AREA

The subject area includes a region of approximately 1000 acres in size as defined as the San Jose Municipal Airport. On the USGS 7.5 minute quadrangle of San Jose West, the Universal Transverse Mercator Grid location (UTMG) is 962-352 for the center of the study area, the with extent of the airport grounds clearly marked on this same map and the adjacent quadrangle of Milpitas, CA. The elevation ranges from approximately 30 to 65 feet in elevation, and the nearest natural water source is the Guadalupe River which cuts into the northern extreme of the airport lands.

At the time of the archeological reconnaissance and testing, the study area was in various states from being highly altered from historic land-use to other places where relatively few modifications had taken place. The greatest difficulty in doing the field survey and testing involved the highly restricted runway and radar areas and the massive expanses of asphalt parking lots.

Most of the difficulties in gaining access to runways, radar sites, and other areas were overcomed with the appreciated assistance of airport staff.

REQUEST FOR ARCHEOLOGICAL EVALUATION

Clearances and permits for future development include an archeological evaluation to determine the presence or absence of any significant cultural resources. Archeological services were requested in January, 1980 in order to: 1) undertake an archival study of the archeological resources in the vicinity of the property for prehistoric sites, 2) conduct a literature survey of the historic activities related to the airport, 3) do a surface survey of the airport grounds, and 4) carry out subsurface testing to determine the potential for buried archeological deposits. A report on these duties and the findings, along with possible recommendations, was to be furnished as one component to an environmental planning document for future airport development.

ARCHEOLOGICAL SURVEY

Archival: Prior to reconnoitering the subject area, a study was conducted of the maps and records at the Regional Office of the California State Site Survey. This check was done to determine if any known archeological resources were recorded on or adjacent to the study area. The archvial check with the Regional Office indicated that no cultural resources were reported in the property. Several sites, however, of a prehistoric and historic nature are recorded a short distance away from the airport boundaries, particularly to the north on the other side of the Guadalupe River. The great majority of the prehistoric sites in the region are Middle Horizon era habitation/burial grounds that have been found through subsurface construction or subsurface testing by archeologists. Some of these sites include SCl-6, SCl-7, SCl-276, SCl-288, SCl-300, SCl-302, SCl-359, and SCl-418 (Cartier, 1979). From this distribution, it is evident that a pattern for buried prehistoric deposits is regular off the Guadalupe River in the Lower Santa Clara Valley.

HISTORICAL BACKGROUND by Charlene Detlefs

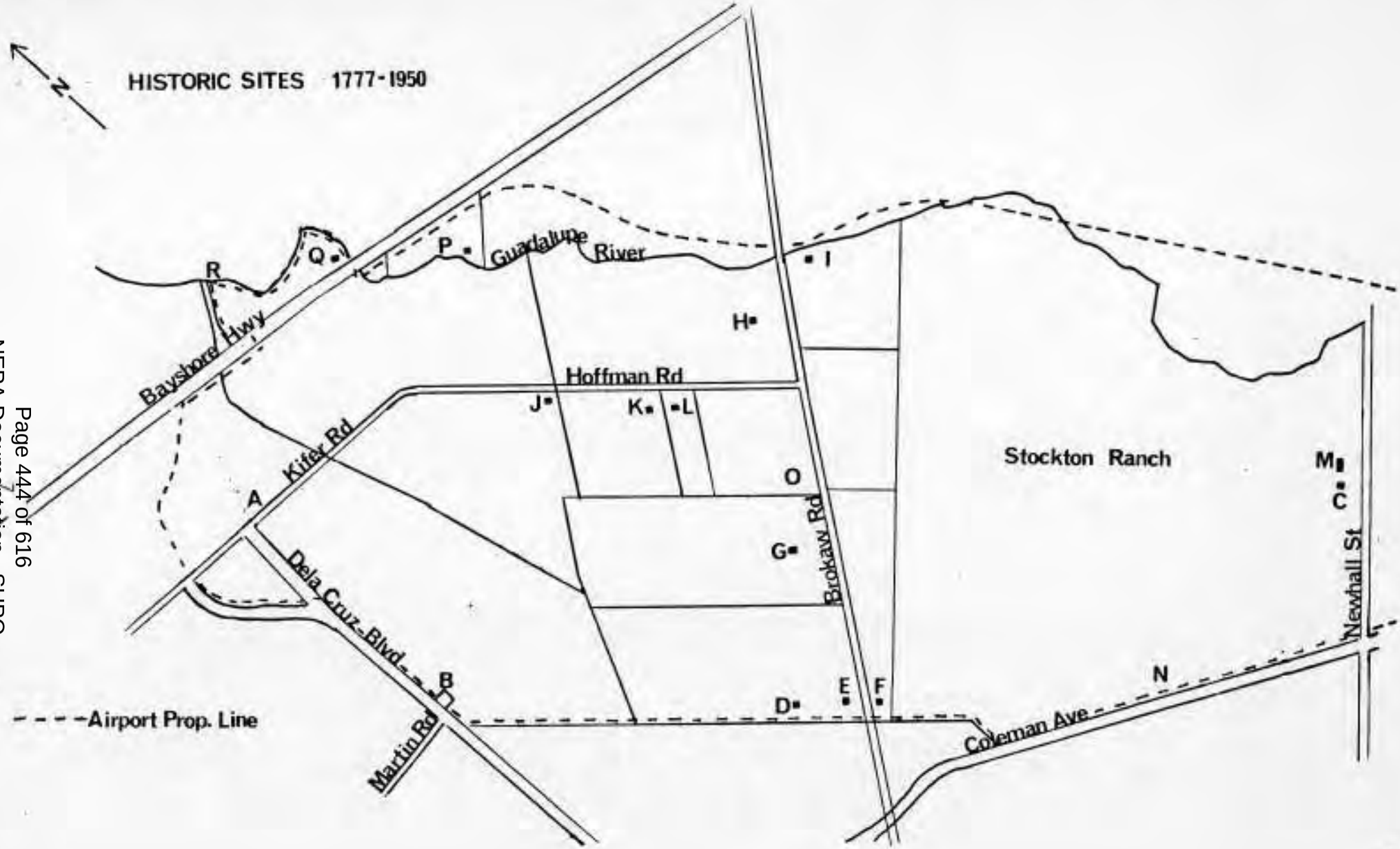
Introduction

The purpose of the following section is to serve as a guide for the location of potentially significant historic resources that may be located within the confines of the San Jose Municipal Airport property. The archival research was conducted during a six day period between Feburary 1 to 8, 1980. Information relating to historic sites was gleaned from aerial photos (1939-1979), historic maps, deeds, tax assessments, census data, city directories, newspaper clipping files, and local history books. These archival resources are located within the offices of the City of San Jose and the County of Santa Clara, the San Jose Historical Museum, and the San Jose Public Library. In addition, an oral communication was conducted with James Nissen, former airport director who has been personally familiar with the airport and its expansion since 1946.

The history of the project area begins essentially with the first historic settlement in the Santa Clara Valley, the founding of Mission Santa Clara on the banks of the Guadalupe River in 1777. This site, as well as the second Mission site, is potentially within the boundaries of the airport property. After the secularization of the Mission, a portion of the subject lands were incorporated into Rancho El Portreo de Santa Clara and the rest into Pueblo Lands of San Jose. Most of the area south of Brokaw Road remained in one large ranch, the Stockton Ranch, until purchase of the land by the City in the early 1940s. The area north of Brokaw Road was broken into smaller parcels, ranging in size from six to one hundred acres during the 1870s. Not all of the farms had habitation complexes on them, the acreage being farmed by persons with residences elsewhere. This section will discuss only those parcels where structures were noted on maps dating prior to 1900. During the early twentieth century, lands were further subdivided and new farming complexes constructed. In some cases, especially in the northern portions of the project area where orchards were prevalent, lands were consolidated into larger farms by fruit producing companies. At least one dairy, Forward Dairy located on the northwest corner

MAP KEY TO POTENTIAL HISTORIC SITES

A - First Site of Mission Santa Clara - 1777
B - Second Site of Mission Santa Clara - 1779
C - Stockton House - 1850
D - Beans House - pre-1876
E - Beans/Souza Farmhouse - post-1900
F - Carling Farm Site - pre-1900
G - Martin/Moorhead/Rogers Farm Site - pre-1900
H - J. W. Hines Farm Site - pre-1876
I - Warner Oliver Farm Site - pre-1876
J - Brokaw(?)/Dawson Farm Site - pre-1876
K - Unidentified Farm Site - pre-1900
L - Unidentified Farm Site - pre-1900
M - California Aviation Activites Flight School - 1946
N - Airport Village - Post WW II
O - Forward Dairy - pre-1921
P - A. M. Ogier House - pre-1876
Q - Dawson House Site - pre-1866
R - Spanish Bridge - 1777



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of Brokaw Road and Kifer (formerly Hoffman) Road, operated during this period. By World War II, there was interest in at least the southern portion of the project area (the Stockton Ranch) for the site of a municipal airport. This idea became a reality in the late 1940s. The lands utilized by the airport have expanded until now they are bounded by the Guadalupe River to the east, Highway 17 to the south, Colemen/Martin Road to the west, and Dela Cruz Avenue to the north.

The remainder of this section will deal with specific areas or historic periods including the early Mission sites, Rancho El Portreo de Santa Clara (Stockton Ranch), the Brokaw Road farms, the Hoffman (Kifer) Road farms, and the development of the airport itself. Finally, a discussion of the potential for locating significant sites during the testing phase of the project will be presented.

Early Mission Santa Clara Sites

The first historic settlement on the project area may have occurred with the founding of Mission Santa Clara on the western bank of the Guadalupe River in 1777 (Site A). The original site, as nearly as has been determined by local scholars, was located at the northern end of the airport property, south of Dela Cruz about where Kifer Road was once located. The founders of the Mission arrived on the site in January of 1777, and after construction of a temporary chapel, mass was said on January 12. Fray Francisco Palou related that soon after, construction of a Mission quadrangle measuring seventy varas (1 vara = 2.75 feet) on each side was initiated. Two sides of the structure were for for the church, dwellings for the Fathers, and offices for the Mission, and the other two sides were for the guardhouse, houses for nine soldiers and one settler, and a granary. The *Informe* of Mission Santa Clara, written December 30, 1777 by Fray Thomas de la Pena and Fray Joseph Antonio Murguia, describes the Mission compound as follows:

> The buildings completed to date are as follows: first, the Church with sacristy, 20 varas in length and 6 wide, of upright logs (*palisada*), chinked with clay, with flat roof of earth (*terrado*). Then a dwelling house adjoining the church, which is now being finished, 22 varas long

> and 6 wide with five living rooms, a kitchen, all of upright saplings like the church. Also another building 31 varas in length and 5 in width which serves at present as the actual dwelling of the Fathers, the servants, offices, toilets, and a hen-coop, all of upright saplings with earthen roof.
>
> There is also a corral, 30 varas square, ditched and with posts to enclose the cattle; and another of the same 12 varas square for the sheep and goats. There is also a bridge of timbers for passage over the river (Guadalupe) with a paving of earth (Spearman, 1963).

The bridge mentioned in the foregoing passage was known as Spanish Bridge and was later noted as being located at the common corner of Rancho Rincon de los Esteros and Rancho Ulstinac (Site R). Eventually, it was the main crossing over the Guadalupe River on the road between Mission Santa Clara and Mission San Jose (*Ibid.*). The original site was lost, however, with the channelization of this portion of the Guadalupe River in 1960.

The Mission remained at Site A for two years until on January 23, 1779 when the Guadalupe River overflowed its banks, inundating the Mission compound. When the waters receded, only storehouses and a few timbers from the buildings remained. The catastrophe necessitated removal of the Mission to a less vulnerable site.

When the winter storms had subsided, a new church was constructed approximately where Dela Cruz and Martin Avenues converge (Site B). At this site a church, 25 varas in length and 6 in width, was dedicated on November 11, 1779. Like the previous buildings, it was built of saplings and chinked with clay. Another building, measuring 45 by 5 varas, was built in a similar fashion and served as a house for the Fathers and a storeroom. Two additional houses, measuring 10 by 5 varas, were built, one to house servants of the mission and the other as a kitchen and workshop. The Fathers lived and worked here until the dedication of a more permanent adobe church on May 16, 1784 which was located at Campbell and Franklin Streets in Santa Clara (Spearman, 1963; Bowman and Hendry, 1940; Hoover, 1966; San Jose Mercury, October 3 and 4, 1920).

Rancho El Portreo de Santa Clara - The Stockton Ranch

Between 1777 and 1844, the project area was a portion of the *Portreo de Santa Clara* or the Mission pasture lands. The land was criss-crossed with ditches which carried water for irrigation of the adjoining lands. After secularization of the Mission, the area south of Brokaw Road was granted to James Alexander Forbes as part of the one square league Rancho Portreo de Santa Clara in 1844. In 1847, Forbes sold the rancho to Commodore Robert Stockton, USN. Stockton was patented about 2,000 acres of the original grant.

Stockton is credited with four major constributions to the area, even though he spent very little time here himself. Among his endeavors were the importation nursury stock to the County including apples, pears, plums, peaches, nectarines and strawberries in 1852; the importation of bees from Italy; the establishment of a residential subdivision, Alameda Gardens, in 1850; and the importation of about ten pre-fabricated houses from Philadelphia in 1850 (Hoover, 1966).

One of these "pre-fab" houses, sometimes known as the "White House" or the "Stockton House," stood on the project area between 1850 and 1947 (Site C). This house, the largest of the pre-fabs, stood at the end of Spring Street just beyond Newhall. It was a two and one-half story, clapboard-sided structure built of cedar and pine with multi-paned windows and shutters (Clipping File, S.J. Public Library, 1948).

James F. Kennedy, Stockton's agent, and his family lived in the Stockton House between 1850 and 1860. In 1852, the family was listed in the California State Census, and members included James F., a farmer born in Philadelphia, Pennsylavania; Serena, 31, his wife also from Pennsylavania; and children William C., 9; James F., 7; Theodore, 5; Edwin, 3; and Clara, 1. In the Federal Census of 1860, three additional persons made up the household: Robert, 6; Bridget Killion, 35, a servant born in Ireland; and Ezra Killion, 36, a servant born in Massachusetts. Kennedy is noted as having run for lieutenant governor of California, serving as Santa Clara County Sheriff in 1863, and serving as adjutant general of California during the Civil War (Foote, 1888; Hoover, 1966; Clipping File, San Jose Public Library).

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The Stockton House, ca. 1850 (San Jose Public Library)



The next known residents of the Stockton House were Charles and Kate McLaughlin. McLaughlin was the co-owner of the construction company that built the San Francisco-San Jose Railroad which was completed in 1864 (Bancroft, 1886). In the 1870 census, the McLaughlin household consisted of the following persons: Charles, 50, a farmer with $59,000 worth of real estate and $20,000 worth of personal property and born in Pennsylavania; Kate, 29, from Ohio; Martha Anne Dillon, 60, from New Jersy; William H. Dillon, 24, a day laborer; John Marlin, 25, farm laborer from Ohio; Ah Sing, 14, house servant from China; Joseph Brazil, 35, day laborer from Portugal; Anna Brazil, 30, cook from Portugal; and Antoine Brazil, 30, day laborer from Portugal. The 1876 Thompson and West map notes that Kate McLaughlin was the owner of the Stockton Ranch, then consisting of 688 acres. In the 1875-76 County tax assessment, the McLaughlin home was valued at $3,000 and the surrounding 537 acres at $93,975. McLaughlin's business interests seem to have been centered in San Francisco. In the 1878 Langley directory for San Francisco, McLaughlin is listed as the agent for the Western Pacific Railroad Land Office. During this period, McLaughlin also owned large amounts of acreage in the mountains north of Mount Hamilton. By 1900, his heirs, Mary Ives Crocker and Kate May Dillon, were the owners of the McLaughlin Co., a real estate firm in San Francisco. Mary Ives Crocker maintained ownership of the Santa Clara County property until her death in the 1930s. The Stockton Ranch land was sold to the City of San Jose between 1941 and 1943 for future use as a municipal airport (*Official Records* 1012-530, 1053-242, 1078-419, 1104-346, 1165-330, 1167-301). The 1850 Stockton/McLaughlin ranchouse was demolished in 1947 after serious efforts toward relocation were abandoned (San Jose Public Library, clipping file).

Farms Along Brokaw Road

Prior to the expansion of the Municipal Airport in 1961, Brokaw Road traversed the project area. This road, dedicated to the County in 1866, provided access to the properties north of the Stockton Ranch. The road was named after James Brokaw, owner of at least 114 acres of the project area during the 1860s.



Site E - Beans/Souza Farmhouse (post-1900)



Site O - Forward Dairy, 1958 (S.J.Municipal Airport)



Site N - Airport Village, 1957 (S.J. Municipal Airport)



Channelization of the Guadalupe River, 1958 (S.J. Municipal Airport)

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By 1876, six farmsteads were located along Brokaw Road between Martin Aveune and the Guadalupe River.

One farm complex was located on a 100-acre parcel belonging to Hayes and Beans in 1876. N. Hayes was a real estate agent in San Jose and T. Ellard Beans was the President of the Bank of San Jose. By 1890, the parcel had been divided into two fifty-acre parcels, the one with the structure belonging to Beans (Site D). Beans remained owner of this farm until after 1903. Sometime after the turn-of-the-century, a newer farmhouse was built closer to Brokaw Road (Site E). This building remains on the property although it has been abandoned and is scheduled for demolition. It appears to date to the 1900-1910 period and is in poor repair.

South of Brokaw Road, across from the existing farmhouse, was located another pre-1900 farm complex (Site F). As of 1903, this property was owned by M. Carling. A small orchard currently marks the site.

Another pre-1900 farm complex, Site G, was located on the parcel formerly held by N. Hayes. By 1890, this parchel was owned by M. Martin and by 1903, by P. I. Moorhead. By 1929, the property was owned by M. Rogers and it was the Rogers family that sold the land to the city in the late 1940s.

Site H, located off Brokaw Road between Hoffman (Kifer) and the Guadalupe River was site of the pre-1876 J. W. Hines farm. Hines owned the property until after 1903. By 1929, Hines 53-acre farm had been divided into 12-acre parcels.

Another pre-1876 farm complex, Site I, was owned by Oliver Warner, an orchardist. Oliver maintained ownership of this farm until after 1903.

Farms Along Hoffman Road

Hoffman Road, later known as Kifer Road after its extention, was originally opened by N. Hayes and H. Hoffman who bought the property from James Brokaw in 1869 (*Deeds*, 14-426). By 1876, only one structure was located off the road and was perhaps the original Brokaw homesite (Site J). This house was located on a 15-acre parcel owned by Michael Dawson in 1876, and by John Walsh, Dawson's heir, in 1890.

By 1899, two other small farms of unidentified ownership were developed west of Hoffman Road (Sites K and L).

Farms Along the Banks of the Guadalupe

Two potentially historic sites lie along the Guadalupe River--another Dawson house site on the western bank, and the Ogier farm site on the eastern bank.

Michael Dawson, early settler and owner of lands on both sides of the Guadalupe, was the owner of a pre-1866 house on the west bank of the Guadalupe in addition to house sites elsewhere(Spearman, 1963). The possibility exists that this structure, which does not show on the Thompson & West map of 1876, may have been built by a previous owner (Site Q).

The A.M. Ogier, an orchardist, had a small twenty-acre farm on the eastern bank of the Guadalupe (Site P). This house probably dated to the 1860-1876 time period. A. M. Ogier was no doubt a relative of James Ogier, a prominent early settler who owned extensively land adjacent to this tract.

San Jose Municipal Airport

Between 1940 and 1943, the City of San Jose purchased the remaining 483 acres of the Stockton Ranch from the Crocker heirs as a site for a municipal airport. In 1946, the first airport related buildings, California Aviation Activities, a flight school, were located directly adjacent to the Stockton Ranch buildings (Site C). About this same time, Airport Village, post-war veterans housing, was constructed on the Coleman Road edge of the property (Nissen interview). The airport, complete with terminal, was officially opened of February 1, 1949. Between 1946 and 1961, the airport's facilities were located between Newhall and Brokaw Roads. The Guadalupe River was straightened and channelized about 1957, giving the airport more useable land along its eastern boundaries. In 1961, the runways were extended across Brokaw Road and a new terminal building was opened in 1965 (Austin, 1971).



1939 Aerial of project area, Site C - the Stockton Ranch House (S.J. Municipal Airport)



1947 Aerial of Project Area, Site M - California Aviation Activities, Site N - Airport Village (S.J. Municipal Airport)



1956 Aerial Photograph (S.J. Municipal Airport) See Map Key for locations.



1957 Aerial Photograph (S.J. Municipal Airport) Note original course of the Guadalupe River

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1958 Aerial, Note realignment of Guadalupe River (S.J. Municipal Airport)



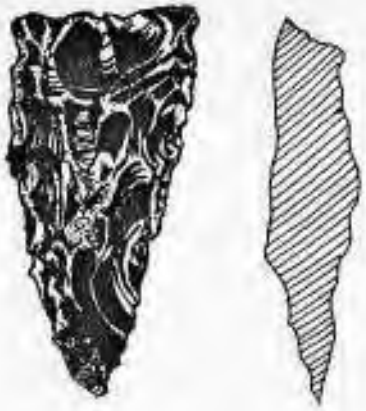
1968 Aerial of northern end of project area

Potential for Historic Resources

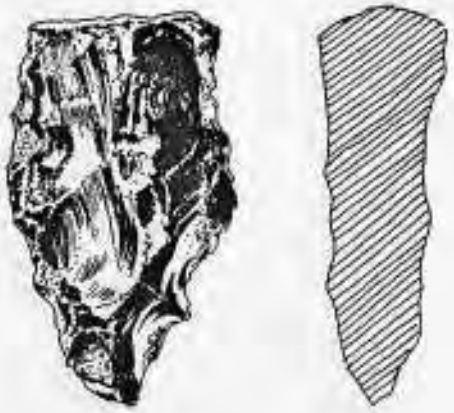
Highly significant historic resources potentially lay within the airport project area. However, due to the massive alteration of the landscape (demolition of structures, removal of historic roadways, new roadways, realignment of the river, massive grading, and pavement of large areas), it is difficult to locate and predict what if any significant deposits may remain intact. The most likely prospect to yield significant data appears to be the circa 1850 Stockton House site. However, most of the complex area has been paved which will make thorough testing difficult. The Mission sites are also extremely significant, but again testing will be difficult as the location of the sites is not precisely known. The literature pertaining to the location of these sites has been thoroughly researched by scholars over the years, however, intensive archeological testing has never been undertaken. Further grading of the areas during airport construction has no doubt helped obscure these sites even more. Random and directed testing of the areas hopefully may reveal significant subsurface features. Also, the later material from 1870 to twentieth-century sites may yield significant data if undisturbed deposits are located. Again, precise location of these resources is difficult due to the removal of all major reference points. Should any intact deposits be located during testing, further site specific archival research should be initiated to determine the significance of the find.

SURFACE SURVEY

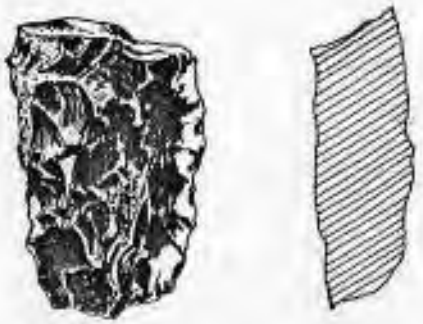
Before subsurface testing was conducted in any given portion of the study area, a surface survey was done to determine the possible presence of archeological resources on the ground. The surface survey was done by the Principal Investigator, Barbara Bocek, Joe Morris, and Pat Harris. No historic or prehistoric deposits were noted in the survey, but a number of isolated historic and prehistoric artifacts were located. The historic artifacts consisted of items that dated from the mid-1800s through the present, including bottle fragments, ceramics, metal objects, and plastic elements. Many of the earlier materials seemed to



OBSIDIAN DART POINT
AIRPORT SURVEY, 2/8/80
SCALE 1:1
PROVENIENCE "A"



OBSIDIAN KNIFE FRAG
AIRPORT SURVEY, 2/8/80
SCALE 1:1
PROVENIENCE "B"



OBSIDIAN BIFACE (MEDIAL FRAG)
AIRPORT SURVEY 2/8/80
SCALE 1:1
PROVENIENCE "C"



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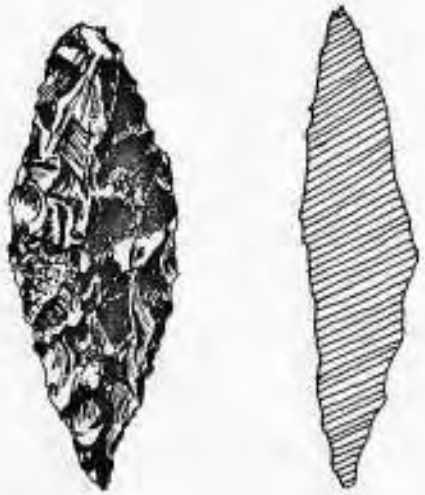
FRANSCIAN CHERT DART POINT
AIRPORT SURVEY 2/8/80
SCALE 1:1
PROVENIENCE "D"



MONTEREY CHERT DART POINT
AIRPORT SURVEY 2/9/80
SCALE 1:1
PROVENIENCE "E"



P. RICHARD

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be related to the turn-of-the-century residences that once fronted on old Brokaw Road and old Hoffman Road (later named Kifer Road) previous to their being removed for airport expansion. Some of the historic artifacts found during the survey appeared to be related to the post-1900 residence (Site "E" on historic map) off the intersection of Martin and Brokaw Roads.

Prehistoric artifacts noted in the surface survey included isolated artifacts of projectile points, a chipped lithic knife fragemnt, several utilized chert flakes, two probable manos, and a few pieces of fire-altered rock spread out in an area of approximately 300 acres. The projectile points and knife fragemnt did, however, form somewhat of a patterned distribution, with four out of five of these elements being in a locus of approximately fourty acres. The presence of these elements is remarkable to the very few other flaked lithics and general absence of midden constituents such as shell, bone, charcoal, wide-spread fire-altered rock, and other artifacts. It appears that this area was some sort of special use area associated with hunting/butchering activities. There is no indication that these elements were bogus or that their locations were contrived. All of the points were relatively large and early in their form, material, and weight--indicating that they were either early Middle Horizon or possibly Early Horixon in their antiquity (probably more than 2000 years old).

In that no distinguishable deposits could be discerned from the surface survey, but prehistoric and historic artifacts were located, a subsurface testing was employed to test for the potential for subsurface deposits that may have been buried by natural flooding or land-use modifications in historic times.

SUBSURFACE TESTING

A total of 230 test trenches were excavated in both random and directed locations to a maximum depth of 300cm. Each test trench was excavated with a 19" bucket on a backhoe tractor and the exposed soil monitored by a trained archeologist. Of all this testing, only trenches 216 and 218 yielded positive cultural data, and these were historic in nature: cut bone, bottle glass, and metal. The following trench records report the stratigraphic findings.

