Appendix A

WEATHER ANALYSIS

2013 UPDATE: The data in this appendix has not been updated.

This appendix presents a discussion on the occurrence and distribution of adverse weather conditions at Mather Airport.

BACKGROUND AND METHODOLOGY

Hourly Surface Airways Observation data from the National Oceanic and Atmospheric Administration (NOAA) for the 10-year period beginning January 1, 1983, through December 31, 1992, were analyzed using Leigh Fisher Associates' proprietary software, *LFA Weather Version 2a*. This period represents the 10 most recent consecutive years for which data are available; limited data exist after 1992 because of Mather's transition from military to civilian use.

ADVERSE WEATHER OCCURRENCE AND DISTRIBUTION

Table A-1 shows the occurrence and distribution of weather conditions at Mather throughout the year. Instrument flight rule (IFR) conditions shown in Table A-1 were divided into Category I and Below Category I conditions representing the amount of time aircraft can land at the Airport using the existing Runway 22L instrument landing system (ILS), and the amount of time flights must be cancelled or diverted to Sacramento International Airport, respectively.

As shown in Table A-1, visual flight rule (VFR) conditions at Mather occur an average of 92.4% of the year, and IFR conditions occur an average of 7.6% of the year. Of the total IFR conditions, 5.4% are Category I and 2.2% are Below Category I.

Adverse weather conditions at Mather are unevenly distributed throughout the year. IFR conditions average 0.1% during May through August and more than 25% during December and January.

Table A-1

PERCENT OCURRENCE OF VFR AND IFR CONDITIONS
Mather Airport

Month	VFR *(a)*	IFR Category I *(b)*	IFR Below Category I *(c)*
January	64.7%	24.5%	10.8%
February	92.7	5.0	2.3
March	96.6	3.0	0.6
April	98.9	1.0	0.1
May	99.9	0.1	0.0
June	99.9	0.1	0.0
July	99.9	0.1	0.0
August	99.9	0.1	0.0
September	99.5	0.5	0.0
October	98.2	1.5	0.4
November	90.7	7.7	1.5
December	69.0	20.7	10.4
Annual average	92.4%	5.4%	2.2%

(a) Cloud ceiling above 1,000 feet and visibility greater than 3 miles.
(b) Cloud ceiling between 200 and 1,000 feet and visibility between 2,400 feet and 3 miles.
(c) Cloud ceiling below 200 feet or visibility below 2,400 feet.

Source: Leigh Fisher Associates using data from the National Oceanic and Atmospheric Administration, March 2002.

Considering that December is the peak month for air cargo operations, the disruption associated with poor weather conditions during that month can have a significant effect on air cargo operations at Mather.

Listed in Table A-2 is the monthly percent occurrence of each IFR category assuming the lowest cloud ceiling and visibility minimums for each instrument approach category.*

*As defined in Federal Aviation Regulations (FAR) Part 121, *Certification and Operations: Domestic, Flag, and Supplemental Air Carriers and Commercial Operators of Large Aircraft,* April 1, 1965, as amended.

Table A-2

PERCENT OCCURRENCE OF CATEGORY I, II, AND III CONDITIONS
Mather Airport

Month	IFR Category I *(a)*	IFR Category II *(b)*	IFR Category III *(c)*
January	25.3%	4.5%	5.6%
February	5.1	0.7	1.5
March	3.1	0.2	0.3
April	1.0	0.0	0.0
May	0.1	0.0	0.0
June	0.1	0.0	0.0
July	0.1	0.0	0.0
August	0.1	0.0	0.0
September	0.5	0.0	0.0
October	1.5	0.3	0.1
November	8.0	0.5	0.8
December	21.3	4.3	5.5
Annual average	5.5%	0.9%	1.2%

(a) Lower than standard Category I conditions. Cloud ceiling between 200 and 1,000 feet, and visibility between 1,800 feet and 3 miles.
(b) Cloud ceiling between 100 and 200 feet, and visibility between 1,200 and 1,800 feet.
(c) Cloud ceiling below 100 feet or visibility below 1,200 feet.

Source: Leigh Fisher Associates using data from the National Oceanic and Atmospheric Administration, March 2002.

As shown in Table A-2, Category I conditions occur 5.5% of the year, Category II conditions occur 0.9 % of the year, and Category III conditions occur 1.2% of the year. It should be noted that the percent of Category I and Below Category I conditions (i.e., Categories II and III combined) is different from those in Table A-1 as a result of lower-than-standard Category I visibility minimums provided by ILS ground equipment required for Category II operations.

HOURLY OCCURRENCE OF ADVERSE WEATHER

Table A-3 presents the hourly occurrence of Below Category I (i.e., Categories II and III combined) and Category III conditions during winter months. As shown, these adverse weather conditions are frequent at night and in the morning, but rare in the afternoon.

Figures A-1 and A-2 compare hourly Below Category I and Category III occurrences during winter months with scheduled air cargo carrier arrivals. As shown, the highest occurrence of Below Category I and Category III weather conditions coincides with the morning arrival period between 3:00 a.m. and 9:00 a.m.

Table A-3

HOURLY OCURRENCE OF BELOW CATEGORY I AND CATEGORY III CONDITIONS DURING WINTER MONTHS

Mather Airport

	Below-Category I *(a)*			Category III *(b)*		
Hours	Dec	Jan	Feb	Dec	Jan	Feb
A.M.						
0:00	13.5%	14.1%	3.1%	8.2%	7.2%	1.4%
1:00	16.4	14.9	4.0	10.3	8.7	2.7
2:00	17.1	19.1	4.1	12.0	13.0	3.1
3:00	17.8	21.0	4.1	9.9	14.0	3.7
4:00	16.5	23.5	4.7	9.5	14.5	3.7
5:00	18.0	23.3	4.7	10.9	13.6	3.3
6:00	16.3	21.1	4.7	9.6	10.9	3.8
7:00	17.4	20.3	4.0	10.4	10.4	2.8
8:00	15.3	19.8	6.4	8.6	8.5	4.7
9:00	12.4	13.1	3.8	6.8	5.1	1.4
10:00	8.7	7.8	2.0	3.9	3.2	0.4
11:00	3.8	3.1	0.4	1.1	0.0	0.0
P.M.						
12:00	1.0%	0.9%	0.0%	0.0%	0.0%	0.0%
1:00	0.0	0.3	0.0	0.0	0.0	0.0
2:00	0.0	0.0	0.0	0.0	0.0	0.0
3:00	0.4	0.0	0.0	0.0	0.0	0.0
4:00	1.1	0.0	0.0	0.4	0.0	0.0
5:00	2.7	0.6	0.0	1.1	0.3	0.0
6:00	4.7	2.5	0.0	2.1	1.9	0.0
7:00	7.8	3.7	1.0	2.8	2.7	1.0
8:00	8.8	4.6	1.3	3.5	3.4	1.0
9:00	10.1	6.6	1.3	4.9	3.9	0.7
10:00	11.7	9.2	1.7	7.3	5.4	1.1
11:00	12.6	12.1	2.0	7.7	6.8	1.4
Average	9.7%	10.1%	2.2%	5.5%	5.6%	1.5%

(a) Cloud ceiling below 200 feet or visibility below 1,800 feet.
(b) Cloud ceiling below 100 feet or visibility below 1,200 feet.

Source: Leigh Fisher Associates using data from the National Oceanic and Atmospheric Administration, March 2002.

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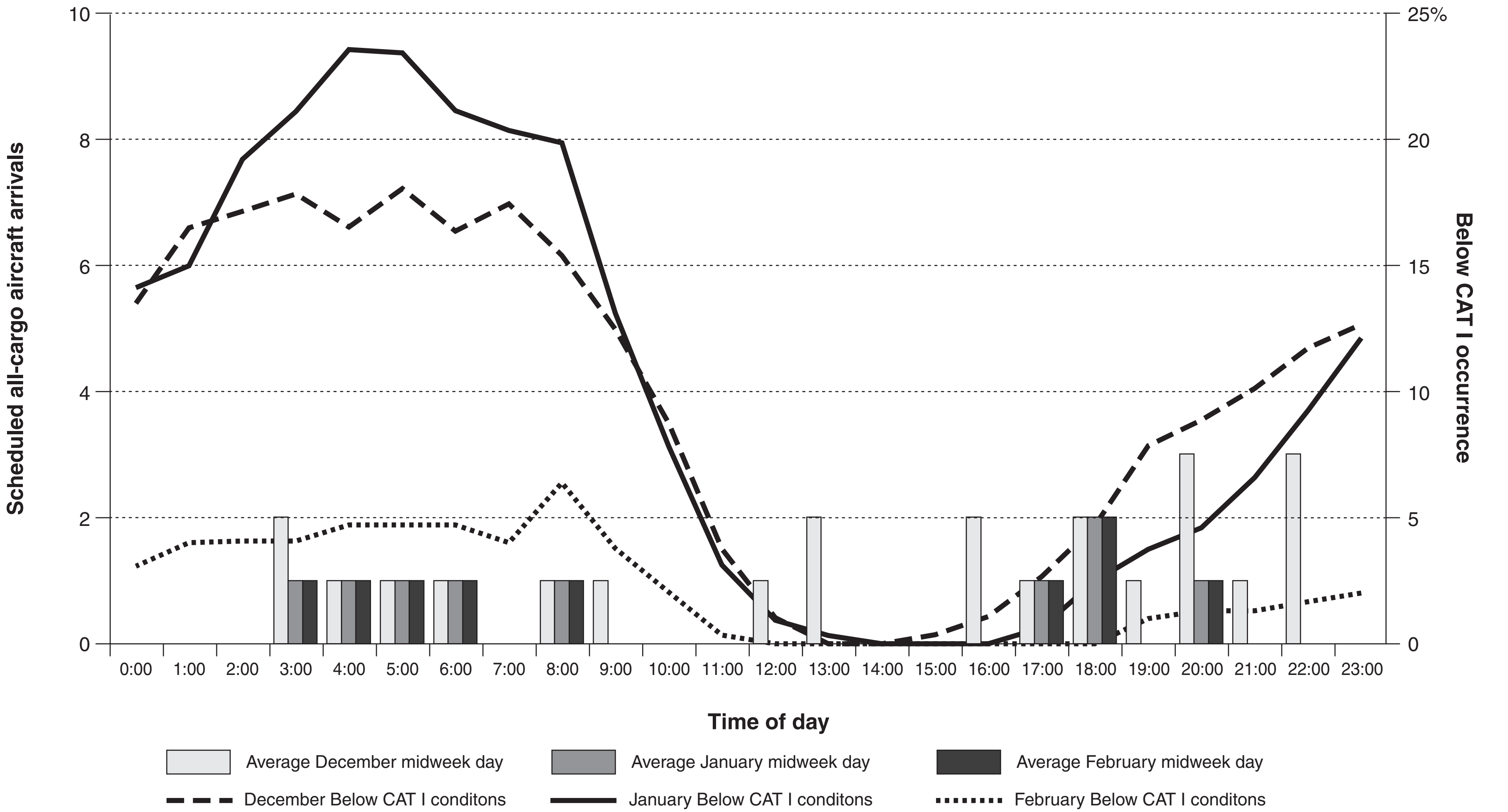
Figure A-1

COMPARISON OF BELOW CATEGORY I CONDITIONS AND EXISTING AIR CARGO OPERATIONS IN WINTER

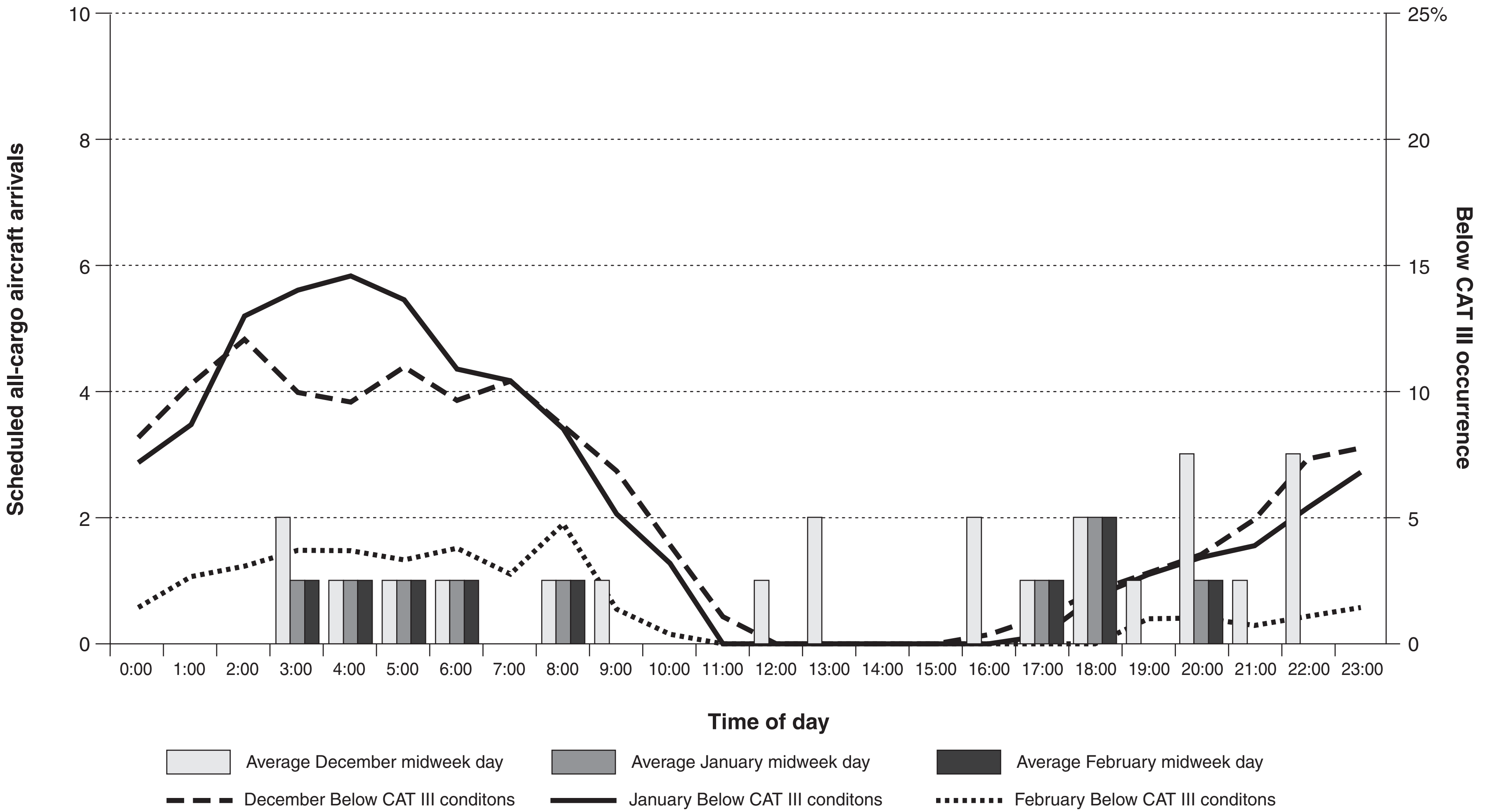


Notes: Below Category I conditions are defined as cloud ceiling below 200 feet or visibility below 1,800 feet. Excludes feeder aircraft operations.

Source: Hourly arrivals based on actual air cargo schedule provided by the Sacramento County Airport System.

Figure A-2

COMPARISON OF BELOW CATEGORY III CONDITIONS AND EXISTING AIR CARGO OPERATIONS IN WINTER



Notes: Below Category III conditions are defined as cloud ceiling below 100 feet or visibility below 1,200 feet. Excludes feeder aircraft operations.

Source: Hourly arrivals based on actual air cargo schedule provided by the Sacramento County Airport System.

Appendix B

MATHER AIRPORT FINANCING CAPACITY

2013 UPDATE: The data in this appendix has not been updated.

This appendix provides an overview of the Airport System's financial framework, and presents the methodology, assumptions, and results of an airport financing capacity analysis.

FRAMEWORK FOR FINANCIAL OPERATIONS

Sacramento County is responsible for the management and operation of four airports in the Airport System—including Mather, Sacramento International, Executive, and Franklin Field—and establishes fees, rentals, rates, and other charges required to meet financial obligations. The County is authorized to issue airport revenue bonds, payable from Airport System net revenues, for the purpose of acquiring or constructing improvements to the Airport System.

The County is also responsible for certain functions such as the development and execution of airline agreements, tenant negotiations, compliance with grant assurances, marketing and development, and long-range planning.

The County accounts for the financial operations of the Airport System as a single, self-sufficient enterprise through the Department of Airports (the Department). The revenues, expenses, and funding sources for the Airports are commingled. The Department's fiscal year (FY) ends June 30.

Airport System Financial Operations

The financial operations of the Airport System are governed by, among other things:

- The Airport System Revenue Bond Resolution adopted by the County in 1989, as supplemented and amended--referred to in this appendix as the "Bond Resolution"

- The Subordinated Bond Resolution adopted by the County in 1996 (for bonds secured by certain passenger facility charge collections with a secondary/back-up pledge of Airport System net revenues), as supplemented and amended

- Operating agreements with passenger and cargo airlines, providing for use of the Airports and the payment of landing fees, ramp fees, terminal rentals, and certain other charges

- Other leases and concession agreements with various tenants at the Airports (including agreements for building and ground rentals, fixed base operator services, and services such as food and beverage, merchandise, car rental, automobile parking, and ground transportation)

- FAA grant approvals and passenger facility charge (PFC) approvals

- Federal statutory and constitutional provisions, including the Aviation and Transportation Security Act, the Anti-Head Tax Act of 1973, the Airport and Airways Improvement Act of 1982, the Interstate Commerce Clause, and the PFC Act of 1990

- U.S. Department of Transportation policies mandated by the FAA Act of 1994 related to airport rates and charges, rules for resolving disputes, and revenue diversion

- Generally accepted accounting principles

- Various policies adopted by the County and the Department

Discussions of various governing documents reflected above (including the Bond Resolution, airline operating agreements, and other tenant leases) are discussed in more detail below, as is the County's PFC program.

Bond Resolution. The issuance of Airport System Revenue Bonds by the County is governed by the provisions of the General Airport System Revenue Bond Resolution (adopted in 1989), as amended. As defined in the Bond Resolution, Airport System Revenue Bonds are payable from a lien on the Net Revenues of the Airport System.

In the Bond Resolution, the County covenants to:

> . . . at all times fix, prescribe and collect rents, fees and charges in connection with the services and facilities furnished by the Airport System which will be sufficient to yield Net Revenues during each Fiscal Year equal to at least one hundred twenty-five percent (125%) of the Debt Service for such Fiscal Year and Revenues during each Fiscal Year equal to at least one hundred percent (100%) of the aggregate amount of transfers required by Section 5.02 hereof for such Fiscal Year.

This provision is referred to as the Rate Covenant. The Bond Resolution also governs the application of Airport revenues to the various funds and accounts established under the Bond Resolution.

Subordinated Bond Resolution. The County issued Airport System Passenger Facility Charge and Subordinated Revenue Bonds (Subordinated Bonds) in 1996 and 1998 under provisions of the Fourth and Sixth Supplemental Bond Resolutions (adopted in May 1996 and August 1998, respectively), referred to collectively in this appendix as the Subordinated Bond Resolution.

As defined in the Subordinated Bond Resolution, PFC and Subordinated Revenue Bonds are payable from a lien on Subordinated Revenues (equal to all PFC revenues, amounts required to be deposited in the Subordinated Revenue Fund from the Subordinate Securities Fund under the Senior Bond Resolution, and any other authorized deposits to the Subordinated Revenue Fund).

The Subordinated Bond Resolution also governs the application of Subordinated Revenues to various funds and accounts.

Airline Operating Agreement. The Airport System derives a substantial portion of its revenues from airline rentals, fees, and charges. In FY 2002, airline revenues paid to the Department represented 21.8% of total Airport System revenues.

In FY 2001, the County entered into an Airline Operating Agreement (the Agreement) with the scheduled major passenger airlines serving Sacramento International Airport and certain all-cargo airlines at Mather Airport and Sacramento International Airport. The Agreement expired on June 30, 2003, and the County is in the process of executing extensions to the Agreement.

The Agreement provides a basis for calculating, charging, and collecting airline Terminal Building rents, Aircraft Parking Fees, Loading Bridge Use Fees, Landing Fees, and other charges so that total Airport System revenues are sufficient to meet the requirements of the Rate Covenant.

Landing Fees are calculated according to a total Airport System residual cost methodology, taking into consideration all Airport System requirements and all nonairline revenues. Airport System requirements are defined to include, among other things, 125% of the annual debt service for outstanding Airport System Revenue Bonds. The FY 2004 landing fee is $1.79 per 1,000 pound unit of landed weight for airlines operating pursuant to an executed Agreement (and $2.24 for nonsignatory airlines). Cargo airlines that are signatory to the Agreement pay the same landing fee as the signatory passenger airlines.

The Agreement includes provisions regarding airline approval of future capital improvements (and inclusion of associated capital costs in the airline rate base). The provisions include specific procedures and definitions regarding the airline approval process. Capital improvements that are not approved by the signatory airlines can be implemented by the County one year after the County's initial request for airline approval.

Other Tenant Leases. The Authority has entered into numerous agreements with other tenants and concessionaires in connection with building rentals, ground leases, concessions, and other services at the Airports.

At Mather Airport, the Department receives building rental and ground lease payments from various tenants, including air cargo operators, the fixed base operator (Trajen Flight Support), aircraft maintenance companies (including Mather Aviation), corporate aircraft operators (including Intel), and other tenants, including a flight school, a rental car company, a metal fabrication company, and a law firm.

Passenger Facility Charge Program. The County's PFC program is administered by the Department in accordance with applicable PFC regulations under FAR Part 158, *Passenger Facility Charges*. In January 1993, the County received approval from the FAA to impose a PFC of $3 per eligible enplaned passenger at the Airport, and has imposed a PFC since April 1, 1993. The Department received approval to collect a $4.50 PFC in November 2001, and began collecting at the $4.50 PFC level on February 1, 2002. Of the total $4.50 PFC imposed at the Airport, the County receives $4.42 per eligible enplaned passenger for approved projects and collecting airlines receive $0.08 per eligible enplaned passenger for administrative costs.

PFC approvals received to date have been for projects at Sacramento International Airport. PFC funding has not been assumed as an available funding source for Mather Airport Master Plan projects.

APPROACH

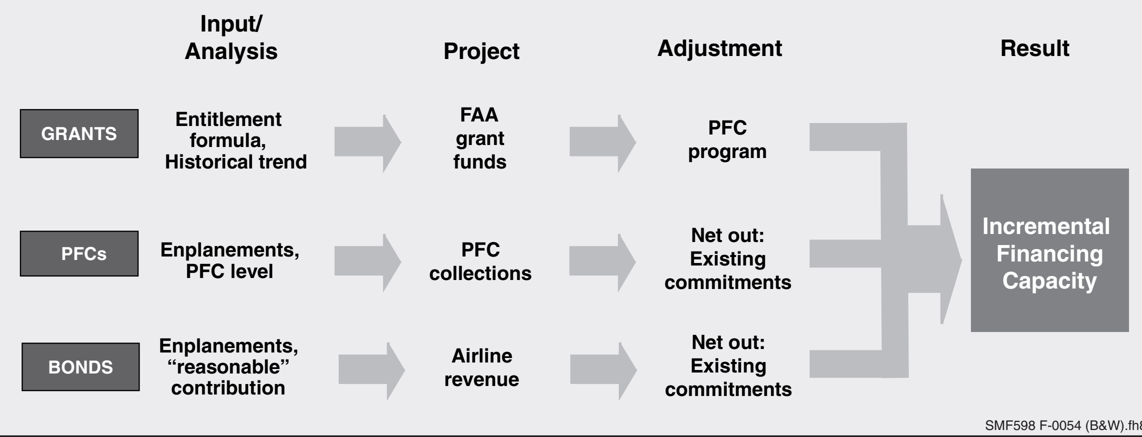
The Sacramento County Airport System is operated as a single financial entity; therefore, the revenues, expenses, and funding sources for the four System Airports are commingled. To determine Mather's future financing capacity, it is necessary to consider the financing capacity of the entire Airport System first, and then determine an appropriate share of potential funding for capital improvements at Mather. In addition, it is necessary to consider existing financing commitments, such as funds required to pay debt service for prior projects and future commitments of PFC revenue.

Figure B-1 illustrates the methodology for the financing capacity analysis.

Figure B-1

SYSTEM FINANCING CAPACITY—METHODOLOGY

Mather Airport Master Plan



The primary sources of financing capacity for the Airport System are:

1. ***Federal grants***—Federal Aviation Administration (FAA) entitlement and discretionary grants.

2. ***PFC revenue***—The per-passenger fee assessed on passengers using Sacramento International Airport.

3. ***Airport System Revenue Bonds***—Debt issued to finance Airport System improvements, supported by the revenues of the Airport System.

As illustrated on Figure B-1, Airport System financing capacity is determined by projecting the likely future contributions from these sources of funds, taking into account existing commitments.

ASSUMPTIONS

To reflect the uncertainty regarding future conditions, a range of assumptions was developed to forecast the Airport System financing capacity. Summarized below are key assumptions for "low" and "high" funding scenarios.

