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SFO GBAS and FQP “2.0”



Christian Valdes

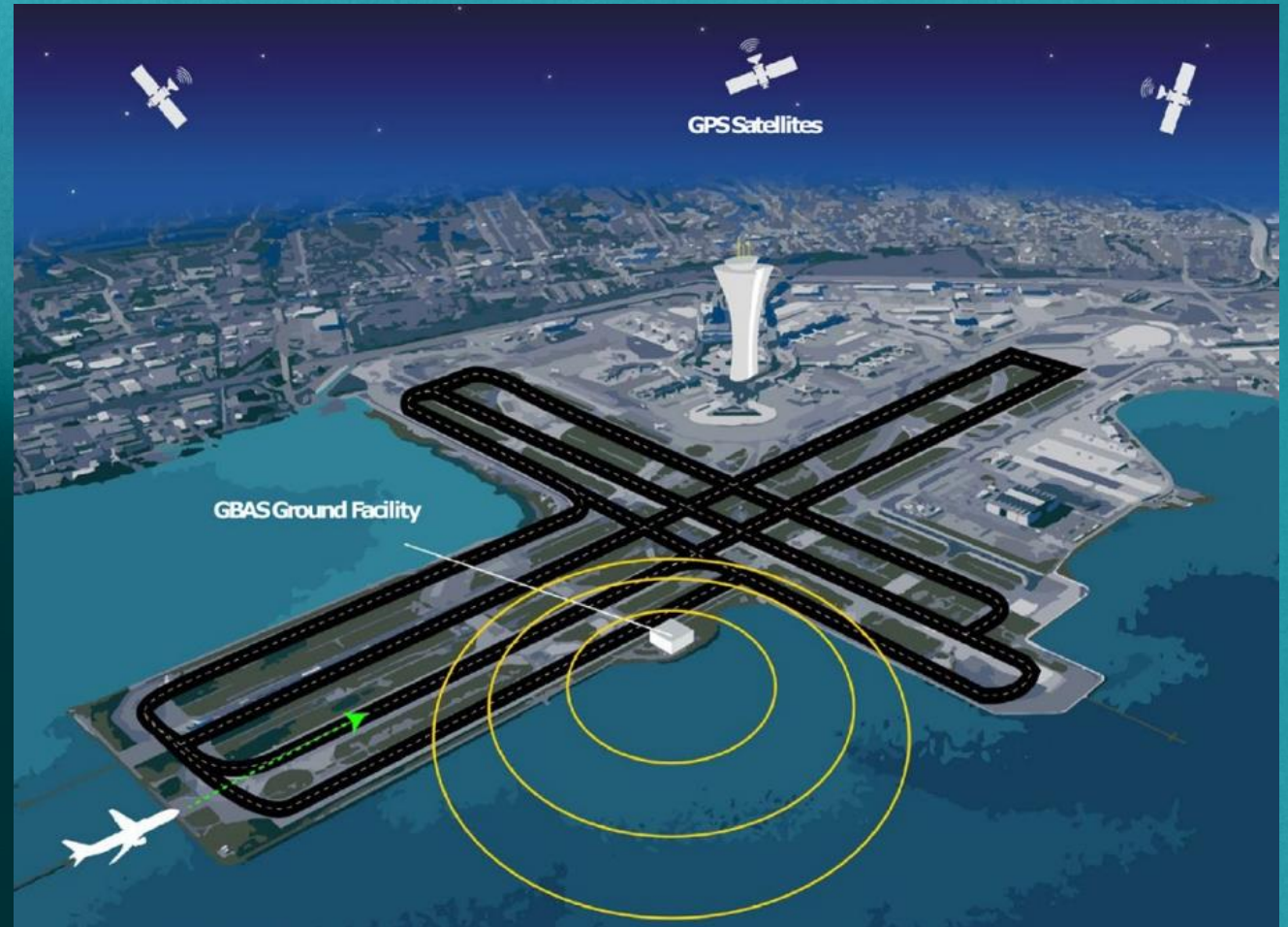