TEST TRENCH DATA

Test Trench #1:	0-60 cm	brown alluvium with little clay
	60-100cm	tanish brown clay
	100cm	less clay, more like 0-60cm
	100-190cm	less clay, more like 0-60cm
	190-210cm	gray clay
Test Trench #2:	0-90 cm	brown alluvium with a little clay, little charcoal; rubber hose (40cm)
	90-140cm	tanish brown clay
	140-190cm	less clay, lighter color
	190-300cm	gray clay with tan (iron) inclusion, charcoal sample from about 220cm
Test Trench #3:	0-70 cm	brown alluvium, some charcoal
	70-130cm	brown alluvium with clay
	130-180cm	less clay, more brown alluvium
	180-200cm	gray clay
Test Trench #4:	9-90 cm	brown alluvium
	90-110cm	dry hard-packed brown alluvium and clay
	110-150cm	dry tan hard packed alluvium and clay
	150-220cm	dry hard packed gray clay
Test Trenches #5 through #7:	80-300cm	alternating light and dark clay layers
Test Trench #5:	0-80 cm	dark brown sandy loam, historic charcoal, charred limbs or roots
	80-110cm	moist gray clay
	110-120cm	tan clay stratum
	120-180cm	dark moist gray clay stratum
	180-240cm	tan clay
	240-270cm	dark gray clay stratum
Test Trench #6:	0-50 cm	brown sandy loam with historic charcoal
	50-90 cm	dark brown sandy loam and clay
	90-110cm	dark clay
	110-170cm	slate gray dry clay, charcoal and roots
	170-200cm	light gray dry clay
	200cm	dark gray clay
Test Trench #7:	0-50 cm	brown sandy loam with roots
	50-110cm	dark clay (gray)
	110-190cm	gray, dry clay
	190-220cm	dark gray moist clay
Test Trench #8:	0-90 cm	brown sandy loam with rubber hose; historic distrubance; 10cm charcoal and roots
	90-130cm	dark gray dry clay
	130-140cm	thin tan clay layer
	140-210cm	dark gray dry clay

Test Trench #9:	0-60 cm	brown sandy loam
	60-210cm	dark gray clay, moist with some charcoal
Test Trench #10:	0-70 cm	brown sandy loam
	70-120cm	dark gray clay, medium moist
	120-140cm	dark gray clay, dry
	140-200cm	light gray clay, very dry
Test Trench #11:	0-80 cm	brown and tan alluvium
	80-120cm	brown clay and loam
	120-140cm	tan clay
	140-200cm	light gray clay
Test Trench #12:	0-60 cm	brown sandy loam, natural chert, sandstone cobbles and gravel
	60-200cm	moist gray clay
Test Trench #13:	0-60 cm	brown loam, natural chert, sandstone cobbles and gravel, historic, roots
	60-160cm	dark gray clay, moist
Test Trench #14:	0-70 cm	gray loam and clay
	70-110cm	lighter gray, moister clay
	110-150cm	dark gray, moist clay
	150-190cm	tan clay with reddish inclusions
	surface	some fire-baked clay in area
Test Trench #15:	surface	some fire-baked clay in area
	0-50 cm	brown sandy loam
	50-110cm	moist gray clay
	110-150cm	dry gray clay
Test Trench #16:	0-50 cm	brown sandy loam
	50-120cm	moist, dark gray clay
	120-140cm	very light gray, dry clay
Test Trench #17:	0-60 cm	brown loam and gray clay
	60-100cm	dark gray clay
	100-130cm	light gray, moist clay
	130-200cm	dark gray clay
Test Trench #18:	0-50 cm	brown loam and clay, roots (old), ceramic fragment (flow blue) 10 cm
	50-80 cm	light gray clay, dry
	80-120cm	very light gray clay
	120-170cm	dark gray clay, moist
Test Trench #19:	0-60 cm	brown loam
	60-170cm	dark gray, moist clay

Test Trench #20:	0-50 cm	brown loam and clay, roots
	50-90 cm	medium gray clay
	90-110cm	dark gray clay, shiny surface
	110-170cm	medium gray clay
Test Trench #21:	0-60 cm	brown loam and clay, roots
	60-100cm	medium gray clay
	100-140cm	dark gray clay
	140-170cm	light gray and tan clay
Test Trench #22:	0-50 cm	brown loam and clay
	50-90 cm	dark gray clay
	90 cm	historic leach field line, off Hoffman
Test Trench #23:	surface	light tan alluvium
	0-50 cm	brown alluvium
	50-110cm	brown alluvium and clay
	110-140cm	gray clay
Test Trench #24:	surface	light tan alluvium
	0-50 cm	brown loam and roots, old.
	50-170cm	dark gray clay
Test Trench #25:	0-50 cm	brown loam
	50 cm	hit 5 foot concrete abandoned pipe
	(moved 1 meter east and redug)	
	50-130cm	dark gray clay
	130-150cm	light dry clay
Test Trench #26:	0-50 cm	brown loam
	50-110cm	dark gray clay
	110-150cm	light dry clay
Test Trench #27:	0-70 cm	brown loam, old root
	70-150cm	dark gray clay
	150-200cm	light gray sandy loam in lower portion
Test Trench #28:	surface	fine, alluvial silt, tan
	0-80 cm	fine alluvial silt
	80-100cm	dark gray clay with orchard roots
	100-170cm	dark gray clay with no roots
	170-200cm	light dry clay
Test Trench #29:	surface	fine alluvial tan silt
	0-80 cm	fine alluvial silt
	80-210cm	dark gray clay
Test Trench #30:	surface	fine alluvial tan silt
	0-100cm	fine alluvial silt
	100-180cm	gray clay
	130cm	mammal bone fragment
	180-200cm	burned clay with charcoal (C-14 sample collected)
	200cm	dark clay

Test Trench #31:	0-100cm	fine silt
	100-200cm	gray clay
Test Trench #32:	0-170cm	fine alluvial silt
	170-270cm	dark gray clay
Test Trench #33:	0-100cm	alluvial silt, a little old root
	100-230cm	dark gray clay
Test Trench #34:	0-100cm	alluvial silt, piece of old orchard root
	100-195cm	dark gray clay
Test Trench #35:	0-60 cm	alluvial silt
	60-170cm	dark gray clay, shiny
Test Trench #36:	0-60 cm	alluvial silt and small roots
	60-150cm	dark gray clay, shiny
Test Trench #37:	0-80 cm	alluvial silt and small orchard roots
	80-170cm	dark gray clay, shiny
Test Trench #38:	0-100cm	alluvial silt
	100-200cm	dark gray clay
Test Trench #39:	0-100cm	alluvial silt, one piece concrete
	100-200cm	dark gray clay
Test Trench #40:	0-140cm	alluvium
	140-200cm	dark gray clay
Test Trench #41:	0-120cm	alluvial silt
	120-200cm	dark gray clay
Test Trench #42:	0-40 cm	gray dry clay and alluvium
	40-160cm	alluvial silt
	160-200cm	light gray clay, dry
Test Trench #43:	0-60 cm	gray dry clay and alluvium
	60-150cm	alluvial silt
	150-190cm	dark gray clay
Test Trench #44:	0-130cm	alluvial silt
	130-200cm	dark gray clay
Test Trench #45:	0-40 cm	brown clay with silt
	40-140cm	dark gray clay
	140-200cm	light gray/yellow silt
Test Trench #46:	0-200cm	Non-regular stratigraphy; dark gray and tan-yellow clay in vertical cross section all the way to the bottom of the trench

Test Trench #47:	0-60 cm	brown clay
	60-150cm	tan silt
	150-200cm	gray clay
Test Trench #48:	0-75 cm	brown clay
	75-180cm	gray clay
	180-200cm	tan clay
Test Trench #49:	0-40 cm	brown alluvium
	40-150cm	tan clay
	150-200cm	yellow clay
Test Trench #50:	0-50 cm	brown clayey alluvium
	50-140cm	gray-brown clay
	140-200cm	tan-brown clay
Test Trench #51:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	gray brown clay, broken cable
Test Trench #52:	0-80 cm	brown clayey alluvium
	80-120cm	tan clay
	120-200cm	yellow/brown clay
Test Trench #53:	0-60 cm	brown clayey alluvium
	60-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #54:	0-60 cm	brown clayey alluvium
	60-120cm	gray/brown clay
	120-200cm	yellow clay
Test Trench #55:	0-60 cm	brown clayey alluvium
	60-130cm	gray/brown clay
	130-200cm	yellow clay
Test Trench #56:	0-50 cm	brown clayey alluvium
	50-120cm	gray/brown clay
	120-200cm	tan/brown clay
Test Trench #57:	0-50 cm	brown alluvium
	50-110cm	tan clay
	110-200cm	gray/brown clay
Test Trench #58:	0-60 cm	brown clayey alluvium
	60-130cm	tan clay
	130-200cm	gray/brown clay
Test Trench #59:	0-50 cm	brown clayey alluvium
	50-120cm	tan clay
	120-200cm	tan/brown clay

Test Trench #60:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	brown clay
Test Trench #61:	0-50 cm	brown clayey alluvium
	50-100cm	gray/brown clay
	100-200cm	tan clay
Test Trench #62:	0-40 cm	brown clayey alluvium
	40-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #63:	0-50 cm	brown clayey alluvium
	50-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #64:	0-50 cm	brown clayey alluvium
	50-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #65:	0-50 cm	brown clayey alluvium
	50-80 cm	tan clay
	80-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #66:	0-90 cm	brown friable soil
	90-160cm	tan clay
	160-200cm	gray/brown clay
Test Trench #67:	0-50 cm	brown clayey soil
	50-160cm	tan clay
	160-200cm	gray/brown clay
Test Trench #68:	0-40 cm	brown clayey alluvium
	40-100cm	tan clay
	100-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #69:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #70:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-140cm	gray/brown clay
	140cm	tan clay
Test Trench #71:	0-50 cm	brown clayey alluvium
	50-120cm	tan clay
	120-160cm	gray/brown clay
	160-200cm	tan clay

Test Trench #72:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-200cm	gray/brown clay
Test Trench #73:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-180cm	dark brown clay
	180-200cm	tan clay
Test Trench #74:	0-60 cm	brown clayey alluvium
	60-90 cm	tan clay
	90-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #75:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #76:	0-60 cm	brown clayey soil
	60-180cm	tan clay
	180-200cm	gray/brown clay
Test Trench #77:	0-60 cm	brown clayey alluvium
	60-120cm	gray/brown clay
	120-160cm	light brown clay
	160-200cm	tan clay
Test Trench #78:	0-60 cm	brown clayey alluvium
	60-140cm	gray/brown clay
	140-200cm	tan clay
Test Trench #79:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #80:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #81:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #82:	0-40 cm	brown clayey alluvium
	40-80 cm	tan clay
80-120cm	80-120cm	gray/brown clay
	120-200cm	tan clay

Test Trench #83:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #84:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-160cm	gray/brown clay
	160cm	tan clay
Test Trench #85:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #86:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #89:	0-50 cm	brown clayey alluvium
	50-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #90:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #91:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #92:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #93:	0-80 cm	brown clayey alluvium
	80-160cm	tan clay
	160-180cm	red/brown clay
	180-200cm	tan clay
Test Trench #94:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #95:	0-40 cm	dark brown alluvium
	40-130cm	yellow/brown silty clay
	130-190cm	brown to dark brown, increasingly darker with depth

Test Trench #96:	0-30 cm	dark brown alluvium
	30-140cm	blue/black clay, sticky and plastic
	140-160cm	gray/light gray silty clay, frier, more friable.
	160-190cm	gray/yellow dry silty clay, very friable
Test Trench #97:	0-30 cm	dark brown to medium brown alluvium
	30-50 cm	medium brown alluvium
	50-150cm	dark gray/black silty clay, sticky
	150-200cm	light gray friable silty clay, dry
Test Trench #98:	0-40 cm	medium brown silty clay, fairly friable
	40-70 cm	dark gray/brown clay
	70-190cm	black/blue black clay, sticky
	190-210cm	light gray claywith organic material (orange-rusty)
Test Trench #99:	0-100cm	slightly friable very dark brown to black alluvium; surface soil is much darker than terminal end of field
	100-120cm	gray silty clay, drier, more friable
	120-190cm	light gray (ash-colored) friable clayey silt

In Test Trenches #99 and #100 no "plow-zone" color change is visible, noted more rocks on surface in this area, none modified.

Test Trench #100:	0-110cm	dark brown alluvium, lightly friable
	110-130cm	lighter brown, grayish clay, sticky
	130-190cm	light gray (almost ash color) silty clay, dry, friable with flecks decomposing sand-stone at 150cm.
Test Trench #101:	0-40 cm	very dark brown to black alluvium, slightly friable
	40-100cm	light gray sandy alluvium, very fraible, dry, very different soil texture than any other
	100-190cm	dark gray/medium brown mixed sticky silty clay, lots of orange-rust colored organic material
	190-200cm	lighter brown silty clay, little organic material
Test Trench #102:	0-50 cm	very dark brown alluvium
	50-100cm	medium brown alluvium, more clay
	100-130cm	gray/light brown silty clay
	130-200cm	light brown silty clay, becomes increasingly yellow
Test Trench #103:	0-80 cm	medium brown alluvium
	80-140cm	gray/light brown silty clay, very friable
	140-190cm	same color and texture, but more compact

Test Trench #104:	0-100cm	medium brown alluvium
	100-120cm	yellow to light brown clay, very plastic no organic materials
	120-190cm	light brown/gray silty clay, dry, friable
Test Trench #105:	0-50 cm	medium brown alluvium
	50-70 cm	gray (ash-colored) friable silty clay
	70-180cm	gray/light brown, less friable silty clay
	180-200cm	light brown/yellow silty clay
Test Trench #106:	0-40 cm	light brown friable silty alluvium
	40-120cm	dark brown/black friable silty clay
	120-180cm	yellow to light brown clay, sticky, plastic
	180-210cm	light brown clay, very compact
Test Trench #107:	0-60 cm	medium brown friable alluvium, few rocks. soil appears to be disturbed
	60-140cm	lighter brown alluvium, some rocks, soil appears to be disturbed
	140-150cm	black/dark gray firm clay, lumps are rock-hard
	150-160cm	lighter gray very firm clay, some decomposing sandstone
	160-230cm	medium brown very friable silty clay, redwood timber
Test Trench #108:	0-30 cm	medium brown alluvium
	30-60 cm	yellow clay, very plastic and moist
	60-80 cm	light brown clay, very plastic, sticky
	80-190cm	medium brown clay, sticky, rust-colored organic material
Test Trench #109:	0-50 cm	medium brown alluvium
	50-80 cm	yellow clay, moist and compact
	80-130cm	light brown clay, moist and compact
	130-190cm	dark brown silty clay, friable
Test Trench #110:	0-40 cm	medium brown alluvium, friable
	40-70 cm	yellow clay
	70-160cm	medium light brown clay with organic material
	160-190cm	medium brown clay, more organic material
Test Trench #111:	0-40 cm	medium to dark brown alluvium, very moist
	40-80 cm	light brown clay, plastic and moist
	80-110cm	dark brown silty clay, slightly friable
	110-160cm	dark brown silty clay with organic material
Test Trench #112:	0-40 cm	medium to dark brown alluvium
	40-80 cm	light brown clay, very plastic
	80-130cm	dark gray/brown clay, sticky, compact
	130-200cm	dark gray/brown clay with organic material

Test Trench #113:	0-50 cm	medium brown alluvium
	50-140cm	light brown clay, plastic, moist
	140-190cm	medium brown silty clay with organic material
Test Trench #114:	0-40 cm	medium brown alluvium
	40-80 cm	yellow/light brown clay
	80-130cm	light brown silty clay, with organic material
	130-200cm	medium/dark brown clay, compact, with much organic material
Test Trench #115:	0-40 cm	medium brown alluvium
	40-70 cm	light brown silty clay, orange organic material
	70-100cm	medium brown (gradual color change and
	100-210cm	dark brown increase in organic material)
Test Trench #116:	0-50 cm	medium brown alluvium
	50-120cm	yellow silty clay, compact
	120-200cm	light brown silty clay, compact
Test Trench #117:	0-30 cm	medium brown alluvium, friable
	30-120cm	yellow clay, compact, moist; much organic material
	120-210cm	gray/light brown clay, compact; less organic material
Test Trench #118:	0-40 cm	medium brown alluvium
	40-70 cm	yellow silty clay, some organic material
	70-150cm	yellow/ light brown silty clay, more organics
	150-200cm	medium/dark brown clay
Test Trench #119:	0-30 cm	dark brown/black friable alluvium
	30-40 cm	gray silty clay, very fraible
	40-120cm	light brown silty clay, compact
	120-200cm	medium brown clay, organic material
Test Trench #120:	0-40 cm	medium/dark brown alluvium
	40-120cm	yellow/light brown silty clay, friable
	120-160cm	yellow/light brown silty clay, compact with organic material
	160-200cm	dark brown/black clay, some organic material
Test Trench #121:	0-40 cm	medium brown alluvium
	40-70 cm	light brown clayey silt, friable, dry
	70-200cm	medium/dark brown silty clay, friable

Test Trench #122:	0-30 cm	dark brown alluvium, friable
	30-100cm	gray clayey silt, moist, friable
	100-180cm	gray silty clay, compact, sticky
	180-200cm	medium brown clay, compact, with root plant fiber
Test Trench #123:	0-110cm	medium brown alluvium, friable
	110-130cm	gray silty clay, moist, compact, with yellow clay mottling
	130-160cm	yellow clay, very compact
	160-200cm	medium brown clay, compact, much organic material
Test Trench #124:	0-40 cm	medium/dark brown friable alluvium
	40-70 cm	gray/yellow clayey silt, friable, moist
	70-160cm	yellow clay, more compact, with some organic material
	160-200cm	medium brown/dark gray clay, compact, much organic material
Test Trench #125:	0-30 cm	dark brown friable alluvium
	30-60 cm	gray clayey silt, friable, moist
	60-150cm	yellow/gray clayey silt, friable, moist
	150-190cm	medium brown clay, organic material
Test Trench #126:	0-40 cm	medium brown friable alluvium
	40-60 cm	gray clayey silt, friable, moist
	60-150cm	yellow clay, more compact, a little organic material
	150-200cm	medium brown clay, much organic material
Test Trench #127:	0-40 cm	medium brown alluvium, friable
	40-70 cm	gray clayey silt, friable, moist
	70-160cm	yellow clay, moist, compact, a little organic material
	160-210cm	medium brown clay, compact, lots of organic material
Test Trench #128:	0-70 cm	medium/dark brown alluvium
	70-110cm	yellow silty clay, fairly compact
	110-160cm	yellow clay, compact, a little organic material
	160-190cm	medium brown clay, compact, lots of organic material
Test Trench #129:	0-70 cm	medium brown alluvium
	70-120cm	yellow gray silty clay, fairly compact
	120-170cm	yellow clay, compact
	170-190cm	medium brown clay, compact, some organic material

Test Trench #130:	0-50 cm	medium brown alluvium
	50-90 cm	yellow/light brown silty clay, fairly compact
	90-160cm	yellow silty clay, much organic material
	160-210cm	medium brown clay, very compact, little organic material
Test Trench #131:	0-70 cm	medium brown alluvium
	70-90 cm	yellow/gray silty clay
	90-150cm	yellow clay, compact, much organic material
	150-200cm	medium brown clay, very compact
Test Trench #132:	0-70 cm	medium/dark brown alluvium
	70-150cm	yellow clay, moist, compact, much organic material
	150-210cm	medium brown clay, very compact, less organic material
Test Trench #133:	0-90 cm	medium brown alluvium, compact
	90-110cm	gray/yellow mottled silty clay
	110-160cm	yellow clay, compact, much organic material
	160-200cm	medium brown/gray clay, compact, a little organic material
Test Trench #134:	0-70 cm	medium brown alluvium, very compact
	70-90 cm	light brown/gray clay, compact
	90-140cm	yellow clay, compact, much organic material
	140-190cm	medium brown mottled clay, some organic material
Test Trench #135:	0-40 cm	medium brown alluvium
	40-60 cm	gray/brown silty clay, compact
	60-160cm	yellow silty clay, slightly friable, a little organic material
	160-210cm	medium brown/gray clay, a little organic material
Test Trench #136:	0-40 cm	medium brown alluvium
	40-90 cm	gray (ash-colored) clayey silt, friable
	90-180cm	tan silty clay, mottled with yellow; much organic material
	180-200cm	medium brown/gray clay, a little organic material, very compact
Test Trench #137:	0-40 cm	medium brown alluvium
	40-50 cm	gray clay, very sticky, compact
	50-110cm	medium brown to black silty clay, compact
	110-190cm	yellow clay, compact, some organic material
	190-200cm	light/medium brown clay, some organic material

Test Trench #138:	0-30 cm	medium brown alluvium
	30-40 cm	tan silty clay, friable
	40-90 cm	dark/medium brown silty clay, much organic material
	90-180cm	yellow silty clay, friable, much organic material
	180-200cm	medium brown/light brown clay, some organic material
Test Trench #139:	0-40 cm	medium brown alluvium
	40-50 cm	gray silty clay, friable
	50-80 cm	medium brown silty clay
	80-170cm	yellow clay, much organic material
	170-200cm	medium brown clay
Test Trench #140:	0-70 cm	brown clayey alluvium
	70-140cm	tan clay
	140-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #141:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #142:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #143:	0-90 cm	brown clayey alluvium
	90-130cm	tan clay
	130-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #144:	0-50 cm	brown clayey alluvium
	50-70 cm	light brown clay
	70-100cm	gray/brown clay
	100-140cm	tan clay
	140-200cm	light brown clay
Test Trench #145:	0-50 cm	brown clayey alluvium
	50-80 cm	tan clay
	80-100cm	gray/brown clay
	100-140cm	orange/tan clay
	140-180cm	tan clay
	180-200cm	gray/brown clay

Test Trench #146:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay
	100-140cm	gray/brown clay
	140-190cm	light brown clay
	190-200cm	charcoal deposit with red clay
	200-220cm	tan clay
Test Trench #147:	0-40 cm	brown clayey alluvium
	40-200cm	tan clay
	200-230cm	light brown clay
Test Trench #148:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-130cm	gray/brown clay
	130- cm	tan clay
Test Trench #149:	0-50 cm	brown clayey alluvium
	50-180cm	tan clay
	180-200cm	gray/brown clay

Note: inconsistency in horizontal deposition of strata. South end of trench has continuation of charcoal deposit found in Trench 146. Charcoal deposit bottoms out at 200cm. (B.S.)

Test Trench #150:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-120cm	gray/brown clay
	120-180cm	tan clay
	180-200cm	gray/brown clay
Test Trench #151:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	gray/brown clay
	140-200cm	tan clay
Test Trench #152:	0-90 cm	brown clayey alluvium
	90-200cm	tan clay
Test Trench #153:	0-50 cm	brown clayey alluvium
	50-170cm	tan clay
	170-200cm	light brown clay
Test Trench #154:	0-60 cm	brown clayey alluvium
	60-140cm	tan clay
	140-200cm	light brown clay
Test Trench #155:	0-90 cm	brown clayey alluvium
	90-150cm	tan clay
	150-200cm	gray/brown clay

Test Trench #157:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-200cm	light brown clay
Test Trench #158:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	light brown clay
	140-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #159:	0-70 cm	brown clayey alluvium
	70-110cm	light brown clay
	110-160cm	tan clay
	160-220cm	red/brown clay
Test Trench #160:	0-30 cm	brown clayey alluvium
	30-40 cm	light brown silt
	40-130cm	gray/brown clay
	130-160cm	light gray dry clay
	160-200cm	tan clay
Test Trench #161:	0-50 cm	brown clayey alluvium
	50-110cm	gray/brown clay
	110-180cm	light gray dry clay
	180-200cm	tan clay
Test Trench #162:	0-40 cm	brown clayey alluvium
	40-90 cm	light brown clay
	90-130cm	gray/brown clay
	130-160cm	light gray dry clay
Test Trench #163:	0-50 cm	brown clayey alluvium
	50-80 cm	light brown clay
	80-160cm	gray/brown clay
	160-200cm	red/tan clay
Test Trench #164:	0-50 cm	brown clayey alluvium
	50-90 cm	light brown clay
	90-130cm	gray/brown clay
	130-200cm	red/tan clay
Test Trench #165:	0-30 cm	brown clayey alluvium
	30-100cm	light brown clay (baked clay at 40cm)
	100-130cm	gray/brown clay
	130-200cm	red/tan clay
Test Trench #166:	0-70 cm	brown clayey alluvium
	70-90 cm	light brown clay
	90-130cm	red/tan clay
	130-160cm	gray/brown clay
	160-200cm	tan clay

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Test Trench #167:	0-60 cm	brown clayey alluvium
	60-120cm	light brown clay
	120-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #168:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay
	100-120cm	red/tan clay
	120-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #169:	0-100cm	brown clayey alluvium
	100-160cm	light brown clay with light gray flecks
	160- cm	tan clay
Test Trench #170:	0-110cm	brown clayey alluvium
	110-170cm	light brown clay
	170-200cm	gray/brown clay
Test Trench #171:	0-50 cm	brown clayey alluvium
	50-150cm	tan clay
	150-200cm	tan clay with orange
Test Trench #172:	0-80 cm	brown clayey alluvium
	80-170cm	tan clay
	170-200cm	tan clay with orange
Test Trench #173:	0-10 cm	brown clayey alluvium
	10-20 cm	tan/orange silt
	20-100cm	gray/brown clay
	100-180cm	tan clay with orange
	180-200cm	tan clay
Test Trench #174:	0-50 cm	brown clayey alluvium
	50-110cm	gray/brown clay
	Abandoned	trench, hit old PVC pipe and water line.
Test Trench #175:	0-60 cm	brown clayey alluvium
	60-150cm	light brown clay with root veins
	150-200cm	tan clay
Test Trench #176:	0-50 cm	brown friable soil with pebbles
	50-70 cm	gray/brown clay
	70-160cm	tan clay with orange
	160-200cm	light brown clay
Test Trench #177:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay with orange
	100-120cm	tan clay
	120-160cm	gray/brown clay (large mammal bone at 120cm. elk?)
	160-200cm	light brown clay with orange

Test Trench #178:	0-60 cm	brown clayey alluvium
	60-100cm	light brown clay
	100-200cm	gray/brown clay
Test Trench #179:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-160cm	gray/brown clay
	160-200cm	light brown clay
Test Trench #180:	0-40 cm	brown clayey alluvium
	40-110cm	light brown clay with orange
	110-140cm	gray/brown clay with orange
	140-200cm	tan clay
Test Trench #181:	0-50 cm	brown clayey alluvium
	50-70 cm	light brown clay
	70-150cm	gray/brown clay with orange
	150-200cm	tan clay
Test Trench #182:	0-40 cm	brown clayey alluvium
	40-70 cm	gray/brown clay
	70-120cm	light brown clay
	120-200cm	tan clay with orange
Test Trench #183:	0-40 cm	brown clayey alluvium
	40-80 cm	gray/brown clay
	80-200cm	tan clay
Test Trench #184:	0-40 cm	brown clayey alluvium
	40-80 cm	gray/brown clay
	80-200cm	tan clay
Test Trench #185:	0-40 cm	brown clayey alluvium
	40-90 cm	gray/brown clay
	90-200cm	tan clay
Test Trench #186:	0-110cm	tan clay
	110-130cm	gray/brown clay
	Abandoned	trench, hit top of large metal tank or pipe.
Test Trench #187:	0-30 cm	brown clayey alluvium
	30-90 cm	gray/brown clay
	90-180cm	light gray clay
	180-200cm	light brown clay
Test Trench #188:	0-10 cm	brown humus
	10-90 cm	light gray clay
	90-120cm	tan clay
	120-200cm	gray/brown clay with light gray
Test Trench #189:	0-40 cm	brown clayey alluvium
	40-90 cm	light gray clay
	90-150cm	light brown with light gray clay
	150-200cm	light gray clay

Test Trench #190:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-130cm	light brown clay
	130-140cm	gray/brown clay
	140-200cm	light brown with orange clay
Test Trench #191:	0-60 cm	brown clayey alluvium
	60-150cm	light brown with orange clay
	150-200cm	tan with orange clay
Test Trench #192:	0-60 cm	brown clayey alluvium
	60-160cm	gray/brown clay
	160-200cm	light brown with orange clay
Test Trench #193:	0-40 cm	brown clayey alluvium
	40-60 cm	tan clay
	60-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #194:	0-100cm	gray/brown clayey alluvium
	100-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #195:	0-60 cm	gray/brown clayey alluvium
	60-100cm	light brown clay
	100-160cm	light brown with light gray clay
	160-200cm	tan clay
Test Trench #196:	0-80 cm	gray/brown clayey alluvium
	80-120cm	gray/brown with light gray clay
	120-180cm	light brown with light gray clay
	180-200cm	tan clay
Test Trench #197:	0-80 cm	gray/brown clayey alluvium
	80-110cm	light brown clay
	110-180cm	tan clay with light gray
	180-200cm	tan clay
Test Trench #198:	0-40 cm	gray/brown clayey alluvium
	40-80 cm	light brown clay
	80-160cm	tan clay
	160-200cm	tan with orange clay
Test Trench #199:	0-120cm	brown clayey alluvium
	120-180cm	gray clay
	180-200cm	gray with orange clay
Test Trench #200:	0-120cm	brown clayey alluvium
	120-180cm	gray clay
	180-200cm	gray with orange clay

Test Trench #201:	0-180cm	brown clayey alluvium
	180-200cm	gray clay
Test Trench #202:	0-120cm	brown clayey alluvium
	120-200cm	gray with orange clay
Test Trench #203:	0-120cm	brown clayey alluvium
	120-200cm	gray clay
Test Trench #204:	0-60 cm	red/brown sandy alluvium
	60-140cm	brown clay
	140-200cm	gray clay
Test Trench #205:	0-80 cm	red/brown sandy alluvium
	80-160cm	tan silt (large mammal bone at 110cm)
	160-200cm	gray clay
Test Trench #206:	0-70 cm	red/brown sandy silt
	70-100cm	gray/green clay
	100-200cm	brown sandy silt
Test Trench #207:	0-120cm	red/brown sandy silt
	120-200cm	gray/green clay
Test Trench #208:	0-110cm	red/brown sandy silt
	110-200cm	gray/brown clay
Test Trench #209:	0-110cm	red/brown sandy silt
	110-200cm	gray/brown clay
Test Trench #210:	0-120cm	red/brown sandy silt
	120-200cm	gray/brown clay
Test Trench #211:	0-90 cm	brown clayey alluvium
	90-140cm	gray/brown clay
	140-200cm	gray/green clay
Test Trench #212:	0-90 cm	brown clayey alluvium
	90-130cm	gray/brown clay
	130-200cm	gray/green clay
Test Trench #213:	0-90 cm	brown clayey alluvium
	90-130cm	gray/brown clay
	130-200cm	gray/green clay
Test Trench #214:	0-60 cm	brown clayey alluvium
	60-150cm	gray/brown clay
	150-200cm	gray/green clay

Test Trench #215:	0-60 cm	brown clayey alluvium
	60-110cm	gray/brown clay
	110-180cm	gray/green clay
	180-200cm	tan clay
Test Trench #216:	0-120cm	brown sandy silt
	120-180cm	gray/brown clay. Historic materials at 150cm (glass, bone, metal)
	180-200cm	tan clay
Test Trench #217:	0-60 cm	brown sandy silt
	60-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #218:	0-110cm	brown sandy silt
	110-200cm	gray/brown clay; historic materials at 110cm
Test Trench #219:	0-120cm	brown sandy silt
	120-170cm	tan sandy silt
	170-200cm	gray/brown clay
Test Trench #220:	0-100cm	brown sandy silt
	100-160cm	tan sandy silt
	160-200cm	gray/brown clay
Test Trench #221:	0-150cm	brown sandy silt
	150-200	tan sandy silt
Test Trench #222:	0-140cm	brown sandy silt
	140-200cm	gray/brown clay with white
Test Trench #223:	0-40 cm	light brown fill
	40-200cm	brown sandy silt
Test Trench #224:	0-120cm	brown clayey alluvium
	120-200cm	gray/green clay
Test Trench #225:	0-100cm	brown clayey alluvium
	100-130cm	tan clay
	130-200cm	gray/green clay
Test Trench #226:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	Abandoned trench, hit abandoned water line at 140cm	
Test Trench #227:	0-70 cm	brown clayey alluvium
	70-100cm	light brown clay
	100-200cm	gray/green clay with orange
Test Trench #228:	0-80 cm	brown clayey alluvium
	80-100cm	tan clay
	100-200cm	gray/green clay with orange

Test Trench #229:	0-80 cm	brown clayey alluvium
	80-150cm	gray/green clay
	150-200cm	tan clay
Test Trench #230:	0-60 cm	brown clayey alluvium
	60-90 cm	gray/green clay with orange
	90-150cm	gray/green clay
	150-200cm	tan clay

CONCLUSIONS AND RECOMMENDATIONS

Based on the archival record, the historic literature, the surface survey, and the subsurface testing, it appears that there are definitely prehistoric archeological resources in the study area and that there is the strong potential for subsurface historic deposits. The regions that appear to contain or potentially contain archeological resources are marked in parallel lines in the attached testing location and sensitivity map of the airport. The sensitive area around Test Trench #184 is the scene of the Stockton House site as known from historic literature. Around Test Trench #181 is a sensitive area established on the basis of prehistoric artifact finds on the surface. Test Trench #216 marks a third sensitive area where both the historic records and subsurface testing point to the possibility of early Spanish and Mission period activities leaving remains in buried deposits. The large sensitive area on the northwest side of the airport contains many prehistoric artifacts, the sites of the first and second locations of the Mission Santa Clara (1777-1784), and possible contact-period Indian materials.

Recommendations for the future management of cultural resources in the study area include 1) the retension of a trained archeologist to monitor any subsurface construction or earthmoving in any of the marked sensitive areas, and 2) the surface collection and analysis of prehistoric artifacts in the prehistoric sentitive zones previous to any construction in those areas. Also, in the event that any archeological traces (human remains, artifacts, concentrations of shell/bone/ash) are encountered in any portion of the study area, all construction within a fifty-meter radius of the find should stop, and a qualified archeologist be brought in to examine the find an to recommend mitigations as necessary.

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ADDENDUM TO ARCHEOLOGICAL EVALUATION OF SAN JOSE MUNICIPAL AIRPORT

The archeological evaluation of the San Jose Municipal Airport originally was intended to include the subsurface testing of the parking lot area in front of the Terminal Building; however, due to rains and problems in coordination in the last days of the testing program this portion of the testing was not carried out. There is a real possibility of archeological deposits existing under this parking area and subsurface testing should be done there previous to the finalization of construction plans for this region. It is intended that such testing will shortly be carried out by ARM when weather allows. A written letter to this effect should be attached to this report to confirm the completion of this last phase of the investigation.

Archeological
Resource Management
Robert R. Cartier, Ph.D.
496 North 5th Street
San Jose, CA 95112
Telephone (408) 295-1373

March 26, 1980

ADDENDUM ON THE COMPLETION OF ARCHEOLOGICAL TEST TRENCHING AT THE SAN JOSE MUNICIPAL AIRPORT

This letter notes the completion of archeological test trenching at the San Jose Municipal Airport. In addition to the 230 test trenches excavated in February, 1980, seven more trenches were excavated in the parking lots adjacent to the Terminal Building to test for the possiblity of buried cultural resources. The results of the new trenches have been incorporated onto the map of trench locations and the description of the trench data. Of the seven additional trenches, trench #231 yielded positive data of a potential archeological site, and, accordingly, the region directly around this location is designated on the archeological map as sensitive. The completion of these additional test trenches marks the overall conclusion of the archeological evaluation.

