Aircraft
Noise
Abatement
Office

San Francisco International Airport

Technical Report

Aircraft Overflight and Noise Analysis

Brisbane, California

December 2010

Prepared by:

Aircraft Noise Abatement Office

San Francisco International Airport
P.O. Box 8097
San Francisco, California 94128
(650) 821-5100

Introduction

In response to growing community concerns of increased aircraft noise in the city of Brisbane, San Francisco International Airport (SFO) Noise Abatement Office conducted a 22 day noise measurement survey at three locations throughout the city to determine the noise levels from aircraft overflights. Noise data was collected from October 28, 2010 through November 18, 2010 at 3xx Kings Road, 2 Solano Street and 475 Mission Blue Drive. Data from these temporary meters along with data from permanent noise monitor #7- located at Margaret Tank are presented in this report.

Review of historical radar data from 2000 through November 2010 was also accomplished using SFO's Airport Noise and Operations Management System (ANOMS). Seven typical West Plan[1] days were identified during the busiest traffic times for March, June, September and November for each of the 11 calendar years. Both Oakland International Airport (OAK) and SFO operations for these identified days[2] were then processed through three flight track analysis gates (Brisbane1, Brisbane2, and Brisbane3) in ANOMS. All aircraft operations through these gates were analyzed and presented in this report.

2. Noise Standards

The State of California uses a Federal Government approved 24 hour, time-weighted, cumulative noise metric known as the Community Noise Equivalent Level (CNEL) to assess and regulate airport noise levels. This metric represents a standard measure of noise averaged over a 24 hour period where each aircraft noise event occurring between 7:00 p.m. and 9:59 p.m. is weighted an additional 4.77 decibels (dB), and each aircraft noise event occurring between 10:00 p.m. and 6:59 a.m. is weighted an additional 10 dB. An exterior noise standard that is greater than 65 dB CNEL within a residential area is incompatible to airport operations.

3. Summary

Aircraft operations detected at these locations resulted in a 24 hour daily average CNEL of 50.4 dB at Site 7, 50.3 dB at 3xx Kings Road, 49.7 dB at 2 Solano Street and 46.1 dB at 475 Mission Blue Drive. Community CNEL was 57.1 dB, 53.6 dB, 56.3 dB and 52.9 dB, respectively. These results are consistent with aircraft noise levels outside of the 65 dB CNEL noise contour. During this measurement period, a daily average of 169 aircraft flew within a cylindrical area of 1 mile in radius and 15,000 feet in height, centered on the Community Park. Of these 123 flights were SFO (26 Arrivals and 97 Departures), 30 flights were OAK Departures and 16 were associated with other local or "Unknown" airports.

Brisbane is located approximately 4 miles north of SFO and experiences noise from aircraft departing SFO's Runways 01L and 01R, bound for a destination south of the Bay Area (Southern California, Arizona and Las Vegas). Aircraft on this departure path are at an average altitude of 4,300 feet above sea level. Similarly, OAK's departures bound for a destination south of the Bay Area also over fly the San Francisco peninsula. OAK's aircraft average altitude is approximately 8,800 feet as they fly over the peninsula. The next layer of traffic above OAK's departures is SFO's Arrivals from the north to Runways 28L and 28R. The average Aircraft altitude on this approach is 10,500 feet.

[1] SFO operates on two sets of parallel runways that intersect midfield at a ninety degree angle. Approximately 83% of the time aircraft depart on either Runway 01L or 01R and arrive on either Runway 28L or 28R. This operation is called the "West Plan."
[2] See Appendix I – Identified West Plan Days and Appendix II – West Plan routes.

Although no changes in established departure procedures or routes serving OAK or SFO were noted, Southwest Airlines (SWA), United Airlines (UAL), and Virgin America (VRD) were identified as the top three contributors for noise events and complaints. While both UAL and VRD operate Airbus A319 and A320 aircraft, altitude measurements during this survey indicate Virgin America consistently operate their aircraft lower than their counterpart. We have contacted UAL and VRD about these operations over the peninsula on the PORTE Departure procedure. VRD have since instituted new aircraft operational procedures on December 2, 2010 that would increase aircraft altitude and decrease noise.

4. Weather Conditions and Runway Use

Weather conditions at SFO are an important factor in the safe operational flow of aircraft arriving and departing the airport. Although cloud cover is an issue with arrivals, it is not a factor where established departure procedures can be utilized, except for the Shoreline Departure Procedure which requires a 2,000 feet cloud ceiling for jet aircraft (1,500 feet for propeller aircraft), 3 miles prevailing visibility with 5 miles to the west and northwest of the airfield. In a simpler term the top of Mt. San Bruno needs to be visible if the Shoreline Departure is to be used.

SFO experiences winds predominately from the west (270°) which allows the airport to operate in the optimal configuration of arrivals on Runway 28L and 28R and departures on Runway 01L and 01R. As mentioned earlier, this configuration is referred to as the "West Plan." West Plan configuration is maintained until the airport reaches a sustained crosswind wind component of 20 knots (23 miles per hour) on a dry runway or 15 knots (17 miles per hour) on a wet runway. Once the crosswind wind components have been reached the runway configuration for arrivals and departures will switch to allow for continued safe aircraft operation at the airport. The configuration that follows utilizes Runway 28L and 28R for both arrivals and departures. Thus, this reduces the amount of flights that the airport can handle since the runways that are available have been reduced by 50 percent.

When a storm system moves through the area, it usually brings with it winds blowing from a southeast direction (135°) or south direction (180°). The airport uses another runway configuration, referred to as the Southeast Plan. The standard Southeast Plan has aircraft arriving on Runway 19L and 19R, while departing aircraft use Runway 10L and 10R. During this configuration the crosswind wind component is 15 knots (17 miles per hour). When this threshold is exceeded Runway 19L and 19R are utilized for both arrivals and departures.

The final configuration that the airport can use, although it is very rare, is departing and landing on Runway 01L and 01R. This only occurs when the airport experiences a strong sustained wind blowing from the north (0° or 360°). Please refer to Appendix II which contains flight track maps of these configurations.

5. BACKGROUND

5.1 Noise Monitor Equipment

The equipment used to measure the noise level was an Environmental Monitor Unit (EMU) 2200 noise monitors and Type 41DM-2 microphones manufactured by Bruel & Kjaer. The measurements consisted of monitoring the A-weighted decibel in accordance with procedures and equipment which comply with International Electrotechnical Commission, and measurement standards established by the American National Standards Institute for Type I instrumentation. The EMU and microphone were calibrated prior to deployment. The EMU is housed in a weatherproof case and powered by on-site electrical outlet or batteries. The microphone was mounted on a tripod at a height of seven feet. The noise levels at the sites were continuously monitored and the results stored on the onboard memory and periodically transferred to a removable memory media for decoding. The decoded noise data were then processed in ANOMS for identification, noise to flight track matching and CNEL calculations.

5.2 Measurement Site Descriptions

Site	Description/Address	Latitude	Longitude	Elevation (feet)	Start Date	End Date
7	Margaret Tank	37.677303	122.402192	543	2/6/2009	Active
964	3xx Kings Road	37.67846	122.40348	364	10/26/2010	11/19/2010
965	2 Solano Street	37.68511	122.40559	72	10/27/2010	11/19/2010
966	475 Mission Blue Drive	37.69268	122.41542	121	10/27/2010	11/19/2010

Figure 1. Location of Monitoring Sites

6. Noise Measurements

Noise data were collected on-site from Thursday, October 28, 2010 through Thursday, November 18, 2010 using various noise monitoring thresholds along with noise to flight track matching parameters which resulted in a 24 hour daily average Aircraft CNEL of 50.4 dB at Site 7, 50.3 dB at 3xx Kings Road, 49.7 dB at 2 Solano Street and 46.1 dB at 475 Mission Blue Drive. Community CNEL was 57.1 dB, 53.6 dB, 56.3 dB and 52.9 dB, respectively. Historically, Aircraft CNEL has been on the decline since 1999 due to the retirement of older aircraft from airlines' fleets and commissioning into service newer technological, more efficient and quieter airplanes. The original community noise monitor in Brisbane measured a 1999 yearly average Aircraft CNEL of 54.5 dB (see Appendix II for more historical levels). The total number of Aircraft Events measured at Site 7 was 1,001 (daily average 46) and Community Events was 58 (daily average 3). At 3xx Kings Roads there was 1,127 Aircraft Events (daily average 51) and 47 Community Events (daily average 3), 2 Solano Street there was 1,279 Aircraft Events (daily average 58) and 547 Community Events (daily average 25) and at 475 Mission Blue Drive there was 786 Aircraft Events (daily average 36) and 96 Community Events (daily average 5). A daily average of 169 aircraft flew within a cylindrical area of 1 mile in radius and 15,000 feet in height, centered on the Community Park. Tables 1 through 4 summarize the data analyzed.

Table 1. Daily Average Community Noise Equivalent Level

	Site 7 - Margaret Tank	3xx Kings Road	2 Solano Street	475 Mission Blue Drive
Aircraft	50.4	50.3	49.7	46.1
SFO Aircraft Only	50.2	50.2	49.5	45.9
Community	57.1	53.6	56.3	52.9
Total	58.1	55.4	57.3	53.8

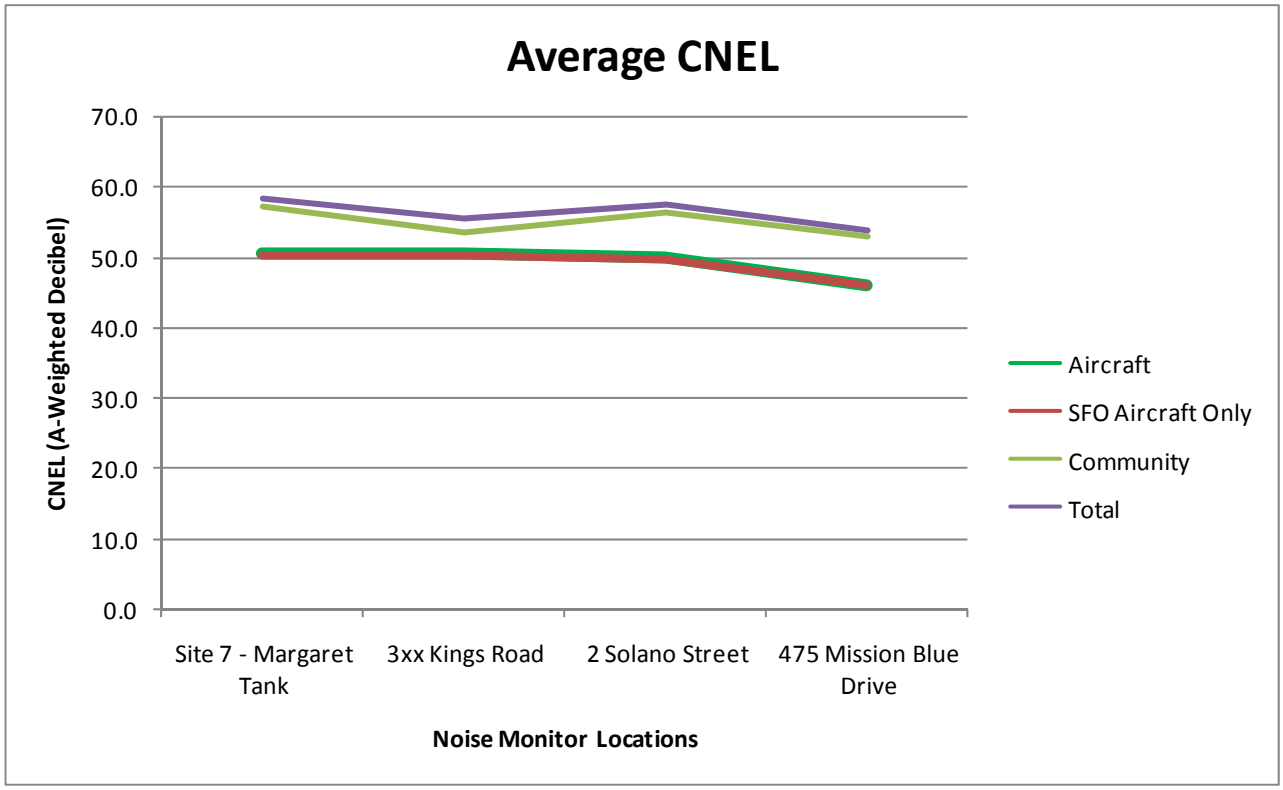


Table 2. Daily Community Noise Equivalent Level (CNEL)

	Site 7 - Margaret Tank				3xx Kings Road				2 Solano Street				475 Mission Blue Drive			
Date	SFO	Aircraft	Community	Total	SFO	Aircraft	Community	Total	SFO	Aircraft	Community	Total	SFO	Aircraft	Community	Total
10/28/10	50.4	50.4	54.8	56.2	49.8	49.8	52.3	54.2	50.4	50.4	56.1	57.1	46.7	46.7	52.3	53.4
10/29/10	49.8	49.9	55.8	56.8	51.1	51.2	53.9	55.7	51.2	51.3	57.1	58.1	49.2	49.3	53.7	55.1
10/30/10	43.6	43.6	64.3	64.4	40.0	40.0	49.4	49.9	39.9	40.0	52.8	53.0	41.9	41.9	49.9	50.5
10/31/10	50.6	50.9	54.5	56.1	51.2	51.3	52.6	55.0	51.0	51.0	53.4	55.4	47.7	47.7	51.9	53.3
11/1/10	51.4	51.4	56.5	57.7	50.5	50.5	55.2	56.5	48.5	48.6	64.0	64.1	46.2	46.2	53.2	54.0
11/2/10	47.6	47.9	57.2	57.6	48.6	48.8	54.3	55.4	47.6	47.8	57.0	57.5	43.1	44.0	54.1	54.5
11/3/10	49.3	49.4	55.2	56.2	49.9	49.9	53.4	55.0	49.8	49.9	56.9	57.7	45.9	46.2	53.1	53.9
11/4/10	53.1	53.1	55.5	57.4	51.2	51.2	53.3	55.4	48.4	48.5	56.8	57.4	43.1	43.3	54.4	54.8
11/5/10	52.7	52.7	55.8	57.6	51.5	51.5	53.2	55.4	51.2	51.3	56.4	57.5	51.1	51.1	54.3	56.0
11/6/10	50.9	51.0	53.9	55.7	51.8	51.9	51.7	54.8	52.1	52.2	55.3	57.0	47.6	47.6	53.8	54.7
11/7/10	52.4	52.4	70.7	70.8	51.7	51.7	53.0	55.4	50.4	50.4	53.6	55.3	46.0	46.1	52.5	53.4
11/8/10	52.5	52.6	60.3	61.0	51.9	52.0	55.1	56.8	51.0	51.2	56.2	57.4	46.0	46.3	53.1	54.0
11/9/10	51.1	51.3	55.7	57.0	52.3	52.3	54.0	56.3	51.8	52.0	56.3	57.6	49.2	49.2	53.2	54.7
11/10/10	51.3	51.4	58.3	59.1	52.8	52.9	55.3	57.2	53.2	53.3	56.4	58.1	50.5	50.5	53.0	55.0
11/11/10	52.0	52.4	56.1	57.7	52.3	52.9	54.5	56.8	51.1	51.7	56.2	57.5	46.0	46.2	52.7	53.6
11/12/10	51.7	52.1	56.2	57.6	52.2	52.2	54.8	56.7	51.1	51.2	57.6	58.5	46.2	46.3	53.7	54.5
11/13/10	48.4	48.6	55.5	56.3	48.7	48.9	54.0	55.2	46.4	46.7	55.9	56.4	42.3	42.3	51.7	52.2
11/14/10	49.8	49.9	55.9	56.8	50.7	50.7	53.9	55.6	48.8	48.8	55.1	56.0	43.5	43.6	52.3	52.8
11/15/10	51.4	51.4	57.2	58.2	51.9	51.9	54.8	56.6	51.1	51.2	56.8	57.8	46.4	46.6	53.2	54.0
11/16/10	47.1	47.2	55.6	56.2	48.1	48.1	53.9	54.9	48.1	48.1	56.7	57.3	43.3	43.3	52.8	53.3
11/17/10	43.2	45.2	54.4	54.9	43.0	44.5	52.9	53.5	44.1	45.1	55.9	56.3	41.5	41.8	52.4	52.8
11/18/10	53.3	53.4	55.7	57.7	53.4	53.4	53.2	56.3	52.4	52.5	55.7	57.4	47.1	47.2	53.0	54.0

SFO – Aircraft noise events associated with San Francisco International Airport operations.
Aircraft – Aircraft noise events associated with all airport(s) operations.
Community – Noise events not associated with aircraft operations.

