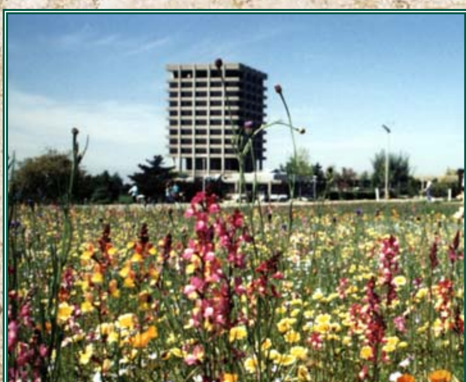
HAYWARD
EXECUTIVE
AIRPORT



HAYWARD EXECUTIVE AIRPORT
Hayward, California

AIRPORT MASTER PLAN

FINAL TECHNICAL REPORT

Prepared By
Coffman Associates, Inc.
Airport Consultants

In Association With
Environmental Science Associates (ESA)

April 2002

HAYWARD
AIRPORT

TABLE OF CONTENTS

CONTENTS

HAYWARD EXECUTIVE AIRPORT
Hayward, California

AIRPORT MASTER PLAN

Chapter One
INVENTORY

Chapter One (Continued)

Chapter Two
AVIATION DEMAND FORECASTS

Chapter Three
AVIATION FACILITY REQUIREMENTS

Chapter Three (Continued)

Chapter Four
AIRPORT DEVELOPMENT ALTERNATIVES

Chapter Five
AIRPORT PLANS

Chapter Five (Continued)

Chapter Six
FINANCIAL PLAN

EXHIBITS

EXHIBITS (Continued)

Appendix A
GLOSSARY AND ABBREVIATIONS

Appendix B
ECONOMIC BENEFIT STUDY

Appendix C
AIRCRAFT NOISE ORDINANCE REVIEW

Appendix D
QUIT CLAIM DEEDS, INSTRUMENTS OF RELEASE

Appendix E
ENVIRONMENTAL RECONNAISSANCE PHASE I, ENVIRONMENTAL RECONNAISSANCE PHASE II, AND OPPORTUNITIES AND CONSTRAINTS ANALYSIS

HAYWARD AIRPORT

Chapter One
INVENTORY

Chapter One

INVENTORY

HAYWARD AIRPORT

The initial step in the preparation of the airport master plan update for Hayward Executive Airport is the collection of information pertaining to the airport and the area the airport serves. This chapter assembles collected information which will be used in subsequent analyses in this study. Within this chapter is an inventory of existing airport facilities, area airspace, and air traffic control. Additionally, background information regarding the City of Hayward and the regional area is collected. This includes information regarding the airport's role in regional, state, and national aviation systems, surface transportation, and the socioeconomic profile.

The information outlined in this chapter provides a foundation, or starting point, for all subsequent chapters. Therefore, it is essential that a complete and accurate inventory is conducted since the findings and assumptions made in this plan are dependent on information collected. The information outlined in this chapter was obtained through on-site inspections of the airport, interviews with City staff and airport tenants, and documents provided by the Federal Aviation Administration (FAA), Hayward Executive Airport, and the City of Hayward.

REGIONAL SETTING

Hayward Executive Airport is located on a 543-acre site approximately two miles west of the City of Hayward's central business district. Situated in the "Heart of the Bay" in Alameda County, the City of Hayward is located 25 miles southeast of San Francisco, 14 miles south of Oakland, 26 miles north of San Jose, and 10 miles west of the Livermore Valley. The City of Hayward encompasses 61 square miles ranging from the Eastern shore of the San

Francisco Bay to the southern portion of the Oakland-Berkeley Hills area. **Exhibit 1A** depicts the airport in its regional and national setting.

The airport facilities can be accessed via Hesperian Boulevard, West A Street, and West Winton Avenue. Hesperian Boulevard and West Winton Avenue provide primary access to the airport site from locations within the City of Hayward, and are situated on the eastern and southern sides respectively. West A Street provides primary access to the airport from Interstate 880. The airport can be accessed regionally by Interstate Highways 880 (Nimitz Freeway) and 580, and State Highways 92 and 238 (Mission Boulevard). Interstate 880 is located approximately one and a half miles east of the airport and provides access to Oakland (to the north) and San Jose (to the south). Interstate 580 is located two miles northeast, and provides access eastward to Dublin and the Pleasanton area. State Highway 92 (San Mateo Toll Bridge) is two miles south, and provides access across the Bay to San Mateo County. State Highway 238 (Mission Boulevard) is located two miles east of the airport and provides access to Union City, Fremont, and Interstates 580 and 680.

The City of Hayward is served by the Bay Area Rapid Transit (BART) system. This system is an 81-mile long, automated rapid transit system serving three million people from 37 stations in four Bay Area counties including Alameda, Contra Costa, San Francisco, and northern San Mateo. The local BART station is located approximately one and a half miles east of the airport.

Commercial and industrial type land uses prevail in the areas near the airport. The Skywest Public Golf Course and John F. Kennedy Memorial Park are located along the northern boundary of the airport on airport property. Further north is the San Lorenzo residential neighborhood. The airport is also bordered on the east by the Longwood-Winton Grove residential neighborhood. The Mt. Eden and Southgate residential neighborhoods are located to the south. Noise abatement and operational procedures have been implemented to reduce aircraft noise over the surrounding communities. These will be described in detail later in this chapter.

CLIMATE

The regional climate is characterized by dry, mild summers and moist, cool winters. The normal daily minimum temperature ranges from 43 degrees in January, to 57 degrees in August. The normal daily maximum temperature ranges from 55 degrees in January to 72 degrees in September. The region can expect approximately 18 inches of precipitation annually. The airport site is often subject to low lying fog conditions, especially in early morning hours. The fog lifts slowly throughout the day as temperatures and wind flows increase. The prevailing winds are from the west.

THE AIRPORT'S SYSTEM ROLE

Airport planning exists on many levels: local, regional, state, and national. Each

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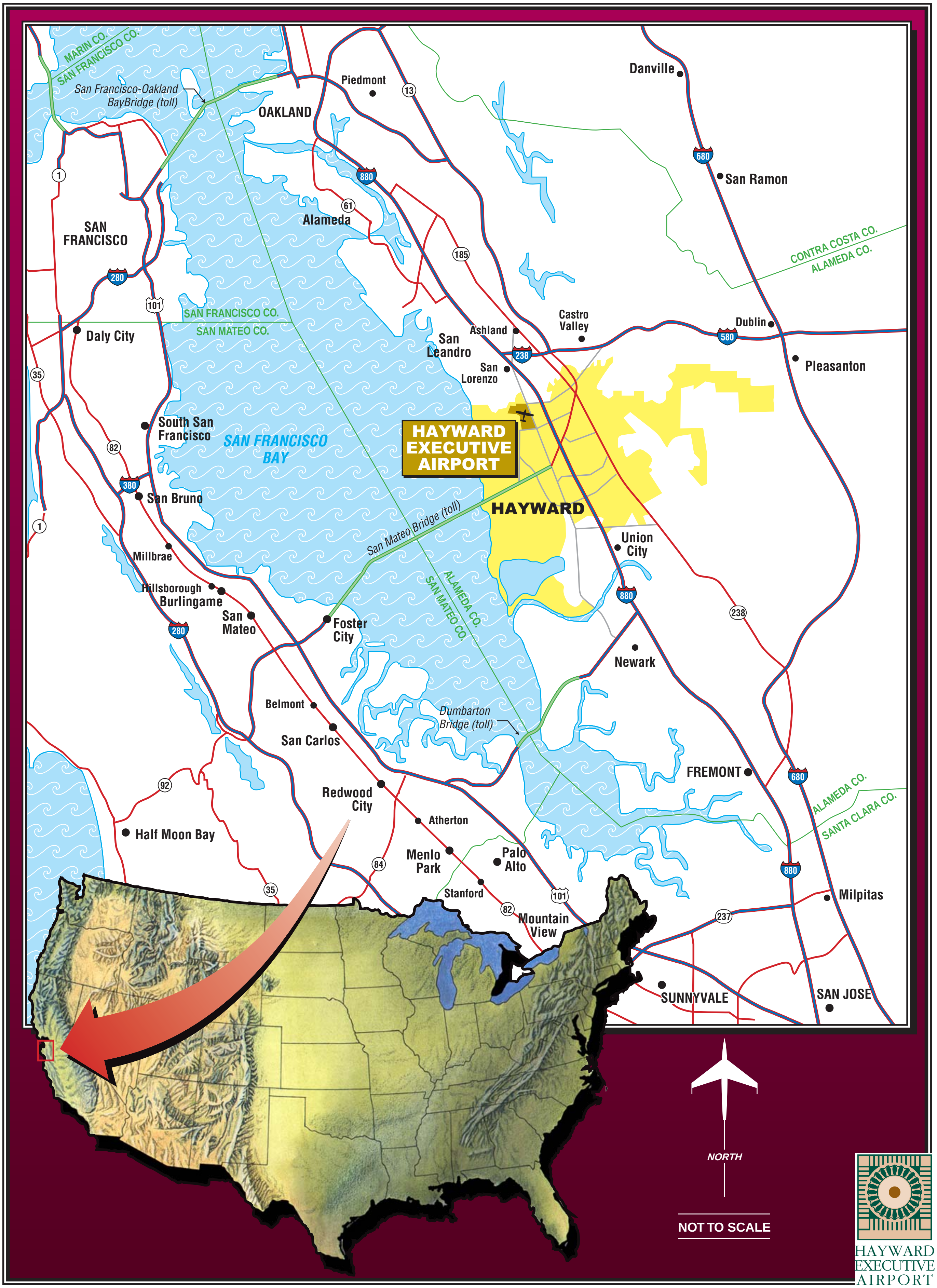

Exhibit 1A
LOCATION MAP

level has a different emphasis and purpose. This master plan is the primary local airport planning document. Regionally, the airport is included in the *Metropolitan Transportation Commission's (MTC) Regional Airport System Plan (RASP)* for the San Francisco Bay area. This plan was updated in November 1994. The *RASP* evaluates the region's capacity and ability to meet aviation demand, expanding their focus beyond the individual airports as provided for in their respective master plans. Hayward Executive Airport is one of 51 airports in the *MTC RASP* and considered important to meeting the region's demand for aviation services.

At the state level, the airport is included in the *California State Aviation System Plan (CASP).* The purpose of the *CASP* is to ensure that the State has an adequate and efficient system of airports to serve its aviation needs well into the future. The *CASP* defines the specific role of each airport in the State's aviation system and establishes funding needs.

At the national level, the airport is included in the *National Plan of Integrated Airport Systems* (*NPIAS*). The *NPIAS* includes a total of 3,660 airports (both existing and proposed) which identifies airports, together with the airport development necessary to meet the present and future requirements in support of civil needs. An airport must be included in the *NPIAS* to be eligible for federal grant-in-aid assistance.

Hayward Executive Airport is one of 43 reliever airports for the State of California included in the *NPIAS*. Reliever airports are specially designated general aviation airports intended to reduce congestion at large commercial service airports. In its designated role as a reliever airport, Hayward Executive Airport is intended to accommodate the overflow of general aviation aircraft and operations from nearby commercial service airports including Oakland International Airport, San Francisco International Airport, and to a lessor extent, San Jose International Airport.

AIRPORT ADMINISTRATION

Hayward Executive Airport is owned and operated by the City of Hayward. The airport is a Division under the Public Works Department. The airport operates as a proprietary enterprise of the City without tax support from the general fund and is fully self-sufficient. An Airport Committee of the City Council meets on a quarterly basis to review policy and provides direction for the operation and development of the airport.

CONVEYANCE OF AIRPORT PROPERTY

The Hayward Executive Airport was developed during World War II as an Army aircraft fighter base. On April 16, 1947, the Federal government declared the Hayward Army Airfield surplus, and conveyed the airport to the City of Hayward "for public airport purposes." As used within the Quit Claim Deed, "public airport purposes" excluded the use of the property for manufacturing or industrial purposes.

In 1961 and 1966 the City of Hayward petitioned the FAA for the release of certain parcels of land from the provisions of the 1947 Quit Claim Deed limiting the use of the conveyed airport property to "public airport purposes." On January 9, 1961, a 28 acre parcel of land was released from the provisions of the 1947 Quit Claim Deed. This release provided for the sale of the property to the highest bidder provided that it be considered fair market value and was publically advertised. The City of Hayward was obligated by the release to devote the entire sum received from the sale "for the development, maintenance, and operation" of the airport.

On May 5, 1966, the FAA released five parcels of land totaling 368.5 acres from provisions the 1947 Claim Deed. This release provided for the sale and/or long term lease of these parcels for non-airport uses. Similar to the 1961 release, the City of Hayward was obligated by the release to use the funds from the sale or lease of the property exclusively for the development, improvement, operation or maintenance of the airport. A copy of the Quitclaim Deed and subsequent instruments of release can be found in Appendix D.

PREVIOUS MASTER PLAN

The completion of the *Hayward Executive Airport, Airport Master Plan Study* in 1984 included a number of recommendations for physical developments to the airport, though some of them have not been completed. A new terminal facility, hotel-restaurant complex, and a transient aircraft parking apron were planned for the area north of the FAA air traffic control tower. In addition, the plan recommended that future landscaping developments be implemented to enhance the open space and environmental habitat of the airport properties.

STRATEGIC BUSINESS PLAN

The *Strategic Business Plan for Hayward Executive Airport* was completed in 1997. The plan was developed to identify economic development opportunities for the City of Hayward at the airport and improve the financial position of the airport and its businesses and industries. Principal recommend-ations of the Strategic Business Plan included: updating the Airport Master Plan, evaluating the impacts of the 1992 Performance-Base Noise Ordinance, preparing a marketing plan for the airport, expanding aviation development on the east and west sides of the airport, expanding non-aviation development on the airport (office and light-industrial), attracting additional general aviation services (aircraft parts and powerplant repair and small piston-engine aircraft overhaul), developing a general aviation terminal complex, and preparing a lease review and evaluation. This Master Plan will addresses a portion of these principal recommendations including reviewing the 1992 Performance-Based Noise Ordinance and evaluating and identifying aviation and non-aviation development parcels on the airport.

DEVELOPMENT HISTORY

Since 1984, the airport has completed a number of improvement projects, many with state and federal grant assistance. **Table 1A** summarizes major airport improvement projects completed at the airport since 1984.

TABLE 1A
Airport Improvement Projects (1984-1998)

Year	Improvement Project
1984	Reconstructed Runway 10L-28R, including marking and safety area improvements; extended Taxiway X (now Taxiway A) including holding apron, marking and lighting; constructed service road.
1985	Extended Taxiway X, including marking; expanded apron including tiedowns and marking; expanded holding apron at Runway 28R end; conducted Federal Aviation Part 150 Noise Compatibility Study.
1986	Constructed Taxiway D, including marking and lighting; seal coated and marked existing taxiways; Runway 10R-28L was rehabilitated and marked.
1990	Seal coated apron and T-hangar taxiways; installed visual approach slope indicator (VASI) to Runway 28R; modified threshold lights for runway 10R; installed medium intensity taxiway lights for Taxiways B, E, and F; installed taxiway guidance signs, and modified electrical vault.
1994	Expanded runup area adjacent to Runway 28L; installed 8-foot high noise berm for runup area of Runway 28L; constructed runway exit Taxiway C.
1997	Installed new lighting and guidance signs for Taxiways B, E, and F; installed precision approach path indicator (PAPI) to Runway 28R; applied seal coat to taxiways; installed emergency generator; expanded Runway 28L holding apron; extended Taxiway C to Taxiway Z.
2000	Installed taxiway signage, overlay Taxiway A, Taxiway B, and Taxiway F.

Sources: Hayward Executive Airport

AIR TRAFFIC ACTIVITY

At airports serving general aviation, the number of based aircraft and the total annual operations (takeoffs and landings) are the primary indicators of aeronautical activity. These indicators will be used in subsequent analyses in this Master Plan Update to project future aeronautical activity and determine future facility needs.

BASED AIRCRAFT

Exhibit 1B illustrates based aircraft activity at Hayward Executive Airport since 1984. After increasing between 1984 and 1989, total based aircraft have gradually declined to approximately 423 aircraft in 1998. Based aircraft grew to 432 in 2001. Single and multi-engine propellor driven aircraft account for a majority of the based aircraft.

AIRCRAFT OPERATIONS

The air traffic control tower (ATCT) located on the airport collects information regarding aircraft operations (takeoffs and landings). **Table 1B** summarizes historical annual aircraft operations at the airport since 1984. **Exhibit 1B** provides an illustration of annual aircraft operations by type since 1984.

TABLE 1B
Historical Aircraft Operations (Airport Control Tower Count)

Year	Total Operations	Local General Aviation Operations	Itinerant General Aviation Operations	Local Military Operations	Itinerant Military Operations	Air Taxi
1984	253,239	140,975	109,208	32	113	2,911
1985	243,198	130,918	108,372	14	296	3,598
1986	261,163	131,752	121,986	22	455	6,948
1987	273,830	137,640	128,644	32	484	7,030
1988	250,516	118,774	125,670	16	533	5,523
1989	252,334	125,433	122,111	8	621	4,161
1990	252,984	125,178	122,806	22	1,040	3,938
1991	193,299	100,802	87,067	32	445	4,953
1992	178,660	84,720	88,913	15	299	4,713
1993	163,204	80,154	81,007	12	319	1,712
1994	154,099	80,070	72,171	204	608	1,046
1995	153,882	89,865	63,158	6	135	718
1996	179,880	108,351	71,101	0	62	366
1997	181,141	106,841	73,649	170	98	383
1998	153,618	93,124	60,223	56	127	88
1999	187,585	114,730	72,104	32	109	610
2000	162,286	94,966	66,460	20	38	802
2001	165,774	100,780	63,908	46	208	832

Source: Federal Aviation Administration (FAA), Air Traffic Activity Data System (ATADS).

Aircraft operations at Hayward Executive Airport are reported in three general categories: air taxi, general aviation, and military. Air taxi operations normally consists of the use of general aviation type aircraft for the "on demand" commercial transport of persons and property in accordance with Federal Aviation Regulations (FAR) Part 135. General aviation operations include a wide range of aircraft use ranging from personal use to business and corporate uses. General aviation operations comprise the majority of operations at Hayward Executive Airport. Military use of the airport is limited and includes occasional training activities from nearby military bases and aircraft supporting the mission of the California Air National Guard based at the airport.

Aircraft operations are further classified as local or itinerant. Local operations consist mostly of aircraft training operations conducted within the airport traffic pattern and touch-and-go and stop-and-go operations. Itinerant operations are originating or departing aircraft which are not conducting operations within the airport traffic pattern. Local operations comprise the majority of total annual

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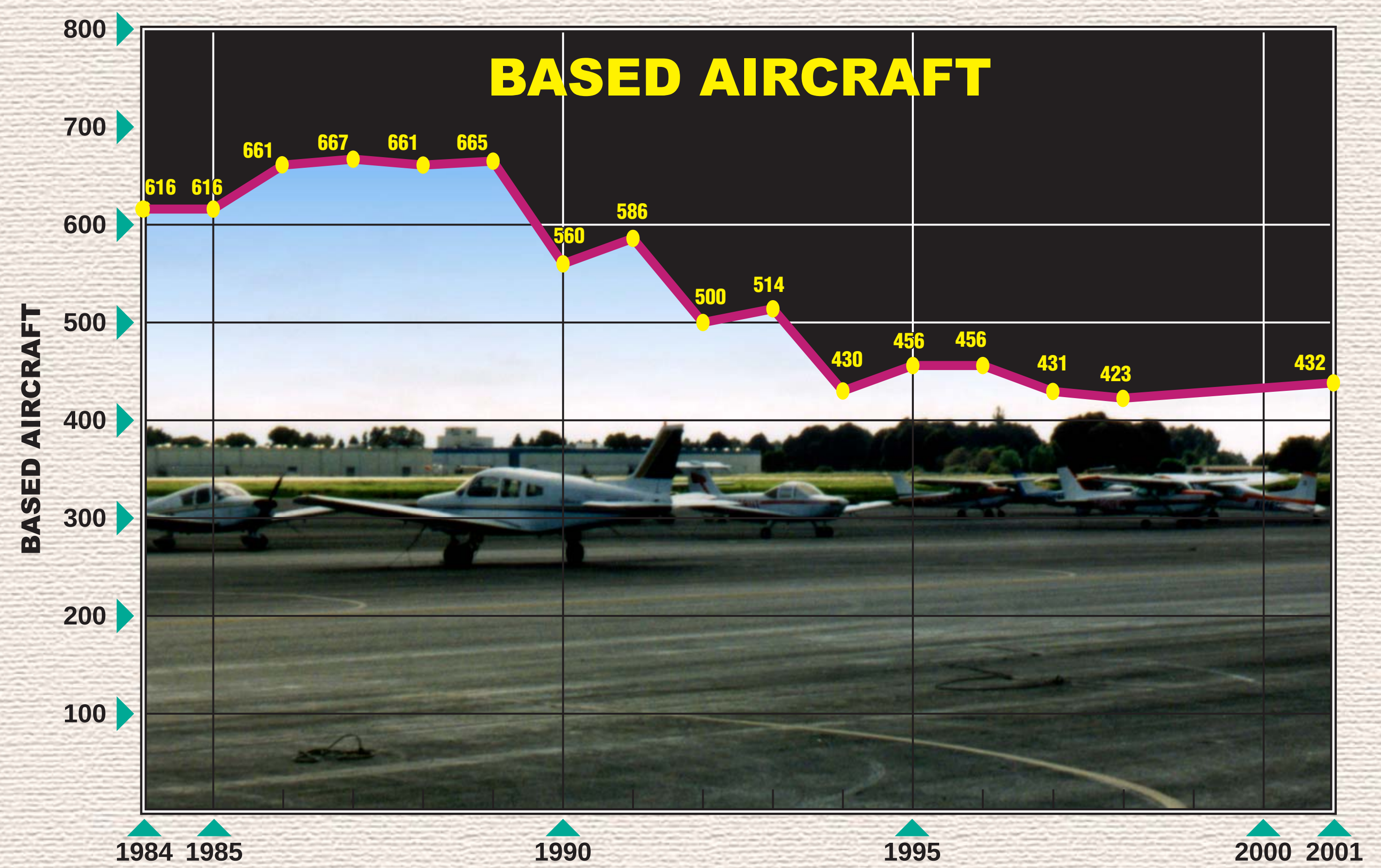
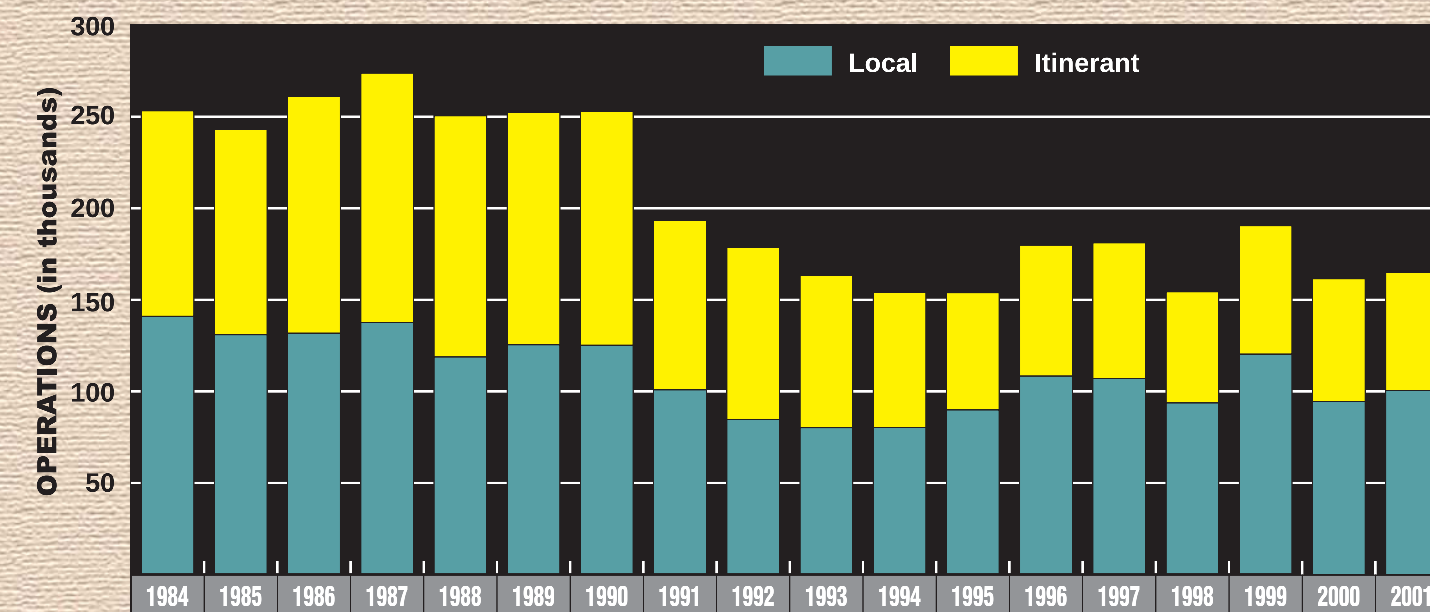
BASED AIRCRAFT

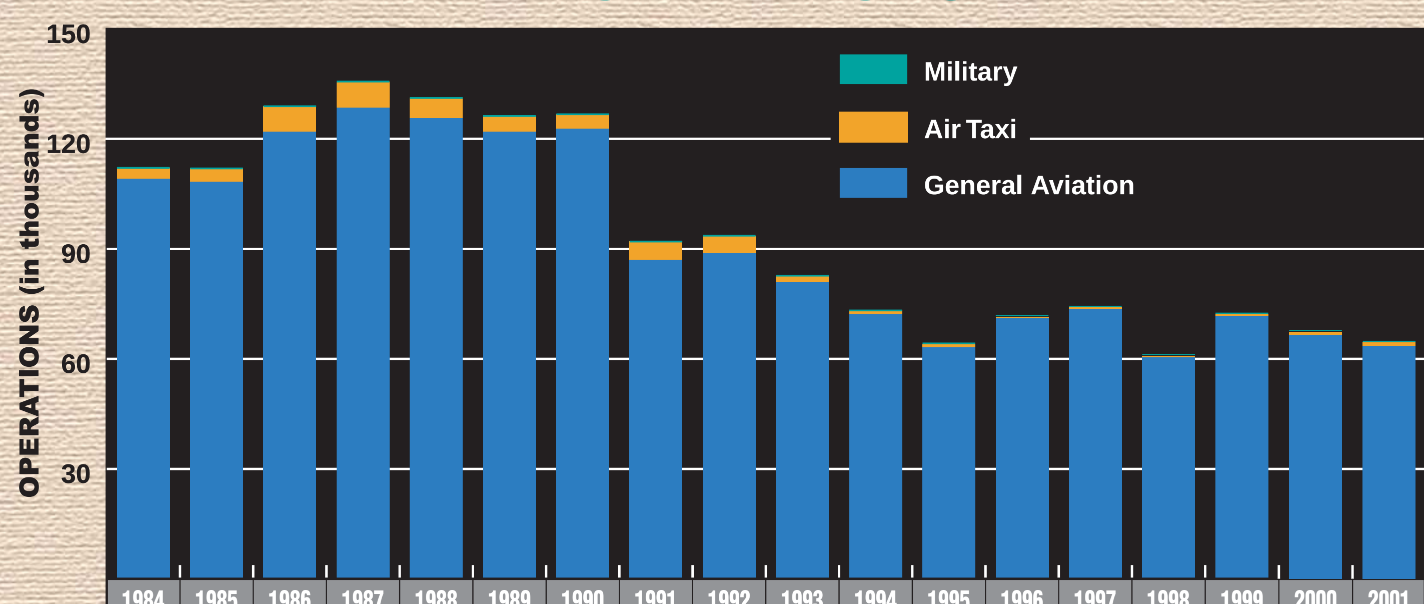


TOTAL ANNUAL OPERATIONS



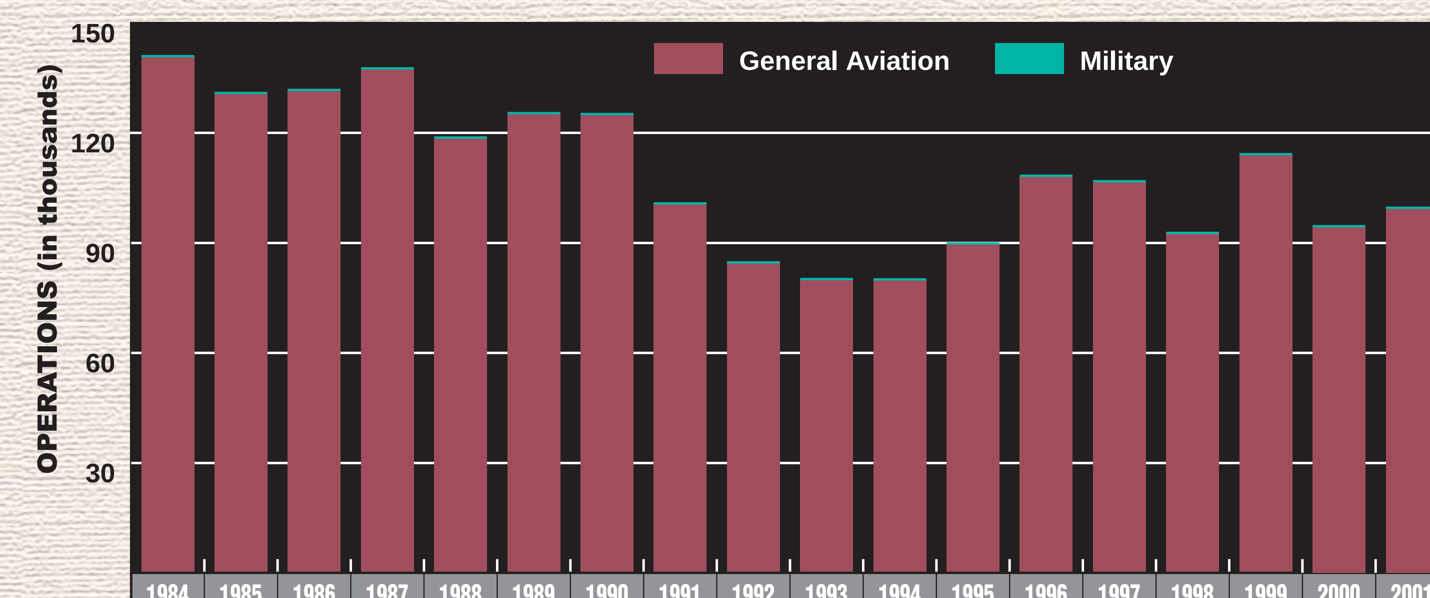
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Local	141,007	130,932	131,774	137,672	118,790	125,441	125,200	100,834	84,735	80,166	80,274	89,871	108,351	107,011	93,180	114,762	94,986	100,826
Itinerant	112,232	112,266	129,389	136,158	131,726	126,893	127,784	92,465	93,925	83,038	73,825	64,011	71,529	74,130	60,438	72,823	67,300	64,998
Total	253,239	243,198	261,163	273,830	250,516	252,334	252,984	193,299	178,660	163,204	154,099	153,882	179,880	181,141	153,618	187,585	162,286	165,774

ITINERANT OPERATIONS BY TYPE



	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
General Aviation	109,208	108,372	121,986	128,644	125,670	122,111	122,806	87,067	88,913	81,007	72,171	63,158	71,101	73,649	60,223	72,104	38	208
Air Taxi	2,911	3,598	6,948	7,030	5,523	4,161	3,938	4,953	4,713	1,712	1,046	718	366	383	88	610	802	832
Military	113	296	455	484	533	621	1,040	445	299	319	608	135	62	98	127	109	66,460	63,908
Total	112,232	112,266	129,389	136,158	131,726	126,893	127,784	92,465	93,925	83,038	73,825	64,011	71,529	74,130	60,438	72,823	67,300	64,948

LOCAL OPERATIONS BY TYPE



	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
General Aviation	140,975	130,918	131,752	137,640	118,774	125,433	125,178	100,802	84,720	80,154	80,070	89,865	108,351	106,841	93,124	114,730	94,966	100,780
Military	32	14	22	32	16	8	22	32	15	12	204	6	0	170	56	32	20	46
Total	141,007	130,932	131,774	137,672	118,790	125,441	125,200	100,834	84,735	80,166	80,274	89,871	108,351	107,011	93,180	114,762	94,986	100,826

Source: Federal Aviation Administration, Hayward Airport operations at Hayward Executive Airport, accounting for over 60 percent of total operations in 1999.

Between 1984 and 1990 annual operations totals fluctuated between a high of 273,000 (1987) and a low of 243,000 (1985). General aviation operations accounted for the majority of all operations during this period with local and itinerant general aviation operations being nearly equal between 1988 and 1990. Between 1991 and 1995, operational levels declined annually. The decline has been attributed, in part, to the overall decline in general aviation activity nationwide. Operations rebounded in 1996 and 1997, increasing in both years. After decreasing in 1998, operations again increased in 1999 (more than 6,000 over 1997) and the third highest level in the 1990s. Operations exceeded 160,000 annually in 2000 and 2001.

The airport maintains records of aircraft operations when the airport control tower is closed. The airport records approximately 4,000 operations annually. This equates to approximately 2-3 percent of total annual operations. These totals were not combined with the airport control tower counts as only a count of total aircraft operations was made and the operational count was not categorized according to aircraft type (air taxi, general aviation, military) or split between itinerant or local.

PERFORMANCE-BASED NOISE ORDINANCE

The City of Hayward implemented a noise ordinance on February 1, 1992 which specifies aircraft noise limits for aircraft operating at the airport. A system of permanently-based noise monitoring equipment monitors and records actual sound levels 24 hours per day. The noise ordinance specifies maximum noise levels for each of the four noise monitor locations. Operations which exceed the specific noise levels specified in the noise ordinance can result in a citation and fine. Exceptions to the maximum noise levels are given for aircraft operations to Oakland International Airport, air ambulance operators, Stage III aircraft, operations for reasons of safety or direction by air traffic control, and military aircraft. Specifics of the existing noise ordinance can be found in Appendix C, Aircraft Noise Ordinance Review.

PART 150 STUDY

The City of Hayward developed and adopted a Federal Aviation Regulation (FAR) Part 150 Study in 1988. A FAR Part 150 Plan establishes procedures for airport noise compatibility planning in order to provide greater nationwide uniformity in the assessment of noise compatibility issues and implementation of programs.

Recommendations in the plan included establishing departure and approach procedures, shifting flight tracks, developing a program to provide pilot and community awareness, constructing a noise berm at the Runway 28L end, relocating the Runway 28L runup area, providing additional exit taxiways, and acquiring an Automated Weather Observation System (AWOS). These recommendations have been completed.

NOISE ABATEMENT AND OPERATIONAL PROCEDURES

The City of Hayward has established a number of voluntary noise abatement operational procedures in an effort to reduce aircraft noise. **Exhibit 1C** provides a graphical depiction of the operational procedures (shown by green arrows), recommended aircraft traffic patterns and altitudes for touch and go and stop and go operations (shown in black), and noise sensitive areas (shown in yellow). The following provides a brief description of the noise abatement operational procedures and quiet flying techniques at Hayward Executive Airport.

Departure Runway 28L: Jets, large twin-engine, and turboprop aircraft should depart this runway from the blast fence using the entrance taxiway. Air traffic control will direct all IFR departures to maintain runway heading until reaching 400 feet mean sea level (MSL). All other aircraft should depart at the Runway 28L threshold and turn (safety permitting) at the end of the runway. For departures to the west, aircraft should initiate a 270-degree left turn, crossing midfield to the west.

Departure Runway 28R: Departures are limited to single-engine aircraft, except high-performance aircraft. Departing aircraft should turn right at the end of the runway. Runway 28R is closed when the tower is not in operation.

Departures 10L and 10R: All departing aircraft should maintain runway heading until above Southland Mall (approximately one-half mile from the airport boundary). Runway 10L is closed when the tower is not in operation.

Touch-and-Go / Stop-and-Go Procedures: Touch and go and stop and go procedures are prohibited between 9:00 p.m. and 7:00 a.m. Monday through Saturday on Runway 10R-28L. Touch and go and stop and go procedures are prohibited on both runways before 10:00 a.m. on Sundays and/or holidays.

Quiet Flying Techniques: In addition to the specific operational procedures listed above, Hayward Executive Airport recommends that pilots avoid overflying residential neighborhoods, gaining as much altitude as quickly as practical, and adjusting the propellor angle and engine speed to reduce engine and propellor noise. The City of Hayward requires that pure jet (Stage II) aircraft follow published operating procedures and coordinate with airport management prior to operating at Hayward Executive Airport.

AIRPORT FACILITIES

Airport facilities can be functionally classified into two broad categories: airside and landside. The airside category includes those facilities directly associated with aircraft operations. The landside category includes those facilities necessary to provide the transition from surface to air transportation and support facilities necessary for the safe operation of the airport.