TEST TRENCHES EXCAVATED IN PARKING AREAS ADJACENT TO THE TERMINAL BUILDING

Test Trench #231:	0-15cm	asphalt hardtop
	15-70cm	fine silty river alluvium
	70-260cm	dark brown clay, very dense
Test Trench #232	0-10cm	asphalt hardtop
	10-60cm	silty clay
	60-130cm	dark, moist clay
	130-180cm	much fire-altered clay and charcoal
	180-250cm	dark clay with organic decomposition
Test Trench #233	0-15cm	asphalt hardtop
	15-50cm	construction gravel and sand
	50-150cm	brown and gray clay with some sand
	150-270cm	moist gray clay
Test Trench #234	0-15cm	asphalt hardtop
	15-55cm	construction gravel and sand
	55-85cm	alluvial silt and brown clay
	85-150cm	soft alluvial silt with little clay
	150-240cm	brown clay with silt
	240-270cm	light gray clay
Test Trench #235	0-15cm	asphalt hardtop
	15-45cm	construction gravel and sand
	45-80cm	reddish brown clay with silt
	80-160cm	brown clay and silt
	160-230cm	dark brown clay
	230-270cm	medium gray clay with yellow inclusions
Test Trench #236	0-20cm	asphalt hardtop
	20-40cm	construction gravel and sand
	40-100cm	brown clay and sand
	100-200cm	dark brown clay
	200-260cm	gray clay
Test Trench #237	0-20cm	asphalt hardtop
	20-50cm	clay and construction gravel
	50-220cm	dark gray clay with sand and burned wood
	220-260cm	moist gray clay

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1939-1979 Collection courtesy of San Jose Municipal Airport, Facilities Planning Office.

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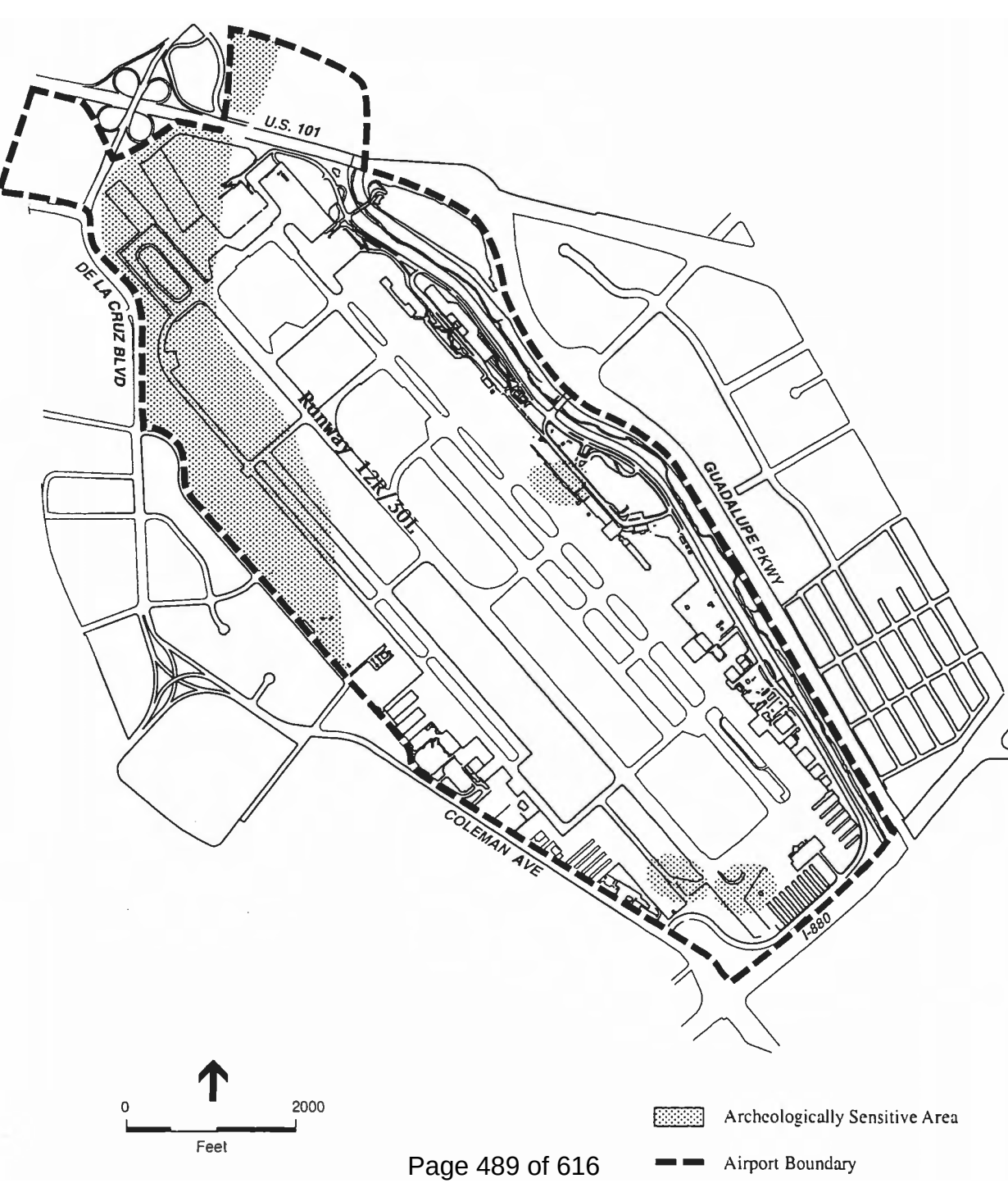
PERSONAL COMMUNICATIONS

James Nissen, former director of the San Jose Municipal Airport.

Note: The figure showing trench locations is oversized and is not included. The figure on the following page that depicts the archaeologically-sensitive areas at the Airport is based on the results of the trenching and represents the recommendations of the archaeologist that prepared this report.


U.S. 101
DE LA CRUZ BLVD
Runway 12R/30L
GUADALUPE PKWY
COLEMAN AVE
I-880
0
2000
Feet
Archeologically Sensitive Area
Airport Boundary

DAVID J. POWERS & ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS & PLANNERS

M E M O R A N D U M

TO: Cary Greene, SJC

FROM: John Hesler, Senior Environmental Specialist

DATE: October 21, 2020

SUBJECT: **Archaeological Issues Associated with Runway Incursion Mitigation (RIM) Improvements At the Norman Y. Mineta San José International Airport**

The purposes of this memorandum are to 1) describe the proposed RIM modifications to the airfield at the Norman Y. Mineta San José International Airport (SJC), 2) describe the archaeological resources that are present, and 3) describe the effects of those proposed modifications on the archaeological resources.

PROJECT DESCRIPTION

The project proposes to modify certain components of the airfield at SJC to reduce the potential for runway incursions and to improve compliance with current FAA design standards. A "runway incursion" is defined as the unauthorized presence of an aircraft, vehicle or person on a surface designated for the landing and take-off of aircraft. Runway incursions are a significant safety concern, the most serious of which have led to collisions, injuries, and fatalities.

The following modifications to the existing airfield at SJC are proposed. The locations of the proposed modifications are shown on Figure 1.

Project #1 - General Aviation Run-up Pad Relocation: The existing run-up pad adjacent to the southwest corner of the Taxiway D/Taxiway W intersection would be removed. A new run-up pad would be located within the existing apron at the southwest corner of the airfield. Improvements would consist of pavement markings, strengthening, and potentially a blast fence.

Project #2 - "Taxi" Markings on Taxiways Y and W: Pavement markings would be added near each end of existing parallel Taxiways W and Y to visually denote their use as taxiways. No construction or demolition would be required.

Project #3 - Taxiway W/M Intersection Modification: The existing northwest corner of the intersection would be rounded off to visually affirm Taxiway W as a parallel taxiway rather than a runway. A portion of the excess pavement would be converted to shoulder, with the remainder closed off through painting.

Project #4 - New Taxiway V: Former Runway 11-29 (closed in 2009 and currently used as Taxiway W1) would be permanently decommissioned and reconstructed as a new parallel Taxiway V, with extensions south to existing cross Taxiway C and north to a new cross Taxiway V7 connecting the end of new Taxiway V to parallel Taxiway W. Total length would be 6,790 feet. Construction would also include up to seven new taxiway connectors (V1-V7) along new Taxiway V to connect to a future parallel taxilane to the west (project element 9 below). Upon completion, existing Taxiway V abutting the general aviation aprons on the west side of SJC would be closed.

Project #5 - Taxiways F and H Closure between Runways: The existing segments of cross Taxiways F and H between Runway 12R-30L and Runway 12L-30R would be closed through pavement painting and lighting/marking removal.

Project #6 - New taxiway Connectors W2 and W3 at Southwest Apron: Two new taxiway connectors (W2-W3) would be created within the southwest apron through pavement marking/painting to channel general aviation aircraft movement to/from parallel Taxiway W.

Project #7 - Taxiway W Extension: Parallel Taxiway W would be extended south from Taxiway B to Runway 12R-30L as Taxiway W1 through construction of new pavement and associated shoulders and lighting/marking.

Project #8 - Runway 12R-30L Hold Bar Relocation: The Runway 12R-30L aircraft hold positions would be relocated 30 feet farther from the runway centerline.

Project #9 - New West Side Parallel Taxilane: Upon closure of existing Taxiway V (part of project element 4 above), the pavement would be replaced with an apron-edge parallel taxilane.

Project #10 - Taxiway B and Taxiway L Width Reduction: A segment of the existing cross Taxiway B between Taxiway Z and Runway 12L-30R, and a segment of the existing cross Taxiway L between Taxiway Y and Runway 12R-30L, would be reduced in width through painted pavement closure.

Project #11 - Runway 12L-30R Blast Pad Improvements: The Runway 12L-30R blast pads would be widened, and the blast pad at the 12L end also lengthened, through pavement construction and markings.

AREA OF POTENTIAL EFFECTS

The area of potential effects (APE) consists of the portions of the airfield at SJC where the above-described RIM improvements will occur; see Figure 1.

EXISTING HISTORIC RESOURCES

There are no existing buildings or structures on the airfield.

EXISTING ARCHAEOLOGICAL RESOURCES

Archaeological investigations conducted for SJC included a detailed survey of the entire Airport property, research on the cultural resources in the Airport vicinity, and an archival search of State records. This research was performed to determine the presence or absence of cultural resources at the Airport and in the Airport vicinity, and to determine the significance of any archaeological resources.

Archival research, which was conducted at the Northwest Information Center of the California Archeological Site Inventory, revealed a number of previous archeological surveys conducted in the Airport vicinity. The existing research has identified two recorded archaeological sites that are known to exist at the Airport: SCL-311H and SCL-430.

SCL-311H

Site SCL-311H is located outside of the APE but is within the northwest portion of SJC and stretches along what was once Mission Road (now called Trimble Road) from the Guadalupe River to North First Street. Research indicates that the site of the route was established in the 1770s as the original access to Mission Santa Clara, which was reported to lie on the east side of the Guadalupe River. In addition, the area may have contained the original adobe structures that housed inhabitants adjacent to the Mission.

In 1999, the FAA determined that SCL-311H is eligible for inclusion on the *National Register of Historic Places* under Criteria A and D. Under Criterion A, this archaeological resource is associated with the Mission Santa Clara. The settlement and occupation of Mission Santa Clara were important events in the history of San José and the Santa Clara Valley and any archaeological resources associated with these events would be considered significant. In addition, this archaeological resource is eligible under Criterion D because it has the potential to yield information associated with the Mission Santa Clara and to provide a greater understanding of the lifeways at the Mission Santa Clara.[1]

SCL-430

SCL-430 is a site that has been recorded in the center of the southwest edge of SJC. Survey of the site surface revealed both historic and pre-historic artifacts. Historic artifacts found dating from the mid-1800s included bottle fragments, ceramics, and metal objects, assumed to be related to turn-of-the-century residences that were removed for Airport expansion (Cartier and Detlefs, 1980). In addition, the site was noted to be on the edge of the old location of the early Santa Clara Mission site. Pre-historic elements encountered included projectile points, three chipped lithics, six fire cracked rocks, and two pieces of possible groundstone within a 300-acre area. The projectile points appeared to be early Middle Horizon or Early Horizon in age (more than 2,000 years old). The area appeared to be associated with hunting/butchering activities.

[1] FAA, Environmental Impact Statement for SJC Master Plan Update, Appendix J: Archaeological, Historical, and Cultural Resources Report, 1999.

In 1999, the FAA determined that SCL-430 is eligible for the *National Register of Historic Places* under Criterion D. This archeological resource is associated with the turn-of-the-century houses that were removed for development of the Airport and this resource is eligible under Criterion D because it has the potential to yield information associated with the lifeways of residents in San José at the turn of the century. [2]

1980 Archaeological Investigation at SJC

Due to the presence of SCL-311H and SCL-430, as well as the general sensitivity of the area due to its proximity to the Guadalupe River, a detailed cultural resources assessment of SJC was prepared as part of the preparation of the EIR for the 1980 Airport Master Plan. This assessment, which is attached to this memorandum as Appendix A, included extensive subsurface testing over the entire Airport site. A total of 237 test trenches were excavated to a maximum depth of 300 cm (approximately three feet). Only three trenches yielded findings of historic nature (cut bone, glass, and metal). None of the trenches yielded prehistoric resources. The 1980 assessment also identified archaeologically sensitive areas at the Airport where the likelihood of encountering buried archaeological materials during the construction of future Airport-related projects is the greatest, as shown on Figure 2.

Archaeological Monitoring at SJC: 1980 - Present

As recommended by the 1980 cultural resources assessment, an archaeological monitoring program was established at the Airport whereby a qualified archaeologist monitors subsurface construction activity within the areas depicted on Figure 2. The program authorizes the monitoring archaeologist to discontinue work within a 100-foot radius of encountering any prehistoric or historic resources. The program also requires the archaeologist to prepare a report evaluating the find and identifying mitigation for impacts. The report is submitted to the City's Director of Planning, Building, and Code Enforcement and the Director of the Airport.

Since 1980, qualified archaeologists have been retained to monitor all earthmoving activities for projects located in the designated archaeological sensitive areas at the Airport. Major construction projects that have been undertaken at the Airport within these archaeological sensitive areas include the Runway 12R/30L extension, Runway 11/29 extension/widening, Taxiways W and L extensions, Taxiways M and V, Yellow Long-Term Parking Lot, Southwest Tiedown Ramp, Passenger Terminal B Construction, westside general aviation facilities, storm and sanitary sewer lines, and employee parking lot and perimeter road. During earthmoving activities associated with these projects, no archaeological resources were observed by the monitoring archaeologist.

Per City policy, archaeological monitoring will continue to occur for all future on-Airport projects that are located within the archaeologically sensitive areas, as depicted on Figure 2.

PREVIOUS SECTION 106 CONSULTATION FOR PROJECTS AT SJC

In 1999, during the preparation of an Environmental Impact Statement (EIS) for the SJC Master Plan Update, the FAA undertook consultation with the State Historic Preservation Officer (SHPO), as required under Section 106 of the National Historic Preservation Act. In a July 1, 1999 letter to the FAA, the SHPO concurred

[2] FAA, Environmental Impact Statement for SJC Master Plan Update, Appendix J: Archaeological, Historical, and Cultural Resources Report, 1999.

that the implementation of the projects listed in the Airport Master Plan Update "will not affect any historic properties." SHPO's concurrence with this conclusion was based on two facts:

- FAA will implement an archeological monitoring program that will require the presence of a qualified archeologist during all earthmoving activities in designated archeologically sensitive areas.
- SCL-311H and SCL-430 will be completely avoided during implementation of the undertaking.[3]

IMPACT OF PROPOSED RIM IMPROVEMENTS ON ARCHAEOLOGICAL RESOURCES

The proposed set of RIM improvements (depicted in Figure 1) are refinements to, and some cases overlap the locations of, the proposed SJC airfield projects that were analyzed in the 1999 Airport Master Plan EIS. The archaeological monitoring program in place at SJC since 1980 would continue to be applied to the construction of the following RIM projects located wholly or partially within the archaeologically sensitive areas (depicted on Figure 3): #1, #3, #4, #6, #7, #8, #9, #10, and #11. Although RIM Project #2 is located within an archaeologically-sensitive area, no monitoring will be required because that project is limited to the painting of markings on existing pavement.

SCL-311H will not be affected by the construction of the RIM projects as it is located outside of the APE. SCL-430 will not be affected since earthmoving activities associated with the RIM projects would be within areas previously subjected to earthmoving activities when Taxiway W was constructed (no archaeological resources were encountered during that taxiway project construction).

CONCLUSION

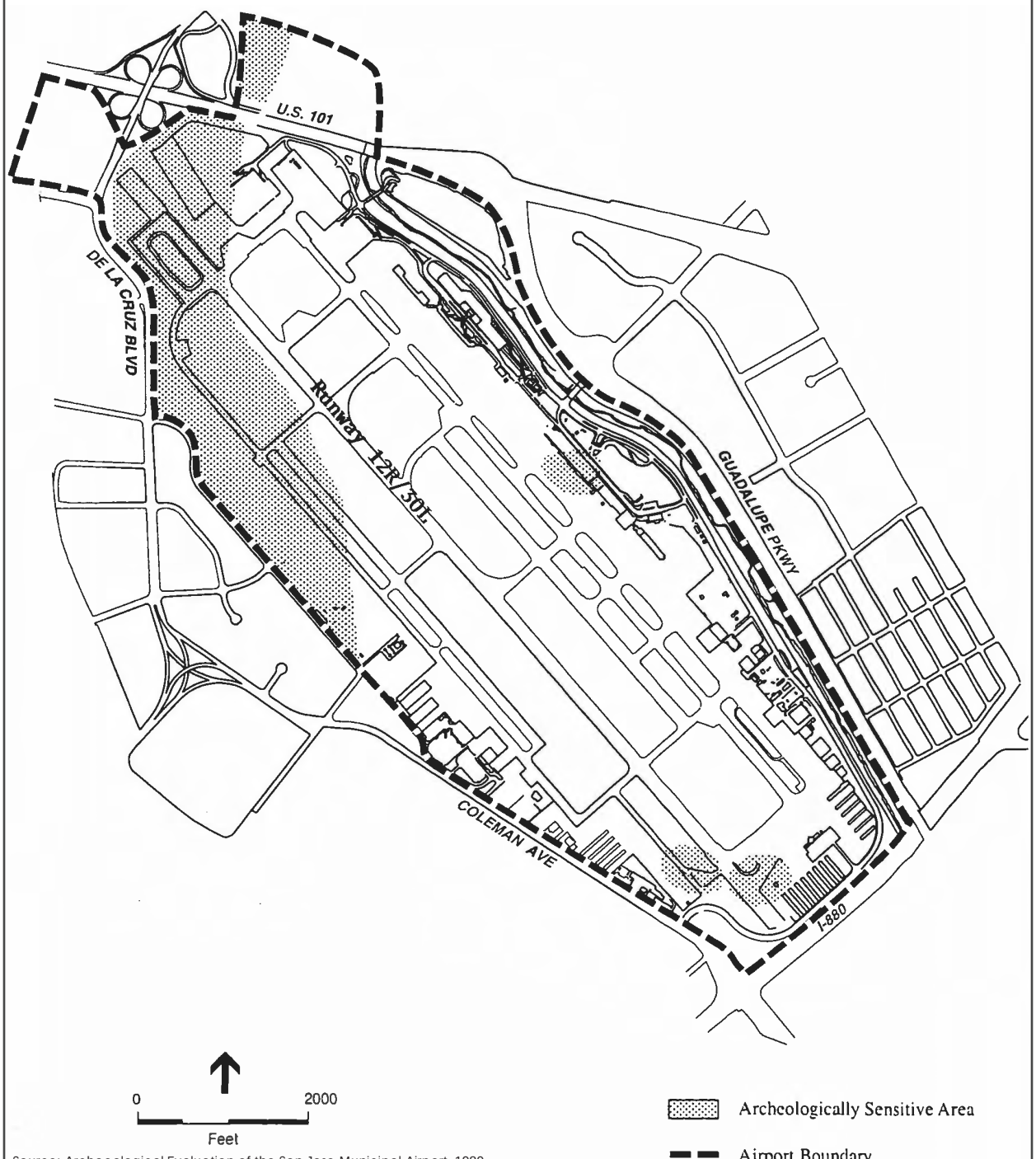
Based on the information contained in this memorandum, it is our conclusion that the proposed RIM improvements will not affect any historic properties. For Section 106 compliance purposes, the City should request FAA to adopt this finding and that FAA should request concurrence from SHPO.

Attachments: Figure 1: Locations of Proposed RIM Improvements
Figure 2: Archaeologically Sensitive Areas at SJC
Figure 3: Locations of RIM Improvements Within Archaeologically-Sensitive Areas
Appendix A: 1980 SJC Cultural Resources Assessment

[3] Source: Letter dated July 1, 1999 from Daniel Abeyta, Acting State Historic Preservation Officer, to Joseph Rodriguez, Supervisor, FAA Airports District Office, Burlingame, CA.

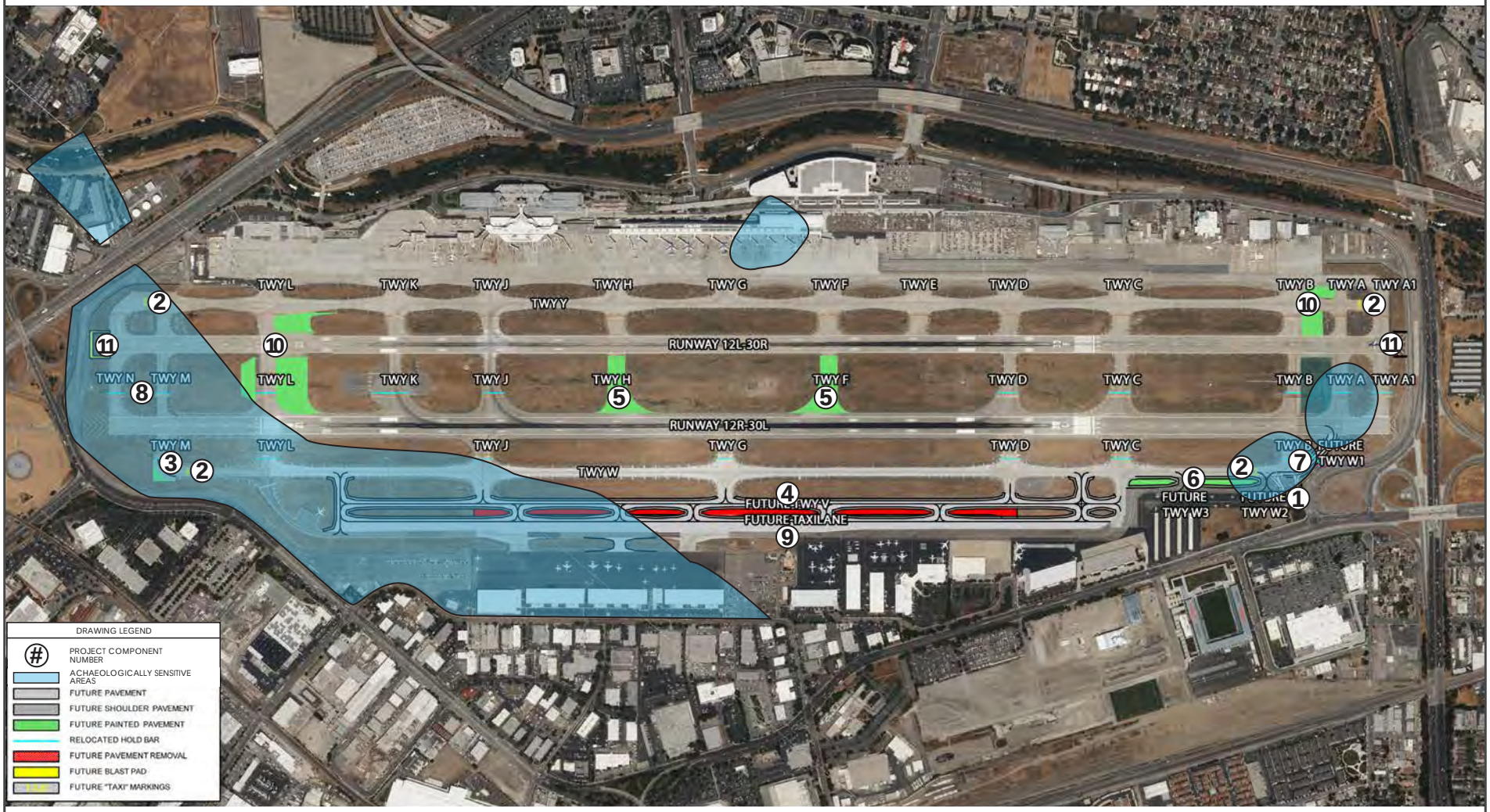


AERIAL PHOTOGRAPH DEPICTING PROPOSED AIRFIELD IMPROVEMENTS | FIGURE 1



Source: Archaeological Evaluation of the San Jose Municipal Airport, 1980.

Archaeologically-Sensitive Areas at SJC | FIGURE 2



LOCATIONS OF PROPOSED IMPROVEMENTS WITHIN ARCHAEOLOGICALLY-SENSITIVE AREAS | FIGURE 3

ARCHEOLOGICAL EVALUATION OF THE SAN JOSE MUNICIPAL AIRPORT

FOR
THE CITY OF SAN JOSE

BY
ARCHEOLOGICAL RESOURCE MANAGEMENT
ROBERT CARTIER, PRINCIPAL

WITH SECTIONS BY:
ROBERT CARTIER
CHARLENE DETLEFS

ADMONITION

Certain information contained in this report is not intended for general public distribution. Portions of this report locate significant archeological sites in the region of the project area, and indiscriminant distribution of these data could result in the desecration and destruction of invaluable cultural resources. In order to insure the security of the critical data in this report, certain maps and passages may be deleted in copies not delivered directly into the hands of environmental personnel and qualified archeologists.

The Principal Investigator

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ABSTRACT

Archeological research was carried out for the property of the San Jose Municipal Airport, San Jose, CA. The research included an archival study of historic literature, an archival check of prehistoric site records, a surface survey, and subsurface testing. Cultural resources were reported in the historic literature and several prehistoric and historic artifacts were recovered in the field survey and testing. No prehistoric resources were located in the subsurface sample testing but some historic artifacts were found in relatively deep deposits near the Guadalupe River. Five projectile points and/or knives of the Middle Horizon or Early Horizon prehistoric eras were recovered from the west side of the study area near the second recorded site of the Mission Santa Clara. Based on the archival and field findings, it is recommended that a trained archeological observer be present if any subsurface construction is considered in the locations indicated on the map attached to this report. The archeological observer would watch for the possible unearthing of any buried deposits or artifacts that the sample testing may not have located and make on-site recommendations for their recovery or preservation.

LOCATION AND DESCRIPTION OF THE SUBJECT AREA

The subject area includes a region of approximately 1000 acres in size as defined as the San Jose Municipal Airport. On the USGS 7.5 minute quadrangle of San Jose West, the Universal Transverse Mercator Grid location (UTMG) is 962-352 for the center of the study area, the with extent of the airport grounds clearly marked on this same map and the adjacent quadrangle of Milpitas, CA. The elevation ranges from approximately 30 to 65 feet in elevation, and the nearest natural water source is the Guadalupe River which cuts into the northern extreme of the airport lands.

At the time of the archeological reconnaissance and testing, the study area was in various states from being highly altered from historic land-use to other places where relatively few modifications had taken place. The greatest difficulty in doing the field survey and testing involved the highly restricted runway and radar areas and the massive expanses of asphalt parking lots.

Most of the difficulties in gaining access to runways, radar sites, and other areas were overcomed with the appreciated assistance of airport staff.

REQUEST FOR ARCHEOLOGICAL EVALUATION

Clearances and permits for future development include an archeological evaluation to determine the presence or absence of any significant cultural resources. Archeological services were requested in January, 1980 in order to: 1) undertake an archival study of the archeological resources in the vicinity of the property for prehistoric sites, 2) conduct a literature survey of the historic activities related to the airport, 3) do a surface survey of the airport grounds, and 4) carry out subsurface testing to determine the potential for buried archeological deposits. A report on these duties and the findings, along with possible recommendations, was to be furnished as one component to an environmental planning document for future airport development.

ARCHEOLOGICAL SURVEY

Archival: Prior to reconnoitering the subject area, a study was conducted of the maps and records at the Regional Office of the California State Site Survey. This check was done to determine if any known archeological resources were recorded on or adjacent to the study area. The archvial check with the Regional Office indicated that no cultural resources were reported in the property. Several sites, however, of a prehistoric and historic nature are recorded a short distance away from the airport boundaries, particularly to the north on the other side of the Guadalupe River. The great majority of the prehistoric sites in the region are Middle Horizon era habitation/burial grounds that have been found through subsurface construction or subsurface testing by archeologists. Some of these sites include SCl-6, SCl-7, SCl-276, SCl-288, SCl-300, SCl-302, SCl-359, and SCl-418 (Cartier, 1979). From this distribution, it is evident that a pattern for buried prehistoric deposits is regular off the Guadalupe River in the Lower Santa Clara Valley.

HISTORICAL BACKGROUND by Charlene Detlefs

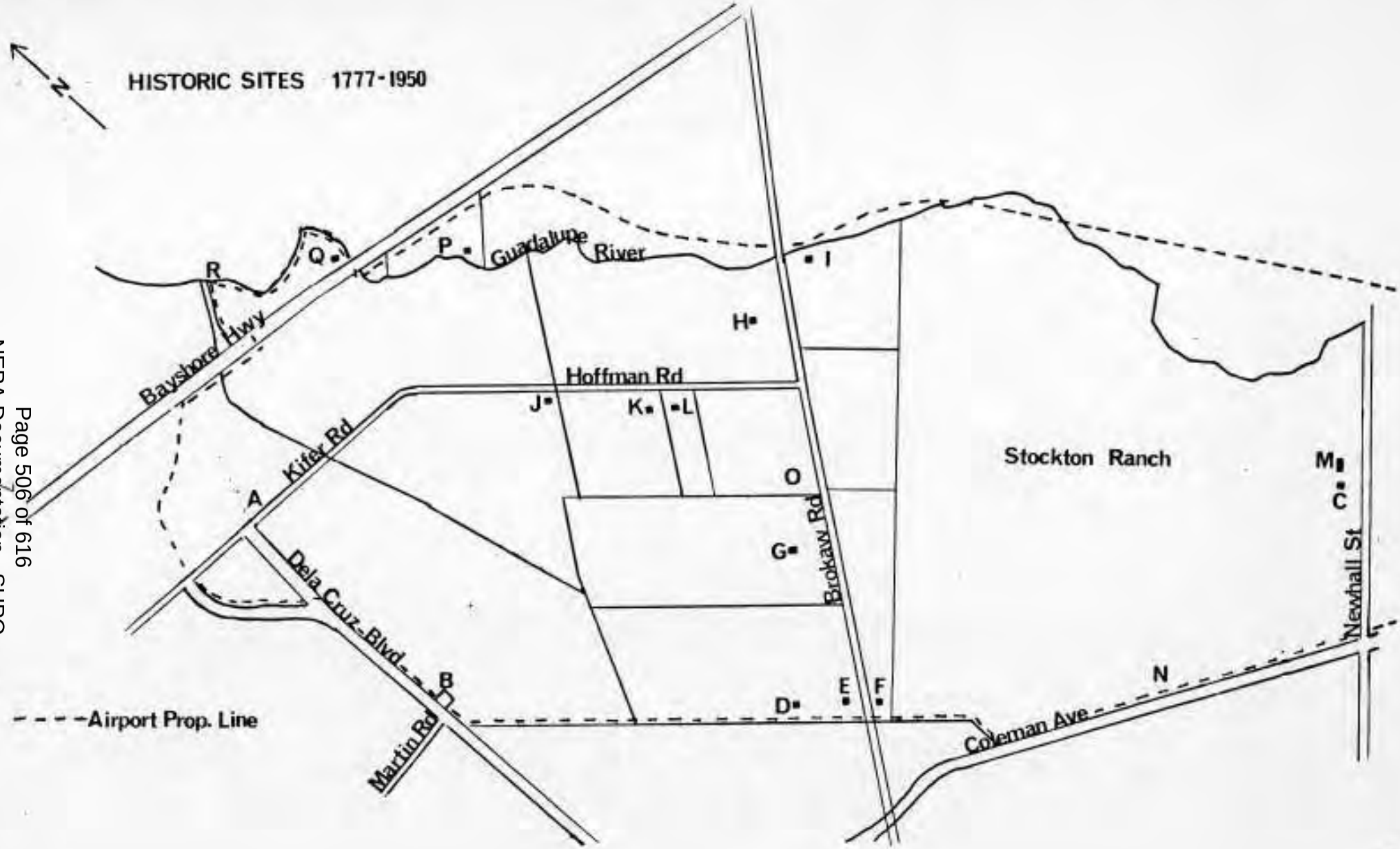
Introduction

The purpose of the following section is to serve as a guide for the location of potentially significant historic resources that may be located within the confines of the San Jose Municipal Airport property. The archival research was conducted during a six day period between Feburary 1 to 8, 1980. Information relating to historic sites was gleaned from aerial photos (1939-1979), historic maps, deeds, tax assessments, census data, city directories, newspaper clipping files, and local history books. These archival resources are located within the offices of the City of San Jose and the County of Santa Clara, the San Jose Historical Museum, and the San Jose Public Library. In addition, an oral communication was conducted with James Nissen, former airport director who has been personally familiar with the airport and its expansion since 1946.

