Short Term Aircraft Noise Monitoring

Brisbane

Prepared for the Mission Blue Drive Neighborhood
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The San Francisco International Airport (SFO) Noise Abatement Office conducted short term noise monitoring in Brisbane at the request of the city of Brisbane, to determine the noise level within the neighborhood from aircraft operations at SFO. The equipment used to measure the sound level was an Environmental Monitor Unit 2200 noise monitor and Type 41DM-2 microphone manufactured by Bruel & Kjaer. The measurements consisted of monitoring the A-weighted decibels (dBA) 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 microphone was calibrated prior to the start of the measurement. The monitor was housed in a weatherproof case and powered by a standard exterior electrical wall outlet. The microphone was mounted on a tripod at a height of approximately 7 feet (see Figure 1). The sound levels at the site were continuously monitored and the results stored on the onboard memory and periodically transferred to a removable memory stick for decoding. The decoded noise data were then processed in the Airport Noise and Operations Management System (ANOMS) for identification, noise to flight track matching and Community Noise Equivalent Level (CNEL) metric calculations.

Aircraft Noise Analysis

Noise measurements were taken at the Mission Blue Community Center starting April 28, 2015 to May 14, 2015 using a sound level threshold of 55dBA. This report evaluates periods where full 24 hour days of data are available, from April 29 through May 13. There were 351 identified correlated aircraft noise events associated with other Bay Area airports and 1,726 identified correlated aircraft noise events associated with SFO operations over the 15 day period. Table 1 below lists these events, along with community events detected by date and events' daily energy averages.

Table 2 below provides the resulting CNELs for this measurement period, while Tables 3, 4 and 5 provides details of SFO Events by Daytime, Evening and Nighttime hours. For the 1,726 aircraft noise events, the average aircraft generated Maximum Noise Level (Lmax) was 65dBA, the average Sound Exposure Level (SEL) was 75dBA, and the average aircraft noise event duration was 32 seconds. The computed levels for the average **Aircraft CNEL** was 52dBA, the average **Community CNEL** was 53dBA, and the **Total CNEL** was 56dBA. For comparison purposes, the cumulative aircraft noise level at permanent noise monitor #7 located approximately 1.3 miles southeast was 50dBA for the same period.

Table 1 - Noise Events by Date

		Average			Average			Average	
Date	SFO Events[1]	SEL	Lmax	Non-SFO Events	SEL	Lmax	Community Events	SEL	Lmax
4/29/2015	133	75	65	12	69	60	28	70	61
4/30/2015	123	76	65	21	71	62	17	71	64
5/1/2015	136	77	66	38	71	60	99	72	64
5/2/2015	125	77	67	30	71	61	15	70	63
5/3/2015	105	77	67	21	71	61	23	75	67
5/4/2015	140	75	65	18	70	61	30	70	62
5/5/2015	100	75	65	14	72	62	34	72	63
5/6/2015	108	77	66	24	71	61	23	72	67
5/7/2015	171	77	66	38	73	62	35	81	68
5/8/2015	194	77	67	43	72	62	34	74	64
5/9/2015	139	76	66	20	72	63	18	71	65
5/10/2015	101	76	66	16	73	63	20	70	64
5/11/2015	15	72	62	10	69	59	138	73	68
5/12/2015	10	71	62	18	82	75	72	72	61
5/13/2015	126	77	67	28	70	60	38	84	80
Total	1,726			351			624		

[1] *SFO Events are Single SFO Aircraft, Multiple SFO Aircraft and Simultaneous SFO and Non-SFO Aircraft.*

SEL and Lmax are in decibels A-weighted.

Table 2 – Aircraft Noise Climate over 15 Days

Community Noise Equivalent Level	Lowest Level (dBA)	Highest Level (dBA)	Average Level (dBA)
Aircraft	44	55	52
Community	51	56	53
Total	54	58	56

Table 3 - SFO Aircraft Noise Data (Single Events) – Day (7:00 a.m. to 7:00 p.m.)

1,261 Correlated Noise Events	Lowest Level (dBA)	Highest Level (dBA)	Average Level (dBA)
Aircraft Lmax	56	76	66
Aircraft SEL	63	85	76
Noise Event Duration (in seconds)	8 seconds	120 seconds	32 seconds

Table 4 - SFO Aircraft Noise Data (Single Events) – Evening (7:00 p.m. to 10:00 p.m.)