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Exhibit 1C
NOISE ABATEMENT PROCEDURES

AIRSIDE FACILITIES

Airside facilities include runways, taxiways, airport lighting, and navigational aids. A depiction of airside facilities at the airport is provided on the aerial photograph on **Exhibit 1D**. **Table 1C** summarizes airside facility data.

TABLE 1C
Airside Facilities Data

	Runway 10R-28L	Runway 10L-28R
Runway Length (feet)	5,024	3,107
Runway Width (feet)	150	75
Runway Surface	Asphalt	Asphalt
Runway Load Bearing Strength (pounds)		
Single Wheel Loading	30,000	13,000
Dual Wheel Loading	75,000	N/A
Runway and Taxiway Lighting	MIRL	MIRL
Approach Aids		
Approach Slope Indicators	VASI (10R, 28L)	PAPI (28R)
Runway End	REIL (10R, 28L)	None
Pavement Markings		
Runway	Precision	Nonprecision
Taxiway, Taxilanes, Apron	Centerline, Tiedown	Centerline, Tiedown
Instrument Approach Procedures	Localizer, VORTAC, VOR/DME, GPS	

MIRL-Medium Intensity Runway Lights
VASI-Visual Approach Slope Indicator
REIL-Runway End Identification Lights
VORTAC-Very High Frequency Omnidirectional Range/Tactical Air Navigational Aid
VOR/DME-Very High Frequency Omnidirectional Range/Distance Measuring Equipment
GPS-Global Positioning System

Runways

The existing runway configuration on Hayward Executive Airport includes two parallel runways aligned in a northwest-southeast configuration and designated as Runways 10L-28R and 10R-28L. Runway 10R-28L serves as the primary runway and is 5,024 feet long by 150 feet wide. Runway 28L has an entrance taxiway (860 feet long by 75 feet wide) available prior to the landing threshold for use by large aircraft. Runway 10R has a displaced threshold of 822 feet. Runway 10R-28L is also equipped with lighted distance-to-go signs along the west side of the runway. Runway 10L-28R is 3,107 feet long by 75 feet wide and primarily serves local training and small propellor-driven aircraft operations. Runway 10L-28R is not available for use when the air traffic control tower is closed.

Both runways are constructed of asphalt. Runway 10R-28L has a load bearing strength of 30,000 pounds single wheel loading (SWL) and 75,000 pounds dual wheel loading (DWL). Runway 10L-28R has a load bearing strength of 13,000 pounds SWL only. Single wheel loading refers to the design of the aircraft landing gear which has a single wheel on each main landing gear strut. Dual wheel loading refers to the design of certain aircraft landing gear which has two wheels on each main landing gear strut.

Taxiways

The taxiway system at the airport is illustrated in **Exhibit 1D**. The airport recently reclassified the taxiway system as new guidance signs were installed at the airport. The new classifications have been used in this section. Taxiway A (formerly Taxiway X) is the full length parallel taxiway serving Runway 10L-28R, and provides access to the general aviation facilities on the east and southeast locations of the airport. It is located approximately 240 feet northeast of Runway 10L-28R and measures 75 feet in width. Taxiway A1 extends from the terminus of Taxiway A to the entrance taxiway for Runway 10R-28L and is 35 feet wide. Taxiway A at the Runway 28L end is 50 feet wide.

Taxiway Z is the full length parallel taxiway serving Runway 10R-28L on the south side of the airport. It is located 400 feet west of Runway 10R-28L between Taxiways F and D, and 300 feet west of Runway 10R-28L from Taxiway D to the Runway 28L end. Taxiway Z is 50 feet wide. Taxiway Z also extends from the terminus of Taxiway Z to the entrance taxiway for Runway 10R-28L and is 50 feet wide.

Connecting the two parallel taxiways are five entrance/exit taxiways serving Runway 10R-28L, Runway 10L-28R, and the general aviation facilities on the east side of the airport. Taxiway B extends between the east apron area and runway 10R-28L. Taxiway B is 40 feet wide and provides access to Runway 28R. Taxiway C is located north of Taxiway B and is 40 feet wide. Taxiway C was recently extended to Taxiway Z. Taxiway D is located at approximately midfield and is 50 feet wide. A portion of Taxiway D between Runways 10L-28R and 10R-28L is angled to allow aircraft to exit the runway at higher speeds, which improves airfield capacity. Taxiway E extends between the transient apron and Taxiway Z and is 50 feet wide. Taxiway F extends along the north side of the runways and provides access to the Runway 10R and Runway 10L ends. Taxiway F is 120 feet wide.

There are two holding apron locations that provide an area off the taxiway for aircraft to prepare for departure and prevent delays to aircraft ready for takeoff. A holding apron location is located near the threshold of Runway 28R and encompasses approximately 1,300 square yards. The second holding apron is located near the threshold of Runway 28L and encompasses approximately 4,100 square yards. The Runway 28L holding apron was recently reconstructed to connect a system of taxiways and provide designated holding areas for jet and piston-engine aircraft.

97MP17-1D-3/31/00

HAYWARD EXECUTIVE AIRPORT

Exhibit 1D
AIRSIDE FACILITIES

Airfield Lighting

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the airport for this purpose. These lighting systems, categorized by function, are summarized as follows:

Identification Lighting: The location of an airport at night is universally indicated by a rotating beacon. A rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The rotating beacon at the airport is located on the airport control tower.

Runway and Taxiway Lighting: Runway and taxiway lighting utilizes light fixtures placed near the pavement edge to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility in order to maintain safe and efficient access to and from the runway and aircraft parking areas. Both runways are equipped with medium intensity runway lighting (MIRL). The intensity of the runway and taxiway lighting can be controlled by the air traffic control tower personnel. During periods when the air traffic control tower is closed, pilots can turn on and change the intensity of the runway and taxiway lighting utilizing the radio transmitter in the aircraft. The Runway 10L-28R MIRL is deactivated when the ATCT is closed. All taxiways are equipped with medium intensity taxiway lights (MIRL).

Visual Approach Lighting: A visual approach slope indicator (VASI) is available at each end of Runway 10R-28L. A precision approach path indicator (PAPI) is available for Runway 28R. The VASI and PAPI consist of a configuration of lights near the runway threshold to aid pilots in landing. These lights enable pilots to determine whether they are above or below the designed decent path to the runway.

Runway End Identification Lighting: Runway end identification lights (REIL's) provide rapid and positive identification of the approach end of the runway. REIL's are typically used on runways with no other approach lighting systems. The REIL system consists of two synchronized flashing lights, located laterally on each side of the runway threshold facing the approaching aircraft. REIL's are installed on each end of Runway 10R-28L and are in operation only when the air traffic control tower is operating.

Pavement Markings

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. The precision markings on Runways 10R-28L identify the runway centerline, pavement edge, designation, touchdown point, threshold, and aircraft holding positions. The non-precision markings to Runway 10L-28R identify the runway centerline, threshold, designation, and aircraft holding positions. Taxiway and apron taxilane centerline markings are provided to assist aircraft using these airport surfaces. Pavement markings also identify aircraft parking positions.

Helipad

A lighted helipad is located on the west side of the airport parallel to Taxiway Z. It is approximately 5,000 square yards in size, and has three parking positions in addition to the landing pad. It is primarily used by air ambulance, transient operations, and for flight training.

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which properly equipped aircraft and pilots translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying to or from the airport include the very high frequency omnidirectional range (VOR) facility, non-directional beacon (NDB), global positioning system (GPS), and Loran-C.

The VOR, in general, provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment is combined with a VOR facility to provide distance as well as direction information to the pilot. Military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. A VORTAC provides distance and direction information to civil and military pilots. The Woodside and Oakland VORTACs and San Francisco VOR/DME can be utilized by pilots flying to or from the airport. **Exhibit 1E** depicts the regional airspace system and locations of these VOR navigational systems in relation to Hayward Executive Airport.

Loran-C is a ground-based enroute navigational aid which utilizes a system of transmitters located in various locations across the continental United States. Loran-C varies from the VOR as pilots are not required to navigate using a specific facility (with the VOR, pilots must navigate to and from a specific VOR facility). With a properly equipped aircraft, pilots can navigate to any airport in the United States using Loran-C.

GPS is an additional navigational aid for pilots enroute to the airport. GPS was initially developed by the United States Department of Defense for military navigation around the world. Increasingly, over the last few years, GPS has been utilized more in civilian aircraft. GPS uses satellites placed in orbit around the globe to transmit electronic signals which properly equipped aircraft use to determine altitude, speed, and navigational information. GPS is similar to Loran-C as pilots can directly navigate to any airport in the country and are not required to navigate using a specific navigational facility.

The FAA is proceeding with a program to gradually replace all traditional enroute navigational aids.

Instrument Approach Procedures

Instrument approach procedures are a series of predetermined maneuvers established by the FAA using electronic navigational aids that assist pilots in locating and landing at an airport during low visibility and cloud ceiling conditions. Presently, the airport is served by a localizer, VOR, and GPS approach procedures.

The localizer is an electronic navigational aid located on the airport which defines the location of the extended runway centerline and provides the pilot with exact directional information for landing to the runway. The localizer instrument approach procedure to Runway 28L provides for landings when cloud ceilings are as low as 400 feet above the ground and the visibility is reduced to one mile for aircraft with approach speeds below 140 knots. For aircraft with approach speeds between 141 and 160 knots, the visibility minimums increase to 1¼ miles. When using the localizer approach to land at a different runway end (defined as a circling approach) the cloud ceilings minimums increase to 500 feet for aircraft with approach speeds less than 120 knots. For approach speeds between 121 and 140 knots the cloud ceiling remains the same (500 feet) but the visibility minimums increase to 1 ½ miles. For higher approach speeds, the visibility and cloud ceilings increase to two miles and 600 feet.

A GPS approach procedure to Runway 28L provides for approaches to landings when cloud ceilings are as low as 400 feet above the ground and visibility is reduced to one mile for aircraft with approach speeds less than 140 knots. For approach speeds between 141 and 160 knots, the visibility minimums increase to 1¼ miles. The cloud ceiling minimums for a circling approach increase to 500 feet for aircraft with approach speeds less than 120 knots. For approach speeds between 121 and 140 knots, the cloud ceiling remains the same (500 feet) and the visibility minimums increase to 1½ miles. For approach speeds between 141 knots, the visibility and cloud ceilings minimums increase for each approach category when local altimeter settings are not available.

A VOR (using the Oakland VORTAC) or GPS circling approach procedure provides for approaches to landings when cloud ceilings are as low as 800 feet above the ground and visibility is reduced to one mile for aircraft with approach speeds less than 90 knots. For aircraft with approach speeds between 91 knots and 120 knots, the visibility minimums increase to 1¼ miles. For aircraft with approach speeds between 121 and 140 knots the visibility minimums increase to 2¼ miles. For approach speeds between 141 and 160 knots the visibility minimums increase to 2½ miles and 600 feet.

A second VOR (using the Oakland VORTAC) or GPS circling approach procedures provides for approaches to landings when cloud ceilings are as low as 500 feet above the ground and visibility is reduced to one mile for aircraft with approach speeds less than 120 knots. For aircraft with approach speeds between 121 and 140 knots, the visibility minimums increase to 1½ miles. For aircraft with approach speeds between 141 and 160 knots, the visibility minimums increase to two miles and cloud ceilings minimums increase to 600 feet.

LANDSIDE FACILITIES

Landside facilities include aircraft storage facilities, aircraft parking aprons, and support facilities such as fuel storage and aircraft rescue and fire fighting facilities. Within the discussion of landside facilities is a description of existing general aviation services and airport tenants. Landside facilities east of Runway 10R-28L are identified on **Exhibit 1F**.

Aircraft Parking Apron

There is approximately 131,400 square yards of apron area at Hayward Executive Airport providing space for aircraft movement and local and transient aircraft tiedown. Approximately 320 aircraft tiedowns are available on the combined aircraft parking areas. The City of Hayward maintains the aircraft transient apron area near the airport traffic control tower. Other apron areas adjacent to large conventional hangars are privately maintained.

Enclosed T-Hangars

There are a total of 219 City-owned enclosed T-hangars units at Hayward Executive Airport, totaling approximately 280,000 square feet of storage space in 19 separate structures. Fourteen of these structures are located on the northwest side of the airport, and were built in the 1980s. The remaining five older hangars (built in the 1950s) are situated on the southeast side of the airport.

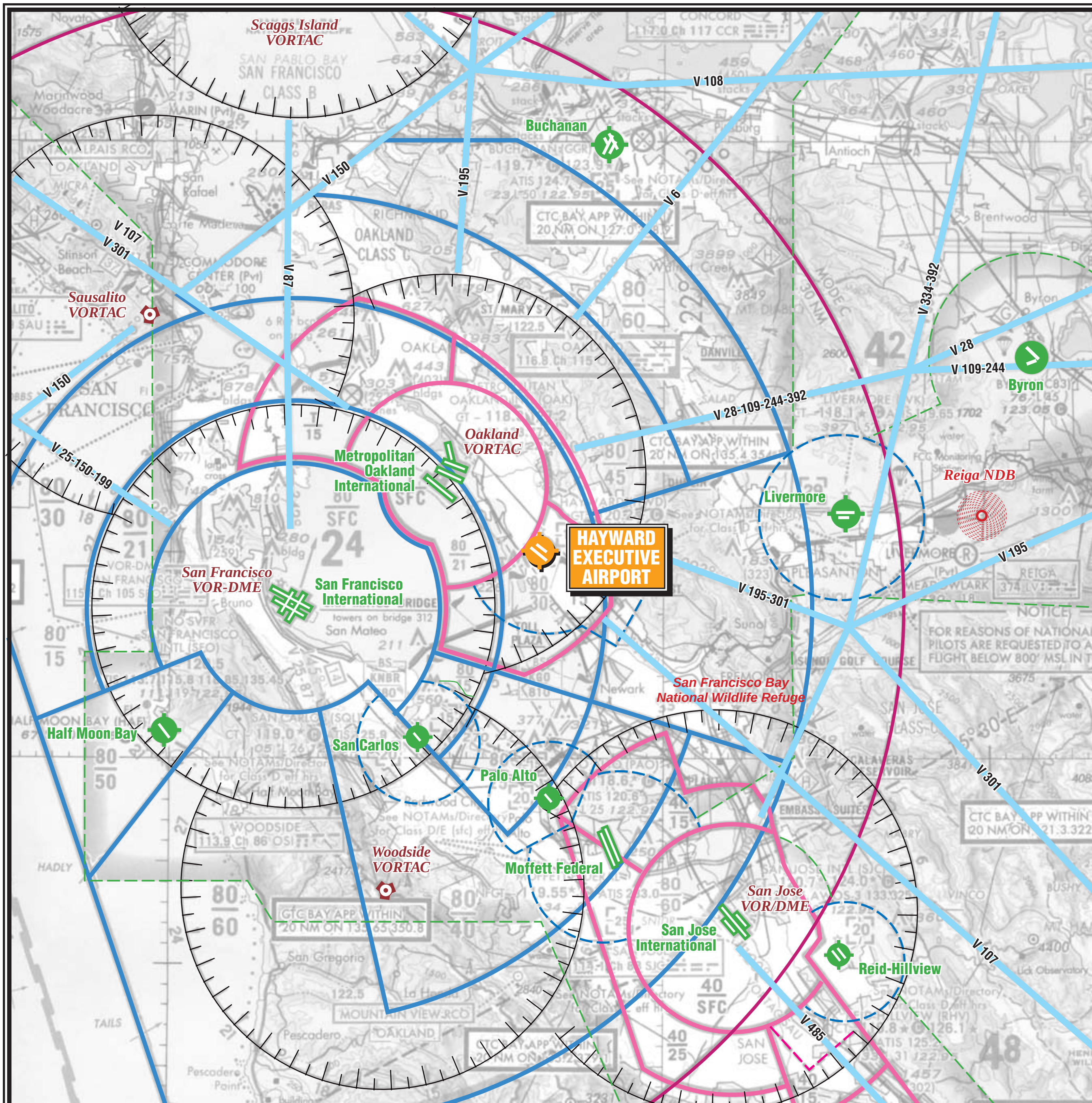
Conventional Hangars

There are 12 conventional hangars located on the east side of airport that consist of approximately 147,000 square feet of storage space. The conventional hangars are privately owned and operated by the tenants providing general aviation services at Hayward Executive Airport.

Automobile Parking

There are approximately 224 parking spaces for airport tenants, operators, and users. Of those, 120 parking spaces are located at the Trajen facilities on the northwest side of the airport; 25 near the ATCT and administration building; 30 near the southeast T-hangars; and approximately 50 spaces located throughout the FBO facilities on the east side of the airport.

97MP17-1E-3/31/00



LEGEND

Airport with hard-surfaced runways greater than 8069' or some multiple runways less than 8069'

Airport with hard-surfaced runways 1500' to 8069' in length

VORTAC

Non-Directional Radiobeacon (NDB)

Compass Rose

Victor Airways

Class B Airspace

Class C Airspace

Class D Airspace

Class E Airspace

Class E Airspace with floor 700' above surface

MODE C

Source: San Francisco Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration

NORTH

NOT TO SCALE

HAYWARD EXECUTIVE AIRPORT

Exhibit 1E
AREA AIRSPACE

97MP17-1F-3/15/02

HAYWARD EXECUTIVE AIRPORT

Exhibit 1F
LANDSIDE FACILITIES

Fuel Storage

All fuel storage facilities a Hayward Executive Airport are privately owned and operated. Fuel storage totals 84,000 gallons. Three 10,000 gallon underground tanks are operated by the Hayward Jet Center from their location on the east side of the airport. Three underground tanks are located on the north side of the airport and operated by Trajen. Two tanks provide 20,000 gallons of storage while a the third tank provides 10,000 gallons of storage each. The East Bay Regional Park District on the west side of the airport owns and operates a 4,000 gallon above-ground fuel storage tank.

Aircraft Wash Facility

Located adjacent to Executive Hangar Building #1 at the north side of the airport is a city-owned, public use aircraft wash rack. Built in 1982, the wash rack is designed to properly dispose of cleaning fluids used on aircraft and equipment. It can accommodate up to two aircraft for cleaning purposes on two separate pads.

Tenant Maintenance Shelter

A tenant maintenance shelter is located on the north side of the airport west of Executive Hangar Building #1. It is approxi-mately 3,000 square feet in size and can accommodate two general aviation aircraft simultaneously. The tenant maintenance shelter provides airport tenants a facility to conduct routine aircraft maintenance and for the proper disposal of aircraft fluids.

Aircraft Rescue and Firefighting

City Fire Station Number 6, located on the south side of the airport along West Winton Avenue, is available for response to aircraft and airport facility emergencies.

Airport Maintenance

Airport maintenance operates from a portion of Hangar M which is located in the far northeast portion of the airport. The airport maintenance facility totals approximately 2,200 square feet and is used for equipment storage and maintenance and repair activities.

Airport Control Tower and Airport Administration

The airport control tower (ATCT) is located along east side of the transient apron in a six story building owned and operated by the City of Hayward. The ATCT operates from 7:00 a.m. to 9:00 p.m. daily. Air traffic control services are provided at the airport by the Federal Aviation Administration (FAA). The City of Hayward Executive Airport administrative offices are located on the first and second floors of this building which was constructed in 1960.

Automated Surface Observation System

Hayward Executive Airport is equipped with an Automated Surface Observation System (ASOS). The ASOS provides automated aviation weather observations 24 hours a day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The ASOS system reports cloud ceiling, visibility, temperature, dew point, wind direction and speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The ASOS is located east of Taxiway A near the apron used by Sullivan Propellors.

GENERAL AVIATION SERVICES

A full range of aviation services are available at Hayward Executive Airport. This includes aircraft rental, flight training, aircraft maintenance, aircraft charter, aircraft fueling, and many other services. The following provides a brief discussion of general aviation services at the airport:

Aerial Services - aerial advertising.

Aeromedical Group, Incorporated - tie-down rental, hangar rental, lifeguard service (air ambulance), aircraft service and maintenance.

American Aircraft Sales - aircraft sales, office rental, tie-down rental.

Ameriflight, Incorporated - air cargo/courier.

Brent's International - aircraft containerization, traffic watch.

CalStar - lifeguard service (air ambulance).

Commander Services - aircraft sales, aircraft service and maintenance.

Flight Watch, SFO - traffic watch.

Flying Vikings - aircraft rental, aircraft sales, air tours-Bay area, flight material for sale, flight training school, aircraft service and maintenance.

Friendship Flyers - flight training.

Hayward Executive Airport (City of Hayward) - hangar rental, tie-down rental.

Hayward Jet Center - fuel service.

International Aircraft Sales - aircraft sales.

J & R Electronics - aviation electronics repair.

National Helicopter - training/sales.

SP Aviation, Incorporated - air charter, aircraft sales, lifeguard service (air ambulance).

Sullivan Propellors - flight materials for sale, hangar rental, aircraft service and maintenance, tie-down rental.

Trajen - air charter, aircraft sales, flight materials for sale, fuel services and facilities, hangar rental, office rental, aircraft service and maintenance, tie-down rental.

Turbine Air - aircraft service and maintenance.

Other Tenants

The following non-aviation airport tenants and their activity are described below.

Carrow's Restaurant - restaurant

Chavez Brothers (formerly Hayward Air Plaza West) - Offices

Executive Inn - motel

Home Depot - retail center

JT's Fuel and Service - gas station

John F. Kennedy Memorial Park - park

Manzella's Restaurant - restaurant

Pacific Roller Die - manufacturing

Skywest Public Golf Course - golf course

Vagabond Inn - motel

Federal Aviation Administration - airport control tower, Airways Facilities

Aviation-Related Tenants

Air National Guard, 234th CCS - military operations

East Bay Regional Park District - helicopter unit

VICINITY AIRSPACE, AIR TRAFFIC CONTROL, AND AIRPORTS

VICINITY AIRSPACE

To ensure a safe and efficient airspace environment for all aspects of aviation, the FAA has established an airspace structure that regulates and establishes procedures for aircraft using the National Airspace System. The U.S. airspace structure provides for two basic categories of airspace, controlled and uncontrolled, and identifies them as Classes A, B, C, D, E, and G.

Class A airspace is controlled airspace and includes all airspace from 18,000 feet mean sea level (MSL) to Flight Level 600 (approximately 60,000 feet MSL). Class B airspace is controlled airspace surrounding high capacity commercial service airports (i.e. San Francisco International Airport). Class C airspace is controlled airspace surrounding lower activity commercial service and some military airports (Oakland International Airport and San Jose International Airport). Class D airspace is controlled airspace surrounding airports with an air traffic control tower. All aircraft operating within Class A, B, C, and D airspace must be in contact with the air traffic control tower facility responsible for that particular airspace. Class E is controlled airspace that encompasses all instrument approach procedures and low altitude federal airways. Only aircraft conducting instrument flights are required to be in contact with air traffic control when operating within Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communications with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist. Class G airspace is uncontrolled airspace that does not require contact with an air traffic control facility.

Airspace in the vicinity of the airport is impacted by the number of airports and the high level of aircraft activity in the Bay area. Airspace in the vicinity of Hayward Executive Airport is depicted on **Exhibit 1E**. The airport is located within Class D airspace. The Class D airspace for Hayward Executive Airport extends approximately four miles to the northeast and southwest and one nautical mile northwest terminating at the Class C airspace surrounding Oakland International Airport. The Class D airspace also extends approximately five miles to the east to accommodate the primary arrival routes for the instrument approach procedures to the airport. The Hayward Executive Airport Class D airspace extends from the surface to 1,500 feet MSL. During periods when the control tower is closed, the Class D airspace surrounding Hayward Executive Airport reverts to Class E airspace.

The airspace above 1,500 MSL to 3,000 MSL over Hayward Executive Airport is Class C airspace surrounding Oakland International Airport. The airspace above 3,000 feet to 8,000 feet MSL is Class B airspace surrounding San Francisco International Airport. The Class B and C airspace in the vicinity of Hayward Executive Airport provides for areas of controlled airspace along primary arrival routes to the Oakland International Airport and San Francisco International Airport. An area of Class E airspace surrounds the entire Metropolitan Bay Area.

While not considered part of the U.S. Airspace Structure, the boundaries of National Park Service Areas, U.S. Fish and Wildlife Service areas, and U.S. Forest Wilderness and Primitive areas are noted on aeronautical charts. While aircraft operations are not specifically restricted over these areas, aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface.

Exhibit 1E depicts the boundaries of the these areas near the Hayward Executive Airport.

For aircraft arriving or departing the Bay Area using VOR facilities, a system of Federal Airways, referred to as Victor airways has been established. Victor airways are corridors of airspace eight miles wide that extend upward from 1,200 feet AGL to 18,000 MSL and extend between VOR navigational facilities. The Victor airways in the San Francisco Bay area emanate from the San Francisco VOR-DME, and Oakland VORTAC, and are identified in **Exhibit 1E**.

AIR TRAFFIC CONTROL

The airport control tower located at the airport controls air traffic within the Class D airspace that surrounds Hayward Executive Airport. Aircraft arriving and departing within the Bay Area are controlled by different control facilities. The Class B airspace surrounding San Francisco International Airport is controlled by the Bay Approach Control facility. The Class C airspace surrounding Oakland International Airport is controlled by the air traffic control tower at Oakland International Airport. All aircraft transiting above the Class B and C airspace in the Bay Area are controlled by the Oakland Air Route Traffic Control Center (ARTCC). This facility controls aircraft in a large multi-state area providing pilots with altitude, aircraft separation, and route guidance information.

Area Airports

A review of the airports within 30 nautical miles of Hayward Executive Airport has been made to identify and distinguish the type of air service provided in the area surrounding the airport. Public use airports within 30 nautical miles of the airport are illustrated on **Exhibit 1E**. Information pertaining to each airport was obtained from FAA Form 5010-1, Airport Master Record.

Oakland International Airport is located six nautical miles northwest of Hayward Executive Airport and is owned and operated by the Port of Oakland. As a commercial service airport, it serves most of the major airlines and serves approximately 470,000 annual operations. Oakland International Airport is equipped with four runways, the longest being 10,000 feet.

An array of instrument approach aids and approach lighting systems aid pilots on approach to landing during inclement weather conditions. The airport is served with eleven published instrument approaches with the instrument landing system (ILS) for Runway 29 certified for Category II and III weather minimums (Cat II: 1,800 feet runway visual range (RVR), 100 foot cloud ceiling; Cat III: 700-0 feet RVR, and 0 foot cloud ceiling).

Although the airport's primary role is to provide commercial service to the area, the airport also serves general aviation activity. The airport has approximately 370 based aircraft including 23 jet aircraft, and 12 helicopters. A full range of general aviation services are available at Oakland International Airport.

San Francisco International Airport is located approximately 12 nautical miles west-northwest of Hayward Executive Airport and is owned and operated by the City and County of San Francisco. San Francisco International Airport serves all major air carriers and accommodates approximately 420,000 operations annually.

San Francisco International Airport is equipped with four runways, the longest 12,000 feet in length. There is an array of instrument approach aids and approach lighting systems which aid pilots on approach to landing during inclement weather conditions. The airport is served by nine instrument approaches with the ILS for Runway 28R certified for Category II and III weather approaches.

General aviation activity at the airport is very minimal. There are 25 based aircraft. Of that total, eight are jet aircraft, 11 are multi-engine, and six are single engine aircraft. A full range of general aviation services are available at San Francisco International Airport.

San Carlos Airport is located approximately 10 nautical miles southwest of Hayward Executive Airport. Owned and operated by the County of San Mateo, the airport is served by one asphalt runway 2,600 feet long. San Carlos Airport averages 330 operations a day. The airport is also served with an air traffic control tower. An estimated 500 aircraft are based (including 60 multi-engine) at the airport. San Carlos Airport provides and a full range of general aviation services.

Palo Alto Airport of Santa Clara County is located 12 nautical miles south of Hayward Executive Airport. Owned and operated by the County of Santa Clara, the airport provides one asphalt runway 2,500 feet long. The airport averages 580 operations a day. The airport is served by an airport traffic control tower. An estimated 500 aircraft (including 33 multi-engine) are based at the airport. Palo Alto Airport provides a full range of general aviation services.

Livermore Municipal Airport is located 14 nautical miles east of Hayward Executive Airport and is owned and operated by the City of Livermore. Livermore Municipal Airport has two runways available for use. Runway 7L-25R is 5,255 feet long while Runway 7R-25L is 2,699 feet long. The airport is equipped with an ILS and has two published instrument approach procedures. A total of 547 aircraft are based at the airport including 50 multi-engine, two jet aircraft, and three helicopters. A full-range of general aviation services are available at Livermore Municipal Airport.

Half Moon Bay Airport is located 20 nautical miles west-southwest Hayward Executive Airport and is owned and operated by the County of San Mateo. As an uncontrolled airport (no air traffic control tower), the airport averages 165 operations a day. There are approximately 70 based aircraft. The airport is served with one asphalt runway that is 5,000 feet long. There are two published instrument approaches to Half Moon Bay Airport. A single business currently provides general aviation services at Half Moon Bay Airport.

Concord/Buchanan Field Airport is located approximately 20 nautical miles north of Hayward Executive Airport. Owned and operated by the County of Contra Costa, the airport is served with four runways with the longest being 5,010 feet. Runway 19R is equipped with a medium intensity approach lighting system (MALS) along with a VASI, and has three published instrument approaches. The airport provides commercial air service, and averages 750 operations a day. There are 579 based aircraft, including 74 multi-engine, 14 jet aircraft, and 17 helicopters. The airport is served by an airport traffic control tower. A full range of general aviation services are available at Concord/Buchanan Field Airport.

San Jose International Airport is located approximately 20 nautical miles south-southeast of Hayward Executive Airport. Owned and operated by the City of San Jose, the airport is served with commercial air service, and averages 850 operations a day. The airport is served with three asphalt runways with the longest at 10,200 feet in length. Each runway has a variety of approach aids. Runway 12R-30L is equipped with a medium intensity approach lighting system with runway alignment indicator (MALSR) and an ILS at each end. There are seven published instrument approach procedures. Approximately 500 aircraft are based at the airport, including 160 multi-engine, and 18 jet aircraft. A variety of general aviation services are available at San Jose International Airport.

Reid-Hillview of Santa Clara County Airport is located approximately 24 nautical miles southeast of Hayward Executive Airport. Owned and operated by the County of Santa Clara, the airport is served with two asphalt runways, the longest at 3,101 feet. Reid-Hillview Airport averages 500 operations a day. There are approximately 550 based aircraft, including 52 multi-engine, and six military aircraft. A full-range of general aviation services are available at Reid-Hillview Airport.

Byron Airport is located approximately 26 miles east-northeast of Hayward Executive Airport. Owned and operated by the County of Contra Costa, the airport is served with two runways, the longest at 4,500 feet. Runways 23 and 30 are equipped with PAPIs. The airport has one published GPS approach. There are approximately 105 based aircraft including two jet aircraft, 26 gliders, and 13 ultralights at Byron Airport. One business facility provides general aviation services at Byron Airport.

SOCIOECONOMIC CHARACTERISTICS

For an airport master plan, socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the study area. This information is essential in determining aviation service level requirements, as well as forecasting the number of based aircraft and aircraft activity at the airport. Aviation forecasts are normally directly related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time.

POPULATION

Historical and forecast resident population for the City of Hayward and the Alameda County is summarized in

Table 1D. Between 1990 and 1995, the population of the City of Hayward grew by 6,521 (an average annual growth rate of 1.1 percent). For Alameda County, the population grew by 69,198 (an average annual growth rate of 1.1 percent). For the City of Hayward, total population is expected to grow to 141,300 by the year 2020 (an average annual growth rate of 0.5 percent). The total population for Alameda County is expected to reach 1,588,400 by the year 2020, averaging annual growth rate of 0.7 percent.

TABLE 1D
Historical and Forecast Population
City of Hayward, Alameda County

Year	City of Hayward	Alameda County
Historical		
1990	117,679	1,276,702
1995	124,200	1,345,900
Average Annual Growth Rate	1.1%	1.1%
Forecast		
2000	129,100	1,421,000
2005	133,700	1,485,400
2010	136,200	1,523,600
2015	139,200	1,558,700
2020	141,300	1,588,400
Average Annual Growth Rate	0.5%	0.7%

Source: Association of Bay Area Governments

EMPLOYMENT

Table 1E summarizes historical and forecast total employed residents for the City of Hayward and Alameda County. Total employed residents declined for both the City of Hayward and Alameda County between 1990 and 1995. The Association of Bay Governments, projects employment to rebound and increase through the year 2020. For the City of Hayward, total employment is expected to increase to 74,100 by the year 2020, an increase of 18,000 over the 1995 figure of 56,100. Total employed residents in Alameda County is expected to increase to 847,200 by the year 2020. An increase of 232,700 over the 1995 figure of 614,500.

TABLE 1E
Historical and Forecast Total Employed Residents
City of Hayward, Alameda County

Year	City of Hayward	Alameda County
Historical		
1990	58,959	648,461
1995	56,100	614,500
Average Annual Growth Rate:	-1.0%	-1.1%
Forecast		
2000	59,600	666,300
2005	64,600	729,300
2010	68,700	780,200
2015	72,000	819,600
2020	74,100	847,200
Average Annual Growth Rate:	1.1%	1.3%

Source: Association of Bay Area Governments

SUMMARY

The information discussed in this inventory chapter provides a foundation upon which the remaining elements of the planning process will be constructed. This information will provide guidance, along with additional analysis and data collection, for the development of forecasts of aviation demand and facility requirements.

DOCUMENT SOURCES

A variety of different documents were referenced in the inventory process. The following listing reflects a partial compilation of these sources. The listing does not include the data provided by Hayward Executive Airport, or drawings which were referenced for information. An on-site inventory and interviews with airport staff and tenants contributed to the development of the inventory effort.

National Plan of Integrated Airport System (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 1993-1997.

San Francisco Sectional Aeronautical Chart, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 61st Edition, September 10, 1998 Edition.

San Francisco VFR Terminal Area Chart, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 53rd Edition, September 10, 1998 Edition.

U.S. Terminal Procedures, Southwest Volume 2 of 2, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, October 8, 1998 Edition.

Airport/Facility Directory, Southwest U.S., U.S. Department of Commerce, National Oceanic and Atmospheric Administration, October 8, 1998 Edition.

Hayward Executive Airport Part 150 Plan, Hodges and Shutt, March 1988.

Strategic Business Plan, Hayward Executive Airport, Aries Consultants Ltd., May 1997.

San Francisco Bay Area Regional Airport System Plan, California Metropolitan Transportation Commission, November 1994.

A number of internet sites were accessed and contributed information for the inventory effort. These include:

Hayward Executive Airport
  http://www.haywardair.org
City of Hayward
  http://www.hayward-ca.gov
California Department of Commerce
  http://www.commerce.ca.gov
FAA 5010 Data, Area Airports
  http://www.airnav.com

HAYWARD AIRPORT

Chapter Two
AVIATION DEMAND FORECASTS

AVIATION DEMAND FORECASTS

The planning process for Hayward Executive Airport begins with a definition of existing and future levels of aviation demand. At airports primarily serving general aviation activity, based aircraft and annual operations (aircraft takeoffs and landings) are the primary indicators of aviation demand. Forecasts of these descriptors will be used in subsequent analyses in this master plan to assess and plan for future facility needs and conduct financial reviews and environmental coordination.

Because aviation activity is influenced by a variety of factors on the local, regional, and national levels, it is important to understand that forecasts serve only as reasonable planning guidelines and cannot be relied upon to predict year-to-year fluctuations in aviation demand indicators at the airport. The intent of the forecasting effort is to define the magnitude of change that can be expected over the planning period, which for this master plan extends through the year 2020.

For facility planning purposes, it will be necessary to select a planning forecast for each of the aviation demand indicators at Hayward Executive Airport. While this single planning forecast will provide an indication of the long term growth potential at the airport, actual growth may fluctuate above and below the selected planning forecast levels. Recognizing that facility planning must remain flexible enough to respond to fluctuations in future growth, this master plan will be demand-based rather than time-based. In subsequent chapters, the reasonable levels of activity potential that are derived from this forecasting effort will

be used to define activity milestones. In turn, the activity milestones will be used to determine facility development, rather than dates in time.

The last master plan for Hayward Executive Airport was undertaken nearly 15 years ago at a time when the airport had larger based aircraft and operational levels. Since this time, activity levels at the airport have declined and remained, to some degree, static. The following forecast analyses examine recent developments, historical information, and current aviation trends to provide updated forecasts of based aircraft and operations for Hayward Executive Airport. The intent is to permit the City of Hayward to make the planning adjustments necessary to ensure that the facility meets projected demands in an efficient and cost effective manner.

NATIONAL AVIATION TRENDS

Each year, the Federal Aviation Administration (FAA) publishes its national aviation forecast. Included in this publication are forecasts for air carriers, regional air carriers, general aviation, and military activity. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was *FAA Aviation Forecasts - Fiscal Years 1998-2009*. The forecast uses the economic performance of the United Sates as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

For the U.S. aviation industry, the outlook for the next twelve years is for moderate economic growth, low to moderate inflation, and constant real fuel prices. Based on these assumptions, aviation activity by fiscal year 2009 is forecast to increase by 18.9 percent at combined FAA and contract towered airports and 24.6 percent at air route traffic control centers. The general aviation active fleet is projected to increase by 12.5 percent while general aviation hours flown are forecast to increase by 18.1 percent.