The history of the project area begins essentially with the first historic settlement in the Santa Clara Valley, the founding of Mission Santa Clara on the banks of the Guadalupe River in 1777. This site, as well as the second Mission site, is potentially within the boundaries of the airport property. After the secularization of the Mission, a portion of the subject lands were incorporated into Rancho El Portreo de Santa Clara and the rest into Pueblo Lands of San Jose. Most of the area south of Brokaw Road remained in one large ranch, the Stockton Ranch, until purchase of the land by the City in the early 1940s. The area north of Brokaw Road was broken into smaller parcels, ranging in size from six to one hundred acres during the 1870s. Not all of the farms had habitation complexes on them, the acreage being farmed by persons with residences elsewhere. This section will discuss only those parcels where structures were noted on maps dating prior to 1900. During the early twentieth century, lands were further subdivided and new farming complexes constructed. In some cases, especially in the northern portions of the project area where orchards were prevalent, lands were consolidated into larger farms by fruit producing companies. At least one dairy, Forward Dairy located on the northwest corner

MAP KEY TO POTENTIAL HISTORIC SITES

A - First Site of Mission Santa Clara - 1777
B - Second Site of Mission Santa Clara - 1779
C - Stockton House - 1850
D - Beans House - pre-1876
E - Beans/Souza Farmhouse - post-1900
F - Carling Farm Site - pre-1900
G - Martin/Moorhead/Rogers Farm Site - pre-1900
H - J. W. Hines Farm Site - pre-1876
I - Warner Oliver Farm Site - pre-1876
J - Brokaw(?)/Dawson Farm Site - pre-1876
K - Unidentified Farm Site - pre-1900
L - Unidentified Farm Site - pre-1900
M - California Aviation Activites Flight School - 1946
N - Airport Village - Post WW II
O - Forward Dairy - pre-1921
P - A. M. Ogier House - pre-1876
Q - Dawson House Site - pre-1866
R - Spanish Bridge - 1777



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NEPA Documentation - SHPO

of Brokaw Road and Kifer (formerly Hoffman) Road, operated during this period. By World War II, there was interest in at least the southern portion of the project area (the Stockton Ranch) for the site of a municipal airport. This idea became a reality in the late 1940s. The lands utilized by the airport have expanded until now they are bounded by the Guadalupe River to the east, Highway 17 to the south, Colemen/Martin Road to the west, and Dela Cruz Avenue to the north.

The remainder of this section will deal with specific areas or historic periods including the early Mission sites, Rancho El Portreo de Santa Clara (Stockton Ranch), the Brokaw Road farms, the Hoffman (Kifer) Road farms, and the development of the airport itself. Finally, a discussion of the potential for locating significant sites during the testing phase of the project will be presented.

Early Mission Santa Clara Sites

The first historic settlement on the project area may have occurred with the founding of Mission Santa Clara on the western bank of the Guadalupe River in 1777 (Site A). The original site, as nearly as has been determined by local scholars, was located at the northern end of the airport property, south of Dela Cruz about where Kifer Road was once located. The founders of the Mission arrived on the site in January of 1777, and after construction of a temporary chapel, mass was said on January 12. Fray Francisco Palou related that soon after, construction of a Mission quadrangle measuring seventy varas (1 vara = 2.75 feet) on each side was initiated. Two sides of the structure were for for the church, dwellings for the Fathers, and offices for the Mission, and the other two sides were for the guardhouse, houses for nine soldiers and one settler, and a granary. The *Informe* of Mission Santa Clara, written December 30, 1777 by Fray Thomas de la Pena and Fray Joseph Antonio Murguia, describes the Mission compound as follows:

> The buildings completed to date are as follows: first, the Church with sacristy, 20 varas in length and 6 wide, of upright logs (*palisada*), chinked with clay, with flat roof of earth (*terrado*). Then a dwelling house adjoining the church, which is now being finished, 22 varas long

> and 6 wide with five living rooms, a kitchen, all of upright saplings like the church. Also another building 31 varas in length and 5 in width which serves at present as the actual dwelling of the Fathers, the servants, offices, toilets, and a hen-coop, all of upright saplings with earthen roof.
>
> There is also a corral, 30 varas square, ditched and with posts to enclose the cattle; and another of the same 12 varas square for the sheep and goats. There is also a bridge of timbers for passage over the river (Guadalupe) with a paving of earth (Spearman, 1963).

The bridge mentioned in the foregoing passage was known as Spanish Bridge and was later noted as being located at the common corner of Rancho Rincon de los Esteros and Rancho Ulstinac (Site R). Eventually, it was the main crossing over the Guadalupe River on the road between Mission Santa Clara and Mission San Jose (*Ibid.*). The original site was lost, however, with the channelization of this portion of the Guadalupe River in 1960.

The Mission remained at Site A for two years until on January 23, 1779 when the Guadalupe River overflowed its banks, inundating the Mission compound. When the waters receded, only storehouses and a few timbers from the buildings remained. The catastrophe necessitated removal of the Mission to a less vulnerable site.

When the winter storms had subsided, a new church was constructed approximately where Dela Cruz and Martin Avenues converge (Site B). At this site a church, 25 varas in length and 6 in width, was dedicated on November 11, 1779. Like the previous buildings, it was built of saplings and chinked with clay. Another building, measuring 45 by 5 varas, was built in a similar fashion and served as a house for the Fathers and a storeroom. Two additional houses, measuring 10 by 5 varas, were built, one to house servants of the mission and the other as a kitchen and workshop. The Fathers lived and worked here until the dedication of a more permanent adobe church on May 16, 1784 which was located at Campbell and Franklin Streets in Santa Clara (Spearman, 1963; Bowman and Hendry, 1940; Hoover, 1966; San Jose Mercury, October 3 and 4, 1920).

Rancho El Portreo de Santa Clara - The Stockton Ranch

Between 1777 and 1844, the project area was a portion of the *Portreo de Santa Clara* or the Mission pasture lands. The land was criss-crossed with ditches which carried water for irrigation of the adjoining lands. After secularization of the Mission, the area south of Brokaw Road was granted to James Alexander Forbes as part of the one square league Rancho Portreo de Santa Clara in 1844. In 1847, Forbes sold the rancho to Commodore Robert Stockton, USN. Stockton was patented about 2,000 acres of the original grant.

Stockton is credited with four major constributions to the area, even though he spent very little time here himself. Among his endeavors were the importation nursury stock to the County including apples, pears, plums, peaches, nectarines and strawberries in 1852; the importation of bees from Italy; the establishment of a residential subdivision, Alameda Gardens, in 1850; and the importation of about ten pre-fabricated houses from Philadelphia in 1850 (Hoover, 1966).

One of these "pre-fab" houses, sometimes known as the "White House" or the "Stockton House," stood on the project area between 1850 and 1947 (Site C). This house, the largest of the pre-fabs, stood at the end of Spring Street just beyond Newhall. It was a two and one-half story, clapboard-sided structure built of cedar and pine with multi-paned windows and shutters (Clipping File, S.J. Public Library, 1948).

James F. Kennedy, Stockton's agent, and his family lived in the Stockton House between 1850 and 1860. In 1852, the family was listed in the California State Census, and members included James F., a farmer born in Philadelphia, Pennsylavania; Serena, 31, his wife also from Pennsylavania; and children William C., 9; James F., 7; Theodore, 5; Edwin, 3; and Clara, 1. In the Federal Census of 1860, three additional persons made up the household: Robert, 6; Bridget Killion, 35, a servant born in Ireland; and Ezra Killion, 36, a servant born in Massachusetts. Kennedy is noted as having run for lieutenant governor of California, serving as Santa Clara County Sheriff in 1863, and serving as adjutant general of California during the Civil War (Foote, 1888; Hoover, 1966; Clipping File, San Jose Public Library).

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The Stockton House, ca. 1850 (San Jose Public Library)



The next known residents of the Stockton House were Charles and Kate McLaughlin. McLaughlin was the co-owner of the construction company that built the San Francisco-San Jose Railroad which was completed in 1864 (Bancroft, 1886). In the 1870 census, the McLaughlin household consisted of the following persons: Charles, 50, a farmer with $59,000 worth of real estate and $20,000 worth of personal property and born in Pennsylavania; Kate, 29, from Ohio; Martha Anne Dillon, 60, from New Jersy; William H. Dillon, 24, a day laborer; John Marlin, 25, farm laborer from Ohio; Ah Sing, 14, house servant from China; Joseph Brazil, 35, day laborer from Portugal; Anna Brazil, 30, cook from Portugal; and Antoine Brazil, 30, day laborer from Portugal. The 1876 Thompson and West map notes that Kate McLaughlin was the owner of the Stockton Ranch, then consisting of 688 acres. In the 1875-76 County tax assessment, the McLaughlin home was valued at $3,000 and the surrounding 537 acres at $93,975. McLaughlin's business interests seem to have been centered in San Francisco. In the 1878 Langley directory for San Francisco, McLaughlin is listed as the agent for the Western Pacific Railroad Land Office. During this period, McLaughlin also owned large amounts of acreage in the mountains north of Mount Hamilton. By 1900, his heirs, Mary Ives Crocker and Kate May Dillon, were the owners of the McLaughlin Co., a real estate firm in San Francisco. Mary Ives Crocker maintained ownership of the Santa Clara County property until her death in the 1930s. The Stockton Ranch land was sold to the City of San Jose between 1941 and 1943 for future use as a municipal airport (*Official Records* 1012-530, 1053-242, 1078-419, 1104-346, 1165-330, 1167-301). The 1850 Stockton/McLaughlin ranchouse was demolished in 1947 after serious efforts toward relocation were abandoned (San Jose Public Library, clipping file).

Farms Along Brokaw Road

Prior to the expansion of the Municipal Airport in 1961, Brokaw Road traversed the project area. This road, dedicated to the County in 1866, provided access to the properties north of the Stockton Ranch. The road was named after James Brokaw, owner of at least 114 acres of the project area during the 1860s.



Site E - Beans/Souza Farmhouse (post-1900)



Site O - Forward Dairy, 1958 (S.J.Municipal Airport)



Site N - Airport Village, 1957 (S.J. Municipal Airport)



Channelization of the Guadalupe River, 1958 (S.J. Municipal Airport)

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By 1876, six farmsteads were located along Brokaw Road between Martin Aveune and the Guadalupe River.

One farm complex was located on a 100-acre parcel belonging to Hayes and Beans in 1876. N. Hayes was a real estate agent in San Jose and T. Ellard Beans was the President of the Bank of San Jose. By 1890, the parcel had been divided into two fifty-acre parcels, the one with the structure belonging to Beans (Site D). Beans remained owner of this farm until after 1903. Sometime after the turn-of-the-century, a newer farmhouse was built closer to Brokaw Road (Site E). This building remains on the property although it has been abandoned and is scheduled for demolition. It appears to date to the 1900-1910 period and is in poor repair.

South of Brokaw Road, across from the existing farmhouse, was located another pre-1900 farm complex (Site F). As of 1903, this property was owned by M. Carling. A small orchard currently marks the site.

Another pre-1900 farm complex, Site G, was located on the parcel formerly held by N. Hayes. By 1890, this parchel was owned by M. Martin and by 1903, by P. I. Moorhead. By 1929, the property was owned by M. Rogers and it was the Rogers family that sold the land to the city in the late 1940s.

Site H, located off Brokaw Road between Hoffman (Kifer) and the Guadalupe River was site of the pre-1876 J. W. Hines farm. Hines owned the property until after 1903. By 1929, Hines 53-acre farm had been divided into 12-acre parcels.

Another pre-1876 farm complex, Site I, was owned by Oliver Warner, an orchardist. Oliver maintained ownership of this farm until after 1903.

Farms Along Hoffman Road

Hoffman Road, later known as Kifer Road after its extention, was originally opened by N. Hayes and H. Hoffman who bought the property from James Brokaw in 1869 (*Deeds*, 14-426). By 1876, only one structure was located off the road and was perhaps the original Brokaw homesite (Site J). This house was located on a 15-acre parcel owned by Michael Dawson in 1876, and by John Walsh, Dawson's heir, in 1890.

By 1899, two other small farms of unidentified ownership were developed west of Hoffman Road (Sites K and L).

Farms Along the Banks of the Guadalupe

Two potentially historic sites lie along the Guadalupe River--another Dawson house site on the western bank, and the Ogier farm site on the eastern bank.

Michael Dawson, early settler and owner of lands on both sides of the Guadalupe, was the owner of a pre-1866 house on the west bank of the Guadalupe in addition to house sites elsewhere(Spearman, 1963). The possibility exists that this structure, which does not show on the Thompson & West map of 1876, may have been built by a previous owner (Site Q).

The A.M. Ogier, an orchardist, had a small twenty-acre farm on the eastern bank of the Guadalupe (Site P). This house probably dated to the 1860-1876 time period. A. M. Ogier was no doubt a relative of James Ogier, a prominent early settler who owned extensively land adjacent to this tract.

San Jose Municipal Airport

Between 1940 and 1943, the City of San Jose purchased the remaining 483 acres of the Stockton Ranch from the Crocker heirs as a site for a municipal airport. In 1946, the first airport related buildings, California Aviation Activities, a flight school, were located directly adjacent to the Stockton Ranch buildings (Site C). About this same time, Airport Village, post-war veterans housing, was constructed on the Coleman Road edge of the property (Nissen interview). The airport, complete with terminal, was officially opened of February 1, 1949. Between 1946 and 1961, the airport's facilities were located between Newhall and Brokaw Roads. The Guadalupe River was straightened and channelized about 1957, giving the airport more useable land along its eastern boundaries. In 1961, the runways were extended across Brokaw Road and a new terminal building was opened in 1965 (Austin, 1971).



1939 Aerial of project area, Site C - the Stockton Ranch House (S.J. Municipal Airport)



1947 Aerial of Project Area, Site M - California Aviation Activities, Site N - Airport Village (S.J. Municipal Airport)



1956 Aerial Photograph (S.J. Municipal Airport) See Map Key for locations.



1957 Aerial Photograph (S.J. Municipal Airport) Note original course of the Guadalupe River

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1958 Aerial, Note realignment of Guadalupe River (S.J. Municipal Airport)



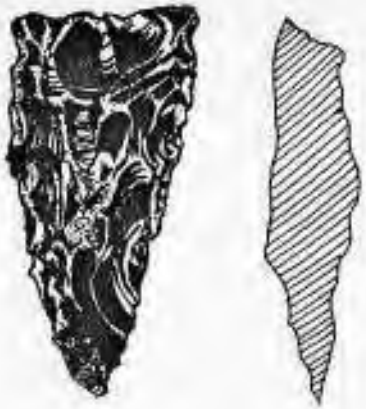
1968 Aerial of northern end of project area

Potential for Historic Resources

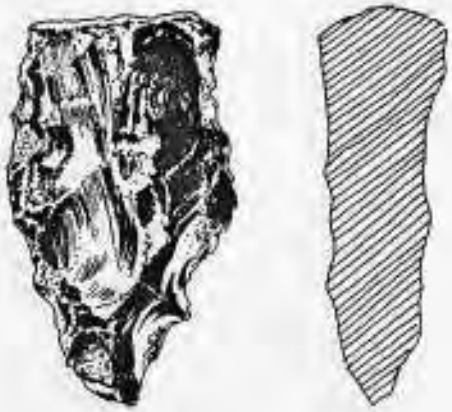
Highly significant historic resources potentially lay within the airport project area. However, due to the massive alteration of the landscape (demolition of structures, removal of historic roadways, new roadways, realignment of the river, massive grading, and pavement of large areas), it is difficult to locate and predict what if any significant deposits may remain intact. The most likely prospect to yield significant data appears to be the circa 1850 Stockton House site. However, most of the complex area has been paved which will make thorough testing difficult. The Mission sites are also extremely significant, but again testing will be difficult as the location of the sites is not precisely known. The literature pertaining to the location of these sites has been thoroughly researched by scholars over the years, however, intensive archeological testing has never been undertaken. Further grading of the areas during airport construction has no doubt helped obscure these sites even more. Random and directed testing of the areas hopefully may reveal significant subsurface features. Also, the later material from 1870 to twentieth-century sites may yield significant data if undisturbed deposits are located. Again, precise location of these resources is difficult due to the removal of all major reference points. Should any intact deposits be located during testing, further site specific archival research should be initiated to determine the significance of the find.

SURFACE SURVEY

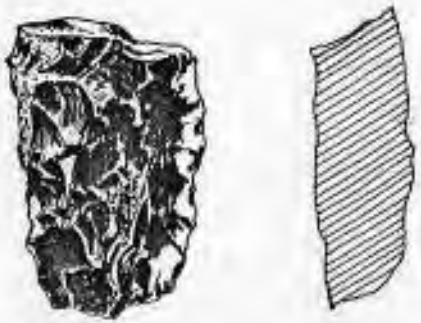
Before subsurface testing was conducted in any given portion of the study area, a surface survey was done to determine the possible presence of archeological resources on the ground. The surface survey was done by the Principal Investigator, Barbara Bocek, Joe Morris, and Pat Harris. No historic or prehistoric deposits were noted in the survey, but a number of isolated historic and prehistoric artifacts were located. The historic artifacts consisted of items that dated from the mid-1800s through the present, including bottle fragments, ceramics, metal objects, and plastic elements. Many of the earlier materials seemed to



OBSIDIAN DART POINT
AIRPORT SURVEY, 2/8/80
SCALE 1:1
PROVENIENCE "A"



OBSIDIAN KNIFE FRAG
AIRPORT SURVEY, 2/8/80
SCALE 1:1
PROVENIENCE "B"



OBSIDIAN BIFACE (MEDIAL FRAG)
AIRPORT SURVEY 2/8/80
SCALE 1:1
PROVENIENCE "C"



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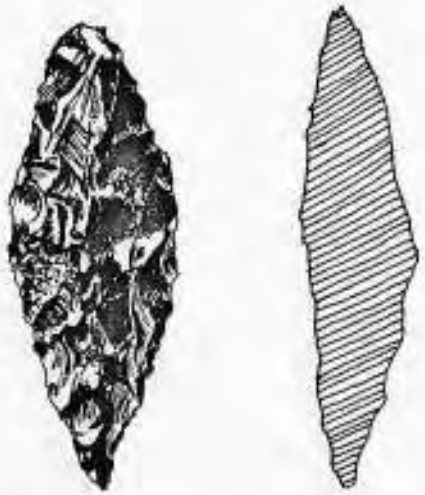
FRANSCIAN CHERT DART POINT
AIRPORT SURVEY 2/8/80
SCALE 1:1
PROVENIENCE "D"



MONTEREY CHERT DART POINT
AIRPORT SURVEY 2/9/80
SCALE 1:1
PROVENIENCE "E"



P. RICHARD

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be related to the turn-of-the-century residences that once fronted on old Brokaw Road and old Hoffman Road (later named Kifer Road) previous to their being removed for airport expansion. Some of the historic artifacts found during the survey appeared to be related to the post-1900 residence (Site "E" on historic map) off the intersection of Martin and Brokaw Roads.

Prehistoric artifacts noted in the surface survey included isolated artifacts of projectile points, a chipped lithic knife fragemnt, several utilized chert flakes, two probable manos, and a few pieces of fire-altered rock spread out in an area of approximately 300 acres. The projectile points and knife fragemnt did, however, form somewhat of a patterned distribution, with four out of five of these elements being in a locus of approximately fourty acres. The presence of these elements is remarkable to the very few other flaked lithics and general absence of midden constituents such as shell, bone, charcoal, wide-spread fire-altered rock, and other artifacts. It appears that this area was some sort of special use area associated with hunting/butchering activities. There is no indication that these elements were bogus or that their locations were contrived. All of the points were relatively large and early in their form, material, and weight--indicating that they were either early Middle Horizon or possibly Early Horixon in their antiquity (probably more than 2000 years old).

In that no distinguishable deposits could be discerned from the surface survey, but prehistoric and historic artifacts were located, a subsurface testing was employed to test for the potential for subsurface deposits that may have been buried by natural flooding or land-use modifications in historic times.

SUBSURFACE TESTING

A total of 230 test trenches were excavated in both random and directed locations to a maximum depth of 300cm. Each test trench was excavated with a 19" bucket on a backhoe tractor and the exposed soil monitored by a trained archeologist. Of all this testing, only trenches 216 and 218 yielded positive cultural data, and these were historic in nature: cut bone, bottle glass, and metal. The following trench records report the stratigraphic findings.

TEST TRENCH DATA

Test Trench #1:	0-60 cm	brown alluvium with little clay
	60-100cm	tanish brown clay
	100cm	less clay, more like 0-60cm
	100-190cm	less clay, more like 0-60cm
	190-210cm	gray clay
Test Trench #2:	0-90 cm	brown alluvium with a little clay, little charcoal; rubber hose (40cm)
	90-140cm	tanish brown clay
	140-190cm	less clay, lighter color
	190-300cm	gray clay with tan (iron) inclusion, charcoal sample from about 220cm
Test Trench #3:	0-70 cm	brown alluvium, some charcoal
	70-130cm	brown alluvium with clay
	130-180cm	less clay, more brown alluvium
	180-200cm	gray clay
Test Trench #4:	9-90 cm	brown alluvium
	90-110cm	dry hard-packed brown alluvium and clay
	110-150cm	dry tan hard packed alluvium and clay
	150-220cm	dry hard packed gray clay
Test Trenches #5 through #7:	80-300cm	alternating light and dark clay layers
Test Trench #5:	0-80 cm	dark brown sandy loam, historic charcoal, charred limbs or roots
	80-110cm	moist gray clay
	110-120cm	tan clay stratum
	120-180cm	dark moist gray clay stratum
	180-240cm	tan clay
	240-270cm	dark gray clay stratum
Test Trench #6:	0-50 cm	brown sandy loam with historic charcoal
	50-90 cm	dark brown sandy loam and clay
	90-110cm	dark clay
	110-170cm	slate gray dry clay, charcoal and roots
	170-200cm	light gray dry clay
	200cm	dark gray clay
Test Trench #7:	0-50 cm	brown sandy loam with roots
	50-110cm	dark clay (gray)
	110-190cm	gray, dry clay
	190-220cm	dark gray moist clay
Test Trench #8:	0-90 cm	brown sandy loam with rubber hose; historic distrubance; 10cm charcoal and roots
	90-130cm	dark gray dry clay
	130-140cm	thin tan clay layer
	140-210cm	dark gray dry clay

Test Trench #9:	0-60 cm	brown sandy loam
	60-210cm	dark gray clay, moist with some charcoal
Test Trench #10:	0-70 cm	brown sandy loam
	70-120cm	dark gray clay, medium moist
	120-140cm	dark gray clay, dry
	140-200cm	light gray clay, very dry
Test Trench #11:	0-80 cm	brown and tan alluvium
	80-120cm	brown clay and loam
	120-140cm	tan clay
	140-200cm	light gray clay
Test Trench #12:	0-60 cm	brown sandy loam, natural chert, sandstone cobbles and gravel
	60-200cm	moist gray clay
Test Trench #13:	0-60 cm	brown loam, natural chert, sandstone cobbles and gravel, historic, roots
	60-160cm	dark gray clay, moist
Test Trench #14:	0-70 cm	gray loam and clay
	70-110cm	lighter gray, moister clay
	110-150cm	dark gray, moist clay
	150-190cm	tan clay with reddish inclusions
	surface	some fire-baked clay in area
Test Trench #15:	surface	some fire-baked clay in area
	0-50 cm	brown sandy loam
	50-110cm	moist gray clay
	110-150cm	dry gray clay
Test Trench #16:	0-50 cm	brown sandy loam
	50-120cm	moist, dark gray clay
	120-140cm	very light gray, dry clay
Test Trench #17:	0-60 cm	brown loam and gray clay
	60-100cm	dark gray clay
	100-130cm	light gray, moist clay
	130-200cm	dark gray clay
Test Trench #18:	0-50 cm	brown loam and clay, roots (old), ceramic fragment (flow blue) 10 cm
	50-80 cm	light gray clay, dry
	80-120cm	very light gray clay
	120-170cm	dark gray clay, moist
Test Trench #19:	0-60 cm	brown loam
	60-170cm	dark gray, moist clay

Test Trench #20:	0-50 cm	brown loam and clay, roots
	50-90 cm	medium gray clay
	90-110cm	dark gray clay, shiny surface
	110-170cm	medium gray clay
Test Trench #21:	0-60 cm	brown loam and clay, roots
	60-100cm	medium gray clay
	100-140cm	dark gray clay
	140-170cm	light gray and tan clay
Test Trench #22:	0-50 cm	brown loam and clay
	50-90 cm	dark gray clay
	90 cm	historic leach field line, off Hoffman
Test Trench #23:	surface	light tan alluvium
	0-50 cm	brown alluvium
	50-110cm	brown alluvium and clay
	110-140cm	gray clay
Test Trench #24:	surface	light tan alluvium
	0-50 cm	brown loam and roots, old.
	50-170cm	dark gray clay
Test Trench #25:	0-50 cm	brown loam
	50 cm	hit 5 foot concrete abandoned pipe
	(moved 1 meter east and redug)	
	50-130cm	dark gray clay
	130-150cm	light dry clay
Test Trench #26:	0-50 cm	brown loam
	50-110cm	dark gray clay
	110-150cm	light dry clay
Test Trench #27:	0-70 cm	brown loam, old root
	70-150cm	dark gray clay
	150-200cm	light gray sandy loam in lower portion
Test Trench #28:	surface	fine, alluvial silt, tan
	0-80 cm	fine alluvial silt
	80-100cm	dark gray clay with orchard roots
	100-170cm	dark gray clay with no roots
	170-200cm	light dry clay
Test Trench #29:	surface	fine alluvial tan silt
	0-80 cm	fine alluvial silt
	80-210cm	dark gray clay
Test Trench #30:	surface	fine alluvial tan silt
	0-100cm	fine alluvial silt
	100-180cm	gray clay
	130cm	mammal bone fragment
	180-200cm	burned clay with charcoal (C-14 sample collected)
	200cm	dark clay

Test Trench #31:	0-100cm	fine silt
	100-200cm	gray clay
Test Trench #32:	0-170cm	fine alluvial silt
	170-270cm	dark gray clay
Test Trench #33:	0-100cm	alluvial silt, a little old root
	100-230cm	dark gray clay
Test Trench #34:	0-100cm	alluvial silt, piece of old orchard root
	100-195cm	dark gray clay
Test Trench #35:	0-60 cm	alluvial silt
	60-170cm	dark gray clay, shiny
Test Trench #36:	0-60 cm	alluvial silt and small roots
	60-150cm	dark gray clay, shiny
Test Trench #37:	0-80 cm	alluvial silt and small orchard roots
	80-170cm	dark gray clay, shiny
Test Trench #38:	0-100cm	alluvial silt
	100-200cm	dark gray clay
Test Trench #39:	0-100cm	alluvial silt, one piece concrete
	100-200cm	dark gray clay
Test Trench #40:	0-140cm	alluvium
	140-200cm	dark gray clay
Test Trench #41:	0-120cm	alluvial silt
	120-200cm	dark gray clay
Test Trench #42:	0-40 cm	gray dry clay and alluvium
	40-160cm	alluvial silt
	160-200cm	light gray clay, dry
Test Trench #43:	0-60 cm	gray dry clay and alluvium
	60-150cm	alluvial silt
	150-190cm	dark gray clay
Test Trench #44:	0-130cm	alluvial silt
	130-200cm	dark gray clay
Test Trench #45:	0-40 cm	brown clay with silt
	40-140cm	dark gray clay
	140-200cm	light gray/yellow silt
Test Trench #46:	0-200cm	Non-regular stratigraphy; dark gray and tan-yellow clay in vertical cross section all the way to the bottom of the trench

Test Trench #47:	0-60 cm	brown clay
	60-150cm	tan silt
	150-200cm	gray clay
Test Trench #48:	0-75 cm	brown clay
	75-180cm	gray clay
	180-200cm	tan clay
Test Trench #49:	0-40 cm	brown alluvium
	40-150cm	tan clay
	150-200cm	yellow clay
Test Trench #50:	0-50 cm	brown clayey alluvium
	50-140cm	gray-brown clay
	140-200cm	tan-brown clay
Test Trench #51:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	gray brown clay, broken cable
Test Trench #52:	0-80 cm	brown clayey alluvium
	80-120cm	tan clay
	120-200cm	yellow/brown clay
Test Trench #53:	0-60 cm	brown clayey alluvium
	60-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #54:	0-60 cm	brown clayey alluvium
	60-120cm	gray/brown clay
	120-200cm	yellow clay
Test Trench #55:	0-60 cm	brown clayey alluvium
	60-130cm	gray/brown clay
	130-200cm	yellow clay
Test Trench #56:	0-50 cm	brown clayey alluvium
	50-120cm	gray/brown clay
	120-200cm	tan/brown clay
Test Trench #57:	0-50 cm	brown alluvium
	50-110cm	tan clay
	110-200cm	gray/brown clay
Test Trench #58:	0-60 cm	brown clayey alluvium
	60-130cm	tan clay
	130-200cm	gray/brown clay
Test Trench #59:	0-50 cm	brown clayey alluvium
	50-120cm	tan clay
	120-200cm	tan/brown clay

Test Trench #60:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	brown clay
Test Trench #61:	0-50 cm	brown clayey alluvium
	50-100cm	gray/brown clay
	100-200cm	tan clay
Test Trench #62:	0-40 cm	brown clayey alluvium
	40-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #63:	0-50 cm	brown clayey alluvium
	50-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #64:	0-50 cm	brown clayey alluvium
	50-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #65:	0-50 cm	brown clayey alluvium
	50-80 cm	tan clay
	80-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #66:	0-90 cm	brown friable soil
	90-160cm	tan clay
	160-200cm	gray/brown clay
Test Trench #67:	0-50 cm	brown clayey soil
	50-160cm	tan clay
	160-200cm	gray/brown clay
Test Trench #68:	0-40 cm	brown clayey alluvium
	40-100cm	tan clay
	100-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #69:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #70:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-140cm	gray/brown clay
	140cm	tan clay
Test Trench #71:	0-50 cm	brown clayey alluvium
	50-120cm	tan clay
	120-160cm	gray/brown clay
	160-200cm	tan clay

Test Trench #72:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-200cm	gray/brown clay
Test Trench #73:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-180cm	dark brown clay
	180-200cm	tan clay
Test Trench #74:	0-60 cm	brown clayey alluvium
	60-90 cm	tan clay
	90-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #75:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #76:	0-60 cm	brown clayey soil
	60-180cm	tan clay
	180-200cm	gray/brown clay
Test Trench #77:	0-60 cm	brown clayey alluvium
	60-120cm	gray/brown clay
	120-160cm	light brown clay
	160-200cm	tan clay
Test Trench #78:	0-60 cm	brown clayey alluvium
	60-140cm	gray/brown clay
	140-200cm	tan clay
Test Trench #79:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #80:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #81:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #82:	0-40 cm	brown clayey alluvium
	40-80 cm	tan clay
80-120cm	80-120cm	gray/brown clay
	120-200cm	tan clay

Test Trench #83:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #84:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-160cm	gray/brown clay
	160cm	tan clay
Test Trench #85:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #86:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #89:	0-50 cm	brown clayey alluvium
	50-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #90:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #91:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #92:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #93:	0-80 cm	brown clayey alluvium
	80-160cm	tan clay
	160-180cm	red/brown clay
	180-200cm	tan clay
Test Trench #94:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #95:	0-40 cm	dark brown alluvium
	40-130cm	yellow/brown silty clay
	130-190cm	brown to dark brown, increasingly darker with depth

Test Trench #96:	0-30 cm	dark brown alluvium
	30-140cm	blue/black clay, sticky and plastic
	140-160cm	gray/light gray silty clay, frier, more friable.
	160-190cm	gray/yellow dry silty clay, very friable
Test Trench #97:	0-30 cm	dark brown to medium brown alluvium
	30-50 cm	medium brown alluvium
	50-150cm	dark gray/black silty clay, sticky
	150-200cm	light gray friable silty clay, dry
Test Trench #98:	0-40 cm	medium brown silty clay, fairly friable
	40-70 cm	dark gray/brown clay
	70-190cm	black/blue black clay, sticky
	190-210cm	light gray claywith organic material (orange-rusty)
Test Trench #99:	0-100cm	slightly friable very dark brown to black alluvium; surface soil is much darker than terminal end of field
	100-120cm	gray silty clay, drier, more friable
	120-190cm	light gray (ash-colored) friable clayey silt

In Test Trenches #99 and #100 no "plow-zone" color change is visible, noted more rocks on surface in this area, none modified.