Table 3. Number of Aircraft Noise Events by Hour

Hour	Site 7 - Margaret Tank	3xx Kings Road	2 Solano Road	475 Mission Blue Drive
Midnight	1	1	2	1
1:00 a.m.	2	2	1	1
2:00 a.m.	1	1	1	1
3:00 a.m.	**0**	**0**	**0**	**0**
4:00 a.m.	**0**	**0**	**0**	**0**
5:00 a.m.	**0**	1	1	1
6:00 a.m.	55	72	57	26
7:00 a.m.	65	74	76	49
8:00 a.m.	35	36	39	23
9:00 a.m.	67	71	81	46
10:00 a.m.	50	64	86	51
11:00 a.m.	61	71	124	54
Noon	75	94	119	71
1:00 p.m.	53	55	75	49
2:00 p.m.	33	40	51	32
3:00 p.m.	53	54	57	37
4:00 p.m.	78	76	103	62
5:00 p.m.	59	65	81	47
6:00 p.m.	73	84	74	49
7:00 p.m.	54	81	82	56
8:00 p.m.	73	76	74	64
9:00 p.m.	68	53	48	43
10:00 p.m.	23	28	25	14
11:00 p.m.	22	28	22	9

Table 4. Average Amount of Aircraft Noise Events by Day, Evening and Night Hours

	Site 7 - Margaret Tank	3xx Kings Road	2 Solano Street	475 Mission Blue Drive
Day [1]	59	65	81	48
Evening [2]	65	70	68	54
Night [3]	12	15	12	6

[1] 7:00 a.m. to 6:59 p.m
[2] 7:00 p.m. to 9:59 p.m.
[3] 10:00 p.m. to 6:59 a.m.

7. Top 3 Noise Contributors

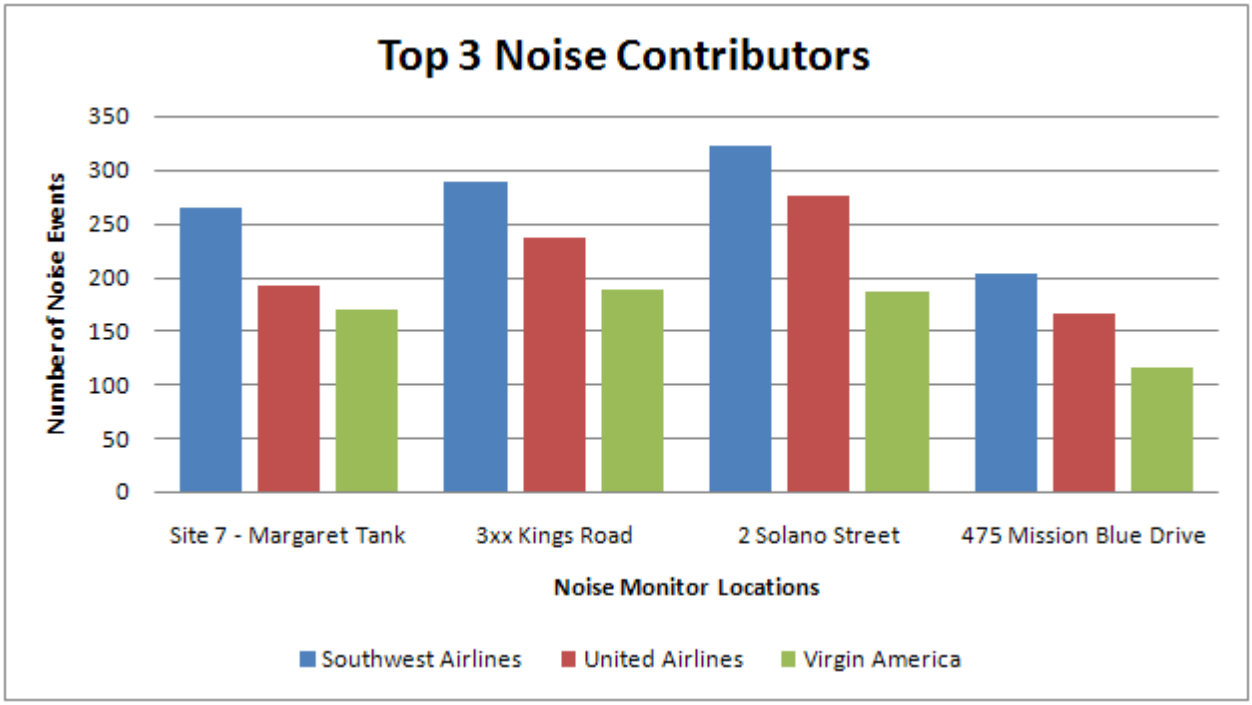
Correlated community complaints and Aircraft Noise Events to aircraft overflights during this survey were evaluated. There were 249 correlated complaints to aircraft overflights. United Airlines received 54 complaints (22%), followed by Virgin America which received 42 complaints (17%) and Southwest Airlines received 37 complaints (15%). These airlines were also identified as the top three contributors for noise events. During this measurement period Southwest Airlines registered 1,078 noise events, United Airlines had 869 noise events and Virgin America recorded 659 events. The "2 Solano Street" location had the most aircraft noise events from these operators with at total of 785 noise events. The least amount of noise events was at "475 Mission Blue Drive" with 483 events. Tables 5 summarize the data analyzed.

Table 5. Correlated Complaints and Top 3 Noise Contributors by Locations

Correlated Complaints: 249 Total

Airline	Number of Complaints	Percent
United Airlines	54	22%
Virgin America	42	17%
Southwest	37	15%

Airlines	Site 7 - Margaret Tank	3xx Kings Road	2 Solano Street	475 Mission Blue Drive
Southwest Airlines	265	288	323	202
United Airlines	191	236	276	166
Virgin America	170	188	186	115



8. Aircraft Type

Aircraft types operated by the top three contributors were also evaluated. While both United Airlines and Virgin America operate Airbus A319 and A320 aircraft, altitude measurements during this survey indicate Virgin America consistently operated lower than their counterpart. On average, the Airbus A319 aircraft was 540 feet lower and the Airbus A320 aircraft was 450 feet lower across Brisbane. Factors that may contribute to this difference could be airlines' operation procedure of aircraft, aircraft departure weight and other aircraft traffic. Please refer to Appendix IV for Altitude versus Sound Exposure Level charts. Table 6 summarizes the data analyzed.

Table 6. Airbus A319 and A320 Average Altitude

Site 7 - Margaret Tank

			Altitude (feet)			Average Altitude
Aircraft Type	**Airline**	**Amount**	**Minimum**	**Average**	**Maximum**	**Delta**
Airbus A319	United Airlines	34	2,530	3,501	4,534	
Airbus A319	Virgin America	48	2,362	3,116	3,973	**-385**
Airbus A320	United Airlines	82	1,644	3,206	5,095	
Airbus A320	Virgin America	122	1,657	2,797	3,793	**-409**

3xx Kings Road

			Altitude (feet)			Average Altitude
Aircraft Type	**Airline**	**Amount**	**Minimum**	**Average**	**Maximum**	**Delta**
Airbus A319	United Airlines	43	2,858	3,869	6,122	
Airbus A319	Virgin America	55	2,526	3,363	4,590	**-506**
Airbus A320	United Airlines	97	2,418	3,493	5,276	
Airbus A320	Virgin America	133	2,198	3,034	3,973	**-459**

2 Solano Street

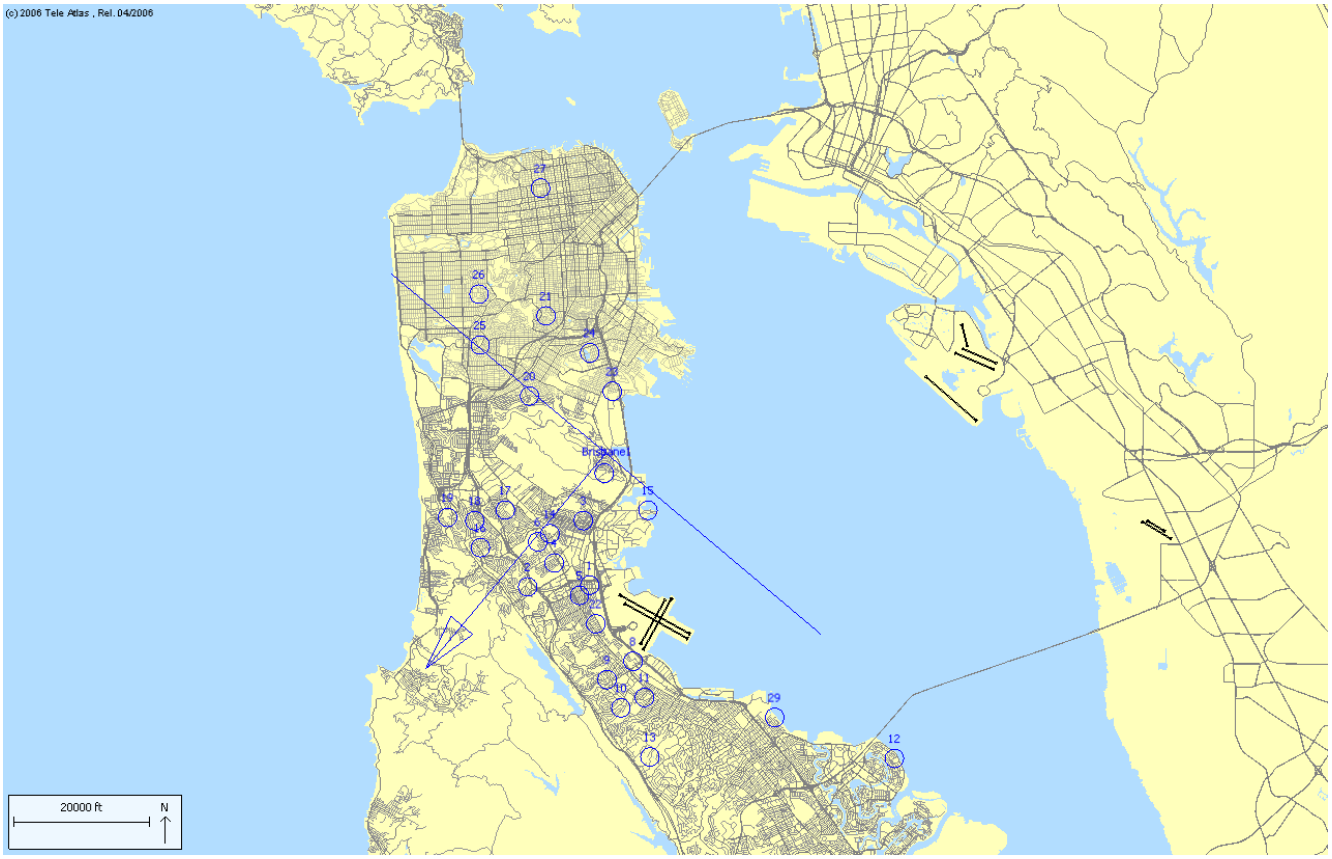
			Altitude (feet)			Average Altitude
Aircraft Type	**Airline**	**Amount**	**Minimum**	**Average**	**Maximum**	**Delta**
Airbus A319	United Airlines	37	3,182	4,291	5,331	
Airbus A319	Virgin America	50	2,484	3,629	4,882	**-662**
Airbus A320	United Airlines	120	2,136	3,869	5,568	
Airbus A320	Virgin America	136	2,651	3,400	4,623	**-469**

475 Mission Blue Drive

			Altitude (feet)			Average Altitude
Aircraft Type	**Airline**	**Amount**	**Minimum**	**Average**	**Maximum**	**Delta**
Airbus A319	United Airlines	18	3,497	4,582	5,692	
Airbus A319	Virgin America	26	3,274	3,969	5,036	**-613**
Airbus A320	United Airlines	76	2,769	4,100	5,427	
Airbus A320	Virgin America	89	2,759	3,639	4,790	**-461**