GENERAL AVIATION

General aviation is the largest and most diverse segment of the air transportation industry. The United States active general aviation aircraft constitute 97 percent of all civil aircraft in use today. General aviation uses cover a broad range of activities ranging from personal/recreational flying to air ambulance to business/commercial uses such as aerial applicators, aerial surveying and photography and the non-scheduled transport of company staff members from one location to another. General aviation aircraft range from one and two seat piston-powered aircraft to long-range business jet aircraft capable of flying non-stop to international destinations.

By most statistical measures, general aviation recorded its third consecutive year of growth. Following more than a decade of decline, the general aviation industry was revitalized with the passage of the General Aviation Revitalization Act in 1994 (federal legislation which limits the liability on general aviation aircraft to 18 years from the date of manufacture). This legislation sparked an interest to renew the manufacturing of general aviation aircraft due to the reduction in product liability and a renewed optimism for the industry. The high cost of product liability insurance was a major factor in the decisions by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft.

According to the General Aviation Manufacturers Association (GAMA), aircraft shipments and billings grew for the third consecutive year in 1997, following fourteen years of annual declines. In 1997, general aviation aircraft manufacturers shipped a total of 1,569 aircraft totaling $4.7 billion. For 1997, aircraft shipments were up 38.8 percent and billings up 49.5 percent over 1996. In 1996, general aviation aircraft manufacturers shipped a total of 1,130 aircraft totaling $3.1 billion.

For 1997, piston engine aircraft shipments were up 64.2 percent and turbine engine aircraft shipments up 10.2 percent. Single-engine piston aircraft recorded the single largest gain, growing 70.8 percent in 1997 while turbofan aircraft shipments increased 44.4 percent. Multi-engine piston aircraft shipments grew 14.3 percent. Only turboprop aircraft registered a decline in shipments in 1997 (18.3 percent).

Despite a small decline in the number of active pilots, student pilot starts were up 1.3 percent in 1997, following a 6.3 percent decline in 1996. These student pilots are the future of general aviation and are one of the key factors impacting the future direction of the general aviation industry. This increase combined with the increases in piston-powered aircraft shipments and aircraft production are a signal that many of the industry initiated programs to revitalize general aviation may be taking hold.

The most notable trend in general aviation is the continued strong use of general aviation aircraft for business and corporate uses. According to the FAA, general aviation operations and general aviation aircraft handled at enroute traffic control centers increased for the sixth consecutive year, signifying the continued growth in the use of the more sophisticated general aviation aircraft. In 1996 (the latest year of recorded data), the number of hours flown by the combined use categories of business and corporate flying represented 22.5 percent of total general aviation activity. In 1990, the number of hours flown by the combined use categories of business and corporate flying represented 21.8 percent of total general aviation activity.

Manufacturer and industry programs and initiatives continue to revitalize the general aviation industry. The newest program "GA Team 2000" has the goal of 100,000 annual student pilot starts by the year 2000. The New Piper Aircraft company has created Piper Financial Services (PFS) to offer competitive interest rates and/or leasing of Piper aircraft.

The most striking industry trend is the continued growth in fractional ownership programs. Fractional ownership programs allow businesses and individuals to purchase an interest in an aircraft and pay for only the time that they use the aircraft. This has allowed many businesses and individuals, who might not otherwise, to own and use general aviation aircraft for business and corporate uses. Aircraft manufacturers Raytheon, Bombardier, and Dassault Falcon Jets have all established fractional ownership programs. Industry leader Executive Jet Aviation has expanded their program to include Boeing Business Jets and Gulfstream.

Exhibit 2A depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts general aviation active aircraft to increase at an average annual rate of 1.0 percent over the next 12 years, increasing from 187,312 in 1996 to 212,960 in 2009. Over the forecast period, the active fleet is expected to increase by almost 2,000 annually (considering approximately 2,000 annual retirements of older piston aircraft and new aircraft production at 4,000 annually). Turbine-powered aircraft are projected to grow faster than all other segments of the national fleet and grow 2.2 percent annually through the year 2008. This includes the number of turboprop aircraft growing from 5,309 in 1996 to 6,482 in 2009 and the number of turbojet aircraft increasing from 4,287 in 1996 to 6,228 in 2009. Amateur built aircraft are projected to increase at an average annual rate of 1.1 percent over the next twelve years, increasing from 16,198 in 1996 to 18,622 in 2008.

EXISTING FORECASTS FOR HAYWARD EXECUTIVE AIRPORT

As mentioned previously in Chapter One, Hayward Executive Airport is included in regional, state, and national aviation system plans. To support these planning activities, aviation demand at each of their component airports is periodically reviewed and updated. The following summarizes the most recent forecasts prepared for Hayward Executive Airport by the FAA, Metropolitan Transportation Commission (MTC), and California Department of Transportation - Aeronautics Program (CALTRANS).

For Hayward Executive Airport, the FAA provides forecasts within their *Terminal Area Forecast (TAF)* document for based aircraft and annual operations. These are updated annually by the FAA based upon current trends and typically updated when new planning forecasts are prepared for master plan studies.

The current FAA *TAF* forecasts for Hayward Executive Airport are summarized in **Table 2A**. While these projections are developed for each year through 2015, only the five year incremental projection is included in the table. The TAF was prepared with a base year of 1997.

The *1998-2015 FAA TAF* projects static operational levels for the airport through 2015. Based aircraft are projected to gradually decline.

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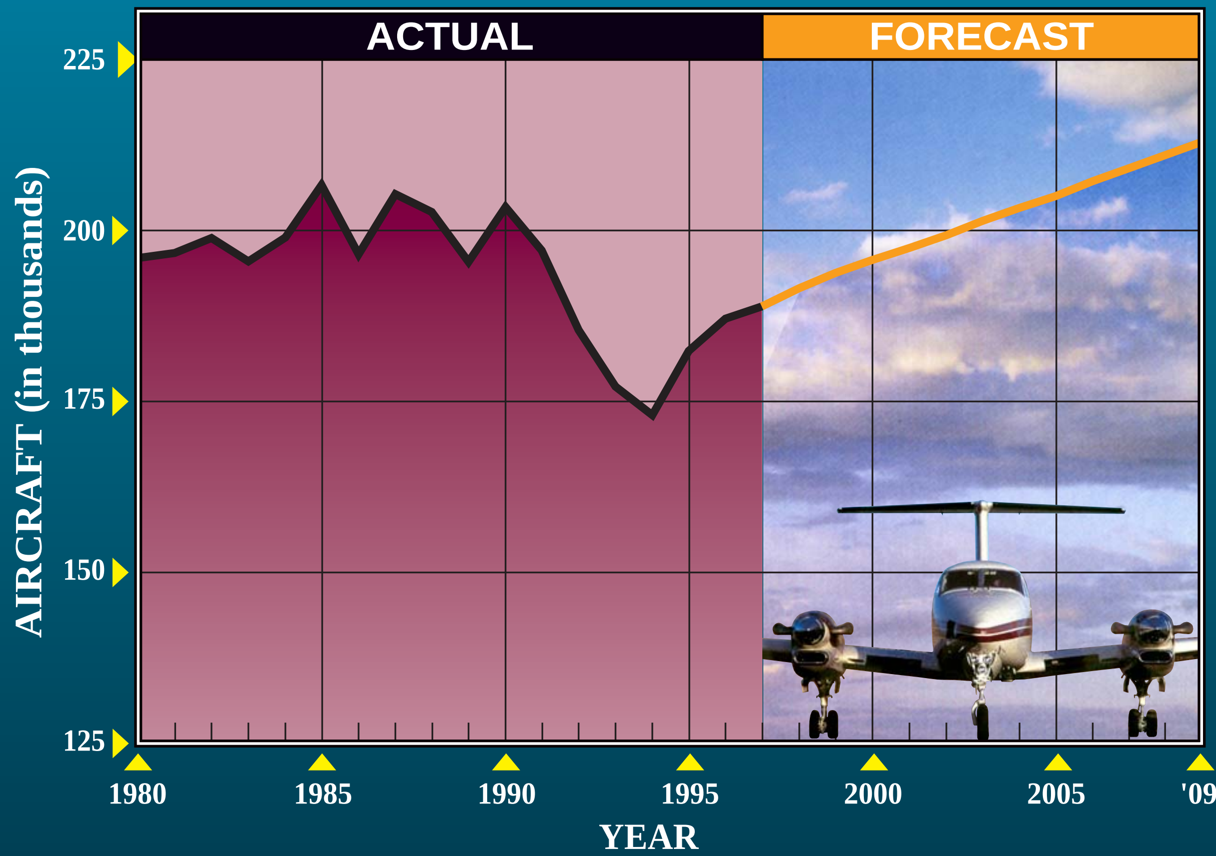
ACTIVE GENERAL AVIATION AIRCRAFT



U.S. ACTIVE GENERAL AVIATION AIRCRAFT (in thousands)

As of January 1	FIXED WING								
	PISTON		TURBINE		ROTORCRAFT				
	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine	Experimental	Other	Total
1997	136.7	15.8	5.3	4.4	2.4	4.0	16.4	4.2	189.3
2000	141.2	16.0	5.5	4.9	2.3	4.2	17.1	4.3	195.6
2003	145.3	16.2	5.8	5.4	2.2	4.4	17.7	4.4	201.4
2006	149.5	16.5	6.1	5.8	2.2	4.5	18.1	4.5	207.2
2009	153.7	16.6	6.5	6.2	2.1	4.6	18.6	4.6	212.9

Source: FAA Aviation Forecasts, Fiscal Years 1998-2009.

Notes: Detail may not add to total because of independent rounding. An active aircraft must have a current registration and it must have been flown at least one hour during the previous calendar year.

HAYWARD EXECUTIVE AIRPORT

Exhibit 2A
U.S. ACTIVE GENERAL AVIATION AIRCRAFT FORECASTS

TABLE 2A
FAA Terminal Area Forecast

	2000	2005	2010	2015
Based Aircraft	453	448	443	438
Itinerant Operations	74,318	74,318	74,318	74,318
Local Operations	110,246	110,246	110,246	110,246
Total Annual Operations	184,564	184,564	184,564	184,564

Source: 1998-2015 FAA Terminal Area Forecast

The MTC prepared the *San Francisco Bay Area Regional Airport System Plan Update (RASP)* in 1994. The RASP was prepared using 1990 base year data and provided 2010 forecasts for three alternative scenarios: 1) No Build, 2) Master Plan Development, and 3) Optimization. The "No Build" alternative considered regional demand and capacity assuming no development at any of the 24 regional airports included in the *RASP*. The second alternative considered development at each of the regional airports as proposed in the current master plan studies at that time. The last alternative considered regional demand and capacity assuming a transfer of some aviation demand to outlying regional airports to reduce expected capacity constraints at close-in airports (particularly Hayward and San Jose). **Table 2B** summarizes 2010 based aircraft and annual operations projections for each of the 24 regional airports (including Hayward Executive Airport) included in the *1994 RASP*. The *California Aviation System Plan* has adopted the *MTC RASP* forecasts for their statewide system planning.

LOCAL AND REGIONAL POPULATION FORECASTS

The City of Hayward and Alameda County historical and forecast population were previously summarized in Chapter One, Table 1D. According to projections prepared by the Association of Bay Governments, the City of Hayward population is expected to grow from 124,200 in 1995 to 141,300 by 2020 (an average annual growth rate of 0.5%). For Alameda County, the population is expected to grow from 1,345,900 in 1995 to 1,588,400 by the year 2020 (an average annual growth rate of 0.7%).

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships are tested to establish statistical logic and rationale for projected growth. However, the judgement of the forecast analyst, based upon professional experience, knowledge of the aviation industry, and their assessment of the local situation, is important in the final determination of the preferred forecast.

TABLE 2B
MTC RASP Forecasts - 2010

	Based Aircraft			Annual Operations		
	ALT 1	ALT 2	ALT 3	ALT 1	ALT 2	ALT 3
Byron	129	350	89	66,500	150,000	49,840
Cloverdale	31	23	18	26,600	25,000	10,080
Concord	829	850	635	380,806	325,000	355,600
Gnoss	256	282	307	166,250	200,000	171,920
Half Moon Bay	100	75	91	93,100	90,000	50,960
Hamilton	—	—	—	—	—	—
Hayward	**597**	**533**	**665**	**244,720**	**255,000**	**372,400**
Healdsburg	82	78	58	42,560	50,000	32,480
Livermore	835	750	578	343,938	320,000	323,680
Marin Ranch	109	110	110	53,200	60,000	61,600
Moffett Field	121	121	121	—	—	—
Napa County	312	320	223	272,650	250,000	124,880
Nut Tree	379	300	193	159,600	242,500	108,080
Oakland North	535	450	600	367,623	281,000	336,000
Palo Alto	474	540	540	316,540	316,540	302,400
Parrett	72	75	—	15,960	20,000	—
Petaluma	236	245	125	86,450	95,000	70,000
Reid-Hillview	560	551	637	262,010	260,000	356,720
Rio Vista	79	68	54	22,610	30,000	30,240
San Carlos	571	562	455	247,380	191,000	254,800
San Jose	650	300	525	457,520	344,000	294,000
Sonoma County	585	500	454	224,770	207,500	254,240
Sonoma Sky Park	69	68	44	15,960	16,000	24,640
Sonoma Valley	154	157	183	67,830	75,000	102,480
South County	38	300	96	79,800	85,000	53,760
System Total	7,802	7,608	6,801	4,014,376	3,888,540	3,740,800

Source: 1994 MTC San Francisco Bay Area Regional Airport System Plan Update

It is important to note that one should not assume a high level of confidence in forecasts that extend beyond five years. Facility and financial planning usually require at least a ten-year preview, since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

A wide range of factors are known to influence the aviation industry and can have significant impacts on the extent and nature of aviation service provided in both the local and national market. Technological advances in aviation have historically altered, and will continue to change, the growth rates in aviation demand over time. The most obvious example is the impact of jet aircraft on the aviation industry, which resulted in a growth rate that far exceeded expectations. Such changes are difficult, if not impossible to predict, and there is simply no mathematical way to estimate their impacts. Using a broad spectrum of local, regional and national socioeconomic and aviation information, and analyzing the most current aviation trends, forecasts are presented in the following sections.

THE LOCAL SERVICE AREA AND BASED AIRCRAFT FORECASTS

The local airport service area is defined by the proximity of other airports and the facilities that they are able to provide to general aviation aircraft. General aviation service areas are very closely defined as the result of nearby airports providing similar aircraft tiedown, fuel, and hangar services. The Inventory Chapter detailed all public-use airports within 30 nautical miles of the airport. These airports provide a wide range of tiedown, fuel, hangar, and general aviation services. Considering that the services at each airport vary according to local conditions (hangar, fuel, and tiedown rates, hangar availability, etc.), the service area for Hayward Executive Airport is not considered to exactly follow the boundaries of any jurisdictional unit, and is affected by many of the factors detailed above.

A review of aircraft ownership for based aircraft at Hayward Executive Airport was made to determine the existing service area for based aircraft demand. Using based aircraft records provided by the City of Hayward, it was determined that the majority of based aircraft are owned by residents of East Bay communities such as Hayward, San Lorenzo, Oakland, Fremont, Newark, Union City, and Castro Valley. A smaller number of aircraft owners base aircraft at Hayward Executive Airport even though another general aviation airport is located closer to their residence. This includes residents of communities to the west (Burlingame, San Carlos, San Mateo, Daly City), south (Sunnyvale, San Jose), and north (Berkeley, Danville).

Defining the service area in a large metropolitan area is difficult since airport service areas commonly overlap, as is the case with Hayward Executive Airport which draws aircraft from all portions of the Bay area. Typically, aircraft owners base their aircraft at a particular airport due to its proximity to their residence or business.

To examine existing and future based aircraft demand at the airport, a generalized service area based on zip codes areas has been established for the airport to account for the majority of based aircraft at the airport. As shown on **Exhibit 2B**, this covers 25 zip codes areas.

Table 2C summarizes historical FAA registered aircraft in this service area since 1993. As shown, registered aircraft have declined since 1993, falling from 655 in 1993 to 446 in 1998. **Table 2C** also compares registered aircraft in the generalized service area to U.S. active general aviation aircraft as recorded by the FAA. Mirroring the decline in registered aircraft in the generalized service area, the generalized service area's share of U.S. active aircraft has also declined.

TABLE 2C
Registered and Based Aircraft Forecasts

Year	U.S. Active Aircraft[1]	Airport Service Area Registered Aircraft[2]	% of U.S. Active Aircraft	Hayward Based Aircraft[3]	% of Airport Service Area Registered Aircraft
HISTORICAL					
1993	177,120	655	0.37%	514	78.5%
1994	172,935	655	0.38%	456	69.6%
1995	182,605	654	0.36%	456	69.7%
1996	187,312	555	0.30%	456	82.2%
1997	189,328	—	0.00%	431	—
1998	191,562	446	0.23%	423	94.8%
FORECAST					
2005	205,274	478	0.23%	454	95.0%
2010	214,930	500	0.23%	475	95.0%
2015	224,610	523	0.23%	497	95.0%
2020	234,290	545	0.23%	518	95.0%

1 Historical and Forecast Data: FAA Aviation Forecasts 1998-2009, FAA Long Range Forecasts 2010-2020
2 Historical Data: Aviation Goldmine CD-ROM of FAA Database of Registered Aircraft
Selected Years Forecasts: Coffman Associates
3 1993 to 1996: 1997 FAA Terminal Area Forecast, 1997: City of Hayward, 1998: City of Hayward, Alameda County Assessor Records, Forecasts: Coffman Associates

The FAA has projected an increase in the total number of active U.S. aircraft through the year 2020, since it appears that the general aviation industry is in recovery. To provide a reasonable estimate of future registered aircraft levels in the local service area for Hayward Executive Airport, the existing local market share has been projected at a static level and compared to forecast U.S. active aircraft. With increasing active aircraft levels projected by the FAA, this provides a growth rate consistent with national trends. This results in registered aircraft in the local service area growing from 446 in 1998 to 545 by 2020. From these figures, the market share of based aircraft at Hayward Executive Airport has been examined.

In 1998, based aircraft totals at Hayward Executive Airport represented approximately 95 percent of the registered aircraft in the local service area. This is an increase over previous years, as the airport's share of registered aircraft has increased as registered aircraft in the local service area have declined. The existing market share of 95 percent has been projected at a static level and compared to the projection of registered aircraft in the local service area to determine future based aircraft levels at Hayward Executive Airport. As shown in **Table 2C**, this yields 518 based aircraft by the end of the planning period (an average annual growth rate of 0.9 percent).

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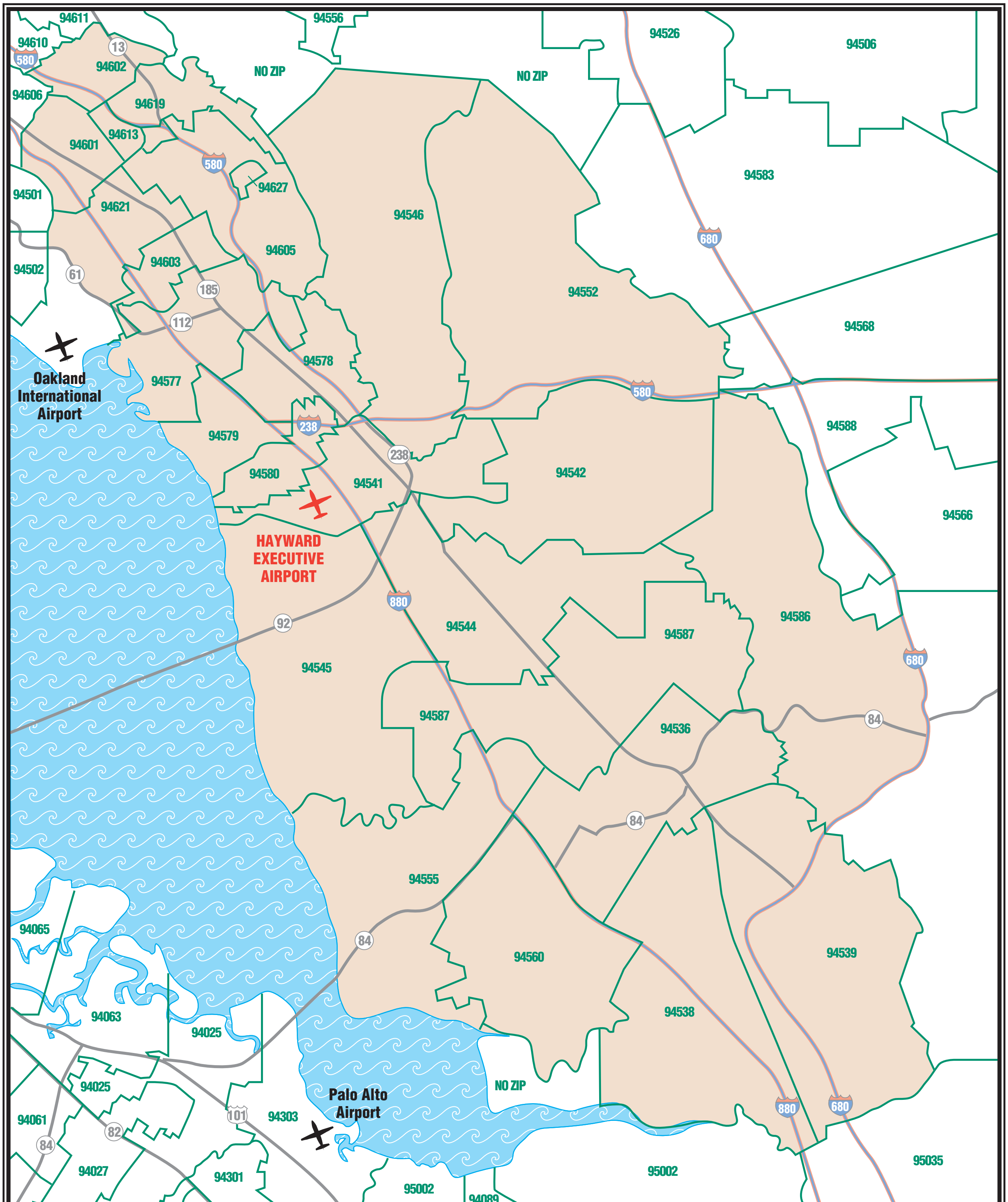

LEGEND

Hayward Airport Service Area

Zip Code Boundaries

NORTH

NOT TO SCALE

HAYWARD
EXECUTIVE
AIRPORT

Exhibit 2B
LOCAL SERVICE AREA

For comparative purposes, this based aircraft projection can be examined against existing forecasts prepared for the *MTC RASP* and *FAA TAF*. While this projection falls below forecast levels prepared for the *MTC RASP* study, this projection of based aircraft reflects a more positive outlook for the airport than the *FAA TAF* which has projected a gradual decline in based aircraft through 2015.

Exhibit 2C graphically depicts the based aircraft forecast for the airport. In all likelihood, actual activity will not follow the planning forecast exactly. It is more likely that based aircraft levels will fluctuate above and below the levels provided in the planning forecast in the range of the planning envelope presented on the exhibit. With this in mind, the time-based projections of anticipated growth should serve only as guidelines for future planning.

A number of factors can affect the selected based aircraft planning forecast including (but not limited to) hangar availability, airport rates and charges, airfield congestion (or lack thereof), and owner preferences. Individually or collectively these factors can affect the planning forecast in a positive or negative manner. For example, additional hangar availability at Hayward Executive Airport can increase based aircraft levels by providing hangar space for aircraft owners on the airport hangar waiting list. Conversely, comparably-priced hangar development at a nearby airport could induce the aircraft owners on the Hayward Executive Airport hangar waiting list to instead chose to base their aircraft at another airport.

As in any business enterprise, the more attractive the facility is in services and capabilities, the more competitive it will be in the market. As the level of attractiveness expands, so will the service area. If an airport's attractiveness increases in relation to nearby airports, so will the size of the service area and consequently its aviation demand levels. If facilities are adequate and rates and fees are competitive at Hayward Executive Airport, some level of general aviation activity might be attracted to the airport from surrounding areas. On the other hand, should the airport not respond to local demand, the ability of the airport to meet operational projections will be diminished.

As mentioned previously, in an effort to deal with unforeseen changes in demand, this master plan will be demand-based. All future development will be tied to reasonable and verifiable airport activity levels. This provides the City of Hayward with the ability to make planning and facility development decisions in relation to actual demand, not just focusing on time as the only means to gauge when planning and facility development should begin. This will be discussed further in subsequent chapters of this master plan.

BASED AIRCRAFT FLEET MIX

Knowing the aircraft fleet mix expected to utilize the airport is necessary to properly plan facilities that will best serve the level of activity and type of activities occurring at the airport. The existing based aircraft fleet mix is comprised primarily of single-engine piston aircraft, but also includes multi-engine piston, turboprop, turbojet, and helicopter aircraft.

The airport's December 1998 based aircraft fleet mix consisted of a higher percentage of single-engine and multi-engine piston aircraft and a lower percentage of turboprop, turbojet, and helicopter aircraft than found in the national fleet. While single-engine piston aircraft account for roughly 72 percent of the national fleet, they comprise approximately 86 percent of the total based aircraft at the airport. Nationally, multi-engine piston aircraft comprise 8.4 percent of the active fleet, while locally they account for 9 percent of total based aircraft. Nationally, turboprop aircraft account for 2.8 percent of the active fleet, while at the airport they currently account for 2.4 percent of total based aircraft. Turbojet aircraft account for 2.3 percent of the national fleet. At the airport, turbojet aircraft comprise 1.7 percent of total based aircraft. Helicopter aircraft account for 3.4 percent of the national fleet. At the airport, helicopter aircraft comprise 1.2 percent of total based aircraft.

The forecast mix of based aircraft was determined by comparing existing and forecast U.S. general aviation fleet trends to the 1998 based aircraft fleet mix. The *FAA Aviation Forecasts Fiscal Years 1998-2010* was consulted for the U.S. general aviation fleet mix trends and considered in the fleet mix projections. The trend in general aviation is toward a greater percentage of larger, more sophisticated turboprop, turbojet, and helicopters. Single-engine piston and multi-engine piston aircraft are projected to grow, but at slower rates than turbine-powered and helicopter aircraft.

The fleet composition of based aircraft is expected to remain heavily in single-engine piston aircraft, although there is expected to be an increasing percentage of turboprop, turbojet, and helicopters in the future mix, consistent with national trends. **Table 2D** and **Exhibit 2D** summarize the based aircraft fleet mix projections for the airport.

ANNUAL OPERATIONS

The airport traffic control tower (ATCT) located on the airport collects information regarding aircraft operations (takeoffs and landings). Aircraft operations are reported in three general categories: air taxi, general aviation, and military. Air taxi operations consist of the use of general aviation aircraft for the "on-demand" commercial transport of persons and property in accordance with Federal Aviation Regulations (FAR) Part 135. General aviation operations include a wide range of activity ranging from personal to business and corporate uses. Military operations include those operations conducted by various branches of the U.S. military.

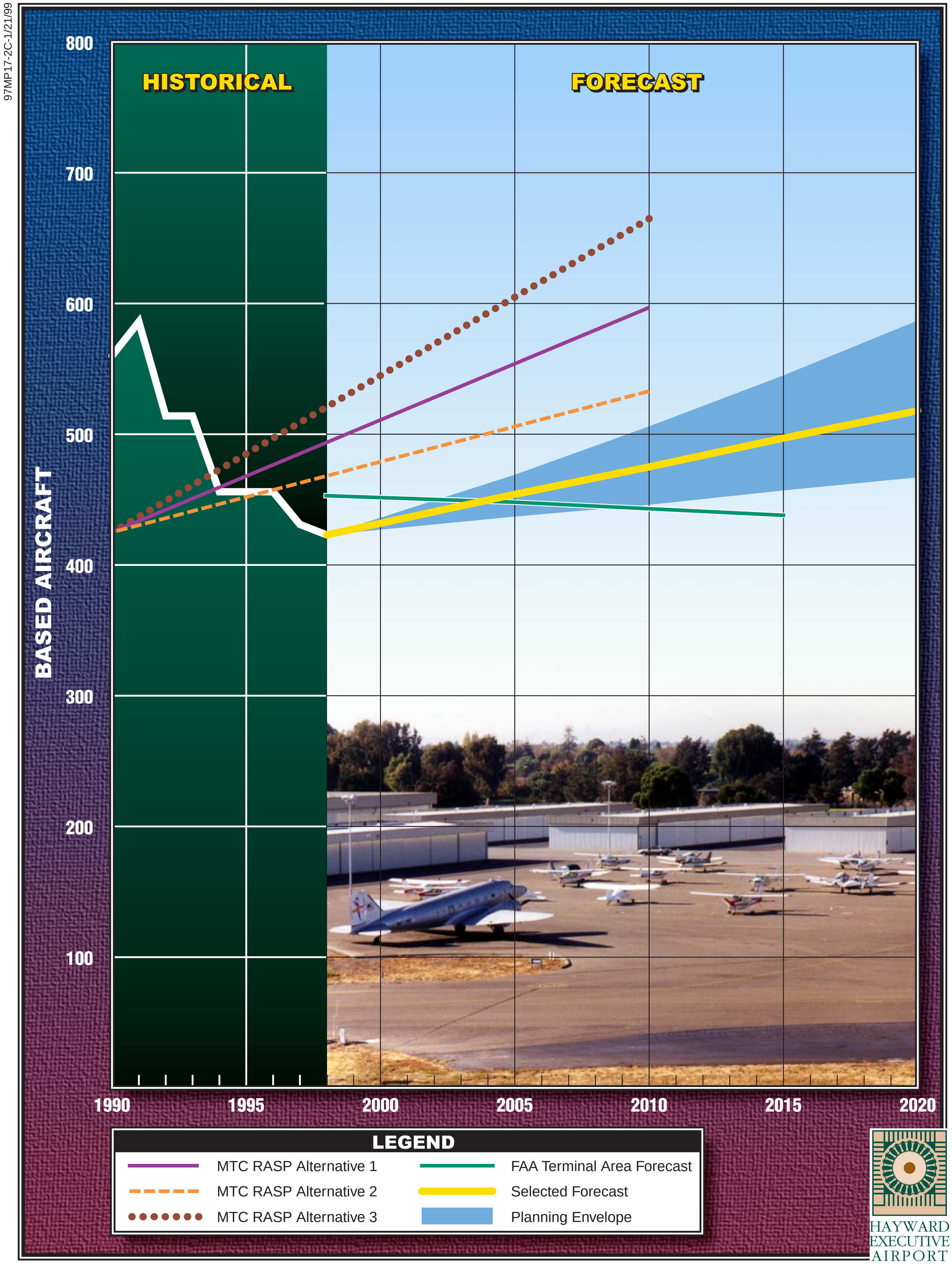

Exhibit 2C
BASED AIRCRAFT FORECAST

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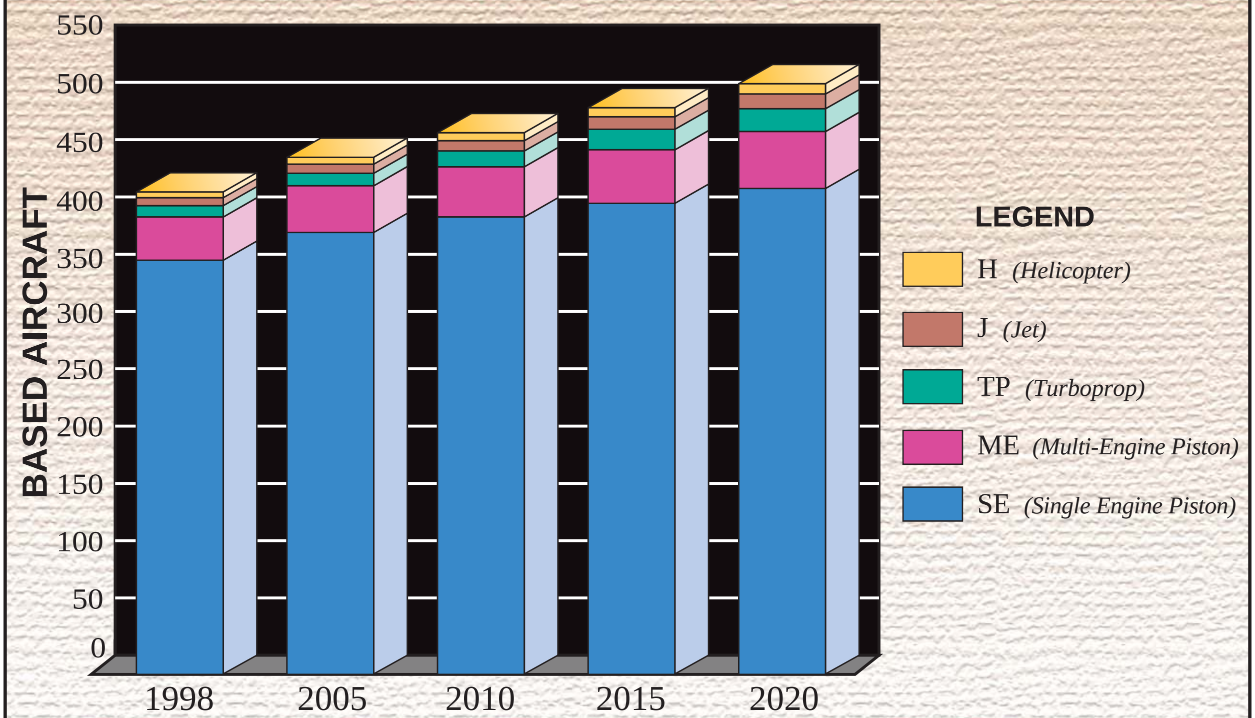
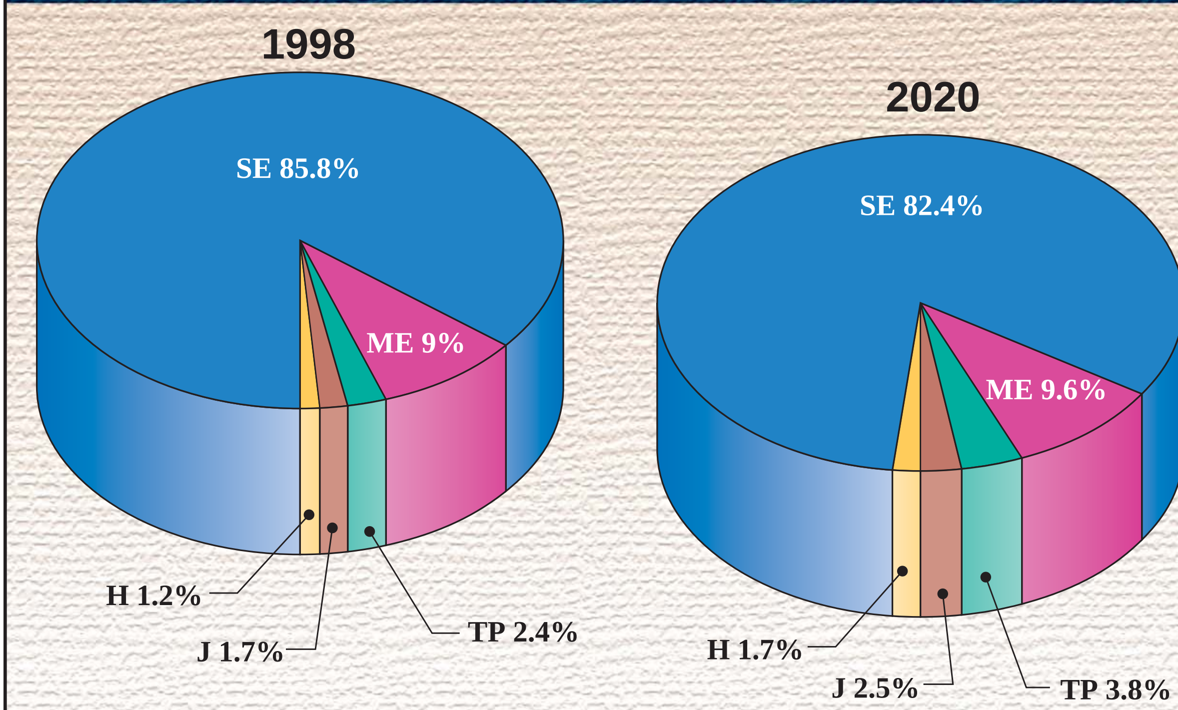
BASED AIRCRAFT



PERCENT BY AIRCRAFT TYPE



HAYWARD EXECUTIVE AIRPORT

Exhibit 2D

BASED AIRCRAFT AND FLEET MIX FORECAST

TABLE 2D
Based Aircraft Fleet Mix Forecasts

Year	Total	Single Engine	Multi-Engine	Turboprop	Jets	Helicopter
HISTORICAL						
1998	423	363	38	10	7	5
FORECAST						
2005	454	388	41	11	8	6
2010	475	401	44	14	9	7
2015	497	413	47	18	11	8
2020	518	426	50	20	13	9

Source for Historical Data: Airport Records, Alameda County Assessor Records.
Forecasts: Coffman Associates.