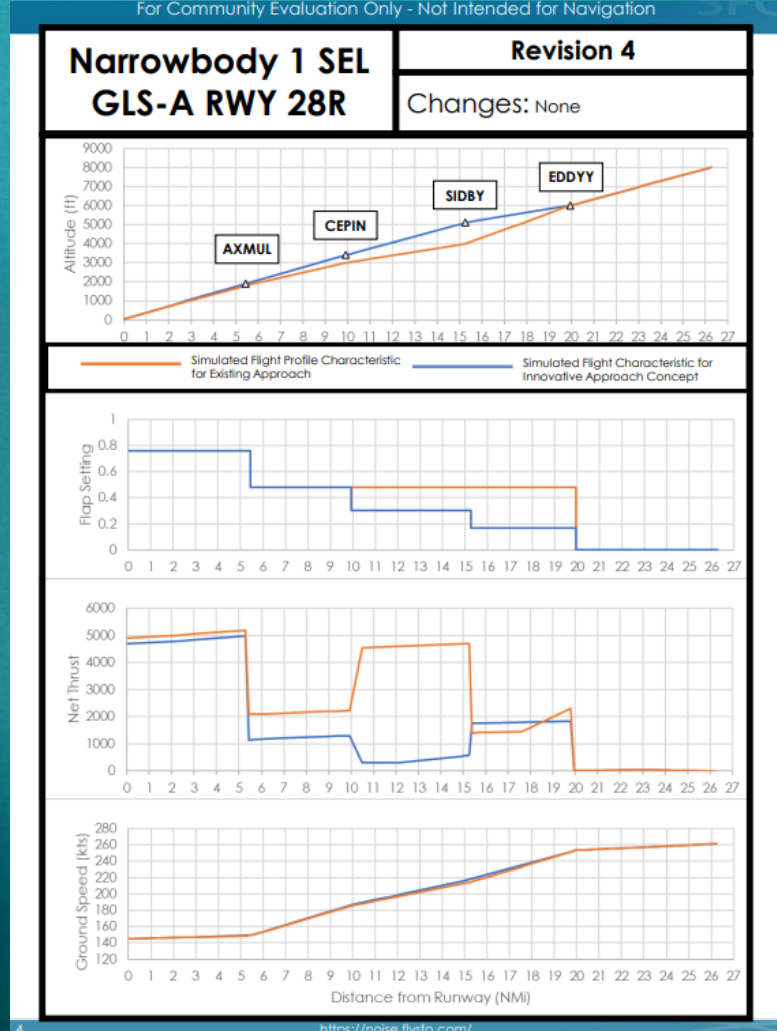
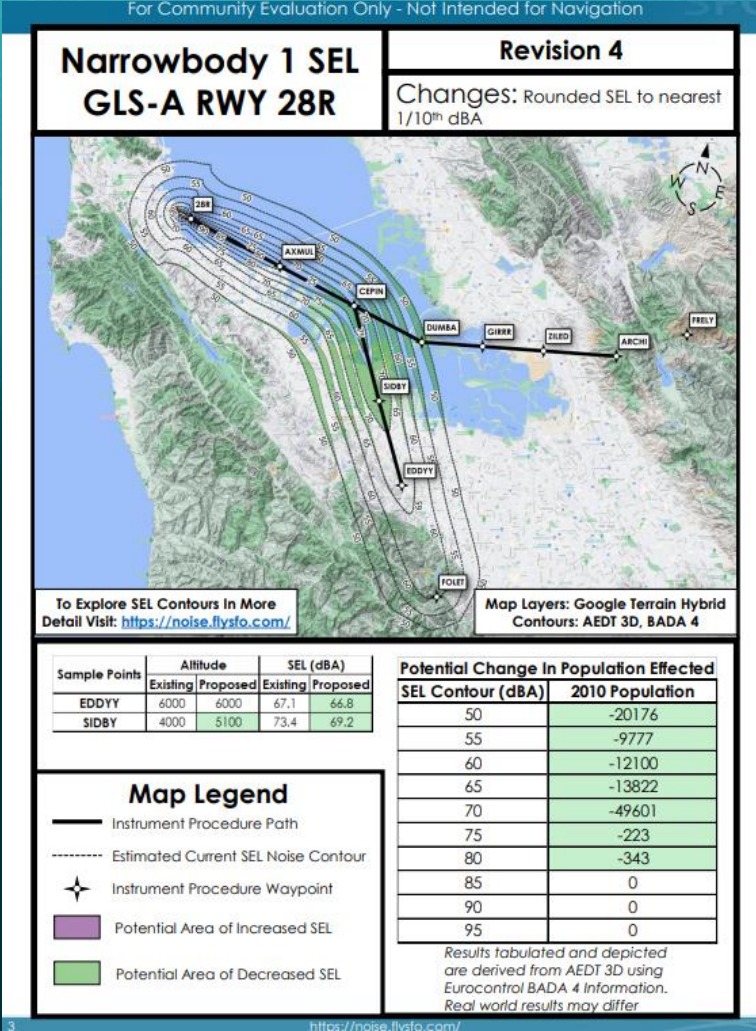
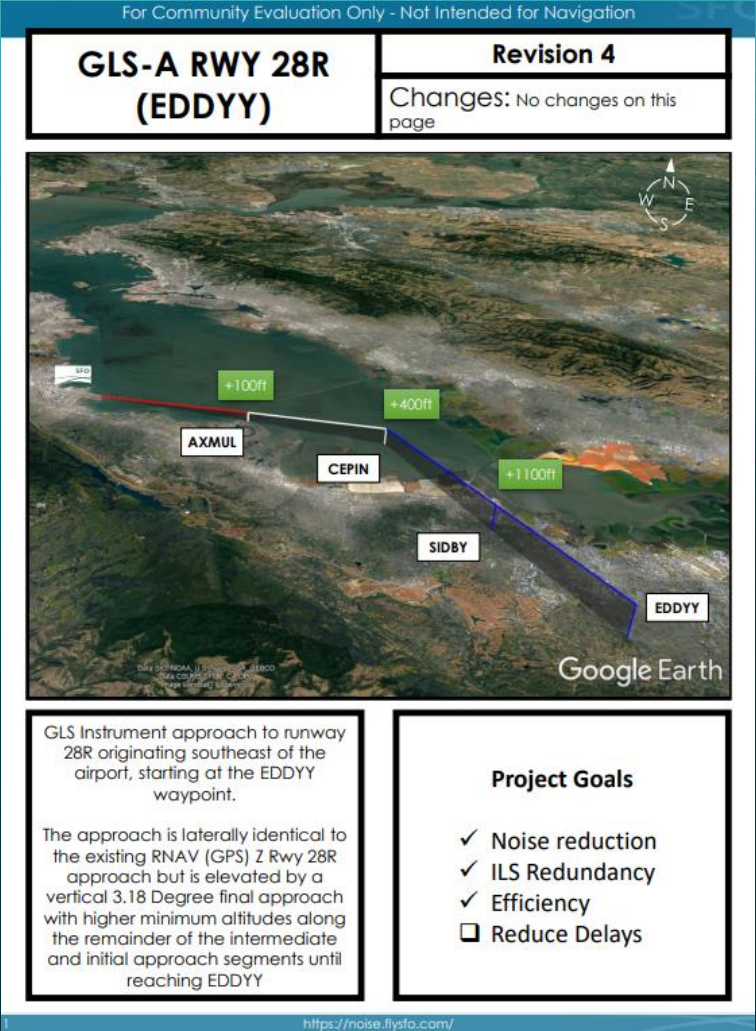
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San Francisco International Airport GBAS Project