Test Trench #100:	0-110cm	dark brown alluvium, lightly friable
	110-130cm	lighter brown, grayish clay, sticky
	130-190cm	light gray (almost ash color) silty clay, dry, friable with flecks decomposing sand-stone at 150cm.
Test Trench #101:	0-40 cm	very dark brown to black alluvium, slightly friable
	40-100cm	light gray sandy alluvium, very fraible, dry, very different soil texture than any other
	100-190cm	dark gray/medium brown mixed sticky silty clay, lots of orange-rust colored organic material
	190-200cm	lighter brown silty clay, little organic material
Test Trench #102:	0-50 cm	very dark brown alluvium
	50-100cm	medium brown alluvium, more clay
	100-130cm	gray/light brown silty clay
	130-200cm	light brown silty clay, becomes increasingly yellow
Test Trench #103:	0-80 cm	medium brown alluvium
	80-140cm	gray/light brown silty clay, very friable
	140-190cm	same color and texture, but more compact

Test Trench #104:	0-100cm	medium brown alluvium
	100-120cm	yellow to light brown clay, very plastic no organic materials
	120-190cm	light brown/gray silty clay, dry, friable
Test Trench #105:	0-50 cm	medium brown alluvium
	50-70 cm	gray (ash-colored) friable silty clay
	70-180cm	gray/light brown, less friable silty clay
	180-200cm	light brown/yellow silty clay
Test Trench #106:	0-40 cm	light brown friable silty alluvium
	40-120cm	dark brown/black friable silty clay
	120-180cm	yellow to light brown clay, sticky, plastic
	180-210cm	light brown clay, very compact
Test Trench #107:	0-60 cm	medium brown friable alluvium, few rocks, soil appears to be disturbed
	60-140cm	lighter brown alluvium, some rocks, soil appears to be disturbed
	140-150cm	black/dark gray firm clay, lumps are rock-hard
	150-160cm	lighter gray very firm clay, some decomposing sandstone
	160-230cm	medium brown very friable silty clay, redwood timber
Test Trench #108:	0-30 cm	medium brown alluvium
	30-60 cm	yellow clay, very plastic and moist
	60-80 cm	light brown clay, very plastic, sticky
	80-190cm	medium brown clay, sticky, rust-colored organic material
Test Trench #109:	0-50 cm	medium brown alluvium
	50-80 cm	yellow clay, moist and compact
	80-130cm	light brown clay, moist and compact
	130-190cm	dark brown silty clay, friable
Test Trench #110:	0-40 cm	medium brown alluvium, friable
	40-70 cm	yellow clay
	70-160cm	medium light brown clay with organic material
	160-190cm	medium brown clay, more organic material
Test Trench #111:	0-40 cm	medium to dark brown alluvium, very moist
	40-80 cm	light brown clay, plastic and moist
	80-110cm	dark brown silty clay, slightly friable
	110-160cm	dark brown silty clay with organic material
Test Trench #112:	0-40 cm	medium to dark brown alluvium
	40-80 cm	light brown clay, very plastic
	80-130cm	dark gray/brown clay, sticky, compact
	130-200cm	dark gray/brown clay with organic material

Test Trench #113:	0-50 cm	medium brown alluvium
	50-140cm	light brown clay, plastic, moist
	140-190cm	medium brown silty clay with organic material
Test Trench #114:	0-40 cm	medium brown alluvium
	40-80 cm	yellow/light brown clay
	80-130cm	light brown silty clay, with organic material
	130-200cm	medium/dark brown clay, compact, with much organic material
Test Trench #115:	0-40 cm	medium brown alluvium
	40-70 cm	light brown silty clay, orange organic material
	70-100cm	medium brown (gradual color change and
	100-210cm	dark brown increase in organic material)
Test Trench #116:	0-50 cm	medium brown alluvium
	50-120cm	yellow silty clay, compact
	120-200cm	light brown silty clay, compact
Test Trench #117:	0-30 cm	medium brown alluvium, friable
	30-120cm	yellow clay, compact, moist; much organic material
	120-210cm	gray/light brown clay, compact; less organic material
Test Trench #118:	0-40 cm	medium brown alluvium
	40-70 cm	yellow silty clay, some organic material
	70-150cm	yellow/ light brown silty clay, more organics
	150-200cm	medium/dark brown clay
Test Trench #119:	0-30 cm	dark brown/black friable alluvium
	30-40 cm	gray silty clay, very fraible
	40-120cm	light brown silty clay, compact
	120-200cm	medium brown clay, organic material
Test Trench #120:	0-40 cm	medium/dark brown alluvium
	40-120cm	yellow/light brown silty clay, friable
	120-160cm	yellow/light brown silty clay, compact with organic material
	160-200cm	dark brown/black clay, some organic material
Test Trench #121:	0-40 cm	medium brown alluvium
	40-70 cm	light brown clayey silt, friable, dry
	70-200cm	medium/dark brown silty clay, friable

Test Trench #122:	0-30 cm	dark brown alluvium, friable
	30-100cm	gray clayey silt, moist, friable
	100-180cm	gray silty clay, compact, sticky
	180-200cm	medium brown clay, compact, with root plant fiber
Test Trench #123:	0-110cm	medium brown alluvium, friable
	110-130cm	gray silty clay, moist, compact, with yellow clay mottling
	130-160cm	yellow clay, very compact
	160-200cm	medium brown clay, compact, much organic material
Test Trench #124:	0-40 cm	medium/dark brown friable alluvium
	40-70 cm	gray/yellow clayey silt, friable, moist
	70-160cm	yellow clay, more compact, with some organic material
	160-200cm	medium brown/dark gray clay, compact, much organic material
Test Trench #125:	0-30 cm	dark brown friable alluvium
	30-60 cm	gray clayey silt, friable, moist
	60-150cm	yellow/gray clayey silt, friable, moist
	150-190cm	medium brown clay, organic material
Test Trench #126:	0-40 cm	medium brown friable alluvium
	40-60 cm	gray clayey silt, friable, moist
	60-150cm	yellow clay, more compact, a little organic material
	150-200cm	medium brown clay, much organic material
Test Trench #127:	0-40 cm	medium brown alluvium, friable
	40-70 cm	gray clayey silt, friable, moist
	70-160cm	yellow clay, moist, compact, a little organic material
	160-210cm	medium brown clay, compact, lots of organic material
Test Trench #128:	0-70 cm	medium/dark brown alluvium
	70-110cm	yellow silty clay, fairly compact
	110-160cm	yellow clay, compact, a little organic material
	160-190cm	medium brown clay, compact, lots of organic material
Test Trench #129:	0-70 cm	medium brown alluvium
	70-120cm	yellow gray silty clay, fairly compact
	120-170cm	yellow clay, compact
	170-190cm	medium brown clay, compact, some organic material

Test Trench #130:	0-50 cm	medium brown alluvium
	50-90 cm	yellow/light brown silty clay, fairly compact
	90-160cm	yellow silty clay, much organic material
	160-210cm	medium brown clay, very compact, little organic material
Test Trench #131:	0-70 cm	medium brown alluvium
	70-90 cm	yellow/gray silty clay
	90-150cm	yellow clay, compact, much organic material
	150-200cm	medium brown clay, very compact
Test Trench #132:	0-70 cm	medium/dark brown alluvium
	70-150cm	yellow clay, moist, compact, much organic material
	150-210cm	medium brown clay, very compact, less organic material
Test Trench #133:	0-90 cm	medium brown alluvium, compact
	90-110cm	gray/yellow mottled silty clay
	110-160cm	yellow clay, compact, much organic material
	160-200cm	medium brown/gray clay, compact, a little organic material
Test Trench #134:	0-70 cm	medium brown alluvium, very compact
	70-90 cm	light brown/gray clay, compact
	90-140cm	yellow clay, compact, much organic material
	140-190cm	medium brown mottled clay, some organic material
Test Trench #135:	0-40 cm	medium brown alluvium
	40-60 cm	gray/brown silty clay, compact
	60-160cm	yellow silty clay, slightly friable, a little organic material
	160-210cm	medium brown/gray clay, a little organic material
Test Trench #136:	0-40 cm	medium brown alluvium
	40-90 cm	gray (ash-colored) clayey silt, friable
	90-180cm	tan silty clay, mottled with yellow; much organic material
	180-200cm	medium brown/gray clay, a little organic material, very compact
Test Trench #137:	0-40 cm	medium brown alluvium
	40-50 cm	gray clay, very sticky, compact
	50-110cm	medium brown to black silty clay, compact
	110-190cm	yellow clay, compact, some organic material
	190-200cm	light/medium brown clay, some organic material

Test Trench #138:	0-30 cm	medium brown alluvium
	30-40 cm	tan silty clay, friable
	40-90 cm	dark/medium brown silty clay, much organic material
	90-180cm	yellow silty clay, friable, much organic material
	180-200cm	medium brown/light brown clay, some organic material
Test Trench #139:	0-40 cm	medium brown alluvium
	40-50 cm	gray silty clay, friable
	50-80 cm	medium brown silty clay
	80-170cm	yellow clay, much organic material
	170-200cm	medium brown clay
Test Trench #140:	0-70 cm	brown clayey alluvium
	70-140cm	tan clay
	140-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #141:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #142:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #143:	0-90 cm	brown clayey alluvium
	90-130cm	tan clay
	130-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #144:	0-50 cm	brown clayey alluvium
	50-70 cm	light brown clay
	70-100cm	gray/brown clay
	100-140cm	tan clay
	140-200cm	light brown clay
Test Trench #145:	0-50 cm	brown clayey alluvium
	50-80 cm	tan clay
	80-100cm	gray/brown clay
	100-140cm	orange/tan clay
	140-180cm	tan clay
	180-200cm	gray/brown clay

Test Trench #146:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay
	100-140cm	gray/brown clay
	140-190cm	light brown clay
	190-200cm	charcoal deposit with red clay
	200-220cm	tan clay
Test Trench #147:	0-40 cm	brown clayey alluvium
	40-200cm	tan clay
	200-230cm	light brown clay
Test Trench #148:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-130cm	gray/brown clay
	130- cm	tan clay
Test Trench #149:	0-50 cm	brown clayey alluvium
	50-180cm	tan clay
	180-200cm	gray/brown clay

Note: inconsistency in horizontal deposition of strata. South end of trench has continuation of charcoal deposit found in Trench 146. Charcoal deposit bottoms out at 200cm. (B.S.)

Test Trench #150:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-120cm	gray/brown clay
	120-180cm	tan clay
	180-200cm	gray/brown clay
Test Trench #151:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	gray/brown clay
	140-200cm	tan clay
Test Trench #152:	0-90 cm	brown clayey alluvium
	90-200cm	tan clay
Test Trench #153:	0-50 cm	brown clayey alluvium
	50-170cm	tan clay
	170-200cm	light brown clay
Test Trench #154:	0-60 cm	brown clayey alluvium
	60-140cm	tan clay
	140-200cm	light brown clay
Test Trench #155:	0-90 cm	brown clayey alluvium
	90-150cm	tan clay
	150-200cm	gray/brown clay

Test Trench #157:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-200cm	light brown clay
Test Trench #158:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	light brown clay
	140-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #159:	0-70 cm	brown clayey alluvium
	70-110cm	light brown clay
	110-160cm	tan clay
	160-220cm	red/brown clay
Test Trench #160:	0-30 cm	brown clayey alluvium
	30-40 cm	light brown silt
	40-130cm	gray/brown clay
	130-160cm	light gray dry clay
	160-200cm	tan clay
Test Trench #161:	0-50 cm	brown clayey alluvium
	50-110cm	gray/brown clay
	110-180cm	light gray dry clay
	180-200cm	tan clay
Test Trench #162:	0-40 cm	brown clayey alluvium
	40-90 cm	light brown clay
	90-130cm	gray/brown clay
	130-160cm	light gray dry clay
Test Trench #163:	0-50 cm	brown clayey alluvium
	50-80 cm	light brown clay
	80-160cm	gray/brown clay
	160-200cm	red/tan clay
Test Trench #164:	0-50 cm	brown clayey alluvium
	50-90 cm	light brown clay
	90-130cm	gray/brown clay
	130-200cm	red/tan clay
Test Trench #165:	0-30 cm	brown clayey alluvium
	30-100cm	light brown clay (baked clay at 40cm)
	100-130cm	gray/brown clay
	130-200cm	red/tan clay
Test Trench #166:	0-70 cm	brown clayey alluvium
	70-90 cm	light brown clay
	90-130cm	red/tan clay
	130-160cm	gray/brown clay
	160-200cm	tan clay

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Test Trench #167:	0-60 cm	brown clayey alluvium
	60-120cm	light brown clay
	120-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #168:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay
	100-120cm	red/tan clay
	120-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #169:	0-100cm	brown clayey alluvium
	100-160cm	light brown clay with light gray flecks
	160- cm	tan clay
Test Trench #170:	0-110cm	brown clayey alluvium
	110-170cm	light brown clay
	170-200cm	gray/brown clay
Test Trench #171:	0-50 cm	brown clayey alluvium
	50-150cm	tan clay
	150-200cm	tan clay with orange
Test Trench #172:	0-80 cm	brown clayey alluvium
	80-170cm	tan clay
	170-200cm	tan clay with orange
Test Trench #173:	0-10 cm	brown clayey alluvium
	10-20 cm	tan/orange silt
	20-100cm	gray/brown clay
	100-180cm	tan clay with orange
	180-200cm	tan clay
Test Trench #174:	0-50 cm	brown clayey alluvium
	50-110cm	gray/brown clay
	Abandoned	trench, hit old PVC pipe and water line.
Test Trench #175:	0-60 cm	brown clayey alluvium
	60-150cm	light brown clay with root veins
	150-200cm	tan clay
Test Trench #176:	0-50 cm	brown friable soil with pebbles
	50-70 cm	gray/brown clay
	70-160cm	tan clay with orange
	160-200cm	light brown clay
Test Trench #177:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay with orange
	100-120cm	tan clay
	120-160cm	gray/brown clay (large mammal bone at 120cm. elk?)
	160-200cm	light brown clay with orange

Test Trench #178:	0-60 cm	brown clayey alluvium
	60-100cm	light brown clay
	100-200cm	gray/brown clay
Test Trench #179:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-160cm	gray/brown clay
	160-200cm	light brown clay
Test Trench #180:	0-40 cm	brown clayey alluvium
	40-110cm	light brown clay with orange
	110-140cm	gray/brown clay with orange
	140-200cm	tan clay
Test Trench #181:	0-50 cm	brown clayey alluvium
	50-70 cm	light brown clay
	70-150cm	gray/brown clay with orange
	150-200cm	tan clay
Test Trench #182:	0-40 cm	brown clayey alluvium
	40-70 cm	gray/brown clay
	70-120cm	light brown clay
	120-200cm	tan clay with orange
Test Trench #183:	0-40 cm	brown clayey alluvium
	40-80 cm	gray/brown clay
	80-200cm	tan clay
Test Trench #184:	0-40 cm	brown clayey alluvium
	40-80 cm	gray/brown clay
	80-200cm	tan clay
Test Trench #185:	0-40 cm	brown clayey alluvium
	40-90 cm	gray/brown clay
	90-200cm	tan clay
Test Trench #186:	0-110cm	tan clay
	110-130cm	gray/brown clay
	Abandoned	trench, hit top of large metal tank or pipe.
Test Trench #187:	0-30 cm	brown clayey alluvium
	30-90 cm	gray/brown clay
	90-180cm	light gray clay
	180-200cm	light brown clay
Test Trench #188:	0-10 cm	brown humus
	10-90 cm	light gray clay
	90-120cm	tan clay
	120-200cm	gray/brown clay with light gray
Test Trench #189:	0-40 cm	brown clayey alluvium
	40-90 cm	light gray clay
	90-150cm	light brown with light gray clay
	150-200cm	light gray clay

Test Trench #190:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-130cm	light brown clay
	130-140cm	gray/brown clay
	140-200cm	light brown with orange clay
Test Trench #191:	0-60 cm	brown clayey alluvium
	60-150cm	light brown with orange clay
	150-200cm	tan with orange clay
Test Trench #192:	0-60 cm	brown clayey alluvium
	60-160cm	gray/brown clay
	160-200cm	light brown with orange clay
Test Trench #193:	0-40 cm	brown clayey alluvium
	40-60 cm	tan clay
	60-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #194:	0-100cm	gray/brown clayey alluvium
	100-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #195:	0-60 cm	gray/brown clayey alluvium
	60-100cm	light brown clay
	100-160cm	light brown with light gray clay
	160-200cm	tan clay
Test Trench #196:	0-80 cm	gray/brown clayey alluvium
	80-120cm	gray/brown with light gray clay
	120-180cm	light brown with light gray clay
	180-200cm	tan clay
Test Trench #197:	0-80 cm	gray/brown clayey alluvium
	80-110cm	light brown clay
	110-180cm	tan clay with light gray
	180-200cm	tan clay
Test Trench #198:	0-40 cm	gray/brown clayey alluvium
	40-80 cm	light brown clay
	80-160cm	tan clay
	160-200cm	tan with orange clay
Test Trench #199:	0-120cm	brown clayey alluvium
	120-180cm	gray clay
	180-200cm	gray with orange clay
Test Trench #200:	0-120cm	brown clayey alluvium
	120-180cm	gray clay
	180-200cm	gray with orange clay

Test Trench #201:	0-180cm	brown clayey alluvium
	180-200cm	gray clay
Test Trench #202:	0-120cm	brown clayey alluvium
	120-200cm	gray with orange clay
Test Trench #203:	0-120cm	brown clayey alluvium
	120-200cm	gray clay
Test Trench #204:	0-60 cm	red/brown sandy alluvium
	60-140cm	brown clay
	140-200cm	gray clay
Test Trench #205:	0-80 cm	red/brown sandy alluvium
	80-160cm	tan silt (large mammal bone at 110cm)
	160-200cm	gray clay
Test Trench #206:	0-70 cm	red/brown sandy silt
	70-100cm	gray/green clay
	100-200cm	brown sandy silt
Test Trench #207:	0-120cm	red/brown sandy silt
	120-200cm	gray/green clay
Test Trench #208:	0-110cm	red/brown sandy silt
	110-200cm	gray/brown clay
Test Trench #209:	0-110cm	red/brown sandy silt
	110-200cm	gray/brown clay
Test Trench #210:	0-120cm	red/brown sandy silt
	120-200cm	gray/brown clay
Test Trench #211:	0-90 cm	brown clayey alluvium
	90-140cm	gray/brown clay
	140-200cm	gray/green clay
Test Trench #212:	0-90 cm	brown clayey alluvium
	90-130cm	gray/brown clay
	130-200cm	gray/green clay
Test Trench #213:	0-90 cm	brown clayey alluvium
	90-130cm	gray/brown clay
	130-200cm	gray/green clay
Test Trench #214:	0-60 cm	brown clayey alluvium
	60-150cm	gray/brown clay
	150-200cm	gray/green clay

Test Trench #215:	0-60 cm	brown clayey alluvium
	60-110cm	gray/brown clay
	110-180cm	gray/green clay
	180-200cm	tan clay
Test Trench #216:	0-120cm	brown sandy silt
	120-180cm	gray/brown clay. Historic materials at 150cm (glass, bone, metal)
	180-200cm	tan clay
Test Trench #217:	0-60 cm	brown sandy silt
	60-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #218:	0-110cm	brown sandy silt
	110-200cm	gray/brown clay; historic materials at 110cm
Test Trench #219:	0-120cm	brown sandy silt
	120-170cm	tan sandy silt
	170-200cm	gray/brown clay
Test Trench #220:	0-100cm	brown sandy silt
	100-160cm	tan sandy silt
	160-200cm	gray/brown clay
Test Trench #221:	0-150cm	brown sandy silt
	150-200	tan sandy silt
Test Trench #222:	0-140cm	brown sandy silt
	140-200cm	gray/brown clay with white
Test Trench #223:	0-40 cm	light brown fill
	40-200cm	brown sandy silt
Test Trench #224:	0-120cm	brown clayey alluvium
	120-200cm	gray/green clay
Test Trench #225:	0-100cm	brown clayey alluvium
	100-130cm	tan clay
	130-200cm	gray/green clay
Test Trench #226:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	Abandoned trench, hit abandoned water line at 140cm	
Test Trench #227:	0-70 cm	brown clayey alluvium
	70-100cm	light brown clay
	100-200cm	gray/green clay with orange
Test Trench #228:	0-80 cm	brown clayey alluvium
	80-100cm	tan clay
	100-200cm	gray/green clay with orange

Test Trench #229:	0-80 cm	brown clayey alluvium
	80-150cm	gray/green clay
	150-200cm	tan clay
Test Trench #230:	0-60 cm	brown clayey alluvium
	60-90 cm	gray/green clay with orange
	90-150cm	gray/green clay
	150-200cm	tan clay

CONCLUSIONS AND RECOMMENDATIONS

Based on the archival record, the historic literature, the surface survey, and the subsurface testing, it appears that there are definitely prehistoric archeological resources in the study area and that there is the strong potential for subsurface historic deposits. The regions that appear to contain or potentially contain archeological resources are marked in parallel lines in the attached testing location and sensitivity map of the airport. The sensitive area around Test Trench #184 is the scene of the Stockton House site as known from historic literature. Around Test Trench #181 is a sensitive area established on the basis of prehistoric artifact finds on the surface. Test Trench #216 marks a third sensitive area where both the historic records and subsurface testing point to the possibility of early Spanish and Mission period activities leaving remains in buried deposits. The large sensitive area on the northwest side of the airport contains many prehistoric artifacts, the sites of the first and second locations of the Mission Santa Clara (1777-1784), and possible contact-period Indian materials.

Recommendations for the future management of cultural resources in the study area include 1) the retension of a trained archeologist to monitor any subsurface construction or earthmoving in any of the marked sensitive areas, and 2) the surface collection and analysis of prehistoric artifacts in the prehistoric sentitive zones previous to any construction in those areas. Also, in the event that any archeological traces (human remains, artifacts, concentrations of shell/bone/ash) are encountered in any portion of the study area, all construction within a fifty-meter radius of the find should stop, and a qualified archeologist be brought in to examine the find an to recommend mitigations as necessary.

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ADDENDUM TO ARCHEOLOGICAL EVALUATION OF SAN JOSE MUNICIPAL AIRPORT

The archeological evaluation of the San Jose Municipal Airport originally was intended to include the subsurface testing of the parking lot area in front of the Terminal Building; however, due to rains and problems in coordination in the last days of the testing program this portion of the testing was not carried out. There is a real possibility of archeological deposits existing under this parking area and subsurface testing should be done there previous to the finalization of construction plans for this region. It is intended that such testing will shortly be carried out by ARM when weather allows. A written letter to this effect should be attached to this report to confirm the completion of this last phase of the investigation.

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March 26, 1980

ADDENDUM ON THE COMPLETION OF ARCHEOLOGICAL TEST TRENCHING AT THE SAN JOSE MUNICIPAL AIRPORT

This letter notes the completion of archeological test trenching at the San Jose Municipal Airport. In addition to the 230 test trenches excavated in February, 1980, seven more trenches were excavated in the parking lots adjacent to the Terminal Building to test for the possiblity of buried cultural resources. The results of the new trenches have been incorporated onto the map of trench locations and the description of the trench data. Of the seven additional trenches, trench #231 yielded positive data of a potential archeological site, and, accordingly, the region directly around this location is designated on the archeological map as sensitive. The completion of these additional test trenches marks the overall conclusion of the archeological evaluation.

TEST TRENCHES EXCAVATED IN PARKING AREAS ADJACENT TO THE TERMINAL BUILDING

Test Trench #231:	0-15cm	asphalt hardtop
	15-70cm	fine silty river alluvium
	70-260cm	dark brown clay, very dense
Test Trench #232	0-10cm	asphalt hardtop
	10-60cm	silty clay
	60-130cm	dark, moist clay
	130-180cm	much fire-altered clay and charcoal
	180-250cm	dark clay with organic decomposition
Test Trench #233	0-15cm	asphalt hardtop
	15-50cm	construction gravel and sand
	50-150cm	brown and gray clay with some sand
	150-270cm	moist gray clay
Test Trench #234	0-15cm	asphalt hardtop
	15-55cm	construction gravel and sand
	55-85cm	alluvial silt and brown clay
	85-150cm	soft alluvial silt with little clay
	150-240cm	brown clay with silt
	240-270cm	light gray clay
Test Trench #235	0-15cm	asphalt hardtop
	15-45cm	construction gravel and sand
	45-80cm	reddish brown clay with silt
	80-160cm	brown clay and silt
	160-230cm	dark brown clay
	230-270cm	medium gray clay with yellow inclusions
Test Trench #236	0-20cm	asphalt hardtop
	20-40cm	construction gravel and sand
	40-100cm	brown clay and sand
	100-200cm	dark brown clay
	200-260cm	gray clay
Test Trench #237	0-20cm	asphalt hardtop
	20-50cm	clay and construction gravel
	50-220cm	dark gray clay with sand and burned wood
	220-260cm	moist gray clay

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1939/1941 San Jose Quad

1953 San Jose Quad.

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1939-1979 Collection courtesy of San Jose Municipal Airport, Facilities Planning Office.

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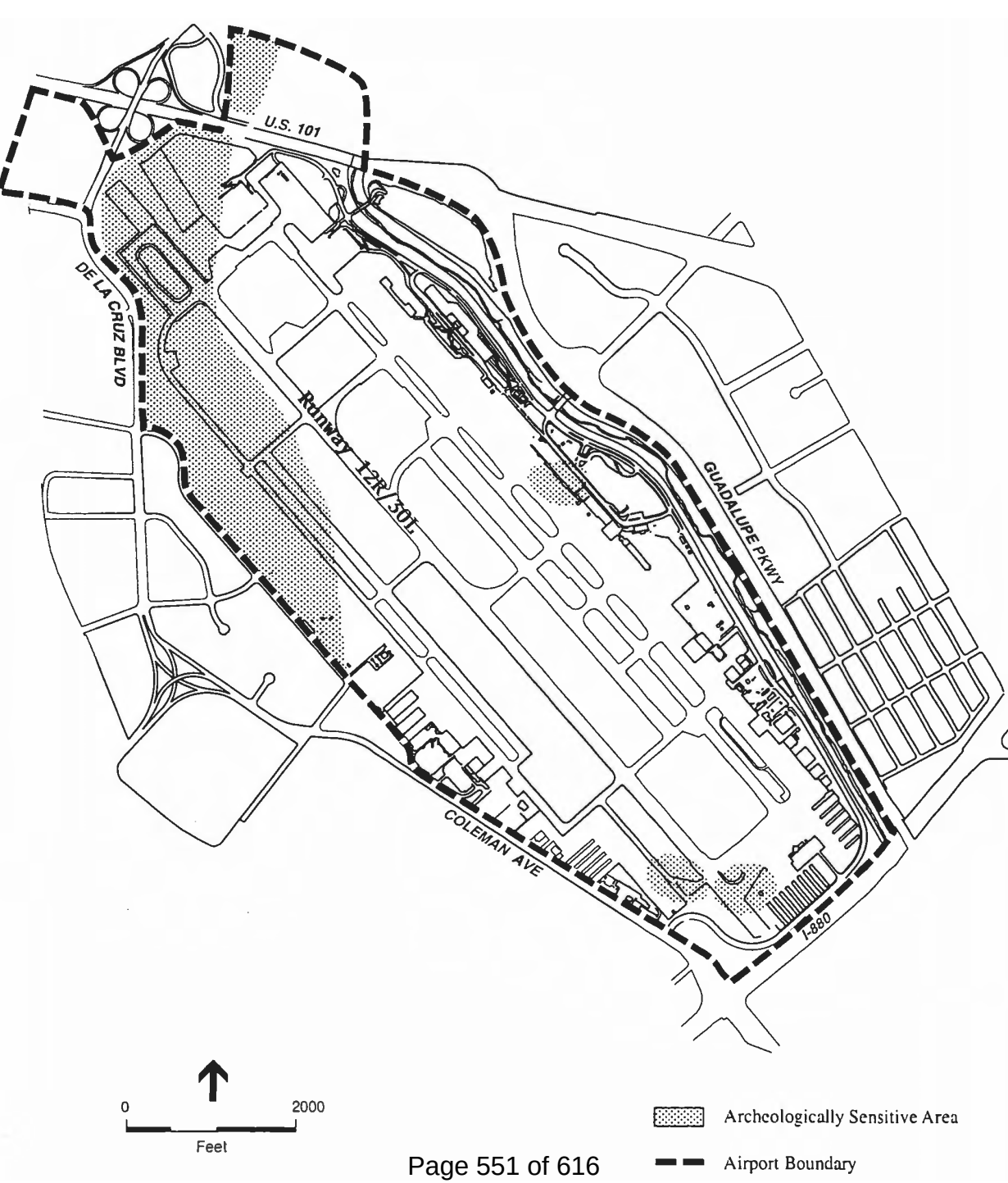
PERSONAL COMMUNICATIONS

James Nissen, former director of the San Jose Municipal Airport.