Aircraft operations are further categorized as either local or itinerant by the ATCT. Local operations consist mostly of aircraft training operations conducted within the aircraft traffic pattern and touch-and-go operations. Itinerant operations are originating or departing aircraft which are not conducting operations within the airport traffic pattern. All operations within the air taxi category are recorded as transient, while military and general aviation activity is divided into local and itinerant categories.

Table 2E summarizes annual operations at the airport for the past 10 years. While remaining relatively unchanged between 1989 and 1990, annual operations declined annually between 1990 and 1995. After increasing in 1996 and 1997, annual totals declined in 1998.

Projections of annual operations at Hayward Executive Airport were prepared by examining the number of operations per based aircraft. Typically, operations per based aircraft can range between 300 and 800 at airports similar to Hayward Executive Airport. Airports with higher levels of training activity (local operations) will have a higher operation per based aircraft ratio; whereas, airports utilized by a higher percentage of transient aircraft will have lower ratios. At Hayward Executive Airport, local operations have historically accounted for about 50 percent of total annual operations which has led to a fairly consistent ratio of operations per based aircraft ranging between 300 and 400.

Table 2E presents historical annual operational totals and operations per based aircraft for the airport. The FAA projects the number of hours flown by general aviation aircraft to increase at an average annual rate of 1.4 percent through 2010 and 1.1 percent to 2020. If this growth rate is applied to the existing operations per based aircraft ratio (363), it will increase the operations per based aircraft ratio to 493 by 2020. Applying this ratio to forecast based aircraft yields 255,500 annual operations by 2020. The existing operations per based aircraft ratio was also compared against forecast based aircraft to consider a forecast of annual operations growing at the same rate as based aircraft. This yields 188,100 annual operations by 2020.

TABLE 2E
Annual Operations Forecasts

Year	Based Aircraft[1]	Total Operations	Operations Per Based Aircraft
HISTORICAL			
1989	665	252,334	379
1990	560	252,984	452
1991	586	193,299	330
1992	514	178,660	348
1993	514	163,204	318
1994	430	154,099	358
1995	456	153,882	337
1996	456	179,880	394
1997	431	181,141	420
1998	423	153,618	363
FORECASTS			
INCREASING OPERATIONS PER BASED AIRCRAFT			
2005	454	181,600	400
2010	475	203,900	429
2015	497	228,500	460
2020	518	255,500	493
CONSTANT OPERATIONS PER BASED AIRCRAFT			
2005	454	164,800	363
2010	475	172,600	363
2015	497	180,300	363
2020	518	188,100	363
SELECTED PLANNING FORECAST			
2005	454	173,200	381
2010	475	188,250	396
2015	497	204,400	411
2020	518	221,800	428

[1] Source for historical data: FAA. Forecasts: Coffman Associates

A planning forecast has been developed which lies approximately midrange between the increasing operations per aircraft forecast and static operations per based aircraft forecast to provide for future annual operational growth at a higher rate than projected based aircraft growth. The selected planning forecast projects annual operations growing at an average annual rate of 1.7 percent. **Table 2E** summarizes the selected planning forecast.

Exhibit 2E provides a depiction of annual operations forecasts for Hayward Executive Airport, including *MTC RASP* and *FAA TAF* projections. While well below the levels forecast for the *MTC RASP*, the selected planning forecast is higher than the *FAA TAF* which projected no growth in operational levels at Hayward Executive Airport.

Table 2F summarizes historical air taxi operations. As shown in the table, air taxi operations declined annually between 1989 and 1996. In 1997 air taxi operations increased slightly, only to decline substantially in 1998. For planning purposes, air taxi operations are forecast at a static rate of 0.2 percent of total annual operations, consistent with 1996 and 1997 air taxi operational levels.

TABLE 2F
Air Taxi Operations

Year	Total Operations	Air Taxi Operations	% of Total
HISTORICAL			
1989	252,334	4,161	1.6%
1990	252,984	3,938	1.6%
1991	193,299	4,953	2.6%
1992	178,660	4,713	2.6%
1993	163,204	1,712	1.0%
1994	154,099	1,046	0.7%
1995	153,882	718	0.5%
1996	179,880	366	0.2%
1997	181,141	383	0.2%
1998	153,618	88	0.1%
FORECAST			
2005	173,200	350	0.2%
2010	188,250	380	0.2%
2015	204,400	410	0.2%
2020	221,800	440	0.2%

Source for Historical Data: FAA
Forecasts: Coffman Associates

Military use of Hayward Executive Airport consists primarily of transient and training helicopter activity. In the past, military C-130 aircraft would support activities of the California Air National Guard and Marine Corp based at the airport. (The Marine Corp is no longer stationed at the airport). As shown in **Table 2G**, military activity at the airport has fluctuated annually from a high of 1,062 in 1990 to a low of 62 in 1996. Consistent with standard planning practices, military operations are forecast at static levels through the planning period since it is difficult to predict the pattern of military operations due to the ever-changing missions of military forces. Therefore, for planning purposes, military operations are forecast at 190 annual operations through the planning period with 130 attributable to transient operations and 60 attributable to local operations.

TABLE 2G
Historical Military Operations

Year	Military Local	% of Total	Military Itinerant	% of Total	Military Total
1989	8	1.3%	621	98.7%	629
1990	22	2.1%	1,040	97.9%	1,062
1991	32	6.7%	445	93.3%	477
1992	15	4.8%	299	95.2%	314
1993	12	3.6%	319	96.4%	331
1994	204	25.1%	608	74.9%	812
1995	6	4.3%	135	95.7%	141
1996	0	0.0%	62	100.0%	62
1997	170	63.4%	98	36.6%	268
1998	56	30.6%	127	69.3%	183

Source for Historical Data: FAA

General aviation operations comprise the majority of all operations at Hayward Executive Airport. Since 1989, total general aviation operations have accounted for more than 98 percent of all operations at the airport. As such, general aviation activity has driven the overall trend in operations at the airport which included annual declines from 1990 to 1995 and annual increases in 1996 and 1997. For 1998, total general aviation operations declined, contributing to the overall decline in annual operations at the airport. General aviation operations for the past 10 years are summarized in **Table 2H**.

Historically, local and itinerant operations accounted for approximately 50 percent each of total annual operations. Since 1990, local operations have grown and accounted for a larger portion of annual operations than itinerant operations. This is representative of continued increases in aircraft training activity at the airport. Consistent with national trends, itinerant operations are forecast to increase through the planning period (in number and as a percentage of total annual operations) due to the expected increased utilization of business and corporate aircraft at the airport (which

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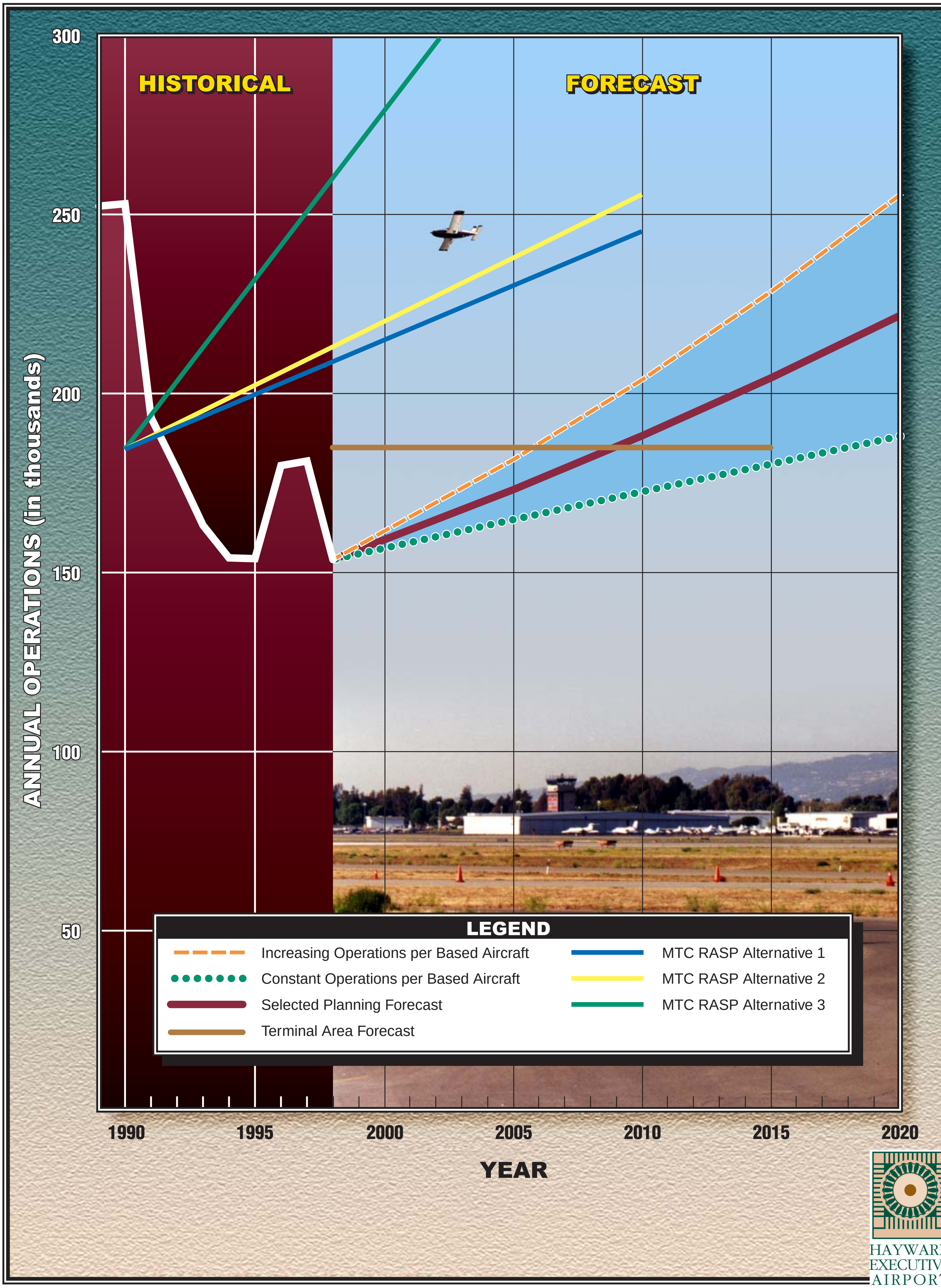


HAYWARD EXECUTIVE AIRPORT

Exhibit 2E
ANNUAL OPERATIONS FORECASTS

are typically itinerant operations). The projection of local and itinerant general aviation operations is summarized in **Table 2H**.

TABLE 2H
General Aviation Operations

Year	Based Aircraft[1]	Total GA Operations[1]	GA Local	% of Total	GA Itinerant	% of Total
HISTORICAL						
1989	665	247,544	125,433	50.7%	122,111	49.3%
1990	560	248,524	125,718	50.6%	122,806	49.4%
1991	586	187,869	100,802	53.7%	87,067	46.3%
1992	514	173,633	84,720	48.8%	88,913	51.2%
1993	514	161,161	80,154	49.7%	81,007	50.3%
1994	430	152,241	80,070	52.6%	72,171	47.4%
1995	456	153,023	89,865	58.7%	63,158	41.3%
1996	456	179,452	108,351	60.4%	71,101	39.6%
1997	431	180,490	106,841	59.2%	73,649	40.8%
1998	423	153,317	93,124	60.7%	60,223	39.2%
FORECAST						
2005	454	172,660	105,320	61.0%	67,340	39.0%
2010	475	187,680	112,610	60.0%	75,070	40.0%
2015	497	203,800	120,240	59.0%	83,560	41.0%
2020	518	221,170	128,280	58.0%	92,980	42.0%

[1] Total Operations less total military and air taxi operations

PEAKING CHARACTERISTICS

Many airport facility needs are related to the levels of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- **Peak Month** - The calendar month when peak aircraft operations occur.
- **Design Day** - The average day in the peak month. This indicator is easily derived by dividing the peak month operations by the number of days in a month.
- **Busy Day** - The busy day of a typical week in the peak month. This descriptor is used primarily to determine apron space requirements.
- **Design Hour** - The peak hour within the design day. This descriptor is used in airfield capacity analysis and as the basis in determining terminal building requirements.

It is important to note that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

Typically, the peak month for general aviation operations approximates 10-12 percent of the airport's annual operations. The peak month for recorded operations in 1998 was September, with 9.8 percent of the annual total. This factor has been applied to forecast annual operations to determine peak month operations forecasts for the airport. Adequate operational information was not available to determine busy day and design hour activity. Therefore, these factors have been estimated for the airport based on operational levels experienced at similar airports. The forecast of busy day operations at the airport was calculated as 1.25 times design day activity. Design hour operations were calculated as 20.0 percent of design day operations. **Table 2J** summarizes peak activity forecasts for the airport.

TABLE 2J
Peak Period Forecasts
Annual Operations

	1998	2005	2010	2015	2020
Annual	153,618	173,200	188,250	204,400	221,800
Peak Month	15,097	17,020	18,500	20,090	21,800
Design Day	503	567	617	670	727
Busy Day[1]	629	709	771	837	908
Design Hour[1]	101	113	123	134	145

Source for Historical Data: FAA
Forecasts: Coffman Associates
[1] Estimated

ANNUAL INSTRUMENT APPROACHES

Annual instrument approach (AIA) data provides guidance in determining an airport's for navigational aids. An instrument approach is defined by the FAA as an "approach to an airport with the intent to land by an aircraft in accordance with an instrument flight rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude" (which for Hayward Executive Airport is 2,600 feet mean sea level (MSL), 2,500 above the ground (AGL).

Historical instrument approach data for the airport is summarized in **Table 2K**. Since 1995, annual instrument approaches have increased annually (except for 1997 which experienced a slight decline). General aviation aircraft comprise the majority of AIAs at the airport.

TABLE 2K Historical Annual Instrument Approaches				
Year	Air Taxi	General Aviation	Military	Total
HISTORICAL				
1995	35	1,049	2	1,086
1996	16	1,235	0	1,251
1997	13	958	2	973
1998	50	1,304	2	1,356
Source: FAA				

As shown in **Table 2L**, AIAs have represented between 0.5 and 0.8 percent of total annual operations. While AIAs can be partially attributable to weather, they may be expected to increase as transient operations and operations by more sophisticated (and consequently properly equipped air-craft) increase through the planning period. The projections of AIAs for the airport are summarized in **Table 2L**.

TABLE 2L Forecast Annual Instrument Approaches			
Year	Annual Operations	Total AIAs	% of Total Operations
HISTORICAL			
1995	153,882	1,086	0.7%
1996	179,880	1,251	0.7%
1997	181,141	973	0.5%
1998	153,618	1,356	0.8%
FORECAST			
2005	173,200	1,400	0.8%
2010	188,250	1,500	0.8%
2015	204,400	1,600	0.8%
2020	221,800	1,800	0.8%
Source for Historical Data: FAA Forecasts: Coffman Associates			

PASSENGER AIR SERVICE FEASIBILITY

A feasibility analysis to determine if there is a market demand for commercial passenger air service at Hayward Executive Airport was completed in September 1999 by Tri-Star Marketing Company of Long Beach, California. Summarized in the report, *Feasibility Analysis for Air Service at Hayward Airport*, the analysis concluded that potential air service at Hayward Executive Airport is strongly influenced by existing air service at Oakland International Airport and to a lessor extent by existing air service at San Francisco International Airport and San Jose International Airport.

Due to the length and weight bearing capacity of the existing primary runway at Hayward Executive Airport, the report concluded that air service would be limited to commuter aircraft with thirty seats or less. The only commuter air service in the Bay area in 1999 was provided by United Express and US Air Express to San Francisco International. Since these airlines are focused on providing connecting passengers to their major airline partner, they were not considered viable candidates for providing air service from Hayward Executive Airport. The report noted that while there were three new commuter airlines in development to provide air service in California, only one was positioned to begin service and its proposed route structure did not fit the market demand for Hayward Executive Airport.

The analysis concluded, that to be feasible, air service at Hayward Executive Airport would only be needed to markets not receiving air service at Oakland International Airport since it is doubtful that passengers would chose commuter airline service from Hayward Executive Airport over the nonstop jet service available from Oakland International Airport. Nine potential markets for air service were identified: Bakersfield, Eureka/Arcata, Fresno, Palm Springs, Redding, Sacramento, San Luis Obispo and Santa Barbara in California and Medford, Oregon. Of these nine markets, only Fresno, Medford, Palm Springs and Santa Barbara were considered to have sufficient market demand to support two daily flights. Low fare jet service was available to Medford, Palm Springs and Santa Barbara from San Francisco International Airport.

The report noted that the primary customer for airline service at Hayward Executive Airport would be business travelers. Air service would need to focus on frequency of service and include at least three daily flights - morning, midday and evening. Since the four potential markets were not anticipated to generate sufficient demand to support three daily flights, and three of these markets were served by existing jet airline service, the report concluded that is was doubtful that there would be sufficient passenger traffic to provide for a viable airline operation from Hayward Executive Airport.

Without a viable airline to provide service from Hayward Executive Airport and limited market demand, the report concluded that air service for Hayward Executive Airport was not feasible.

FORECAST SUMMARY

This chapter has outlined the various aviation demand levels anticipated for the next 20 years at Hayward Executive Airport. Long term growth at the airport will be influenced by many factors including the local economy, the need for a viable aviation facility in the immediate area, and trends in general aviation at the national level.

The next step in the master planning process will be to assess the capacity of existing facilities, their ability to meet forecast demand, and to identify changes to the airfield and/or landside facilities which will create a more functional aviation facility. The aviation demand forecasts for Hayward Executive Airport through 2020 are summarized in **Table 2M**.

TABLE 2M
Forecast Summary

	1998	2005	2010	2015	2020
Based Aircraft					
Single-Engine Piston	363	388	401	413	426
Multi-Engine Piston	38	41	44	47	50
Turboprop	10	11	14	18	20
Turbojet	7	8	9	11	13
Helicopter	5	6	7	8	9
Total Based Aircraft	423	454	475	497	518
General Aviation Operations					
Local	93,124	105,320	112,610	120,240	128,280
Itinerant	60,223	67,340	75,070	83,560	92,890
Total General Aviation	153,347	172,660	187,680	203,800	221,170
Military Operations					
Local	56	60	60	60	60
Itinerant	127	130	130	130	130
Total Military	183	190	190	190	190
Air Taxi	88	350	380	410	440
Total Annual Operations	153,618	173,200	188,250	204,400	221,800
Annual Instrument Approaches	1,293[1]	1,400	1,500	1,600	1,800

[1] Through November

HAYWARD
AIRPORT

Chapter Three
AVIATION FACILITY REQUIREMENTS

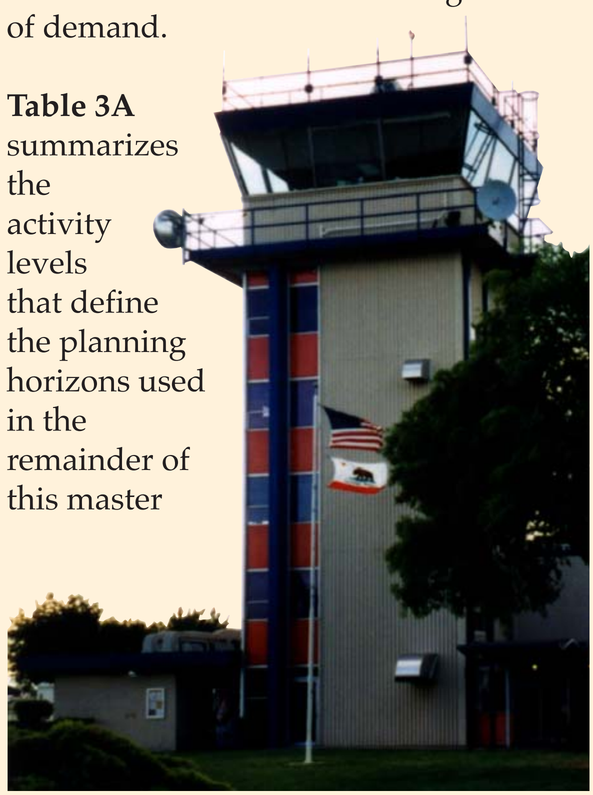
AVIATION FACILITY REQUIREMENTS

To properly plan for the future of Hayward Executive Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve this identified demand. This chapter uses the results of the forecasts conducted in Chapter Two, as well as established planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting), and landside (i.e., hangars, aircraft parking apron) facility requirements.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities, outline what new facilities may be needed, and when these may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in Chapter Four to determine the most cost-effective and efficient means for implementation.

Recognizing that the need to develop facilities is determined by demand, rather than a point in time, the requirements for new facilities have been expressed for the short, intermediate, and long term planning horizons, which roughly correlate to five-year, ten-year, and twenty-year time frames. Planning horizons provide for facility development according to the need generated by actual demand levels. This provides flexibility in development, as development schedules can be accelerated or slowed according to levels of demand.

Table 3A summarizes the activity levels that define the planning horizons used in the remainder of this master



plan which were derived from the aviation demand levels forecast in the previous chapter. Future facility needs will be related to these activity levels rather than a specific year.

TABLE 3A **Planning Horizon Activity Levels**	**1998**	**Short Term Planning Horizon**	**Intermediate Term Planning Horizon**	**Long Term Planning Horizon**
Based Aircraft	423	454	475	518
Annual Operations	153,618	173,200	188,250	221,800

AIRFIELD REQUIREMENTS

Airfield requirements include the need for those facilities related to the arrival and departure of aircraft. The adequacy of existing airfield facilities at Hayward Executive Airport has been analyzed from a number of perspectives, including airfield capacity, runway length, runway pavement strength, airfield lighting, navigational aids, and pavement markings.

AIRFIELD CAPACITY

An airport's airfield capacity is expressed in terms of its annual service volume. Annual service volume is a reasonable estimate of the maximum level of aircraft operations that can be accommodated at the airport in a year. Annual service volume accounts for annual differences in runway use, aircraft mix, and weather conditions. The airport's annual service volume was examined utilizing Federal Aviation Administration (FAA) Advisory Circular (AC) *150/ 5060-5, Airport Capacity and Delay.*

Factors Influencing Annual Service Volume

Exhibit 3A graphically presents the various factors included in the calculation of an airport's annual service volume. These include: airfield characteristics, meteorological conditions, aircraft mix, and demand characteristics (aircraft operations). These factors are described below.

- **Airfield Characteristics**

The layout of the runways and taxiways directly affects an airfield's capacity. This not only includes the location and orientation of the runways, but the percent of time that a particular runway or combination of runways is in use and the length, width, weight bearing capacity, and instrument approach capability of each runway at the airport. The length, width, weight

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AIRFIELD LAYOUT

Runway Configuration

Runway Use

Number of Exits

WEATHER CONDITIONS

VFR

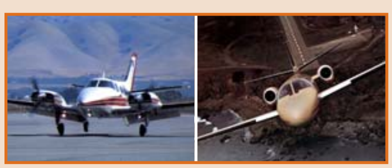
IFR

PVC

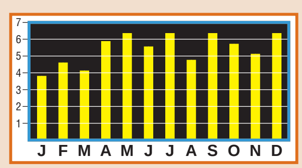
AIRCRAFT MIX

OPERATIONS

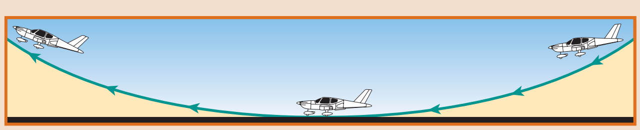
Arrivals and Departures



Total Annual Operations



Touch-and-Go Operations



HAYWARD EXECUTIVE AIRPORT

Exhibit 3A

FACTORS INFLUENCING ANNUAL SERVICE VOLUME bearing capacity, and instrument approaches available to a runway determine which type of aircraft may operate on the runway and if operations can occur during poor weather conditions.

Runway Configuration: The existing runway configuration includes two parallel runways. This maximizes airfield capacity by providing for simultaneous operations to each runway. However, capacity at Hayward Executive Airport is diminished as Runway 10L-28R is closed when the airport traffic control tower is closed. Additionally, Runway 10R-28L serves as the primary instrument runway. During low visibility and cloud ceiling situations, this is the only runway available for use. This diminishes airfield capacity as well since only a single runway is available for use during these operating conditions.

Runway Use: Runway use is normally dictated by wind conditions. The direction of take-offs and landings is generally determined by the speed and direction of wind. It is generally safest for aircraft to takeoff and land into the wind, avoiding a crosswind (wind that is blowing perpendicular to the travel of the aircraft) or tailwind components during these operations. The parallel runway configuration provides for maximum runway capacity by providing for simultaneous operations into the prevailing wind.

Exit Taxiways: Exit taxiways have a significant impact on airfield capacity since the number and location of exits directly determines the occupancy time of an aircraft on the runway. Seven entrance/exit taxiways are available for use along Runway 10R-28L. Five entrance/exit taxiways are available for use along Runway10L-28R.

The airfield capacity analysis gives credit to exits located within a prescribed range from a runway's threshold. This range is based upon the mix index of the aircraft that use the runway. The exits must be at least 750 feet apart to count as separate exits. Under this criteria, the airport is credited with two exits to Runway 28L and one exit to Runway 10R. Runway 10L-28R is credited with one exit in each direction.

- **Meteorological Conditions**

Weather conditions can have a significant affect on airfield capacity. Airport capacity is usually highest in clear weather, when flight visibility is at its best. Airfield capacity is diminished as weather conditions deteriorate and cloud ceilings and visibility are reduced. As weather conditions deteriorate, the spacing of aircraft must increase to provide allowable margins of safety. The increased distance between aircraft reduces the number of aircraft which can operate at the airport during any given period. This consequently reduces overall airfield capacity.

There are three categories of meteorological conditions, each defined by the reported cloud ceiling and flight visibility. Visual Flight Rule (VFR) conditions exist whenever the cloud ceiling is greater than 1,000 feet above ground level, and visibility is greater than three statute miles. VFR flight conditions permit pilots to approach, land, or take off by visual reference and to see and avoid other aircraft.

Instrument Flight Rule (IFR) conditions exist when the reported ceiling is less than 1,000 feet above ground level and/or visibility is less than three statute miles. Under IFR conditions, pilots must rely on instruments for navigation and guidance to the runway. Other aircraft cannot be seen and safe separation between aircraft must be assured solely by following air traffic control rules and procedures. As mentioned, this leads to increased distances between aircraft which diminishes airfield capacity.

Poor Visibility Conditions (PVC) exist when the cloud ceiling and/or visibility is less than cloud ceiling and visibility minimums prescribed by the instrument approach procedures for the airport. Essentially, the airport is closed to arrivals during PVC conditions.

According to regional data, VFR conditions exist approximately 91 percent of the time, whereas IFR conditions occur approximately 7 percent of the time. PVC conditions occur the remaining two percent of the time.

- **Aircraft Mix**

Aircraft mix refers to the speed, size, and flight characteristics of aircraft operating at the airport. As the mix of aircraft operating at an airport increases to include larger aircraft, airfield capacity begins to diminish. This is due to larger separation distances that must be maintained between aircraft of different speeds and sizes.

Aircraft mix for the capacity analysis is defined in terms of four aircraft classes. Classes A and B consist of single and multi-engine aircraft weighing less than 12,500 pounds. Aircraft within these classifications are primarily associated with general aviation operations, but do include some business turboprop and business jet aircraft (e.g. the Cessna Citation business jet and Beechcraft King Air). Class C consists of multi-engine aircraft weighting between 12,500 and 300,000 pounds. This is broad classification that includes business jets, turboprops, and large commercial airline aircraft. Most of the business jets in the national fleet are included within this category. Class D includes all aircraft over 300,000 pounds and includes wide-bodied and jumbo jets. No aircraft within Class D operate or are expected to operate at the airport.

For the capacity analysis, the percentage of Class C aircraft operating at the airport is critical in determining the annual service volume as this class includes the larger and faster aircraft in the operational mix. The existing and projected operational fleet mix for the airport is summarized in **Table 3B**. Consistent with projections prepared in the previous chapter, the operational fleet mix at the airport is expected to slightly increase its percentage of Class C through the planning period as business and corporate use of the airport increases through the planning period.

TABLE 3B Aircraft Operational Mix		
	A & B	C
Existing (Estimated)	99.3%	0.7%
Short Term	99.7%	0.9%
Intermediate Term	98.9%	1.1%
Long Term	98.5%	1.5%

- **Demand Characteristics**

Operations, not only the total number of annual operations, but the manner in which they are conducted, have an important effect on airfield capacity. Peak operational periods, touch-and-go operations, and the percent of arrivals impact the number of annual operations that can be conducted at the airport.

Peak Period Operations: For the airfield capacity analysis, average daily operations and average peak hour operations during the peak month is calculated.

Tough-and-Go Operations: A touch-and-go operation involves an aircraft making a landing and an immediate take-off without coming to a full stop or exiting the runway. These operations are normally associated with general aviation training operations and are included in local operations data recorded by the air traffic control tower.

Touch-and-go activity is counted as two operations since there is an arrival and a departure involved. A high percentage of touch-and-go traffic normally results in a higher operational capacity because one landing and one takeoff occurs within a shorter time than individual operations.

Percent Arrivals: The percentage of arrivals as they relate to the total operations in the design hour is important in determining airfield capacity. Under most circumstances, the lower the percentage of arrivals, the higher the hourly capacity. However, except in unique circumstances, the aircraft arrival-departure split is typically 50-50. At the airport, traffic information indicated no major deviation from this pattern, and arrivals were estimated to account for 50 percent of design period operations.

- **Calculation of Annual Service Volume**

The preceding information was used in conjunction with the airfield capacity methodology developed by the FAA to determine airfield capacity for Hayward Executive Airport.

Hourly Runway Capacity: The first step in determining annual service volume involves the computation of the hourly capacity of each runway in use configuration using the capacity model. The percentage use of each runway, the amount of touch-and-go training activity, and the number and locations of runway exits become important factors in determining the hourly capacity of each runway configuration.

Annual Service Volume: Once the hourly capacity is known, the annual service volume can be determined. Annual service volume is calculated by the following equation:

Annual Service Volume = C x D x H	
C =	weighted hourly capacity
D =	ratio of annual demand to average daily demand during the peak month
H =	ratio of average daily demand to average peak hour demand during the peak month

Following this formula, the current annual service volume for Hayward Executive Airport has been estimated at 323,000 operations. While the airport is expected to experience an increase in Class C aircraft through the planning period, it is expected that this will have a negligible effect on airfield capacity and the annual service volume will remain near the 323,000 level through the planning period. **Table 3C** summarizes annual service volume data for Hayward Executive Airport through the planning period. As evidenced in the table, projected long term activity levels are expected to represent 68.7 percent of the airport's annual service volume. Therefore, the capacity of the existing airfield system will not be reached and the airfield can meet operational demands. **Exhibit 3B** graphically depicts annual service volume and projected operational activity.

TABLE 3C
Annual Service Volume Comparison

	Annual Operations	Weighted Hourly Capacity	Annual Service Volume	Percent ASV
Existing (1998)	153,618	121	323,000	47.6%
Short Term	173,200	121	323,000	53.6%
Intermediate Term	188,250	121	323,000	58.3%
Long Term	221,800	121	323,000	68.7%

[1] September 1997 to August 1998

PHYSICAL PLANNING CRITERIA

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using, or are expected to use the airport. Planning for future aircraft use is of particular importance since design standards are used to plan separation distances between facilities. These standards must be determined now since the relocation of these facilities will likely be extremely expensive at a later date.

The most important characteristics in airfield planning are the approach speed and wingspan of the critical design aircraft anticipated to use the

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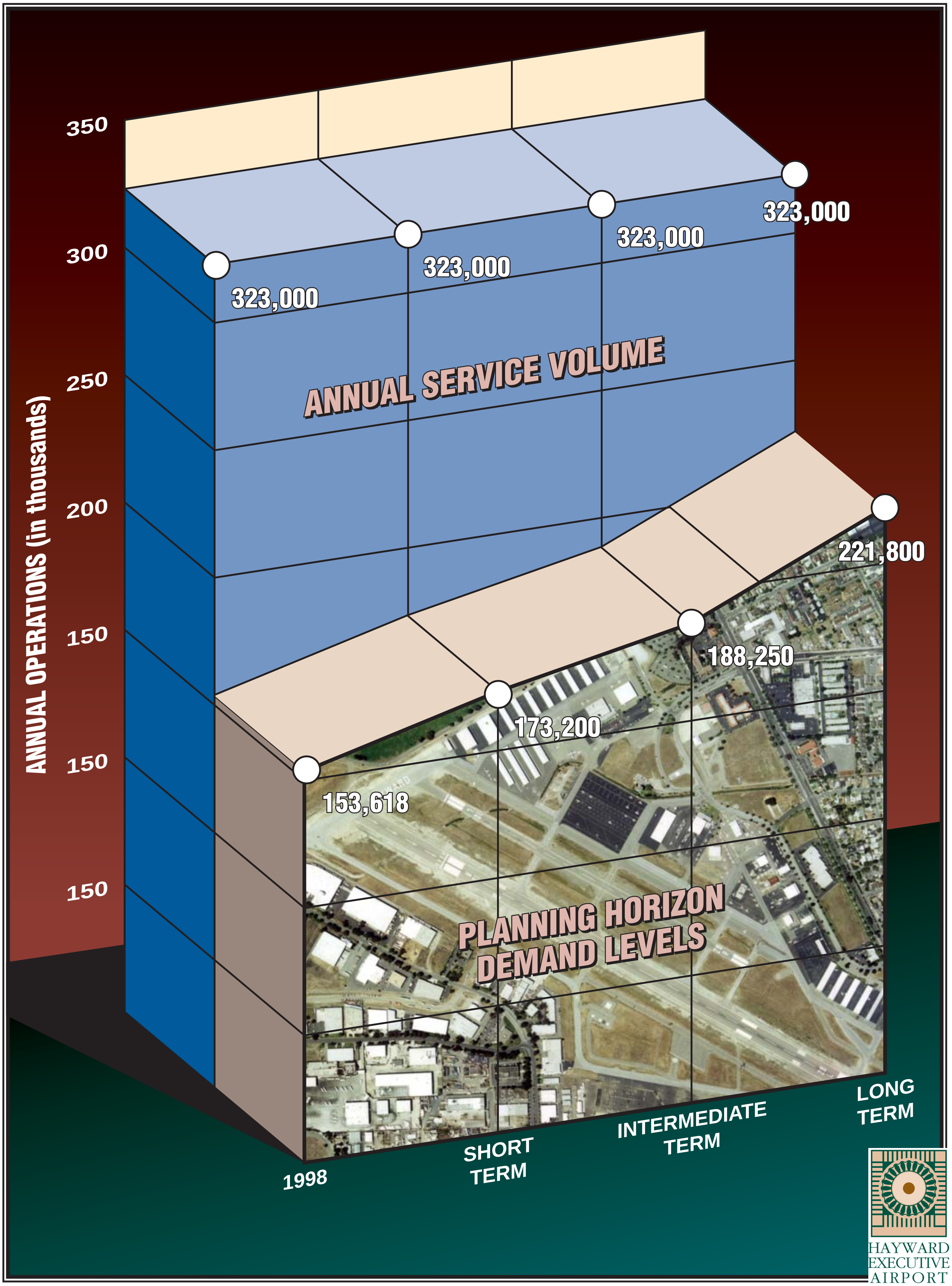

HAYWARD
EXECUTIVE
AIRPORT

Exhibit 3B
DEMAND VS. CAPACITY

airport now or in the future. The critical design aircraft is defined as the most demanding category of aircraft which conducts 500 or more operations per year at the airport.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This code, referred to as the airport reference code (ARC), has two components: the first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group (ADG) and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities.

According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Speed less than 91 knots.
Category B: Speed 91 knots or more, but less than 121 knots.
Category C: Speed 121 knots or more, but less than 141 knots.
Category D: Speed 141 knots or more, but less than 166 knots.
Category E: Speed greater than 166 knots.

The airplane design group (ADG) is based upon the aircraft's wingspan. The six ADG's used in airport planning are as follows:

Group I: Up to but not including 49 feet.
Group II: 49 feet up to but not including 79 feet.
Group III: 79 feet up to but not including 118 feet.
Group IV: 118 feet up to but not including 171 feet.
Group V: 171 feet up to but not including 214 feet.
Group VI: 214 feet or greater.

In order to determine facility requirements, an ARC should first be determined, then appropriate airport design criteria can be applied. This begins with a review of the type of aircraft using and expected to use Hayward Executive Airport.