- Background

- Ground Based Augmentation System (GBAS) improves capacity, efficiency, safety, and community benefits
- Ability to construct complex, defined, and highly repeatable flight paths
- Informed the SFO Roundtable in 2017
 - Reduce Noise
 - ILS Redundancy
 - Enhance Efficiency
 - Reduce Delays
- FAA commissioned the SFO GBAS and implemented overlays in 2022
- GBAS Innovative Approach procedure development
- Community Flight Procedure Packages





SFO Roundtable Suggested Procedures for Group 2A Evaluation

Suggested procedures all involve increased utilization of overwater flight and higher altitudes over residential areas. Procedures are anticipated to be used during late night operations or low traffic periods



GLS-DBN Rwy 28R



Green line: suggested offset path to 28R until passing the San Mateo Bridge

GLS-OW1 Rwy 28R



Green line: suggested wide circuitous offset path to 28R until passing the San Mateo Bridge

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- GLS Flight Test
 - December 2 and 16, 2021 United Airlines flew two new Boeing 737 MAX 8's to test GLS procedures
 - Limited number of passes, but measurements agreed with modeling

GBAS Noise Measurement Report

Group 1 Innovative Approach Procedures

March 2022

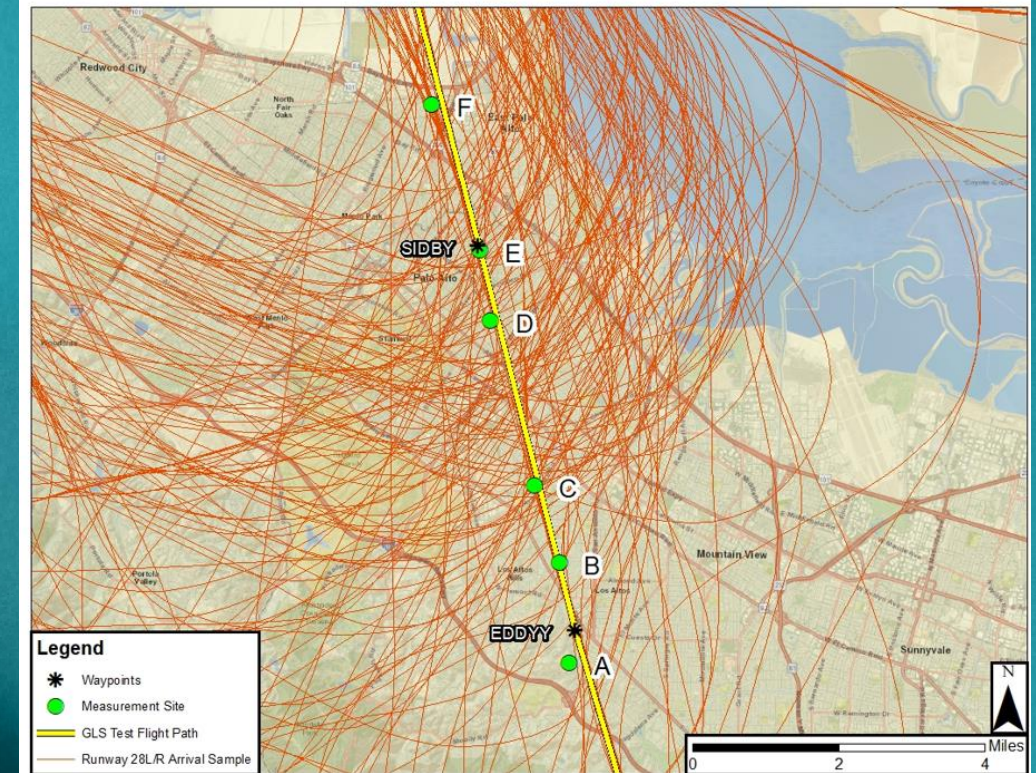
PREPARED BY
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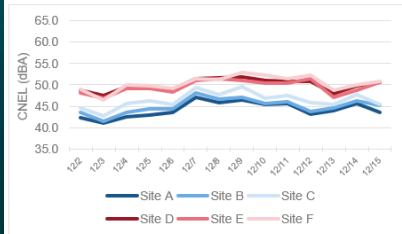
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- PNMT Deployment
 - Six PNMT's were deployed under proposed GLS flight track
- Visual Representation
 - Noise
 - Altitude
 - Frequency of altitude range

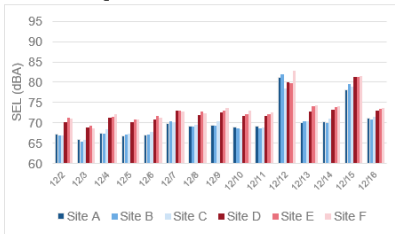
Figure 3-2 GBAS Measurement Site Map with Flight Tracks