Note: The figure showing trench locations is oversized and is not included. The figure on the following page that depicts the archaeologically-sensitive areas at the Airport is based on the results of the trenching and represents the recommendations of the archaeologist that prepared this report.


U.S. 101
DE LA CRUZ BLVD
Runway 12R/30L
GUADALUPE PKWY
COLEMAN AVE
I-880
0
2000
Feet
Archeologically Sensitive Area
Airport Boundary

DAVID J. POWERS & ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS & PLANNERS

M E M O R A N D U M

TO: Cary Greene, SJC

FROM: John Hesler, Senior Environmental Specialist

DATE: October 21, 2020

SUBJECT: **Archaeological Issues Associated with Runway Incursion Mitigation (RIM) Improvements At the Norman Y. Mineta San José International Airport**

The purposes of this memorandum are to 1) describe the proposed RIM modifications to the airfield at the Norman Y. Mineta San José International Airport (SJC), 2) describe the archaeological resources that are present, and 3) describe the effects of those proposed modifications on the archaeological resources.

PROJECT DESCRIPTION

The project proposes to modify certain components of the airfield at SJC to reduce the potential for runway incursions and to improve compliance with current FAA design standards. A "runway incursion" is defined as the unauthorized presence of an aircraft, vehicle or person on a surface designated for the landing and take-off of aircraft. Runway incursions are a significant safety concern, the most serious of which have led to collisions, injuries, and fatalities.

The following modifications to the existing airfield at SJC are proposed. The locations of the proposed modifications are shown on Figure 1.

Project #1 - General Aviation Run-up Pad Relocation: The existing run-up pad adjacent to the southwest corner of the Taxiway D/Taxiway W intersection would be removed. A new run-up pad would be located within the existing apron at the southwest corner of the airfield. Improvements would consist of pavement markings, strengthening, and potentially a blast fence.

Project #2 - "Taxi" Markings on Taxiways Y and W: Pavement markings would be added near each end of existing parallel Taxiways W and Y to visually denote their use as taxiways. No construction or demolition would be required.

Project #3 - Taxiway W/M Intersection Modification: The existing northwest corner of the intersection would be rounded off to visually affirm Taxiway W as a parallel taxiway rather than a runway. A portion of the excess pavement would be converted to shoulder, with the remainder closed off through painting.

Project #4 - New Taxiway V: Former Runway 11-29 (closed in 2009 and currently used as Taxiway W1) would be permanently decommissioned and reconstructed as a new parallel Taxiway V, with extensions south to existing cross Taxiway C and north to a new cross Taxiway V7 connecting the end of new Taxiway V to parallel Taxiway W. Total length would be 6,790 feet. Construction would also include up to seven new taxiway connectors (V1-V7) along new Taxiway V to connect to a future parallel taxilane to the west (project element 9 below). Upon completion, existing Taxiway V abutting the general aviation aprons on the west side of SJC would be closed.

Project #5 - Taxiways F and H Closure between Runways: The existing segments of cross Taxiways F and H between Runway 12R-30L and Runway 12L-30R would be closed through pavement painting and lighting/marking removal.

Project #6 - New taxiway Connectors W2 and W3 at Southwest Apron: Two new taxiway connectors (W2-W3) would be created within the southwest apron through pavement marking/painting to channel general aviation aircraft movement to/from parallel Taxiway W.

Project #7 - Taxiway W Extension: Parallel Taxiway W would be extended south from Taxiway B to Runway 12R-30L as Taxiway W1 through construction of new pavement and associated shoulders and lighting/marking.

Project #8 - Runway 12R-30L Hold Bar Relocation: The Runway 12R-30L aircraft hold positions would be relocated 30 feet farther from the runway centerline.

Project #9 - New West Side Parallel Taxilane: Upon closure of existing Taxiway V (part of project element 4 above), the pavement would be replaced with an apron-edge parallel taxilane.

Project #10 - Taxiway B and Taxiway L Width Reduction: A segment of the existing cross Taxiway B between Taxiway Z and Runway 12L-30R, and a segment of the existing cross Taxiway L between Taxiway Y and Runway 12R-30L, would be reduced in width through painted pavement closure.

Project #11 - Runway 12L-30R Blast Pad Improvements: The Runway 12L-30R blast pads would be widened, and the blast pad at the 12L end also lengthened, through pavement construction and markings.

AREA OF POTENTIAL EFFECTS

The area of potential effects (APE) consists of the portions of the airfield at SJC where the above-described RIM improvements will occur; see Figure 1.

EXISTING HISTORIC RESOURCES

There are no existing buildings or structures on the airfield.

EXISTING ARCHAEOLOGICAL RESOURCES

Archaeological investigations conducted for SJC included a detailed survey of the entire Airport property, research on the cultural resources in the Airport vicinity, and an archival search of State records. This research was performed to determine the presence or absence of cultural resources at the Airport and in the Airport vicinity, and to determine the significance of any archaeological resources.

Archival research, which was conducted at the Northwest Information Center of the California Archeological Site Inventory, revealed a number of previous archeological surveys conducted in the Airport vicinity. The existing research has identified two recorded archaeological sites that are known to exist at the Airport: SCL-311H and SCL-430.

SCL-311H

Site SCL-311H is located outside of the APE but is within the northwest portion of SJC and stretches along what was once Mission Road (now called Trimble Road) from the Guadalupe River to North First Street. Research indicates that the site of the route was established in the 1770s as the original access to Mission Santa Clara, which was reported to lie on the east side of the Guadalupe River. In addition, the area may have contained the original adobe structures that housed inhabitants adjacent to the Mission.

In 1999, the FAA determined that SCL-311H is eligible for inclusion on the *National Register of Historic Places* under Criteria A and D. Under Criterion A, this archaeological resource is associated with the Mission Santa Clara. The settlement and occupation of Mission Santa Clara were important events in the history of San José and the Santa Clara Valley and any archaeological resources associated with these events would be considered significant. In addition, this archaeological resource is eligible under Criterion D because it has the potential to yield information associated with the Mission Santa Clara and to provide a greater understanding of the lifeways at the Mission Santa Clara.[1]

SCL-430

SCL-430 is a site that has been recorded in the center of the southwest edge of SJC. Survey of the site surface revealed both historic and pre-historic artifacts. Historic artifacts found dating from the mid-1800s included bottle fragments, ceramics, and metal objects, assumed to be related to turn-of-the-century residences that were removed for Airport expansion (Cartier and Detlefs, 1980). In addition, the site was noted to be on the edge of the old location of the early Santa Clara Mission site. Pre-historic elements encountered included projectile points, three chipped lithics, six fire cracked rocks, and two pieces of possible groundstone within a 300-acre area. The projectile points appeared to be early Middle Horizon or Early Horizon in age (more than 2,000 years old). The area appeared to be associated with hunting/butchering activities.

[1] FAA, Environmental Impact Statement for SJC Master Plan Update, Appendix J: Archaeological, Historical, and Cultural Resources Report, 1999.

In 1999, the FAA determined that SCL-430 is eligible for the *National Register of Historic Places* under Criterion D. This archeological resource is associated with the turn-of-the-century houses that were removed for development of the Airport and this resource is eligible under Criterion D because it has the potential to yield information associated with the lifeways of residents in San José at the turn of the century. [2]

1980 Archaeological Investigation at SJC

Due to the presence of SCL-311H and SCL-430, as well as the general sensitivity of the area due to its proximity to the Guadalupe River, a detailed cultural resources assessment of SJC was prepared as part of the preparation of the EIR for the 1980 Airport Master Plan. This assessment, which is attached to this memorandum as Appendix A, included extensive subsurface testing over the entire Airport site. A total of 237 test trenches were excavated to a maximum depth of 300 cm (approximately three feet). Only three trenches yielded findings of historic nature (cut bone, glass, and metal). None of the trenches yielded prehistoric resources. The 1980 assessment also identified archaeologically sensitive areas at the Airport where the likelihood of encountering buried archaeological materials during the construction of future Airport-related projects is the greatest, as shown on Figure 2.

Archaeological Monitoring at SJC: 1980 - Present

As recommended by the 1980 cultural resources assessment, an archaeological monitoring program was established at the Airport whereby a qualified archaeologist monitors subsurface construction activity within the areas depicted on Figure 2. The program authorizes the monitoring archaeologist to discontinue work within a 100-foot radius of encountering any prehistoric or historic resources. The program also requires the archaeologist to prepare a report evaluating the find and identifying mitigation for impacts. The report is submitted to the City's Director of Planning, Building, and Code Enforcement and the Director of the Airport.

Since 1980, qualified archaeologists have been retained to monitor all earthmoving activities for projects located in the designated archaeological sensitive areas at the Airport. Major construction projects that have been undertaken at the Airport within these archaeological sensitive areas include the Runway 12R/30L extension, Runway 11/29 extension/widening, Taxiways W and L extensions, Taxiways M and V, Yellow Long-Term Parking Lot, Southwest Tiedown Ramp, Passenger Terminal B Construction, westside general aviation facilities, storm and sanitary sewer lines, and employee parking lot and perimeter road. During earthmoving activities associated with these projects, no archaeological resources were observed by the monitoring archaeologist.

Per City policy, archaeological monitoring will continue to occur for all future on-Airport projects that are located within the archaeologically sensitive areas, as depicted on Figure 2.

PREVIOUS SECTION 106 CONSULTATION FOR PROJECTS AT SJC

In 1999, during the preparation of an Environmental Impact Statement (EIS) for the SJC Master Plan Update, the FAA undertook consultation with the State Historic Preservation Officer (SHPO), as required under Section 106 of the National Historic Preservation Act. In a July 1, 1999 letter to the FAA, the SHPO concurred

[2] FAA, Environmental Impact Statement for SJC Master Plan Update, Appendix J: Archaeological, Historical, and Cultural Resources Report, 1999.

that the implementation of the projects listed in the Airport Master Plan Update "will not affect any historic properties." SHPO's concurrence with this conclusion was based on two facts:

- FAA will implement an archeological monitoring program that will require the presence of a qualified archeologist during all earthmoving activities in designated archeologically sensitive areas.
- SCL-311H and SCL-430 will be completely avoided during implementation of the undertaking.[3]

IMPACT OF PROPOSED RIM IMPROVEMENTS ON ARCHAEOLOGICAL RESOURCES

The proposed set of RIM improvements (depicted in Figure 1) are refinements to, and some cases overlap the locations of, the proposed SJC airfield projects that were analyzed in the 1999 Airport Master Plan EIS. The archaeological monitoring program in place at SJC since 1980 would continue to be applied to the construction of the following RIM projects located wholly or partially within the archaeologically sensitive areas (depicted on Figure 3): #1, #3, #4, #6, #7, #8, #9, #10, and #11. Although RIM Project #2 is located within an archaeologically-sensitive area, no monitoring will be required because that project is limited to the painting of markings on existing pavement.

SCL-311H will not be affected by the construction of the RIM projects as it is located outside of the APE. SCL-430 will not be affected since earthmoving activities associated with the RIM projects would be within areas previously subjected to earthmoving activities when Taxiway W was constructed (no archaeological resources were encountered during that taxiway project construction).

CONCLUSION

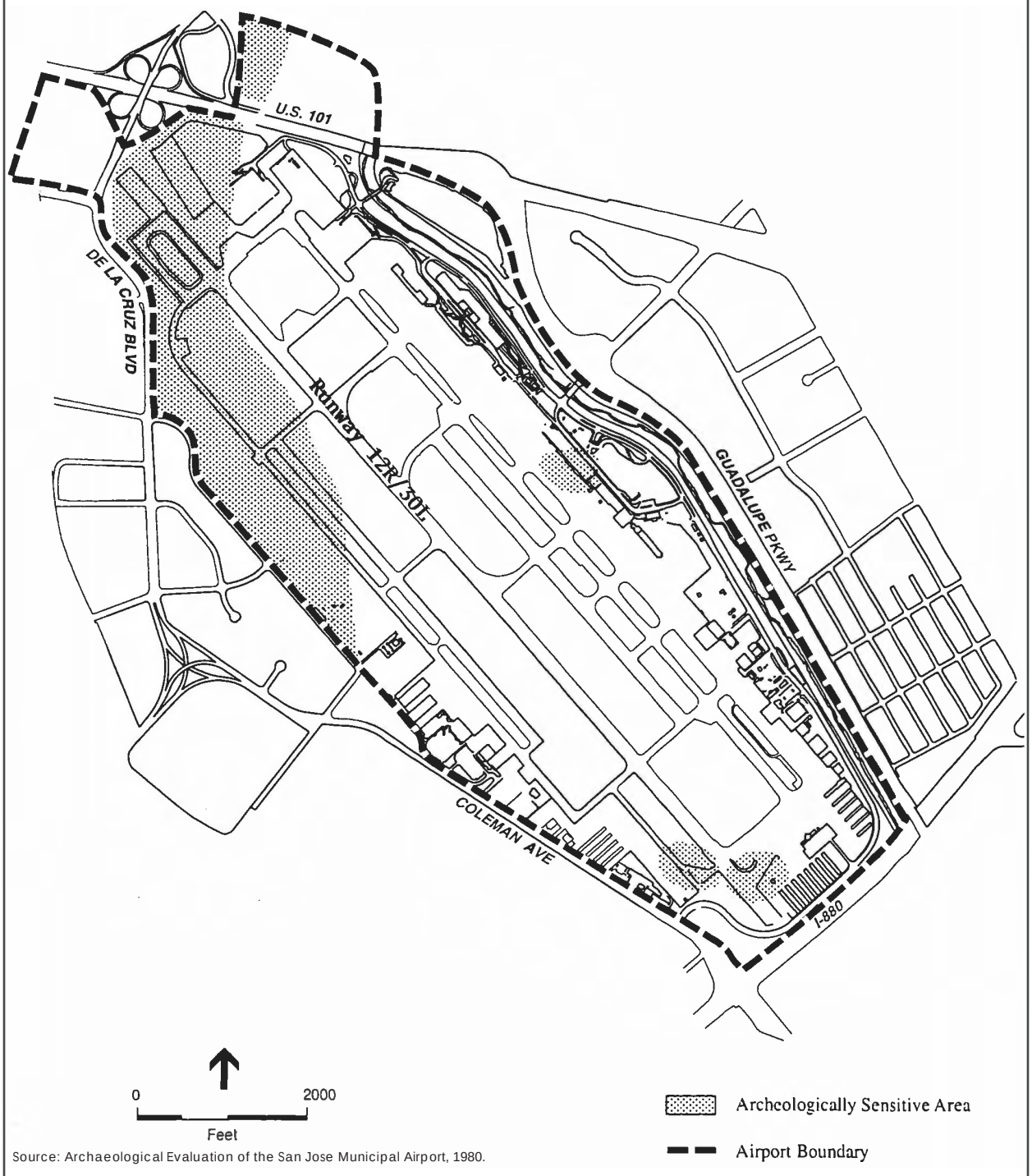
Based on the information contained in this memorandum, it is our conclusion that the proposed RIM improvements will not affect any historic properties. For Section 106 compliance purposes, the City should request FAA to adopt this finding and that FAA should request concurrence from SHPO.

Attachments: Figure 1: Locations of Proposed RIM Improvements
Figure 2: Archaeologically Sensitive Areas at SJC
Figure 3: Locations of RIM Improvements Within Archaeologically-Sensitive Areas
Appendix A: 1980 SJC Cultural Resources Assessment

[3] Source: Letter dated July 1, 1999 from Daniel Abeyta, Acting State Historic Preservation Officer, to Joseph Rodriguez, Supervisor, FAA Airports District Office, Burlingame, CA.

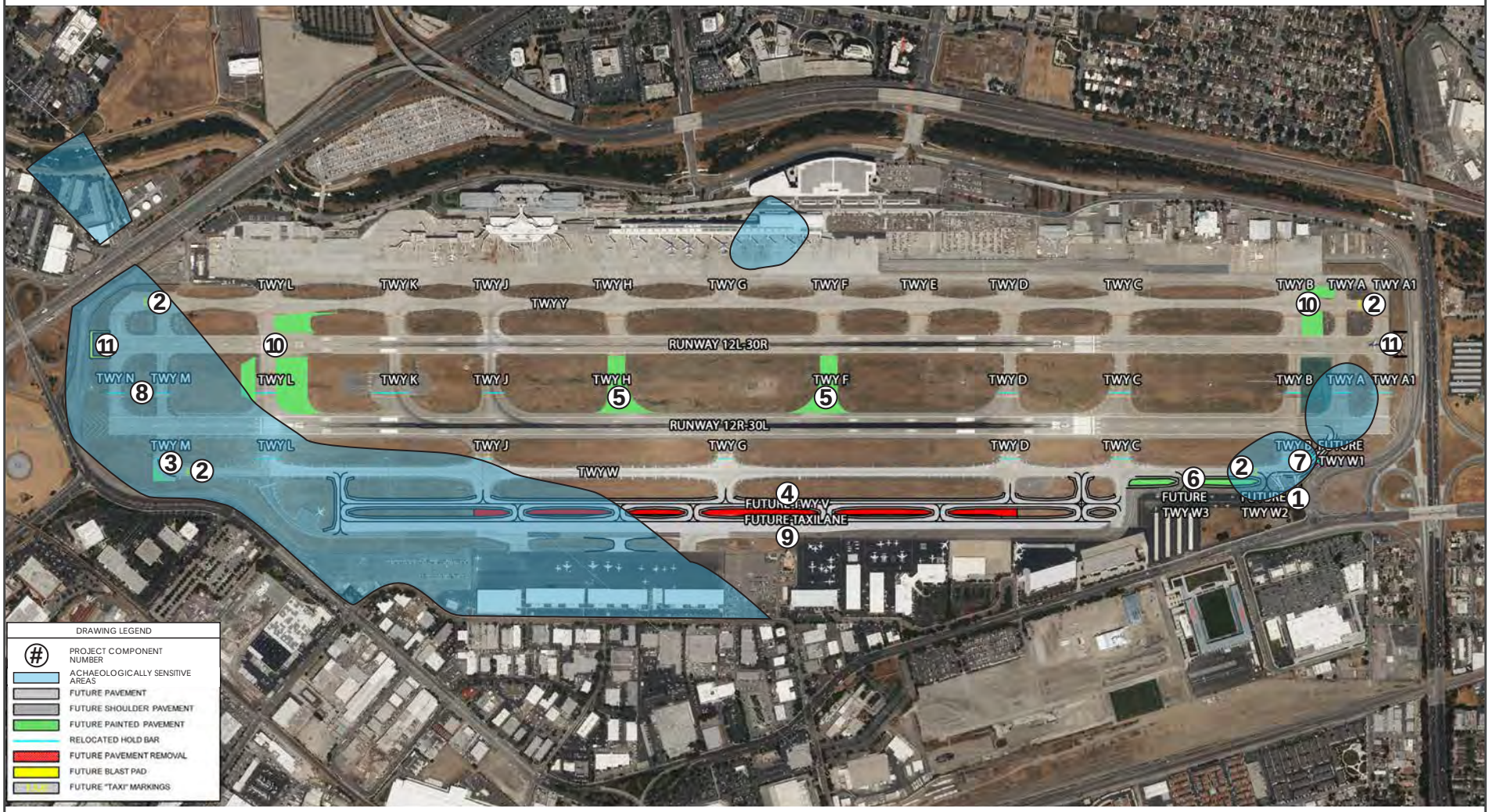


AERIAL PHOTOGRAPH DEPICTING PROPOSED AIRFIELD IMPROVEMENTS | FIGURE 1



Source: Archaeological Evaluation of the San Jose Municipal Airport, 1980.

Archaeologically-Sensitive Areas at SJC | FIGURE 2



LOCATIONS OF PROPOSED IMPROVEMENTS WITHIN ARCHAEOLOGICALLY-SENSITIVE AREAS | FIGURE 3

ARCHEOLOGICAL EVALUATION OF THE SAN JOSE MUNICIPAL AIRPORT

FOR
THE CITY OF SAN JOSE

BY
ARCHEOLOGICAL RESOURCE MANAGEMENT
ROBERT CARTIER, PRINCIPAL

WITH SECTIONS BY:
ROBERT CARTIER
CHARLENE DETLEFS

ADMONITION

Certain information contained in this report is not intended for general public distribution. Portions of this report locate significant archeological sites in the region of the project area, and indiscriminant distribution of these data could result in the desecration and destruction of invaluable cultural resources. In order to insure the security of the critical data in this report, certain maps and passages may be deleted in copies not delivered directly into the hands of environmental personnel and qualified archeologists.

The Principal Investigator

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ABSTRACT

Archeological research was carried out for the property of the San Jose Municipal Airport, San Jose, CA. The research included an archival study of historic literature, an archival check of prehistoric site records, a surface survey, and subsurface testing. Cultural resources were reported in the historic literature and several prehistoric and historic artifacts were recovered in the field survey and testing. No prehistoric resources were located in the subsurface sample testing but some historic artifacts were found in relatively deep deposits near the Guadalupe River. Five projectile points and/or knives of the Middle Horizon or Early Horizon prehistoric eras were recovered from the west side of the study area near the second recorded site of the Mission Santa Clara. Based on the archival and field findings, it is recommended that a trained archeological observer be present if any subsurface construction is considered in the locations indicated on the map attached to this report. The archeological observer would watch for the possible unearthing of any buried deposits or artifacts that the sample testing may not have located and make on-site recommendations for their recovery or preservation.

LOCATION AND DESCRIPTION OF THE SUBJECT AREA

The subject area includes a region of approximately 1000 acres in size as defined as the San Jose Municipal Airport. On the USGS 7.5 minute quadrangle of San Jose West, the Universal Transverse Mercator Grid location (UTMG) is 962-352 for the center of the study area, the with extent of the airport grounds clearly marked on this same map and the adjacent quadrangle of Milpitas, CA. The elevation ranges from approximately 30 to 65 feet in elevation, and the nearest natural water source is the Guadalupe River which cuts into the northern extreme of the airport lands.

At the time of the archeological reconnaissance and testing, the study area was in various states from being highly altered from historic land-use to other places where relatively few modifications had taken place. The greatest difficulty in doing the field survey and testing involved the highly restricted runway and radar areas and the massive expanses of asphalt parking lots.

Most of the difficulties in gaining access to runways, radar sites, and other areas were overcomed with the appreciated assistance of airport staff.

REQUEST FOR ARCHEOLOGICAL EVALUATION

Clearances and permits for future development include an archeological evaluation to determine the presence or absence of any significant cultural resources. Archeological services were requested in January, 1980 in order to: 1) undertake an archival study of the archeological resources in the vicinity of the property for prehistoric sites, 2) conduct a literature survey of the historic activities related to the airport, 3) do a surface survey of the airport grounds, and 4) carry out subsurface testing to determine the potential for buried archeological deposits. A report on these duties and the findings, along with possible recommendations, was to be furnished as one component to an environmental planning document for future airport development.

ARCHEOLOGICAL SURVEY

Archival: Prior to reconnoitering the subject area, a study was conducted of the maps and records at the Regional Office of the California State Site Survey. This check was done to determine if any known archeological resources were recorded on or adjacent to the study area. The archvial check with the Regional Office indicated that no cultural resources were reported in the property. Several sites, however, of a prehistoric and historic nature are recorded a short distance away from the airport boundaries, particularly to the north on the other side of the Guadalupe River. The great majority of the prehistoric sites in the region are Middle Horizon era habitation/burial grounds that have been found through subsurface construction or subsurface testing by archeologists. Some of these sites include SCl-6, SCl-7, SCl-276, SCl-288, SCl-300, SCl-302, SCl-359, and SCl-418 (Cartier, 1979). From this distribution, it is evident that a pattern for buried prehistoric deposits is regular off the Guadalupe River in the Lower Santa Clara Valley.

HISTORICAL BACKGROUND by Charlene Detlefs

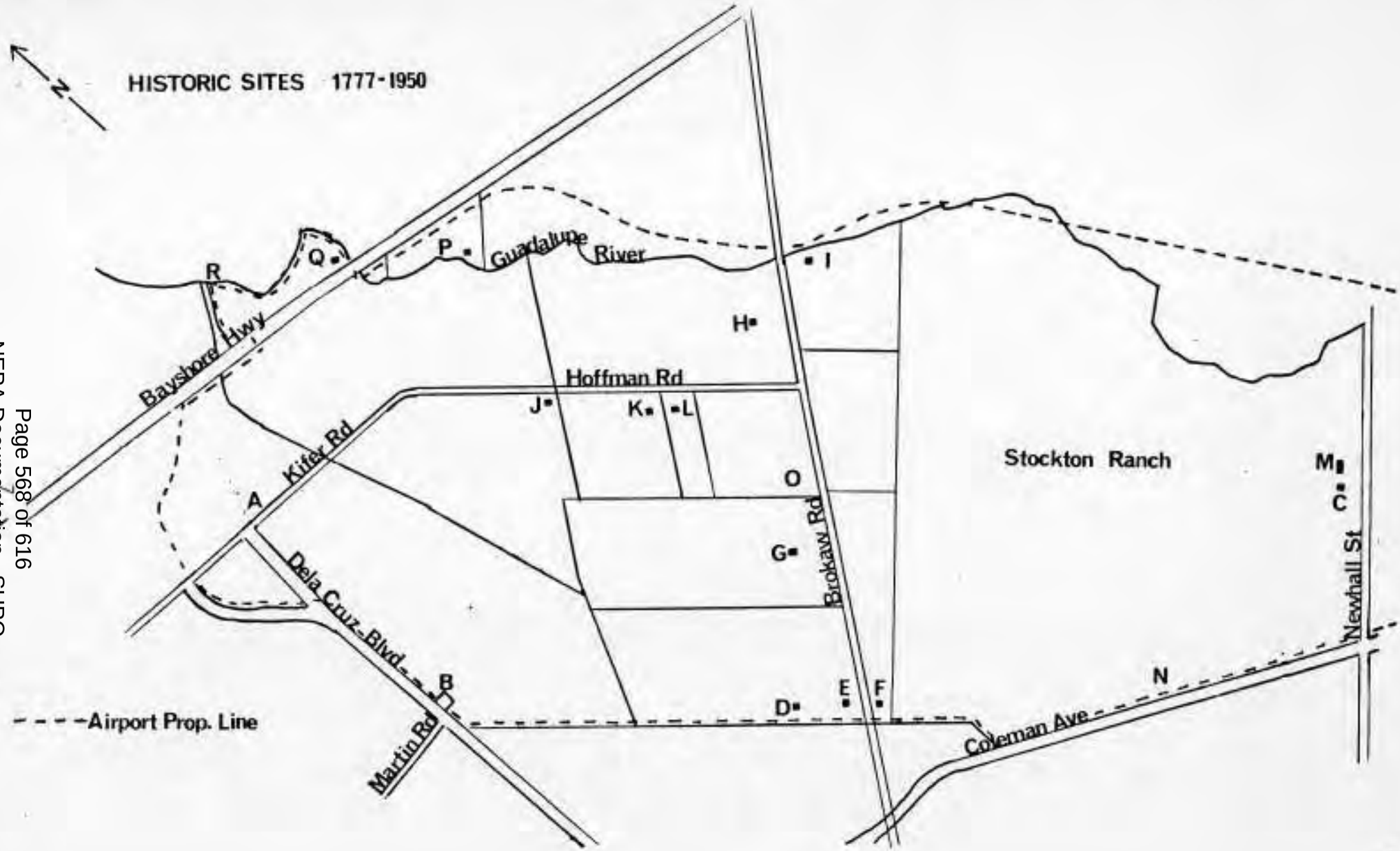
Introduction

The purpose of the following section is to serve as a guide for the location of potentially significant historic resources that may be located within the confines of the San Jose Municipal Airport property. The archival research was conducted during a six day period between Feburary 1 to 8, 1980. Information relating to historic sites was gleaned from aerial photos (1939-1979), historic maps, deeds, tax assessments, census data, city directories, newspaper clipping files, and local history books. These archival resources are located within the offices of the City of San Jose and the County of Santa Clara, the San Jose Historical Museum, and the San Jose Public Library. In addition, an oral communication was conducted with James Nissen, former airport director who has been personally familiar with the airport and its expansion since 1946.

The history of the project area begins essentially with the first historic settlement in the Santa Clara Valley, the founding of Mission Santa Clara on the banks of the Guadalupe River in 1777. This site, as well as the second Mission site, is potentially within the boundaries of the airport property. After the secularization of the Mission, a portion of the subject lands were incorporated into Rancho El Portreo de Santa Clara and the rest into Pueblo Lands of San Jose. Most of the area south of Brokaw Road remained in one large ranch, the Stockton Ranch, until purchase of the land by the City in the early 1940s. The area north of Brokaw Road was broken into smaller parcels, ranging in size from six to one hundred acres during the 1870s. Not all of the farms had habitation complexes on them, the acreage being farmed by persons with residences elsewhere. This section will discuss only those parcels where structures were noted on maps dating prior to 1900. During the early twentieth century, lands were further subdivided and new farming complexes constructed. In some cases, especially in the northern portions of the project area where orchards were prevalent, lands were consolidated into larger farms by fruit producing companies. At least one dairy, Forward Dairy located on the northwest corner

MAP KEY TO POTENTIAL HISTORIC SITES

A - First Site of Mission Santa Clara - 1777
B - Second Site of Mission Santa Clara - 1779
C - Stockton House - 1850
D - Beans House - pre-1876
E - Beans/Souza Farmhouse - post-1900
F - Carling Farm Site - pre-1900
G - Martin/Moorhead/Rogers Farm Site - pre-1900
H - J. W. Hines Farm Site - pre-1876
I - Warner Oliver Farm Site - pre-1876
J - Brokaw(?)/Dawson Farm Site - pre-1876
K - Unidentified Farm Site - pre-1900
L - Unidentified Farm Site - pre-1900
M - California Aviation Activites Flight School - 1946
N - Airport Village - Post WW II
O - Forward Dairy - pre-1921
P - A. M. Ogier House - pre-1876
Q - Dawson House Site - pre-1866
R - Spanish Bridge - 1777



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of Brokaw Road and Kifer (formerly Hoffman) Road, operated during this period. By World War II, there was interest in at least the southern portion of the project area (the Stockton Ranch) for the site of a municipal airport. This idea became a reality in the late 1940s. The lands utilized by the airport have expanded until now they are bounded by the Guadalupe River to the east, Highway 17 to the south, Colemen/Martin Road to the west, and Dela Cruz Avenue to the north.

The remainder of this section will deal with specific areas or historic periods including the early Mission sites, Rancho El Portreo de Santa Clara (Stockton Ranch), the Brokaw Road farms, the Hoffman (Kifer) Road farms, and the development of the airport itself. Finally, a discussion of the potential for locating significant sites during the testing phase of the project will be presented.

Early Mission Santa Clara Sites

The first historic settlement on the project area may have occurred with the founding of Mission Santa Clara on the western bank of the Guadalupe River in 1777 (Site A). The original site, as nearly as has been determined by local scholars, was located at the northern end of the airport property, south of Dela Cruz about where Kifer Road was once located. The founders of the Mission arrived on the site in January of 1777, and after construction of a temporary chapel, mass was said on January 12. Fray Francisco Palou related that soon after, construction of a Mission quadrangle measuring seventy varas (1 vara = 2.75 feet) on each side was initiated. Two sides of the structure were for for the church, dwellings for the Fathers, and offices for the Mission, and the other two sides were for the guardhouse, houses for nine soldiers and one settler, and a granary. The *Informe* of Mission Santa Clara, written December 30, 1777 by Fray Thomas de la Pena and Fray Joseph Antonio Murguia, describes the Mission compound as follows:

> The buildings completed to date are as follows: first, the Church with sacristy, 20 varas in length and 6 wide, of upright logs (*palisada*), chinked with clay, with flat roof of earth (*terrado*). Then a dwelling house adjoining the church, which is now being finished, 22 varas long

> and 6 wide with five living rooms, a kitchen, all of upright saplings like the church. Also another building 31 varas in length and 5 in width which serves at present as the actual dwelling of the Fathers, the servants, offices, toilets, and a hen-coop, all of upright saplings with earthen roof.
>
> There is also a corral, 30 varas square, ditched and with posts to enclose the cattle; and another of the same 12 varas square for the sheep and goats. There is also a bridge of timbers for passage over the river (Guadalupe) with a paving of earth (Spearman, 1963).