9. Flight Track Analysis Gates

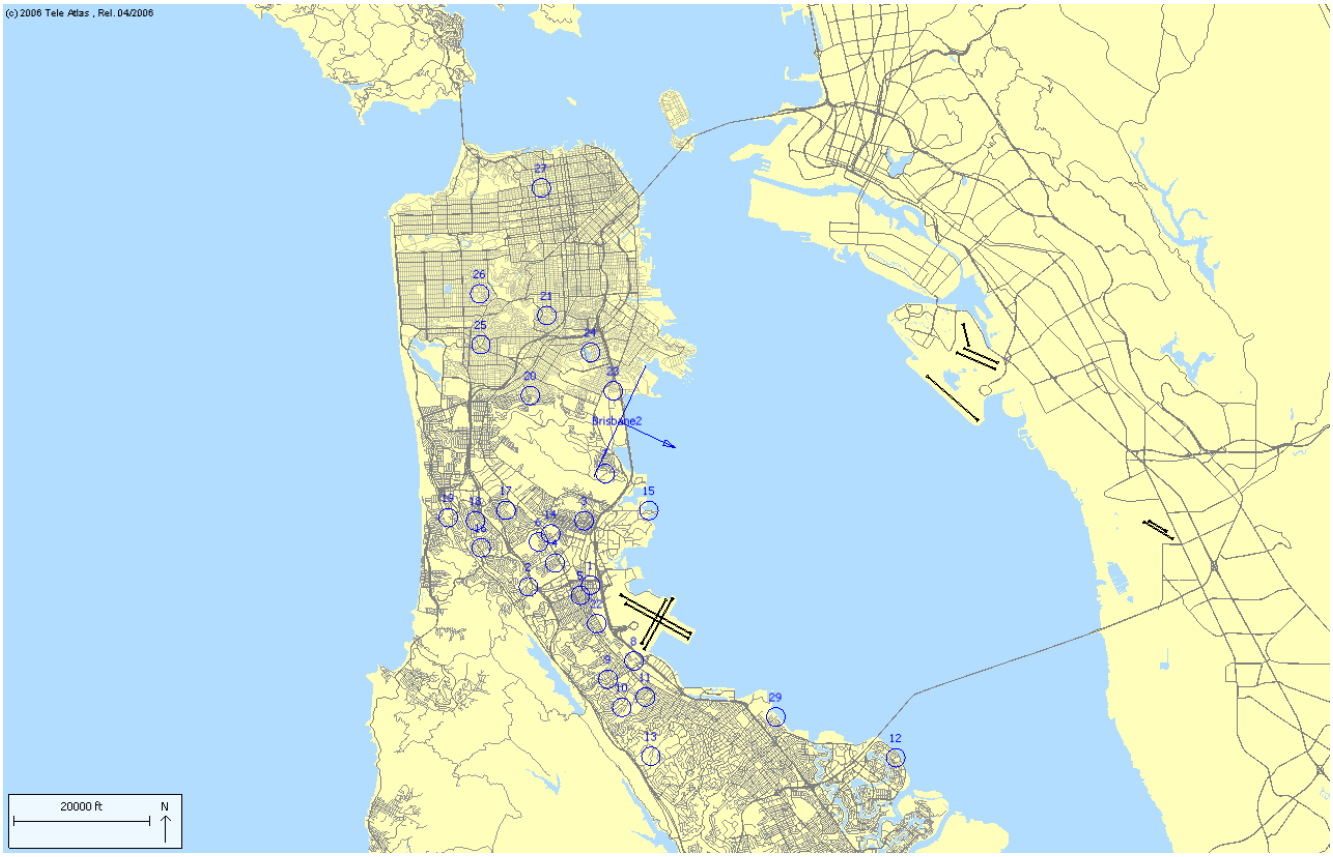
Three flight track analysis gates were used to identify, select and evaluate aircraft operations over the city of Brisbane for the identified West Plan days. Brisbane1 gate, depicted below measured OAK Departures. Table 7 details average aircraft altitudes at the gate and the amount of overflights. (see Appendix V for aircraft altitude versus center deviation for these analysis gates).



Brisbane 1 Gate Location (above) and Table 7 (below)

Average Aircraft Altitude of Oakland Departures (feet)											
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
March	8,580	8,513	8,792	9,009	8,347	8,657	9,372	8,955	9,692	9,638	9,626
June	8,026	8,381	8,322	8,320	8,094	8,576	8,430	8,804	8,864	9,704	9,479
September	8,460	8,355	8,539	8,305	8,087	8,913	8,727	8,643	9,273	9,291	9,369
November	8,807	8,924	8,382	8,894	8,445	8,595	9,207	9,055	9,406	9,287	9,259
Average	8,468	8,543	8,509	8,632	8,243	8,685	8,934	8,864	9,309	9,480	9,433
Average Amount of Aircraft											
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
March	767	803	749	841	901	1007	581	975	1002	692	645
June	808	853	936	786	270	860	975	527	851	644	688
September	787	830	908	800	882	1015	934	1018	788	605	603
November	748	815	889	820	954	969	958	973	681	639	607
Average	778	825	871	812	752	963	862	873	831	645	636

Brisbane2 gate measured SFO Arrivals from Pt. Reyes to Runways 28L and 28R. The location of this gate is shown below. Table 8 details average aircraft altitudes at the gate and the amount of overflights.

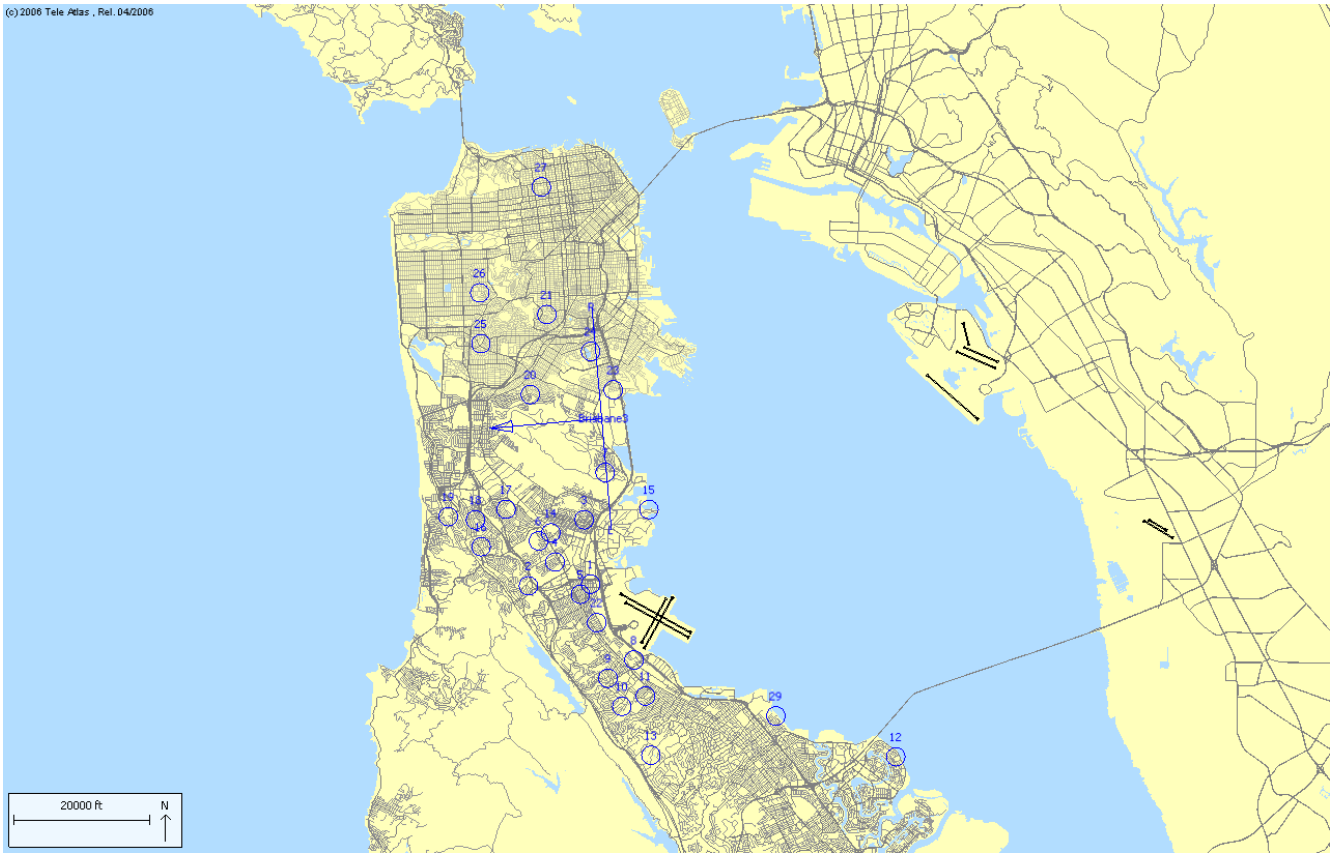


Brisbane 2 Gate

Average Aircraft Altitudes to Runways 28L and 28R (feet)											
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Mar	10,493	10,577	10,430	10,568	10,626	10,416	10,452	10,458	10,548	10,595	10,570
Jun	10,567	10,642	10,563	10,558	10,663	10,425	10,451	10,505	10,523	10,591	10,580
Sep	10,530	10,556	10,543	10,522	10,365	10,479	10,461	10,435	10,521	10,506	10,575
Nov	10,543	10,571	10,476	10,558	10,473	10,375	10,479	10,556	10,531	10,540	10,542
Avg	10,533	10,586	10,503	10,551	10,532	10,424	10,461	10,489	10,531	10,558	10,567
Average Amount of Aircraft											
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Mar	62	59	38	60	80	63	62	73	74	48	60
Jun	52	68	53	56	66	58	53	56	49	40	56
Sep	44	65	64	57	85	58	64	58	60	54	46
Nov	60	56	55	78	62	57	62	65	30	58	66
Avg	54	62	52	63	73	59	60	63	53	50	57

Table 8. Average Aircraft Altitudes and Amount of Over Flights

Brisbane3 gate measured SFO Departures from Runways 01L and 01R. The location of this gate is shown below. Table 9 details average aircraft altitudes at the gate and the amount of overflights.



Brisbane 3 Gate

Average Aircraft Altitude of SFO Runways 01L and 01R Departures (feet)											
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
March	4,397	4,333	4,258	4,433	4,337	4,246	4,331	4,474	4,656	4,555	4,623
June	4,090	4,229	4,297	4,220	4,138	4,182	4,176	4,272	4,248	4,449	4,520
September	4,185	4,123	4,298	4,338	4,019	4,337	4,211	4,308	4,226	4,227	4,386
November	4,393	4,428	4,297	4,429	4,399	4,183	4,452	4,556	4,459	4,521	4,622
Average	4,266	4,278	4,288	4,355	4,223	4,237	4,292	4,402	4,397	4,438	4,538
Average Amount of Aircraft											
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
March	1149	810	553	760	775	814	519	967	1179	1123	1204
June	1113	863	785	540	173	587	788	472	1076	1259	1121
September	980	947	812	593	706	786	871	1036	1170	1185	1070
November	972	714	727	683	852	838	870	1101	1092	1111	1176
Average	1054	834	719	644	627	756	762	894	1129	1170	1143

Table 9. Average Aircraft Altitudes and Amount of Over Flights

APPENDIX I

Identified West Plan Days

Typical West Flow Day = "X"
Departures: Runways 01L/R and 28L/R, with very few or minimal Shoreline Departures off of Runways 28L/R
Arrivals: Runways 28L/R

March	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1											
2											
3											
4											
5											
6											
7											
8				X							
9				X					X		
10			X	X		X		X		X	
11			X	X		X			X	X	
12			X	X		X				X	
13						X			X		
14					X			X	X	X	X
15					X	X		X			X
16		X			X	X		X	X		X
17	X	X			X	X		X		X	X
18	X	X	X		X			X		X	X
19		X	X		X		X		X		X
20		X	X		X					X	X
21	X	X	X	X				X	X		
22	X	X		X			X				
23	X						X				
24	X										
25	X										
26							X				
27											
28											
29											
30											
31											
Number of Days Sampled	7	7	7	7	7	7	4	7	7	7	7

APPENDIX I

Identified West Plan Days

Typical West Flow Day = "X"
Departures: Runways 01L/R and 28L/R, with very few or minimal Shoreline Departures off of Runways 28L/R
Arrivals: Runways 28L/R

June	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1											
2			X	X			X	X			X
3				X							X
4			X	X				X		X	X
5										X	
6		X								X	
7		X								X	
8	X					X				X	
9	X	X								X	
10			X				X			X	
11			X	X			X				
12			X	X					X		
13	X	X	X								X
14	X	X									
15	X	X			X				X		
16	X	X						X	X		X
17	X							X			
18											
19									X		
20			X		X	X	X		X		
21							X				
22						X	X				
23									X		
24							X		X		X
25											X
26						X					
27				X		X					
28											
29											
30						X					
Number of Days Sampled	7	7	7	6	2	6	7	4	7	7	7

APPENDIX I

Identified West Plan Days

Typical West Flow Day = "X"
Departures: Runways 01L/R and 28L/R, with very few or minimal Shoreline Departures off of Runways 28L/R
Arrivals: Runways 28L/R

September	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1		X					X			X	
2		X	X							X	
3		X			X		X		X		
4		X	X		X				X		
5					X			X	X		
6		X	X	X	X			X			
7		X	X	X	X	X	X				
8			X					X	X	X	
9	X		X	X	X	X	X	X		X	
10	X	X	X	X	X		X	X	X	X	
11	X			X		X	X			X	
12	X			X		X			X	X	X
13				X		X			X		X
14	X					X					X
15	X					X					X
16	X						X				X
17								X			X
18											X
19											
20											
21											
22											
23								X			
24											
25											
26											
27											
28											
29											
30											
Number of Days Sampled	7	7	7	7	7	7	7	7	7	7	7