207 Correlated Noise Events	Lowest Level (dBA)	Highest Level (dBA)	Average Level (dBA)
Aircraft Lmax	55	74	66
Aircraft SEL	64	83	76
Noise Event Duration (in seconds)	8 seconds	70 seconds	31 seconds

Table 5 - SFO Aircraft Noise Data (Single Events) – Night (10:00 p.m. to 7:00 a.m.)

258 Correlated Noise Events	Lowest Level (dBA)	Highest Level (dBA)	Average Level (dBA)
Aircraft Lmax	56	80	66
Aircraft SEL	64	84	76
Noise Event Duration (in seconds)	8 seconds	120 seconds	32 seconds

SSTIK Procedure

Aircraft departures off Runway 01L, which flew a quarter of a mile of SSTIK (Appendix 2) were also evaluated for this measurement period. The daily average of 01L departures that flew a quarter of a mile SSTIK was 39%. An average of 65% of those operations registered a noise event at the noise monitor.

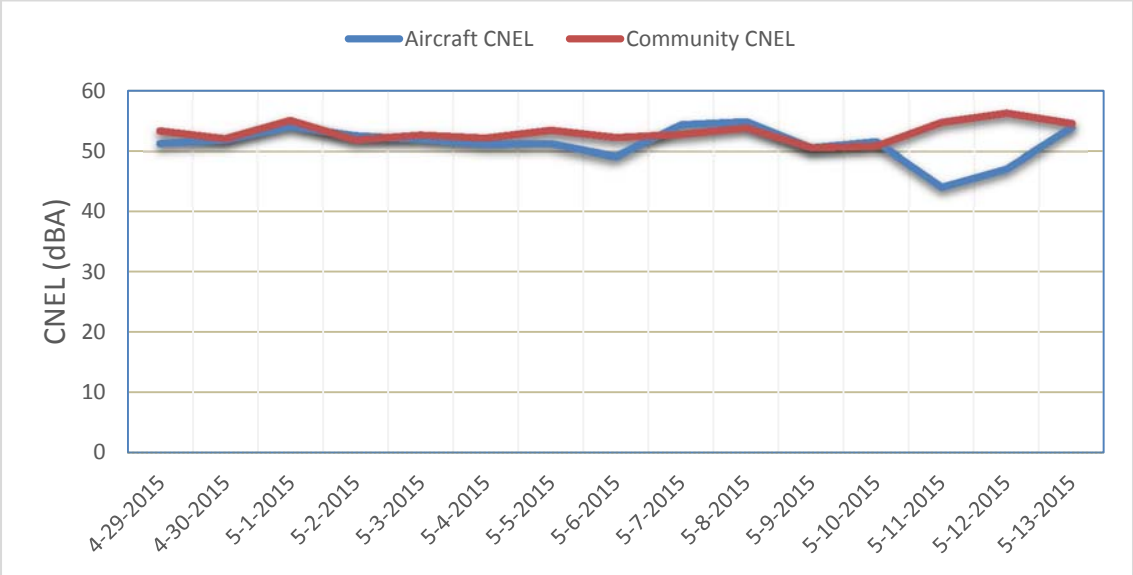
						Average			
Date	**01L Departure**	**SSTIK (1/4 mi)**	**% of 01L Departure**	**Noise Events**	**% of SSTIK**	**SEL**	**Lmax**	**Duration[2]**	**Alitiude**
4/29/2015	157	63	40%	37	59%	74	63	26	5,063
4/30/2015	198	75	38%	41	55%	75	64	31	4,740
5/1/2015	145	59	41%	40	68%	76	65	35	4,802
5/2/2015	162	77	48%	48	62%	76	66	31	4,467
5/3/2015	112	35	31%	19	54%	76	66	35	5,057
5/4/2015	169	65	38%	47	72%	74	65	24	4,623
5/5/2015	123	44	36%	26	59%	75	65	29	4,494
5/6/2015	136	50	37%	38	76%	76	65	35	5,019
5/7/2015	190	66	35%	49	74%	77	66	37	5,108
5/8/2015	213	86	40%	68	79%	77	67	35	4,773
5/9/2015	175	74	42%	46	62%	75	65	29	5,074
5/10/2015	135	54	40%	34	63%	74	67	27	4,987
5/11/2015	6	0	0%	4[1]	-	72	62	23	4,468
5/12/2015	10	5	50%	2	40%	72	62	30	6,085
5/13/2015	98	40	41%	29	73%	77	67	37	5,025
	2,029	793							