Key assumptions for the lower end of the range include:

1. 3% annual growth in enplaned passengers
2. PFC collections at the $4.50 level
3. Entitlement grants consistent with the $4.50 PFC

4. Modest discretionary grant amounts
5. Airline payments per enplaned passenger equal to approximately 5% of the average one-way airfare, and an average 2% annual increase in airfares

Key assumptions for the higher end of the range include:

1. 4% annual growth in enplaned passengers
2. PFC collections at the $4.50 level through FY 2005, and at the $6.00 level thereafter
3. Entitlement grants consistent with the $4.50 PFC (assuming no further reduction with $6.00 PFC)
4. Optimistic discretionary grant amounts
5. Airline payments per enplaned passenger equal to approximately 7% of the average one-way airfare, and an average 2% annual increase in airfares

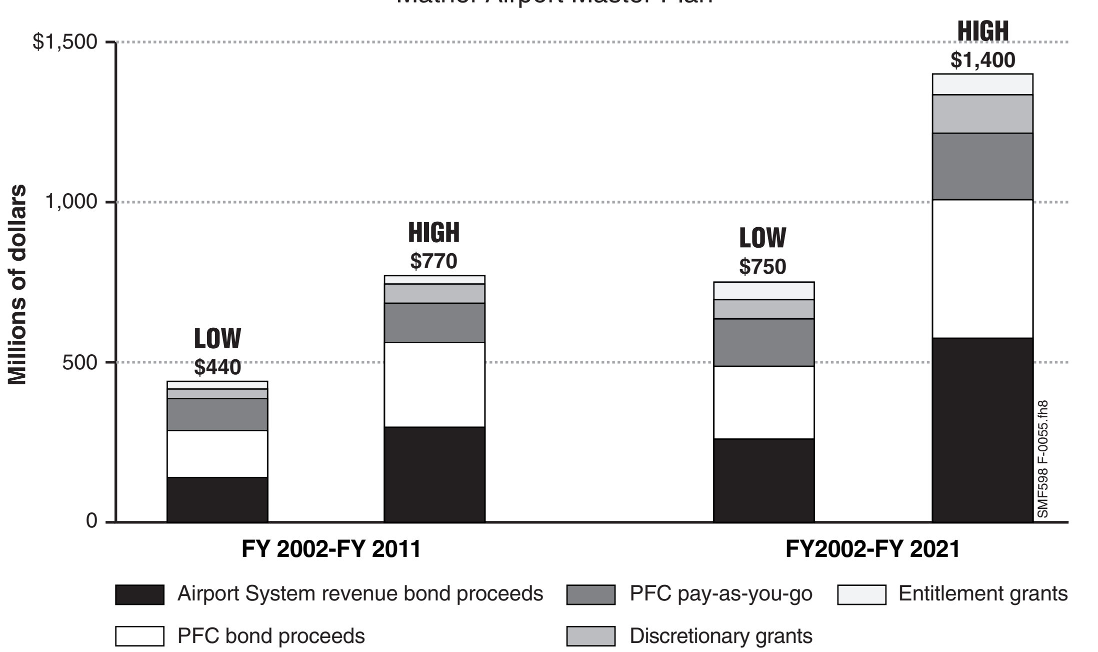
PROJECTED AIRPORT SYSTEM FINANCING CAPACITY

Figure B-2 summarizes the projected Airport System financing capacity for the near term (10 years from 2002 through 2011) and long term (20 years from 2002 through 2021).

Figure B-2

PROJECTED COUNTY FINANCING CAPACITY

Mather Airport Master Plan



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As shown, it is projected that the County could finance between $440 million and $770 million of capital improvements between FY 2002 and FY 2011, and between $750 million and $1,400 million of capital improvements between FY 2002 and FY 2021.

- ***Federal grants.*** Federal entitlement grants are projected to account for between $55 million and $65 million of financing capacity between FY 2002 and FY 2021. Discretionary grant funding was assumed to be between $60 million and $120 million in FY 2002 through FY 2021.

- ***PFC funds.*** PFC bond proceeds are projected to provide between $225 million and $430 million of financing capacity between FY 2002 and FY 2021. PFC pay-as-you-go funding is projected to provide an additional $150 million to $210 million between FY 2002 and FY 2021.

- ***Revenue bonds.*** Airport System revenue bond proceeds are projected to account for between $260 million and $575 million of financing capacity between FY 2002 and FY 2021.

PROJECTED FINANCING CAPACITY FOR MATHER AIRPORT

Two approaches were used to project the future Airport System financing capacity that could reasonably be assumed to be available for improvements at Mather:

1. The historical share of Airport System funding applied to Mather

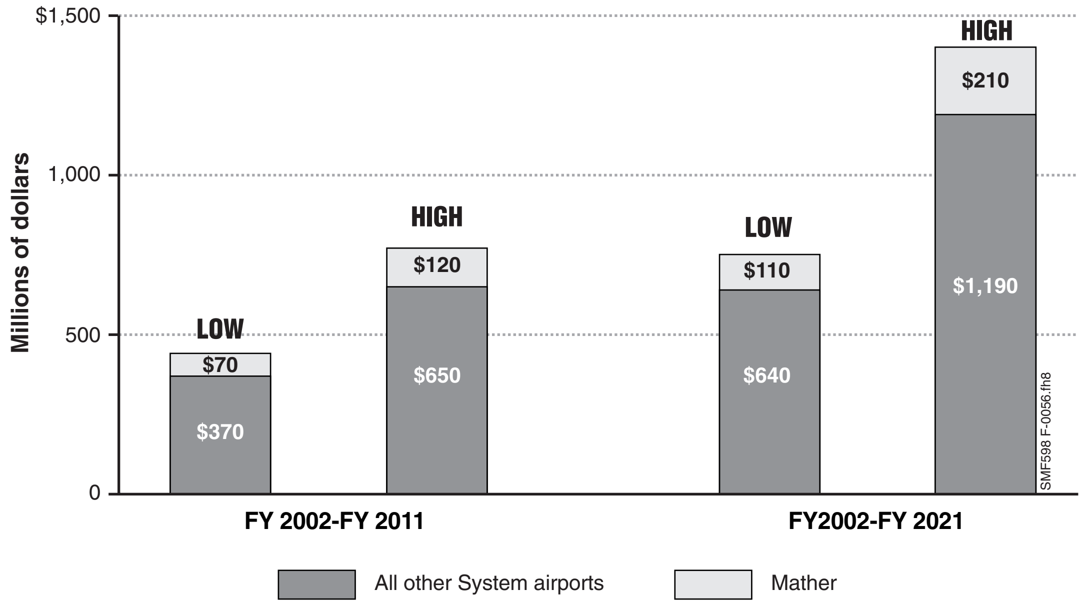
2. The "reasonable" share of funding for Mather based on the sources of funds

Using these two approaches, it was determined that it would be reasonable to assume that about 15% of the Airport System's financing capacity would be available for improvements at Mather. Consequently, it was calculated that between $70 million and $120 million would be available for improvements at Mather in the near term (10 years), and that between $110 million and $210 million would be available in the long term (20 years).

Figure B-3

MATHER SHARE OF SYSTEM FINANCING CAPACITY

Mather Airport Master Plan



Appendix C

AIRFIELD CAPACITY

2013 UPDATE: The data in this appendix has not been updated.

The FAA's Runway Capacity Model was used to determine the hourly capacity of Mather Airport. Hourly capacity is defined as the maximum number of aircraft operations that can take place on an airfield in one hour. Using the hourly capacity and methodologies outlined in FAA Advisory Circular (AC) 150/5060-5 (Change 2), *Airport Capacity and Delay*, the annual service volume (ASV)—an estimate of annual capacity—of Mather was calculated.

FACTORS AFFECTING AIRFIELD CAPACITY

Airfield capacity is a measure of the throughput of a runway-taxiway system and, therefore, is not constant over time. Airfield capacity varies considerably during the day and year as a result of physical and operational factors, as well as characteristics of demand. These factors include, but are not limited to, weather conditions, aircraft fleet mix, runway use configurations, and percent of touch-and-go operations.

Weather Conditions

The primary effect of weather on airfield capacity relates to the required spacing between aircraft operations. As ceiling and visibility conditions deteriorate, spacing between aircraft must increase to maintain safety. Increased spacing reduces the number of aircraft that can operate at an airport in a given period.

For aviation purposes, there are two primary categories of ceiling and visibility conditions. Visual meteorological conditions (VMC) are those in which pilots can operate under visual flight rules (VFR), i.e., pilots can approach, land, or take off by *visual* reference. In VMC, it is the pilot's responsibility to see and avoid other aircraft. Visual meteorological conditions occur when the cloud ceiling is at least 1,000 feet above ground level (AGL) and the visibility is greater than 3 statute miles. Instrument meteorological conditions (IMC) occur during inclement weather when other aircraft cannot easily be seen and the separation of aircraft must be assured solely by air traffic control rules and procedures. During IMC, pilots operate under instrument flight rules (IFR) and must rely on instruments for navigation and guidance to and from the airport. Instrument meteorological conditions occur when the cloud ceiling is less than 1,000 feet AGL, and/or the visibility is less than 3 statute miles.

Fleet Mix

For capacity computation purposes, aircraft fleet mix is the relative percentage of operations conducted by each of the following four classes of aircraft identified in AC 150/5060-5:

- ***Class A***—Single engine aircraft weighing 12,500 pounds or less
- ***Class B***—Multiengine aircraft weighing 12,500 pounds or less
- ***Class C***—Aircraft weighing between 12,500 and 300,000 pounds
- ***Class D***—Turbojet aircraft weighing more than 300,000 pounds

Mix Index is defined as the percent Class C aircraft plus 3 times the percent of Class D aircraft. In general, airports that serve high percentages of Class C and D aircraft (i.e., high mix index) have lower capacities because larger aircraft require greater in-trail separations and longer runway occupancy times. Class percentages and mix indices for Mather are provided for 2001, PAL 1, and PAL 2 in Table C-1 at the end of this appendix.

Runway Use Configurations

Airfield capacity is calculated based on the configuration that provides the maximum capacity. Generally, this configuration is also the configuration most frequently used. For this analysis, Mather was assumed to operate two independent parallel runways during VMC with Runway 4L-22R restricted to Class A aircraft and local touch-and-go operations. During IMC, only Runway 4R-22L remains open for aircraft operations at Mather. For this analysis, it was assumed that all Class A aircraft and 60% of Class B aircraft will not be capable of operating during IMC.

Touch-and-Go Operations

Touch-and-go operations are normally associated with pilot flight training. The number of touch-and-go operations usually decreases as the number of air carrier operations increases, as demand for service approaches airport capacity, or as weather conditions deteriorate. For this analysis, touch and go operations are estimated to represent 40% of Class A operations in 2001 and PAL 1, and 30% of Class A operations in PAL 2.

HOURLY CAPACITY

For VMC, the maximum capacity of the airfield is estimated to be approximately 92 operations per hour in PAL 1 and approximately 88 operations per hour in PAL 2, reflecting an increase in operations by Class C and D aircraft. For IMC, the maximum hourly capacity of the airfield is estimated to be 54 in PAL 1, and 53 in PAL 2.

Maximum hourly capacity is generally greater under VMC than IFC, reflecting closer aircraft spacing allowances.

ANNUAL SERVICE VOLUME

For planning purposes, airfield capacity is expressed in terms of ASV, which is a reasonable estimate of annual capacity. The initial step in calculating ASV is to calculate a single hourly capacity of the entire Airport. This is accomplished by determining weighted hourly capacities (Cw) for the primary runway use configurations based on the percentage of time in a year that the Airport is operated under each configuration. According to AC 150/5060-5, if a runway-use configuration is used less than 2% of the time, that time may be credited to another runway-use configuration. Because Mather operates on east flow less than 2% of the time, the capacity associated with this configuration was not considered in this analysis.

The next step in calculating ASV is to multiply Cw by the following ratios:

- D = Ratio of annual demand to average daily demand during peak month
- H = Ratio of daily demand to peak hour demand during peak month

Ratios for D and H are normally obtained from forecast data of peak period operations. However, because peak hour demand data are not available for the entire aircraft fleet mix at Mather, mid-range ratios for D and H were used. AC 150/5060-5 provides the following typical D and H ratios for different mix index ranges:

Mix Index	Daily (D)	Hourly (H)
0-20	280-310	7-11
21-50	300-320	10-13
51-180	310-350	11-15

Mather's mix index is between 51 and 180 for the entire planning period; therefore, D=330 and H=13 were selected to represent mid-range peaking characteristics.

ASV was then calculated as follows:

$$ASV = Cw \times D \times H$$

The results of the ASV calculations are summarized in Table C-1. The ASV for the existing airfield at Mather was determined to be 300,000 operations. If no airfield improvements are implemented at the Airport, the ASV of the existing airfield is projected to decrease to 292,000 in PAL 1 and to 287,000 in PAL 2. The decrease in ASV is anticipated as a result of projected decreases in maximum hourly capacity attributed to increases in Class C and D aircraft operations.

Table C-1

AIRFIELD CAPACITY SUMMARY
Mather Airport

	Aircraft class mix (% of annual operations) Aircraft class				Mix Index (C+3D)	Hourly capacity			
	A	B	C	D	%	VMC	IMC	Cw	ASV *(a)*
2001	25%	41%	25%	9%	52%	96	54	69	300,000
PAL 1	22	43	25	10	55	92	54	68	292,000
PAL 2	20	41	27	12	63	88	53	66	287,000

PAL = Planning Activity Level.
PAL 1 corresponds to 84,700 annual operations.
PAL 2 corresponds to 118,900 annual operations.

Note: See text for definitions of aircraft classes.

(a) Assuming D and H ratios of 330 and 13, respectively.

Source: Leigh Fisher Associates, May 2002.

Appendix D

BACKUP RUNWAY LENGTH ANALYSIS

2013 UPDATE: The data in this appendix has not been updated.

This appendix presents the assumptions and basic data used to determine the required length for a backup runway at Mather Airport. Runway length requirements were assessed for the existing 2001 and projected 2006 and 2021 air carrier cargo aircraft fleet mix.

Minimum departure and arrival runway lengths for the existing and projected fleet mix are presented in Table D-1. Aircraft with various engine and/or fuselage types were evaluated using the most common aircraft among cargo carriers. Total operations for B-767 and DC-10 aircraft were each divided into two categories to account for significant differences in performance between two models commonly used by cargo carriers; B-727-200 aircraft were distributed among four models due to the number of engine settings available for this aircraft.

DEPARTURE LENGTH REQUIREMENTS

Departure runway length requirements were identified for maximum takeoff weight (MTOW), 95% MTOW, and 90% MTOW assuming increased temperatures (standard 59°F plus 21°F, 25°F, 27°F, 31°F, or 36°F depending on aircraft type). The percentage of the total 2001, 2006, and 2021 air carrier cargo aircraft fleet mix that could be accommodated by alternative departure runway lengths is presented on Figure D-1. For example, an 8,500-foot runway would accommodate approximately 88% of departures at 95% MTOW in 2006, and 92% of departures at 95% MTOW in 2021. A 12,500-foot runway would be required to accommodate 100% of the projected fleet mix at 100% MTOW in 2006 and 2021.

Figure D-2 presents the percent of air cargo aircraft departures that could be accommodated by alternative runway lengths at MTOW, 95% MTOW, and 90% MTOW in 2001, 2006 and 2021. Generally, departure runway length requirements do not vary significantly between 2001 and 2021.

ARRIVAL LENGTH REQUIREMENTS

Minimum arrival runway lengths were identified for dry and wet conditions at low-angle flap settings and maximum landing weights (MLW). The percentage of the 2001, 2006, and 2021 air cargo aircraft fleet mix that could be accommodated by alternative arrival runway lengths is presented on Figure D-3. As presented, an 8,500-foot runway would accommodate 100% of projected arrivals in dry conditions

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Table D-1

DEPARTURE AND ARRIVAL RUNWAY LENGTH REQUIREMENTS
Mather Airport

Aircraft characteristics				Percent of air carrier cargo operations			Minimum runway length (ft)				
							Departure *(a)*			Arrival *(b)*	
Type	Engine	MTOW (lbs)	MLW (lbs)	2001	2006	2021	At 100% MTOW	At 95% MTOW	At 90% MT0W	Dry	Wet *(c)*
A300-600 *(d)*	PW PW4158	376,000	308,600	0.0%	1.9%	2.7%	10,000	7,500	6,500	6,500	7,500
A300B4-203	GE CF6-50C2	364,000	304,200	4.2	3.1	3.7	10,000	7,500	6,500	6,500	7,500
A-310	PW JT9D-7R4E1	330,000	261,250	0.0	1.9	2.6	12,000	8,500	7,000	5,500	6,300
B-727-100	PW JT8D-7B	170,000	142,500	2.6	2.2	0.0	9,000	8,000	6,500	5,300	5,600
B-727-200	PW JT8D-7B	170,000	154,500	12.6	5.6	0.0	8,500	7,000	6,500	5,300	5,800
B-727-200	PW JT8D-9	170,000	154,500	6.3	2.8	0.0	8,000	6,500	6,000	5,300	5,800
B-727-200	PW JT8D-15	170,000	154,500	16.7	7.4	0.0	6,500	5,500	5,000	5,300	5,800
B-727-200	PW JT8D-15	197,000	161,000	6.3	2.8	0.0	10,000	8,500	7,500	4,900	5,900
B-747-100	PW JT9D-7A	750,000	557,000	2.5	0.5	1.1	10,500	9,000	8,000	6,800	7,800
B-757-200	RB211-535-E4	255,000	210,000	29.4	40.5	68.2	7,500	6,500	6,000	4,900	5,700
B-767-200	GE CF6-80A	310,000	274,000	10.2	6.7	10.3	6,500	5,500	5,000	5,100	5,800
DC-10-10F	GE CF6-6D1	440,000	363,500	1.2	9.1	11.4	12,500	9,500	7,500	6,000	6,900
DC-8-63F	PW JT3D-7	355,000	274,000	6.4	15.5	0.0	11,000	10,000	9,000	6,600	7,500
DC-9-41	PW JT8D-11	114,000	103,000	1.7	0.3	0.0	7,000	6,000	5,000	5,300	6,000
MD-11	GE CF6-80C2D1F	620,000	480,000	0.1	0.0	0.0	11,500	10,500	9,500	8,200	9,500

MTOW = Maximum takeoff weight
MLW = Maximum landing weight

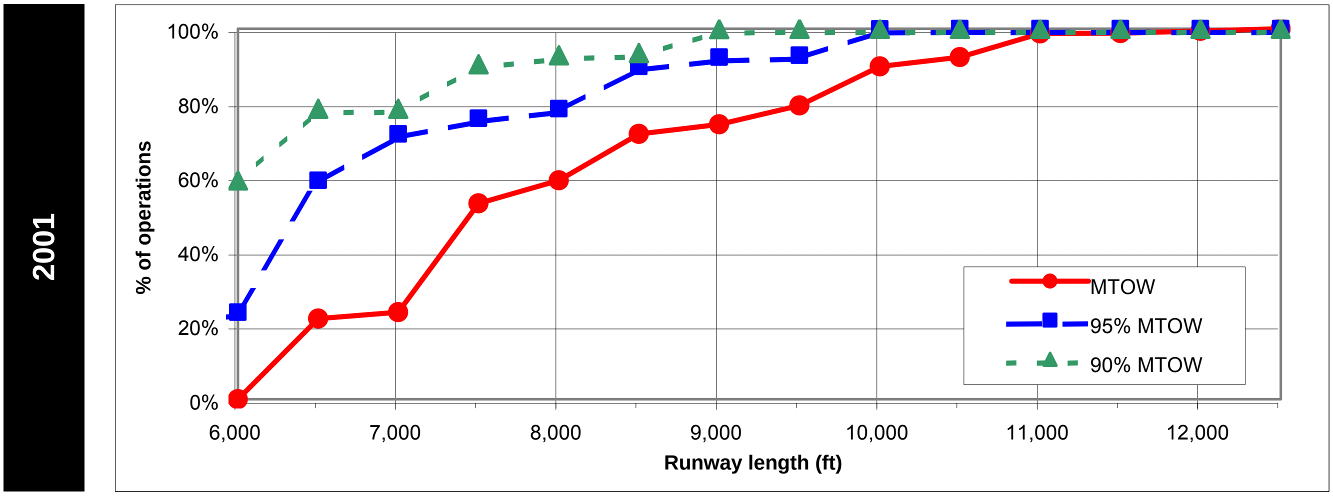
(a) Assuming increased temperature, zero runway gradient, and zero wind.
(b) Assuming maximum landing weight, standard day, zero runway gradient, and auto spoilers and anti-skid operative.
(c) No data available for Airbus aircraft; 15% increase in runway length over dry conditions was assumed for wet conditions.
(d) No runway length data available for this aircraft; same performance as the A300B4-203 was assumed.

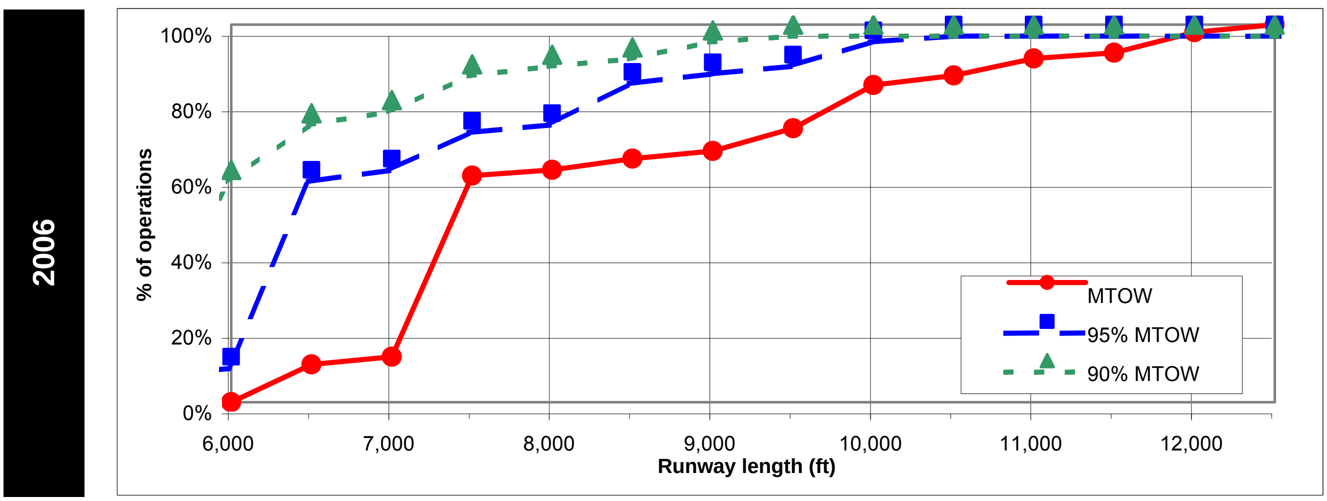
Sources: Fleet mix - Leigh Fisher Associates, April 2002.
Runway length requirements - The Boeing Company and Airbus Industries aircraft performance manuals, various dates.