APPENDIX I

Identified West Plan Days

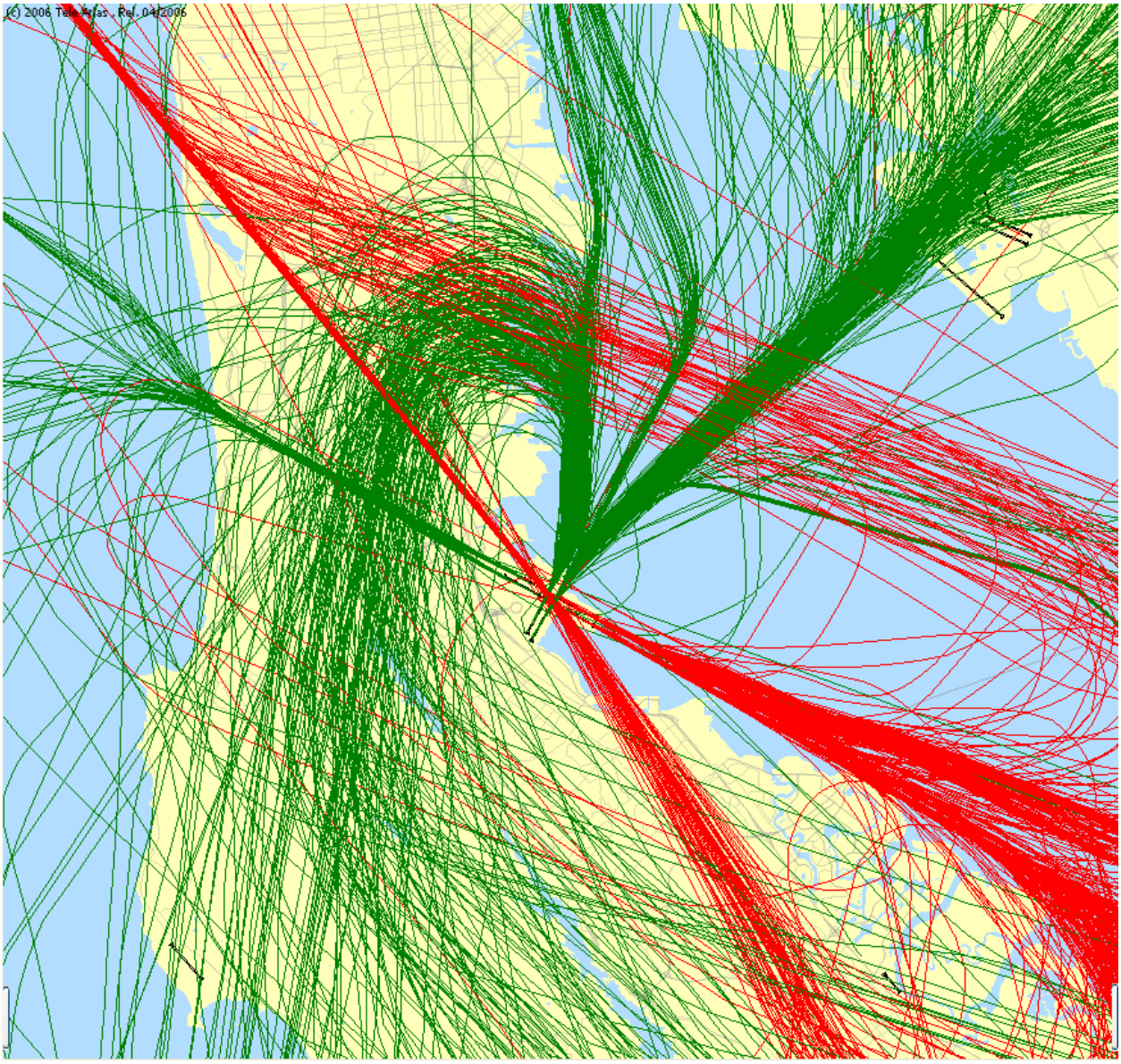
Typical West Flow Day = "X"
Departures: Runways 01L/R and 28L/R, with very few or minimal Shoreline Departures off of Runways 28L/R
Arrivals: Runways 28L/R

November	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											X
14											X
15											X
16		X									X
17		X				X					X
18		X			X	X	X				X
19	X			X	X	X	X				
20	X	X				X	X	X			
21	X					X	X	X		X	
22	X		X	X	X	X		X		X	X
23	X	X	X	X	X	X	X	X	X	X	
24	X		X	X	X		X	X	X	X	
25	X	X	X		X		X	X	X	X	
26		X		X	X			X	X	X	
27				X					X		
28			X	X					X		
29			X						X	X	
30			X								
Number of Days Sampled	7	7	7	7	7	7	7	7	7	7	7

APPENDIX II

Weather Conditions and Runway Use

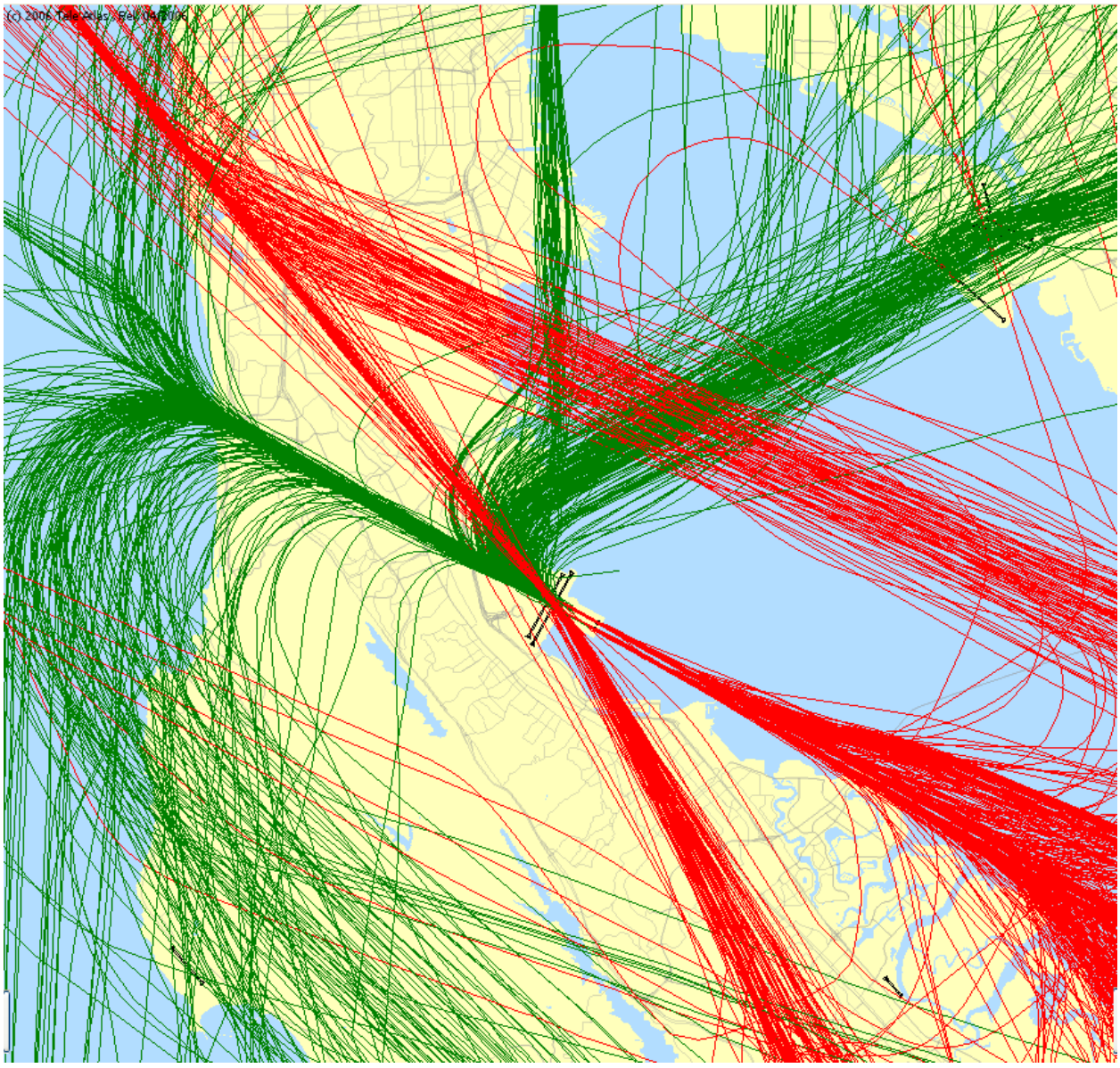
28/01 Runway Configuration – 28L/R Arrivals (Red), 01L/R Departures (Green)
Date: 12/2/10



APPENDIX II

Weather Conditions and Runway Use

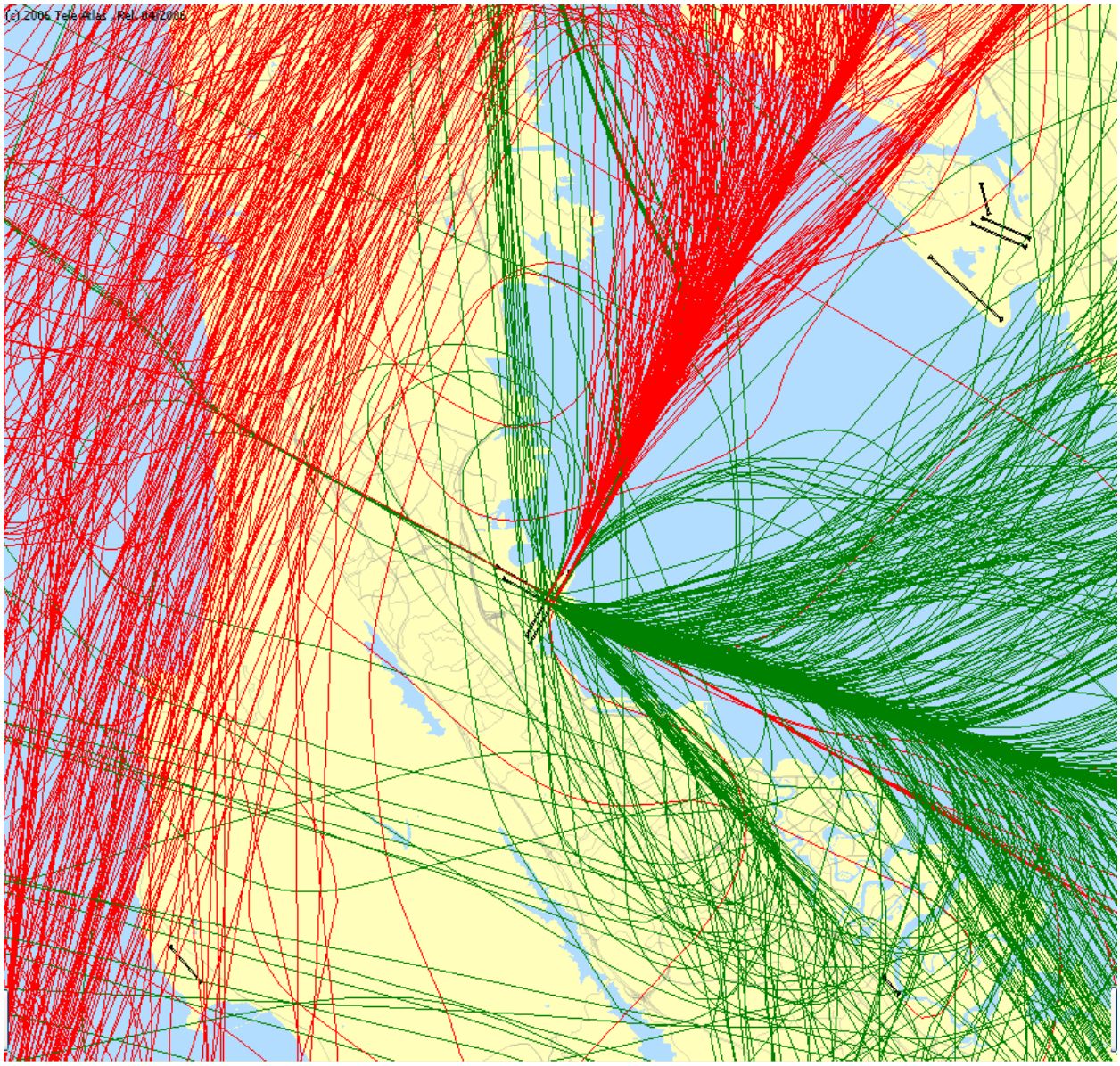
28/28 Runway Configuration – 28L/R Arrivals (Red), 28L/R Departures (Green)
Date: 11/23/10



APPENDIX II

Weather Conditions and Runway Use

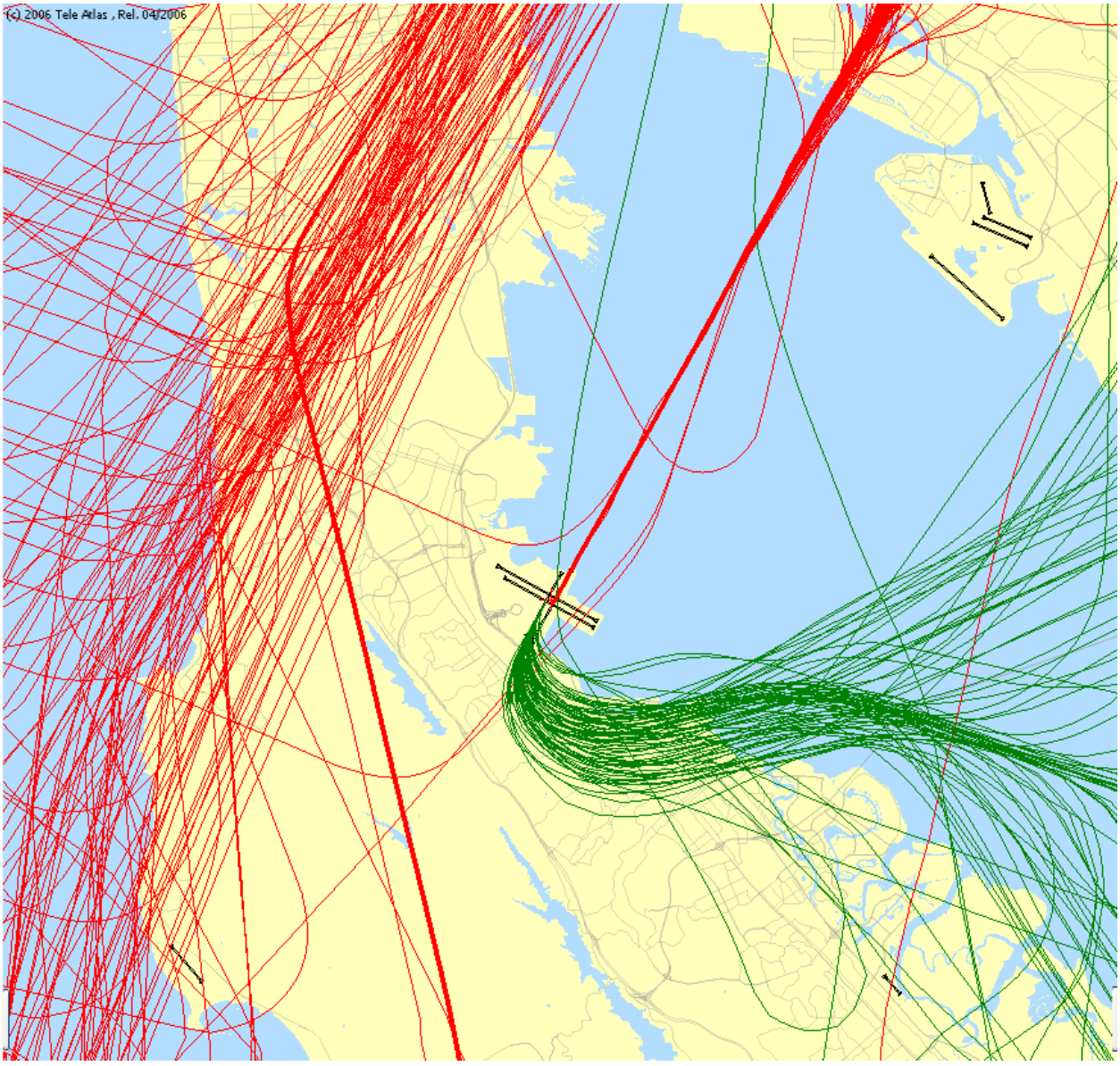
19/10 Runway Configuration – 19L/R Arrivals (Red), 10L/R Departures (Green)
Date: 12/5/10