The bridge mentioned in the foregoing passage was known as Spanish Bridge and was later noted as being located at the common corner of Rancho Rincon de los Esteros and Rancho Ulstinac (Site R). Eventually, it was the main crossing over the Guadalupe River on the road between Mission Santa Clara and Mission San Jose (*Ibid.*). The original site was lost, however, with the channelization of this portion of the Guadalupe River in 1960.

The Mission remained at Site A for two years until on January 23, 1779 when the Guadalupe River overflowed its banks, inundating the Mission compound. When the waters receded, only storehouses and a few timbers from the buildings remained. The catastrophe necessitated removal of the Mission to a less vulnerable site.

When the winter storms had subsided, a new church was constructed approximately where Dela Cruz and Martin Avenues converge (Site B). At this site a church, 25 varas in length and 6 in width, was dedicated on November 11, 1779. Like the previous buildings, it was built of saplings and chinked with clay. Another building, measuring 45 by 5 varas, was built in a similar fashion and served as a house for the Fathers and a storeroom. Two additional houses, measuring 10 by 5 varas, were built, one to house servants of the mission and the other as a kitchen and workshop. The Fathers lived and worked here until the dedication of a more permanent adobe church on May 16, 1784 which was located at Campbell and Franklin Streets in Santa Clara (Spearman, 1963; Bowman and Hendry, 1940; Hoover, 1966; San Jose Mercury, October 3 and 4, 1920).

Rancho El Portreo de Santa Clara - The Stockton Ranch

Between 1777 and 1844, the project area was a portion of the *Portreo de Santa Clara* or the Mission pasture lands. The land was criss-crossed with ditches which carried water for irrigation of the adjoining lands. After secularization of the Mission, the area south of Brokaw Road was granted to James Alexander Forbes as part of the one square league Rancho Portreo de Santa Clara in 1844. In 1847, Forbes sold the rancho to Commodore Robert Stockton, USN. Stockton was patented about 2,000 acres of the original grant.

Stockton is credited with four major constributions to the area, even though he spent very little time here himself. Among his endeavors were the importation nursury stock to the County including apples, pears, plums, peaches, nectarines and strawberries in 1852; the importation of bees from Italy; the establishment of a residential subdivision, Alameda Gardens, in 1850; and the importation of about ten pre-fabricated houses from Philadelphia in 1850 (Hoover, 1966).

One of these "pre-fab" houses, sometimes known as the "White House" or the "Stockton House," stood on the project area between 1850 and 1947 (Site C). This house, the largest of the pre-fabs, stood at the end of Spring Street just beyond Newhall. It was a two and one-half story, clapboard-sided structure built of cedar and pine with multi-paned windows and shutters (Clipping File, S.J. Public Library, 1948).

James F. Kennedy, Stockton's agent, and his family lived in the Stockton House between 1850 and 1860. In 1852, the family was listed in the California State Census, and members included James F., a farmer born in Philadelphia, Pennsylavania; Serena, 31, his wife also from Pennsylavania; and children William C., 9; James F., 7; Theodore, 5; Edwin, 3; and Clara, 1. In the Federal Census of 1860, three additional persons made up the household: Robert, 6; Bridget Killion, 35, a servant born in Ireland; and Ezra Killion, 36, a servant born in Massachusetts. Kennedy is noted as having run for lieutenant governor of California, serving as Santa Clara County Sheriff in 1863, and serving as adjutant general of California during the Civil War (Foote, 1888; Hoover, 1966; Clipping File, San Jose Public Library).

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The Stockton House, ca. 1850 (San Jose Public Library)



The next known residents of the Stockton House were Charles and Kate McLaughlin. McLaughlin was the co-owner of the construction company that built the San Francisco-San Jose Railroad which was completed in 1864 (Bancroft, 1886). In the 1870 census, the McLaughlin household consisted of the following persons: Charles, 50, a farmer with $59,000 worth of real estate and $20,000 worth of personal property and born in Pennsylavania; Kate, 29, from Ohio; Martha Anne Dillon, 60, from New Jersy; William H. Dillon, 24, a day laborer; John Marlin, 25, farm laborer from Ohio; Ah Sing, 14, house servant from China; Joseph Brazil, 35, day laborer from Portugal; Anna Brazil, 30, cook from Portugal; and Antoine Brazil, 30, day laborer from Portugal. The 1876 Thompson and West map notes that Kate McLaughlin was the owner of the Stockton Ranch, then consisting of 688 acres. In the 1875-76 County tax assessment, the McLaughlin home was valued at $3,000 and the surrounding 537 acres at $93,975. McLaughlin's business interests seem to have been centered in San Francisco. In the 1878 Langley directory for San Francisco, McLaughlin is listed as the agent for the Western Pacific Railroad Land Office. During this period, McLaughlin also owned large amounts of acreage in the mountains north of Mount Hamilton. By 1900, his heirs, Mary Ives Crocker and Kate May Dillon, were the owners of the McLaughlin Co., a real estate firm in San Francisco. Mary Ives Crocker maintained ownership of the Santa Clara County property until her death in the 1930s. The Stockton Ranch land was sold to the City of San Jose between 1941 and 1943 for future use as a municipal airport (*Official Records* 1012-530, 1053-242, 1078-419, 1104-346, 1165-330, 1167-301). The 1850 Stockton/McLaughlin ranchouse was demolished in 1947 after serious efforts toward relocation were abandoned (San Jose Public Library, clipping file).

Farms Along Brokaw Road

Prior to the expansion of the Municipal Airport in 1961, Brokaw Road traversed the project area. This road, dedicated to the County in 1866, provided access to the properties north of the Stockton Ranch. The road was named after James Brokaw, owner of at least 114 acres of the project area during the 1860s.



Site E - Beans/Souza Farmhouse (post-1900)



Site O - Forward Dairy, 1958 (S.J.Municipal Airport)



Site N - Airport Village, 1957 (S.J. Municipal Airport)



Channelization of the Guadalupe River, 1958 (S.J. Municipal Airport)

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By 1876, six farmsteads were located along Brokaw Road between Martin Aveune and the Guadalupe River.

One farm complex was located on a 100-acre parcel belonging to Hayes and Beans in 1876. N. Hayes was a real estate agent in San Jose and T. Ellard Beans was the President of the Bank of San Jose. By 1890, the parcel had been divided into two fifty-acre parcels, the one with the structure belonging to Beans (Site D). Beans remained owner of this farm until after 1903. Sometime after the turn-of-the-century, a newer farmhouse was built closer to Brokaw Road (Site E). This building remains on the property although it has been abandoned and is scheduled for demolition. It appears to date to the 1900-1910 period and is in poor repair.

South of Brokaw Road, across from the existing farmhouse, was located another pre-1900 farm complex (Site F). As of 1903, this property was owned by M. Carling. A small orchard currently marks the site.

Another pre-1900 farm complex, Site G, was located on the parcel formerly held by N. Hayes. By 1890, this parchel was owned by M. Martin and by 1903, by P. I. Moorhead. By 1929, the property was owned by M. Rogers and it was the Rogers family that sold the land to the city in the late 1940s.

Site H, located off Brokaw Road between Hoffman (Kifer) and the Guadalupe River was site of the pre-1876 J. W. Hines farm. Hines owned the property until after 1903. By 1929, Hines 53-acre farm had been divided into 12-acre parcels.

Another pre-1876 farm complex, Site I, was owned by Oliver Warner, an orchardist. Oliver maintained ownership of this farm until after 1903.

Farms Along Hoffman Road

Hoffman Road, later known as Kifer Road after its extention, was originally opened by N. Hayes and H. Hoffman who bought the property from James Brokaw in 1869 (*Deeds*, 14-426). By 1876, only one structure was located off the road and was perhaps the original Brokaw homesite (Site J). This house was located on a 15-acre parcel owned by Michael Dawson in 1876, and by John Walsh, Dawson's heir, in 1890.

By 1899, two other small farms of unidentified ownership were developed west of Hoffman Road (Sites K and L).

Farms Along the Banks of the Guadalupe

Two potentially historic sites lie along the Guadalupe River--another Dawson house site on the western bank, and the Ogier farm site on the eastern bank.

Michael Dawson, early settler and owner of lands on both sides of the Guadalupe, was the owner of a pre-1866 house on the west bank of the Guadalupe in addition to house sites elsewhere(Spearman, 1963). The possibility exists that this structure, which does not show on the Thompson & West map of 1876, may have been built by a previous owner (Site Q).

The A.M. Ogier, an orchardist, had a small twenty-acre farm on the eastern bank of the Guadalupe (Site P). This house probably dated to the 1860-1876 time period. A. M. Ogier was no doubt a relative of James Ogier, a prominent early settler who owned extensively land adjacent to this tract.

San Jose Municipal Airport

Between 1940 and 1943, the City of San Jose purchased the remaining 483 acres of the Stockton Ranch from the Crocker heirs as a site for a municipal airport. In 1946, the first airport related buildings, California Aviation Activities, a flight school, were located directly adjacent to the Stockton Ranch buildings (Site C). About this same time, Airport Village, post-war veterans housing, was constructed on the Coleman Road edge of the property (Nissen interview). The airport, complete with terminal, was officially opened of February 1, 1949. Between 1946 and 1961, the airport's facilities were located between Newhall and Brokaw Roads. The Guadalupe River was straightened and channelized about 1957, giving the airport more useable land along its eastern boundaries. In 1961, the runways were extended across Brokaw Road and a new terminal building was opened in 1965 (Austin, 1971).



1939 Aerial of project area, Site C - the Stockton Ranch House (S.J. Municipal Airport)



1947 Aerial of Project Area, Site M - California Aviation Activities, Site N - Airport Village (S.J. Municipal Airport)



1956 Aerial Photograph (S.J. Municipal Airport) See Map Key for locations.



1957 Aerial Photograph (S.J. Municipal Airport) Note original course of the Guadalupe River

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1958 Aerial, Note realignment
of Guadalupe River
(S.J. Municipal Airport)



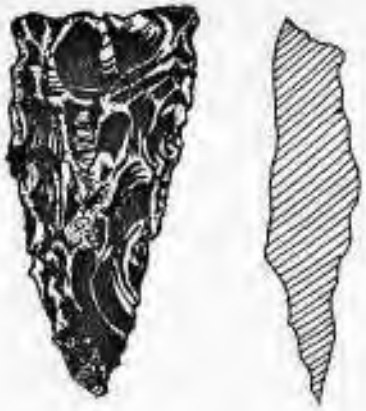
1968 Aerial of northern end
of project area

Potential for Historic Resources

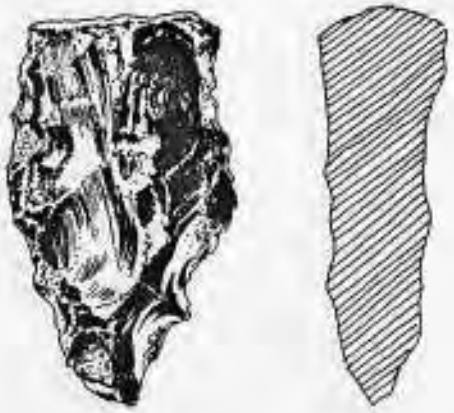
Highly significant historic resources potentially lay within the airport project area. However, due to the massive alteration of the landscape (demolition of structures, removal of historic roadways, new roadways, realignment of the river, massive grading, and pavement of large areas), it is difficult to locate and predict what if any significant deposits may remain intact. The most likely prospect to yield significant data appears to be the circa 1850 Stockton House site. However, most of the complex area has been paved which will make thorough testing difficult. The Mission sites are also extremely significant, but again testing will be difficult as the location of the sites is not precisely known. The literature pertaining to the location of these sites has been thoroughly researched by scholars over the years, however, intensive archeological testing has never been undertaken. Further grading of the areas during airport construction has no doubt helped obscure these sites even more. Random and directed testing of the areas hopefully may reveal significant subsurface features. Also, the later material from 1870 to twentieth-century sites may yield significant data if undisturbed deposits are located. Again, precise location of these resources is difficult due to the removal of all major reference points. Should any intact deposits be located during testing, further site specific archival research should be initiated to determine the significance of the find.

SURFACE SURVEY

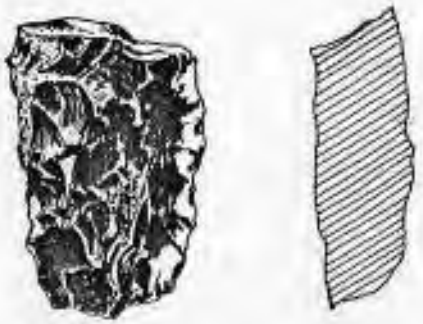
Before subsurface testing was conducted in any given portion of the study area, a surface survey was done to determine the possible presence of archeological resources on the ground. The surface survey was done by the Principal Investigator, Barbara Bocek, Joe Morris, and Pat Harris. No historic or prehistoric deposits were noted in the survey, but a number of isolated historic and prehistoric artifacts were located. The historic artifacts consisted of items that dated from the mid-1800s through the present, including bottle fragments, ceramics, metal objects, and plastic elements. Many of the earlier materials seemed to



OBSIDIAN DART POINT
AIRPORT SURVEY, 2/8/80
SCALE 1:1
PROVENIENCE "A"



OBSIDIAN KNIFE FRAG
AIRPORT SURVEY, 2/8/80
SCALE 1:1
PROVENIENCE "B"



OBSIDIAN BIFACE (MEDIAL FRAG)
AIRPORT SURVEY 2/8/80
SCALE 1:1
PROVENIENCE "C"



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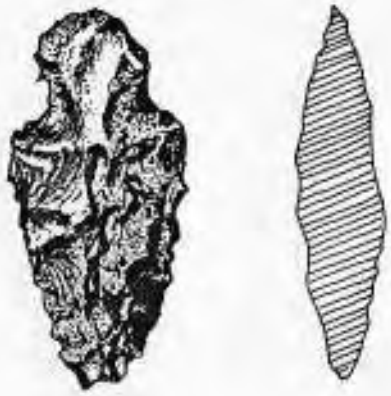
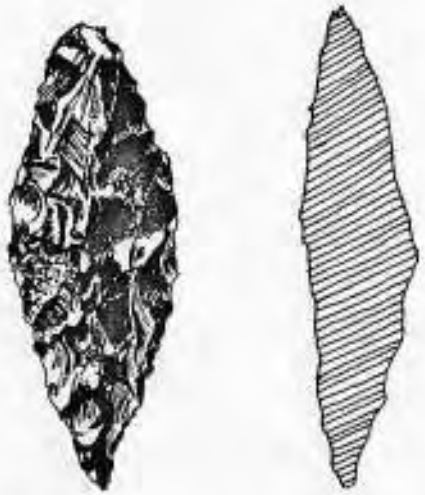


FRANSCIAN CHERT DART POINT
AIRPORT SURVEY 2/8/80
SCALE 1:1
PROVENIENCE "D"



MONTEREY CHERT DART POINT
AIRPORT SURVEY 2/9/80
SCALE 1:1
PROVENIENCE "E"



P. RICHARD

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be related to the turn-of-the-century residences that once fronted on old Brokaw Road and old Hoffman Road (later named Kifer Road) previous to their being removed for airport expansion. Some of the historic artifacts found during the survey appeared to be related to the post-1900 residence (Site "E" on historic map) off the intersection of Martin and Brokaw Roads.

Prehistoric artifacts noted in the surface survey included isolated artifacts of projectile points, a chipped lithic knife fragemnt, several utilized chert flakes, two probable manos, and a few pieces of fire-altered rock spread out in an area of approximately 300 acres. The projectile points and knife fragemnt did, however, form somewhat of a patterned distribution, with four out of five of these elements being in a locus of approximately fourty acres. The presence of these elements is remarkable to the very few other flaked lithics and general absence of midden constituents such as shell, bone, charcoal, wide-spread fire-altered rock, and other artifacts. It appears that this area was some sort of special use area associated with hunting/butchering activities. There is no indication that these elements were bogus or that their locations were contrived. All of the points were relatively large and early in their form, material, and weight--indicating that they were either early Middle Horizon or possibly Early Horixon in their antiquity (probably more than 2000 years old).

In that no distinguishable deposits could be discerned from the surface survey, but prehistoric and historic artifacts were located, a subsurface testing was employed to test for the potential for subsurface deposits that may have been buried by natural flooding or land-use modifications in historic times.

SUBSURFACE TESTING

A total of 230 test trenches were excavated in both random and directed locations to a maximum depth of 300cm. Each test trench was excavated with a 19" bucket on a backhoe tractor and the exposed soil monitored by a trained archeologist. Of all this testing, only trenches 216 and 218 yielded positive cultural data, and these were historic in nature: cut bone, bottle glass, and metal. The following trench records report the stratigraphic findings.

TEST TRENCH DATA

Test Trench #1:	0-60 cm	brown alluvium with little clay
	60-100cm	tanish brown clay
	100cm	less clay, more like 0-60cm
	100-190cm	less clay, more like 0-60cm
	190-210cm	gray clay
Test Trench #2:	0-90 cm	brown alluvium with a little clay, little charcoal; rubber hose (40cm)
	90-140cm	tanish brown clay
	140-190cm	less clay, lighter color
	190-300cm	gray clay with tan (iron) inclusion, charcoal sample from about 220cm
Test Trench #3:	0-70 cm	brown alluvium, some charcoal
	70-130cm	brown alluvium with clay
	130-180cm	less clay, more brown alluvium
	180-200cm	gray clay
Test Trench #4:	9-90 cm	brown alluvium
	90-110cm	dry hard-packed brown alluvium and clay
	110-150cm	dry tan hard packed alluvium and clay
	150-220cm	dry hard packed gray clay
Test Trenches #5 through #7:	80-300cm	alternating light and dark clay layers
Test Trench #5:	0-80 cm	dark brown sandy loam, historic charcoal, charred limbs or roots
	80-110cm	moist gray clay
	110-120cm	tan clay stratum
	120-180cm	dark moist gray clay stratum
	180-240cm	tan clay
	240-270cm	dark gray clay stratum
Test Trench #6:	0-50 cm	brown sandy loam with historic charcoal
	50-90 cm	dark brown sandy loam and clay
	90-110cm	dark clay
	110-170cm	slate gray dry clay, charcoal and roots
	170-200cm	light gray dry clay
	200cm	dark gray clay
Test Trench #7:	0-50 cm	brown sandy loam with roots
	50-110cm	dark clay (gray)
	110-190cm	gray, dry clay
	190-220cm	dark gray moist clay
Test Trench #8:	0-90 cm	brown sandy loam with rubber hose; historic distrubance; 10cm charcoal and roots
	90-130cm	dark gray dry clay
	130-140cm	thin tan clay layer
	140-210cm	dark gray dry clay

Test Trench #9:	0-60 cm	brown sandy loam
	60-210cm	dark gray clay, moist with some charcoal
Test Trench #10:	0-70 cm	brown sandy loam
	70-120cm	dark gray clay, medium moist
	120-140cm	dark gray clay, dry
	140-200cm	light gray clay, very dry
Test Trench #11:	0-80 cm	brown and tan alluvium
	80-120cm	brown clay and loam
	120-140cm	tan clay
	140-200cm	light gray clay
Test Trench #12:	0-60 cm	brown sandy loam, natural chert, sandstone cobbles and gravel
	60-200cm	moist gray clay
Test Trench #13:	0-60 cm	brown loam, natural chert, sandstone cobbles and gravel, historic, roots
	60-160cm	dark gray clay, moist
Test Trench #14:	0-70 cm	gray loam and clay
	70-110cm	lighter gray, moister clay
	110-150cm	dark gray, moist clay
	150-190cm	tan clay with reddish inclusions
	surface	some fire-baked clay in area
Test Trench #15:	surface	some fire-baked clay in area
	0-50 cm	brown sandy loam
	50-110cm	moist gray clay
	110-150cm	dry gray clay
Test Trench #16:	0-50 cm	brown sandy loam
	50-120cm	moist, dark gray clay
	120-140cm	very light gray, dry clay
Test Trench #17:	0-60 cm	brown loam and gray clay
	60-100cm	dark gray clay
	100-130cm	light gray, moist clay
	130-200cm	dark gray clay
Test Trench #18:	0-50 cm	brown loam and clay, roots (old), ceramic fragment (flow blue) 10 cm
	50-80 cm	light gray clay, dry
	80-120cm	very light gray clay
	120-170cm	dark gray clay, moist
Test Trench #19:	0-60 cm	brown loam
	60-170cm	dark gray, moist clay

Test Trench #20:	0-50 cm	brown loam and clay, roots
	50-90 cm	medium gray clay
	90-110cm	dark gray clay, shiny surface
	110-170cm	medium gray clay
Test Trench #21:	0-60 cm	brown loam and clay, roots
	60-100cm	medium gray clay
	100-140cm	dark gray clay
	140-170cm	light gray and tan clay
Test Trench #22:	0-50 cm	brown loam and clay
	50-90 cm	dark gray clay
	90 cm	historic leach field line, off Hoffman
Test Trench #23:	surface	light tan alluvium
	0-50 cm	brown alluvium
	50-110cm	brown alluvium and clay
	110-140cm	gray clay
Test Trench #24:	surface	light tan alluvium
	0-50 cm	brown loam and roots, old.
	50-170cm	dark gray clay
Test Trench #25:	0-50 cm	brown loam
	50 cm	hit 5 foot concrete abandoned pipe
	(moved 1 meter east and redug)	
	50-130cm	dark gray clay
	130-150cm	light dry clay
Test Trench #26:	0-50 cm	brown loam
	50-110cm	dark gray clay
	110-150cm	light dry clay
Test Trench #27:	0-70 cm	brown loam, old root
	70-150cm	dark gray clay
	150-200cm	light gray sandy loam in lower portion
Test Trench #28:	surface	fine, alluvial silt, tan
	0-80 cm	fine alluvial silt
	80-100cm	dark gray clay with orchard roots
	100-170cm	dark gray clay with no roots
	170-200cm	light dry clay
Test Trench #29:	surface	fine alluvial tan silt
	0-80 cm	fine alluvial silt
	80-210cm	dark gray clay
Test Trench #30:	surface	fine alluvial tan silt
	0-100cm	fine alluvial silt
	100-180cm	gray clay
	130cm	mammal bone fragment
	180-200cm	burned clay with charcoal (C-14 sample collected)
	200cm	dark clay

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Test Trench #31:	0-100cm	fine silt
	100-200cm	gray clay
Test Trench #32:	0-170cm	fine alluvial silt
	170-270cm	dark gray clay
Test Trench #33:	0-100cm	alluvial silt, a little old root
	100-230cm	dark gray clay
Test Trench #34:	0-100cm	alluvial silt, piece of old orchard root
	100-195cm	dark gray clay
Test Trench #35:	0-60 cm	alluvial silt
	60-170cm	dark gray clay, shiny
Test Trench #36:	0-60 cm	alluvial silt and small roots
	60-150cm	dark gray clay, shiny
Test Trench #37:	0-80 cm	alluvial silt and small orchard roots
	80-170cm	dark gray clay, shiny
Test Trench #38:	0-100cm	alluvial silt
	100-200cm	dark gray clay
Test Trench #39:	0-100cm	alluvial silt, one piece concrete
	100-200cm	dark gray clay
Test Trench #40:	0-140cm	alluvium
	140-200cm	dark gray clay
Test Trench #41:	0-120cm	alluvial silt
	120-200cm	dark gray clay
Test Trench #42:	0-40 cm	gray dry clay and alluvium
	40-160cm	alluvial silt
	160-200cm	light gray clay, dry
Test Trench #43:	0-60 cm	gray dry clay and alluvium
	60-150cm	alluvial silt
	150-190cm	dark gray clay
Test Trench #44:	0-130cm	alluvial silt
	130-200cm	dark gray clay
Test Trench #45:	0-40 cm	brown clay with silt
	40-140cm	dark gray clay
	140-200cm	light gray/yellow silt
Test Trench #46:	0-200cm	Non-regular stratigraphy; dark gray and tan-yellow clay in vertical cross section all the way to the bottom of the trench

Test Trench #47:	0-60 cm	brown clay
	60-150cm	tan silt
	150-200cm	gray clay
Test Trench #48:	0-75 cm	brown clay
	75-180cm	gray clay
	180-200cm	tan clay
Test Trench #49:	0-40 cm	brown alluvium
	40-150cm	tan clay
	150-200cm	yellow clay
Test Trench #50:	0-50 cm	brown clayey alluvium
	50-140cm	gray-brown clay
	140-200cm	tan-brown clay
Test Trench #51:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	gray brown clay, broken cable
Test Trench #52:	0-80 cm	brown clayey alluvium
	80-120cm	tan clay
	120-200cm	yellow/brown clay
Test Trench #53:	0-60 cm	brown clayey alluvium
	60-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #54:	0-60 cm	brown clayey alluvium
	60-120cm	gray/brown clay
	120-200cm	yellow clay
Test Trench #55:	0-60 cm	brown clayey alluvium
	60-130cm	gray/brown clay
	130-200cm	yellow clay
Test Trench #56:	0-50 cm	brown clayey alluvium
	50-120cm	gray/brown clay
	120-200cm	tan/brown clay
Test Trench #57:	0-50 cm	brown alluvium
	50-110cm	tan clay
	110-200cm	gray/brown clay
Test Trench #58:	0-60 cm	brown clayey alluvium
	60-130cm	tan clay
	130-200cm	gray/brown clay
Test Trench #59:	0-50 cm	brown clayey alluvium
	50-120cm	tan clay
	120-200cm	tan/brown clay

Test Trench #60:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	brown clay
Test Trench #61:	0-50 cm	brown clayey alluvium
	50-100cm	gray/brown clay
	100-200cm	tan clay
Test Trench #62:	0-40 cm	brown clayey alluvium
	40-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #63:	0-50 cm	brown clayey alluvium
	50-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #64:	0-50 cm	brown clayey alluvium
	50-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #65:	0-50 cm	brown clayey alluvium
	50-80 cm	tan clay
	80-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #66:	0-90 cm	brown friable soil
	90-160cm	tan clay
	160-200cm	gray/brown clay
Test Trench #67:	0-50 cm	brown clayey soil
	50-160cm	tan clay
	160-200cm	gray/brown clay
Test Trench #68:	0-40 cm	brown clayey alluvium
	40-100cm	tan clay
	100-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #69:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-120cm	gray/brown clay
	120-200cm	tan clay
Test Trench #70:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-140cm	gray/brown clay
	140cm	tan clay
Test Trench #71:	0-50 cm	brown clayey alluvium
	50-120cm	tan clay
	120-160cm	gray/brown clay
	160-200cm	tan clay

Test Trench #72:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-200cm	gray/brown clay
Test Trench #73:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-180cm	dark brown clay
	180-200cm	tan clay
Test Trench #74:	0-60 cm	brown clayey alluvium
	60-90 cm	tan clay
	90-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #75:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #76:	0-60 cm	brown clayey soil
	60-180cm	tan clay
	180-200cm	gray/brown clay
Test Trench #77:	0-60 cm	brown clayey alluvium
	60-120cm	gray/brown clay
	120-160cm	light brown clay
	160-200cm	tan clay
Test Trench #78:	0-60 cm	brown clayey alluvium
	60-140cm	gray/brown clay
	140-200cm	tan clay
Test Trench #79:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #80:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #81:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #82:	0-40 cm	brown clayey alluvium
	40-80 cm	tan clay
80-120cm	80-120cm	gray/brown clay
	120-200cm	tan clay

Test Trench #83:	0-50 cm	brown clayey alluvium
	50-110cm	tan clay
	110-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #84:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-160cm	gray/brown clay
	160cm	tan clay
Test Trench #85:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #86:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #89:	0-50 cm	brown clayey alluvium
	50-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #90:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #91:	0-50 cm	brown clayey alluvium
	50-90 cm	tan clay
	90-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #92:	0-60 cm	brown clayey alluvium
	60-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #93:	0-80 cm	brown clayey alluvium
	80-160cm	tan clay
	160-180cm	red/brown clay
	180-200cm	tan clay
Test Trench #94:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #95:	0-40 cm	dark brown alluvium
	40-130cm	yellow/brown silty clay
	130-190cm	brown to dark brown, increasingly darker with depth

Test Trench #96:	0-30 cm	dark brown alluvium
	30-140cm	blue/black clay, sticky and plastic
	140-160cm	gray/light gray silty clay, frier, more friable.
	160-190cm	gray/yellow dry silty clay, very friable
Test Trench #97:	0-30 cm	dark brown to medium brown alluvium
	30-50 cm	medium brown alluvium
	50-150cm	dark gray/black silty clay, sticky
	150-200cm	light gray friable silty clay, dry
Test Trench #98:	0-40 cm	medium brown silty clay, fairly friable
	40-70 cm	dark gray/brown clay
	70-190cm	black/blue black clay, sticky
	190-210cm	light gray claywith organic material (orange-rusty)
Test Trench #99:	0-100cm	slightly friable very dark brown to black alluvium; surface soil is much darker than terminal end of field
	100-120cm	gray silty clay, drier, more friable
	120-190cm	light gray (ash-colored) friable clayey silt

In Test Trenches #99 and #100 no "plow-zone" color change is visible, noted more rocks on surface in this area, none modified.