Hayward Executive Airport is currently used by a wide variety of general aviation aircraft. Aircraft using the airport include small single and multi-engine aircraft (which fall within approach categories A and B and ADG I) and business turboprop, and jet aircraft (which fall within approach categories B, C, and D and ADGs I and II). Business jet aircraft are the most demanding aircraft to operate at the airport due to their approach speeds, runway take-off requirements, and wingspans. **Exhibit 3C** presents representative aircraft by ARC.

Business jet aircraft use of the airport is limited with small single-engine and multi-engine piston aircraft comprising the majority of operations at the airport. Therefore, the current critical design aircraft at Hayward Executive Airport are smaller general aviation aircraft within ARC B-I.

The potential exists in the future for increased business jet use of the airport. Business jets within ARC B-II comprise the majority of the national business jet fleet. While the airport currently accommodates, and will continue to accommodate, business jet aircraft in ARCs C-I through D-II, these aircraft are not expected to exceed the 500 annual operations threshold established by the FAA to consider these as the critical design aircraft. Therefore, it is expected that as business jet activity increases at the airport, the critical design aircraft will fall within ARC B-II. As the primary runway, Runway 10R-28L should conform to ARC B-II design standards to safely and efficiently accommodate the critical design aircraft.

It is not necessary to design all airfield elements to the critical design aircraft. Since Runway 10L-28R serves small aircraft (less than 12,500 pounds) exclusively, it can be designed to lessor standards. The primary aircraft using Runway 10L-28R are small single and multi-engine aircraft which fall with ARC B-I. Therefore, ARC B-I design standards are sufficient for the design and operation of Runway 10L-28R.

The design of taxiway and apron areas should consider the wingspan requirements of the most demanding aircraft to operate within that specific functional area on the airport. All runway exit and parallel taxiways, and transient apron and aircraft maintenance and repair hangar areas should consider ADG II requirements to accommodate business jet aircraft. T-hangar and small conventional hangar areas should consider ADG I requirements as these commonly serve smaller single and multi-engine piston aircraft.

AIRFIELD DESIGN STANDARDS

The FAA has established imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect the safe operation of aircraft. These include the object free area (OFA), obstacle free zone (OFZ), and runway safety area (RSA).

The OFA is defined as "a two dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects except for objects whose location is fixed by function." The OFZ is the airspace below 150 feet above the established airport elevation surrounding the runway and extending 200 feet from the runway end which is required to be clear of objects, except for frangible items required for the navigation of aircraft. The RSA is defined as "a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway."

Table 3D summarizes the dimensions of these safety areas for ARC B-I (small aircraft exclusively) and ARC B-II. The FAA expects these areas to be under the

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A-I

Beech Baron 55
Beech Bonanza
Cessna 150
Cessna 172
Piper Archer
Piper Seneca

B-I, II
over 12,500 lbs.

Super King Air 300
Beech 1900
Jetstream 31
Falcon 10, 20, 50
Falcon 200, 900
Citation II, III, IV, V
Saab 340
Embraer 120

B-I
less than 12,500 lbs.

Beech Baron 58
Beech King Air 100
Cessna 402
Cessna 421
Piper Navajo
Piper Cheyenne
Swearingen Metroliner
Cessna Citation I

C-I, D-I

Lear 25, 35, **55**
Israeli Westwind
HS 125

B-II
less than 12,500 lbs.

Super King Air 200
Cessna 441
DHC Twin Otter

C-II, D-II

Gulfstream II, **III**, IV
Canadair 600
Canadair Regional Jet
Lockheed JetStar
Super King Air 350

HAYWARD
EXECUTIVE
AIRPORT

Exhibit 3C
AIRPORT REFERENCE CODES

control of the airport and free from obstructions. A review of current airport drawings and aerial photography indicates that these design standards are fully met on airport property.

TABLE 3D Airfield Safety Area Dimensional Standards	B-I (Small Aircraft Exclusively)	B-II
Runway Safety Area		
Width	120	150
Length Beyond Runway End	240	300
Object Free Area		
Width	250	500
Length Beyond Runway End	240	300
Obstacle Free Zone		
Width	250	400
Length Beyond Runway End	200	200

Source: FAA Airport Design Software Version 4.2D

RUNWAY ORIENTATION

The airport is presently served by parallel Runways 10R-28L and 10L-28R oriented in an northwest-southeast direction. For the operational safety and efficiency of an airport, it is desirable for the principal runway of an airport's runway system to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off (defined as a crosswind).

FAA design standards recommend additional runway configurations when the primary runway configuration provides less than 95 percent wind coverage at specific crosswind components. The 95 percent wind coverage is computed on the basis of crosswinds not exceeding 10.5 knots for small aircraft weighing less than 12,500 pounds and from 13 to 20 knots for aircraft weighing over 12,500 pounds.

The most current ten years of wind data specific to Hayward Executive Airport has been examined to determine wind coverage at the airport. The results of this analysis are summarized in **Table 3E**. As shown in the table, the existing runway orientation exceeds percent wind coverage in all crosswind conditions. Therefore, no additional runway orientations are needed to achieve minimum wind coverage at the airport.

RUNWAY LENGTH

The determination of runway length requirements for an airport are based on five primary factors: airport elevation; mean maximum temperature of the hottest month; runway gradient (difference in elevation of each runway end); critical aircraft type expected to use the airport, and stage length of the longest nonstop trip destinations. Aircraft performance declines as each of these factors increase.

TABLE 3E **Wind Coverage**			
Crosswind Component			
10.5 Knots	**13.0 knots**	**16.0 Knots**	**20.0 Knots**
98.26%	99.19%	99.75%	99.93%
Source: Hayward Executive Airport, 1988-1997			

For calculating runway length requirements at Hayward Executive Airport, the airport elevation is 47 feet above mean sea level (MSL) and the mean maximum temperature of the hottest month is 94 degrees Fahrenheit (July). Runway 10R-28L slopes upward to the east. Presently, the Runway 10R threshold elevation is approximately 26 feet while the Runway 28L threshold elevation is approximately 47 feet. The overall difference in runway end elevations for this runway is 21 feet (an effective runway gradient of 0.5 percent). Runway 10L-28R slopes upward to the east as well. For Runway 10L-28R, the overall difference in runway end elevations is 9 feet (an effective runway gradient of 0.2 percent).

Using the specific data for Hayward Executive Airport described above, runway length requirements for the various classifications of aircraft that may operate at the airport were examined using the FAA Airport Design computer program Version 4.2D which groups general aviation aircraft into several categories, reflecting the percentage of the fleet within each category and useful load (passengers and fuel) of the aircraft. **Table 3F** summarizes FAA recommended runway lengths for Hayward Executive Airport for wet runway conditions.

As detailed previously, based upon the existing aircraft operating at the airport and the projected aircraft to operate at the airport through the planning period, Runway 10R-28L should be designed to accommodate aircraft through ARC B-II. The appropriate FAA runway length planning category for aircraft within ARC B-II is "small airplanes with 10 or more passengers seats". As shown in the table, the FAA recommends a runway length of 4,300 feet to serve this category of aircraft. At its present length of 5,024 feet, Runway 10R-28L exceeds this minimum FAA planning criteria. Therefore, there is not a requirement for additional runway length.

Presently, the Runway 10R threshold is displaced 822 feet. While the runway behind the threshold is not available for landing, it is available for departures to the east. Therefore, the entire 5,024-foot length of the runway is available for departures to the east. Similarly, the pavement behind the Runway 10R displaced threshold is available for departures to the west. This provides the same 5,024 feet of runway for departures to the west from Runway 28L. Including the 860-foot entrance taxiway, a total of 5,884 feet of runway is available for departures to the west.

TABLE 3F
Runway Length Requirements

Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	2,600 feet
95 percent of these small airplanes	3,100 feet
100 percent of these small airplanes	3,700 feet
Small airplanes with 10 or more passenger seats	4,300 feet
Large airplanes between 12,500 and 60,000 pounds	
75 percent of these large aircraft at 60 percent useful load	5,400 feet
100 percent of large aircraft at 60 percent useful load	5,800 feet

Source: FAA Airport Design computer program Version 4.2D

Ultimately, the airport can expect increased business jet aircraft use of the airport. As discussed previously, this could include aircraft within ARCs C-II and D-II. The appropriate FAA runway length planning category for aircraft within ARC C-II is "75 percent of large aircraft at 60 percent useful load." For ARC D-II, the appropriate planning category is "100 percent of large aircraft at 60 percent useful load". As shown in the table, runway length requirements for these categories of aircraft vary from 5,400 feet for ARC C-II to 5,800 feet for ARC D-II. When considering the runway available for departures in each direction, sufficient runway length is available along Runway 10R-28L to accommodate the takeoff requirements of the full-range of business jet aircraft expected to operate at the airport through the planning period.

The appropriate planning category for the mix of small aircraft which use Runway 10L-28R is "75 percent of small airplanes with less than 10 passenger seats". At Hayward Executive Airport the FAA recommends a runway length of 2,800 feet to meet the requirements of this category of aircraft. Presently, Runway 10L-28R is 3,107 feet long exceeding the minimum runway length requirements established by the FAA.

RUNWAY WIDTH

Runway width is primarily determined by the planning ARC for a particular runway. As mentioned previously, a B-II ARC is appropriate for Runway 10R-28L. At 150 feet wide, Runway 10L-28R exceeds ARC B-II requirements which specify a runway pavement width of 75 feet. Presently, the entrance taxiway at the Runway 28L end is 75 feet wide. Consideration may be given to widening this taxiway to 150 feet to conform with the width of the runway.

For Runway 10L-28R, ARC B-I (small aircraft exclusively) design standards specify a runway pavement width of 60 feet. At 75 feet wide, Runway 10L-28R exceeds the minimum design requirement specified by the FAA.

RUNWAY PAVEMENT STRENGTH

The most important feature of airfield pavement is its ability to withstand repeated use by aircraft of significant weight. At the airport, this includes a wide range of general aviation aircraft ranging from small single-engine aircraft to business jet aircraft.

The current strength ratings for each runway have been summarized in **Table 3**G Considering the future fleet mix, which is expected to include a larger number of business jets, these pavement strength ratings are sufficient through the planning period.

TABLE 3G
Pavement Strength Ratings (pounds)

	Runway 10R-28L	Runway 10L-28R
Single Wheel Loading (SW)	30,000	13,000
Dual Wheel Loading (DW)	75,000	N/A

NAVIGATIONAL AIDS AND INSTRUMENT APPROACH PROCEDURES

A number of electronic navigational aids are in place to assist pilots in locating and landing at Hayward Executive Airport. The Oakland VOR, localizer (located at the airport), and GPS navigational aids assist pilots landing at the airport during poor weather conditions when following instrument approach procedures established by the FAA.

As mentioned previously in Chapter One, the FAA is proceeding with a program to transition from existing ground-based navigational aids to a satellite-based navigation system utilizing GPS technology. Currently, GPS is certified for enroute guidance and for use with instrument approach procedures. As evidenced at Hayward Executive Airport, the initial GPS approaches being developed by the FAA provide only course guidance information. By the year 2003, it is expected that GPS approaches will also be certified for use in providing descent information for an instrument approach. This capability is currently only available using an Instrument Landing System.

GPS approaches fit into three categories, each based upon the desired visibility minimum of the approach. The three categories of GPS approaches are: one-half mile, three-quarter mile, and one mile. To be eligible for a GPS approach, the airport landing surface must meet specific standards as outlined in Appendix 16 of the FAA Airport Design Advisory Circular. The specific airport landing surface requirements which must be met in order to establish a GPS approach are summarized in **Table 3H**.

Presently, Runway 10R-28L, which serves as the primary instrument runway, fully meets the requirements for one-mile visibility minimum GPS approaches. To achieve lower approach visibility minimums, approach lighting equipment would need to installed at the Runway 28L end. The SSALS, required for a ¾ mile visibility minimum approach, consists of a system of lights extending 1,600 feet from the runway threshold. The MALSR, required for a ½-mile visibility minimum GPS approach, would extend 2,600 feet from the runway threshold. Presently, the blast fence, noise berm, roadways, and residential and commercial development off the end of Runway 28L, prevent the installation of any approach lighting system to Runway 28L. Therefore, due to these site constraints, it appears unlikely that lower approach minimums could be achieved at the airport since an approach lighting system cannot be installed on the Runway 28L approach.

TABLE 3H
GPS Instrument Approach Requirements

Requirement	One-Half Mile Visibility	¾ Mile Visibility Greater Than 300-Foot Cloud Ceiling	One Mile Visibility Greater Than 400-Foot Cloud Ceiling
Minimum Runway Length	4,200 Feet	3,500 Feet	2,400 Feet
Runway Markings	Precision	Nonprecision	Visual
Runway Edge Lighting	Medium Intensity	Medium Intensity	Low Intensity
Approach Lighting	MALSR	SSALS	Not Required
Parallel Taxiway[1]	Required	Required	Recommended
Approach Surface	34:1 (clear)	20:1 (clear)	20:1 (clear)
Obstacle Free Zone	400' wide, 200' beyond runway end	400' wide, 200' beyond runway end	400' wide, 200' beyond runway end
Holding Positions Signs and Markings	Required	Required	Required

Source: Appendix 16, FAA AC 150/5300-13, Airport Design, Change 5
MALSR - Medium Intensity Approach Lighting System with Runway Alignment Lighting
SSALS - Simplified Short Approach Lighting System
[1] Parallel Taxiway must lead to the threshold and keep airplanes on centerline outside the OFZ

As the FAA transitions to satellite-based navigation, it is expected that the existing localizer and VOR navigational aids will be replaced by GPS and that future GPS approaches will provide descent information in addition to the course guidance presently provided by the existing instrument approaches. No instrument approach capability is needed for Runway 10L-28R since this runway primarily serves small aircraft during visual conditions.

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport to provide safe and efficient use of the airfield. Taxiways A and Z provide full length parallel taxiway access along the east and west sides of the parallel runway system, respectively. Taxiways B, C, D, E, and F serve as runway entrance/exit taxiways.

Taxiway width is determined by the ADG of the most demanding aircraft to use the taxiway. As mentioned previously, the most demanding aircraft to use the runways and taxiways fall within ADG II. According to FAA design standards, the minimum taxiway width for ADG II is 35 feet. All taxiways presently meet or exceed this minimum design requirement.

Design standards for the separation distances between runways and parallel taxiways are based primarily on the most demanding ARC and type of instrument approach capability. FAA design standards specify a runway/taxiway separation distance of 240 feet for ARC B-II and one-mile visibility minimum instrument approach. Presently, Taxiways A and Z exceed this minimum runway/taxiway separation criterion.

Holding aprons provide an area for aircraft to prepare for departure off the taxiway and allow aircraft to bypass other aircraft which are ready for departure. Holding aprons are available at the Runway 28L and 28R runway ends. At 150 feet wide, Taxiway F functions as a holding apron for the Runway 10L and 10R ends by providing sufficient width for aircraft to taxi past aircraft preparing for departure. Since holding aprons enhance airfield capacity and operational efficiency, these areas should be maintained through the planing period.

HELIPAD

A lighted helipad is located on the west side of the airport along Taxiway Z. Three helicopter parking pads are located along the west side of the pad. Based upon existing planning standards, this area is sufficiently-sized to accommodate the full-range of general aviation helicopters. Therefore, there is not a need to increase the size of the helipad. No additional parking positions are anticipated through the planning period as most helicopter activity at the airport consists of training operations. A location has been established along Taxiway Z for autorotation training activities. A helipad should be planned for the north side of the airport to accommodate helicopter activity on this portion of the airport.

LIGHTING AND MARKING

Currently, there are a number of lighting and pavement markings aids serving pilots and aircraft using the Hayward Executive Airport. These lighting and marking aids assist pilots in locating the airport during night or poor weather conditions, as well as assist in the ground movement of aircraft.

Runway markings are designed according to the type of instrument approach available on the runway. FAA AC 150/5340-1F, *Marking of Paved Areas on Airports*, provides the guidance necessary to design an airport's markings. Runway 10R-28L is equipped with precision markings. Runway 10L-28R is equipped with nonprecision markings. These markings exceed the requirements for the existing and planned one-mile visibility minimum instrument approaches to Runway 28L and existing and ultimate visual approaches to each end of Runway 10L-28R.

Taxiway and apron areas also require marking to assure that aircraft remain on the pavement. Yellow centerline stripes are currently painted on all taxiway and apron surfaces at the airport to provide this guidance to pilots. Besides routine maintenance, these markings will be sufficient through the planning period.

The airport is equipped with a rotating beacon to assist pilots in locating the airport at night. The existing rotating beacon is adequate and should be maintained in the future.

Runway lighting systems provide critical guidance to pilots at night and during low visibility operations. Each runway is equipped with medium intensity runway lighting (MIRL). These systems are sufficient for the existing and planned instrument approaches and should be maintained through the planning period.

Effective ground movement of aircraft at night is enhanced by the availability of taxiway lighting. All taxiways are equipped with medium intensity taxiway lighting (MITL). These lighting systems are sufficient and should be maintained through the planning period.

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway, visual approach slope indicators (VASIs) and precision approach path indicators (PAPIs) are commonly provided at airports. Presently, VASIs are available at each end of Runway 10R-28L. A PAPI is available at the Runway 28R end. These lighting systems are sufficient and should be maintained through the planning period. Facility planning should include installing a PAPI at the Runway 10L end to assist pilots in determining the correct glide path to this runway end.

Runway identification lighting provides the pilot with a rapid and positive identification of the runway end. The most basic system involves runway end identifier lights (REILs). REILs are normally installed to runways not equipped with a more sophisticated approach lighting system. The existing REILs installed at each end of Runway 10R-28L are sufficient and should be maintained through the planning period. While REILs are not specifically required for visual approaches, REILs would enhance the safety of nighttime operations to Runways 10L and 28R by providing pilots with the ability to identify these runway ends and distinguish this lighting from other lighting on the airport and in the approach areas.

Lighted distance-to-go signs are installed along the west side of Runway 10R-28L. These assist pilots in accurately determining the remaining runway length available when landing and departing this runway. These systems are sufficient and should be maintained through the planning period.

Lighted airfield signs are installed at taxiway and runway intersections. These signs assist pilots in identifying their location on the airfield and direct them to their desired location. These lighting systems enhance airfield safety by preventing inadvertent incursions onto active runways and aid transient pilots who are not familiar with the airfield layout. These systems are sufficient and should be maintained through the planning.

OTHER FACILITIES

The airport has a lighted wind cone and segmented circle which provides pilots with information about wind conditions and local traffic patterns. Each of these facilities should be maintained in the future.

The automated surface observation system (ASOS) is an important component to airfield operations as it notifies pilots of local weather conditions when the airport traffic control tower is closed. This system should be maintained through the planning period. The ASOS is presently located along the western edge of the apron used by Sullivan Propellors. Consideration may be given to designating an alternate location for the ASOS to provide for apron expansion in this area.

A compass rose and VOR checkpoint are available at the airport. These enable pilots to calibrate navigational equipment in their aircraft and should be maintained through the planning period.

CONCLUSIONS

A summary of the airfield facility requirements is presented on **Exhibit 3D**. Based upon existing and forecast operational levels, additional airfield capacity is not needed through the planning period. Therefore, no additional runways are needed. The existing runway lengths, widths, and pavement strengths are sufficient for the existing and future mix of aircraft using the airport. While existing development at the Runway 28L end (blast fence, noise berm etc.) precludes the ability to install an approach lighting system to provide lower approach visibility minimums, it is expected that existing navigational aids and instrument approach procedures will be replaced with GPS and be enhanced with descent guidance information in addition to course guidance information. A PAPI at the Runway 10L end would enhance the safety of visual approaches to this runway end. A REIL installed at the Runway 10L and Runway 28R ends would enhance the safety of night operations to these runways. Consideration may be given to relocating the ASOS to provide for apron expansion in the area where it is presently located.

Consideration should be given to designating the existing Runway 28L entrance taxiway as part of the runway and utilizing this pavement for departures to the northwest. This would provide for a departure point further southeast than presently provided on the runway. This could allow aircraft to climb to a safe altitude

97MP17-3D-3/31/00

RUNWAYS , TAXIWAYS, HELIPAD

EXISTING	SHORT TERM NEED (5 Years)	LONG TERM NEED (10-20 Years)
Runway 10R-28L 5,024' x 150' 30,000 lbs. SW • 75,000 lbs. DW Full-Length Parallel Taxiway	**Runway 10R-28L** Widen Entrance Taxiway to 150'	**Runway 10R-28L** None
Runway 10L-28R 3,107' x 75' 13,000 lbs. SW Full-Length Parallel Taxiway	**Runway 10L-28R** None	**Runway 10L-28R** None
Helipad Three Parking Positions	**Helipad** Northside Helipad	**Helipad** None

NAVIGATIONAL AIDS AND INSTRUMENT APPROACH PROCEDURES

EXISTING	SHORT TERM NEED (5 Years)	LONG TERM NEED (10-20 Years)
ASOS	None	Relocate
Localizer	None	None
Localizer Approach to Runway 28L GPS Approach to Runway 28L VOR or GPS Circling Approaches	None None None	Replace with GPS None Replace with GPS

AIRFIELD LIGHTING AND MARKING

EXISTING	SHORT TERM NEED (5 Years)	LONG TERM NEED (10-20 Years)
Rotating Beacon	None	None
VASI (10R & 28L) PAPI (28R)	PAPI (10L)	None
REIL (10R & 28L)	None	REIL (10L-28R)
Medium Intensity Runway & Taxiway Lighting	None	None
Taxiway Guidance Signage	None	None
Precision Runway Markings (10R-28L) Nonprecision Runway Markings (10L-28R)	None None	None None
Lighted Distance to go Signs VOR Checkpoint Compass Rose	None None None	None None None

ASOS - Automated Surface Observation System
VOR - Very High Frequency Omnidirectional Range Facility
REIL - Runway End Identifier Light
VASI - Visual Approach Slope Indicator
PAPI - Precision Approach Slope Indicator
GPS - Global Positioning System

HAYWARD EXECUTIVE AIRPORT

Exhibit 3D
AIRFIELD REQUIREMENTS

over the airport and begin departures over the airport prior to overflying residential developments to the west.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling of aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs.

HANGAR, APRON AND TERMINAL REQUIREMENTS

The demand for aircraft storage hangars typically depends upon the number and type of aircraft expected to be based at the airport. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, hangar development should be based on actual demand trends and financial investment conditions.

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single or multi-engine, is in more sophisticated (and consequently more expensive) aircraft. Therefore, many hangar owners prefer hangar space to outside tiedowns.

Presently, aircraft storage and maintenance activities are being met through a combination of T-hangars, small conventional (executive) hangars, and large conventional hangars operated by fixed based operators providing a full-range of general aviation services (i.e. aircraft maintenance and repair). Currently, there are approximately 192 enclosed T-hangar facilities and 14 executive hangar positions. Approximately 147,000 square-feet of conventional hangar provides additional aircraft storage and maintenance area.

T-hangars provide the aircraft owner more privacy and greater ease in obtaining access to aircraft than do conventional hangars. A trend in hangar development is for the construction of smaller clearspan hangars instead of traditional T-hangar facilities (similar to the existing executive hangars). Smaller clearspan hangars have the ability to accommodate multiple aircraft simultaneously and larger business jet and turboprop aircraft. This is evident at Hayward Executive Airport where approximately 32 aircraft are stored in the 14 executive hangar units. In the future it is expected that the aircraft storage hangar requirements will continue to be met through a combination of hangar types.

Currently, approximately 71 percent of based aircraft are stored in hangars. Approximately 71 percent of single-engine aircraft and 41 percent of multi-engine aircraft are stored in T-hangars. The remaining aircraft are stored in either the executive hangars or conventional hangars operated by the general aviation businesses at the airport. Future hangar requirements were determined based upon an assumption that this percentage would grow to approximately 80 percent of total based aircraft.

Future aircraft storage needs were determined following the present distribution of aircraft listed above. A planning standard of 1,200 square feet was used to determine space requirements for single and multi-engine piston aircraft. A planning standard of 2,500 square feet was used to determine space requirements for turboprop, turbojet, and helicopter aircraft. Conventional hangar area was increased by 15 percent to account for future aircraft maintenance needs. Future hangar requirements for the airport are summarized on **Exhibit 3E**.

A parking apron should be provided for at least the number of locally-based aircraft that are not stored in hangars, as well as transient aircraft. Approximately 320 tiedowns are available for transient and based aircraft at the airport. Although the majority of future based aircraft were assumed to be stored in an enclosed hangar, a number of based aircraft will still tie down outside. Total apron area requirements were determined by applying a planning criterion of 800 square yards per transient aircraft parking position and 650 square yards for each locally-based aircraft parking position. The results of this analysis are presented on **Exhibit 3E**. As evidenced in the analysis, sufficient aircraft parking apron is available at the airport through the planning period.

General aviation terminal facilities provide an area for transient users of the airport to meet waiting passengers. Additionally, general aviation terminal facilities typically provide space for a pilot's lounge and flight planning, management offices, storage, restrooms, and general aviation businesses providing services such as flighting training or charter activities. Presently, facilities located at each fixed based operator provide area for these functions at the airport. To provide a single location for transient aircraft passengers, facility planning has included developing a public terminal building at the airport. The methodology used in estimating general aviation terminal facility needs is based on the number of airport users expected to utilize general aviation facilities during the design hour. Space requirements are based upon providing 90 square feet per design hour itinerant passenger. **Exhibit 3E** outlines the space requirements for general aviation terminal services at the airport through the planning period. Additional area will be required should services such as rental car counters and restaurant facilities be required. Local building preferences and building codes requirements will also affect the final design of the terminal.

AIRCRAFT RESCUE AND FIREFIGHTING

The airport is not required to have aircraft rescue and firefighting equipment on the site, since there are no scheduled airline flights and the airport does not operate under Federal Aviation Regulations (FAR) Part 139 standards. City Fire Station #6, located on the west side of the airport along West Winton Avenue, is available for aircraft and airport emergencies. A firefighting vehicle is equipped with dry

97MP17-3E-3/31/00

AIRCRAFT STORAGE HANGARS

	EXISTING	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Aircraft to be Hangared	303	341	369	426
T-Hangar Positions	192	230	246	279
Aircraft in Conventional Hangars	97	111	123	147
Conventional Hangar Area (s.f.)*	197,400	191,000	217,000	268,300
T-Hangar Area (s.f.)	229,600	275,600	295,300	334,700
Total Hangar Area (s.f.)	427,000	466,600	512,300	603,000

* Includes Executive Hangars

APRON AREA

	EXISTING CAPACITY	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
Transient Aircraft				
Positions	---	44	47	56
Apron Area (s.y.)	---	34,900	37,900	44,700
Locally-Based Aircraft				
Positions	---	113	106	92
Apron Area (s.y.)	---	73,500	68,900	59,800
Total Positions	320	157	153	148
Total Apron Area (s.y.)	131,700	108,400[1]	106,800[1]	104,500[1]

Public Terminal Building (s.f.)	N/A	7,900	9,100	11,800
Aircraft Wash Facility	Two Bays	None	None	None
Tenant Maintenance Shelter	Two Bays 3,000 (s.f.)	None	None	None

1 This figure represents projected apron requirements. While this is intended to reflect that the existing apron capacity is sufficient to accommodate future demand, this should not be construed to indicate the existing apron area will be reduced to these levels.

HAYWARD EXECUTIVE AIRPORT

Exhibit 3E
GENERAL AVIATION REQUIREMENTS

chemical and foam for emergency response.

AIRCRAFT WASH FACILITY

An uncovered aircraft wash pad is located adjacent to Executive Hangar Building #1 on the north side of the airport. Two separate pads can accommodate two aircraft simultaneously. Wastewater from the facility is filtered through an oil-water separator maintained by the City. This facility is sufficient and should be maintained through the planning period.

TENANT MAINTENANCE SHELTER

A tenant maintenance shelter is located on the north side of the airport west of Executive Hangar Building #1. It is approximately 3,000 square feet in size and can accommodate two aircraft simultaneously. The tenant maintenance shelter provides airport tenants with a facility to conduct routine maintenance and dispose of aircraft fluids. This facility should be maintained through the planning period.

AIRPORT MAINTENANCE FACILITY

The airport maintenance facility is located along the north side of Hangar M which is located in the far northeast quadrant of the airport. Approximately 1,600 square feet of shop space is available for equipment storage and maintenance and repair activities. Additional maintenance area will be a function of City of Hayward needs.

AIRPORT ACCESS

Presently, airport facilities are accessed via Hesperian Boulevard, West A Street, and West Winton Avenue. Interstate I-880 provides access to regional communities. City planning presently includes the extension of West A Street (primarily along the Golf Course Road alignment) to the west.

A primary consideration with roadway access is adequate roadway directional signage. Enhanced guidance signage along primary arrival routes to the airport should be included in facility planning to assist transient users in locating the airport from regional communities.

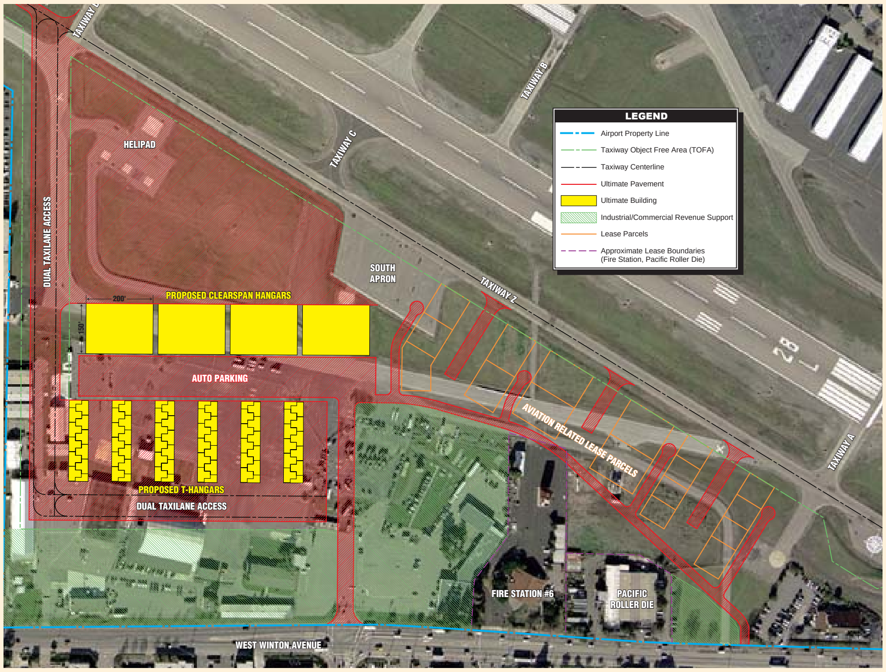
SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for Hayward Executive Airport through the planning horizon. The next step is to develop a direction for development to best meet these projected needs. The remainder of the master plan will be devoted to outlining this direction, its schedule, and costs.

HAYWARD AIRPORT

Chapter Four
AIRPORT DEVELOPMENT ALTERNATIVES

AIRPORT DEVELOPMENT ALTERNATIVES



Prior to defining the development program for the airport, it is important to consider development potential and constraints at the airport. In this chapter, a series of airport development scenarios are considered for the airport to satisfy the projected demand through the planning period and identify the highest and best uses for airport property, taking into consideration existing physical and environmental constraints and appropriate federal design standards, where appropriate. The alternatives analysis is an important step in the planning process since it provides the underlying rationale for the final master plan recommendations.

The evaluation of alternatives is a process of deciding which options are most compatible with the goals and objectives of the local area and the City of Hayward. The alternatives considered are compared using economic and aviation factors to determine which of the alternatives best fulfill the aviation needs of the community as well as the region. After the evaluation process, a selected airport concept can be transformed into a realistic development plan.

AIRPORT DEVELOPMENT OBJECTIVES

It is the overall objective of this effort to produce a balanced airside and landside complex to serve forecast aviation demands. However, before defining and evaluating specific alternatives, airport development objectives should be considered. The City of Hayward provides the overall guidance for the operation and development of the Hayward Executive Airport. It is of primary concern that the airport is marketed, developed, and operated for the betterment of its users. With this in mind, the following development objectives have been defined:

- Develop an attractive, efficient, and safe aviation facility in accordance with federal safety regulations.
- Develop facilities to efficiently serve general aviation users and encourage increased use of the airport, including increased business and corporate use of the airport.
- Provide sufficient airside and landside capacity through additional facility improvements which will meet projected demands for the airport.
- Contribute to local economic development through the development of airport property for business and general aviation uses.
- Support local economic development and growth by providing the airport facilities necessary to support business and corporate aircraft use. This includes adequate runway and terminal facilities to serve both turboprop and turbojet aircraft.

The remainder of the chapter will describe various development alternatives for the airside (airfield) and landside facilities (aircraft storage hangars, apron, and terminal areas). Within each of these areas, specific facilities are required or desired. Although each area is treated separately, planning must integrate the individual requirements so that they complement one another.

AIRFIELD ALTERNATIVES

Airfield facilities are, by nature, the focal point of the airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. In particular, the runway system requires the greatest commitment of land area and often imparts the greatest influence on the identification and development of other airport facilities. Furthermore, aircraft operations dictate the FAA design criteria that must be considered when looking at airfield improvements. These criteria, depending upon the areas around the airport, can often have a significant impact on the viability of various alternatives designed to meet airfield needs. The primary planning issues related to the airfield include:

- Runway 10R-28L usable length, safety areas, widening of entrance taxiway.
- Taxiway locations and separation (from runway).
- Automated Surface Observation System (ASOS) Siting.

RUNWAY 10R-28L

Runway 10R-28L presently serves as the primary runway at the airport and is 5,024 feet long. As indicated in the facility requirements analysis, this length is adequate for the existing and future mix of aircraft expected to utilize the airport. Therefore, there is not a requirement for additional runway length. However, due to the displaced landing threshold to the Runway 10R end, and certain safety area requirements, it is important to define the usable runway lengths for departure and landing operations to Runway 10R-28L.

As shown on **Exhibit 4A**, the Runway 10R landing threshold has been displaced 822 feet to the southeast to reduce the impacts of aircraft noise from landing aircraft overflying the San Lorenzo neighborhood located northwest of the airport. The effects of the displaced threshold are as such: for aircraft landing to Runway 10R, only 4,202 feet of the existing 5,024 feet is available for landing to the southeast; however, the full 5,024 feet is available for departures to the southeast using Runway 10R since the pavement behind the displaced threshold can be used for departure.

When displacing a landing threshold, FAA guidelines specify two runway protection zones (RPZs) – an approach RPZ and departure RPZ. The RPZ was established by the FAA to provide an area off of the runway end which is clear of obstructions and incompatible land uses in order to enhance the protection of people and property on the ground. Normally, the approach and departure RPZs overlap.

The FAA does not require fee simple interest in the RPZ in all cases. The FAA does encourage an airport operator to have positive control over the RPZ to ensure that incompatible development and/or obstructions are not developed within the RPZ area. In many cases, an avigation easement is acquired to define land use within the RPZ and provide positive control of the airspace within the RPZ. In situations where fee simple acquisitions and/or avigation easements are too costly or not practical to obtain, local land use controls and zoning can be effective in controlling development within an RPZ to ensure that it is compatible with aircraft operations.

As shown on **Exhibit 4A**, both the approach and departure RPZ for the northwest end of Runway 10R are located within the existing airport property line. Much of the golf course is located within the departure RPZ. This is considered a compatible land use.

Exhibit 4A depicts an alternative of widening the entrance taxiway to Runway 28L and designating this as part of the active runway. In this manner, large aircraft could begin their departure 860 feet southeast of the existing Runway 28L threshold. This aids aircraft in reaching a safe altitude quicker to begin a turn to the east or west and avoid directly overflying the San Lorenzo neighborhood to the northwest of the airport.

In this alternative, the Runway 28L landing threshold would remain in its existing location. Similar to the Runway 10R end, the Runway 28L threshold was placed in this location to reduce the impacts of aircraft noise from landing aircraft overflying residential development to the southeast. In the same manner as the existing displaced threshold at the Runway 10R end, the pavement behind the Runway 28L threshold would be available for departures to the northwest only. Since the landing threshold location does not change, the existing 5,024 feet of pavement would remain for aircraft landing to the northwest on Runway 28L. Designating the 860-foot entrance taxiway to Runway 28L as runway would provide a total of 5,884 feet of pavement for departures to the northwest.

Since the Runway 28L threshold would be displaced in this alternative, two RPZs would be required. As shown on **Exhibit 4A**, portions of both the approach and departure RPZs would extend outside existing airport boundaries. To protect these areas from future incompatible development, the City of Hayward may wish to explore methods to protect these areas of the approach and departure RPZs. As discussed previously, this can include a number of methods, including the acquisition of property or avigation easements, or instituting land use and/or zoning controls.

Shown in yellow on **Exhibit 4A** are the limits of the Runway 10R-28L object free area (OFA). Shown in orange are the limits of the Runway 10R-28L runway safety area (RSA). The FAA defines the OFA as an area centered on the runway centerline, extending laterally and beyond each runway end to provide an area clear of all ground-based objects protruding above the surface, except those serving air or ground navigation. The RSA is also centered on the runway centerline, extending laterally and beyond each runway end. As defined by the FAA, the purpose of the RSA is to "provide an area surrounding the runway which is prepared or suitable to reduce the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway."