APPENDIX II

Weather Conditions and Runway Use

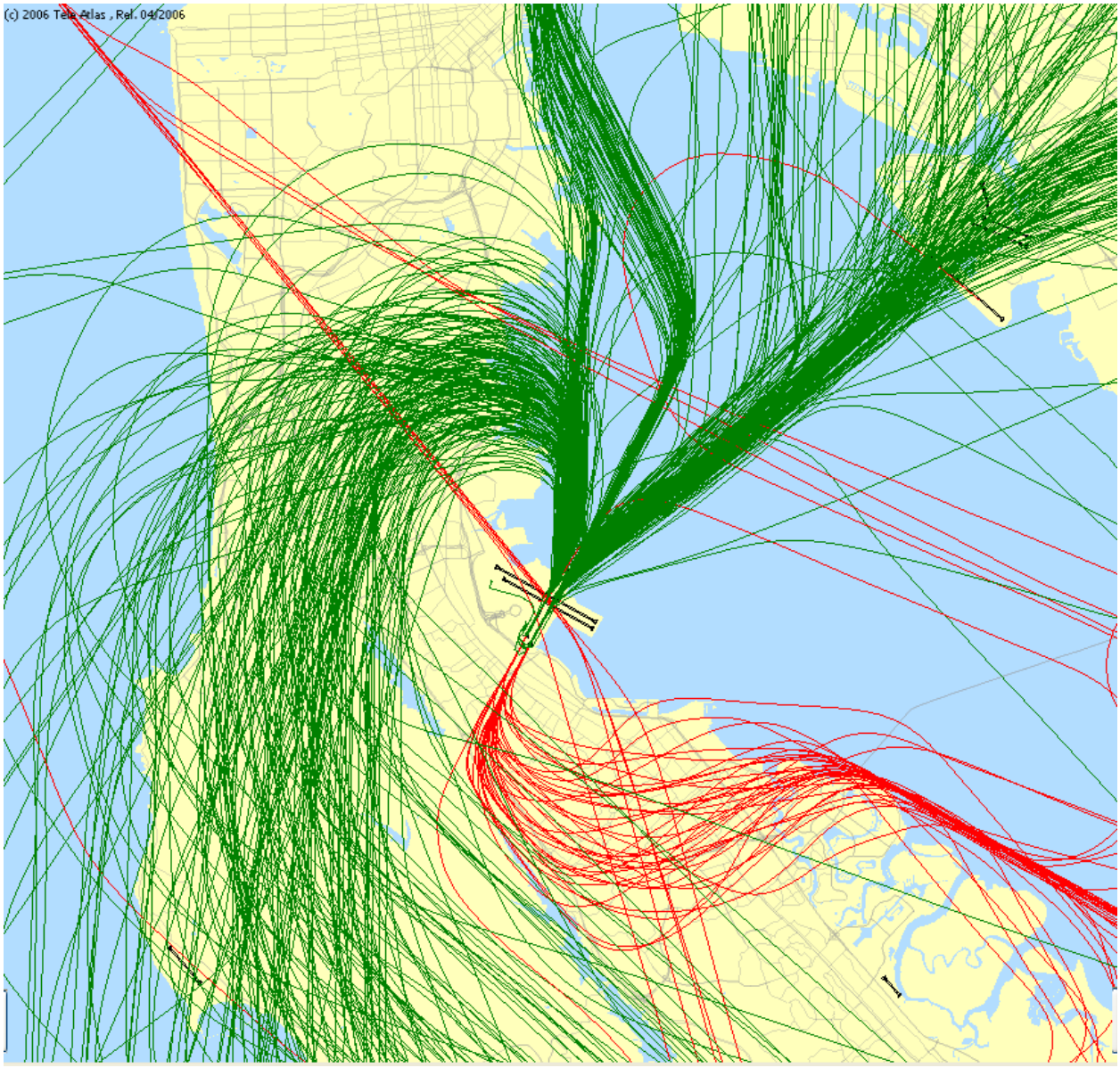
19/19 Runway Configuration – 19L/R Arrivals (Red), 19L/R Departures (Green)
Date: 10/24/10



APPENDIX II

Weather Conditions and Runway Use

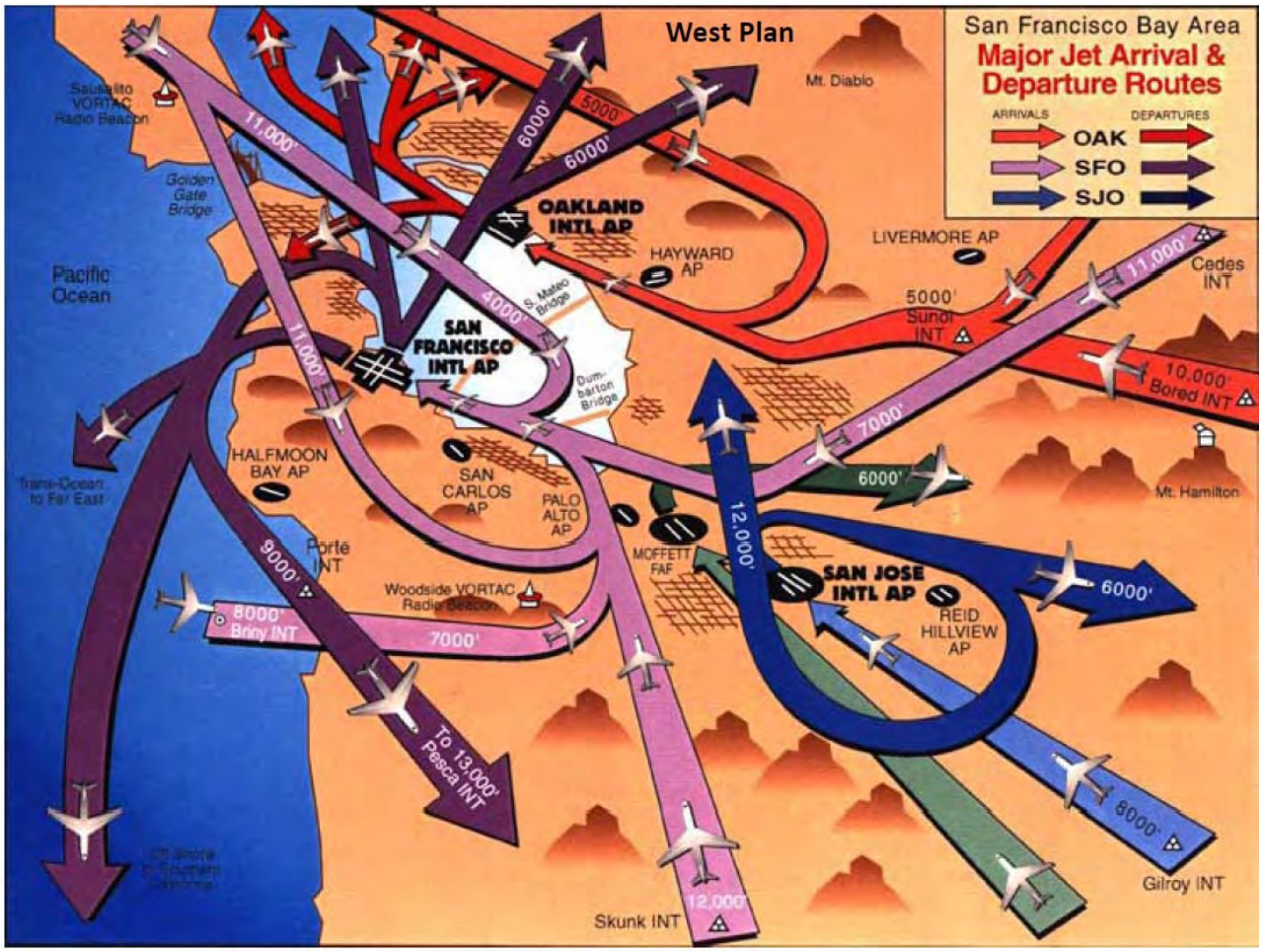
01/01 Runway Configuration – 01L/R Arrivals (Red), 01L/R Departures (Green)
Date: 11/28/09



APPENDIX II

Weather Conditions and Runway Use

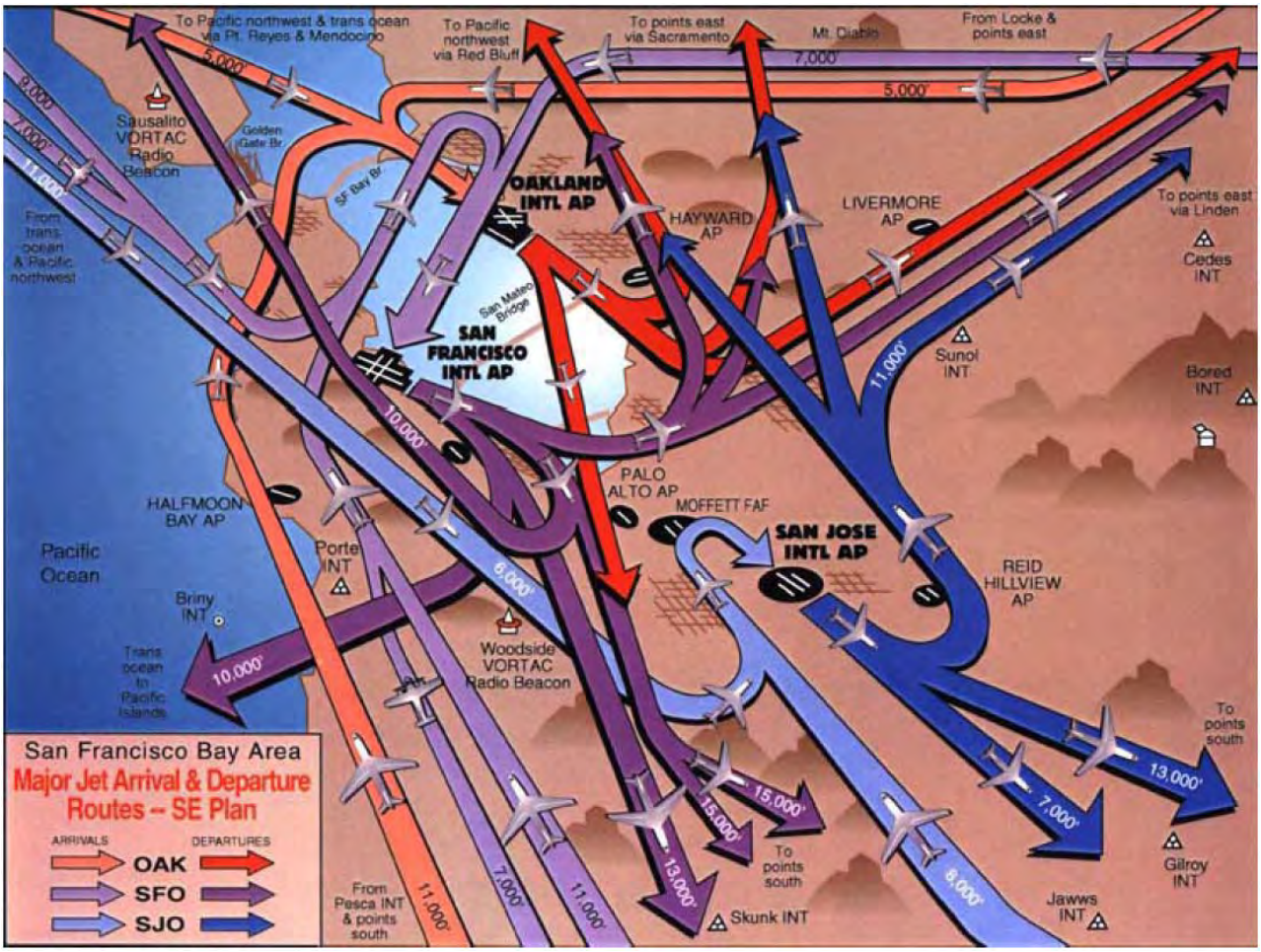
West Plan



APPENDIX II

Weather Conditions and Runway Use

Southeast Plan

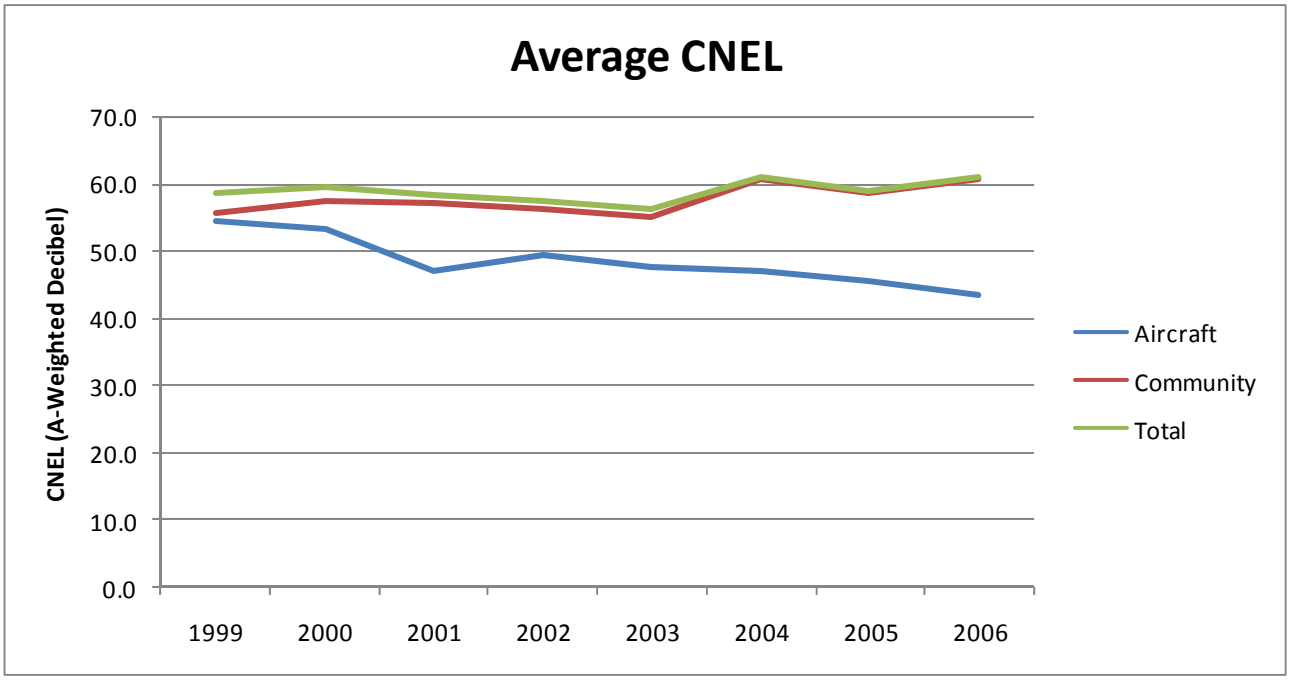


APPENDIX III

Historical Noise Levels in Brisbane 1/1/1999 – 9/12/2006 and Current Levels

Average Daily Community Noise Equivalent Level
Period: January 1, 1999 through September 12, 2006