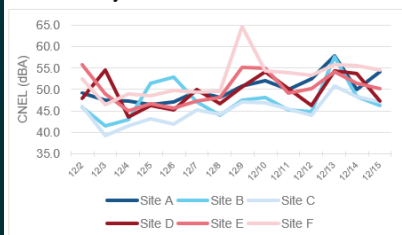
A – Aircraft CNEL



B – Average Aircraft SEL



C – Community CNEL



D – Average Community SEL

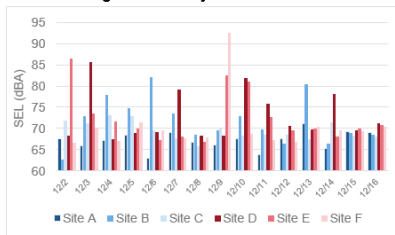


Figure 5-2 Site A Gate Penetration Graph

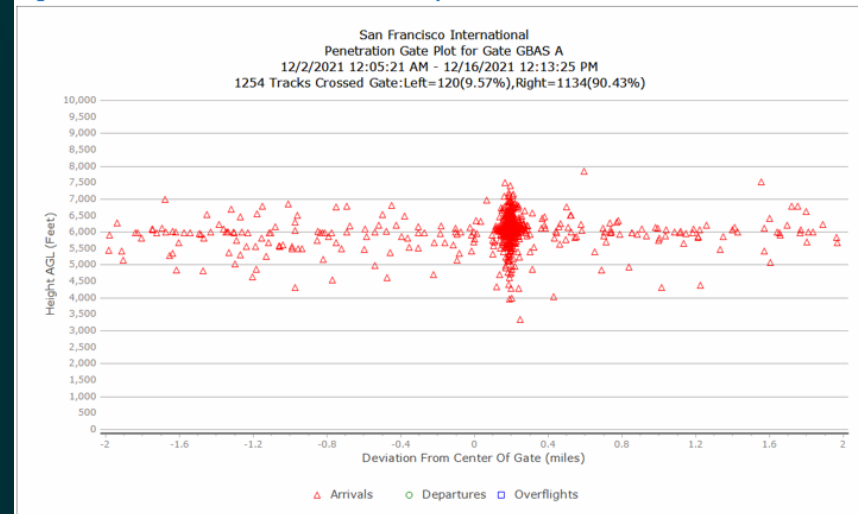
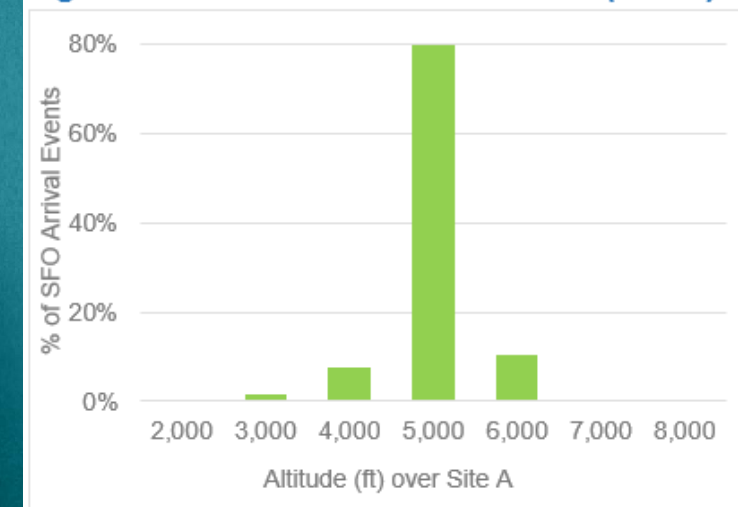


Figure 5-8 Arrival PCA over Site A (380 ft.)



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- Results
 - The non-GLS approaches were three (3) to six (6) dB SEL and four (4) to seven (7) dB Lmax higher than the test GLS approaches
 - Non-GLS approaches flew at higher altitudes over sites A, B, and C, but at lower altitudes over sites D, E, and F compared to the test GLS approaches