FIGURE D-1

Departure Runway Length Requirements

Total Air Carrier Cargo Fleet Mix





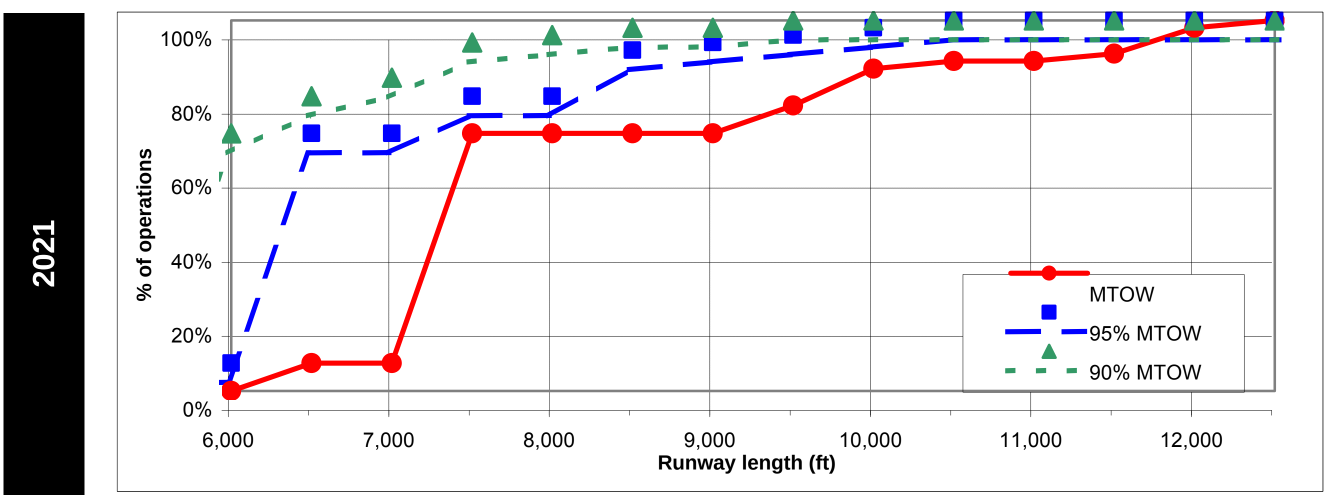
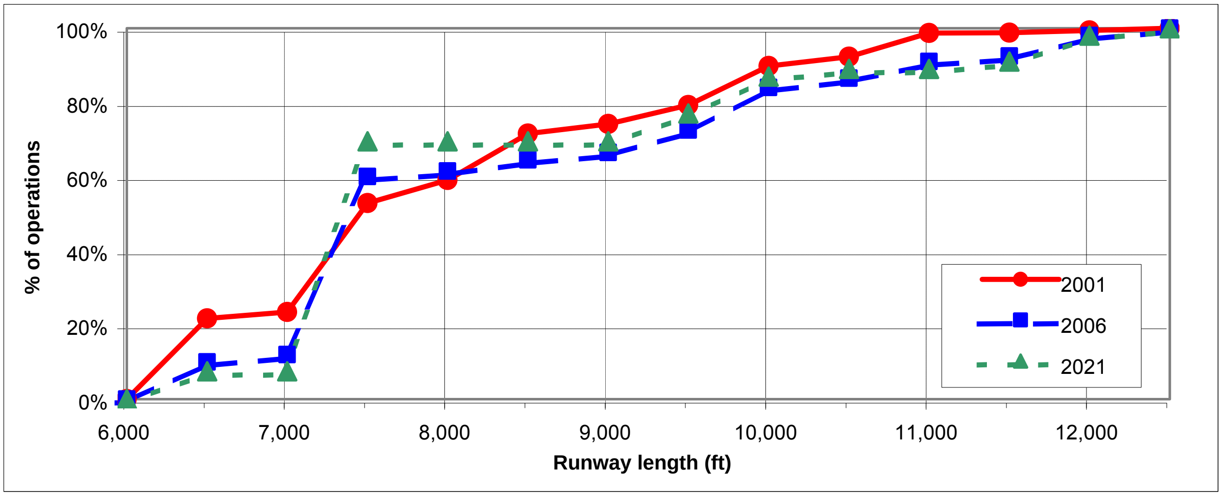


FIGURE D-2

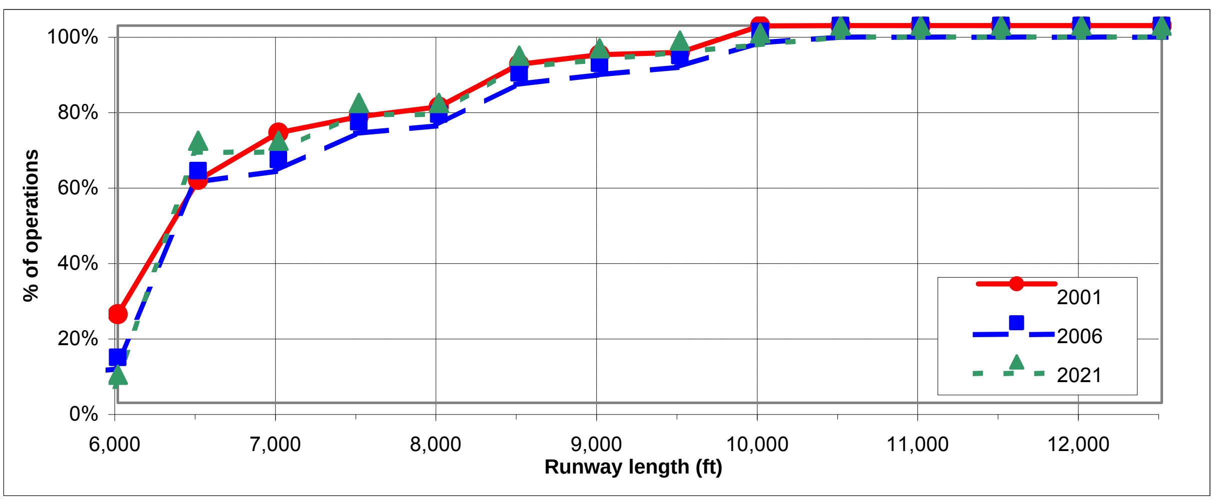
Departure Runway Length Requirements

Total Air Carrier Cargo Fleet Mix

MTOW



95% MTOW



90% MTOW

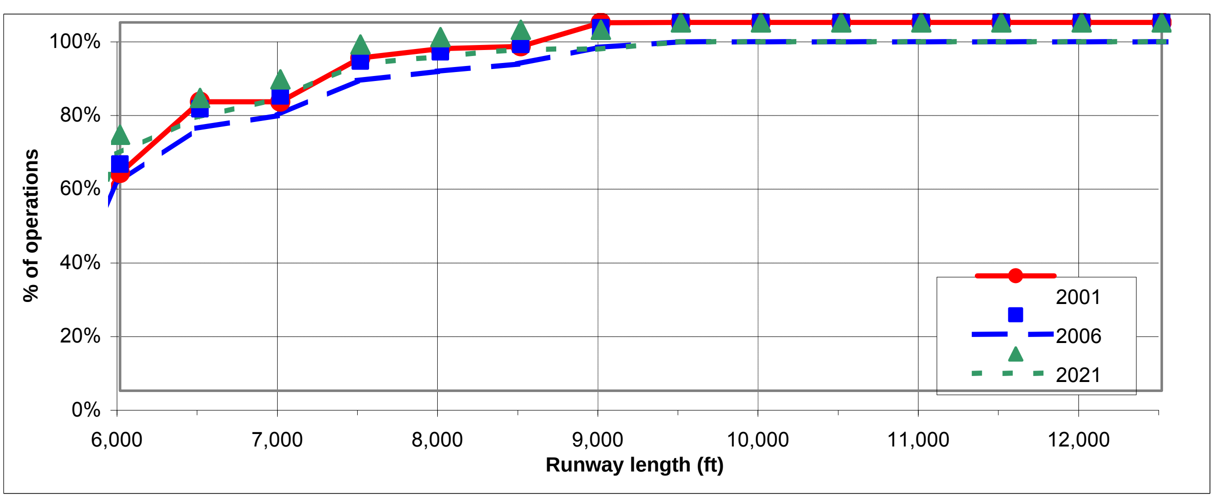
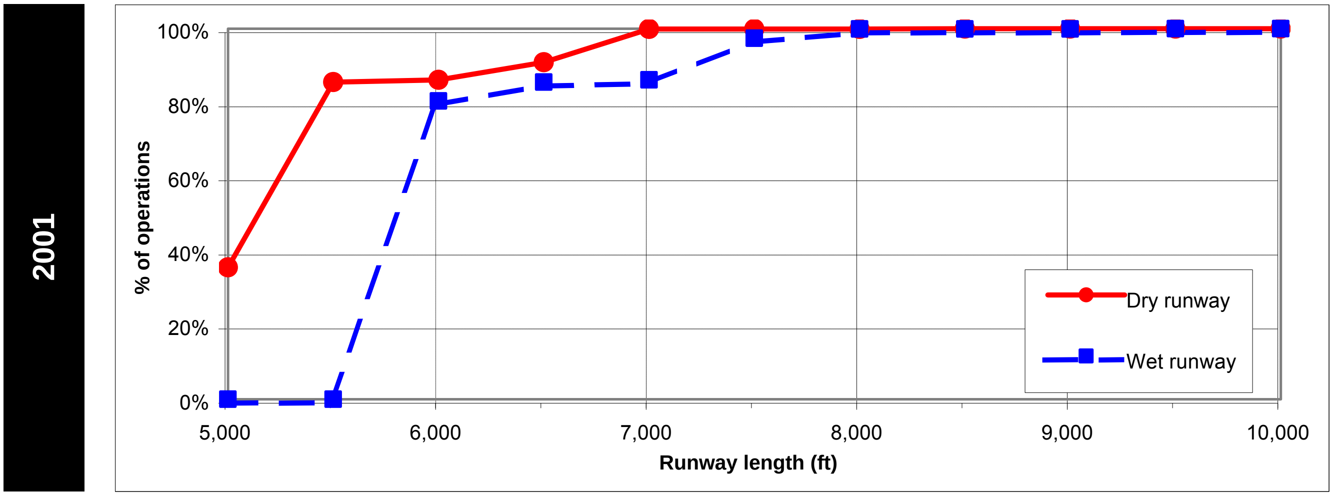
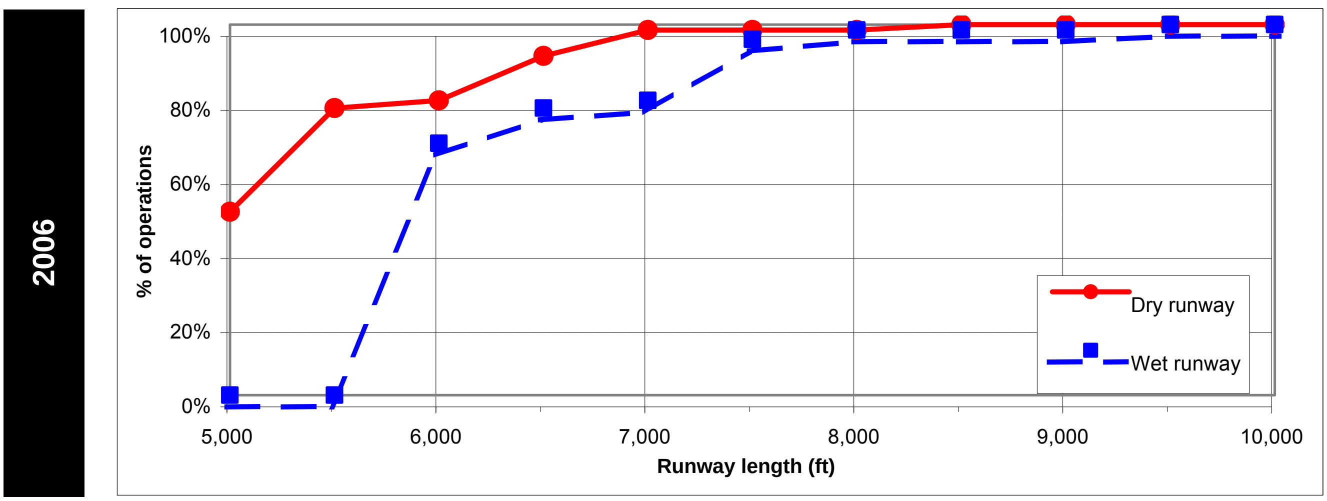


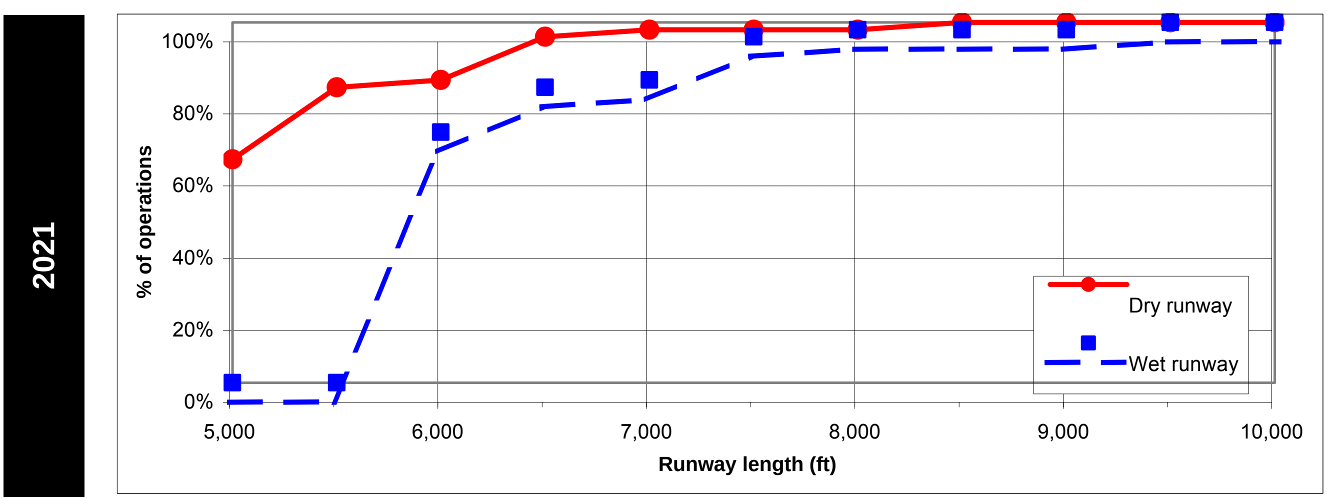
FIGURE D-3

Arrival Runway Length Requirements

Total Air Carrier Cargo Fleet Mix







Appendix E

AIRCRAFT NOISE ANALYSIS

2013 UPDATE: The data in this appendix has not been updated.

This appendix provides a discussion of the general characteristics of aircraft noise and the methodologies used to analyze aircraft noise for Mather Airport.

NOISE MEASUREMENT

Noise is defined as unwanted sound. In other words, noise is sound that disturbs routine activities or quiet, and/or causes feelings of annoyance. Whether sound is interpreted as pleasant (e.g., music) or unpleasant (e.g., jackhammer) depends largely upon the listener's current activity, past experience, and attitude toward the source.

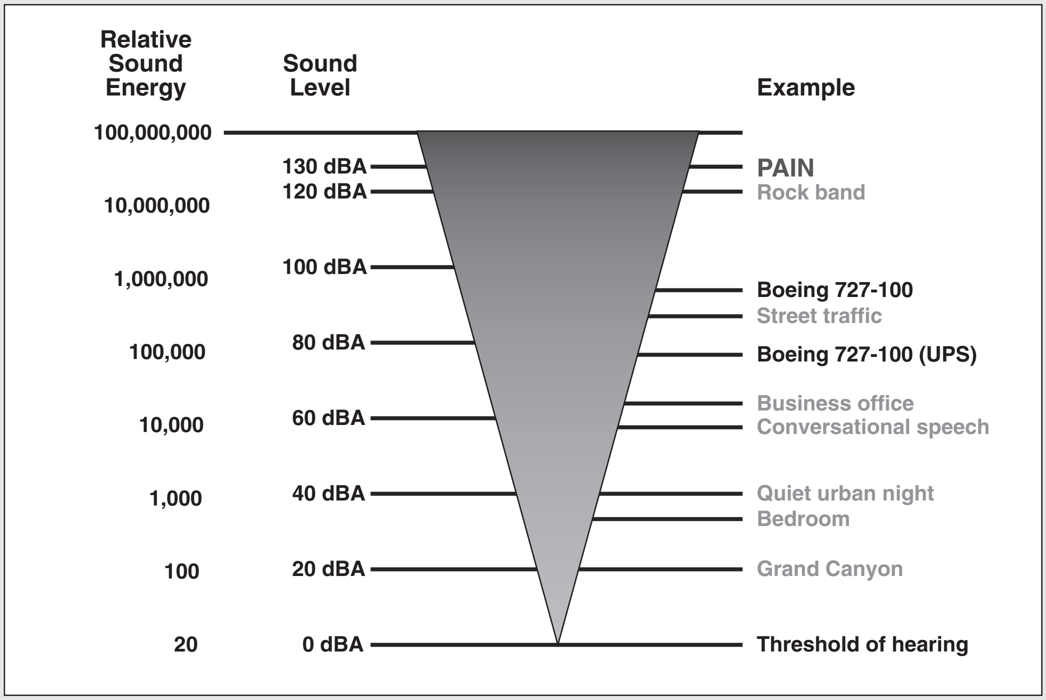
Characteristics of Sound

Sound is transmitted by alternating compression and decompression in air pressure. These relatively small changes in atmospheric pressure are called sound waves. The measurement and human perception of sound involve two physical characteristics—intensity and frequency. Intensity is a measure of the strength or magnitude of the sound vibrations, and is expressed in terms of the sound pressure level (SPL). The higher the SPL, the more intense the perception of that sound. The other characteristic is sound frequency, or "pitch"—the speed of vibration. Frequencies are expressed in terms of cycles per second or hertz (Hz). Examples of low frequency sounds might be characterized as a rumble or roar, while high frequency sounds are typified by sirens or screeches. Noise analysis accounts for both of these characteristics in the units used to measure sound.

Decibel (dB). The human ear is sensitive to an extremely wide range of sound intensity, which covers a relative scale of from 1 to 100,000,000. Representation of sound intensity using a *linear* index becomes difficult due to this wide range. As a result, the decibel, a logarithmic measure of the magnitude of sound, is typically used. Sound intensity is measured in terms of sound levels ranging from 0 dB, which is approximately the threshold of hearing, to 130 dB, which is the threshold of pain. Figure E-1 presents a comparison of the sound pressure levels of typical events.

Figure E-1

NOISE METRICS—TYPICAL SOUND LEVELS



Source: Leigh Fisher Associates, from various sources, 1999.

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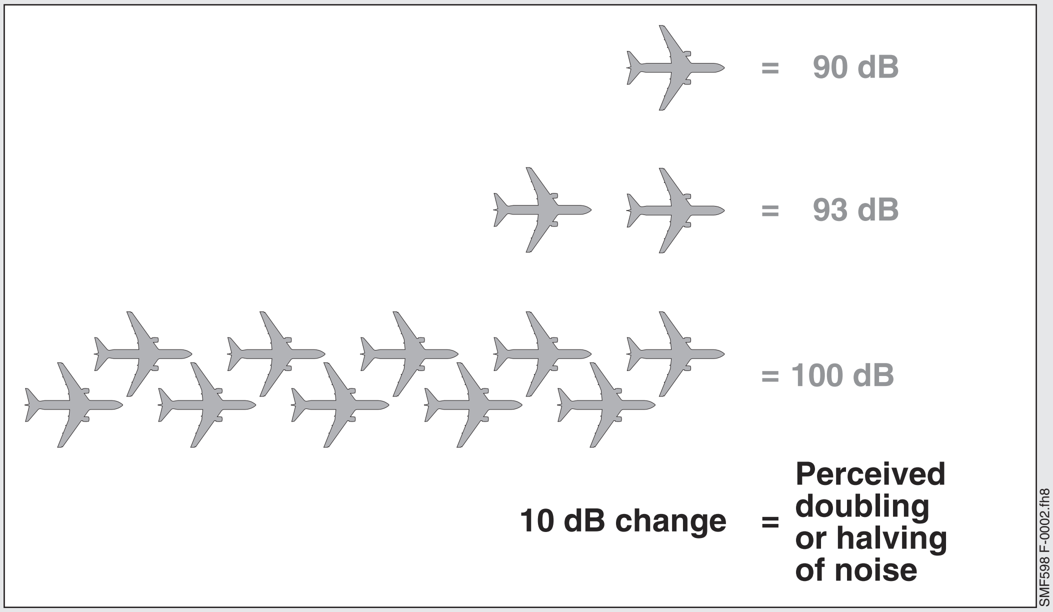
Because of the logarithmic unit of measurement, decibels cannot be added or subtracted linearly (see Figure E-2); however, a number simple "rules" are useful.

- If two sounds of the same level are added, the sound level increases by approximately 3 dB. For example: 60 dB + 60 dB = 63 dB.
- The sum of two sounds of different levels is only slightly higher than the louder level. For example: 60 dB + 70 dB = 70.4 dB.
- Sound from a "point source," such as an aircraft, decreases approximately 6 dB for each doubling of distance.
- Although the human ear can detect a sound as faint as 1 dB, the typical person does not perceive changes of less than approximately 3 dB.
- A 10 dB change in sound level is perceived by the average person as a doubling, or halving, of the sound's loudness.

Figure E-2

NOISE METRICS—DECIBEL (dB) ADDITION



Source: Leigh Fisher Associates, 1999.

A-Weighted Decibel. Humans are most sensitive to frequencies near the normal range of speech communications. "A-weighting" reflects this sensitivity by emphasizing mid-range frequencies and de-emphasizing high and low frequencies (see Figure E-3). Since the A-weighted decibel (dBA) provides a better prediction of human reaction to environmental noise than the unweighted decibel, it is used as the basis for the metrics most frequently used in noise compatibility planning.*

Additional Noise Metrics

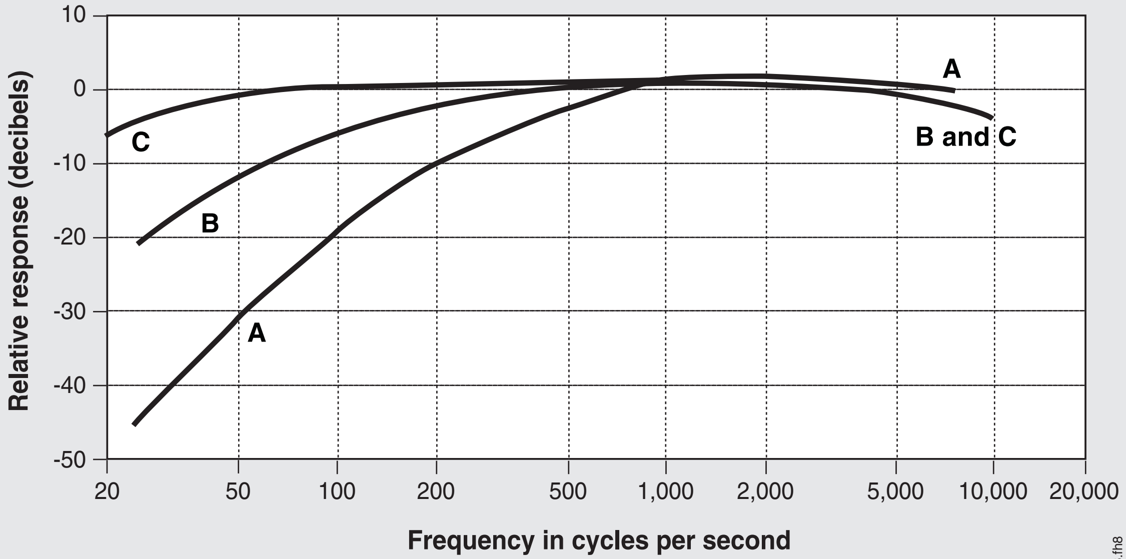
The measurement of sound is not a simple task. Consider typical sounds in a suburban neighborhood on a normal or "quiet" afternoon. If a short time in history of those sounds is plotted on a graph, it would look very much like Figure E-4

In Figure E-4, the background, or residential, sound level in the absence of any identifiable noise sources is approximately 45 dB. During roughly three-quarters of the time, the sound level is 50 dB or less. The highest sound level, caused by a nearby sports car is approximately 70 dB, while an aircraft generates a maximum

*Chantlett, E. T., *Environmental Protection*, McGraw-Hill Book Co. New York, 1973.

Figure E-3

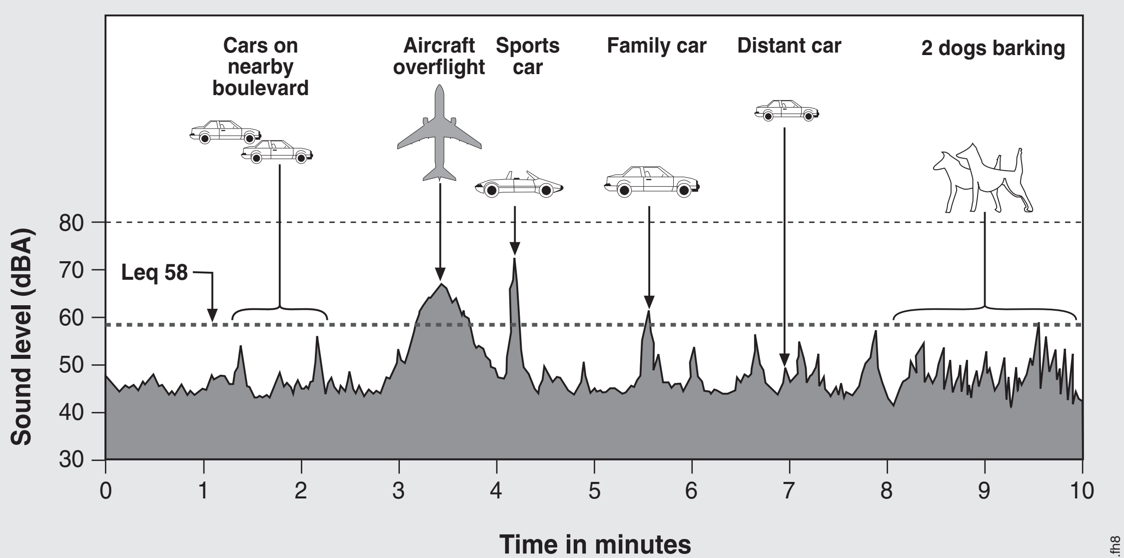
NOISE METRICS—FREQUENCY RESPONSE



Source: A. Peterson and E. Gross, *Handbook of Noise Control,* West Concord: General Radio Company, 1967.

Figure E-4

NOISE METRICS—COMPARATIVE NOISE LEVELS



Source: United States Environmental Protection Agency, *Protective Noise Levels, Condensed Version of EPA Levels Document,* November 1978.

sound level of about 68 dB. The following subsections provide a discussion of how variable community noise is measured.

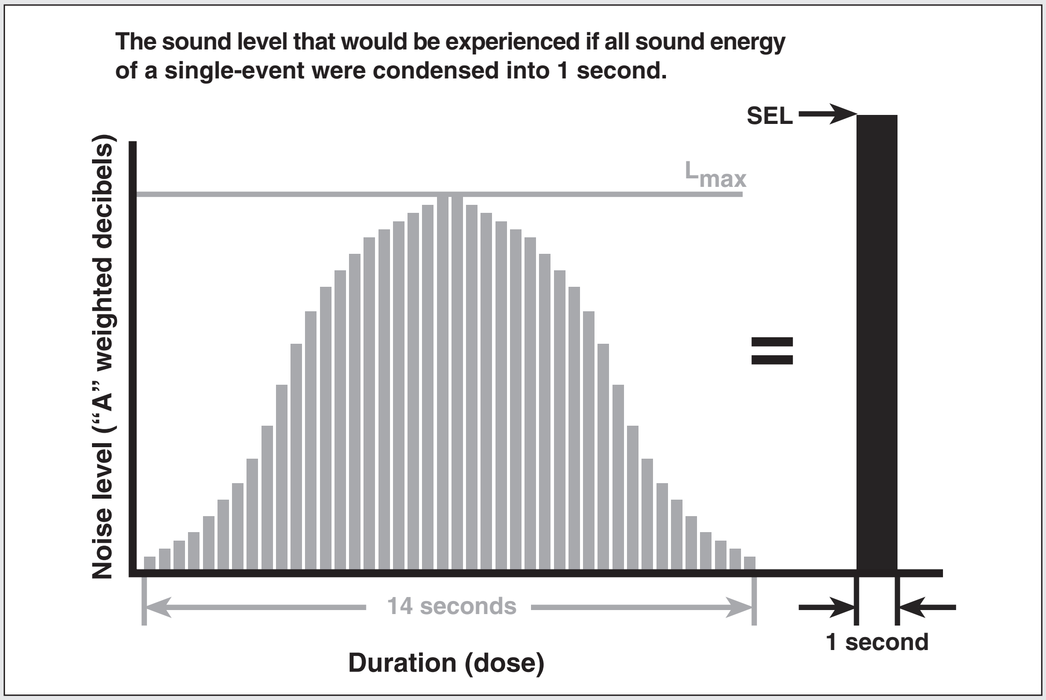
Maximum Sound Level. One way of describing noise is to measure the maximum sound level—typified by the sports car at 70 dB on Figure E-4. The maximum sound level measurement does not account for the duration of the sound. Studies have shown that human response to noise involves both the maximum level and its duration. For example, the aircraft in this case is not as loud as the sports car, but the aircraft sound lasts longer. For most people, the aircraft overflight would be more annoying than the sports car. Thus, the maximum sound level alone is not sufficient to predict reaction to environmental noise.