	Original Community Noise Monitor Site (461 Kings Road)								
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	Average
Aircraft	54.5	53.4	47.0	49.3	47.6	47.1	45.5	43.4	48.5
Community	55.5	57.3	57.2	56.1	55.0	60.5	58.5	60.7	57.6
Total	58.5	59.4	58.2	57.4	56.3	60.9	59.0	60.9	58.8

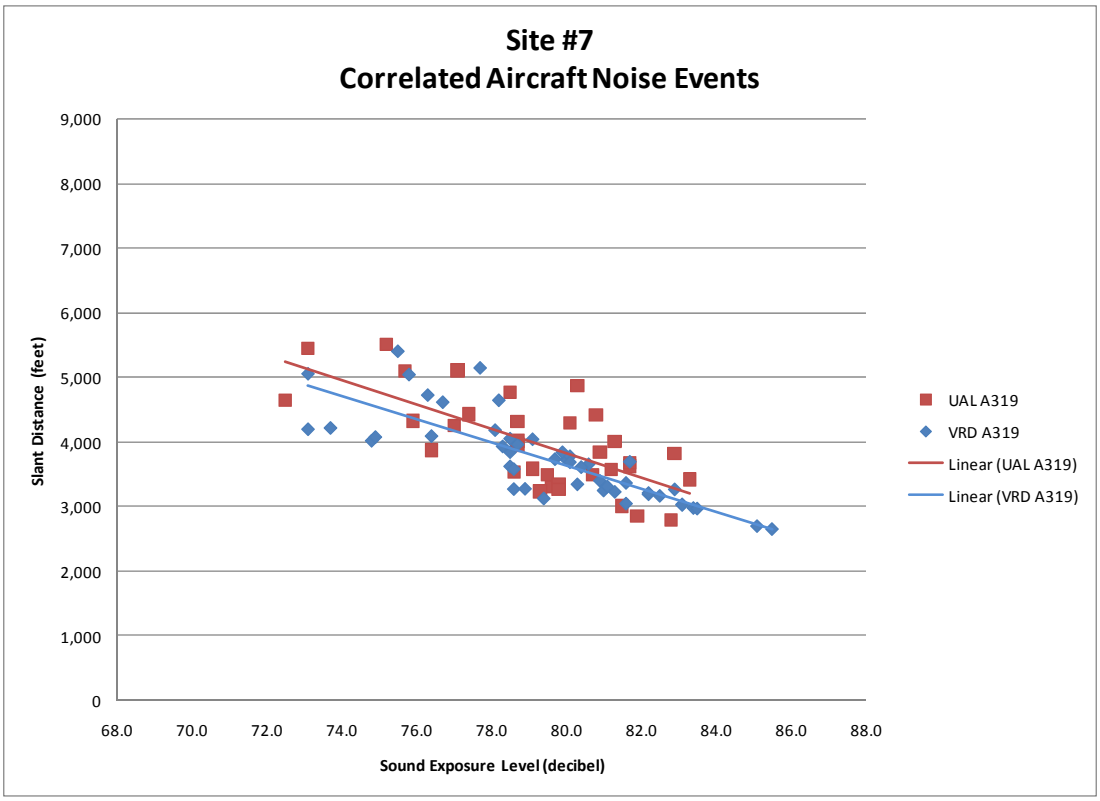


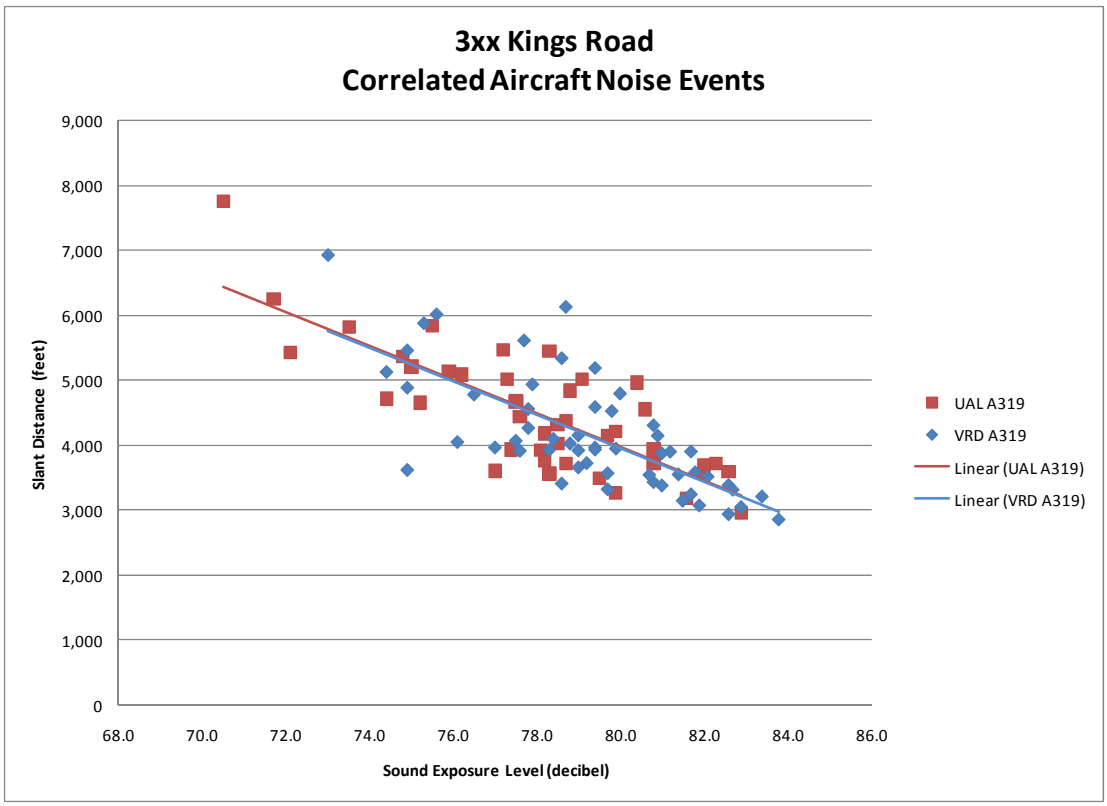
Site #7 – Margaret Tank
Average Daily CNEL
Period: February 2, 2009 through December 5, 2010

2009	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Aircraft	**N/A**	47.8	55.4	56.6	54.8	44.2	50.5	52.0	51.2	52.4	52.6	49.9
SFO Aircraft	**N/A**	45.4	54.6	55.7	54.0	43.9	50.1	51.3	50.7	52.1	52.4	49.6
Community	**N/A**	62.4	64.2	66.0	63.9	55.1	60.9	61.9	62.4	62.5	61.6	61.1
Total	**N/A**	63.0	65.0	66.5	64.5	55.9	61.3	62.4	62.8	63.1	62.2	61.8
2010	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Aircraft	46.3	51.4	53.1	50.1	52.9	53.6	51.4	56.3	54.9	47.9	51.5	48.1
SFO Aircraft	44.9	51.2	52.9	49.8	52.5	52.7	51.2	55.9	54.1	47.8	51.4	48.1
Community	61.0	60.6	61.3	61.3	62.6	64.2	61.7	66.2	64.2	56.4	57.1	55.6
Total	61.6	61.3	62.0	61.9	63.2	64.6	62.2	66.7	64.8	57.4	58.5	56.5

APPENDIX IV

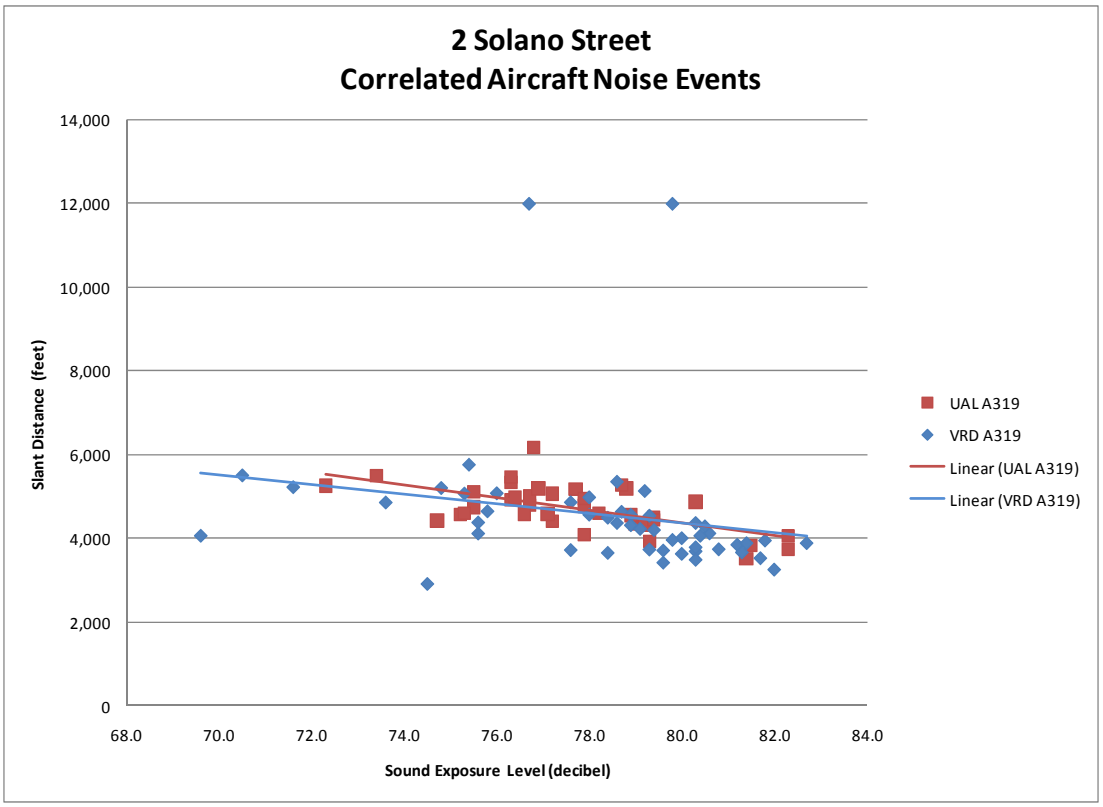
Airbus A319 and A320 Aircraft Altitude versus Sound Exposure Level

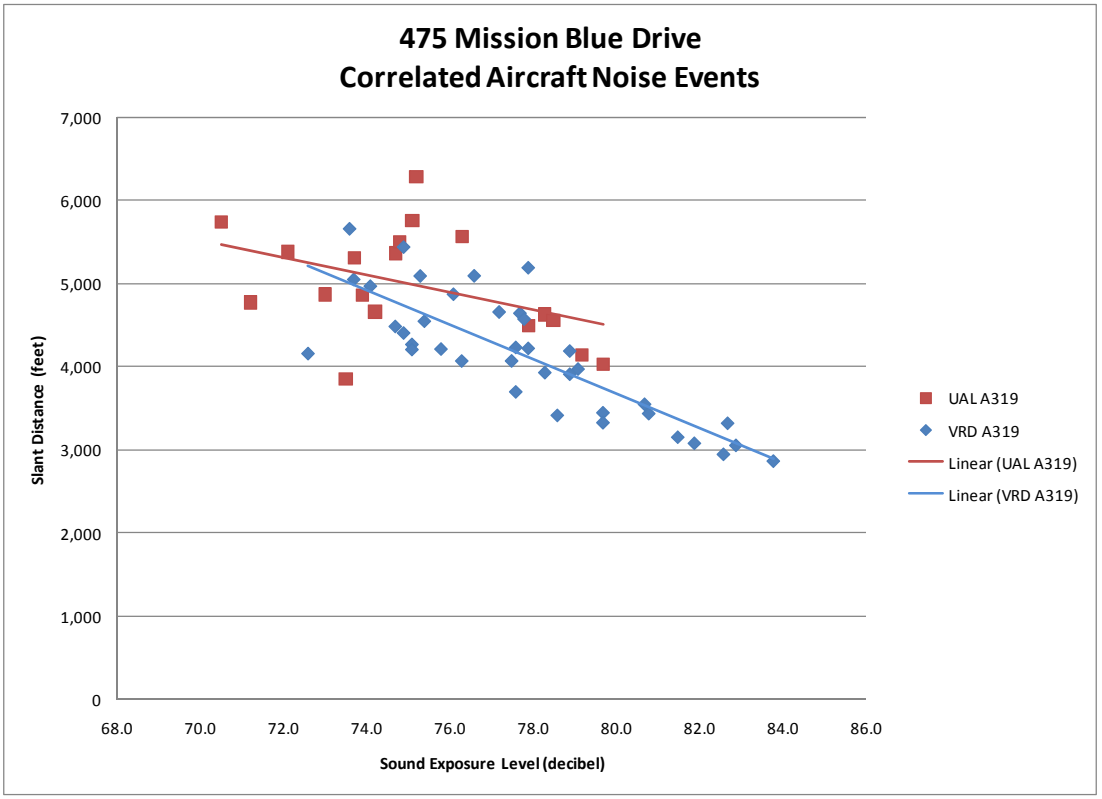




APPENDIX IV

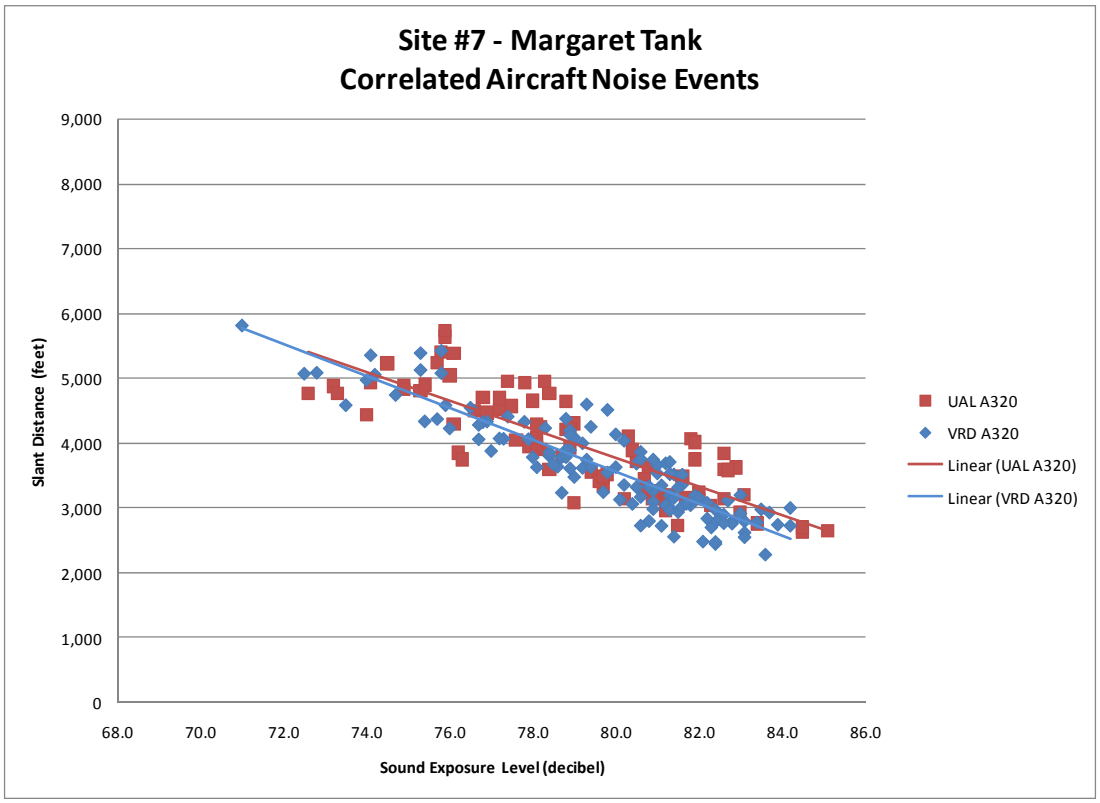
Airbus A319 and A320 Aircraft Altitude versus Sound Exposure Level