[1] *These noise events were caused by 01L departures that did not fly a quarter of a SSTIK.*

[2] *Duration is in seconds*

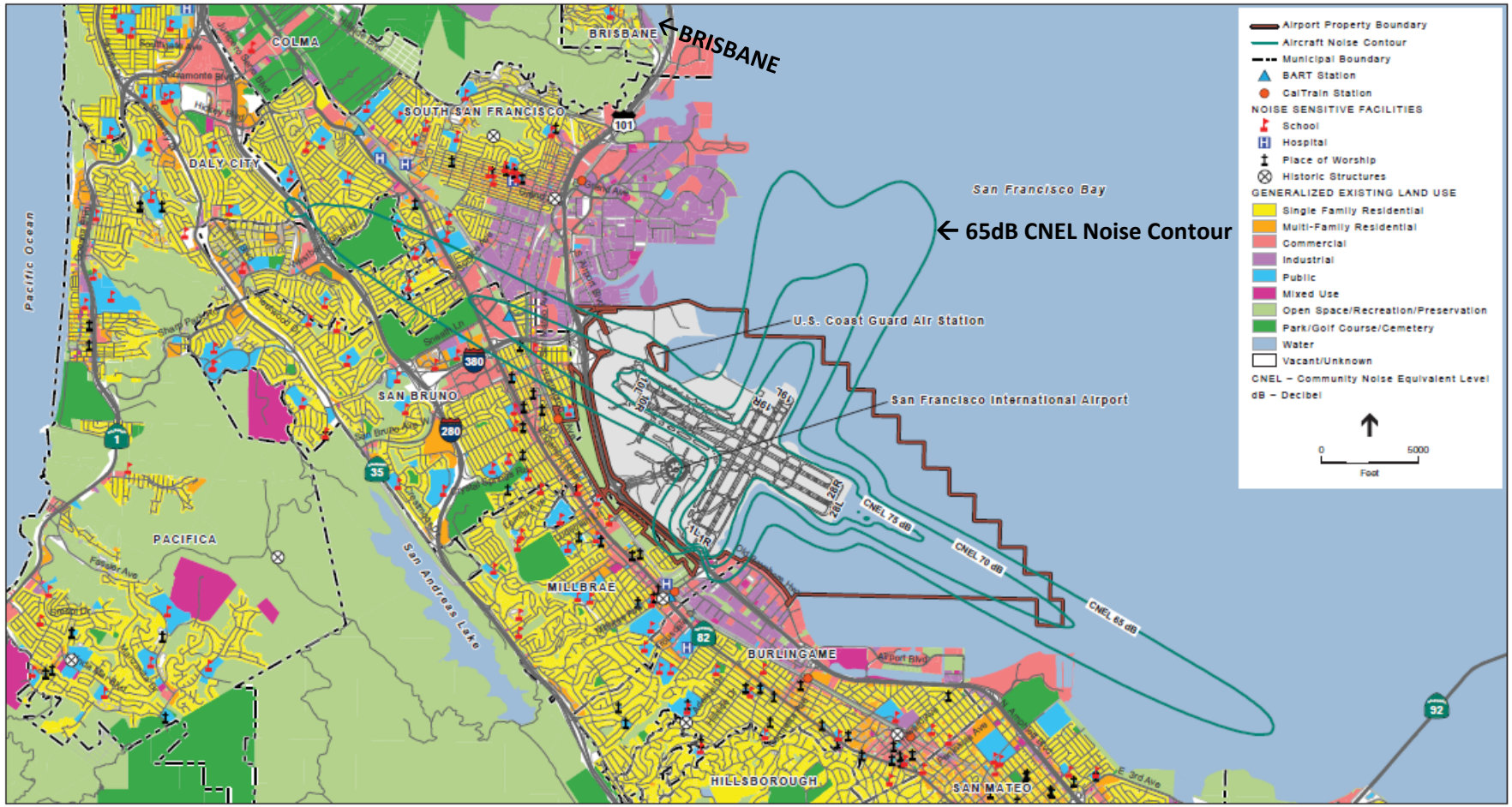
Conclusion

Aircraft noise levels at Mission Blue Community Center are at levels expected in a community that is approximately 4.5 miles away from a large hub airport, but below several departure corridors serving four main commercial use runways (28L, 28R, 1L, 1R) at SFO. Actual aircraft noise measurements contribute 1.6dBA additional noise to the total cumulative average noise levels. The average Aircraft CNEL was 52dBA and the average Community CNEL was 53dBA. When Aircraft noise is added to the Community noise the Total CNEL results in 56dBA.