Sound Exposure Level. Clearly, the longer a noise lasts the more it disrupts activity and the more annoying it is likely to be. Laboratory tests indicate that the acceptability of noise decreases at a rate of roughly 3 dB per doubling of duration.* In other words, two sounds would be judged equally acceptable if one had an intensity of 3 dB more than the other, but half the duration of the other. Accordingly, a second way to describe noise is to measure the sound exposure level (SEL), which is the total sound energy of a single sound event. By accounting for both intensity and duration, SEL allows us to compare the "annoyance" of different events. One way to understand SEL is to think of it as the sound level you would experience if all of the sound energy of a sound event occurred in one second (see Figure E-5). This normalization to a duration of one second allows the direct comparison of sounds of different duration. In the sample time history on Figure E-4, the sports car generates an SEL of about 77 dB, while the aircraft generates an SEL of about 81 dB.

*Galloway, William J., "Predicting Community Response to Noise from Laboratory Data," in *Transportation Noises: A Symposium on Acceptability Criteria*, Ann Arbor Science Publishers, Ann Arbor Michigan, 1970.

Figure E-5

NOISE METRICS—SOUND EXPOSURE LEVEL (SEL)



Source: Leigh Fisher Associates, 1999.

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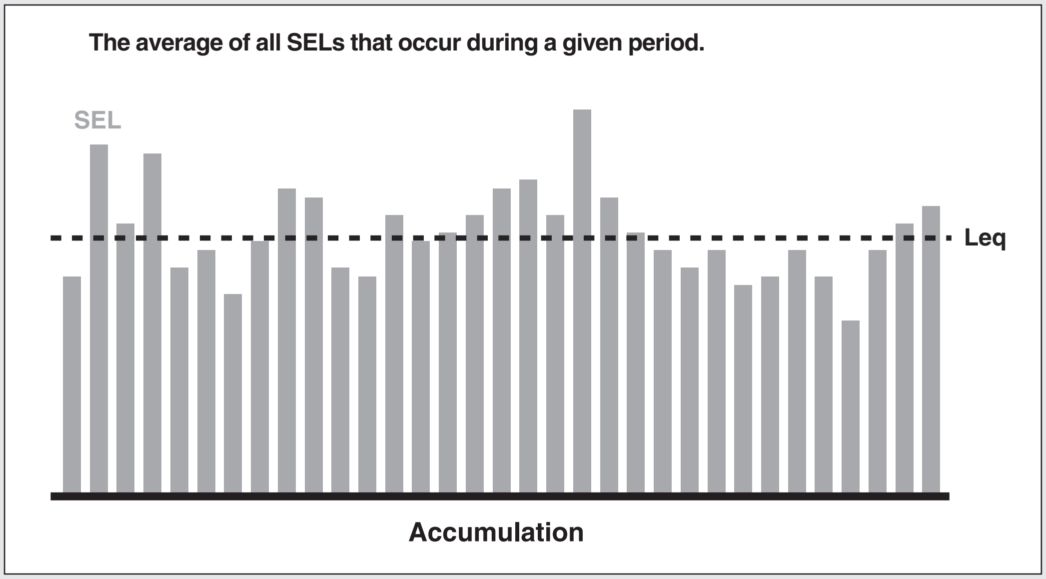
Equivalent Sound Level. The maximum sound level and sound exposure level measure individual events. The number of events can also be an important consideration in estimating the effect of noise. One way to describe this factor might be to count the number of events exceeding SEL 80 dBA, plus the number that exceed SEL 75 dBA, plus the number that exceed SEL 70 dBA, etc. A more efficient way to describe both the number of such events and the sound exposure level of each is the time-average of the total sound energy over a specified period (see Figure E-6), referred to as the equivalent sound level (L_{eq}). Research indicates that community reaction to noise corresponds to the total acoustic energy that is represented by the L_{eq}. In the example shown on Figure E-6, the L_{eq} is roughly 56 dBA. This accounts for all of the sound energy during the sample period and provides a single-number descriptor.

Figure E-6

NOISE METRICS—EQUIVALENT SOUND LEVEL (Leq)



Source: Leigh Fisher Associates, 1999.

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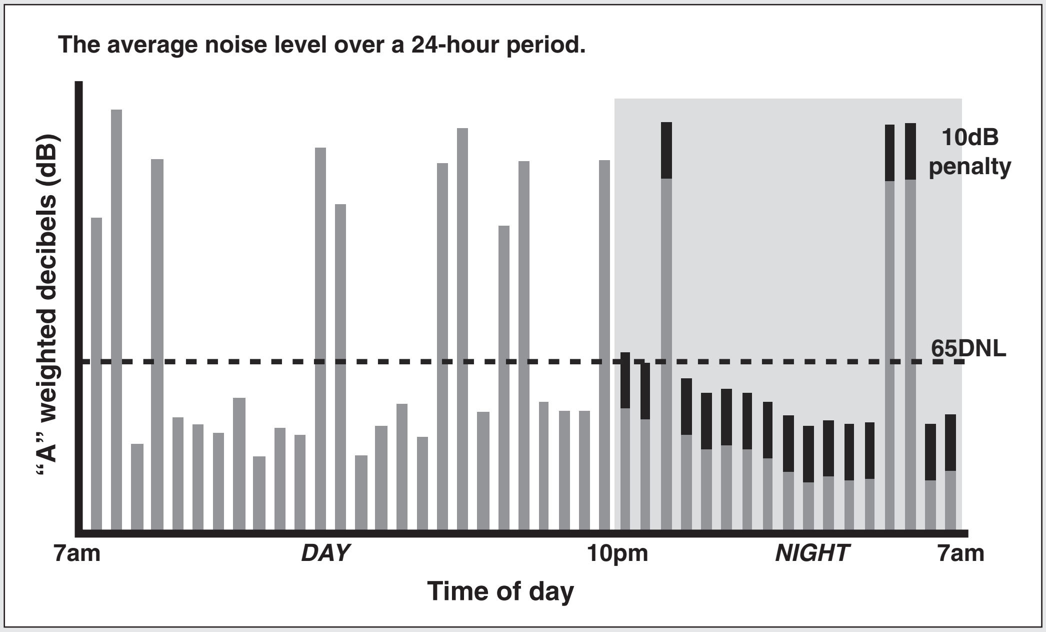
Day-Night Average Sound Level. One additional factor is also important in measuring sound—the occurrence of sound events during nighttime hours. People are normally more sensitive to intrusive sound events at night, and the background sound levels are normally lower at night because of decreased human activity. Therefore, noise events during the nighttime hours are likely to be more annoying than noise events at other times. To account for these factors, the day-night average sound level (DNL) adds a 10 dB penalty to sound levels occurring during the nighttime period (10:00 p.m. and 6:59 a.m.) (see Figure E-7). In essence, DNL is the 24-hour equivalent sound level (or L_{eq} 24), including the 10 dB penalty. This 10 dB penalty means that one nighttime sound event is equivalent to 10 daytime events of the same level. DNL has been identified by the U.S. Environmental Protection Agency (U.S. EPA) as the principal metric for airport noise analysis.*

DNL is expressed as an average noise level on the basis of annual aircraft operations for a calendar year. To calculate the DNL at a specific location, SELs for that particular location are determined for each aircraft operation (landing or takeoff). The SEL for each operation is then adjusted to reflect the duration of the operation

*U.S. Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, U.S. EPA Report No. 550/9-74-004, 1974.

Figure E-7

NOISE METRICS—DAY-NIGHT AVERAGE SOUND LEVEL (DNL)



Source: Leigh Fisher Associates, 1999.

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and arrive at a "partial" DNL for the operation. The partial DNLs are then added logarithmically—with the appropriate penalty for those operations occurring during the nighttime hours—to determine total noise exposure levels for the average day of the year.

The logarithmic addition process described earlier also applies to DNL. For example, a DNL increase or decrease of 3 dB would require either a doubling or halving of aircraft operations (assuming the same types of aircraft and the same proportion of nighttime activity). This same change of 3 dB could also be achieved by an average change of 3 dB per aircraft operation.

DNL is used to describe the existing and predicted cumulative noise exposure for communities in airport environs in most of the United States, and to estimate the effects of airport operations on land use compatibility. DNL has been widely accepted as the best available method to describe aircraft noise exposure and is the noise descriptor required by the FAA for use in aircraft noise exposure analyses and noise compatibility planning.*

Community Noise Equivalent Level. A variant of the DNL used in California and Europe is the community noise equivalent level (CNEL). Although FAR Part 150 requires that an airport operator use DNL, the FAA permits use of the CNEL metric for those civil airports in the State of California. A given CNEL value essentially averages the sound levels at a location over a 24-hour average sound level, weighted as follows: (1) aircraft noise occurring during the evening period (7:00 p.m. to 9:59 p.m.) has a 5-dB penalty, and (2) aircraft noise occurring during the nighttime period (10:00 p.m. to 6:59 a.m.) has a 10-dB penalty.** The 5- and 10-dB penalties represent the added intrusiveness of sounds that occur during sleeping hours, both because of the increased sensitivity to noise during sleep, and because ambient sound levels during evening and nighttime hours are typically about 5 and 10 dB lower than during daytime hours.

INTEGRATED NOISE MODEL

The FAA's Integrated Noise Model (INM) is a computer model used to develop aircraft noise exposure maps and is the primary means for calculating the level of aircraft noise at and around airports. The INM uses a database of aircraft noise characteristics to predict CNEL or DNL based on user input on the types and number of aircraft operations, annual average airport operating conditions, average aircraft performance, and aircraft flight patterns. Consistent with the CNEL metric, the primary use of the INM is to produce estimates of annual average noise conditions in an airport environs.

INM Database

The INM aircraft database includes information for commercial, general aviation, and military aircraft powered by turbojet, turbofan, or propeller-driven engines. For each aircraft in the database, the following information is provided: (1) a set of departure profiles for each applicable trip length, (2) a set of approach parameters, and (3) SEL versus distance curves for several thrust settings. As described above, SEL is essentially an A-weighted sound level corrected for time-duration effects. Thus, SEL represents the total noise exposure for each individual aircraft event.

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*Federal Aviation Administration, Federal Aviation Regulations Part 150, *Airport Noise Compatibility Planning*, Appendix A, 1984.

**California Airport Noise Standards, California Code of Regulations, Title 21, §5000 *et seq.* 1990.

Noise Contours

The noise exposure maps derived from the INM consist of noise contours, or lines of equal noise exposure, expressed in terms of CNEL or DNL. These noise contours are analogous to topographic contour maps in that a set of concentric contours representing successively lower levels of CNEL that extend outward from the airport's runways. According to FAA Order 5050.4A, CNEL 75+ is considered to represent "severe" noise exposure, while CNEL 65 represents the threshold of "significant" noise exposure.

Limitations of Noise Modeling

The validity and accuracy of noise modeling depend on the basic information used in the calculations. For future airport activities, the reliability of calculations is affected by a number of uncertainties:

- Aviation activity levels—i.e., the forecast number of aircraft operations, the types of aircraft serving the airport, the times of operation (daytime, evening, and nighttime), and aircraft flight tracks—are estimates. The achievement of the estimated levels of activity cannot be assured.

- Aircraft acoustical and performance characteristics are also estimates. When new aircraft designs are involved, aircraft noise data and flight characteristics must be estimated.

- The CNEL and related metrics represent typical human response to aircraft noise. Because people vary in their responses to noise, the CNEL scale can show only an average response to aircraft noise that might be expected from a community, but cannot predict an individual's reaction.

- Single flight tracks are used, as required, in computer modeling to represent a wider band of actual flight tracks.

The above considerations result in more reliable noise contours for existing conditions than those projected for future conditions. Also, noise contours are more reliable closer to the airport. As the distance from the airport increases, the potential for aircraft to deviate significantly from the assumed profiles and flight tracks also increases. Accordingly, noise exposure mapping is best used for comparative purposes rather than for providing absolute values. That is, calculations provide valid comparisons between different projected conditions so long as consistent assumptions are used for all calculations. Thus, sets of CNEL calculations can show (1) which of a series of potential situations would be better, and generally how much better, from the standpoint of noise exposure, or (2) anticipated changes in aircraft noise exposure over time.

AIRCRAFT OPERATIONS DATA AND ASSUMPTIONS USED FOR THIS MASTER PLAN

This section presents an overview of the assumptions and basic data used in the noise analysis conducted for the Mather Airport Master Plan. An aircraft noise analysis depends largely on aircraft operations data, which include annual aircraft activity levels, fleet mix, stage length data, and operations by time of day. A noise analysis is also dependent on airport operational assumptions, which include information on annual average runway use and flight tracks. Each of these factors is ultimately used as input to the INM to generate noise exposure maps, as discussed throughout the remainder of this appendix.

Aircraft Operations

Accurate aircraft operations data are critical to the development of noise contours. Average daily operations are derived by dividing total annual operations by 365 days.

Annual and average daily aircraft operations for PAL 1 and PAL 2 are provided in Table E-1. Total average daily aircraft operations are anticipated to increase from 232.1 at PAL 1 to 325.8 at PAL 2.

Table E-1

PROJECTED ANNUAL AND AVERAGE DAY AIRCRAFT OPERATIONS
Mather Airport

	Annual		Average annual day	
	PAL 1	PAL 2	PAL 1	PAL 2
Air carrier cargo	7,300	15,300	20.0	41.9
Commuter air cargo	9,600	19,500	26.3	53.4
Air taxi	6,500	6,800	17.8	18.6
General aviation	54,000	70,000	147.9	191.8
Military	7,300	7,300	20.0	20.0
Total operations	84,700	118,900	232.1	325.8

Note: Columns may not add to totals shown because of rounding.

Source: Leigh Fisher Associates, May 2002.

Aircraft Fleet Mix, Stage Length, and Time of Day of Operation

The assumed aircraft fleet mix, stage length, and number of operations by time of day for an average day at Mather Airport in 2001 (current Airport activity) are provided in Table E-2. Similar information for PAL 1 and PAL 2 is provided in Tables E-3 and E-4, respectively.

Stage length refers to the average distance an aircraft travels nonstop. Aircraft noise characteristics can vary depending on the takeoff weight of the aircraft. Thus, departure operations in the INM are divided into seven stage length categories that correspond to approximate nonstop flight distances. Each stage length associates the aircraft operation with a takeoff weight that represents a typical fuel requirement. Stage length assumptions remain constant for all alternatives.

Because 5 and 10 dBA penalties are added for evening and night operations, CNEL contours can vary depending on the time of day an operation occurs. It was assumed that day, evening, and night split assumptions for all aircraft categories will remain constant for all alternatives. Day, evening, and night split assumptions were developed from a 2001 Automated Radar Terminal Systems (ARTS) data sample. Additional day, evening, and night split assumptions for general aviation and military operations were based on information provided by Mather Airport traffic control tower personnel.

Runway Use

The existing and assumed future use of Mather's runways is important in determining where aircraft are flying and what flight tracks pilots are following. It was assumed that approximately 95% of future aircraft operations will occur in west flow; that is, aircraft will be arriving on and departing from either Runway 22L or 22R. Approximately 5% of future aircraft operations will occur in east flow; that is, aircraft will be arriving on and departing from either Runway 4R or 4L. Anticipated runway use for each alternative is shown on Figure E-8. Runway use was estimated based on a 2001 ARTS data sample and was generally confirmed by historical data.

Flight Tracks

A flight track is a projection on the ground of an aircraft's path in the sky. Because of meteorological conditions, aircraft types, destinations, and pilot judgment, no two flight tracks are the same. To obtain a clear indication of where aircraft are flying, generalized flight tracks were developed based on actual observations and information provided by Airport management and operations personnel. Figure E-9 depicts typical generalized departure, arrival, and touch-and-go flight tracks developed to model noise at Mather.

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Table E-2

AVERAGE DAY AIRCRAFT OPERATIONS BY TYPE, TIME OF DAY, AND STAGE LENGTH—2001

Mather Airport

Fleet mix			Arrivals			Departures (stage length): 0-500 miles			Departures (stage length): 500-1,000 miles			Departures (stage length): 1,000-1,500 miles			Departures (stage length): 1,500-2,500 miles			Touch and go			Total
Category	Aircraft type	INM type	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	operations
Air carrier cargo	A300	A300	0.29	--	0.15	0.02	0.02	0.01	--	--	--	0.05	0.07	0.02	0.09	0.13	0.04				
	A300-600	A300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
	A310	A310	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
	B-727-100	727QF	0.05	0.04	0.18	0.02	0.05	0.08	0.01	0.02	0.03	0.00	0.01	0.02	0.01	0.01	0.02				
	B-727-200	727EM2	0.87	0.65	2.83	0.36	0.72	1.32	0.13	0.26	0.48	0.07	0.13	0.24	0.10	0.20	0.36				
	B-747	74720B	0.17	--	0.09	0.01	0.01	0.00	--	--	--	0.03	0.04	0.01	0.05	0.08	0.02				
	B-757	757PW	0.61	0.46	2.00	0.25	0.51	0.93	0.09	0.18	0.34	0.05	0.09	0.17	0.07	0.14	0.25				
	B-767	767CF6	0.69	--	0.37	0.04	0.05	0.02	--	--	--	0.11	0.16	0.05	0.22	0.32	0.10				
	DC-8	DC870	0.44	--	0.24	0.02	0.03	0.01	--	--	--	0.07	0.10	0.03	0.14	0.20	0.06				
	DC-9	DC93LW	0.04	0.03	0.12	0.01	0.03	0.05	0.01	0.01	0.02	0.00	0.01	0.01	0.00	0.01	0.01				
	DC-10	DC1030	0.08	--	0.04	0.00	0.01	0.00	--	--	--	0.01	0.02	0.01	0.03	0.04	0.01				
	MD-11	MD11PW	0.01	--	0.00	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00				
		Subtotal	3.25	1.18	6.02	0.74	1.43	2.42	0.24	0.47	0.87	0.39	0.62	0.55	0.72	1.13	0.88	--	--	--	20.92
Commuter air cargo	Turboprop	DHC8	0.77	0.10	1.06	0.67	0.10	1.15													
		PA31	4.15	0.52	0.52	1.04	0.26	3.89													
	Single engine piston	CNA208	2.39	--	0.42	2.11	--	0.70													
		Subtotal	7.30	0.61	2.00	3.82	0.36	5.74	--	--	--	--	--	--	--	--	--	--	--	--	19.83
Air taxi	Regional jet	EMB135	--	--	--	--	--	--													
	Turboprop	BEC190	4.70	0.26	0.26	3.65	0.26	1.30													
		CNA441	2.86	0.16	0.16	2.22	0.16	0.79													
	Multiengine piston	BEC58P	0.65	0.04	0.04	0.51	0.04	0.18													
		Subtotal	8.20	0.46	0.46	6.38	0.46	2.28	--	--	--	--	--	--	--	--	--	--	--	--	18.23
General aviation	Corporate jet	CIT3	1.10	0.21	0.07	0.76	0.09	0.04	0.23	0.03	0.01	0.12	0.01	0.01	0.06	0.01	0.00				
		CL600	1.10	0.21	0.07	0.76	0.09	0.04	0.23	0.03	0.01	0.12	0.01	0.01	0.06	0.01	0.00				
		CNA500	1.10	0.21	0.07	0.76	0.09	0.04	0.23	0.03	0.01	0.12	0.01	0.01	0.06	0.01	0.00				
		GIV	1.10	0.21	0.07	0.76	0.09	0.04	0.23	0.03	0.01	0.12	0.01	0.01	0.06	0.01	0.00				
		LEAR25	1.10	0.21	0.07	0.76	0.09	0.04	0.23	0.03	0.01	0.12	0.01	0.01	0.06	0.01	0.00				
		LEAR35	1.10	0.21	0.07	0.76	0.09	0.04	0.23	0.03	0.01	0.12	0.01	0.01	0.06	0.01	0.00				
	Turboprop	CNA441	8.63	1.85	1.85	8.20	0.59	2.93	0.43	0.03	0.15	--	--	--	--	--	--	2.60	0.14	--	
	Multiengine piston	BEC58P	7.19	1.54	1.54	7.05	0.50	2.52	0.14	0.01	0.05	--	--	--	--	--	--	10.41	0.55	--	
	Single engine piston	GASEPV	9.25	0.82	0.21	9.06	0.50	0.50	0.18	0.01	0.01	--	--	--	--	--	--	39.05	2.06	--	
		Subtotal	31.65	5.45	4.01	28.86	2.13	6.22	2.16	0.22	0.30	0.70	0.08	0.04	0.35	0.04	0.02	52.07	2.74	--	137.01
Military	Military C-5A	C5	0.96	0.02	--	0.91	0.02	--	0.05	0.00	--	--	--	--	--	--	--	0.00	0.00	--	
	Military C-130	C130	0.96	0.02	--	0.91	0.02	--	0.05	0.00	--	--	--	--	--	--	--	0.97	0.02	--	
	Fighter/Trainer	A7D	0.96	0.02	--	0.91	0.02	--	0.05	0.00	--	--	--	--	--	--	--	17.44	0.36	--	
	Helicopter	CNA441	3.59	0.07	--	3.59	0.07	--	--	--	--	--	--	--	--	--	--	0.97	0.02	--	
		Subtotal	6.46	0.13	--	6.32	0.13	--	0.14	0.00	--	--	--	--	--	--	--	19.38	0.40	--	32.96
Grand total			56.87	7.83	12.49	46.11	4.50	16.66	2.54	0.69	1.17	1.09	0.70	0.59	1.07	1.17	0.90	71.45	3.14	--	228.95

Note: INM types for general aviation aircraft are representative and may represent multiple aircraft types.

Day = 7:00 a.m. to 6:59 p.m.
Evening = 7:00 p.m. to 9:59 p.m.
Night = 10:00 p.m. to 6:59 a.m.

Source: Leigh Fisher Associates, May 2002.

Table E-3

PROJECTED AVERAGE DAY AIRCRAFT OPERATIONS BY TYPE, TIME OF DAY, AND STAGE LENGTH—PAL 1

Mather Airport

Fleet mix			Arrivals			Departures (stage length): 0-500 miles			Departures (stage length): 500-1,000 miles			Departures (stage length): 1,000-1,500 miles			Departures (stage length): 1,500-2,500 miles			Touch and go			Total
Category	Aircraft type	INM type	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	operations
Air carrier cargo	A300	A300	0.49	--	0.26	0.03	0.04	0.01	--	--	--	0.08	0.11	0.03	0.16	0.23	0.07				
	A300-600	A300	0.16	--	0.09	0.01	0.01	0.00	--	--	--	0.03	0.04	0.01	0.05	0.08	0.02				
	A310	A310	0.23	--	0.12	0.01	0.02	0.01	--	--	--	0.04	0.05	0.02	0.07	0.11	0.03				
	B-727-100	727QF	0.04	0.03	0.13	0.02	0.03	0.06	0.01	0.01	0.02	0.00	0.01	0.01	0.00	0.01	0.02				
	B-727-200	727EM2	0.20	0.15	0.65	0.08	0.17	0.30	0.03	0.06	0.11	0.02	0.03	0.06	0.02	0.05	0.08				
	B-747	74720B	0.16	--	0.09	0.01	0.01	0.00	--	--	--	0.03	0.04	0.01	0.05	0.08	0.02				
	B-757	757PW	0.96	0.72	3.12	0.40	0.79	1.45	0.14	0.29	0.53	0.07	0.14	0.26	0.11	0.22	0.40				
	B-767	767CF6	0.78	--	0.42	0.04	0.06	0.02	--	--	--	0.13	0.18	0.05	0.25	0.36	0.11				
	DC-8	DC870	0.29	--	0.16	0.02	0.02	0.01	--	--	--	0.05	0.07	0.02	0.09	0.14	0.04				
	DC-9	DC93LW	0.04	0.03	0.13	0.02	0.03	0.06	0.01	0.01	0.02	0.00	0.01	0.01	0.00	0.01	0.02				
	DC-10	DC1030	0.26	--	0.14	0.01	0.02	0.01	--	--	--	0.04	0.06	0.02	0.08	0.12	0.04				
	MD-11	MD11PW	0.10	--	0.05	0.01	0.01	0.00	--	--	--	0.02	0.02	0.01	0.03	0.05	0.01				
		Subtotal	3.71	0.93	5.36	0.64	1.21	1.93	0.19	0.37	0.68	0.49	0.76	0.51	0.94	1.42	0.85	--	--	--	20.00
Commuter air cargo	Turboprop	DHC8	1.14	0.14	1.57	1.00	0.14	1.71													
		PA31	5.26	0.66	0.66	1.32	0.33	4.93													
	Single engine piston	CNA208	3.17	0.00	0.56	2.79	0.00	0.93													
		Subtotal	9.57	0.80	2.78	5.11	0.47	7.57	--	--	--	--	--	--	--	--	--	--	--	--	26.30
Air taxi	Regional jet	EMB135	2.07	3.00	0.10	2.07	0.00	3.10													
	Turboprop	BEC190	0.00	0.00	0.00	0.00	0.00	0.00													
		CNA441	2.72	0.15	0.15	2.12	0.15	0.76													
	Multiengine piston	BEC58P	0.64	0.04	0.04	0.50	0.04	0.18													
		Subtotal	5.43	3.18	0.29	4.68	0.19	4.03	--	--	--	--	--	--	--	--	--	--	--	--	17.81
General aviation	Corporate Jet	CIT3	1.48	0.28	0.09	1.02	0.12	0.06	0.31	0.04	0.02	0.16	0.02	0.01	0.08	0.01	0.00				
		CL600	1.48	0.28	0.09	1.02	0.12	0.06	0.31	0.04	0.02	0.16	0.02	0.01	0.08	0.01	0.00				
		CNA500	1.48	0.28	0.09	1.02	0.12	0.06	0.31	0.04	0.02	0.16	0.02	0.01	0.08	0.01	0.00				
		GIV	1.48	0.28	0.09	1.02	0.12	0.06	0.31	0.04	0.02	0.16	0.02	0.01	0.08	0.01	0.00				
		LEAR25	1.48	0.28	0.09	1.02	0.12	0.06	0.31	0.04	0.02	0.16	0.02	0.01	0.08	0.01	0.00				
		LEAR35	1.48	0.28	0.09	1.02	0.12	0.06	0.31	0.04	0.02	0.16	0.02	0.01	0.08	0.01	0.00				
	Turboprop	CNA441	9.32	2.00	2.00	8.85	0.63	3.16	0.47	0.03	0.17	--	--	--	--	--	--	2.81	0.15	--	
	Multiengine piston	BEC58P	6.99	1.50	1.50	6.85	0.49	2.45	0.14	0.01	0.05	--	--	--	--	--	--	11.24	0.59	--	
	Single engine piston	GASEPV	8.99	0.80	0.20	8.81	0.49	0.49	0.18	0.01	0.01	--	--	--	--	--	--	42.16	2.22	--	
		Subtotal	34.18	5.96	4.25	30.64	2.33	6.46	2.67	0.28	0.34	0.94	0.11	0.06	0.47	0.06	0.03	56.22	2.96	--	147.95
Military	Military C-5A	C5	0.59	0.01	--	0.56	0.01	--	0.03	0.00	--	--	--	--	--	--	--	0.00	0.00	--	
	Military C-130	C130	0.59	0.01	--	0.56	0.01	--	0.03	0.00	--	--	--	--	--	--	--	0.59	0.01	--	
	Fighter/Trainer	A7D	0.59	0.01	--	0.56	0.01	--	0.03	0.00	--	--	--	--	--	--	--	10.58	0.22	--	
	Helicopter	CNA441	2.16	0.08	--	2.16	0.04	--	--	--	--	--	--	--	--	--	--	2.81	0.15	--	
		Subtotal	3.92	0.08	--	3.83	0.08	--	0.09	0.00	--	--	--	--	--	--	--	--	--	--	20.00
Grand total			56.80	10.95	12.68	44.91	4.28	20.00	2.95	0.65	1.02	1.44	0.87	0.57	1.41	1.47	0.88	67.98	3.20	--	232.05

Note: INM types for general aviation aircraft are representative and may represent multiple aircraft types.