Test Trench #100:	0-110cm	dark brown alluvium, lightly friable
	110-130cm	lighter brown, grayish clay, sticky
	130-190cm	light gray (almost ash color) silty clay, dry, friable with flecks decomposing sand-stone at 150cm.
Test Trench #101:	0-40 cm	very dark brown to black alluvium, slightly friable
	40-100cm	light gray sandy alluvium, very fraible, dry, very different soil texture than any other
	100-190cm	dark gray/medium brown mixed sticky silty clay, lots of orange-rust colored organic material
	190-200cm	lighter brown silty clay, little organic material
Test Trench #102:	0-50 cm	very dark brown alluvium
	50-100cm	medium brown alluvium, more clay
	100-130cm	gray/light brown silty clay
	130-200cm	light brown silty clay, becomes increasingly yellow
Test Trench #103:	0-80 cm	medium brown alluvium
	80-140cm	gray/light brown silty clay, very friable
	140-190cm	same color and texture, but more compact

Test Trench #104:	0-100cm	medium brown alluvium
	100-120cm	yellow to light brown clay, very plastic no organic materials
	120-190cm	light brown/gray silty clay, dry, friable
Test Trench #105:	0-50 cm	medium brown alluvium
	50-70 cm	gray (ash-colored) friable silty clay
	70-180cm	gray/light brown, less friable silty clay
	180-200cm	light brown/yellow silty clay
Test Trench #106:	0-40 cm	light brown friable silty alluvium
	40-120cm	dark brown/black friable silty clay
	120-180cm	yellow to light brown clay, sticky, plastic
	180-210cm	light brown clay, very compact
Test Trench #107:	0-60 cm	medium brown friable alluvium, few rocks, soil appears to be disturbed
	60-140cm	lighter brown alluvium, some rocks, soil appears to be disturbed
	140-150cm	black/dark gray firm clay, lumps are rock-hard
	150-160cm	lighter gray very firm clay, some decomposing sandstone
	160-230cm	medium brown very friable silty clay, redwood timber
Test Trench #108:	0-30 cm	medium brown alluvium
	30-60 cm	yellow clay, very plastic and moist
	60-80 cm	light brown clay, very plastic, sticky
	80-190cm	medium brown clay, sticky, rust-colored organic material
Test Trench #109:	0-50 cm	medium brown alluvium
	50-80 cm	yellow clay, moist and compact
	80-130cm	light brown clay, moist and compact
	130-190cm	dark brown silty clay, friable
Test Trench #110:	0-40 cm	medium brown alluvium, friable
	40-70 cm	yellow clay
	70-160cm	medium light brown clay with organic material
	160-190cm	medium brown clay, more organic material
Test Trench #111:	0-40 cm	medium to dark brown alluvium, very moist
	40-80 cm	light brown clay, plastic and moist
	80-110cm	dark brown silty clay, slightly friable
	110-160cm	dark brown silty clay with organic material
Test Trench #112:	0-40 cm	medium to dark brown alluvium
	40-80 cm	light brown clay, very plastic
	80-130cm	dark gray/brown clay, sticky, compact
	130-200cm	dark gray/brown clay with organic material

Test Trench #113:	0-50 cm	medium brown alluvium
	50-140cm	light brown clay, plastic, moist
	140-190cm	medium brown silty clay with organic material
Test Trench #114:	0-40 cm	medium brown alluvium
	40-80 cm	yellow/light brown clay
	80-130cm	light brown silty clay, with organic material
	130-200cm	medium/dark brown clay, compact, with much organic material
Test Trench #115:	0-40 cm	medium brown alluvium
	40-70 cm	light brown silty clay, orange organic material
	70-100cm	medium brown (gradual color change and
	100-210cm	dark brown increase in organic material)
Test Trench #116:	0-50 cm	medium brown alluvium
	50-120cm	yellow silty clay, compact
	120-200cm	light brown silty clay, compact
Test Trench #117:	0-30 cm	medium brown alluvium, friable
	30-120cm	yellow clay, compact, moist; much organic material
	120-210cm	gray/light brown clay, compact; less organic material
Test Trench #118:	0-40 cm	medium brown alluvium
	40-70 cm	yellow silty clay, some organic material
	70-150cm	yellow/ light brown silty clay, more organics
	150-200cm	medium/dark brown clay
Test Trench #119:	0-30 cm	dark brown/black friable alluvium
	30-40 cm	gray silty clay, very fraible
	40-120cm	light brown silty clay, compact
	120-200cm	medium brown clay, organic material
Test Trench #120:	0-40 cm	medium/dark brown alluvium
	40-120cm	yellow/light brown silty clay, friable
	120-160cm	yellow/light brown silty clay, compact with organic material
	160-200cm	dark brown/black clay, some organic material
Test Trench #121:	0-40 cm	medium brown alluvium
	40-70 cm	light brown clayey silt, friable, dry
	70-200cm	medium/dark brown silty clay, friable

Test Trench #122:	0-30 cm	dark brown alluvium, friable
	30-100cm	gray clayey silt, moist, friable
	100-180cm	gray silty clay, compact, sticky
	180-200cm	medium brown clay, compact, with root plant fiber
Test Trench #123:	0-110cm	medium brown alluvium, friable
	110-130cm	gray silty clay, moist, compact, with yellow clay mottling
	130-160cm	yellow clay, very compact
	160-200cm	medium brown clay, compact, much organic material
Test Trench #124:	0-40 cm	medium/dark brown friable alluvium
	40-70 cm	gray/yellow clayey silt, friable, moist
	70-160cm	yellow clay, more compact, with some organic material
	160-200cm	medium brown/dark gray clay, compact, much organic material
Test Trench #125:	0-30 cm	dark brown friable alluvium
	30-60 cm	gray clayey silt, friable, moist
	60-150cm	yellow/gray clayey silt, friable, moist
	150-190cm	medium brown clay, organic material
Test Trench #126:	0-40 cm	medium brown friable alluvium
	40-60 cm	gray clayey silt, friable, moist
	60-150cm	yellow clay, more compact, a little organic material
	150-200cm	medium brown clay, much organic material
Test Trench #127:	0-40 cm	medium brown alluvium, friable
	40-70 cm	gray clayey silt, friable, moist
	70-160cm	yellow clay, moist, compact, a little organic material
	160-210cm	medium brown clay, compact, lots of organic material
Test Trench #128:	0-70 cm	medium/dark brown alluvium
	70-110cm	yellow silty clay, fairly compact
	110-160cm	yellow clay, compact, a little organic material
	160-190cm	medium brown clay, compact, lots of organic material
Test Trench #129:	0-70 cm	medium brown alluvium
	70-120cm	yellow gray silty clay, fairly compact
	120-170cm	yellow clay, compact
	170-190cm	medium brown clay, compact, some organic material

Test Trench #130:	0-50 cm	medium brown alluvium
	50-90 cm	yellow/light brown silty clay, fairly compact
	90-160cm	yellow silty clay, much organic material
	160-210cm	medium brown clay, very compact, little organic material
Test Trench #131:	0-70 cm	medium brown alluvium
	70-90 cm	yellow/gray silty clay
	90-150cm	yellow clay, compact, much organic material
	150-200cm	medium brown clay, very compact
Test Trench #132:	0-70 cm	medium/dark brown alluvium
	70-150cm	yellow clay, moist, compact, much organic material
	150-210cm	medium brown clay, very compact, less organic material
Test Trench #133:	0-90 cm	medium brown alluvium, compact
	90-110cm	gray/yellow mottled silty clay
	110-160cm	yellow clay, compact, much organic material
	160-200cm	medium brown/gray clay, compact, a little organic material
Test Trench #134:	0-70 cm	medium brown alluvium, very compact
	70-90 cm	light brown/gray clay, compact
	90-140cm	yellow clay, compact, much organic material
	140-190cm	medium brown mottled clay, some organic material
Test Trench #135:	0-40 cm	medium brown alluvium
	40-60 cm	gray/brown silty clay, compact
	60-160cm	yellow silty clay, slightly friable, a little organic material
	160-210cm	medium brown/gray clay, a little organic material
Test Trench #136:	0-40 cm	medium brown alluvium
	40-90 cm	gray (ash-colored) clayey silt, friable
	90-180cm	tan silty clay, mottled with yellow; much organic material
	180-200cm	medium brown/gray clay, a little organic material, very compact
Test Trench #137:	0-40 cm	medium brown alluvium
	40-50 cm	gray clay, very sticky, compact
	50-110cm	medium brown to black silty clay, compact
	110-190cm	yellow clay, compact, some organic material
	190-200cm	light/medium brown clay, some organic material

Test Trench #138:	0-30 cm	medium brown alluvium
	30-40 cm	tan silty clay, friable
	40-90 cm	dark/medium brown silty clay, much organic material
	90-180cm	yellow silty clay, friable, much organic material
	180-200cm	medium brown/light brown clay, some organic material
Test Trench #139:	0-40 cm	medium brown alluvium
	40-50 cm	gray silty clay, friable
	50-80 cm	medium brown silty clay
	80-170cm	yellow clay, much organic material
	170-200cm	medium brown clay
Test Trench #140:	0-70 cm	brown clayey alluvium
	70-140cm	tan clay
	140-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #141:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #142:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #143:	0-90 cm	brown clayey alluvium
	90-130cm	tan clay
	130-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #144:	0-50 cm	brown clayey alluvium
	50-70 cm	light brown clay
	70-100cm	gray/brown clay
	100-140cm	tan clay
	140-200cm	light brown clay
Test Trench #145:	0-50 cm	brown clayey alluvium
	50-80 cm	tan clay
	80-100cm	gray/brown clay
	100-140cm	orange/tan clay
	140-180cm	tan clay
	180-200cm	gray/brown clay

Test Trench #146:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay
	100-140cm	gray/brown clay
	140-190cm	light brown clay
	190-200cm	charcoal deposit with red clay
	200-220cm	tan clay
Test Trench #147:	0-40 cm	brown clayey alluvium
	40-200cm	tan clay
	200-230cm	light brown clay
Test Trench #148:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-130cm	gray/brown clay
	130- cm	tan clay
Test Trench #149:	0-50 cm	brown clayey alluvium
	50-180cm	tan clay
	180-200cm	gray/brown clay

Note: inconsistency in horizontal deposition of strata. South end of trench has continuation of charcoal deposit found in Trench 146. Charcoal deposit bottoms out at 200cm. (B.S.)

Test Trench #150:	0-50 cm	brown clayey alluvium
	50-100cm	tan clay
	100-120cm	gray/brown clay
	120-180cm	tan clay
	180-200cm	gray/brown clay
Test Trench #151:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	gray/brown clay
	140-200cm	tan clay
Test Trench #152:	0-90 cm	brown clayey alluvium
	90-200cm	tan clay
Test Trench #153:	0-50 cm	brown clayey alluvium
	50-170cm	tan clay
	170-200cm	light brown clay
Test Trench #154:	0-60 cm	brown clayey alluvium
	60-140cm	tan clay
	140-200cm	light brown clay
Test Trench #155:	0-90 cm	brown clayey alluvium
	90-150cm	tan clay
	150-200cm	gray/brown clay

Test Trench #157:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	140-200cm	light brown clay
Test Trench #158:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-140cm	light brown clay
	140-180cm	gray/brown clay
	180-200cm	tan clay
Test Trench #159:	0-70 cm	brown clayey alluvium
	70-110cm	light brown clay
	110-160cm	tan clay
	160-220cm	red/brown clay
Test Trench #160:	0-30 cm	brown clayey alluvium
	30-40 cm	light brown silt
	40-130cm	gray/brown clay
	130-160cm	light gray dry clay
	160-200cm	tan clay
Test Trench #161:	0-50 cm	brown clayey alluvium
	50-110cm	gray/brown clay
	110-180cm	light gray dry clay
	180-200cm	tan clay
Test Trench #162:	0-40 cm	brown clayey alluvium
	40-90 cm	light brown clay
	90-130cm	gray/brown clay
	130-160cm	light gray dry clay
Test Trench #163:	0-50 cm	brown clayey alluvium
	50-80 cm	light brown clay
	80-160cm	gray/brown clay
	160-200cm	red/tan clay
Test Trench #164:	0-50 cm	brown clayey alluvium
	50-90 cm	light brown clay
	90-130cm	gray/brown clay
	130-200cm	red/tan clay
Test Trench #165:	0-30 cm	brown clayey alluvium
	30-100cm	light brown clay (baked clay at 40cm)
	100-130cm	gray/brown clay
	130-200cm	red/tan clay
Test Trench #166:	0-70 cm	brown clayey alluvium
	70-90 cm	light brown clay
	90-130cm	red/tan clay
	130-160cm	gray/brown clay
	160-200cm	tan clay

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Test Trench #167:	0-60 cm	brown clayey alluvium
	60-120cm	light brown clay
	120-160cm	gray/brown clay
	160-200cm	tan clay
Test Trench #168:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay
	100-120cm	red/tan clay
	120-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #169:	0-100cm	brown clayey alluvium
	100-160cm	light brown clay with light gray flecks
	160- cm	tan clay
Test Trench #170:	0-110cm	brown clayey alluvium
	110-170cm	light brown clay
	170-200cm	gray/brown clay
Test Trench #171:	0-50 cm	brown clayey alluvium
	50-150cm	tan clay
	150-200cm	tan clay with orange
Test Trench #172:	0-80 cm	brown clayey alluvium
	80-170cm	tan clay
	170-200cm	tan clay with orange
Test Trench #173:	0-10 cm	brown clayey alluvium
	10-20 cm	tan/orange silt
	20-100cm	gray/brown clay
	100-180cm	tan clay with orange
	180-200cm	tan clay
Test Trench #174:	0-50 cm	brown clayey alluvium
	50-110cm	gray/brown clay
	Abandoned	trench, hit old PVC pipe and water line.
Test Trench #175:	0-60 cm	brown clayey alluvium
	60-150cm	light brown clay with root veins
	150-200cm	tan clay
Test Trench #176:	0-50 cm	brown friable soil with pebbles
	50-70 cm	gray/brown clay
	70-160cm	tan clay with orange
	160-200cm	light brown clay
Test Trench #177:	0-50 cm	brown clayey alluvium
	50-100cm	light brown clay with orange
	100-120cm	tan clay
	120-160cm	gray/brown clay (large mammal bone at 120cm. elk?)
	160-200cm	light brown clay with orange

Test Trench #178:	0-60 cm	brown clayey alluvium
	60-100cm	light brown clay
	100-200cm	gray/brown clay
Test Trench #179:	0-60 cm	brown clayey alluvium
	60-120cm	tan clay
	120-160cm	gray/brown clay
	160-200cm	light brown clay
Test Trench #180:	0-40 cm	brown clayey alluvium
	40-110cm	light brown clay with orange
	110-140cm	gray/brown clay with orange
	140-200cm	tan clay
Test Trench #181:	0-50 cm	brown clayey alluvium
	50-70 cm	light brown clay
	70-150cm	gray/brown clay with orange
	150-200cm	tan clay
Test Trench #182:	0-40 cm	brown clayey alluvium
	40-70 cm	gray/brown clay
	70-120cm	light brown clay
	120-200cm	tan clay with orange
Test Trench #183:	0-40 cm	brown clayey alluvium
	40-80 cm	gray/brown clay
	80-200cm	tan clay
Test Trench #184:	0-40 cm	brown clayey alluvium
	40-80 cm	gray/brown clay
	80-200cm	tan clay
Test Trench #185:	0-40 cm	brown clayey alluvium
	40-90 cm	gray/brown clay
	90-200cm	tan clay
Test Trench #186:	0-110cm	tan clay
	110-130cm	gray/brown clay
	Abandoned	trench, hit top of large metal tank or pipe.
Test Trench #187:	0-30 cm	brown clayey alluvium
	30-90 cm	gray/brown clay
	90-180cm	light gray clay
	180-200cm	light brown clay
Test Trench #188:	0-10 cm	brown humus
	10-90 cm	light gray clay
	90-120cm	tan clay
	120-200cm	gray/brown clay with light gray
Test Trench #189:	0-40 cm	brown clayey alluvium
	40-90 cm	light gray clay
	90-150cm	light brown with light gray clay
	150-200cm	light gray clay

Test Trench #190:	0-60 cm	brown clayey alluvium
	60-110cm	tan clay
	110-130cm	light brown clay
	130-140cm	gray/brown clay
	140-200cm	light brown with orange clay
Test Trench #191:	0-60 cm	brown clayey alluvium
	60-150cm	light brown with orange clay
	150-200cm	tan with orange clay
Test Trench #192:	0-60 cm	brown clayey alluvium
	60-160cm	gray/brown clay
	160-200cm	light brown with orange clay
Test Trench #193:	0-40 cm	brown clayey alluvium
	40-60 cm	tan clay
	60-170cm	gray/brown clay
	170-200cm	light brown clay
Test Trench #194:	0-100cm	gray/brown clayey alluvium
	100-180cm	gray/brown clay
	180-200cm	light brown clay
Test Trench #195:	0-60 cm	gray/brown clayey alluvium
	60-100cm	light brown clay
	100-160cm	light brown with light gray clay
	160-200cm	tan clay
Test Trench #196:	0-80 cm	gray/brown clayey alluvium
	80-120cm	gray/brown with light gray clay
	120-180cm	light brown with light gray clay
	180-200cm	tan clay
Test Trench #197:	0-80 cm	gray/brown clayey alluvium
	80-110cm	light brown clay
	110-180cm	tan clay with light gray
	180-200cm	tan clay
Test Trench #198:	0-40 cm	gray/brown clayey alluvium
	40-80 cm	light brown clay
	80-160cm	tan clay
	160-200cm	tan with orange clay
Test Trench #199:	0-120cm	brown clayey alluvium
	120-180cm	gray clay
	180-200cm	gray with orange clay
Test Trench #200:	0-120cm	brown clayey alluvium
	120-180cm	gray clay
	180-200cm	gray with orange clay

Test Trench #201:	0-180cm	brown clayey alluvium
	180-200cm	gray clay
Test Trench #202:	0-120cm	brown clayey alluvium
	120-200cm	gray with orange clay
Test Trench #203:	0-120cm	brown clayey alluvium
	120-200cm	gray clay
Test Trench #204:	0-60 cm	red/brown sandy alluvium
	60-140cm	brown clay
	140-200cm	gray clay
Test Trench #205:	0-80 cm	red/brown sandy alluvium
	80-160cm	tan silt (large mammal bone at 110cm)
	160-200cm	gray clay
Test Trench #206:	0-70 cm	red/brown sandy silt
	70-100cm	gray/green clay
	100-200cm	brown sandy silt
Test Trench #207:	0-120cm	red/brown sandy silt
	120-200cm	gray/green clay
Test Trench #208:	0-110cm	red/brown sandy silt
	110-200cm	gray/brown clay
Test Trench #209:	0-110cm	red/brown sandy silt
	110-200cm	gray/brown clay
Test Trench #210:	0-120cm	red/brown sandy silt
	120-200cm	gray/brown clay
Test Trench #211:	0-90 cm	brown clayey alluvium
	90-140cm	gray/brown clay
	140-200cm	gray/green clay
Test Trench #212:	0-90 cm	brown clayey alluvium
	90-130cm	gray/brown clay
	130-200cm	gray/green clay
Test Trench #213:	0-90 cm	brown clayey alluvium
	90-130cm	gray/brown clay
	130-200cm	gray/green clay
Test Trench #214:	0-60 cm	brown clayey alluvium
	60-150cm	gray/brown clay
	150-200cm	gray/green clay

Test Trench #215:	0-60 cm	brown clayey alluvium
	60-110cm	gray/brown clay
	110-180cm	gray/green clay
	180-200cm	tan clay
Test Trench #216:	0-120cm	brown sandy silt
	120-180cm	gray/brown clay. Historic materials at 150cm (glass, bone, metal)
	180-200cm	tan clay
Test Trench #217:	0-60 cm	brown sandy silt
	60-150cm	gray/brown clay
	150-200cm	tan clay
Test Trench #218:	0-110cm	brown sandy silt
	110-200cm	gray/brown clay; historic materials at 110cm
Test Trench #219:	0-120cm	brown sandy silt
	120-170cm	tan sandy silt
	170-200cm	gray/brown clay
Test Trench #220:	0-100cm	brown sandy silt
	100-160cm	tan sandy silt
	160-200cm	gray/brown clay
Test Trench #221:	0-150cm	brown sandy silt
	150-200	tan sandy silt
Test Trench #222:	0-140cm	brown sandy silt
	140-200cm	gray/brown clay with white
Test Trench #223:	0-40 cm	light brown fill
	40-200cm	brown sandy silt
Test Trench #224:	0-120cm	brown clayey alluvium
	120-200cm	gray/green clay
Test Trench #225:	0-100cm	brown clayey alluvium
	100-130cm	tan clay
	130-200cm	gray/green clay
Test Trench #226:	0-80 cm	brown clayey alluvium
	80-140cm	tan clay
	Abandoned trench, hit abandoned water line at 140cm	
Test Trench #227:	0-70 cm	brown clayey alluvium
	70-100cm	light brown clay
	100-200cm	gray/green clay with orange
Test Trench #228:	0-80 cm	brown clayey alluvium
	80-100cm	tan clay
	100-200cm	gray/green clay with orange

Test Trench #229:	0-80 cm	brown clayey alluvium
	80-150cm	gray/green clay
	150-200cm	tan clay
Test Trench #230:	0-60 cm	brown clayey alluvium
	60-90 cm	gray/green clay with orange
	90-150cm	gray/green clay
	150-200cm	tan clay

CONCLUSIONS AND RECOMMENDATIONS

Based on the archival record, the historic literature, the surface survey, and the subsurface testing, it appears that there are definitely prehistoric archeological resources in the study area and that there is the strong potential for subsurface historic deposits. The regions that appear to contain or potentially contain archeological resources are marked in parallel lines in the attached testing location and sensitivity map of the airport. The sensitive area around Test Trench #184 is the scene of the Stockton House site as known from historic literature. Around Test Trench #181 is a sensitive area established on the basis of prehistoric artifact finds on the surface. Test Trench #216 marks a third sensitive area where both the historic records and subsurface testing point to the possibility of early Spanish and Mission period activities leaving remains in buried deposits. The large sensitive area on the northwest side of the airport contains many prehistoric artifacts, the sites of the first and second locations of the Mission Santa Clara (1777-1784), and possible contact-period Indian materials.

Recommendations for the future management of cultural resources in the study area include 1) the retension of a trained archeologist to monitor any subsurface construction or earthmoving in any of the marked sensitive areas, and 2) the surface collection and analysis of prehistoric artifacts in the prehistoric sentitive zones previous to any construction in those areas. Also, in the event that any archeological traces (human remains, artifacts, concentrations of shell/bone/ash) are encountered in any portion of the study area, all construction within a fifty-meter radius of the find should stop, and a qualified archeologist be brought in to examine the find an to recommend mitigations as necessary.

Archeological
Resource Management
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496 North 5th Street
San Jose, CA 95112
Telephone (408) 295-1373

ADDENDUM TO ARCHEOLOGICAL EVALUATION OF SAN JOSE MUNICIPAL AIRPORT

The archeological evaluation of the San Jose Municipal Airport originally was intended to include the subsurface testing of the parking lot area in front of the Terminal Building; however, due to rains and problems in coordination in the last days of the testing program this portion of the testing was not carried out. There is a real possibility of archeological deposits existing under this parking area and subsurface testing should be done there previous to the finalization of construction plans for this region. It is intended that such testing will shortly be carried out by ARM when weather allows. A written letter to this effect should be attached to this report to confirm the completion of this last phase of the investigation.

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March 26, 1980

ADDENDUM ON THE COMPLETION OF ARCHEOLOGICAL TEST TRENCHING AT THE SAN JOSE MUNICIPAL AIRPORT

This letter notes the completion of archeological test trenching at the San Jose Municipal Airport. In addition to the 230 test trenches excavated in February, 1980, seven more trenches were excavated in the parking lots adjacent to the Terminal Building to test for the possiblity of buried cultural resources. The results of the new trenches have been incorporated onto the map of trench locations and the description of the trench data. Of the seven additional trenches, trench #231 yielded positive data of a potential archeological site, and, accordingly, the region directly around this location is designated on the archeological map as sensitive. The completion of these additional test trenches marks the overall conclusion of the archeological evaluation.

TEST TRENCHES EXCAVATED IN PARKING AREAS ADJACENT TO THE TERMINAL BUILDING

Test Trench #231:	0-15cm	asphalt hardtop
	15-70cm	fine silty river alluvium
	70-260cm	dark brown clay, very dense
Test Trench #232	0-10cm	asphalt hardtop
	10-60cm	silty clay
	60-130cm	dark, moist clay
	130-180cm	much fire-altered clay and charcoal
	180-250cm	dark clay with organic decomposition
Test Trench #233	0-15cm	asphalt hardtop
	15-50cm	construction gravel and sand
	50-150cm	brown and gray clay with some sand
	150-270cm	moist gray clay
Test Trench #234	0-15cm	asphalt hardtop
	15-55cm	construction gravel and sand
	55-85cm	alluvial silt and brown clay
	85-150cm	soft alluvial silt with little clay
	150-240cm	brown clay with silt
	240-270cm	light gray clay
Test Trench #235	0-15cm	asphalt hardtop
	15-45cm	construction gravel and sand
	45-80cm	reddish brown clay with silt
	80-160cm	brown clay and silt
	160-230cm	dark brown clay
	230-270cm	medium gray clay with yellow inclusions
Test Trench #236	0-20cm	asphalt hardtop
	20-40cm	construction gravel and sand
	40-100cm	brown clay and sand
	100-200cm	dark brown clay
	200-260cm	gray clay
Test Trench #237	0-20cm	asphalt hardtop
	20-50cm	clay and construction gravel
	50-220cm	dark gray clay with sand and burned wood
	220-260cm	moist gray clay

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MAPS

Hermann Bros.
1890 Official Map of Santa Clara County.

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1903 Official Map of Santa Clara County.

McMillan & McMillan
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USGS
1895 San Jose Quad.

1939/1941 San Jose Quad

1953 San Jose Quad.

AERIAL PHOTOGRAPHS

1939-1979 Collection courtesy of San Jose Municipal Airport, Facilities Planning Office.

RECORDS

Book of Deeds. County Recorder's Office.

California State Census, Santa Clara County. 1852.

Federal Census, Santa Clara County. 1860, 1870, 1880.

Official Records. County Recorder's Office.

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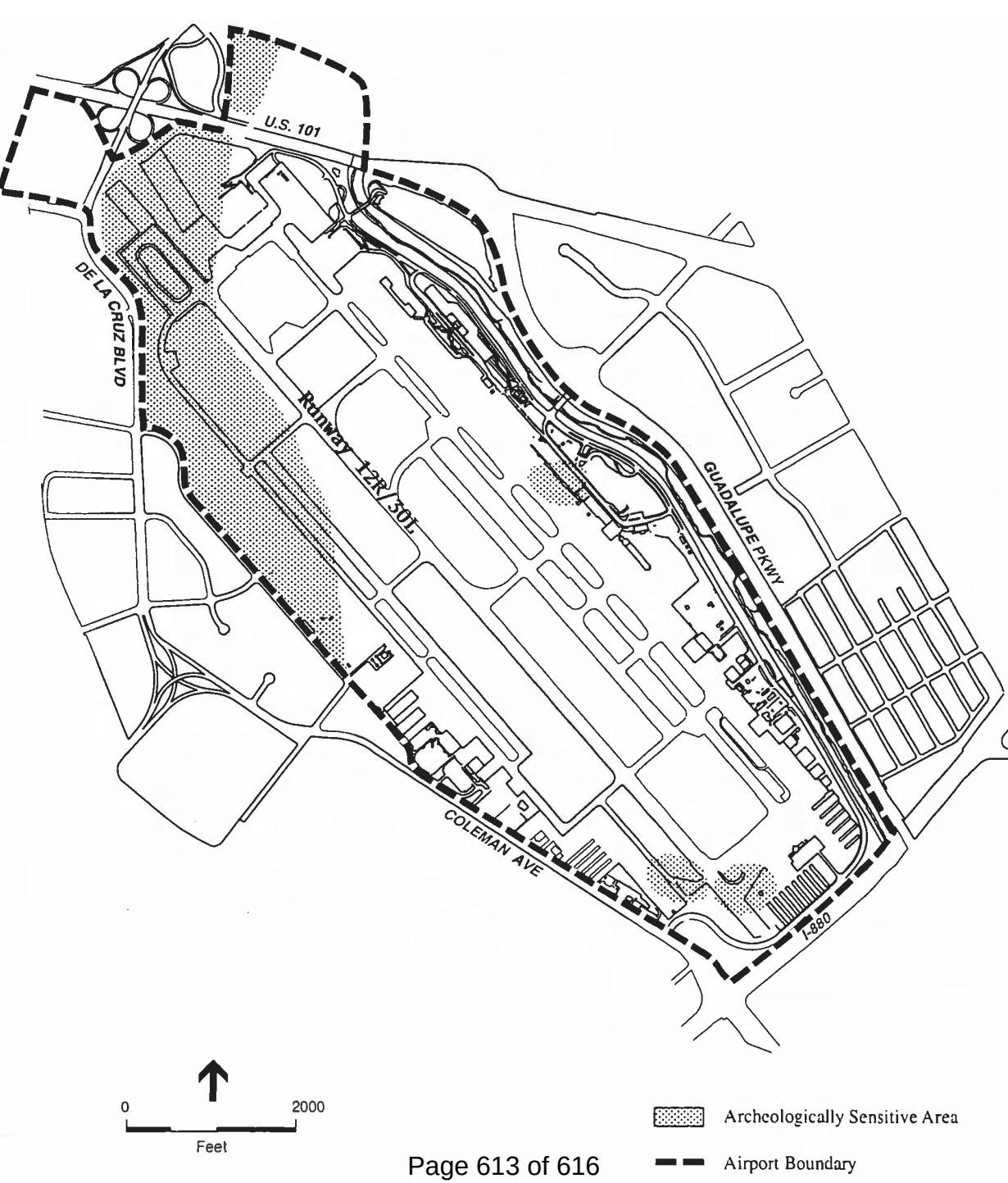
NEPA Documentation - SHPO

Tax Assessments, County of Santa Clara. 1875-1877. Courtesy of the San Jose Historical Museum.

PERSONAL COMMUNICATIONS

James Nissen, former director of the San Jose Municipal Airport.

Note: The figure showing trench locations is oversized and is not included. The figure on the following page that depicts the archaeologically-sensitive areas at the Airport is based on the results of the trenching and represents the recommendations of the archaeologist that prepared this report.


U.S. 101
DE LA CRUZ BLVD
Runway 12R/30L
GUADALUPE PKWY
COLEMAN AVE
I-880
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2000
Feet
Archeologically Sensitive Area
Airport Boundary

DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION
Julianne Polanco, State Historic Preservation Officer
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Lisa Ann L. Mangat, *Director*

December 7, 2020 Reply in Reference To: FAA_2019_1023_001

Submitted Via Electronic Mail

Douglas R. Pomeroy
Environmental Protection Specialist
Federal Aviation Administration
Western-Pacific Region, Airports Division
1000 Marina Boulevard, Suite 220
Brisbane, CA 94005

Re: Norman Y. Mineta San Jose International Airport, Runway Incursion Mitigation Projects, Santa Clara County, California

Dear Mr. Pomeroy:

The United States Federal Aviation Administration (FAA) is consulting with the State Historic Preservation Officer (SHPO) in order to comply with Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 306108), as amended, and its implementing regulations at 36 CFR Part 800. The FAA is requesting SHPO concurrence with a finding of no historic properties affected.

The City of San Jose, airport sponsor of the Norman Y. Mineta San Jose International Airport (SJC), is proposing eleven Runway Incursion Mitigation (RIM) project actions at SJC. A “runway incursion” is defined as the unauthorized presence of an aircraft, vehicle or person on a surface designated for the landing and take-off of aircraft. The eleven RIM projects include the following:

- Project 1: General Aviation Run-Up Pad Relocation
- Project 2: Taxi Markings on Taxiways Y and W
- Project 3: Taxiway W/M Intersection Modification
- Project 4: New Taxiway V
- Project 5: Taxiway F and H Closure Between Runways
- Project 6: New Taxiway Connectors W2 and W3 at Southwest Apron

- Project 7: Taxiway W Extension
- Project 8: Runway 12R-30L Hold Bar Relocation
- Project 9: New Westside Parallel Taxilane
- Project 10: Taxiway B and Taxiway L Width Reduction
- Project 11: Runway 12L-30R Blast Pad Improvements

The Area of Potential Effects (APE) is defined as the eleven project activity locations within the boundary of SJC.

Having reviewed your submittal, SHPO offers the following comments:

1) SHPO does not concur that the undertakings will not affect historic properties, as the information provided does not meet the documentation standards outlined at 36 CFR Part 800.11. The cultural resources studies produced for the 1980 Airport Master Plan and 1999 Master Plan Update is outdated. SHPO recommends the FAA consult current records when carrying out cultural resources identification efforts;

2) SHPO would prefer the FAA consult on individual undertakings rather groupings or classes of projects.

If the FAA has any questions or comments, please contact staff historian Tristan Tozer at (916) 445-7027 or Tristan.Tozer@parks.ca.gov.

Sincerely,



Julianne Polanco
State Historic Preservation Officer