The RSA for Runway 10R-28L is 150 feet wide, centered on the runway centerline, extending 300 feet beyond each runway end. The OFA is 500 feet wide, centered on the runway centerline, extending 300 feet beyond each end of the runway. In most instances, the RSA and OFA would extend 300 feet beyond the end of the actual runway pavement. As shown in green on **Exhibit 4A**, extending the RSA and OFA 300 feet beyond the Runway 28L pavement edge places the OFA outside the existing airport property line, with the blast fence and noise berm both located within the RSA and OFA. As discussed previously, FAA standards preclude objects extending above the ground surface into the OFA and RSA. The RSA is required to be graded and level. The FAA encourages these areas to be under the control of the airport to prevent the development of incompatible objects.

Two options can be considered to comply with RSA and OFA requirements. The first option is to provide for the full RSA and OFA safety areas by clearing and grading the full RSA and OFA area. For the Runway 28L end, this would require relocating both Hesperian Boulevard and West Winton Avenue and relocating the blast fence and noise berm outside the limits of the RSA and OFA. During the review of development alternatives, this option was removed from consideration because of the obvious high costs associated with these realignments and existing land use constraints which would make the realignments difficult.

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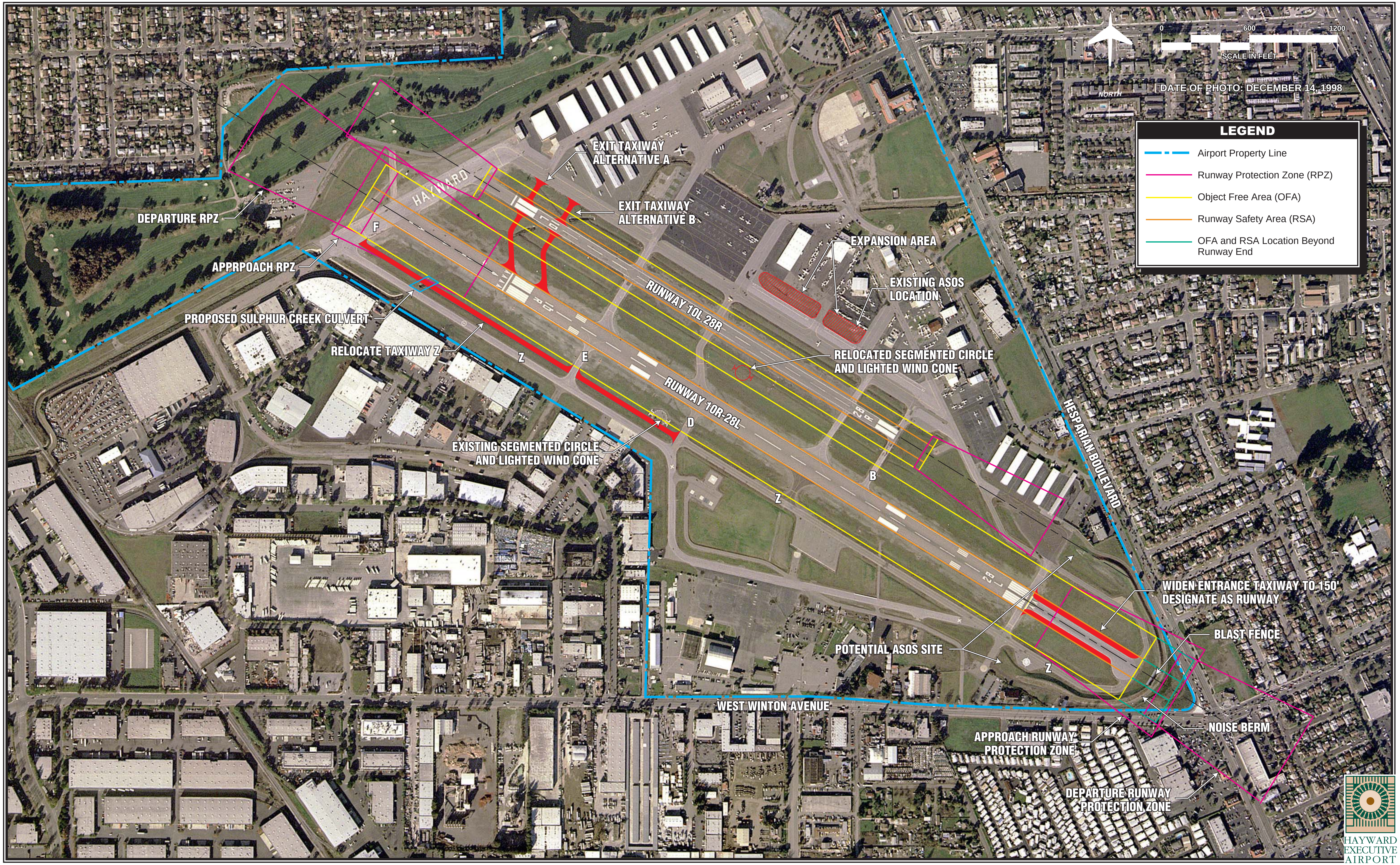

HAYWARD EXECUTIVE AIRPORT

Exhibit 4A
AIRFIELD CONSIDERATIONS

The second option is to relocate the RSA and OFA into the areas of the runway end which are not obstructed. This option is detailed on **Exhibit 4A**. As shown by the yellow and orange lines, the OFA and RSA have been located at the existing pavement edge, within the limits of airport property and the existing noise berm.

When the full safety areas cannot be provided from the pavement edge and/or landing thresholds are displaced, the FAA utilizes a concept known as "declared distances" to ensure that the full safety areas are provided during critical aircraft operational activities. Specifically, declared distances incorporate the following concepts:

Takeoff Runway Available (TORA) - The length of the runway declared available and suitable to accelerate from brake release to lift-off, plus safety factors;

Takeoff Distance Available (TODA) - The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA available to accelerate from brake release past lift-off to start of take-off climb, plus safety factors;

Accelerate-Stop Distance Available (ASDA) - The length of the runway plus stopway declared available and suitable to accelerate from brake release to take-off decision speed, and then decelerate to a stop, plus safety factors; and

Landing Distance Available (LDA) - The distance from threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors.

Exhibit 4B summarizes declared distances for Hayward Executive Airport, considering the existing displaced landing threshold to Runway 10R, the widening of the entrance taxiway to Runway 28L, and the relocation of the Runway 28L RSA and OFA inside the airport property line and noise berm.

As shown on **Exhibit 4B**, the TORA and TODA for each runway would be equal to the actual pavement which would be available with the widening of the entrance taxiway to Runway 28L since a clearway has not been designated for the airport. When determining the ASDA, FAA guidelines require that the full RSA and OFA safety areas be provided at the far end of the runway an aircraft is departing. For example, the ASDA for Runway 10R is reduced by 300 feet, the distance necessary to locate the Runway 28L RSA and OFA inside the airport property line and noise berm. The full OFA and RSA safety areas are provided off the Runway 10R end. Therefore, departure operations to the northwest along Runway 28L are not limited and the ASDA is equal to the actual pavement length that would be available after the widening of the entrance taxiway: 5,884 feet.

The LDA must provide the full RSA at the approach end of the runway, as well as at the roll-out end of the runway. Since the full RSA and OFA safety areas are provided at the Runway 10R end (the roll-out end for landing operations to Runway 28L), the Runway 28L LDA is only reduced by 860 feet, equal to the amount of the Runway 28L displaced landing threshold after the entrance taxiway is widened. For Runway 10R, the LDA is reduced by 300 feet, the amount necessary to relocate the Runway 28L OFA inside the airport property line and noise berm, and the existing 822-foot displaced threshold for noise abatement.

The inset on **Exhibit 4B** depicts the lighting and marking requirements should the entrance taxiway to Runway 28L be widened to 150 feet. The blue lights signify areas which area designated for aircraft taxi operations and not available for landing operations. The red lights identify the portion of Runway 28L which is not available for landing. Green lights identify the landing threshold for Runway 28L. The yellow lights signify the portion of the runway which is available for departure operations to the southeast. Certain lights (shown as half circles), such as the green threshold lights for Runway 28L, would only be visible for aircraft landing Runway 28L or departing Runway 10R.

As shown on **Exhibit 4A**, the existing segmented circle and lighted wind cone are within the limits of the Runway 10R-28L OFA. As discussed previously, OFA clearing standards preclude any development in the OFA which is not fixed by function, i.e. pavement edge lighting. Therefore, as indicated in the facility requirements analysis in Chapter Three, consideration may be given to relocating the segmented circle and lighted wind cone outside the limits of the OFA. A potential location between each runway is shown on **Exhibit 4A**. This location remains at approximately midfield and outside the OFA for either runway.

The existing Airport Layout Plan, City of Hayward's *General Policies Plan*, and *Hayward Industrial Assessment District Administrative Draft Environmental Impact Report*, have examined an extension of West A Street along the northern boundary of the airport. These documents depict West A Street basically following the existing Golf Course Road Alignment and being widened to four lanes. An important consideration for the final alignment of West A Street is that it avoids the RSA and OFA for both Runway 10R-28L and 10L-28R and provides 15 feet of vertical clearance from the departure surface for each runway considering a 34:1 approach surface. This requires locating West A Street approximately 710 feet north of the Runway 10R threshold.

TAXIWAY LOCATIONS AND SEPARATION FROM RUNWAY

Taxiway Z extends the full length of Runway 10R-28L and is located on the west side of the airfield. Presently, the portion of Taxiway Z north of Taxiway D is located 400 feet from the Runway 10R-28L centerline. The portion of Taxiway Z from Taxiway D to Taxiway A is located 300 feet from the Runway 10R-28L runway centerline. This creates a less than desirable situation as aircraft are required to make a 90 degree turn at the midpoint of the taxi. This can be confusing to pilots and difficult to maneuver at night and during poor weather conditions.

Ideally, the taxiway would extend the full length of the runway and at the same lateral distance from the runway centerline. This increases airfield

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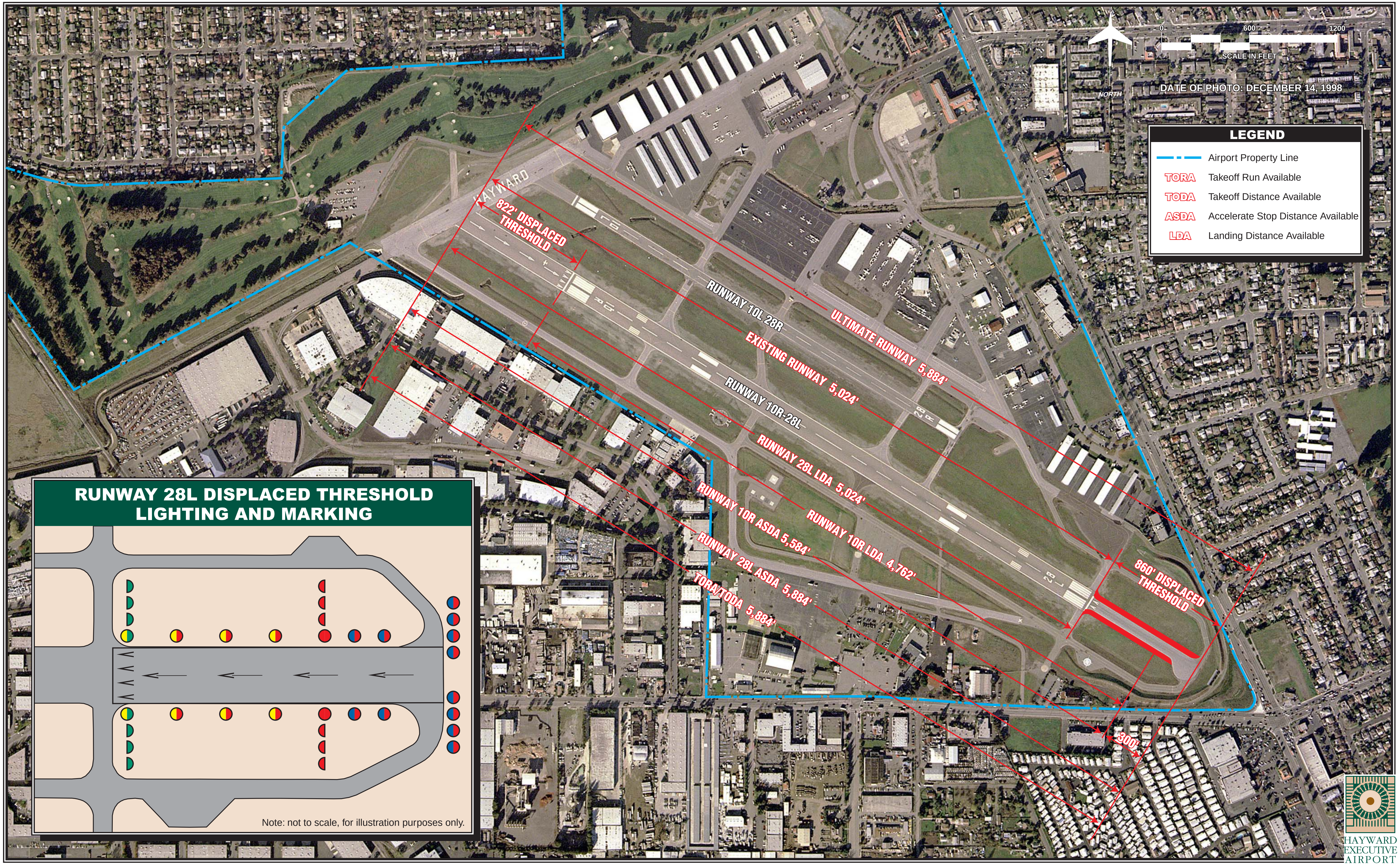

Exhibit 4B
RUNWAY 10R-28L
DECLARED DISTANCES

safety and efficiency by allowing aircraft to taxi at a continuous rate along the full length of the taxiway without having to slow to make a turn to access the other taxiway segment.

There are three options to alleviate this situation and extend Taxiway Z the full length of Runway 10R-28L: 1) relocate Taxiway Z to 240 feet from the Runway 10R-28L runway centerline; 2) relocate the southeast portion of Taxiway Z (the portion of Taxiway Z extending from Taxiway D to Taxiway A) to the same lateral distance as the northwest portion of Taxiway Z (the portion of Taxiway Z from Taxiway D to Taxiway F); and 3) relocate the northwest portion of Taxiway Z to the same lateral distance from the Runway 10R-28L centerline as the southeast portion of Taxiway Z.

As detailed in Chapter Three, Facility Requirements, FAA design standards permit a parallel taxiway serving Runway 10R-28L to be located at 240 feet from the Runway 10R-28L centerline. This is dependent upon the existing one mile visibility minimum approaches and critical aircraft within Airport Reference Code B-II. During the preparation of alternatives, this alternative was eliminated for a number of reasons. First, relocating Taxiway Z at a minimum separation distance of 240 feet would involve abandoning all existing investments in Taxiway Z and cost approximately $1.6 million. Secondly, any change in approach visibility minimums or critical design aircraft could require a greater runway/taxiway separation distance.

The second alternative involves relocating the southeast portion of Taxiway Z to the same lateral distance from the Runway 10R-28L centerline as the northwest portion of Taxiway Z. Similar to the first alternative, this alternative has been eliminated from further consideration. First, relocating this portion of Taxiway Z would displace the existing helipad and portions of the south apron and cost approximately $725,000. Secondly, this would create a similar intersection problem at Taxiway A as is presently experienced at Taxiway D. Taxiway Z1 intersects with Taxiway A and Taxiway Z 300 feet from the Runway 10R-28L centerline. Relocating this portion of Taxiway Z would locate the Taxiway Z and Taxiway A intersection 400 feet from the Runway 10R-28L centerline.

The third alternative involves relocating the northwest portion of Taxiway Z to the same lateral distance from the Runway 10R-28L centerline as the southeast portion of Taxiway Z as illustrated on **Exhibit 4A**. While estimated to cost approximately $825,000, relocating Taxiway Z as proposed in this alternative would allow for limited hangar development south of Taxiway Z (refer to South Landside Alternative A) and eliminate all intersection difficulties. This alternative requires crossing an exposed portion of Sulphur Creek. Therefore, it would necessary to place this portion of Sulphur Creek in a culvert beneath the taxiway. As detailed in Appendix A, placing this portion of Sulphur Creek in a culvert might require wetland mitigation and permitting from various State and Federal agencies. Refer to Appendix A for more specifics on the environmental concerns related to this alternative. The segmented circle and lighted wind cone would also have to be relocated prior to relocating this portion of Taxiway Z.

Exhibit 4A depicts two alternatives for the development of an additional exit taxiway between Taxiway E and Taxiway F. This taxiway is intended to provide more direct access to the north hangar area for aircraft landing Runway 28L and eliminate the need to taxi to Taxiway F if landing aircraft cannot exit at Taxiway E. This increases airfield capacity and safety by reducing the amount of time aircraft occupy the runway.

Taxiway Alternative A locates this taxiway in-line with the existing taxiway through the north hangar area. Taxiway Alternative B locates this taxiway approximately midway between Taxiways E and F. While the exit taxiway location in Alternative A is more convenient for aircraft owners located in the north hangar area, this taxiway may provide only limited benefit considering its close proximity to Taxiway F. The location of the Taxiway in Alternative A may require placing a portion of Sulphur Creek within a culvert, while the location of the taxiway in Alternative B has been located to avoid crossing exposed portions of Sulphur Creek in this area.

AUTOMATED SURFACE OBSERVING SYSTEM (ASOS)

The existing ASOS equipment at Hayward Executive Airport is located east of Taxiway A along the apron used by Sullivan Propellors as shown on **Exhibit 4A**. The facility requirements analysis indicated that consideration needs to be given to relocating the ASOS to provide for apron and/or facility expansion in this area as shown on the exhibit.

Exhibit 4A depicts two alternative locations for the existing ASOS equipment. Each site is located adjacent to the Runway 28L end since this runway serves as the primary runway end and is served by instrument approaches. These areas are also not designated for future development due to site constraints of the noise berm and taxiways. The FAA is responsible for ASOS certification. Relocating the ASOS to these areas will be at the determination of the FAA.

LANDSIDE DEVELOPMENT ALTERNATIVES

The primary aviation-related landside functions to be accommodated at Hayward Executive Airport include aircraft storage hangars, aircraft maintenance facilities, public terminal facilities, and airport-related businesses. The interrelationship of these functions is important to defining a long term landside layout for the airport. To a certain extent, landside uses need to be grouped with similar uses or uses that are compatible. Other functions should be separated, or at least have well defined boundaries for reasons of safety, security, and efficient operation. Finally, each landside use must be planned in conjunction with the airfield, as well as ground access that is suitable to the function. Runway frontage should be reserved for those uses with a high level of airfield interface, or need of exposure. Other uses with lower levels of aircraft movements, or little need for runway exposure can be planned in more isolated locations.

The orderly development of landside facilities can be the most critical, and probably the most difficult development to control on the airport. A development approach of taking the path of least resistance can have a significant effect on the long term viability of an airport. Allowing development without regard to a functional plan can result in a haphazard array of buildings and small ramp areas, which will eventually preclude the most efficient use of the valuable space along the flight line.

As discussed previously, the layout of landside facilities is analyzed from the perspective of anticipated activity levels. Landside facility activity levels can be divided into three areas: high activity, moderate activity, and low activity. The high activity area is the area typically providing aviation services on the airport. This includes businesses involved with (but not limited to) aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft refueling. Businesses such as these are characterized by high levels of aircraft movements with a need for apron space for the storage and circulation of aircraft. The facilities commonly associated with businesses such as these include large, conventional type hangars which hold several aircraft. Utility services are needed for these type of facilities as well as automobile parking areas. The best location for high activity areas is along the flight line for ease of access to all areas of the airfield with good visibility from public roadways for easy identification and location.

The moderate activity area generally includes hangar development areas for large business aircraft and some lower activity aviation service providers. This can include areas for aircraft owners who desire their own hangar facilities on the airport and corporate flight departments. Typically, hangar development in these areas include clearspan hangars of various sizes. The best location for medium activity use is off the immediate flight line but readily accessible. Taxiway access is typically provided to the main apron or runway system for these types of users. Parking and utilities should also be provided in this area.

Low activity areas are typically areas for the storage of smaller single and twin-engine aircraft in T-shade or enclosed T-hangar facilities. Low activity areas can be located in more isolated areas (i.e., behind high activity use areas or at either end of the runway). This use category will require electricity and may require water or sewer services.

Secure parking and access is a priority for all activity areas. While limited access to the apron areas can be permitted for based aircraft owners, vehicle and aircraft movement areas should be segregated to the extent possible. Additionally, access and parking areas should be designed for ease of locating facilities by visitors and prospective users and customers, especially high activity uses, which are typically businesses which need exposure for customers and clients.

Public parking areas should be considered for all hangar areas, including conveniently located parking areas near T-hangars for vehicle storage when aircraft owners are away from the airport.

In addition to the functional compatibility of landside facilities, landside facilities should provide a first class appearance. Consideration to aesthetics should be given to the entryway as well as public areas when developing the various activity areas.

Typically, landside development at general aviation airports follows a linear configuration parallel to the primary runway. The linear configuration allows for greater depth maximizing space available for aircraft parking apron while providing ease of access to terminal facilities from the airfield.

The existing terminal area at Hayward Executive Airport has been developed with some basic separations of uses by activity levels. T-hangars are located at either end of the runway system, while most high activity users, such as flight training facilities and aircraft maintenance facilities, are located along the flight line between these facilities. While all hangar facilities have not been located directly along the flight line, each facility has airfield access.

The landside development alternatives will examine development opportunities in areas of the airport which can accommodate future growth. The redevelopment of existing hangar areas will not be addressed. Development east of Skywest Drive will not be addressed as well. Specifically, the landside development alternatives will examine aviation-related development potential in the vacant area east of the airport traffic control tower, along Taxiway Z, and adjacent to the south apron. The lease for the California Air National Guard (CANG) site will expire in 2014. The landside development alternatives will examine options for the redevelopment of this area should the CANG not renew this lease.

Exhibit 4C depicts development potential for the vacant area east of the airport traffic control tower. As shown, a mix of large clearspan hangars and T-hangars is proposed for this area. The existing one-way loop of Skywest Drive is proposed to be closed, opening this area to development. A proposed reconfiguration of the West A Street and Skywest Drive intersection is depicted.

To provide sufficient area for aircraft movement in this area, a portion of the proposed corporate hangars are located along the first row of automobile parking for the Trajen facilities located north of the airport traffic control tower. To facilitate aircraft movements to this area, a 150-foot portion of Sulphur Creek is proposed to be placed in a culvert to allow for an expanded taxiway entrance to the area. Please refer to Appendix A for specific environmental concerns related to Sulphur Creek.

A public general aviation terminal is proposed for development northwest of the airport traffic control tower. This building is expected to also serve airport administration. This location is ideal for the development of a public terminal building as it is located along

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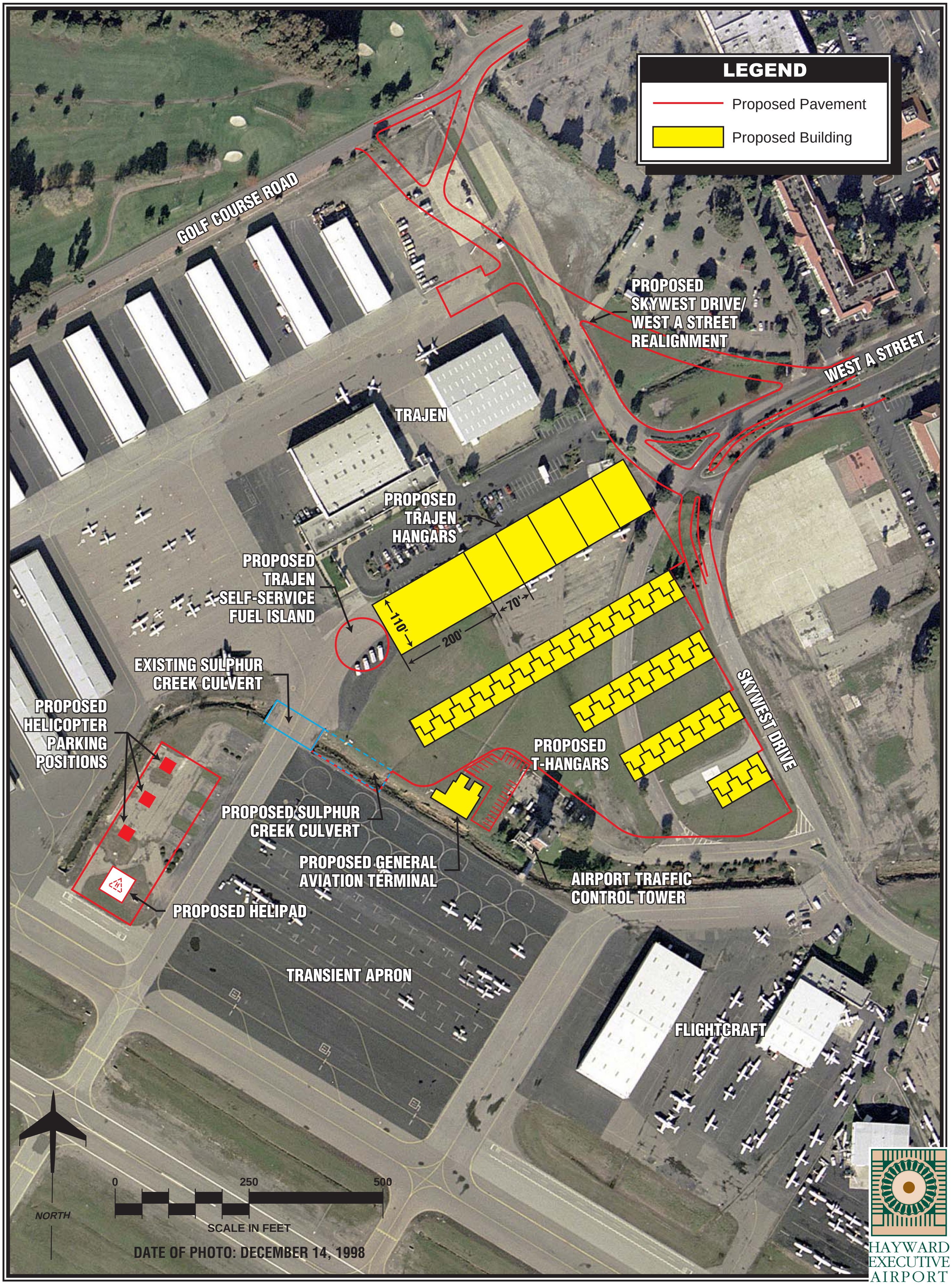

Exhibit 4C
TERMINAL AREA ALTERNATIVES

the transient apron and is located at approximately midfield.

The area northwest of Taxiway E is shown to be redeveloped for a helipad and helicopter parking. As will be discussed in greater detail later in this chapter, potential development along Taxiway Z could displace the existing helipad. Should the existing helipad be retained, this area could provide a helicopter parking area on the east side of the airfield. Helicopter operations are well-suited for this area since this area is segregated from fixed-wing parking and operational areas. Aircraft tiedown locations could also be developed in this area should helicopter positions not be needed on this side of the airport or the existing helipad retained.

Exhibit 4D depicts South Landside Alternative A. This alternative examines development potential north of Taxiway D should Taxiway Z be relocated as discussed previously. As shown, relocating the northwest portion of Taxiway Z to the same lateral distance from the Runway 10R-28L centerline as the southeast portion of the taxiway can provide an area for executive hangar development. As a low to moderate activity area, this area can be developed adjacent to Taxiway Z without congesting aircraft movements along the taxiway. Vehicle access would be available be redeveloping an abandoned taxiway easement to Corsair Boulevard. A series of similarly-sized hangars are depicted on the alternative. However, this area could be developed to accommodate hangar door sizes of varying widths. The depth of the hangars may be limited to the depth shown on the exhibit to provide sufficient access and parking area on the west side of the hangars and aircraft apron area on the east side of the hangars.

Development potential along the southeast portion of Taxiway Z is also incorporated into South Landside Alternative A. Development in this area builds upon providing public roadway access from West Winton Avenue and reserving taxiway access for C-130 aircraft to the CANG area. As shown in the alternative, a mixture of enclosed T-hangar and large clearspan hangars have been proposed for this area. The T-Hangars have been located along the Taxiway OFA with vehicle parking and access located along the western side of the hangars. Approximately 90 T-hangar units can be located within this area. Large clearspan hangars (20,000 square feet each) have been located along the western edge of the south apron. The south apron is expanded to the north and abuts the existing helipad. Automobile parking is located adjacent to the hangars and at the terminus of the access road. The existing service road intersection along West Winton Avenue has been located along the eastern boundary of the Pacific Roller Die leasehold to provide a large leaseable parcel between this road and Manzellas Restaurant.

This alternative makes maximum advantage of the area of the airfield for a mixture of low and high activity uses. This alternative also utilizes existing roadway access along West Winton Avenue and retains much of the existing helipad while utilizing the entire south apron area. However, this alternative proposed to redevelop a portion of the Fire Station leasehold for the access road. Additionally, the direct airfield access road to the fire station is eliminated. An alternate access point would have to be established. An existing fire training facility would also have to be relocated. The apron area is limited in size and may be insufficient for certain high activity uses, especially those related to large business turboprop and turbojet aircraft.

South Landside Alternatives B and C examine options for utilizing the available development areas west of Taxiway Z and the redevelopment of the existing CANG site. South Landside Alternative B is depicted on **Exhibit 4E** while South Landside Alternative C is depicted on **Exhibit 4F**.

Each alternative proposed to develop access to this area from existing roadway access points along West Winton Avenue. As shown on the exhibit, the existing entrance to the CANG site and service road are retained. In each alternative, the existing entrance to the CANG area is developed to provide access to an area reserved for the development of large clearspan hangars. In Alternative B, these hangars are turned at an angle to Taxiway Z in order to develop the entire area between the hangars and Taxiway Z for apron and provide sufficient area for the high activity uses proposed for this area. In Alternative C, these hangars remain parallel with Taxiway Z. This allows for the development of more hangar facilities than in Alternative B.

Both alternatives reserve the ability to develop enclosed T-hangar facilities behind the conventional hangars along West Winton Avenue. Dual taxilane access is reserved for this area to prevent congestion and potential blocking of taxiways. Both alternatives also depict various options for designating a variety of lease parcels along Taxiway Z. These parcels are reserved for the private development of facilities by individuals or corporations with a need for airfield access. This could include hangar facilities or hangar/office facilities. Alternative B proposes to loop the access road through this area, while Alternative C segregates access to each area. Alternative A leaves the existing service road intersection in its existing location, while Alternative B proposes to locate this intersection further to the east to provide for a larger leaseable parcel in this area.

Alternative C provides for direct airfield access from the fire station. Direct airfield access could also be developed from the fire station in Alternative B by connecting the fire station with one of the stub taxiways.

In both alternatives, a portion of the CANG site would not be accessible to the airfield (shown in green crosshatch). These areas are reserved for aviation-related and/or non-aviation industrial/ commercial revenue support. A portion of the CANG site along West Winton Avenue is reserved for this type of development as well.

While both alternatives maximize aviation-related development potential in this area, they are dependent upon the CANG relinquishing a portion or the entire lease to this portion of the airport. In both alternatives, only small portions of the proposed development

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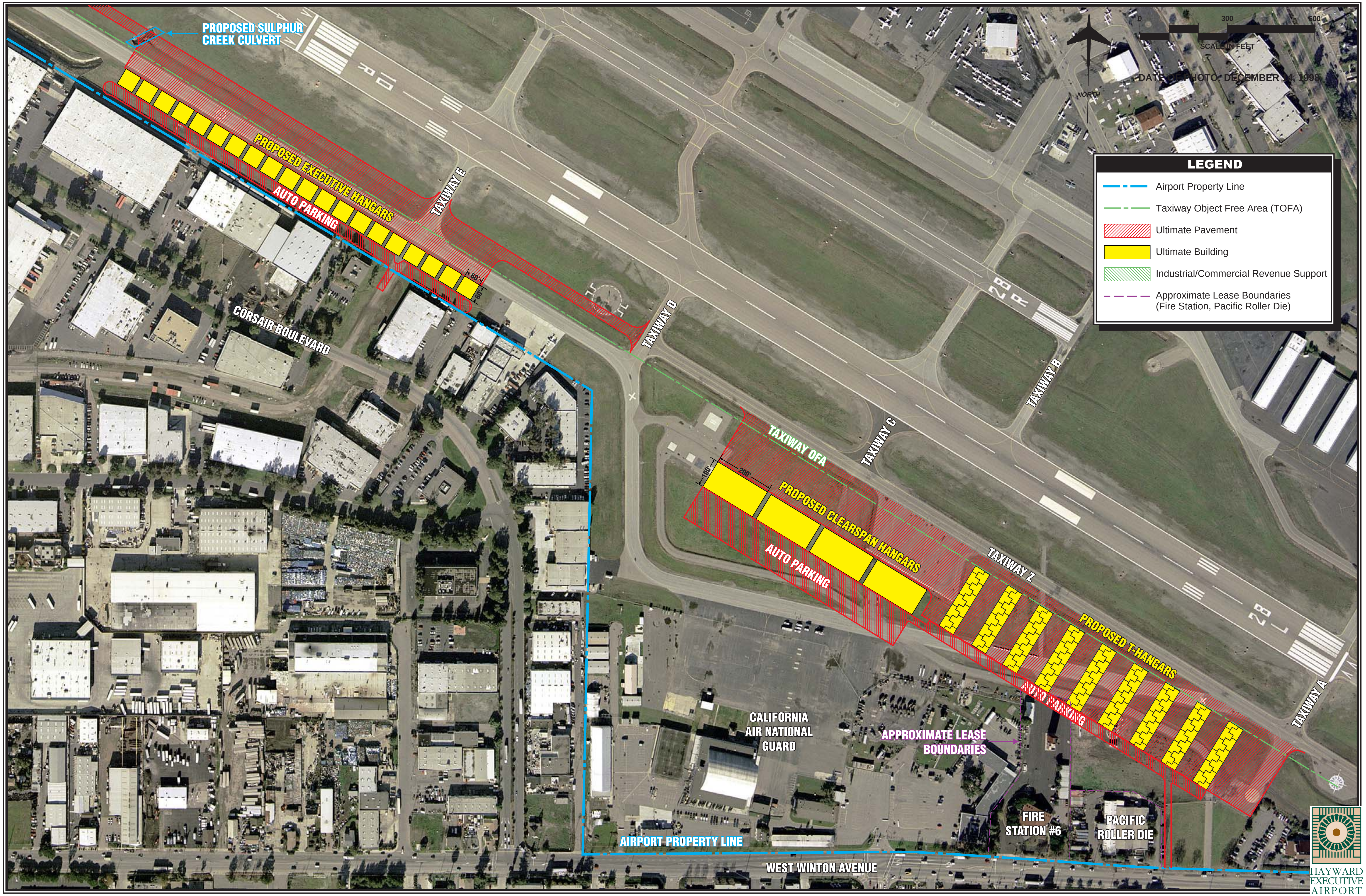