Day = 7:00 a.m. to 6:59 p.m.
Evening = 7:00 p.m. to 9:59 p.m.
Night = 10:00 p.m. to 6:59 a.m.

Source: Leigh Fisher Associates, May 2002.

Table E-4

PROJECTED AVERAGE DAY AIRCRAFT OPERATIONS BY TYPE, TIME OF DAY, AND STAGE LENGTH—PAL 2

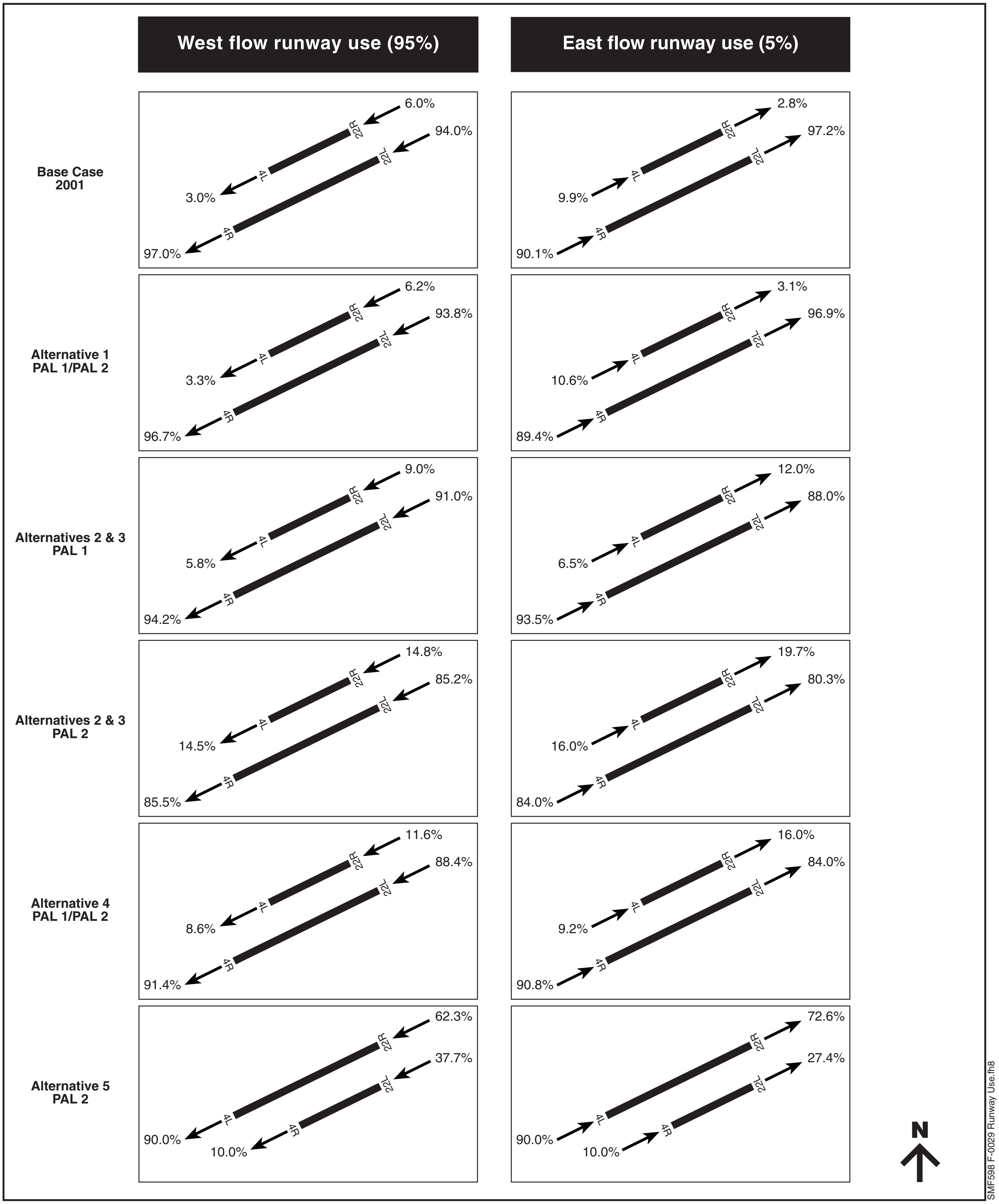
Mather Airport

Fleet mix			Arrivals			Departures (stage length) 0-500 miles			Departures (stage length) 500-1,000 miles			Departures (stage length) 1,000-1,500 miles			Departures (stage length) 1,500-2,500 miles			Touch and go			Total
Category	Aircraft type	INM type	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	operations
Air carrier cargo	A300	A300	0.89	--	0.48	0.05	0.07	0.02	--	--	--	0.14	0.20	0.06	0.29	0.41	0.12				
	A300-600	A300	0.48	--	0.26	0.03	0.04	0.01	--	--	--	0.08	0.11	0.03	0.15	0.22	0.07				
	A310	A310	0.68	--	0.37	0.04	0.05	0.02	--	--	--	0.11	0.16	0.05	0.22	0.31	0.09				
	B-727-100	727QF																			
	B-727-200	727EM2																			
	B-747	74720B	0.27	--	0.15	0.01	0.02	0.01	--	--	--	0.04	0.06	0.02	0.09	0.13	0.04				
	B-757	757PW	2.60	1.95	8.45	1.07	2.14	3.93	0.39	0.78	1.43	0.19	0.39	0.71	0.29	0.58	1.07				
	B-767	767CF6	2.04	--	1.10	0.11	0.16	0.05	--	--	--	0.33	0.47	0.14	0.66	0.94	0.28				
	DC-8	DC870																			
	DC-9	DC93LW																			
	DC-10	DC1030	0.54	--	0.29	0.03	0.04	0.01	--	--	--	0.09	0.13	0.04	0.18	0.25	0.08				
	MD-11	MD11PW	0.27	--	0.15	0.01	0.02	0.01	--	--	--	0.04	0.06	0.02	0.09	0.13	0.04				
		Subtotal	7.78	1.95	11.23	1.35	2.54	4.05	0.39	0.78	1.43	1.03	1.58	1.07	1.96	2.97	1.79	--	--	--	41.92
Commuter air cargo	Turboprop	DHC8	2.74	0.34	3.77	2.40	0.34	4.11													
		PA31	9.83	1.23	1.23	2.46	0.61	9.22													
	Single engine piston	CNA208	6.43	0.00	1.13	5.67	0.00	1.89													
		Subtotal	19.00	1.57	6.14	10.53	0.96	15.22	--	--	--	--	--	--	--	--	--	--	--	--	53.42
Air taxi	Regional jet	EMB135	2.24	3.24	0.11	2.24	0.00	3.35													
	Turboprop	BEC190	0.00	0.00	0.00	0.00	0.00	0.00													
		CNA441	2.68	0.15	0.15	2.09	0.15	0.75													
	Multiengine piston	BEC58P	0.67	0.04	0.04	0.52	0.04	0.19													
		Subtotal	5.59	3.43	0.30	4.84	0.19	4.28	--	--	--	--	--	--	--	--	--	--	--	--	18.63
General aviation	Corporate jet	CIT3	2.68	0.50	0.17	1.85	0.22	0.11	0.57	0.07	0.03	0.29	0.03	0.02	0.14	0.02	0.01				
		CL600	2.68	0.50	0.17	1.85	0.22	0.11	0.57	0.07	0.03	0.29	0.03	0.02	0.14	0.02	0.01				
		CNA500	2.68	0.50	0.17	1.85	0.22	0.11	0.57	0.07	0.03	0.29	0.03	0.02	0.14	0.02	0.01				
		GIV	2.68	0.50	0.17	1.85	0.22	0.11	0.57	0.07	0.03	0.29	0.03	0.02	0.14	0.02	0.01				
		LEAR25	2.68	0.50	0.17	1.85	0.22	0.11	0.57	0.07	0.03	0.29	0.03	0.02	0.14	0.02	0.01				
		LEAR35	2.68	0.50	0.17	1.85	0.22	0.11	0.57	0.07	0.03	0.29	0.03	0.02	0.14	0.02	0.01				
	Turboprop	CNA441	14.10	3.02	3.02	13.39	0.96	4.78	0.70	0.05	0.25	--	--	--	--	--	--	2.73	0.14	--	
	Multiengine piston	BEC58P	9.40	2.01	2.01	9.21	0.66	3.29	0.19	0.01	0.07	--	--	--	--	--	--	10.93	0.58	--	
	Single engine piston	GASEPV	12.08	1.07	0.27	11.84	0.66	0.66	0.24	0.01	0.01	--	--	--	--	--	--	40.99	2.16	--	
		Subtotal	51.68	9.13	6.31	45.57	3.58	9.38	4.56	0.48	0.53	1.71	0.20	0.10	0.86	0.10	0.05	54.66	2.88	--	191.78
Military	Military C-5A	C5	0.59	0.01	--	0.56	0.01	--	0.03	0.00	--	--	--	--	--	--	--	0.00	0.00	--	
	Military C-130	C130	0.59	0.01	--	0.56	0.01	--	0.03	0.00	--	--	--	--	--	--	--	0.59	0.01	--	
	Fighter/Trainer	A7D	0.59	0.01	--	0.56	0.01	--	0.03	0.00	--	--	--	--	--	--	--	10.58	0.22	--	
	Helicopter	CNA441	2.16	0.04	--	2.16	0.04	--	--	--	--	--	--	--	--	--	--	2.68	0.15	--	
		Subtotal	3.92	0.08	--	3.83	0.08	--	0.09	0.00	--	--	--	--	--	--	--		0.24	--	20.00
																		11.76			
Grand total			87.97	16.16	23.98	66.13	7.53	32.94	5.04	1.26	1.96	2.74	1.97	1.17	2.82	3.07	1.84	66.42	3.12	--	325.75

Note: INM types for general aviation aircraft are representative and may represent multiple aircraft types.

Day = 7:00 a.m. to 6:59 p.m.
Evening = 7:00 p.m. to 9:59 p.m.
Night = 10:00 p.m. to 6:59 a.m.

Source: Leigh Fisher Associates, May 2002.



Sources: Base case runway use ~~B~~ased on 2001 ARTS data.
Annual percent runway use ~~E~~stimated by
Leigh Fisher Associates, May 2002.

Figure E-8
RUNWAY USE ASSUMPTIONS
Mather Airport Master Plan
December 2003

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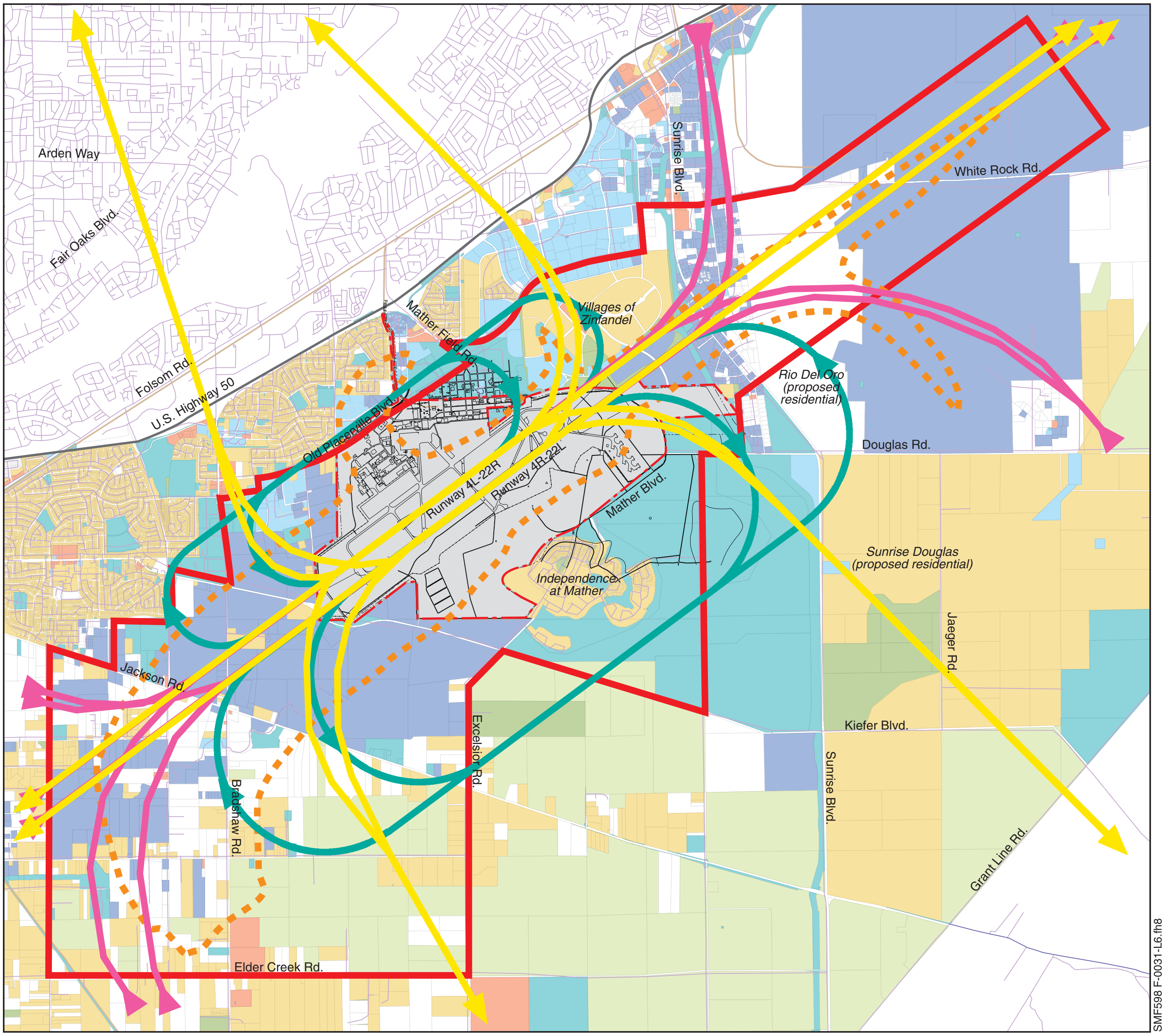


LEGEND

- Departure flight track
- Arrival flight track
- Touch-and-go flight track
- Mather CLUP CNEL 60 noise exposure area
- Mather Airport Policy Area
- Airport boundary

CLUP = Comprehensive Land Use Plan
CNEL = Community Noise Equivalent Level

Notes: Flight tracks depicted for Alternative 4 PAL 2.

Land use information not obtained for areas north of U.S. Highway 50.

Source: Flight tracks ~~L~~eigh Fisher Associates, May 2002.

Generalized land uses (2005)

- Airport
- Residential
- Commercial
- Office
- Industrial
- Public
- Agricultural
- Open space

N

2,500 0 3,500 7,000

Graphic Scale in Feet

Figure E-9

GENERALIZED FLIGHT TRACKS

Mather Airport Master Plan

December 2003

LEIGH FISHER ASSOCIATES

Appendix F

BACKUP RUNWAY POLICY OPTIONS

On August 7, 2002, Sacramento County Airport System staff conducted a public workshop with the Sacramento County Board of Supervisors on the Mather Airport Master Plan. The purpose of the workshop was to summarize study progress to date and present findings on airfield alternatives intended to provide Mather with a backup runway capable of accommodating the full-range of Airport users.

The following questions were raised during the workshop that are addressed in the following sections:

What runway use policies could be implemented at Mather?

Where will runway use policies be documented and when do runway use policies become "official"?

If you build a backup runway, how do you keep it from becoming a "second" runway?

RUNWAY USE POLICIES

Because airport sponsors are ultimately responsible for the location and design of airport facilities, they have historically been held liable for the effects of aircraft operations on surrounding communities. As a means of mitigating potential adverse effects, an airport operator may impose runway use programs (or policies) and/or flight track management measures. Such policies may be implemented to (1) regulate the direction and frequency of aircraft operations; and/or (2) restrict the use of facilities to particular types of aircraft—typically to minimize noise exposure or maximize capacity.

Typical runway use policies designate "preferential" arrival and departure runways (or flight tracks) for the most common wind and weather conditions. Actual use may differ from the preferential use when (1) wind and weather conditions do not allow operations on certain runways or flight tracks; (2) construction, maintenance, or incidents close runways; (3) air traffic demand requires more efficient procedures; or (4) an aircraft is unable to follow specified procedures due to physical constraints, such as weight restrictions or limited performance characteristics.

Legal Setting

An airport operator may not prohibit access, limit the types of aircraft that can use the facility, and/or impose curfews or other such operating restrictions without FAA review and approval under Federal Aviation Regulations (FAR) Part 161, *Notice and Approval of Airport Noise and Access Restrictions*. To date, no such restrictions have been approved by FAA, although multiple applications have been prepared. However, runway use policies and flight tracks management measures could be implemented formally or informally.

Formal Policies. FAA Order 8400.9, *National Safety and Operational Criteria for Runway Use Programs*, defines two types of preferential runway use programs—formal and informal. A formal program must be defined and acknowledged in a Letter of Understanding (LOU) between the FAA's Flight Standards Division and Air Traffic Service, the airport operator, and the airport users. Once established, participation by aircraft operators is mandatory. At present, there are no formal runway use programs in effect in the United States.

Informal Policies. Informal runway use policies or flight track management measures do not require a LOU, and are typically implemented through a Memorandum of Agreement (MOA) between the airport operator and FAA ATCT, a Tower Order, and publication of the procedures in the Airport Facilities Directory. Participation by airport users is voluntary, but adherence is typically achieved since most aircraft operate under the ATCT's direction. Such measures are normally identified during preparation of an airport master plan, Environmental Assessment (EA), Environmental Impact Statements (EIS), or FAR Part 150 study.

- **Master Plans**. An airport operator can request FAA implement runway use policies and flight track management measures identified as part of an airport master plan. However, approval and implementation of such actions normally requires environmental review under the National Environmental Policy Act of 1969 (NEPA), necessitating preparation of an EA or EIS (see below).

- **Environmental Documents**. In addition to assessing measures identified in a master plan, runway use policies and flight track management measures can be identified during preparation of an EA or EIS.

- **FAR Part 150 Study**. Runway use policies and flight track management measures can also be adopted for noise abatement purposes if they are recommended and approved by FAA in a Noise Compatibility Program (NCP) prepared pursuant to FAR Part 150, *Airport Noise Compatibility Planning*.

In addition, an airport operator is authorized to implement regulations affecting airport operations. For example, some airports regulate the timing and location of nighttime engine run-ups, or restrict the use of taxiways to reduce noise exposure on surrounding communities.

In any event, when developing such measures, an airport operator is prohibited from taking actions that would (1) impose an undue burden on interstate or foreign commerce; (2) unjustly discriminate between different categories of airport users; or (3) constitute unilateral action in matters preempted by the federal government. Such actions fall under the purview of FAR Part 161.

Examples

There are numerous examples of runway use policies at airports throughout the United States. Most are implemented to reduce noise exposure resulting from operations on existing runways. There are examples, however, of proposed runways (or extensions) that include restrictions prior to construction. The following describes three runway improvement projects where operational restrictions were identified and integrated into the planning process. It should be noted, however, that only the runway project at Phoenix Sky Harbor International Airport was constructed and is operational.

Third Parallel Runway, Phoenix Sky Harbor International Airport. In 1994 FAA approved a Final EIS for a third parallel runway for Sky Harbor International Airport with mitigation procedures. These procedures, delineated in an intergovernmental agreement between the City of Tempe and City of Phoenix (the Airport operator), stated the City of Tempe would not oppose the third runway if the following mitigation procedures were imposed on the new runway for noise abatement:

- Use of a converging departure corridor following the Salt River when operating in an east flow
- Use of extended common departure routes for departures on the Airport's south runway in west flow
- Implementation of an extensive noise monitoring program

It should be noted that the approved mitigation measures significantly limit the capacity of the Airport's runway system, especially in east flow, when departures from all three of the Airport's runways must follow the extended common departure course. This requires controllers to separate these departures "in-trail," effectively reducing the Airport departure capacity to that of a single runway. Furthermore, the airlines have roundly criticized the intergovernmental agreement due to the capacity limitations imposed by the east flow procedures.

New Runway 14-32, Boston-Logan International Airport. On June 21, 2002, FAA's Final EIS for a proposed sixth runway at Logan Airport was filed with the U.S. Environmental Protection Agency (EPA). The filing essentially approves construction of the 5,000-foot long, $60 million runway for use by smaller, regional type aircraft. Logan ranks sixth in the United States for aircraft delays, primarily due to strong northwest winds. The new runway, expected to reduce delays by 25%, would be the first wind-restricted runway in the United States. The EIS stipulates the runway can be used only when northwest or southeast winds are 10 knots or higher. Strict penalties will be imposed if the runway is used at inappropriate times.

Airport and FAA officials believe the wind-restrictions will appease opponents concerned with noise and air quality issues. Construction is anticipated in 2004, although a 26-year-old Superior Court injunction banning construction of new runways at Logan must first be lifted.

Runway 9R-27L Extension, Fort Lauderdale-Hollywood International Airport. Broward County Aviation Department (BCAD) is planning to extend Runway 9R-27L to the east by approximately 3,650 feet to a total length of 8,900 feet; and widen the runway by 50 feet to a total width of 150 feet. If approved, operation of the airfield with the extended runway would be in accordance with (1) a runway use and noise mitigation plan stipulated in Interlocal Agreements between Broward County, the City of Dania Beach, and City of Fort Lauderdale; and (2) Development Orders of the City of Hollywood, City of Fort Lauderdale and Broward County. In essence, these agreement prohibit aircraft weighing more than 58,000 pounds from departing on Runway 27L (to the west) and landing on Runway 9R (to the east) until total airport capacity necessitates such operations.

FAA was initially concerned that some conditions in the Interlocal Agreements and Development Orders restrict access to the airport, and therefore, require analyses and approval under FAR Part 161. However, after thorough analysis it was determined that Part 161 did not apply since mechanisms were in place to ease runway use provisions contained in the agreements as demand increased. BCAD is actively seeking federal funding through a Letter of Intent (LOI) and has also applied to use Passenger Facility Charge (PFC) funds for construction. An EIS for the runway extension is in the final stages of preparation.

Consideration of Mather Options

In the event that the Mather Airport Master Plan recommends Runway 4L-22R be extended and upgraded to serve as a backup runway, the intent of runway use and flight track management policies at Mather would be to reduce aircraft noise exposure and minimize overflights of non-compatible land uses in the immediate vicinity of the airport (for example, Rosemont High School, Villages of Zinfandel and Independence at Mather). Selection and approval of policies for Mather will require additional analysis and may necessitate formal review in an EA or EIS. Nevertheless, the following factors are assumed or understood from prior analysis and can be used to guide the identification of generalized policies for Mather.

- Prevailing winds are from the west resulting in departures and arrivals on Runways 22R/L approximately 98% of the time.

- Operations conducted during evening and nighttime hours are more intrusive than those conducted during the day.

- Air carrier turbojet aircraft, such as the B-727, DC-8, and B-747 are the most significant contributors to cumulative noise exposure, followed by corporate jets and military jet aircraft.

- Noise sensitive facilities nearby Mather include residential units in the Villages of Zinfandel, located immediately northeast of Runway 22R; and the Rosemont High School site located 9,000 feet from the approach end of Runway 4L and 1,700 feet north of the extended centerline.

- Mather has sufficient airfield capacity to accommodate aircraft operations using only a single runway in the near- and long-term. A backup runway would provide additional safety and operational efficiency and redundancy for large aircraft.

- Scheduled closures of Runway 4R-22L occur 8-10 hours per month for routine maintenance; and 5-7 days per year for major maintenance. In addition, the runway is planned to be closed 45-60 days each year between 2002 and 2005 for major construction. Unanticipated (unscheduled) closures of Runway 4R-22L range from 4.0 to 72 hour annually (based on analysis of historical data).

Taking the above into consideration, the following potential policies could meet the County's objective to reduce aircraft noise and minimize overflights of non-compatible land uses.