The California Code of Federal Regulations, Title 21, Division 2.5, Chapter 6, paragraph 5012 states: "The standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels." Since the average Aircraft CNEL was measured at 52dBA for Mission Blue Community Center, this residential area has an acceptable level of aircraft noise as defined by state law. The extent of the 65dBA CNEL noise impact contour at SFO is shown on page 3. This noise contour was generated using Federal Aviation Administration's Integrated Noise Model (version 7.0d) and is a working draft of a noise exposure map update under Federal Aviation Regulations Part 150. The results of the field monitoring validates the extent of the 65dBA CNEL noise impact boundary confirming Aircraft CNEL is less than 65dBA CNEL for this location.

2014 Noise Exposure Map



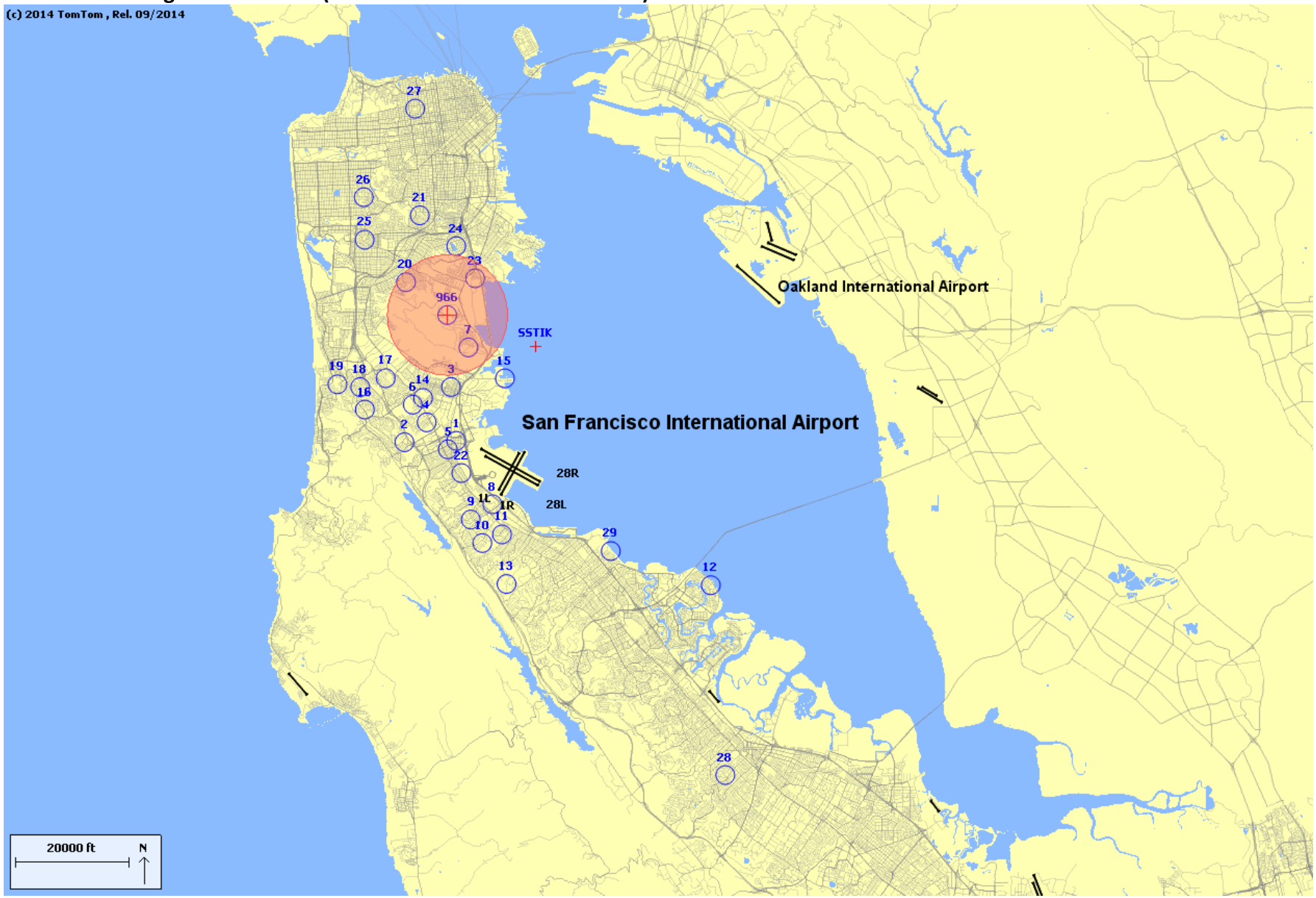
SOURCE: ESRI, 2014; San Mateo County Planning and Building Department, 2014; ESA Airports, 2014