Exhibit 4D
SOUTH LANDSIDE ALTERNATIVE A

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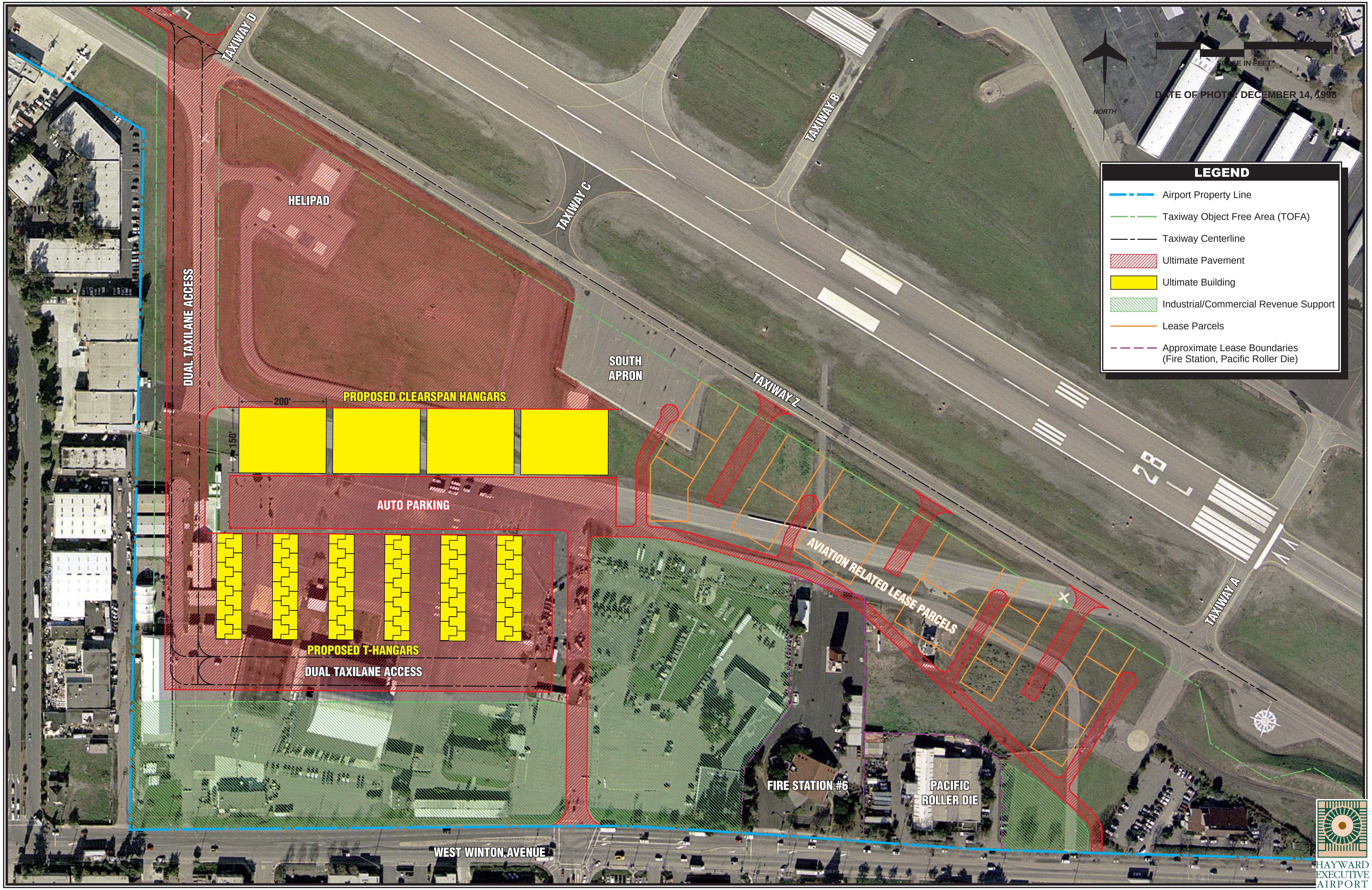

Exhibit 4E
SOUTH LANDSIDE ALTERNATIVE B

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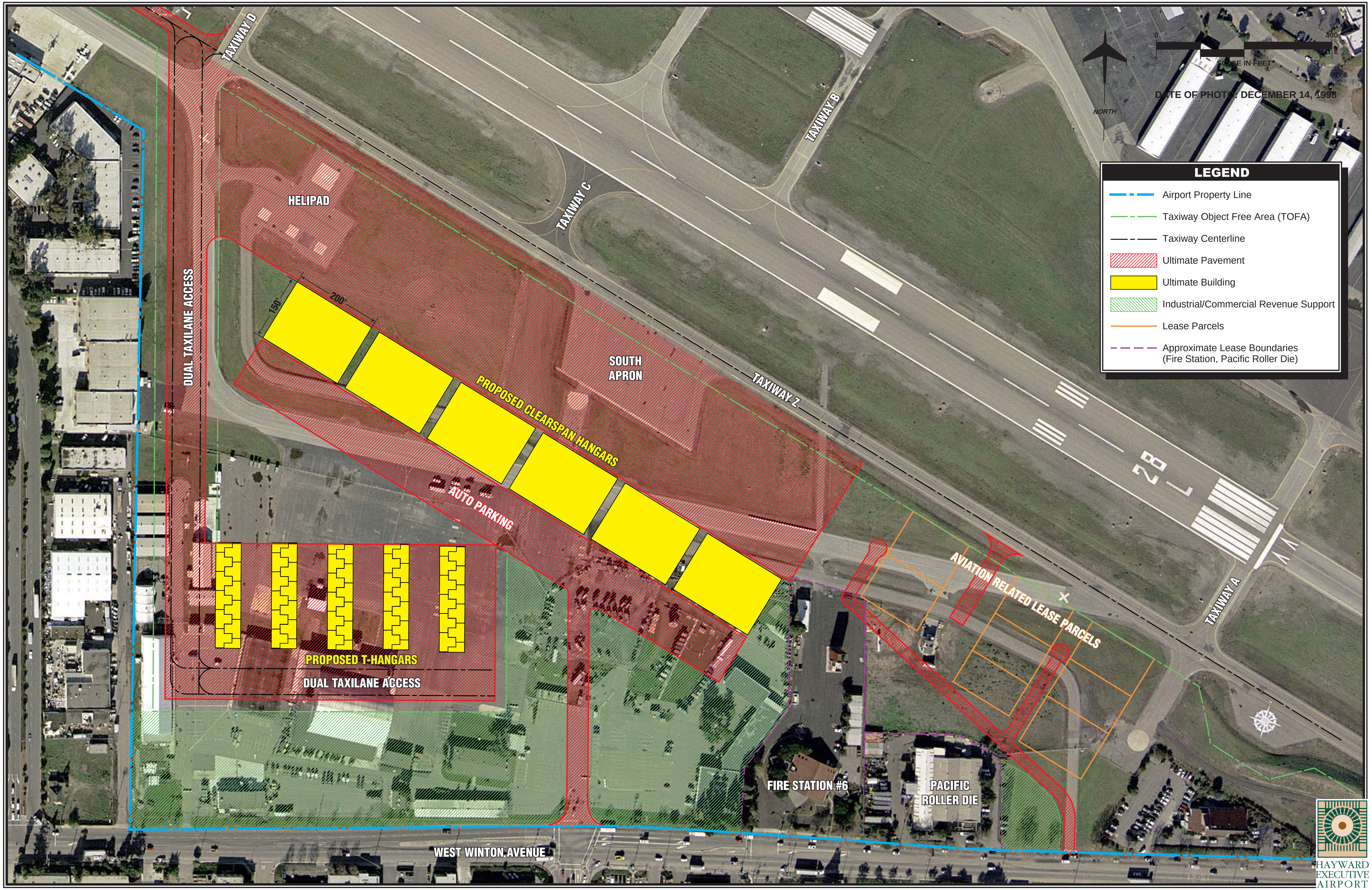


Exhibit 4F
SOUTH LANDSIDE ALTERNATIVE C

could be implemented with the CANG occupying the entire existing lease area.

Neither of the alternatives proposes to reuse any of the existing CANG facilities, including a large aircraft storage hangar. It is assumed that these facilities will have exceeded their useful life by the end of the CANG lease period and will have little redevelopment opportunities. The large aircraft storage hangar is nearly 50 years old.

SUMMARY

The process utilized in assessing the landside and airside development alternatives involved a detailed analysis of short and long term requirements as well as future growth potential. Current airport design standards were considered at every stage of development. The proposed development plan for the airport must represent a means by which the airport can grow in a balanced manner to accommodate forecast demand for both the airside and landside areas. In addition, it must provide for flexibility in the plan to meet activity growth beyond the 20-year planning period.

The next action step is the determination of a final master plan concept after the alternatives have been reviewed by the Planning Advisory Committee and the City of Hayward. Once the concept has been identified, cost estimates will be prepared for the individual projects, and a development schedule will be prepared. Potential funding sources for recommended projects will also be identified (including those projects that are eligible for federal or state funding assistance.) The remaining chapters of the master plan will be used to refine a final concept through the development of detailed layouts and a phased development program.

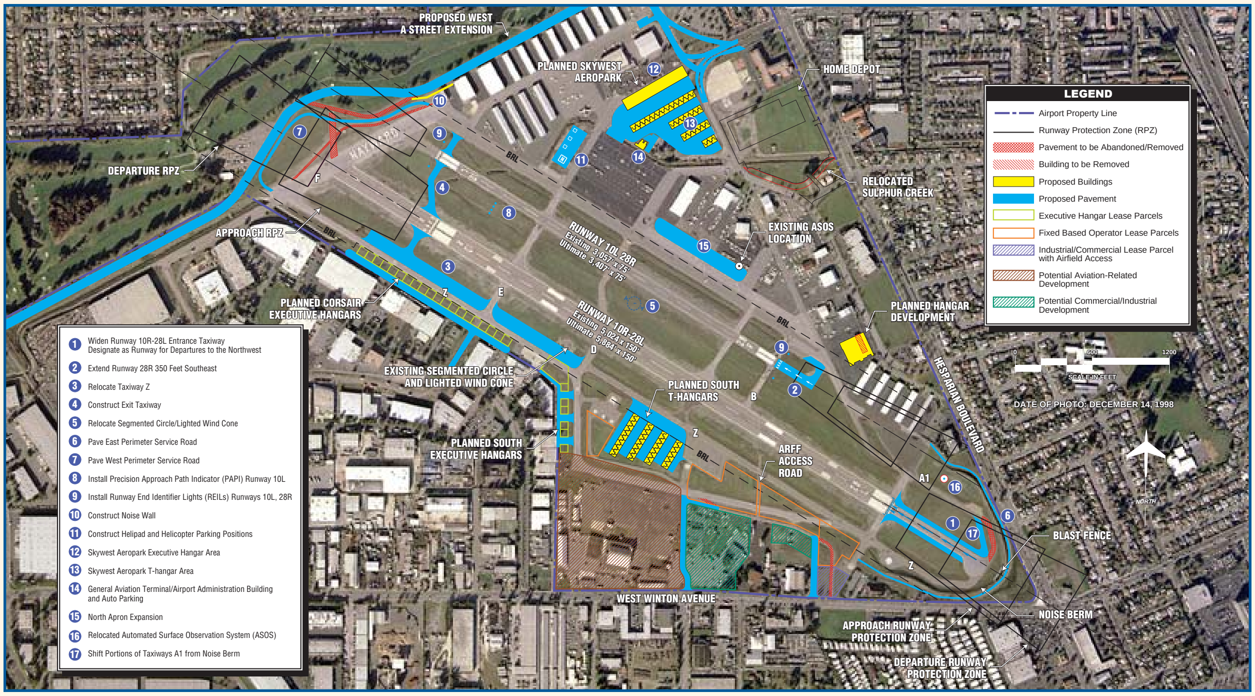
HAYWARD
AIRPORT

Chapter Five
AIRPORT PLANS

Chapter Five

AIRPORT PLANS

HAYWARD AIRPORT



The intent of the master planning process, thus far, has been to project aviation demand through the planning period as well as the airside and landside facilities required to accommodate that expected demand. In the preceding chapter, an evaluation was made of the options for the future development of the airport to meet projected airside and landside facilities needs and improve the airport's overall efficiency of operation. Through this process, an airport development concept began to evolve. The purpose of this chapter is to describe in narrative and graphic form, the selected direction for future airside and landside development through the 20-year planning period of this Master Plan.

The planning process, thus far, has included the presentation of a series of working papers to the Airport Planning Committee (APC) and City of Hayward. Each has provided feedback to the consultant. The recommended master plan concept did not evolve until the City of Hayward officials and APC had the opportunity to submit detailed comments on the draft working papers. Having completed the review meetings with these participants, and reviewing suggestions from APC members, the development alternatives have now been refined into a single recommended master plan concept. The purpose of this chapter is to describe in narrative and graphic form, the recommended direction for the future use and development of Hayward Executive Airport and review the detailed airport drawings which will be submitted to the Federal Aviation Administration (FAA) for review and approval.

REVIEW OF AIRPORT DESIGN STANDARDS

The FAA has established design criteria to define the physical dimensions of runways, taxiways, and areas which protect the safe operation of aircraft at the airport. FAA design standards also define the separation criteria for the placement of landside facilities. As discussed previously in Chapter Three, FAA design criteria is a function of the critical design aircraft - the most demanding aircraft or "family" of aircraft which will conduct 500 or more operations (take-offs and landings) per year at the airport - wingspan and approach speed, and in some cases, the runway approach visibility minimums. The Federal Aviation Administration (FAA) has established the Airport Reference Code (ARC) to relate these factors to airfield design standards.

As discussed in Chapter Three, the current critical aircraft at Hayward Executive Airport fall within ARC B-I (aircraft approach speeds less than 120 knots, wingspans less than 49 feet) design standards. As discussed in Chapter Two, the potential exists in the future for increased use of the airport by business turboprop and turbojet aircraft. This follows with the national trend of increased business and corporate use of turboprop and turbojet aircraft, strong sales and deliveries of turboprop and turbojet aircraft, and expanded fractional ownership programs for these aircraft.

As noted in Chapter Three, common business turboprop (i.e. Beechcraft Super King Air) and turbojet (i.e. Dassault Falcon, Cessna Citation) aircraft have larger wingspans than the current critical aircraft operating at the airport; however, most of these aircraft have similar approach speeds to the existing critical aircraft operating at the airport. These larger wingspans are expected to change the critical aircraft designation for the airport. Ultimately, the airport is expected to accommodate aircraft within ARC B-II (aircraft approach speeds less than 120 knots, wingspans less than 79 feet) design standards. While the airport currently accommodates, and will continue to accommodate, business jet aircraft in ARCs C-I through D-II, these aircraft are not expected to exceed the 500 annual operations threshold established by the FAA to consider these as the critical design aircraft.

As the primary runway, Runway 10R-28L accommodates the critical design aircraft and should conform with ARC B-II standards. ARC B-I design standards are sufficient for Runway 10L-28R, since this runway serves only small single and multi-engine aircraft within this design category. **Table 5A** summarizes the planning standards used in the ultimate design and layout of the runways at the airport.

The design of taxiway and apron areas should consider the wingspan requirements of the typical aircraft expected to operate within the specific area. The transient apron areas, aircraft maintenance and repair areas, and parallel and connecting taxiways serving the runways are planned to accommodate the critical design aircraft which fall within airplane design group (ADG) II. T-hangar areas and based aircraft tiedown areas are planned to accommodate smaller aircraft within ADG I. **Table 5B** summarizes taxiway and taxilane design requirements.

TABLE 5A Runway Design Standards				
	Runway 10R-28L		Runway 10L-28R	
Airport Reference Code **Approach Visibility Minimums**	B-II One Mile		B-I Visual	
Runway				
Width	75		60	
Runway Safety Area (RSA)				
Width (centered on runway centerline)	150		120	
Length Beyond Runway End	300		240	
Object Free Area (OFA)				
Width	500		400	
Length Beyond Runway End	300		240	
Obstacle Free Zone (OFZ)				
Width	400		400	
Length Beyond Runway End	200		200	
Runway Centerline to:				
Parallel Taxiway Centerline	240		225	
Edge of Aircraft Parking Apron	250		200	
Runway Protection Zones (RPZ)				
Inner Width	500		500	
Outer Width	700		700	
Length	1,000		1,000	
Obstacle Clearance	**10R**	**28L**	**10L**	**28R**
	34:1	34:1	20:1	20:1

Source: FAA Airport Design Software Version 4.2D, Airport Obstruction Chart

TABLE 5B Taxiway and Taxilane Design Standards		
	ADG II	ADG I
Taxiways		
Width	35	25
Shoulder Width	10	10
Safety Area Width	79	49
Object Free Area Width	131	89
Taxiway Centerline to:		
Parallel Taxiway/Taxilane	105	69
Fixed or Moveable Object	65.5	44.5
Taxilanes		
Taxilane Centerline to:		
Parallel Taxilane Centerline	97	64
Fixed or Moveable Object	57.5	39.5
Taxilane Object Free Area	115	79

Source: FAA Airport Design Software Version 4.2D

In many cases, the existing runway areas exceed many of the minimum design requirements of the FAA. For example, Runway 10R-28L exceeds minimum width requirements. Presently, Runway 10R-28L is 150 feet wide. FAA design standards specify a width of 75 feet.

Additionally, Taxiway Z and Taxiway A exceed minimum requirements for runway/taxiway separation distances. The portion of Taxiway Z from Taxiway D to Taxiway F is located 400 feet from the Runway 10R-28L centerline. The portion of Taxiway Z from Taxiway D to the Runway 28R threshold is located 300 feet from the Runway 10R-28L centerline. Taxiway A is located 260 feet from the Runway 10L-28R centerline. FAA design standards specify a runway/taxiway separation distance of 240 feet. As will be discussed later, the greater runway/taxiway separation distances can provide for additional hangar development along the northwest portion of Taxiway Z.

RECOMMENDED MASTER PLAN CONCEPT

The recommended master plan concept provides for anticipated facility needs over the next twenty years as well as the airport's ability to accommodate aviation demand for the Hayward Executive Airport service area well beyond this period. Additionally, the recommended master plan concept includes provisions to ensure the long term viability and self-sufficiency of the airport by maximizing developable properties at the airport for aviation and non-aviation related development. **Exhibit 5A** provides a depiction of the recommended master plan concept. The following sections summarize airside and landside recommendations.

AIRFIELD RECOMMENDATIONS

The recommended master plan concept includes planned improvements for the runways, taxiways, navigational aids, and lighting. The following pages discuss planned airfield improvements in greater detail.

The recommended master plan concept includes designating the existing Runway 28L entrance taxiway as part of the runway and utilizing this pavement for departures to the northwest. The intent is to provide a departure point further southeast than presently provided on the runway. This can allow aircraft to more easily and more safely climb to a safe altitude over the airport and initiate turns to depart the area over the airport. This supports current noise abatement procedures which attempt to avoid direct overflights of the San Lorenzo neighborhood to the northwest. Additionally, should aircraft directly overfly the San Lorenzo neighborhood to the northwest, these aircraft would be at a higher altitude which can reduce the impacts of overflight noise.

This improvement has the direct advantage of aiding pilots in complying with the noise abatement procedures and has the added advantage of reducing the impacts of departure aircraft noise since much of an aircraft's departure procedure is anticipated to

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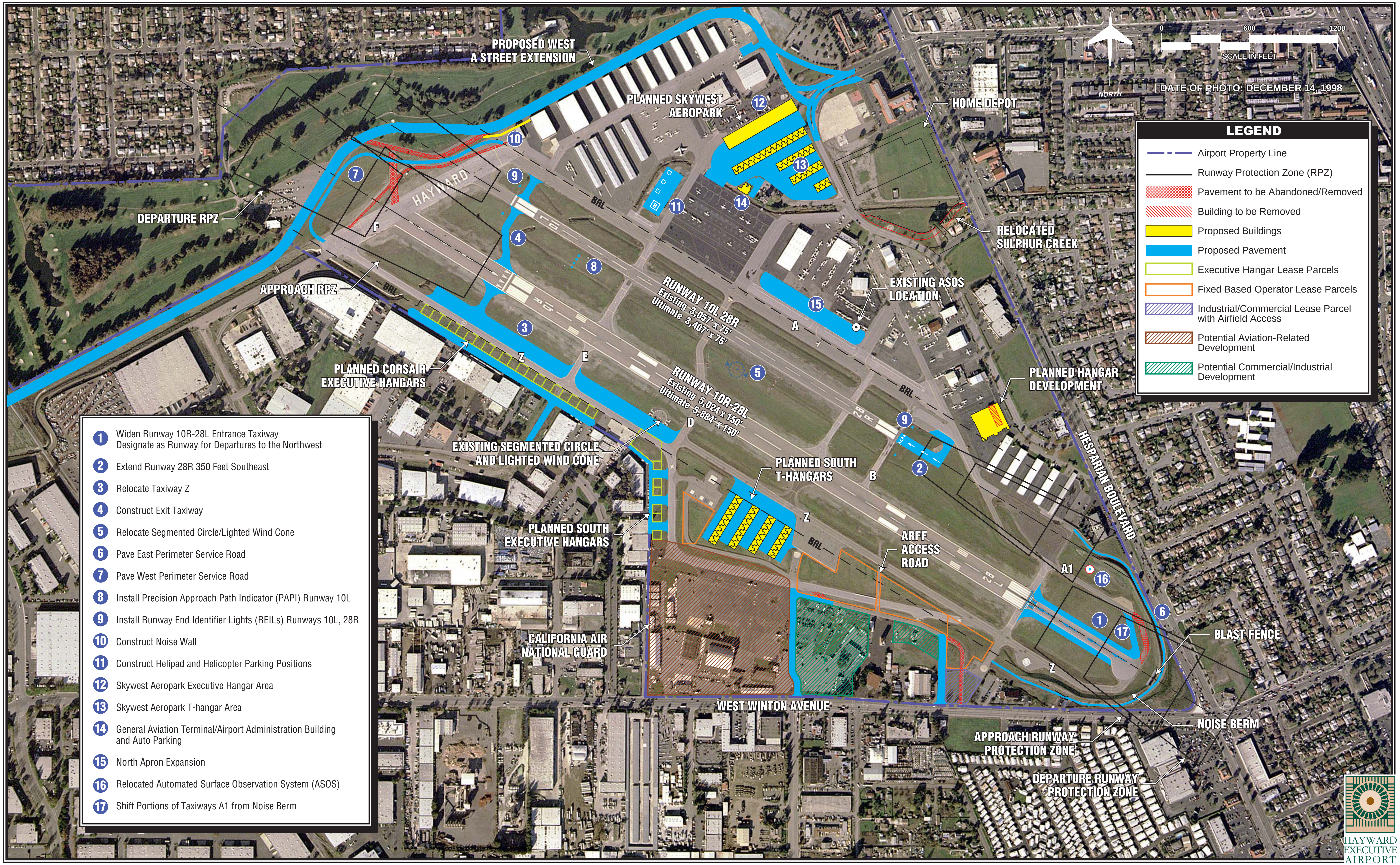


Exhibit 5A
RECOMMENDED MASTER PLAN CONCEPT

remain over the airport. Pilots will also benefit from the increase in altitude gained through departing further to the southeast. This enables aircraft to be at a higher altitude over the noise monitors which can reduce the noise levels over the monitor.

The exact benefits of this improvement are being quantified in a separate Environmental Impact Report (EIR) being conducted concurrently with this Master Plan. The EIR will summarize aircraft noise exposure contours for the airport assuming the existing departure threshold and noise exposure contours assuming the new departure threshold, 860 feet to the southeast. A comparison of the noise contours can quantify the benefit of this recommended improvement.

The Runway 28L landing threshold is planned to remain in its present position. This is to ensure that sufficient clearance is maintained along the approach surface to Runway 28L for landing aircraft approaching from the east and to maintain existing landing and aircraft traffic patterns. This ensures that existing land uses to the southeast of the airport are not exposed to new aircraft patterns and potential shifts in noise patterns from landing aircraft.

Maintaining the Runway 28L threshold in its existing location limits the use of the entrance taxiway to departure operations only. This is similar to the Runway 10R end. The existing Runway 10R threshold is displaced 822 feet. In this manner, the pavement behind the displaced threshold is available only for departures to the southeast. In situations when thresholds are displaced, declared distances are commonly implemented to notify pilots of the specific departure and landing distances at the airport and are published in flight planning publications. As discussed in Chapter Four, declared distances incorporate the following:

- Takeoff Runway Available (TORA) - the length of the runway declared available and suitable to accelerate from brake release to lift-off, plus safety factors;

- Takeoff Distance Available (TODA) - the TORA plus the length of any remaining runway or clearway beyond the far end of the TORA available to accelerate from brake release past lift-off to start of climb, plus safety factors;

- Accelerate-Stop Distance Available (ASDA) - the length of the runway plus stopway declared available and suitable to accelerate from brake release to take-off decision speed, and then decelerate to a stop, plus safety factors;

- Landing Distance Available (LDA) - the distance from threshold to complete the approach, touchdown, and decelerate to a stop, plus safety factors.

Table 5C summarizes declared distances for Runway 10R-28L considering the existing runway configuration and the recommended improvement to designate the existing Runway 28L entrance taxiway as runway. When compared to existing landing capabilities at the airport, the future landing capabilities will change slightly under this proposal. For Runway 10R, the landing distance available will increase by 398 feet. This is equal to the amount of the entrance taxiway that can be utilized for landing to the southeast once the entrance taxiway is designated as useable runway while providing sufficient runway safety area (RSA) and object free area (OFA) as required by FAA design standards. The Runway 28L LDA will not change.

TABLE 5C
Runway 10R-28L Declared Distances

	Existing Runway Configuration		After Designating the Runway 28L Entrance Taxiway as Usable Runway	
	10R	28R	10R	28L
TORA	5,024	5,024	5,884	5,884
TODA	5,024	5,024	5,884	5,884
ASDA	5,024	5,024	5,422	5,884
LDA	4,202	5,024	4,600	5,024

Source: Coffman Associates Analysis

Following FAA standards, the departure lengths increase for each runway end under this proposal. For both Runway 10R and Runway 28L, the TORA and TODA increase by 860 feet (the length of the entrance taxiway). The ASDA for Runway 28L increases by 860 feet since full safety area requirements can be met at the Runway 10R end. The ASDA for Runway 10R increases by 398 feet. This is equal to the amount of the entrance taxiway that can be utilized for departures to southeast once the entrance taxiway is designated as useable runway while providing sufficient runway safety area (RSA) and object free area (OFA) as required by FAA design standards.

It should be noted that the additional runway length resulting from the use of the entrance taxiway for departure operations is not expected to result in the introduction of a new mix of aircraft or larger aircraft at the airport. This is primarily due the weight bearing capacities of the airfield pavement which limits the size and type of aircraft which can operate at the airport.

The airport presently accommodates a wide-range of general aviation turboprop and turbojet aircraft which can operate at the airport under the existing pavement weight bearing capacities. Since an increase in pavement weight bearing strength is not planned for the airport, a significant change in the operational fleet mix is not anticipated. Therefore, the result of this improvement is that the safety and capabilities for the existing aircraft fleet mix are enhanced and additional capabilities are provided to pilots in conforming with noise abatement procedures.

Presently, the entrance taxiway is 75 feet wide, while the remainder of Runway 10R-28L is 150 feet wide. Prior to activating the entrance taxiway as part of the runway, the entrance taxiway is planned to be widened to 150 feet. Existing runway threshold and pavement edge lighting is also planned to be reconfigured to appropriately identify the landing and departure thresholds consistent with the declared distances. The configuration of the threshold and pavement edge lights for this improvement were previously identified on the inset on **Exhibit 4A**.

The recommended master plan concept includes extending Runway 28R 350 feet to the southeast. Similar to Runway 28L, the intent of this improvement is to move the Runway 28R departure point 350 feet southeast of its present position and provide pilots with the ability to climb to a safe altitude more quickly over the airport and initiate departure turns over the airport. This aids pilots in complying with noise abatement procedures. Additionally, should aircraft directly overfly the San Lorenzo neighborhood to the northwest, these aircraft would be at a higher altitude which can reduce the impacts of overflight noise.

The Runway 28R landing threshold is recommended to remain in its present location. Similar to Runway 28L, this is to ensure that sufficient clearance is maintained along the approach surface to Runway 28R for landing aircraft approaching from the southeast and to maintain existing landing and aircraft traffic patterns. This ensures that existing land uses to the southeast of the airport are not exposed to new aircraft patterns and potential shifts in noise patterns from landing aircraft.

Maintaining the Runway 28R threshold in its existing location limits the use of the extension to departure operations to the northwest only. While declared distances are sometimes implemented in situations when displaced landing thresholds are utilized, they may not fully be applicable in this situation due to the mix of aircraft utilizing this runway. Declared distances are most appropriate for runways utilized by business turboprop and turbojet aircraft (Runway 10R-28L). Runway 10L-28R is primarily used by small single and twin-engine piton-powered aircraft.

A 1,973-foot portion of Taxiway Z, northwest of Taxiway D, is recommended to be relocated 100 feet north (to the same lateral distance from the Runway 10R-28L centerline as the southeast portion of the taxiway) to provide for hangar development along the southern airport boundary. As noted previously, Taxiway Z is located 400 feet from the Runway 10R-28L centerline. This exceeds minimum FAA design requirements for the airport. Therefore, Taxiway Z can be relocated to the north and still comply with design requirements.

The development alternatives (summarized in Chapter Four) considered relocating the entire northwest portion of Taxiway Z (from Taxiway D to Taxiway F) 100 feet to the north. This would have located this portion of Taxiway Z at the same lateral distance from the Runway 10R-28L centerline as the southeast portion of Taxiway Z and would have eliminated the need for pilots to make a series of turns to transition between each segment of Taxiway Z.

As discussed in Chapter Four, locating the northwest portion of Taxiway Z at the same lateral distance from Runway 10R-28L as the southeast portion of the taxiway would have required crossing Sulphur Creek and placing portions of the creek within a culvert. In recognition of the environmental concerns related to placing Sulphur Creek within a culvert, the recommended master plan concept includes relocating only a portion of Taxiway Z to avoid crossing Sulphur Creek. Therefore, an existing portion of Taxiway Z will remain in its present location 400 feet from the Runway 10R-28L centerline.

While this does not entirely eliminate having two segments of Taxiway Z at different distances from the Runway 10R-28L centerline, all exiting and proposed hangar development areas would be located along the portion of Taxiway Z which is located at the same lateral distance from the Runway 10R-28L centerline. Since aircraft depart to the northwest the majority of the time, any aircraft accessing either the Runway 28R or 28L thresholds will have direct access to these runway ends and will not have to transition between two different taxiway segments. Under this proposal only aircraft taxiing the entire length of Taxiway Z would be required to transition between two taxiway segments.

The recommended master plan concept includes relocating a portion of both Taxiway A1 and Taxiway Z1 away from the existing noise berm at the Runway 28L end to meet taxiway object free area standards. The intent is to locate the taxiway centerline a sufficient distance from the nosie berm to provide standard wingtip clearance for the large aircraft (within ADG II) which presently use these taxiways.

The development of a runway exit taxiway between Taxiway E and Taxiway F is included in the recommended master plan concept. This will provide a direct connection to the west T-hangar and apron area and enhance airfield capacity and safety by allowing aircraft to exit the runway system quicker and reduce the amount of time that each landing aircraft occupies the runway. This taxiway has been positioned to avoid crossing Sulphur Creek.

Recommended airfield lighting improvements include installing a precision approach path indicator (PAPI) to the Runway 10L end and runway end identifier lights (REILs) to the Runway 10L and Runway 28R ends. The PAPI will assist pilots in determining the correct glide path to the Runway 10L end. The PAPI can be an effective tool for ensuring aircraft remain on the designed approach path to the Runway 10L end and avoid flying too low over residential development to the northwest. The REILs can assist pilots in locating the Runway 10L and 28R ends at night and distinguish the runway threshold lighting from other airfield lighting.

At the suggestion of members of the Airport Planning Committee (APC), the development of a noise barrier at the Runway 10L end has been included in the recommended master plan concept. This is intended to reduce run-up noise from aircraft preparing for departure to the southeast from impacting residents in the San Lorenzo neighborhood to the northwest. As presently planned, the noise wall would be constructed of concrete at a height of 12 feet and extend for approximately 450 feet. Detailed signs placed near the ultimate noise wall could aid pilots in correctly positioning their aircraft for run-up. Detailed acoustical analysis may need to be completed prior to constructing the noise barrier to determine the specific design, location and orientation of the noise barrier which can provide the greatest benefit for reducing run-up noise in this area.

The segmented circle and lighted wind cone are recommended to be relocated to the center of the airfield between Runway 10R-28L and Runway 10L-28R. Presently, the segmented circle and wind cone are located within the Runway 10R-28L object free area. FAA design standards preclude development within the OFA. Relocating the segmented circle and lighted wind cone is also required prior to relocating Taxiway Z 100 feet to the north.

RECOMMENDED LANDSIDE IMPROVEMENTS

The recommended landside improvements included in this Master Plan are limited to those facilities necessary to accommodate aviation demand at Hayward Executive Airport through the planning period. A separate planning study completed prior to the initiation of this Master Plan addresses non-aviation related development along Hesperian Boulevard at the airport.

The recommended landside improvements for Hayward Executive Airport are focused on providing new hangar development areas on the airport to accommodate projected demand and meet existing demand needs as evidenced by the existing hangar waiting list. Specific attention has been given to providing hangar and terminal facilities to adequately serve business and corporate aircraft consistent with City of Hayward goals to serve this segment of aviation for the Bay area. Additionally, the recommended master plan concept includes the examination of the potential use of the area currently occupied by the California Air National Guard (CANG).

North Side

An area for T-hangar and large clearspan (executive hangar) development has been recommended for a vacant parcel of land adjacent to the transient apron. Referred to as the Skywest Aeropark, this area is planned for the development of T-hangars and executive hangars. Airfield access is planned from Taxiway E and the transient apron. Prior to development, a portion of Sulphur Creek will placed within a culvert. This will allow for two-way aircraft access to these hangar areas from Taxiway E and the transient aircraft parking apron. Prior to developing this area, Skywest Drive must also be relocated.

Presently, the north side of the airport is not served by a designated helicopter landing and tiedown area. The existing helipad is located on the south side of the airport near Taxiway D. The recommended master plan concept includes developing a helipad and three helicopter parking positions northwest of the transient apron through the redevelopment of an area previously used for aircraft fueling. This location is segregated from fixed-wing aircraft operational areas and ideally located along the transient apron to adequately serve transient users.

The recommended master plan concept includes the development of a public-use terminal building along the north side of the transient apron adjacent to the existing airport traffic control tower/airport administration building. This is intended to provide a single location for transient users to meet and provide facilities for pilots to conduct flight planning activities. Airport administration offices are ultimately planned for this facility.

Two areas of the apron along the north side of airfield are presently unpaved. While not required to meet aircraft parking demands, the recommended master plan concept includes paving these areas to provide additional apron adjacent to existing hangar areas for future growth and efficiency at these areas.

Prior to paving a portion of the apron adjacent to Sullivan Propellors, the existing automated surface observation system (ASOS) will need to be relocated. The ASOS equipment is owned and operated by the FAA. Relocation of the ASOS will be at the discretion of the FAA. An area north of Taxiway A, near the noise berm at the southeast end of the airport, has been designated for the relocated ASOS equipment.

The existing east airport perimeter service road has a dirt/gravel surface. The recommended master plan concept includes paving this road for year-round use by airport rescue and firefighting vehicles. Additionally, this road can be used by airport personnel and eliminate the need to cross active runways. This has the potential to reduce runway incursions.

The west airport perimeter service road presently extends along the northwest side of Taxiway F and is located within the Runway 10R runway safety area and object free area. This road is planned to be relocated to remove this roadway from the safety area and provide direct access to the localizer antenna, located northwest of Taxiway F.

The proposed West A Street extension is included on all future development drawings. The alignment closely follows the alignment included in previous planning efforts. The future alignment of West A Street is critical for the safety of aircraft operations. The alignment of the road must consider appropriate clearances for each approach and runway safety area and object free area standards. The alignment depicted provides for these necessary clearances.

South Side

South side development considers development potential along Taxiway Z. The development of the south side of the airport will be required as the airport expands facilities to meet existing and future demand. The existing demand is evidenced by the hangar waiting list maintained by airport staff. The November 1, 1999 hangar waiting list includes 206 separate aircraft owners interested in a hangar facility at Hayward Executive Airport.

Table 5D compares existing and future demand (aircraft requiring hangar space) to available hangar capacity on the north side of the airport. As evidenced in the table, approximately 300 aircraft are currently stored in hangar facilities on the north side of the airport. An additional 206 aircraft owners are on the hangar waiting list and presently desire hangar space at Hayward Executive Airport. Combined, there is a total demand for the storage of 509 aircraft at Hayward Executive Airport. In the future, the number of aircraft requiring hangar space is expected to grow by126 by the end of the 20-year planning period. Combined with the aircraft on the hangar waiting list, an additional 332 aircraft could potentially desire hangar space at Hayward Executive Airport through the planning period. Therefore, hangar capacity for 632 aircraft should be considered for the airport.

The second half of **Table 5D** summarizes the number of aircraft which can be accommodated in the existing aircraft storage hangars. A range for both the executive hangars and conventional hangars has been shown since these hangars can accommodate multiple aircraft. Capacity in these hangars is greatly affected by both the size and design of the aircraft stored in the hangars. Larger aircraft diminish the space available for storage. This is represented by the lower portion of the range indicated in the table. The higher portion of the range indicates the potential for small aircraft storage. However, this can only be achieved through a mixture of aircraft designs which can allow for making maximum advantage of the available aircraft storage space (i.e. a low wing and high wing aircraft stored in close proximity to each other). As shown in the table, between 268 and 318 aircraft can be accommodated in the existing aircraft storage hangars on the airport.

It should be noted that this comparison does not account for individual aircraft owner preferences. While this analysis indicates that there may presently be some available hangar capacity at the airport, this capacity is only available in existing conventional hangars maintained by the Fixed Based Operators (FBO) since all existing T-hangar and executive hangars are filled. Aircraft storage in large FBO hangars is not preferred by many aircraft owners. This type of storage does not allow for an aircraft owner to store personal belongings related to their aircraft or allow for the owner to complete minor maintenance activities on their aircraft. Additionally, since the aircraft are stored with multiple aircraft, these aircraft are commonly moved to provide access to other aircraft. This increases the chances of damage to the aircraft. Consequently, most aircraft owners desire individual T-hangar space or executive hangar space. This is evidenced by the large waiting list for T-hangar and executive hangar space at the airport.