Preferential Runway Use. A preferential runway use program could be developed for periods when **both** runways are operational based on one, or a combination of the following:

Restriction type:	Examples:
Wind condition	▪ Preferential use of Runway 4R-22L when winds are calm ▪ During east flow conditions, departures on Runway 4R and arrivals on Runway 4L
Time of day	▪ Preferential use of primary Runway 4R-22L between the hours of 7:00 a.m. and 7:00 p.m. ▪ Nighttime arrivals on Runway 22R prohibited
Type of operation	▪ Preferential use of primary Runway 4R-22L for departures ▪ Preferential use of Runway 4L-22R for touch-and-go operations
Aircraft type	▪ Preferential use of primary Runway 4R-22L by air carrier turbojet aircraft ▪ Preferential use of Runway 4L-22R by non turbojet powered (piston and turbo-prop) aircraft ▪ Use of Runway 4L-22R by aircraft weighing less than 12,500 pounds

Flight Track Management. The following flight track management measures could be implemented during periods when **both** runways are operational:

Operations on:	Examples:
Runway 22R	▪ Departures by turbojet aircraft turn left to specified heading until reaching altitude (or distance from the airport) before turning on course
Runway 22L	▪ North and westbound departures maintain the runway heading until reaching altitude (or distance from the airport) before turning on course ▪ South and eastbound departures turn left to specified heading until reaching altitude (or distance from the airport) before turning on course
Runway 4R	▪ Departures turn right to specified heading until reaching altitude (or distance from the airport) before turning on course

The following flight track management measures could be implemented during periods when **only one** runway is operational:

Operations on:	Examples:
Runways 22R/L	▪ Left traffic pattern for arrivals and touch-and-go activity ▪ North and westbound departures turn left to specified heading until reaching altitude (or distance from the airport) before turning on course ▪ South and eastbound departures turn left to specified heading until reaching altitude (or distance from the airport) before turning on course
Runways 4R/L	▪ Right traffic pattern for arrivals and touch-and-go activity ▪ Departures turn right to specified heading until reaching altitude (or distance from the airport) before turning on course

Appendix G

AIRPORT LAYOUT PLAN

2013 UPDATE: The data in this appendix has not been updated but will be updated pending FAA approval.

AIRPORT LAYOUT PLAN

MATHER AIRPORT - SACRAMENTO COUNTY, CALIFORNIA

JUNE 2004

THE PREPARATION OF THESE DRAWINGS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION(FAA) AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982. THE CONTENTS DO NOT NECESSARILY REFLECT THE VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS REPORT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN, NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAW.

AIRPORT DATA

			EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL (NPIAS)			TRANSPORT	SAME
AIRPORT REFERENCE POINT		LATITUDE	38° 33' 19.11" N (D)	38° 33' 18.44" N (D)
		LONGITUDE	121° 17' 49.92" W (D)	121° 17' 51.3" W (D)
AIRPORT ELEVATION (ABOVE MEAN SEA LEVEL)			98.5'	SAME
TAXIWAY WIDTH			75' U.O.N.	SAME
MEAN MAX. TEMP. (HOTTEST MONTH)			93°	SAME
TERMINAL NAVIGATIONAL AIDS	22L LOCALIZER	LATITUDE	38° 32' 32.17" N (B)	SAME
		LONGITUDE	121° 19' 03.89" W (B)	SAME
	22L GLIDESLOPE	LATITUDE	38° 33' 36.46" N (B)	SAME
		LONGITUDE	121° 17' 01.58" W (B)	SAME
AIRPORT ACREAGE		LEASE (F)	2,875± ACRES	FEE SIMPLE
		EASEMENT (G)	125± ACRES	SAME

RUNWAY PROTECTION ZONE DATA

RUNWAY	4R EXISTING	4R ULTIMATE	22L EXISTING	22L ULTIMATE	4L EXISTING	4L ULTIMATE	22R EXISTING	22R ULTIMATE
RPZ WIDTH: INNER END	1,000'	SAME	1,000'	SAME	500'	SAME	500'	SAME
RPZ WIDTH: OUTER END	1,510'	SAME	1,750'	SAME	1,010'	SAME	1,010'	SAME
RPZ LENGTH	1,700'	SAME	2,500'	SAME	1,700'	SAME	1,700'	SAME

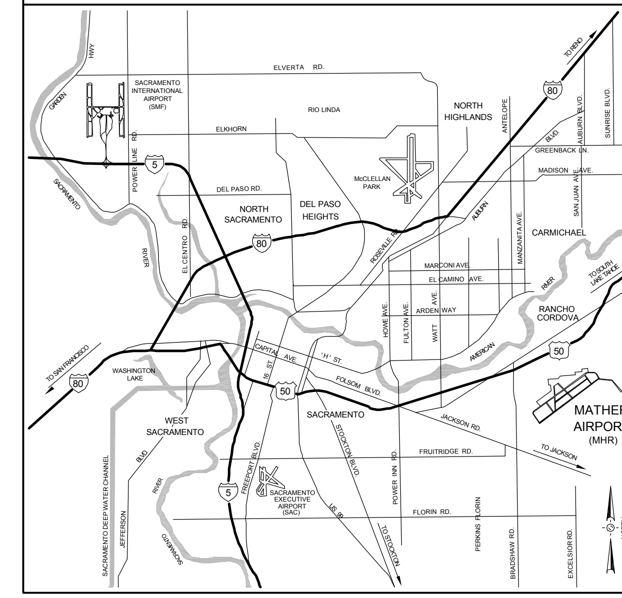
SURVEY MONUMENTS of RUNWAY ENDPOINTS

4L	4" BRASS DISC AT CENTERLINE OF RUNWAY, STAMPED "U.S. DEPARTMENT OF INTERIOR GEOLOGICAL SURVEY"
4R	5/8" REBAR AT CENTERLINE OF RUNWAY, WHERE PCC MEETS ACC
22L	CONCRETE NAIL AT CENTERLINE OF RUNWAY, WHERE PCC MEETS ACC
22R	4" METAL DISC AT CENTERLINE OF RUNWAY, STAMPED "U.S. DEPARTMENT OF INTERIOR GEOLOGICAL SURVEY"

RUNWAY DATA

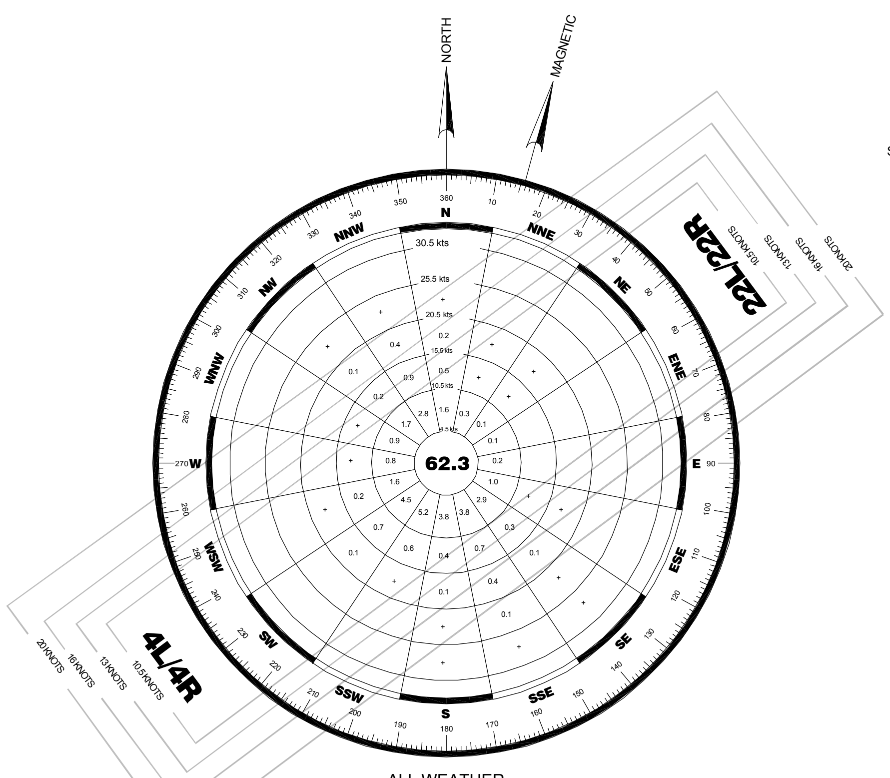
		RUNWAY 4R/22L EXISTING	RUNWAY 4R/22L ULTIMATE	RUNWAY 4L/22R EXISTING	RUNWAY 4L/22R ULTIMATE
AIRPORT REFERENCE CODE		D-V	SAME	C-IV	D-IV
CRITICAL AIRCRAFT		B-747	SAME	MED. BUSINESS JET	DC-10
PHYSICAL LENGTH AND WIDTH		11,301' x 150'	SAME	6,040' x 150'	7,200' x 150'
EFFECTIVE GRADIENT		0.2%	SAME	0.2%	SAME
ASPHALT PAVEMENT STRENGTH (1000#) S/D/DT		160/280/500 (E)	SAME	60/110/150 (E)	80/210/365
RUNWAY SURFACE TYPE		PORTLAND CEMENT CONCRETE AT ENDS; ASPHALT AT CENTER	GROOVED	ASPHALT CEMENT CONCRETE	SAME
APPROACH TYPE: FAR PART 77 CATEGORY AND VISIBILITY MINIMUMS		4R: NON-PRECISION INSTRUMENT 1 MILE 22L: PRECISION INSTRUMENT 1/2 MILE	4R: SAME 22L: PRECISION INSTRUMENT CAT-III	4L: VISUAL 22L: VISUAL	SAME
RUNWAY MARKINGS		PRECISION	SAME	NON-PRECISION	VISUAL
FAR PART 77 APPROACH SURFACE SLOPE:		4R - 34:1 22L - 50:1	SAME	4L & 22R - 20:1	SAME
NAVIGATION AIDS		4R: VOR, VASI	SAME	4L: NONE	SAME
		22L: VOR, VASI, MALSR, CAT-I ILS	ALSAF, CAT-III ILS	22R: NONE	PAPI
RUNWAY END COORDINATES SEE LIST OF RUNWAY ENDPOINT SURVEY MONUMENTS BELOW LEFT	LATITUDE	4R 38° 32' 40.965" N (A)	SAME	4L 38° 33' 10.94" N (B)	38°33' 04.48" N (D)
	LONGITUDE	4R 121° 18' 48.649" W (A)		4L 121° 18' 17.94" W (B)	121°18' 25.89" W (D)
	ELEVATION	4R 77.5' MSL LP (C)		4L 81.2' MSL LP (C)	79' MSL LP (D)
LP = RUNWAY LOW POINT	LATITUDE	22L 38° 33' 47.086" N (A)	SAME	22R 38° 33' 46.28" N (B)	SAME
HP = RUNWAY HIGH POINT	LONGITUDE	22L 121° 16' 53.988" W (A)		22R 121° 17' 16.66" W (B)	
	ELEVATION	22L 98.5' MSL HP (C)		22R 94.3' MSL HP (C)	
TOUCHDOWN ZONE ELEVATION (TDZE) DEFINED AS HIGH POINT OF THE TOUCHDOWN ZONE, FIRST 3000' OF RUNWAY AVAILABLE FOR LANDING		4R - 81.6' MSL 22L - 98.5' MSL	SAME	4L - 88.5' MSL 22R - 94.3' MSL	4L - 85.8' MSL 22R - SAME
RUNWAY LIGHTING		HIRL	SAME	MIRL	SAME
RUNWAY SAFETY AREA, WIDTH		500'	SAME	500'	SAME
RUNWAY SAFETY AREA, LENGTH BEYOND RWY END		1000'	SAME	1000'	SAME
OBJECT FREE AREA, WIDTH		800'	SAME	800'	SAME
OBJECT FREE AREA, LENGTH BEYOND RWY END		1000'	SAME	1000'	SAME

VICINITY MAP



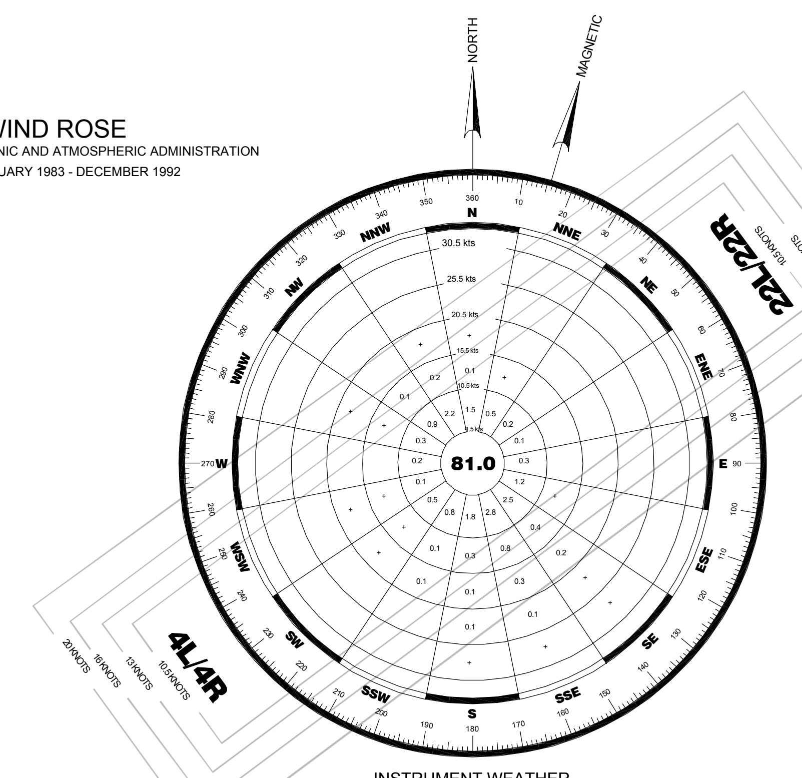
WIND ROSE

SOURCE: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
PERIOD: JANUARY 1983 - DECEMBER 1992



ALL WEATHER

WIND COVERAGE	12 MPH 10.5 KNOTS	15 MPH 13 KNOTS	18 MPH 16 KNOTS	23 MPH 20 KNOTS
RUNWAY 4-22	95.9%	97.5%	98.8%	99.7%



INSTRUMENT WEATHER

WIND COVERAGE	12 MPH 10.5 KNOTS	15 MPH 13 KNOTS	18 MPH 16 KNOTS	23 MPH 20 KNOTS
RUNWAY 4-22	97.4%	98.4%	99.2%	99.7%

NOTES

(A) Latitude and longitude from NOAA Airport Obstruction Chart (AOC), surveyed December 1995, published November 1996. Horizontal datum - NAD83, Vertical datum - NGVD29.

(B) Latitude and longitude coordinates from 2000 ALP, refers to "National Oceanic and Atmospheric Administration survey, December 1995 (NAD83)". Coordinates corroborate with NOAA AOC.

(C) Latitude, longitude, elevations from County GPS survey February 2004 to confirm runway endpoints. Horizontal datum - NAD83, vertical datum - NAVD88.

(D) Latitude, longitude, elevations calculated for this ALP set. Horizontal datum - NAD83, vertical datum - NAVD88.

(E) Pavement strength source: Pavement Evaluation Report - 1998

(F) Lease Agreement between Department of the Air Force and the Sacramento Mather Conversion Authority for Mather Air Force Base, California - March 28, 1995

(G) U.S.A.F. Easement, Survey Pending - 2004

SHEET INDEX

SHEET	DESCRIPTION
1	COVER, INDEX, & DATA
2	EXISTING CONDITIONS DRAWING
3	AIRPORT LAYOUT DRAWING
4	BUILDING AREA DRAWING
5	LAND USE DRAWING
6	AIRPORT AIRSPACE DRAWING 1 of 2, CENTRAL AREA
7	AIRPORT AIRSPACE DRAWING 2 of 2, OUTER PRECISION APPROACH
8	RUNWAY & APPROACH PROFILES
9	INNER PORTION OF APPROACH SURFACE - 4R
10	INNER PORTION OF APPROACH SURFACE - 4L
11	INNER PORTION OF APPROACH SURFACE - 22R
12	INNER PORTION OF APPROACH SURFACE - 22L

APPROVAL

SUBMITTED BY: COUNTY OF SACRAMENTO	FAA APPROVAL BLOCK
APPROVED:	
G. HARDY ACREE DATE DIRECTOR, SACRAMENTO COUNTY AIRPORT SYSTEM	

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SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

Airport Layout Plan Set

MATHER AIRPORT
SACRAMENTO COUNTY
CALIFORNIA

Issue Log

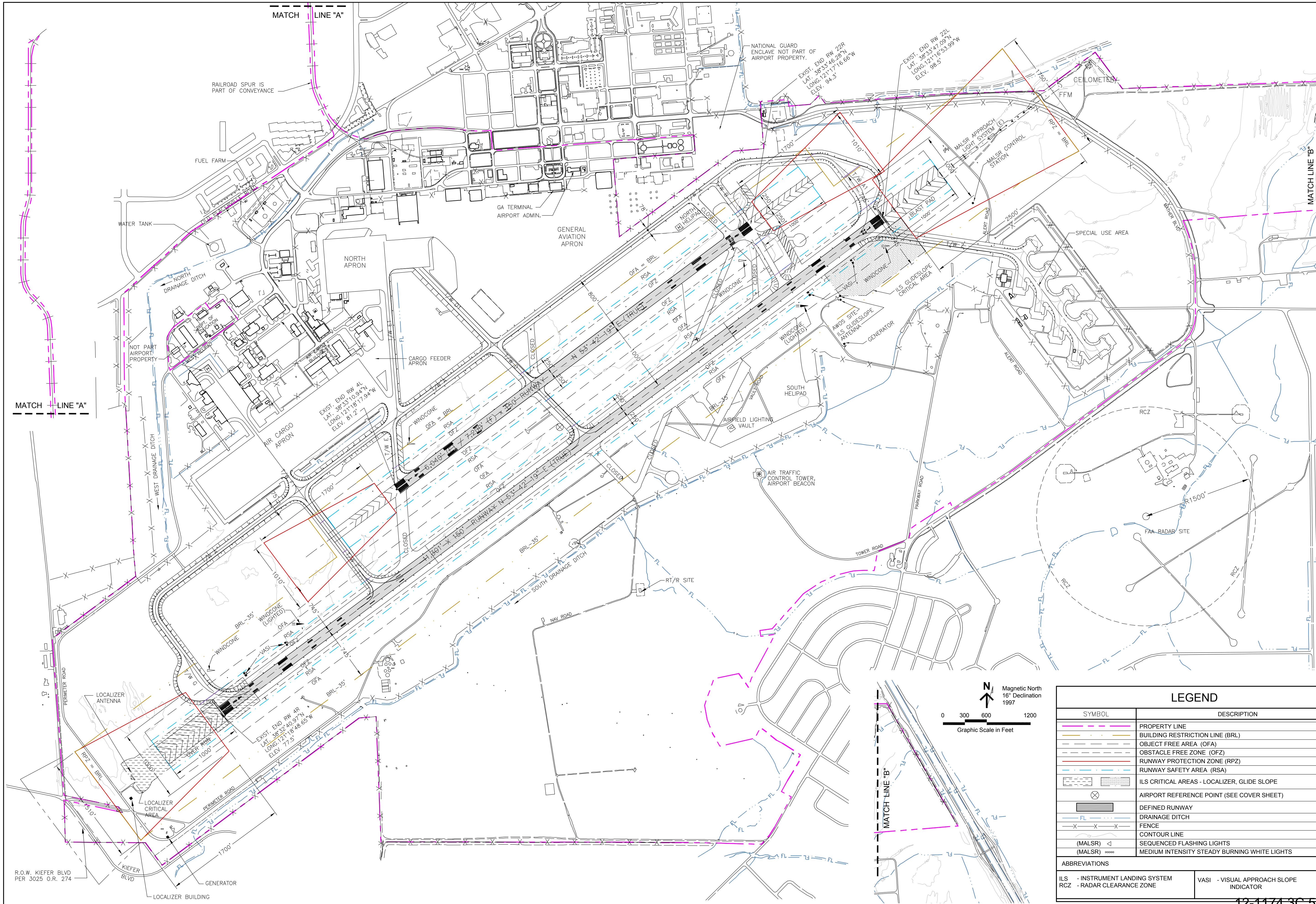
DATE	REVISION DESCRIPTION	DRAWN	CHECKED
06/30/2004	CLIENT REVIEW	BHT	EEB
09/24/2004	CLIENT REVIEW 2	BHT	DM
11/24/2004	CLIENT REVIEW 3	BHT	DM

Drawing Title

COVER, INDEX & DATA

SHEET

1 OF 12



LEGEND

SYMBOL	DESCRIPTION
	PROPERTY LINE
	BUILDING RESTRICTION LINE (BRL)
	OBJECT FREE AREA (OFA)
	OBSTACLE FREE ZONE (OFZ)
	RUNWAY PROTECTION ZONE (RPZ)
	RUNWAY SAFETY AREA (RSA)
	ILS CRITICAL AREAS - LOCALIZER, GLIDE SLOPE
	AIRPORT REFERENCE POINT (SEE COVER SHEET)
	DEFINED RUNWAY
FL	DRAINAGE DITCH
	FENCE
	CONTOUR LINE
(MALSR)	SEQUENCED FLASHING LIGHTS
(MALSR)	MEDIUM INTENSITY STEADY BURNING WHITE LIGHTS

ABBREVIATIONS

ILS - INSTRUMENT LANDING SYSTEM
RCZ - RADAR CLEARANCE ZONE
VASI - VISUAL APPROACH SLOPE INDICATOR

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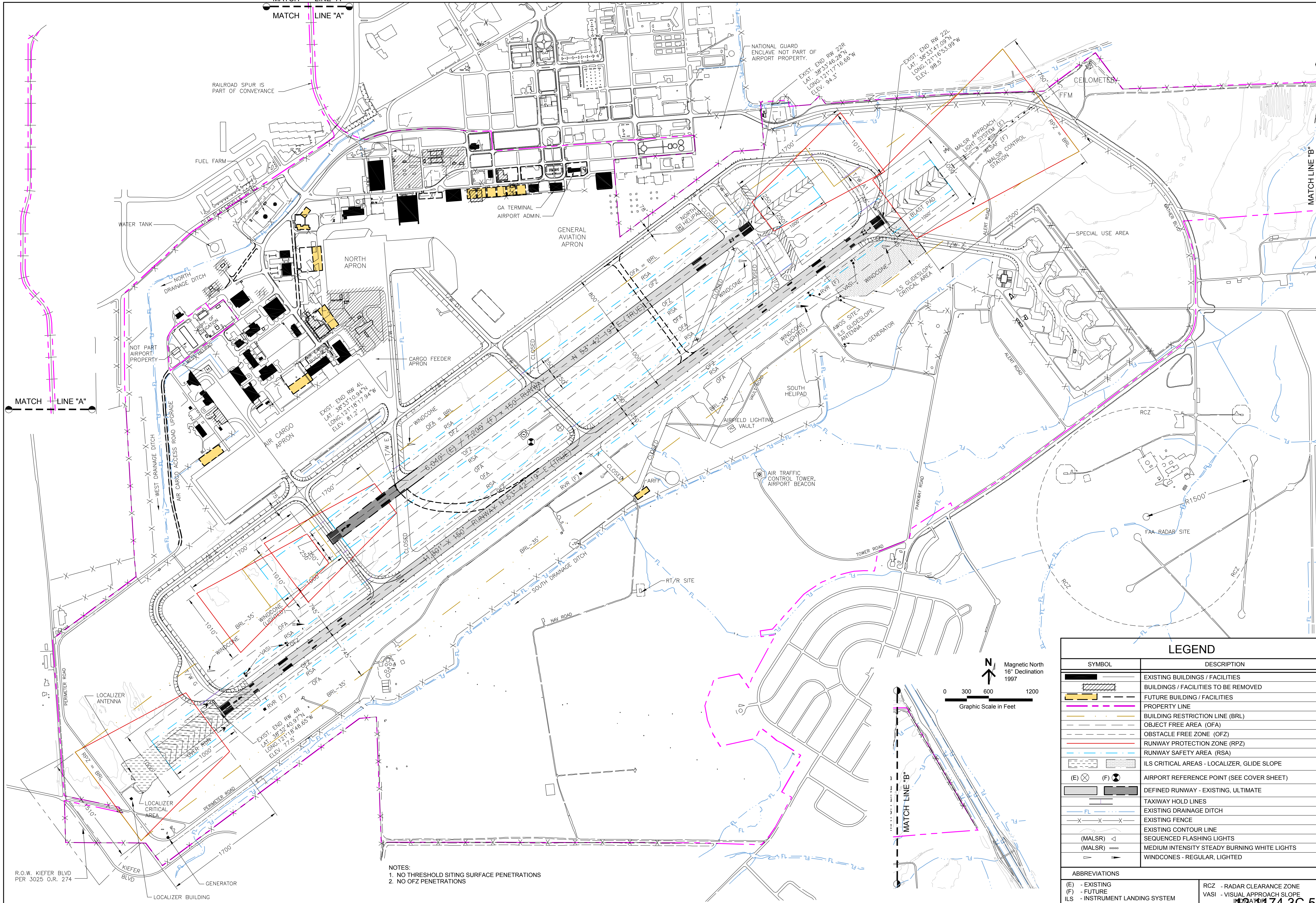
Drawing Title

EXISTING CONDITIONS DRAWING

SHEET

2 OF 12



NOTES:
1. NO THRESHOLD SITING SURFACE PENETRATIONS
2. NO OFZ PENETRATIONS

LEGEND

SYMBOL	DESCRIPTION
	EXISTING BUILDINGS / FACILITIES
	BUILDINGS / FACILITIES TO BE REMOVED
	FUTURE BUILDING / FACILITIES
	PROPERTY LINE
	BUILDING RESTRICTION LINE (BRL)
	OBJECT FREE AREA (OFA)
	OBSTACLE FREE ZONE (OFZ)
	RUNWAY PROTECTION ZONE (RPZ)
	RUNWAY SAFETY AREA (RSA)
	ILS CRITICAL AREAS - LOCALIZER, GLIDE SLOPE
(E) (F)	AIRPORT REFERENCE POINT (SEE COVER SHEET)
	DEFINED RUNWAY - EXISTING, ULTIMATE
	TAXIWAY HOLD LINES
FL	EXISTING DRAINAGE DITCH
	EXISTING FENCE
	EXISTING CONTOUR LINE
(MALSR)	SEQUENCED FLASHING LIGHTS
(MALSR)	MEDIUM INTENSITY STEADY BURNING WHITE LIGHTS
	WINDCONES - REGULAR, LIGHTED