SFO FAR Part 150 Noise Exposure Map Report . 120832

Exhibit 5-1
2014 Noise Exposure Map – San Francisco International Airport

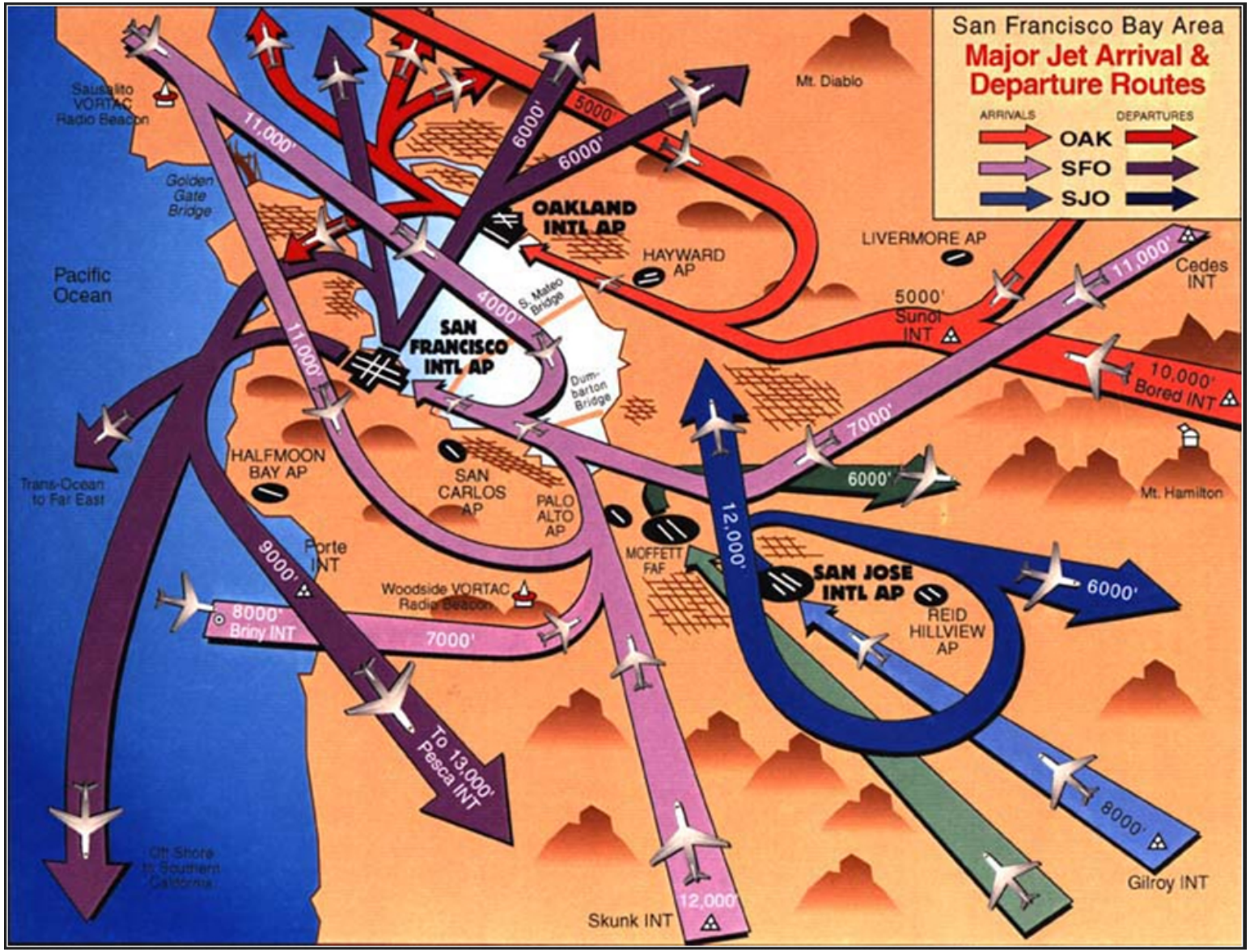
Figure 1 – Microphone and Tripod (main) and Monitor (bottom right)