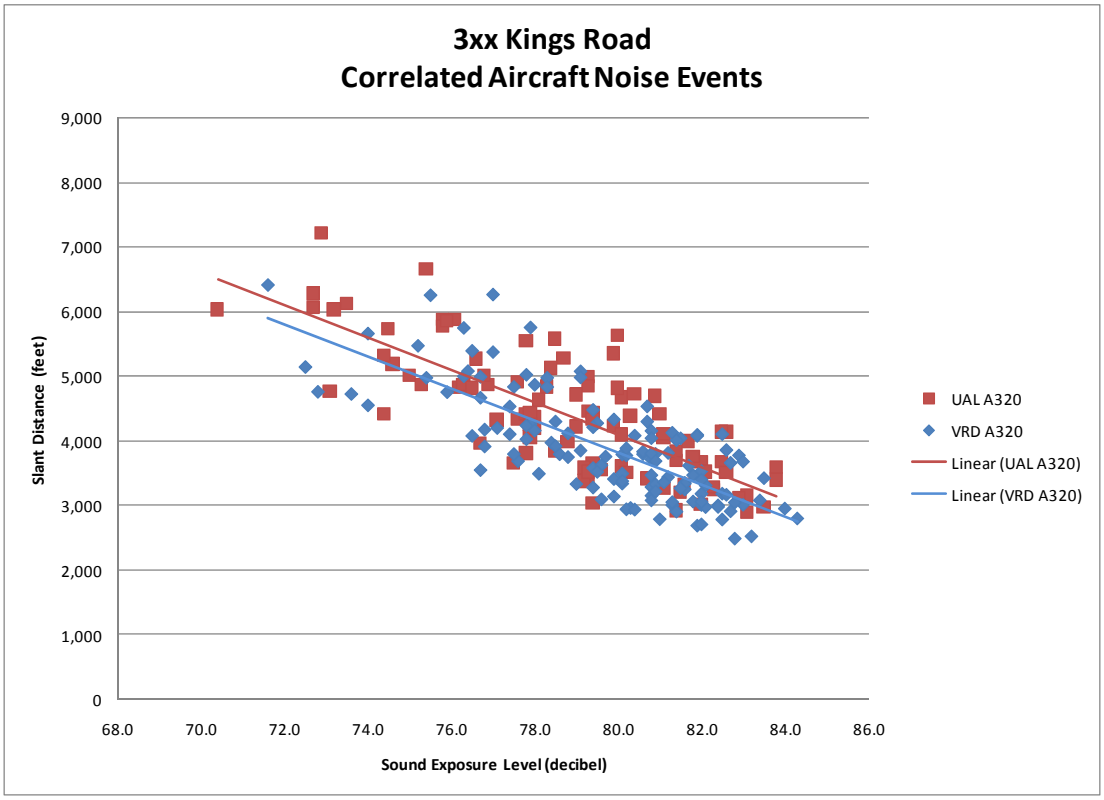




APPENDIX IV

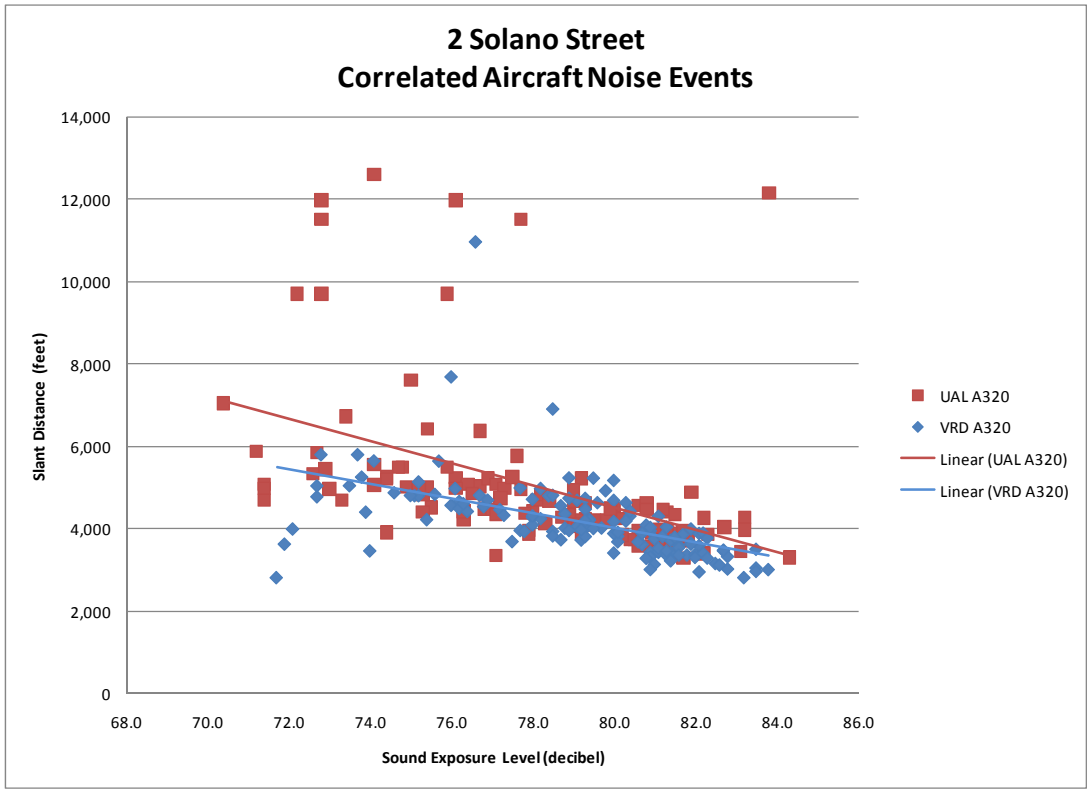
Airbus A319 and A320 Aircraft Altitude versus Sound Exposure Level

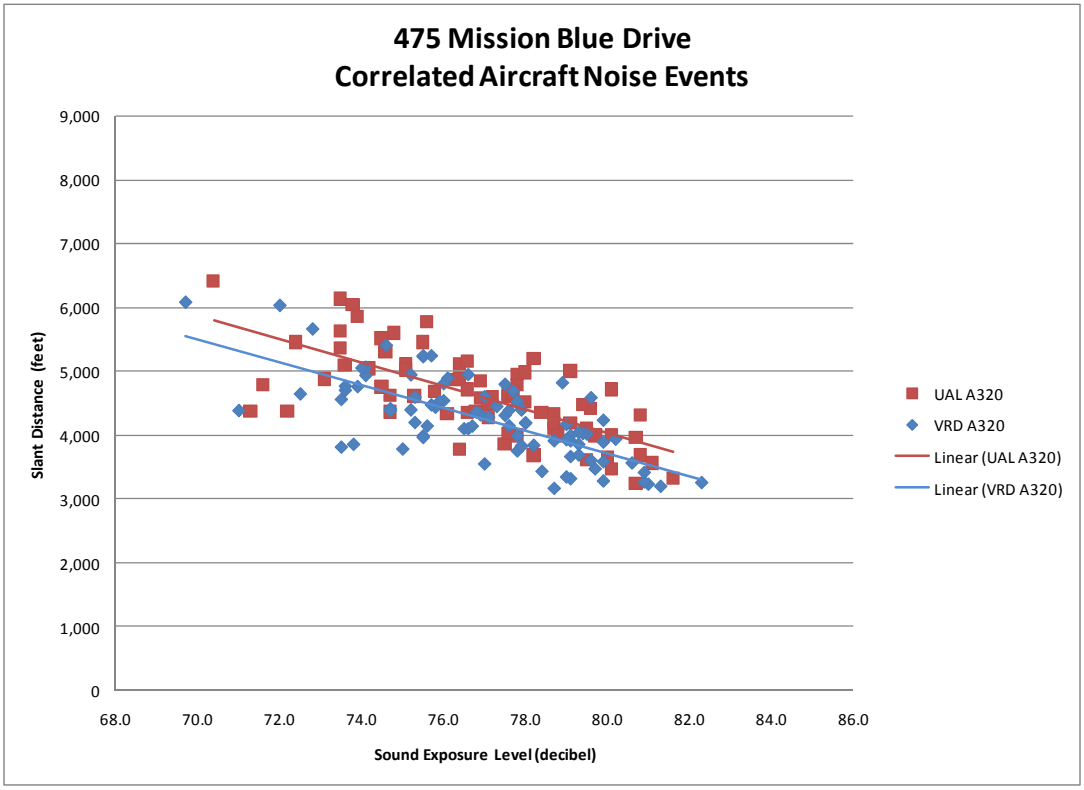




APPENDIX IV

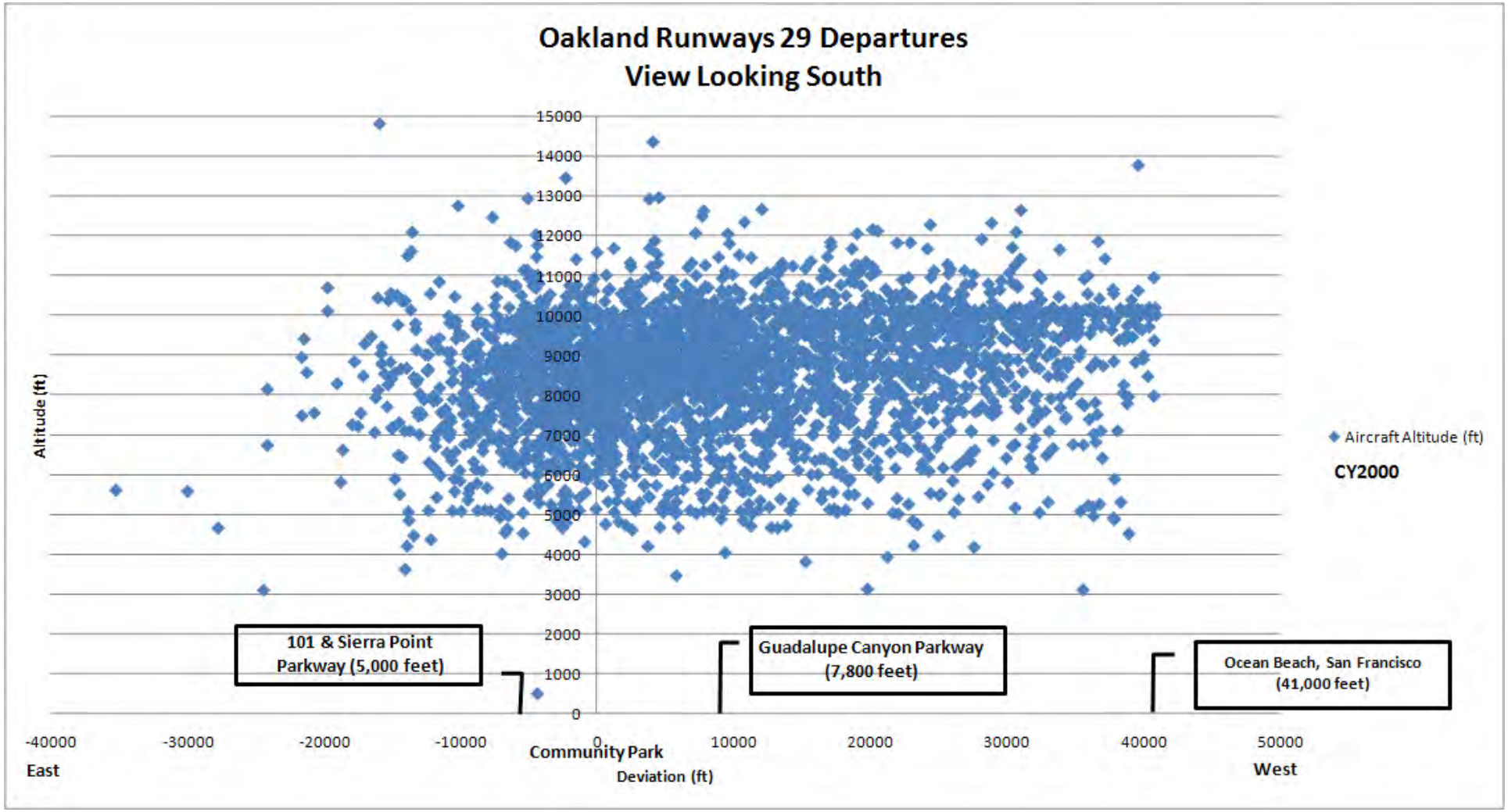
Airbus A319 and A320 Aircraft Altitude versus Sound Exposure Level