ABBREVIATIONS

(E) - EXISTING
(F) - FUTURE
ILS - INSTRUMENT LANDING SYSTEM
RCZ - RADAR CLEARANCE ZONE
VASI - VISUAL APPROACH SLOPE INDICATOR

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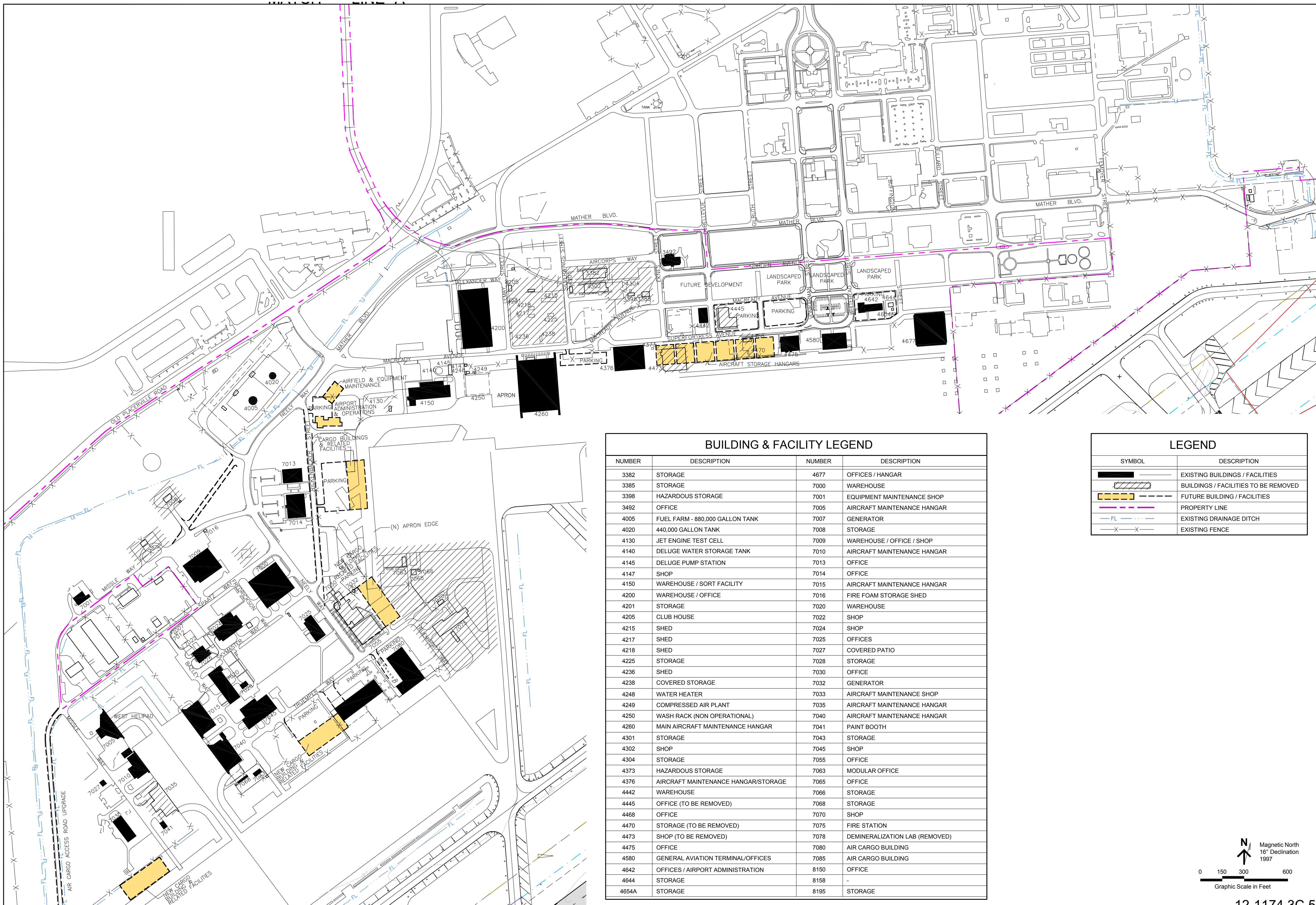
Drawing Title

AIRPORT LAYOUT DRAWING

SHEET

3 OF 12



BUILDING & FACILITY LEGEND

NUMBER	DESCRIPTION	NUMBER	DESCRIPTION
3382	STORAGE	4677	OFFICES / HANGAR
3385	STORAGE	7000	WAREHOUSE
3398	HAZARDOUS STORAGE	7001	EQUIPMENT MAINTENANCE SHOP
3492	OFFICE	7005	AIRCRAFT MAINTENANCE HANGAR
4005	FUEL FARM - 880,000 GALLON TANK	7007	GENERATOR
4020	440,000 GALLON TANK	7008	STORAGE
4130	JET ENGINE TEST CELL	7009	WAREHOUSE / OFFICE / SHOP
4140	DELUGE WATER STORAGE TANK	7010	AIRCRAFT MAINTENANCE HANGAR
4145	DELUGE PUMP STATION	7013	OFFICE
4147	SHOP	7014	OFFICE
4150	WAREHOUSE / SORT FACILITY	7015	AIRCRAFT MAINTENANCE HANGAR
4200	WAREHOUSE / OFFICE	7016	FIRE FOAM STORAGE SHED
4201	STORAGE	7020	WAREHOUSE
4205	CLUB HOUSE	7022	SHOP
4215	SHED	7024	SHOP
4217	SHED	7025	OFFICES
4218	SHED	7027	COVERED PATIO
4225	STORAGE	7028	STORAGE
4236	SHED	7030	OFFICE
4238	COVERED STORAGE	7032	GENERATOR
4248	WATER HEATER	7033	AIRCRAFT MAINTENANCE SHOP
4249	COMPRESSED AIR PLANT	7035	AIRCRAFT MAINTENANCE HANGAR
4250	WASH RACK (NON OPERATIONAL)	7040	AIRCRAFT MAINTENANCE HANGAR
4260	MAIN AIRCRAFT MAINTENANCE HANGAR	7041	PAINT BOOTH
4301	STORAGE	7043	STORAGE
4302	SHOP	7045	SHOP
4304	STORAGE	7055	OFFICE
4373	HAZARDOUS STORAGE	7063	MODULAR OFFICE
4376	AIRCRAFT MAINTENANCE HANGAR/STORAGE	7065	OFFICE
4442	WAREHOUSE	7066	STORAGE
4445	OFFICE (TO BE REMOVED)	7068	STORAGE
4468	OFFICE	7070	SHOP
4470	STORAGE (TO BE REMOVED)	7075	FIRE STATION
4473	SHOP (TO BE REMOVED)	7078	DEMINERALIZATION LAB (REMOVED)
4475	OFFICE	7080	AIR CARGO BUILDING
4580	GENERAL AVIATION TERMINAL/OFFICES	7085	AIR CARGO BUILDING
4642	OFFICES / AIRPORT ADMINISTRATION	8150	OFFICE
4644	STORAGE	8158	-
4654A	STORAGE	8195	STORAGE

LEGEND

SYMBOL	DESCRIPTION
	EXISTING BUILDINGS / FACILITIES
	BUILDINGS / FACILITIES TO BE REMOVED
	FUTURE BUILDING / FACILITIES
	PROPERTY LINE
FL	EXISTING DRAINAGE DITCH
X X	EXISTING FENCE

Magnetic North
16° Declination
1997

0 150 300 600
Graphic Scale in Feet

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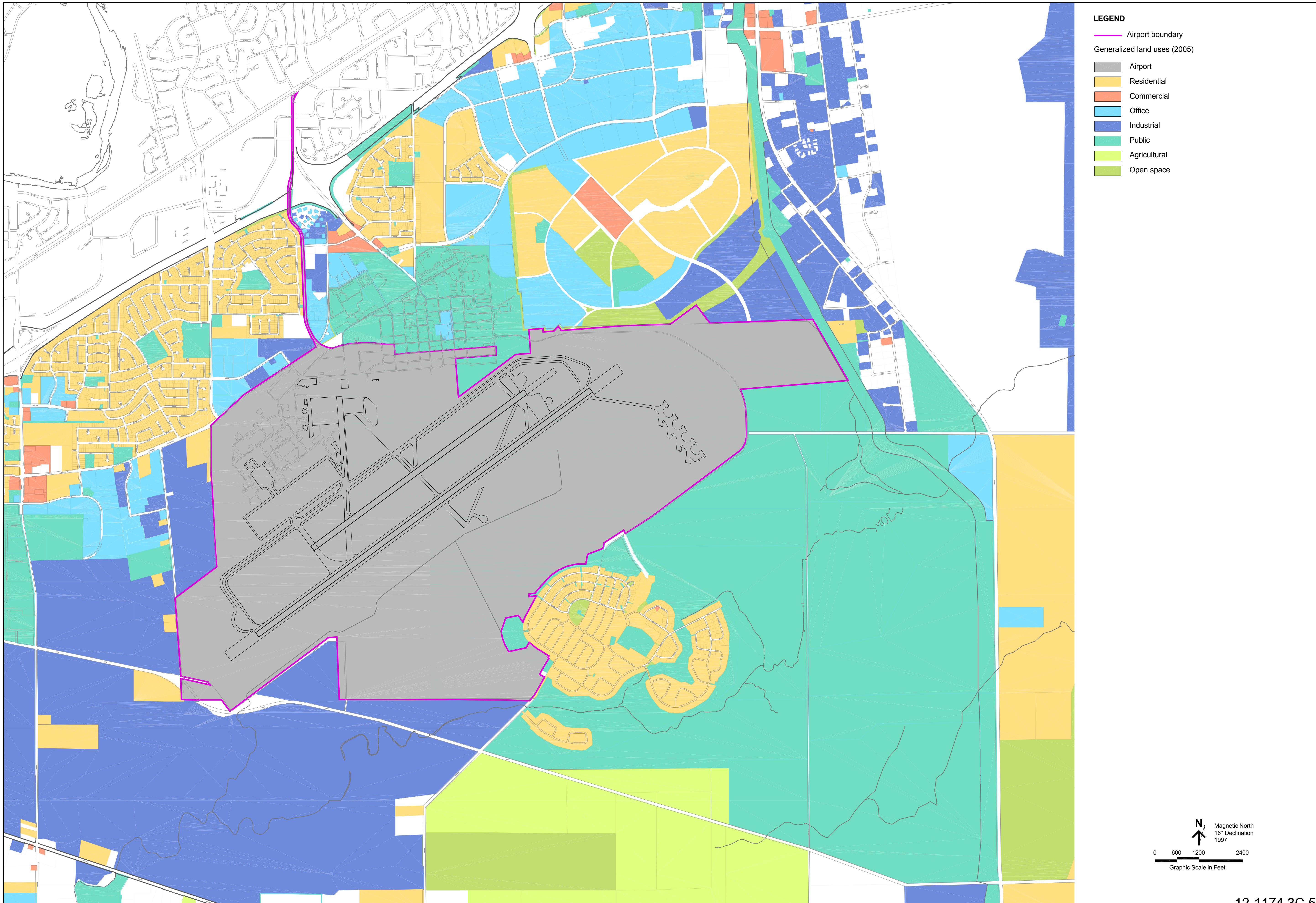
Drawing Title

BUILDING AREA
DRAWING

SHEET

4 OF 12



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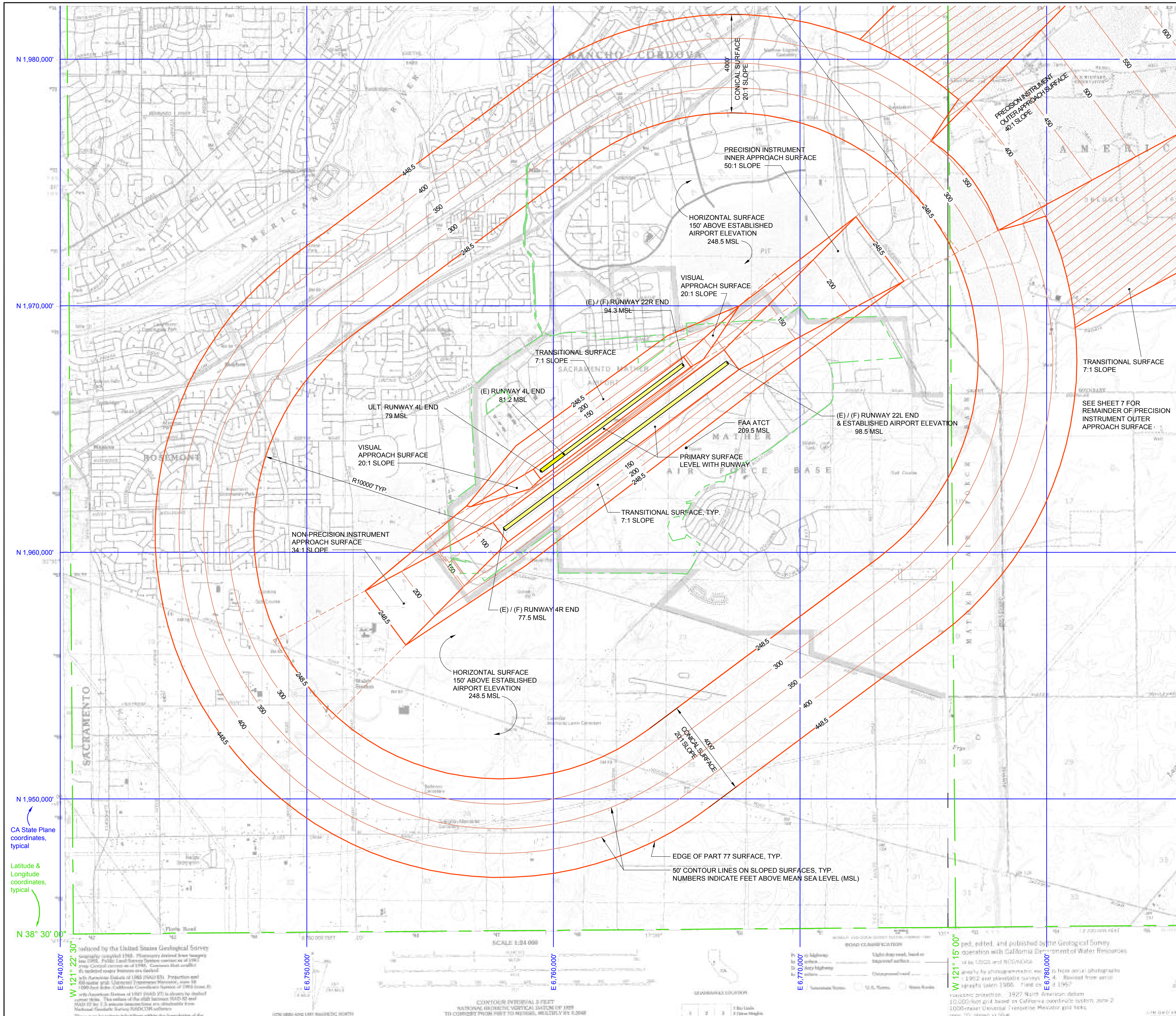
11/24/2004	CLIENT REVIEW 3	BHT	DM

Drawing Title

LAND USE
DRAWING

SHEET

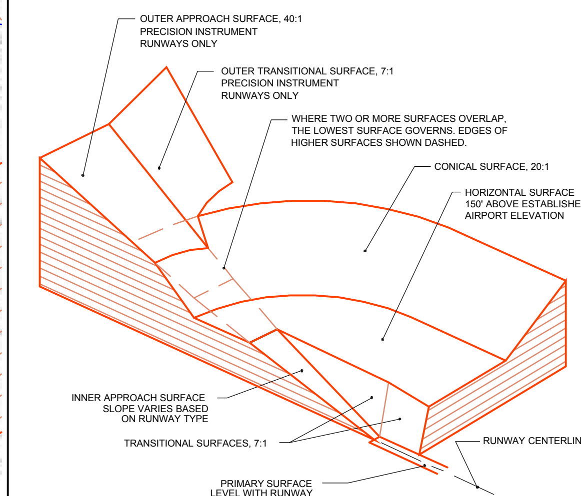
5 OF 12



ISOMETRIC VIEW OF IMAGINARY SURFACES

FEDERAL AVIATION REGULATIONS
14 CFR PART 77 SURFACES, TYPICAL

NOT TO SCALE - VERTICAL PROPORTIONS EXAGGERATED



SOURCES OF INFORMATION

National Oceanic and Atmospheric Administration (NOAA)
Airport Obstruction Chart (AOC), 1996
Horizontal datum - NAD83. Vertical datum - NGVD29.
Used for: runway end coordinates, elevations, and obstructions

Sacramento County Surveyor Services
GPS Survey February 6, 2004
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Used for: confirmation of runway endpoints and elevations

California Spatial Information Library (CASIL)
Scans of USGS 7.5' contour maps
Used for: background image, elevation contours
Below diagram shows arrangement, datums, and publication dates -

W 121° 22' 30"	W 121° 15' 00"	W 121° 07' 30"
"CITRUS HEIGHTS" Dated 1992 NAD83/27 NGVD29	"FOLSOM" Dated 1980 NAD27 NGVD29	N 38° 45' 00" – N 38° 37' 30"
"CARMICHAEL" MHR Dated 1992 NAD83/27 NGVD29	"BUFFALO CREEK" Dated 1980 NAD27 NGVD29	N 38° 37' 30" – N 38° 30' 00"

AIRSPACE DRAWING INFORMATION

1. New AutoCAD file created, with base coordinates assigned as California State Plane Coordinate System, Zone 2 (NAD83), U.S. Survey Feet.

2. Latitude and longitude 7.5' increments drawn, calculated to California State Plane Coordinate System locations using US Army Corps of Engineers CORPSCON software.

3. Scanned USGS maps were attached in background. Note: On some maps, border text and tick marks indicate NAD83 alignment. However, scanned files had been converted back to NAD27 / CA Teale Projection (in order to match scans of older maps which were never converted to NAD83). Adjustment was made in this Airspace Drawing to align all scanned maps to NAD83.

4. Vertical data: Runway endpoint elevations and Part 77 surfaces shown are based in NAVD88. Note, elevations on USGS background maps are based in NGVD29. Add 2.5' to NGVD29 elevations to get NAVD88 equivalent.

NOTES

1. No terrain or other recorded obstructions of Part 77 approach surfaces.

N
Magnetic North
16° Declination
1997

0 1000 2000 4000
Graphic Scale in Feet

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Prepared For
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6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

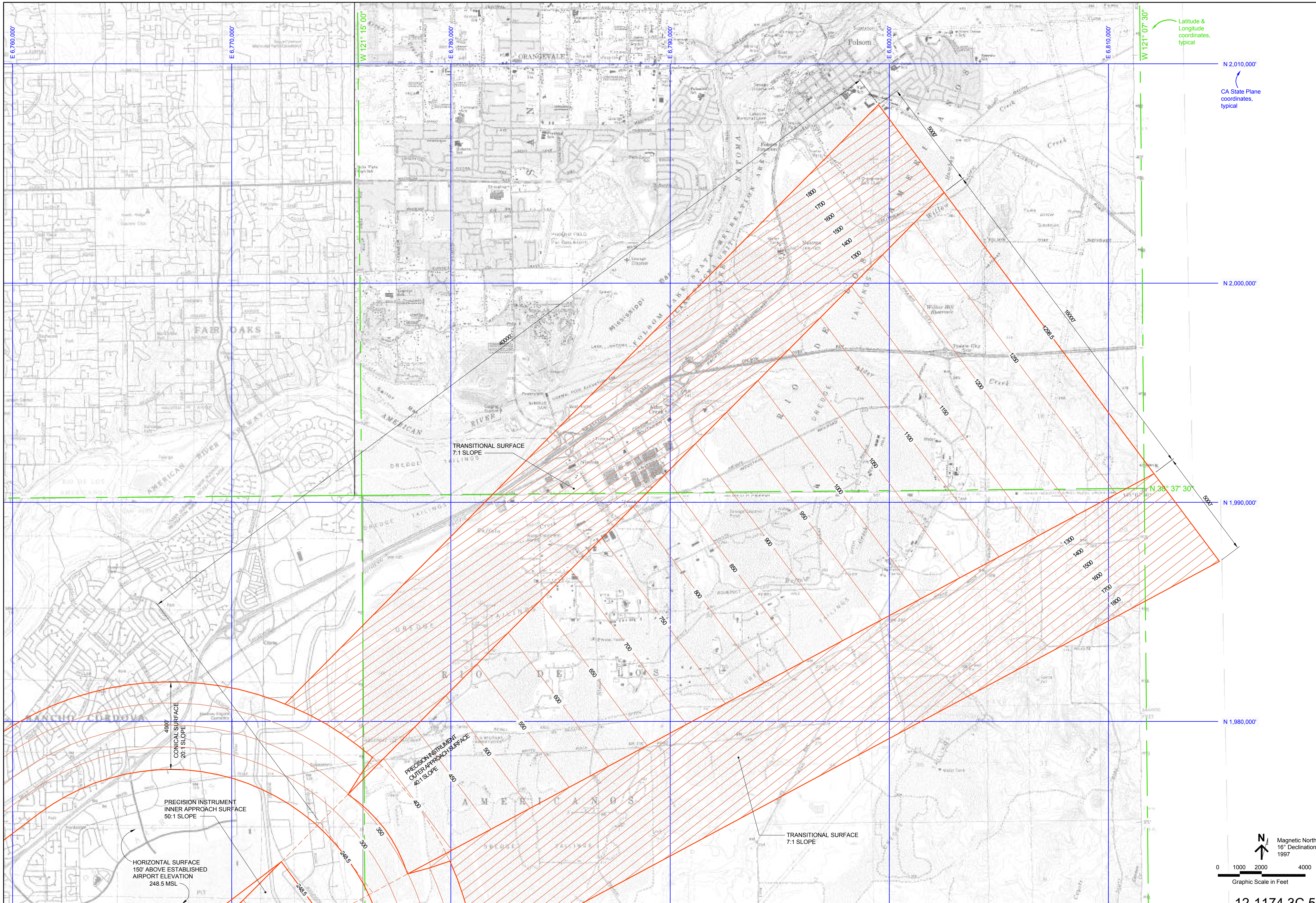
Airport Layout Plan Set
MATHER AIRPORT
SACRAMENTO COUNTY
CALIFORNIA

Issue Log

DATE	REVISION DESCRIPTION	DRAWN	CHECKED
06/30/2004	CLIENT REVIEW	BHT	EEB
09/24/2004	CLIENT REVIEW 2	BHT	DM
11/24/2004	CLIENT REVIEW 3	BHT	DM

Drawing Title
AIRSPACE DRAWING 1 of 2
CENTRAL AREA

SHEET
6 OF 12



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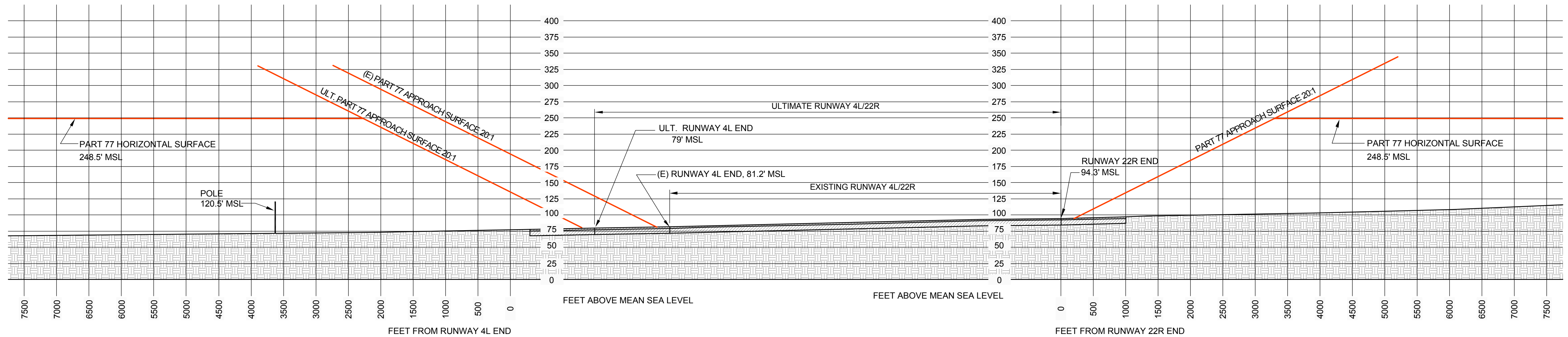
11/24/2004	CLIENT REVIEW 3	BHT	DM

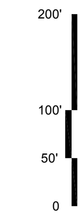
Drawing Title

AIRSPACE DRAWING 2 of 2
OUTER PORTION OF
PRECISION APPROACH

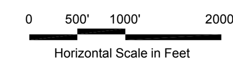
SHEET

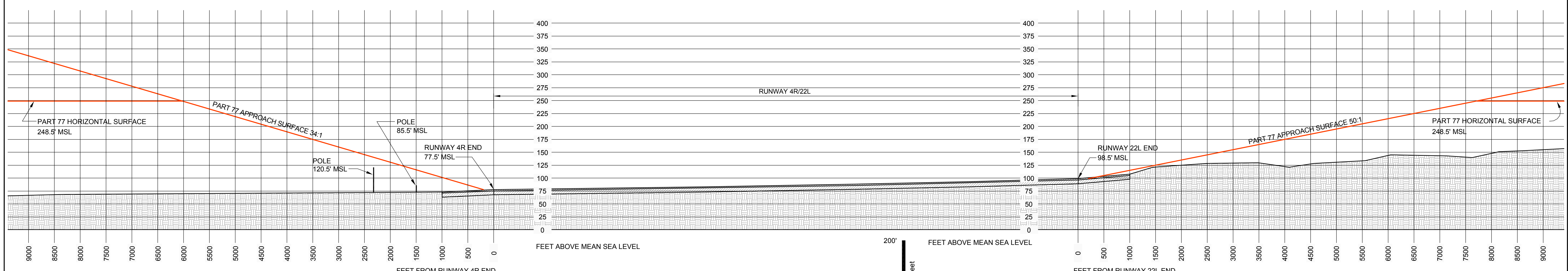
7 OF 12



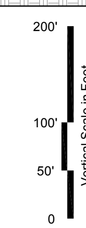


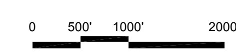
PROFILE VIEW - RUNWAY 4L/22R





PROFILE VIEW - RUNWAY 4R/22L





SOURCES OF INFORMATION

NOAA Airport Obstruction Chart (AOC), 1996
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Horizontal datum - NAD83
Vertical datum - NGVD29