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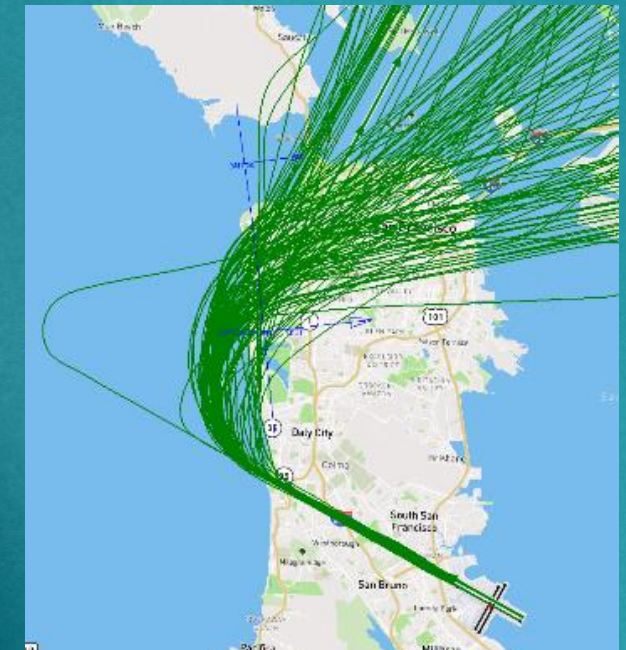
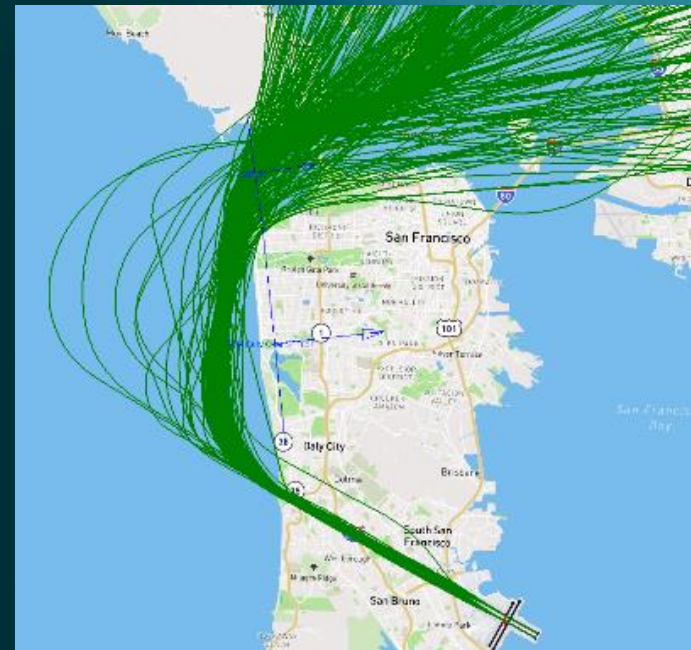
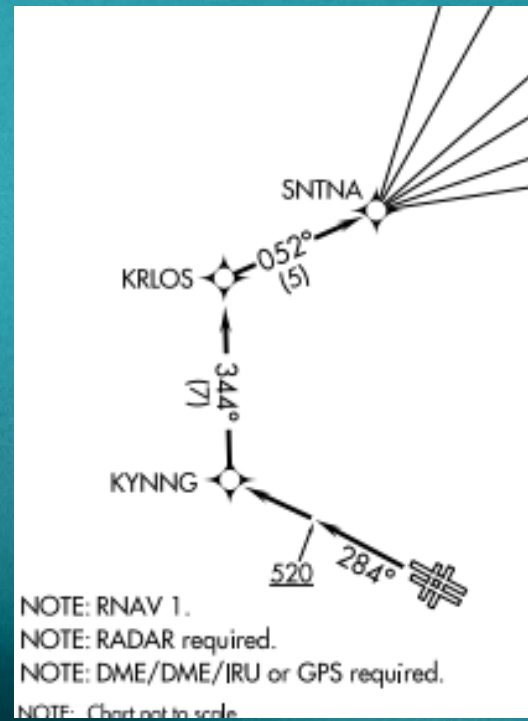
San Francisco International Airport Fly Quiet Program “2.0”

- Background
 - SFO would like to enhance current Fly Quiet Program
 - Monitor existing procedures within the TRACON Standard Operating Procedures

Airline Fly Quiet Summary Report - 1st Quarter 2023								January 1 to March 31, 2023	
Airline		Fleet Noise Quality	Noise Exceedance	Nighttime Runway Use	Departures Shoreline Gap		Arrivals Foster City	Final Score	Airline Fly Quiet Rating
 VIR		8.44	9.94	-	-	9.15	-	9.18	
 FBU		7.72	9.80	-	6.67	9.66	-	8.46	
 FLE		8.39	10.00	-	7.50	7.92	-	8.45	
 QXE		8.23	9.79	10.00	9.57	6.18	5.00	8.13	
 ANZ		7.37	10.00	-	-	6.71	-	8.03	
 FFT		9.98	9.57	4.83	9.83	7.29	6.49	8.00	
 WJA		6.45	10.00	-	9.00	5.83	-	7.82	
 TAI		10.00	8.38	4.39	10.00	7.71	5.36	7.64	
 TAP		8.31	10.00	-	6.67	5.33	-	7.58	
 SKW		8.24	9.86	5.63	9.46	6.98	5.15	7.55	
 SCX		5.15	10.00	-	10.00	7.50	5.00	7.53	
 JZA		9.29	9.94	-	6.00	4.33	-	7.39	
 AFR		6.97	9.94	-	-	5.05	-	7.32	
 EIN		3.79	10.00	-	-	8.05	-	7.28	
 MXV		8.27	9.86	5.00	9.29	5.63	5.00	7.17	
 SWR		6.95	9.84	-	-	4.52	-	7.10	
 DAL		6.08	9.10	4.59	8.24	8.48	6.00	7.08	
 UAE		7.20	9.93	-	5.00	6.05	-	7.05	
 KLM		8.05	10.00	-	5.00	5.00	-	7.01	
 SWA		5.60	9.40	4.10	9.56	6.32	7.08	7.01	
 ANA		8.39	9.57	3.03	-	6.93	-	6.98	
 UAL		6.48	9.25	4.57	6.65	8.41	5.99	6.89	
 FDX		3.90	7.39	-	10.00	7.78	5.14	6.84	
 DLH		7.45	9.86	10.00	0.00	6.57	-	6.78	
 AAL		5.90	9.20	5.14	9.00	4.48	6.80	6.75	
 ASA		6.01	9.32	6.25	7.85	4.72	6.10	6.71	
 JAL		8.00	9.93	-	0.00	8.82	-	6.69	
 CMP		8.88	6.81	2.91	10.00	6.46	4.64	6.62	
 HAL		5.96	9.67	-	-	5.72	5.00	6.59	
 ACA		8.64	9.79	3.81	7.67	3.68	5.83	6.57	
8.42									8.42
 JBU		4.85	9.21	4.94	7.29	4.74	6.45	6.25	
 CSR		5.11	9.70	-	5.00	-	5.00	6.08	