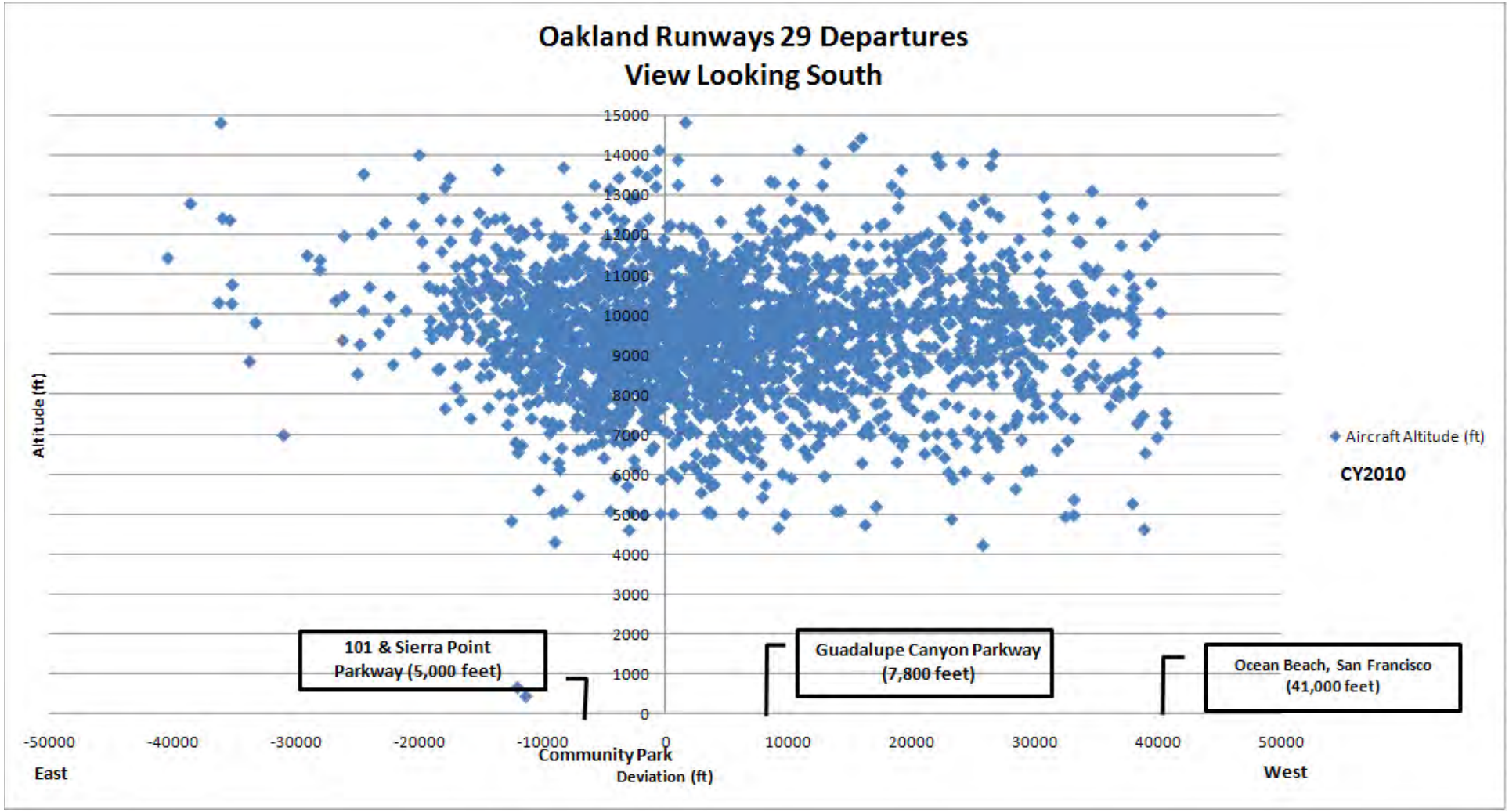
APPENDIX IV

Brisbane1 - Analysis Gate Penetration View



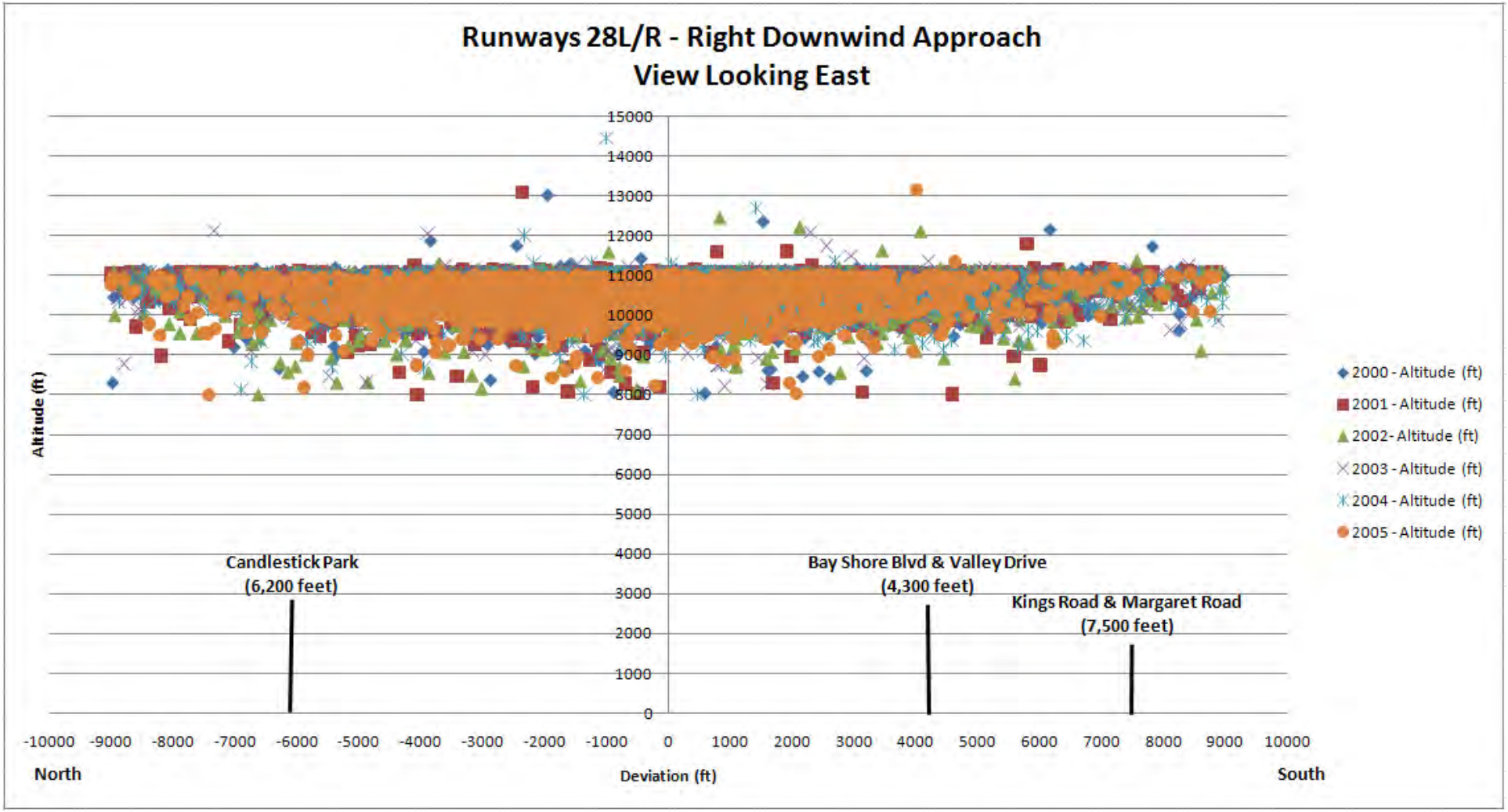
APPENDIX IV

Brisbane1 - Analysis Gate Penetration View



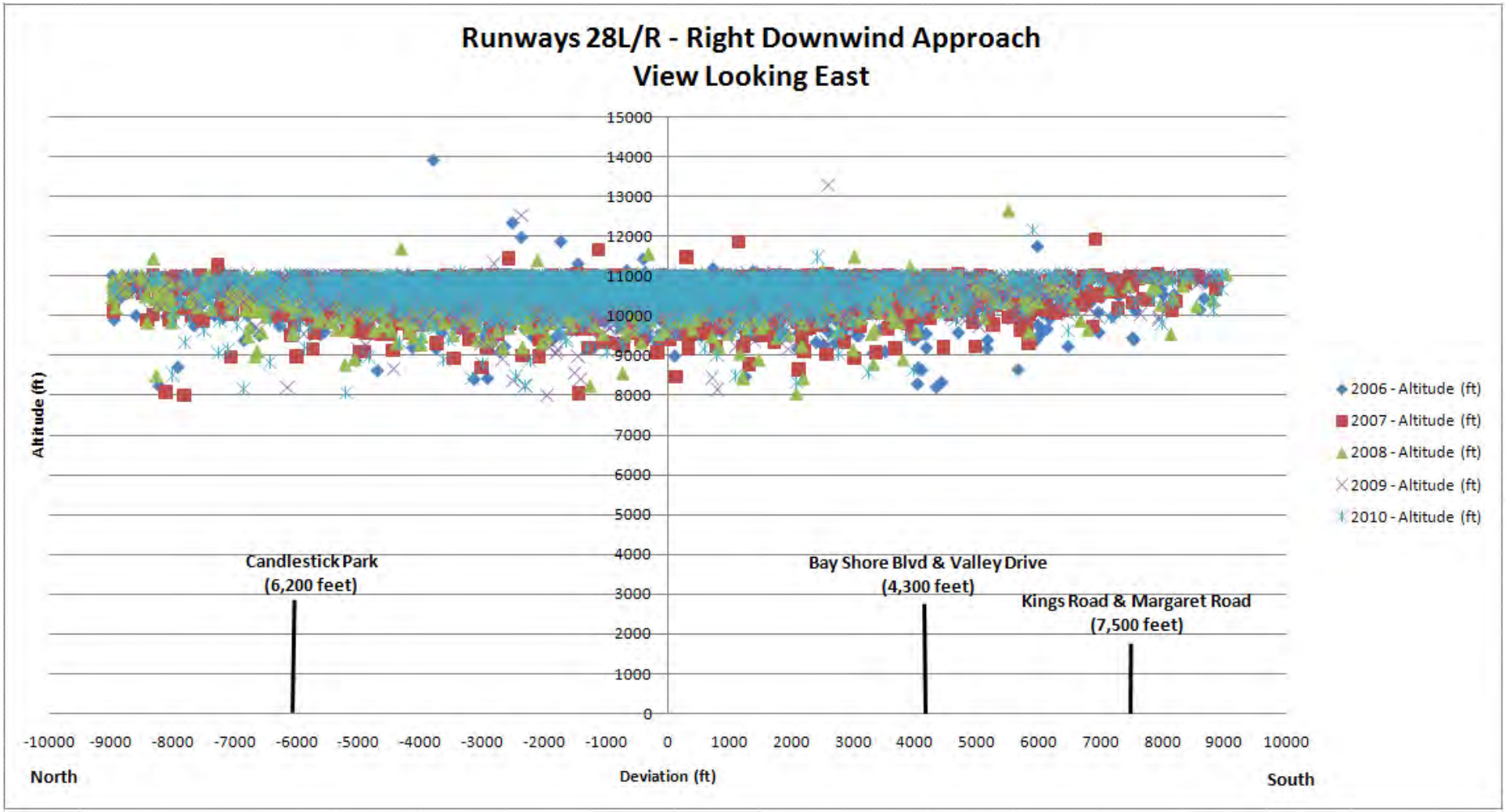
APPENDIX IV

Brisbane2 - Analysis Gate Penetration View



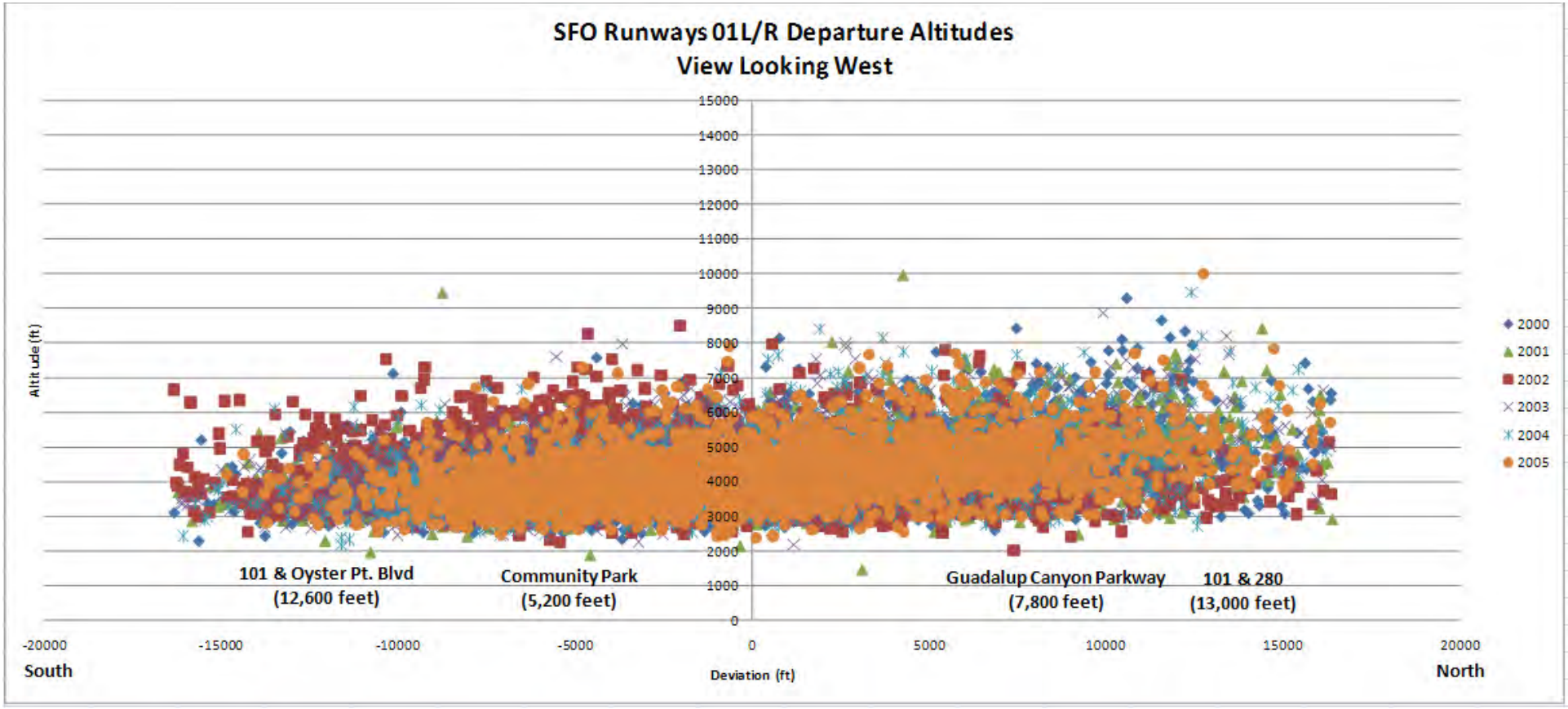
APPENDIX IV

Brisbane2 - Analysis Gate Penetration View



APPENDIX IV

Brisbane3 - Analysis Gate Penetration View



APPENDIX IV

Brisbane3 - Analysis Gate Penetration View