Sacramento County GPS survey February 6, 2004
Used for: confirmation of runway endpoints; elevations in NAVD88

California Spatial Information Library, scans of USGS 7.5' contour maps
Used for: background image, elevation contours
Below diagram shows arrangement, datums, and publication dates -

NOTES

1. No terrain or other recorded obstructions of Part 77 approach surfaces.

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11/24/2004	CLIENT REVIEW 3	BHT	DM

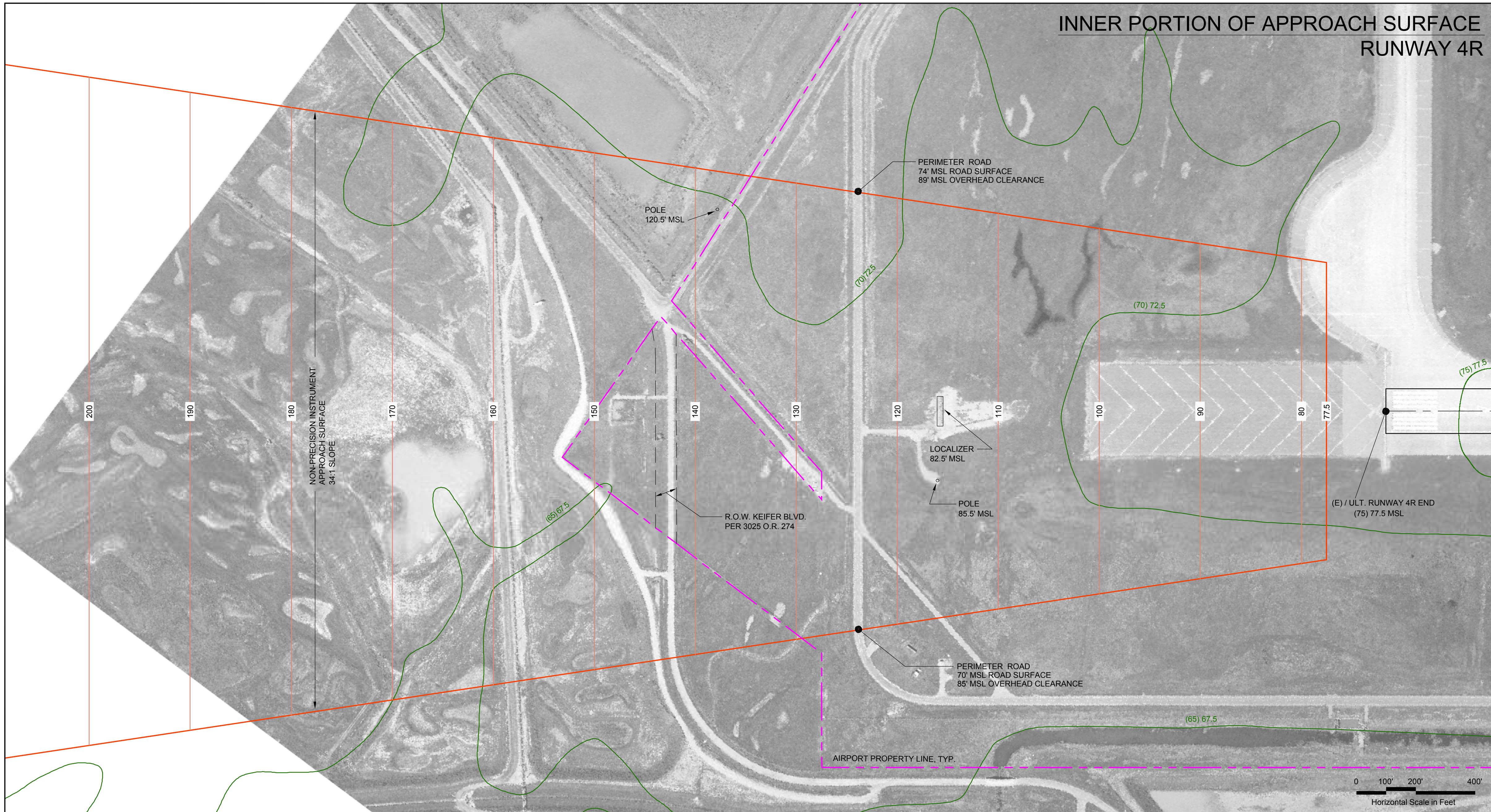
Drawing Title

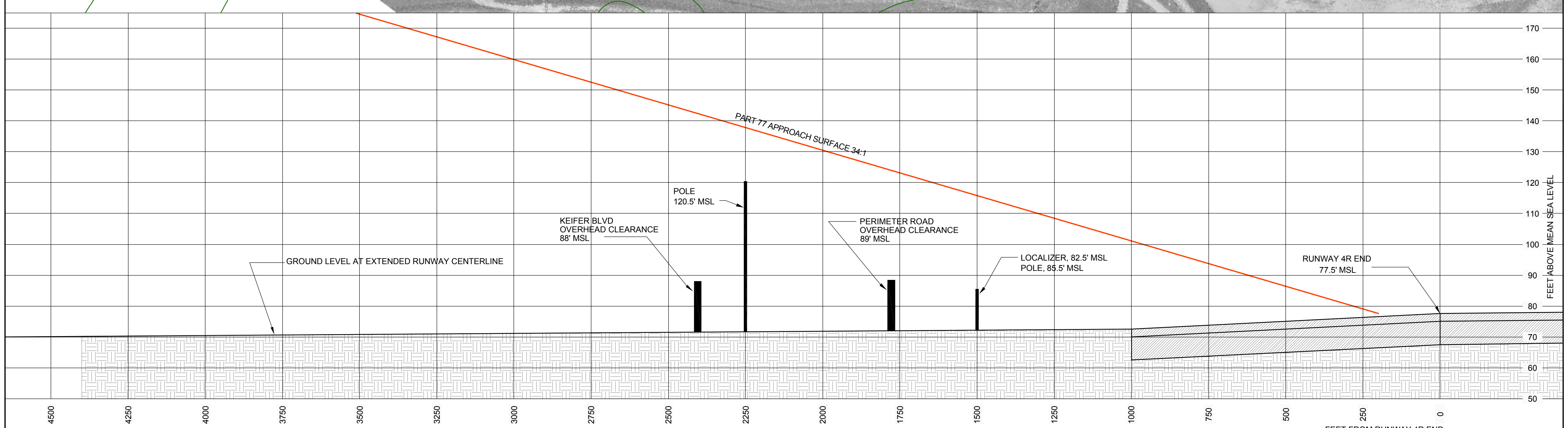
RUNWAY PROFILES

SHEET

8 OF 12

INNER PORTION OF APPROACH SURFACE
RUNWAY 4R





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Used for: runway end coordinates, elevations, obstructions

Sacramento County Airport System
Aerial photo, April 2001
Used for: background image

Sacramento County Surveyor Services
GPS Survey February 6, 2004
Horizontal datum - NAD83. Vertical datum - NAVD88.
Used for: confirmation of runway endpoints and elevations

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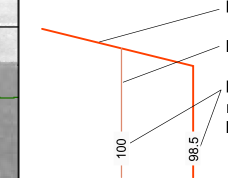
Scans of USGS 7.5' contour maps
Used for: elevation contours
See Airspace Drawing for more information

NOTES

1. No terrain or other recorded obstructions of Part 77 approach surfaces.

KEY

Part 77 Approach Surfaces

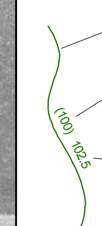


Edge of surface

Elevation contour

Elevation in feet above mean sea level (MSL), NAVD88 datum

Elevation contours



5-foot elevation contours traced from USGS maps.

Numbers in parentheses - Original USGS map elevations, feet above mean sea level (MSL), NGVD29 datum

Numbers with no parentheses - Updated equivalent elevation, feet above mean sea level (MSL), NAVD88 datum

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11/24/2004	CLIENT REVIEW 3	BHT	DM

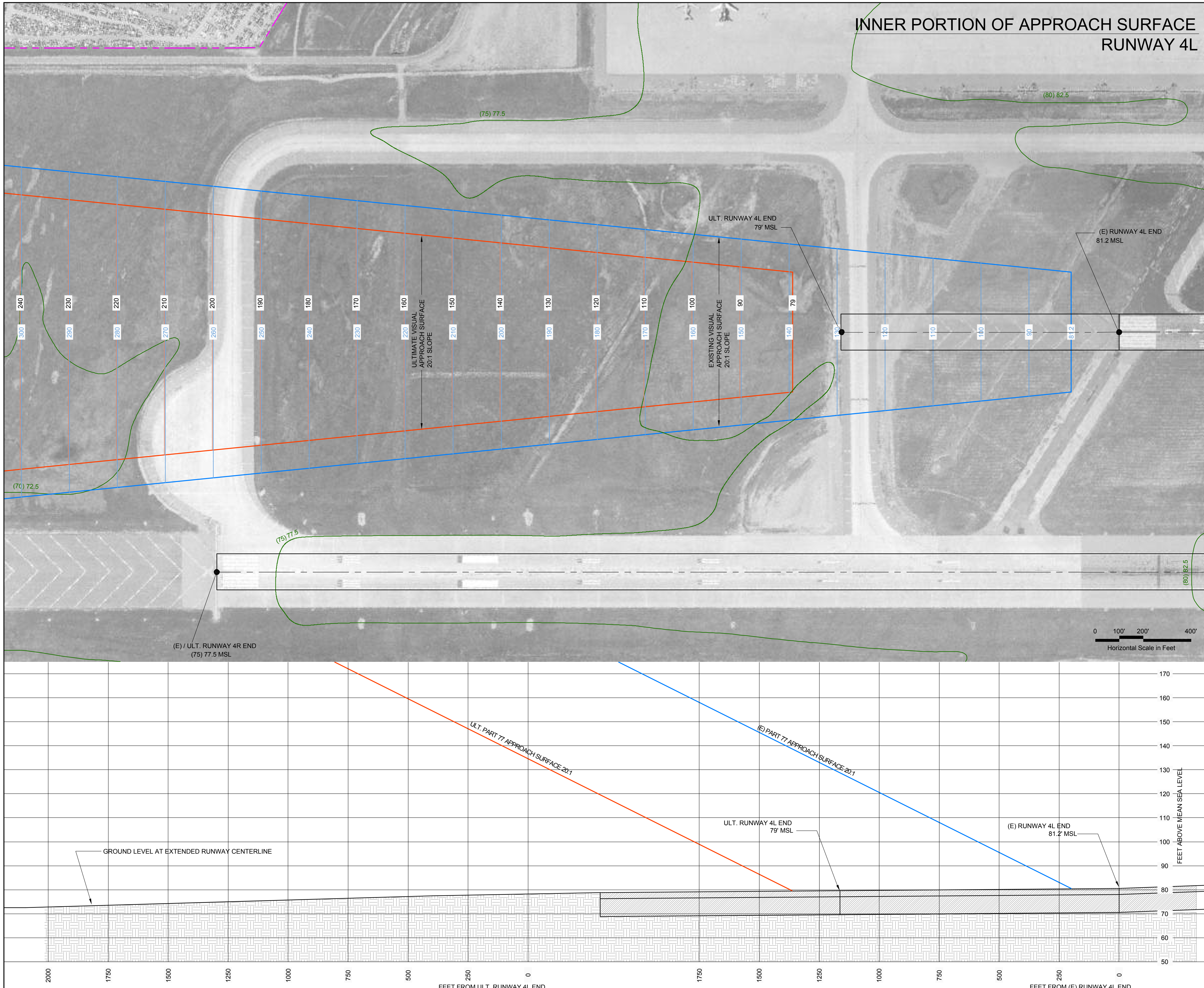
Drawing Title

INNER PORTION OF APPROACH SURFACE RUNWAY 4R

SHEET

9 OF 12

INNER PORTION OF APPROACH SURFACE
RUNWAY 4L



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See Airspace Drawing for more information

NOTES

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KEY

Part 77 Approach Surfaces

- Edge of surface
- Elevation contour
- Elevation in feet above mean sea level (MSL), NAVD88 datum

Elevation contours

- 5-foot elevation contours traced from USGS maps.
- Numbers in parentheses - Original USGS map elevations, feet above mean sea level (MSL), NGVD29 datum
- Numbers with no parentheses - Updated equivalent elevation, feet above mean sea level (MSL), NAVD88 datum

Vertical Scale in Feet

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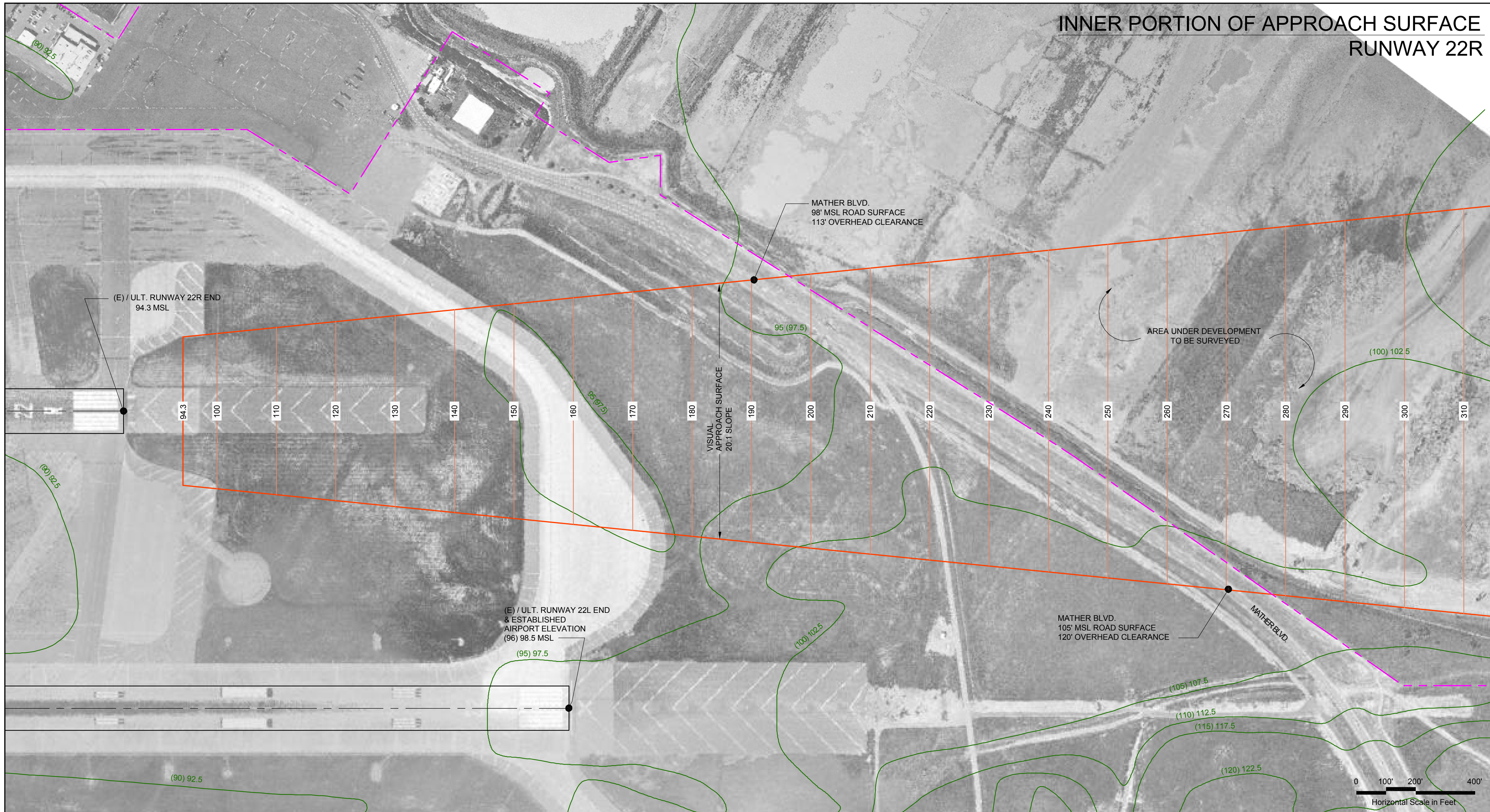
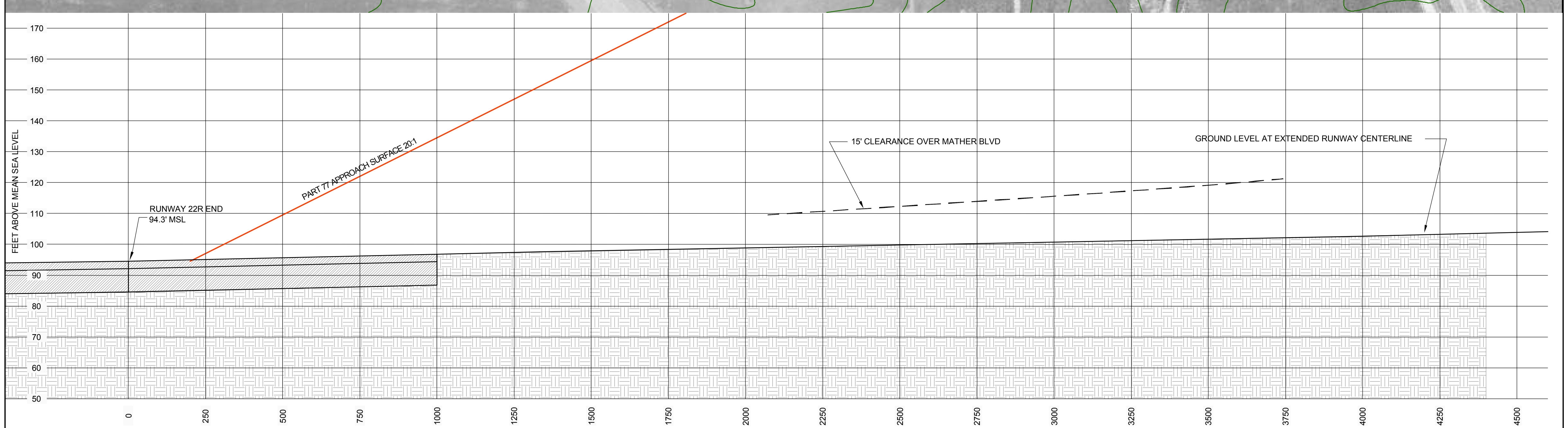
Drawing Title
INNER PORTION OF APPROACH SURFACE RUNWAY 4L

SHEET
10 OF 12

INNER PORTION OF APPROACH SURFACE
RUNWAY 22R





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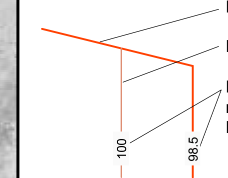
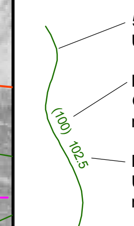
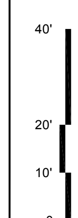
KEY

Part 77 Approach Surfaces



Elevation contours





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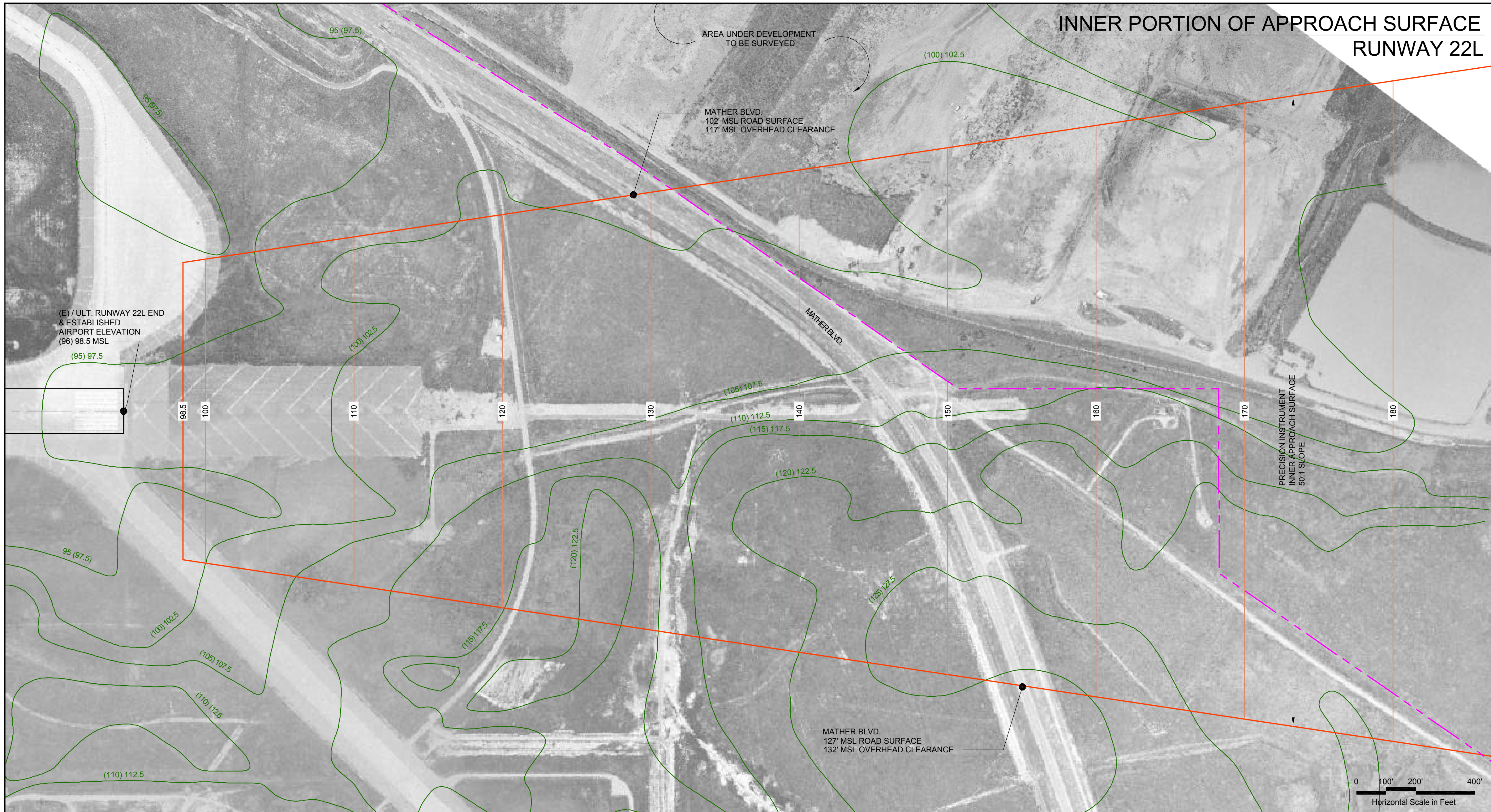
Drawing Title

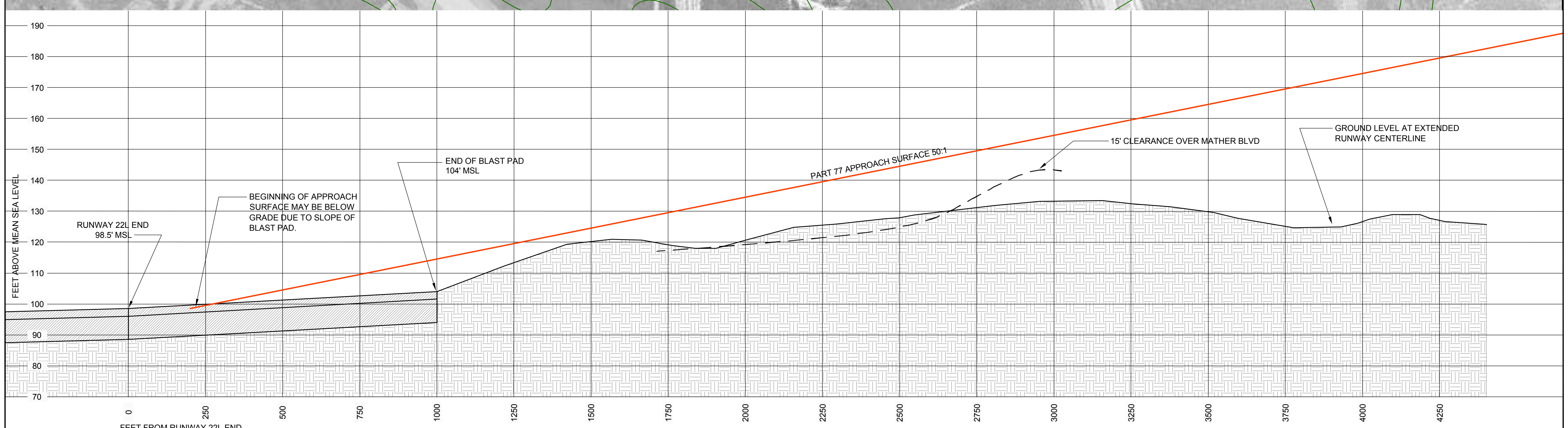
INNER PORTION OF
APPROACH SURFACE
RUNWAY 22R

SHEET

11 OF 12

INNER PORTION OF APPROACH SURFACE RUNWAY 22L





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INNER PORTION OF APPROACH SURFACE RUNWAY 22L

SHEET

12 OF 12