Noise Monitoring Location #966 (red colored circle - 2 mile radius) and Permanent Noise Monitor Sites

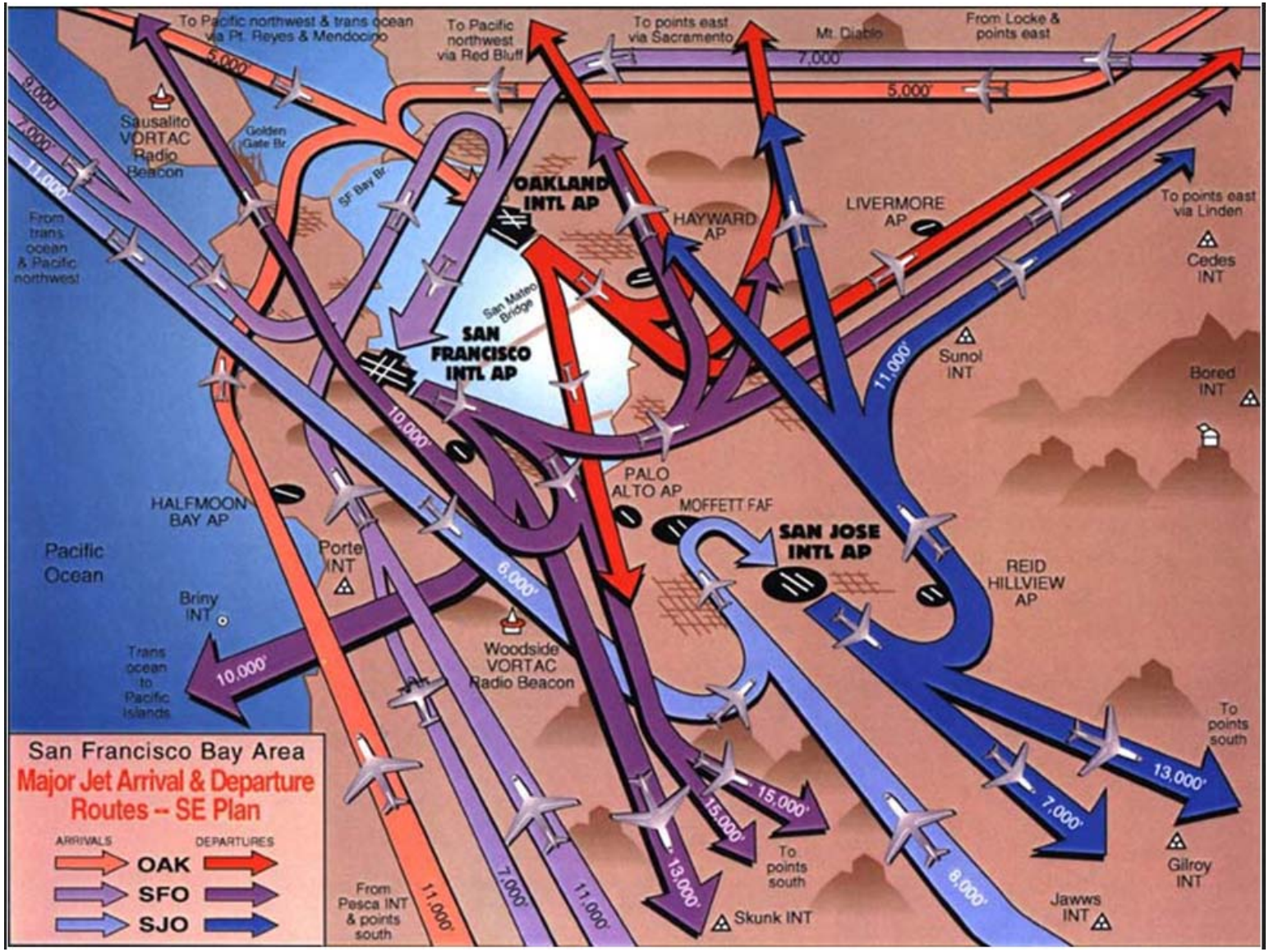


Appendix 1 – San Francisco Bay Area Major Jet Arrival and Departure Routes

West Flow Plan



Southeast Flow Plan



Appendix 2 - SSTIK Departure