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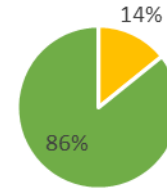
- Proposed Elements
 - SNTNA Utilization
 - SSTIK Gate Crossing
 - GAP (28L/R Departure) Vectoring
 - East Turn over Foster City
 - Woodside VORTAC Gate Crossing



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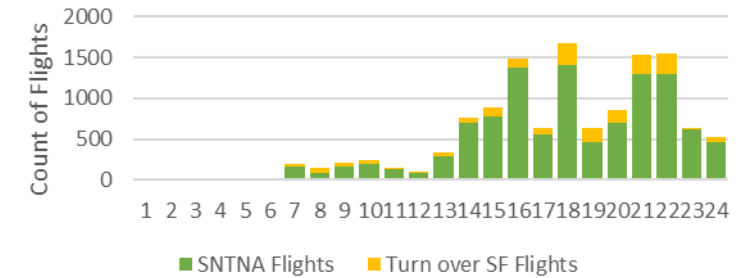
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SNTNA Utilization

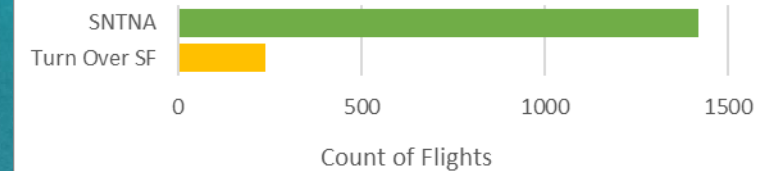


■ Turn Over SF ■ SNTNA

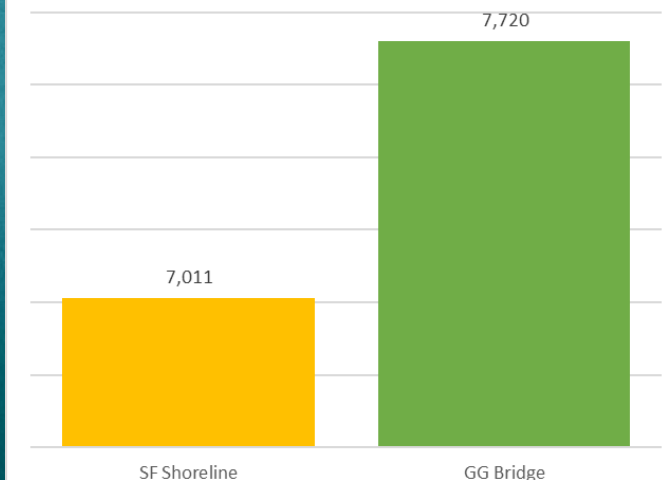
Departures per Hour



SNTNA Utilization



Average Altitude at SF Shoreline and GG Bridge



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- Final Thoughts
 - Challenges: Effectively monitor and report on noise abatement procedures
 - Partnership Approach: Engage EVS early and collaborate on solutions
 - Solutions Implemented: Developed ongoing, evolving, and scalable monitoring and reporting.
 - Key Takeaway: It takes a village...Use your supporting cast.