TABLE 5D
Hangar Facility Demand/Capacity Comparison

	Existing	Short Term	Intermediate Term	Long Term
Aircraft Requiring Hangar Space				
Aircraft on Hangar Waiting List	206	206	206	206
Single Engine	254	286	306	347
Multi-Engine	27	30	33	37
Turboprop & Jet	17	19	23	33
Helicopter	5	6	7	9
Total Aircraft Requiring Hangar Space	509	547	575	632
Existing Aircraft Hangar Capacity (North Side)				
T-Hangars	192			
Executive Hangar Units	14-33			
Conventional Hangar Area	56-93			
Total	268-318			
Capacity With Skywest Aeropark Development				
Existing T-Hangars	192			
Existing Executive Hangar Units	14-33			
Existing Conventional Hangar Area	56-93			
Proposed Skywest Aeropark Executive Hangars	11-29			
Proposed Skywest Aeropark T-hangars	51			
Total	324-398			
Capacity With Planned South Side Hangar Development				
Existing T-Hangars	192			
Existing Executive Hangar Units	14-33			
Existing Conventional Hangar Area	56-93			
Proposed Skywest Aeropark Executive Hangars	11-29			
Proposed Skywest Aeropark T-hangars	51			
Proposed Corsair Executive Hangars	20-48			
Proposed South Executive Hangars	6-14			
Proposed South T-hangars	52			
Total	402-512			

The north side aircraft storage hangar capacity increases to between 324 and 398 aircraft when considering the proposed Skywest Aeropark hangar development described in detail previously. This represents the maximum capacity of the north side of the airfield. With a demand for over 500 aircraft storage spaces in 1999, it is evident that future hangar demand will need to be met through developing the south side of the airport.

The south side of the airport is planned to accommodate the wide range of hangar facilities desired by aircraft owners. This includes areas for executive hangar, T-hangar and large conventional hangar development.

An area for the development of individual executive hangars is recommended along the relocated portion of Taxiway Z. As planned, this area would be accessed through the adjacent industrial park via Corsair Boulevard. Roadway access from Corsair Boulevard would be developed in the area previously used to provide taxiway access to the industrial park. This taxiway easement has been abandoned and is no longer used by tenants of the industrial park.

Designated the Corsair Executive Hangars, this area has been planned for 20 individual lease parcels which can accommodate hangars to 3,600 square feet (60' x 60'). As detailed on Exhibit A11, the Environmental Reconnaissance Appendix, the northwestern most parcels are within a designated floodplain. Hangar development in these areas would be subject to floodplain requirements.

A series of executive hangar parcels have been designated along the northwest side of Taxiway D. Roadway access for these hangar parcels is planned from existing access gates near the Calstar hangar area. To provide sufficient area for aircraft movement to and from the planned executive hangars, the hangars developed on the northwest side of Taxiway D will not face the taxiway. Instead, these hangars will be rotated 90 degrees. An apron area will connect the hangars to Taxiway D. This will reduce the chances that Taxiway D could be blocked by aircraft accessing these hangars. These parcels are planned to accommodate executive hangars to 3,600 square feet (60' x 60').

The planned south landside development includes retaining the existing helipad and helicopter parking positions. A parcel has been designed along the south side of the helipad for the future development of helicopter service facilities, assumed to be developed privately.

A T-hangar area has been reserved for the vacant area adjacent to helipad. As planned, this area can accommodate 51 T-hangars in four separate buildings. Roadway access for the T-hangars and south helipad is via an existing access roadway.

Considering the City of Hayward goals to retain existing pavement areas, the south apron is retained for aircraft tiedown as well as to accommodate activities for a future fixed based operator on this portion of the airfield providing general aviation services such as maintenance, flight training etc. Two lease parcels southeast of the existing airport rescue and firefighting access road have also been designated for this purpose.

Two industrial/commercial parcels, one with potential for airfield access, have been designated along West Winton Avenue. The existing roadway entrance is planned to be relocated to the northwest to increase the size of the parcel with airfield access potential.

CALIFORNIA AIR NATIONAL GUARD SITE

The California Air National Guard (CANG) is presently situated on a 27-acre site on the southwest portion of Hayward Executive Airport along West Winton Avenue. The existing CANG lease will expire in 2014, which is within the 20-year planning period for this Master Plan. Therefore, it is necessary to examine the potential use of this lease area should the existing CANG lease not be extended or portions of the lease area be returned to the City of Hayward by the CANG.

The CANG area could eventually be need to provide additional capabilities for aircraft hangar facilities. As shown in **Table 5D**, the airport is expected to require space for 632 aircraft by the end of the long term planning horizon. Should the proposed development in the Skywest Aeropark, Corsair Executive hangars, South executive hangars and South T-Hangars be completed, the airport will provide capacity for only 402 to 512 aircraft.

In consideration of the need for additional aircraft storage space, the potential use of the existing CANG site is split between aviation-related development and commercial/industrial development. Potential aviation-related development is reserved for the area west of the proposed access road to the south apron and hangar development parcels. Potential commercial/ industrial development is reserved for the areas east of the proposed access road since airfield access is restricted in this area by the location of the access road for the south side hangar development parcels. Aviation-related development is reserved for the western portion of the CANG site, since this area has the potential for airfield access via Taxiway D. This area also includes a large existing apron which could potentially support future aviation-related development.

AIRPORT LAYOUT PLANS

The remainder of this chapter provides a brief description of the official layout drawings for the airport that will be submitted to the FAA for review and approval. These plans, referred to as Airport Layout Plans, have been prepared to graphically depict the ultimate airfield layout, facility development, and imaginary surfaces which protect the airport from hazards. This set of plans includes:

- Airport Layout Plan
- Terminal Area Drawing
- Airport Airspace Drawings
- Inner Portion of the Approach Surface Drawings
- Utilities Map
- Property Map

The airport layout plan set has been prepared on a computer-aided drafting system for future ease of use. The computerized plan set provides detailed information of existing and future facility layout on multiple layers that permits the user to focus in on any section of the airport at a desirable scale. The plan can be used as base information for design, and can be easily updated in the future to reflect new development and more detail concerning existing conditions as made available through design surveys. The airport layout plan set is submitted to the FAA for approval and must reflect all future development for which federal funding is anticipated. Otherwise, the proposed development will not be eligible for federal funding. Therefore, updating these drawings to reflect changes in existing and ultimate facilities is essential. The following provides a brief discussion of each drawing in the Airport Layout Plan set.

AIRPORT LAYOUT PLAN

The Airport Layout Plan graphically presents the existing and ultimate airport layout. Both airfield and landside improvements are depicted.

TERMINAL AREA DRAWING

The Terminal Area Drawings provides greater detail concerning landside improvements and at a larger scale than the on the Airport Layout Plan. The Terminal Area Drawing includes detail concerning all existing and planned landside development along both sides of the runways.

AIRPORT AIRSPACE DRAWING

To protect the airspace around the airport and approaches to each runway end from hazards that could affect the safe and efficient operation of aircraft arriving and departing the airport, *Federal Aviation Regulations (FAR) Part 77, Objects Affecting Navigable Airspace*, have been established for use by local authorities to control the height of objects near the airport. The Airport Airspace Drawing included in this Master Plan is a graphic depiction of this regulatory criterion. The Airport Airspace Drawing is a tool to aid local authorities in determining if proposed development could present a hazard to the airport and obstruct the approach path to a runway end.

The Part 77 Airspace Plan assigns three-dimensional imaginary areas to each runway. These imaginary surfaces emanate from the runway centerline and are dimensioned according the visibility minimums associated with the approach to the runway end and size of aircraft to operate on the runway. The Part 77 imaginary surfaces include the primary surface, approach surface, transitional surface, horizontal surface, and conical surface. Part 77 imaginary surfaces are described in the following paragraphs.

Primary Surface

The primary surface is an imaginary surface longitudinally centered on the runway. The primary surface extends 200 feet beyond each runway end and its width is determined by the type of approach established for that runway end. The elevation of any point on the primary surface is the same as the elevation along the nearest associated point on the runway centerline. The primary surface for Runway 10R-28L is 500 feet wide due to the existing localizer approach to Runway 28L. The primary surface for Runway 10L-28R is also 500 feet wide.

Situated adjacent to the runway and taxiway system, the primary surface must remain clear of unnecessary objects to allow for the unobstructed passage of aircraft. Within the primary surface, objects are only permitted if they are no taller than two feet above the ground and if they are constructed on frangible (breakaway) fixtures. The only exception to the two-foot height requirement is for objects whose location is fixed by function. A precision approach path indicator (PAPI) system is an example of an object which falls within the category of "fixed by function."

Approach/Departure Surface

An approach/departure surface is also established for each runway. The approach/departure surface begins at the same width as the primary surface and extends upward and outward from the primary surface end centered along an extended runway centerline. The upward slope and length of the approach/departure surface is determined by the type of approach (existing and/or planned) to the runway end. The approach surface for each end of Runway 10R-28L extends 10,000 feet from the end of the primary surface at an upward slope of 34 to 1 to a width of 3,500 feet. The approach surface for each end of Runway 10L-28R extends 5,000 feet from end of the primary surface at a slope of 20 to 1 to a width of 1,500 feet.

Transitional Surface

Each runway has a transitional surface that begins at the outside edge of the primary surface at the same elevation as the runway. The transitional surface also connects with the approach surfaces of each runway. The surface rises at a slope seven to one up to a height which is 150 feet above the highest runway elevation. At that point, the transitional surface is replaced by the horizontal surface.

Horizontal Surface

The horizontal surface is established at 150 feet above the highest elevation of the runway surface. Having no slope, the horizontal surface connects the transitional and approach surfaces to the conical surface at a distance of 10,000 feet from the primary surfaces of each runway.

Conical Surface

The conical surface begins at the outer edge of the horizontal surface. The conical surface then continues for an additional 4,000 feet horizontally at a slope of 20 to 1. Therefore, at 4,000 feet from the horizontal surface, the elevation of the conical surface is 350 feet above the highest airport elevation.

INNER PORTION OF THE APPROACH SURFACE PLANS

The Inner Portion of the Approach Surface Plan is a scaled drawing of the runway protection zone (RPZ), runway safety area (RSA), obstacle free zone (OFZ), and object free area (OFA) for each runway end. A plan and profile view of each RPZ is provided to facilitate identification of obstructions that lie within these safety areas. Detailed obstruction and facility data is provided to identify planned improvements and the disposition of obstructions (as appropriate).

AIRPORT PROPERTY MAP

The Property Map provides information on the acquisition and identification of all land tracts under the control of the airport. Lease boundaries, leaseholder and lease dates are also included on the drawing for reference and use by the City of Hayward.

OBSTRUCTION REVIEW

The City of Hayward is responsible for clearing any obstructions to the F.A.R. Part 77 surfaces at Hayward Executive Airport. Obstruction data for Hayward Executive Airport has been determined through reviewing the Airport Obstruction Chart prepared by the National Ocean Survey and detail derived from the topographic and planimetric mapping prepared for this study. The Airport Airspace Drawing, Approach Zone Profiles Drawing and Inner Portion of the Approach Surface Drawings (included at the end of this chapter) provide detail concerning the location and type of obstructions and proposed dispositions.

A variety of obstructions have been noted including existing obstruction lighting, trees, and existing terrain surfaces. While some of the obstructions, such as lighting standards, are fixed by function and will not need to be removed, other obstructions such as terrain and trees should be graded and removed, respectively. An aeronautical study is requested by the FAA for trees and terrain obstructions located off airport property.

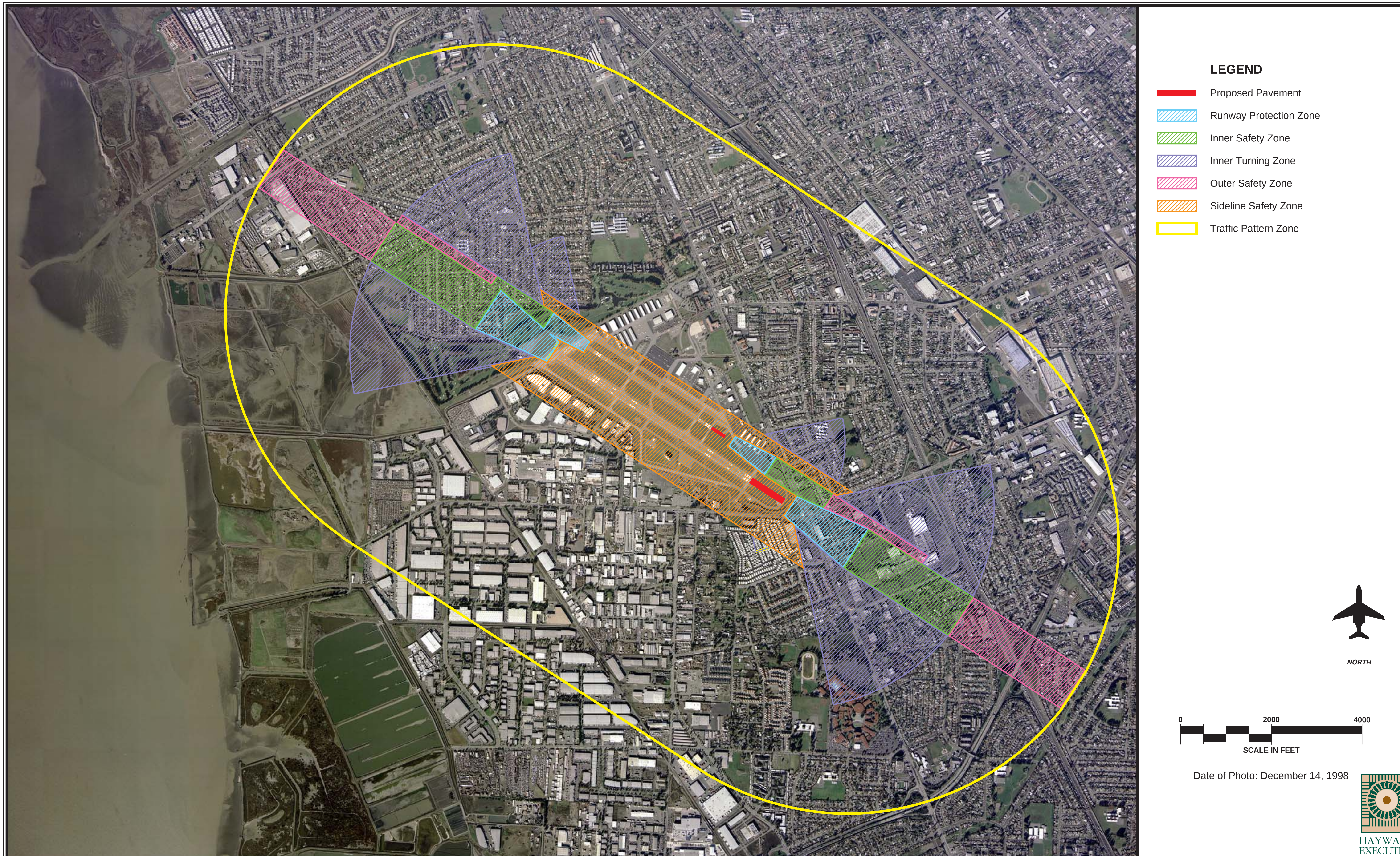
CALIFORNIA AIRPORT LAND USE PLANNING

Exhibit 5B depicts the imaginary safety zones as specified by the CALTRANS Division of Aeronautics *Airport Land Use Planning Handbook*. These safety areas were established to aid local planning authorities and Airport Land Use Commissions (ALUCs) in ensuring compatible land use near the airport and to protect people and property on the ground. These surfaces have been prepared to reflect the recommendations of this master plan which include extending Runway 28R 350 feet east and widening the Runway 28R entrance taxiway. The Alameda County ALUC is responsible for reviewing comprehensive land use planning and proposed development for Hayward Executive Airport.

SUMMARY

The airport layout plan set is designed to assist the City of Hayward in making decisions relative to future development and growth at Hayward Executive Airport. The plan provides for development to satisfy expected airport needs over the next twenty years and well beyond. Flexibility will be a key to future development since activity may not occur exactly as forecast. The plan has considered demands that could be placed upon the airport even beyond the twenty year planning period to ensure that the facility is capable of accommodating a variety of circumstances. The ALP set also provides the City of Hayward with options to pursue in marketing the assets of the airport for community development. Following the general recommendations of the plan, the airport can maintain it's long term viability and continue to provide air transportation services to the region.

97MP17-5B-10/15/99



HAYWARD EXECUTIVE AIRPORT

Exhibit 5B

CALIFORNIA LAND USE SAFETY ZONES

AIRPORT LAYOUT PLANS

FOR

HAYWARD EXECUTIVE AIRPORT

HAYWARD, CALIFORNIA

Prepared for

CITY OF HAYWARD

INDEX OF DRAWINGS

Coffman Associates
Airport Consultants

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT
		PAVEMENT (To Be Removed)
		BUILDING (To Be Removed)
		BUILDING CONSTRUCTION
BRL		BUILDING RESTRICTION LINE (BRL)
		DRAINAGE
		FACILITY CONSTRUCTION
		RUNWAY EDGE LIGHTS
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY THRESHOLD LIGHTS and REIL
34 35 / 3 2		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)
		DIRT ROAD
		PARCELS
		TREES

DECLARED DISTANCES

	ULTIMATE 10R-28L	ULTIMATE 10L-28R
TAKEOFF RUN AVAILABLE (TORA)	5,884'/5,884'	3,457'/3,457'
TAKEOFF DISTANCE AVAILABLE (TODA)	5,884'/5,884'	3,457'/3,457'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	5,422'/5,884'	3,457'/3,457'
LANDING DISTANCE AVAILABLE (LDA)	5,574'/5,024'	3,457'/3,107'

OBSTACLE FREE ZONE (OFZ) OBJECT PENETRATIONS

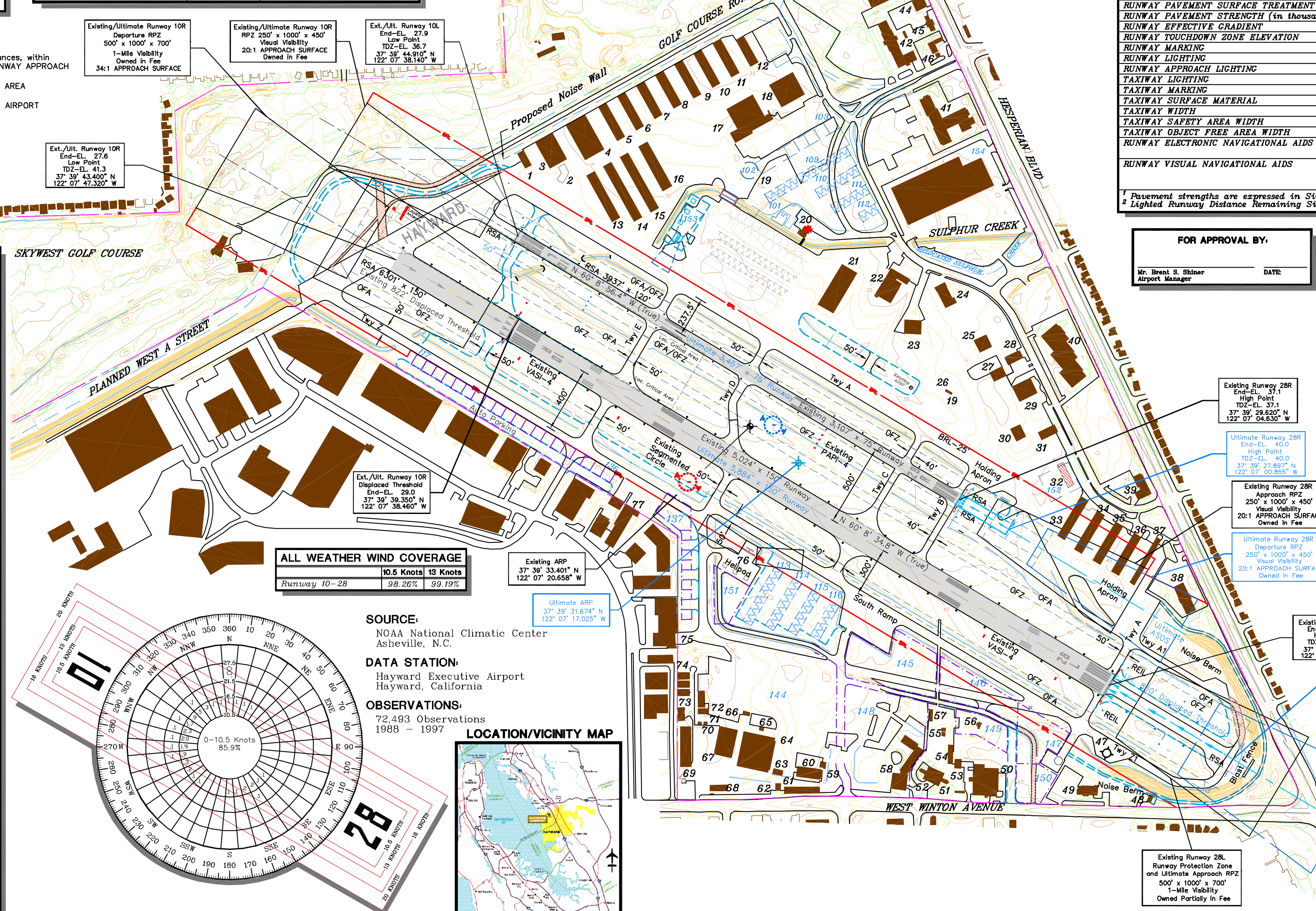
OBJECT	PENETRATION	DISPOSITION
Noise Berm	55'	Displaced Threshold
Blast Pad	102'	Displaced Threshold

THRESHOLD SITING SURFACE OBJECT PENETRATIONS

OBJECT	PENETRATION	DISPOSITION
–		
–		
–		

GENERAL NOTES:

1. Depiction of features and objects, including related elevations and clearances, within the runway protection zones are depicted on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWING, sheets 5, 6 and 7 of these plans.
2. Details concerning terminal improvements are depicted on the TERMINAL AREA DRAWING, sheet 2 of these plans.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE DRAWING, sheet 8 of these plans.
4. Property Line depicted taken from approved 1984 Airport Layout Plan.



EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEVATION
1	TENANT MAINTENANCE FACILITY	49.80 MSL
2	AIRCRAFT WASH PAD	N/A
3	EXECUTIVE HANGAR #1	53.23 MSL
4	EXECUTIVE HANGAR #2	53.85 MSL
5	WEST T-HANGAR (F)	48.26 MSL
6	WEST T-HANGAR (G)	49.29 MSL
7	WEST T-HANGAR (H)	50.92 MSL
8	WEST T-HANGAR (I)	51.68 MSL
9	WEST T-HANGAR (J)	52.03 MSL
10	WEST T-HANGAR (K)	52.78 MSL
11	WEST T-HANGAR (L)	53.00 MSL
12	WEST T-HANGAR (M)/AIRPORT MAINTENANCE SHOP	53.54 MSL
13	WEST T-HANGAR (N)	46.29 MSL
14	WEST T-HANGAR (O)	46.48 MSL
15	WEST T-HANGAR (P)	46.76 MSL
16	WEST T-HANGAR (Q)	48.93 MSL
17	AIRCRAFT MAINTENANCE/STORAGE HANGAR	52.05 MSL
18	AIRCRAFT MAINTENANCE/STORAGE HANGAR	59.03 MSL
19	UNDERGROUND FUEL STORAGE	N/A
20	AIRPORT TRAFFIC CONTROL TOWER/ADMINISTRATION	116.0 MSL
21	AIRCRAFT MAINTENANCE/STORAGE HANGAR	52.42 MSL
22	AIRCRAFT MAINTENANCE/STORAGE HANGAR	51.01 MSL
23	AIRCRAFT MAINTENANCE/STORAGE HANGAR	55.57 MSL
24	AIRCRAFT MAINTENANCE/STORAGE HANGAR	57.73 MSL
25	AIRCRAFT MAINTENANCE/STORAGE HANGAR	50.32 MSL
26	FUEL SERVICES	47.70 MSL
27	AIRCRAFT MAINTENANCE/STORAGE HANGAR	50.03 MSL
28	AIRCRAFT MAINTENANCE/STORAGE HANGAR	59.32 MSL
29	AIRCRAFT MAINTENANCE/STORAGE HANGAR	45.62 MSL
30	AIRCRAFT MAINTENANCE/STORAGE HANGAR	52.73 MSL
31	AIRCRAFT MAINTENANCE/STORAGE HANGAR	60.39 MSL
32	SHADE HANGARS	57.35 MSL
33	EAST T-HANGAR (A)	57.92 MSL
34	EAST T-HANGAR (B)	59.21 MSL
35	EAST T-HANGAR (C)	60.79 MSL
36	EAST T-HANGAR (D)	61.78 MSL
37	EAST T-HANGAR (E)	58.65 MSL
38	OFFICE BUILDING	68.94 MSL
39	OFFICE BUILDING	62.29 MSL
40	OFFICE BUILDING	66.64 MSL
41	HOTEL/MOTEL	63.32 MSL
42	HOTEL/MOTEL	56.78 MSL
43	THEATER	59.22 MSL
44	RESTAURANT	50.12 MSL
45	SERVICE STATION	52.22 MSL
46	SERVICE STATION	54.32 MSL
47	COMPASS CALIBRATION PAD	47.4 MSL
48	PUMP STATION	64.7 MSL
49	RESTAURANT	77.8 MSL
50	WAREHOUSE	67.8 MSL
51	CITY OF HAYWARD FIRE DEPARTMENT	54.37 MSL
52	CITY OF HAYWARD FIRE DEPARTMENT	71.1 MSL
53	CITY OF HAYWARD FIRE DEPARTMENT	53.5 MSL
54	CITY OF HAYWARD FIRE DEPARTMENT	55.5 MSL
55	CITY OF HAYWARD FIRE DEPARTMENT	93.4 MSL
56	CITY OF HAYWARD FIRE DEPARTMENT	62.4 MSL
57	CITY OF HAYWARD FIRE DEPARTMENT	55.9 MSL
58	CALIFORNIA AIR NATIONAL GUARD	55.1 MSL
59	CALIFORNIA AIR NATIONAL GUARD	45.9 MSL
60	CALIFORNIA AIR NATIONAL GUARD	48.3 MSL
61	CALIFORNIA AIR NATIONAL GUARD	48.5 MSL
62	CALIFORNIA AIR NATIONAL GUARD	46.1 MSL
63	CALIFORNIA AIR NATIONAL GUARD	44.9 MSL
64	CALIFORNIA AIR NATIONAL GUARD	88.4 MSL
65	CALIFORNIA AIR NATIONAL GUARD	46.9 MSL
66	CALIFORNIA AIR NATIONAL GUARD	47.5 MSL
67	CALIFORNIA AIR NATIONAL GUARD	45.3 MSL
68	CALIFORNIA AIR NATIONAL GUARD	46.4 MSL
69	CALIFORNIA AIR NATIONAL GUARD	65.1 MSL
70	CALIFORNIA AIR NATIONAL GUARD	42.6 MSL
71	CALIFORNIA AIR NATIONAL GUARD	42.6 MSL
72	CALIFORNIA AIR NATIONAL GUARD	51.1 MSL
73	CALIFORNIA AIR NATIONAL GUARD	51.1 MSL
74	CALIFORNIA AIR NATIONAL GUARD	45.7 MSL
75	EAST BAY REGIONAL PARK POLICE	51.5 MSL
76	HELIPAD AND 3 PARKING POSITIONS	31.6 MSL
77	AIRCRAFT MAINTENANCE/STORAGE HANGAR	46.9 MSL

MODIFICATIONS FROM FAA AIRPORT DESIGN STANDARDS

STANDARD MODIFIED	DESCRIPTION	AIRSPACE CASE NUMBER	APPROVAL DATE
NONE	–	–	–

DEVIATIONS FROM FAA AIRPORT DESIGN STANDARDS

DEVIATION DESCRIPTION	EFFECTED DESIGN STANDARD	STANDARD	EXISTING	PROPOSED DISPOSITION
Runway 10R Runway Safety Area	5300-13, Distance beyond runway end	300'	237'	RELOCATE SERVICE ROAD
Runway 10R Object Free Area	5300-13, Distance beyond runway end	300'	237'	RELOCATE SERVICE ROAD
Runway 28L Runway Safety Area	5300-13, Distance beyond runway end	300'	117'	Displaced Threshold, Implement Declared Distances
Runway 28L Object Free Area	5300-13, Distance beyond runway end	300'	-10	Displaced Threshold, Implement Declared Distances
Runway 28L Obstacle Free Zone	5300-13, Distance beyond runway end	200'	10'	Displaced Threshold, Implement Declared Distances

RUNWAY DATA

RUNWAY DATA	RUNWAY 10R-28L EXISTING	RUNWAY 10R-28L ULTIMATE	RUNWAY 10L-28R EXISTING	RUNWAY 10L-28R ULTIMATE
RUNWAY CATEGORY	General Aviation	General Aviation	General Aviation	General Aviation
AIRCRAFT APPROACH CATEGORY-DESIGN GROUP	B-II	B-II	B-I	B-I
RUNWAY GEODETIC AZIMUTH (OC. 5015)	119.857°/299.868°	119.857°/299.858°	119.851°/299.857°	119.851°/299.857°
RUNWAY BEARING (True)	N 60° 8' 34.8" W	N 60° 8' 34.8" W	N 60 ° 8' 56.4" W	N 60° 8' 56.4" W
MAXIMUM RUNWAY ELEVATION (Above MSL)	49.8 MSL	52.0 MSL	37.1 MSL	40.0 MSL
RUNWAY WIND COVERAGE (10.5/13 KNOTS)	98.26/99.19	98.26/99.19	98.26/99.19	98.26/99.19
RUNWAY DIMENSIONS	5,024' x 150'	5,884' x 150'	3,107' x 75'	3,457' x 75'
APPROACH VISIBILITY MINIMUMS	1 mile, 1 mile	1 mile, 1 mile	Visual	Visual
F.A.R. PART 77 CATEGORY	Nonprecision	Nonprecision	Visual-Utility	Visual-Utility
RUNWAY INSTRUMENTATION	Nonprecision	Nonprecision	NONE	NONE
RUNWAY APPROACH SURFACES	34:1, 34:1	34:1, 34:1	20:1, 20:1	20:1, 20:1
RUNWAY THRESHOLD DISPLACEMENT	822' (10R)	822' (10R), 860' (28L)	NONE	350' (28R)
RUNWAY STOPWAY	NONE	NONE	NONE	NONE
RUNWAY SAFETY AREA (RSA)	5,561' x 150'	6,301' x 150'	3,587' x 120'	3,937' x 120'
RUNWAY SAFETY AREA (RSA) BEYOND RWY END	237'/ 300'	300'/117'	240'/240'	240'/240'
RUNWAY OBSTACLE FREE ZONE (OFZ)	5,424' x 400'	6,124' x 400'	3,507' x 250'	3,857' x 250'
RUNWAY OBJECT FREE AREA (OFA)	5,561' x 500'	6,174' x 500'	3,587' x 250'	3,937' x 250'
RUNWAY OBJECT FREE AREA BEYOND RWY END	237'/ 300'	300'/ -10'	240'/240'	240'/240'
RUNWAY SURFACE MATERIAL	Asphalt	Asphalt	Asphalt	Asphalt
RUNWAY PAVEMENT SURFACE TREATMENT	NONE	GROOVED	NONE	NONE
RUNWAY PAVEMENT STRENGTH (in thousand lbs.)[1]	30(S), 75(D)	30(S), 75(D)	13(S)	13(S)
RUNWAY EFFECTIVE GRADIENT	0.44%	0.45%	0.29%	0.43%
RUNWAY TOUCHDOWN ZONE ELEVATION	41.3 MSL, 49.8 MSL	41.3 MSL, 52.0 MSL	36.7 MSL, 37.1 MSL	36.7 MSL, 40.0 MSL
RUNWAY MARKING	Precision/Precision	Precision/Precision	Nonprecision/Nonprec.	Nonprecision/Nonprec.
RUNWAY LIGHTING	MIRL	MIRL	MIRL	MIRL
RUNWAY APPROACH LIGHTING	None	None	None	None
TAXIWAY LIGHTING	MITL	MITL	MITL	MITL
TAXIWAY MARKING	Centerline	Centerline	Centerline	Centerline
TAXIWAY SURFACE MATERIAL	Asphalt	Asphalt	Asphalt	Asphalt
TAXIWAY WIDTH	50'	50'	35'	35'
TAXIWAY SAFETY AREA WIDTH	79'	79'	49'	49'
TAXIWAY OBJECT FREE AREA WIDTH	131'	131'	89'	89'
RUNWAY ELECTRONIC NAVIGATIONAL AIDS	GPS (28L) LOC/DME (28L)	GPS –	– –	– –
RUNWAY VISUAL NAVIGATIONAL AIDS	VASI-4 REIL	VASI-4 REIL LRDRS[2]	PAPI-4(28R)	PAPI-4 REIL

[1] Pavement strengths are expressed in Single(S), Dual(D), Dual Tandem(DT), and/or Double Dual Tandem(DDT) wheel loading capacities.
[2] Lighted Runway Distance Remaining Signs.

FOR APPROVAL BY:

Mr. Brent S. Shiner
Airport Manager

DATE:

AIRPORT DATA

OWNER: City of Hayward	AIRPORT NPIAS CODE: Reliever (RL/TR)
CITY: Hayward, Ca.	COUNTY: Alameda, California
RANGE: 2 West TOWNSHIP: 2 South	CIVIL TOWNSHIP: –

HAYWARD AIR TERMINAL AIRPORT		EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL		RELIEVER	SAME
AIRPORT REFERENCE CODE		B-II	B-II
DESIGN AIRCRAFT		Cessna Citation III	Cessna Citation III
AIRPORT ELEVATION		49.8 MSL	52.0 MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		93 ° July	93 ° July
AIRPORT REFERENCE POINT (NAD 83)	Latitude	37° 39' 33.401" N	37° 39' 31.689" N
	Longitude	122° 07' 20.658" W	122° 07' 17.037" W
AIRPORT INSTRUMENT APPROACH GPS APPROACH		GPS (28L) VOR or GPS-A VOR/DME OR GPS-B LOC/DME	GPS
AIRPORT and TERMINAL NAVIGATIONAL AIDS		Rotating Beacon ATCT	Rotating Beacon ATCT
GPS AT AIRPORT		YES	YES
RUNWAY END COORDINATES (NAD 83) RUNWAY 10R	Latitude	37° 39' 43.400" N	37° 39' 43.400" N
	Longitude	122° 07' 47.320" W	122° 07' 47.320" W
RUNWAY END COORDINATES (NAD 83) RUNWAY 10R DISPLACED THRESHOLD	Latitude	37° 39' 39.350" N	37° 39' 39.350" N
	Longitude	122° 07' 38.460" W	122° 07' 38.460" W
RUNWAY END COORDINATES (NAD 83) RUNWAY 28L	Latitude	37° 39' 18.670" N	37° 39' 14.436" N
	Longitude	122° 06' 53.140" W	122° 06' 43.866" W
RUNWAY END COORDINATES (NAD 83) RUNWAY 28L DISPLACED THRESHOLD	Latitude	N/A	37° 39' 18.670" N
	Longitude	N/A	122° 06' 53.140" W
RUNWAY END COORDINATES (NAD 83) RUNWAY 10L	Latitude	37° 39' 44.910" N	37° 39' 44.910" N
	Longitude	122° 07' 38.140" W	122° 07' 38.140" W
RUNWAY END COORDINATES (NAD 83) RUNWAY 28R	Latitude	37° 39' 29.620" N	37° 39' 27.897" N
	Longitude	122° 07' 04.630" W	122° 07' 00.855" W
RUNWAY END COORDINATES (NAD 83) RUNWAY 28R DISPLACED THRESHOLD	Latitude	N/A	37° 39' 29.620" N
	Longitude	N/A	122° 07' 04.630" W

FAA APPROVAL STAMP

MAGNETIC DECLINATION
15.1564° East (March 2002)

TRUE NORTH
Magnetic North 15.1564° E

0 400 800 1200
SCALE IN FEET

ULTIMATE BUILDINGS/FACILITIES

NO.	DESCRIPTION
101	GENERAL AVIATION TERMINAL/ADMINISTRATION
102	SELF FUELING ISLAND
103-108	SKYWEST AEROPARK EXECUTIVE HANGAR
109-112	SKYWEST AEROPARK T-HANGAR
113-116	SOUTH T-HANGARS
117-136	CORSAIR EXECUTIVE HANGAR LEASE PARCELS
137-144	AVIATION-RELATED LEASE PARCELS
145-147	FIXED BASE OPERATOR LEASE PARCELS
148-150	INDUSTRIAL/COMMERCIAL LEASE PARCELS
151	HELICOPTER FIXED BASE OPERATOR
152	AIRCRAFT MAINTENANCE/STORAGE HANGAR
153	HELIPAD AND 3 PARKING POSITIONS
154	RETAIL WAREHOUSE

No.	REVISIONS	DATE	BY	APP'D.
1	–	–	–	–

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS 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 LAWS."

HAYWARD EXECUTIVE AIRPORT

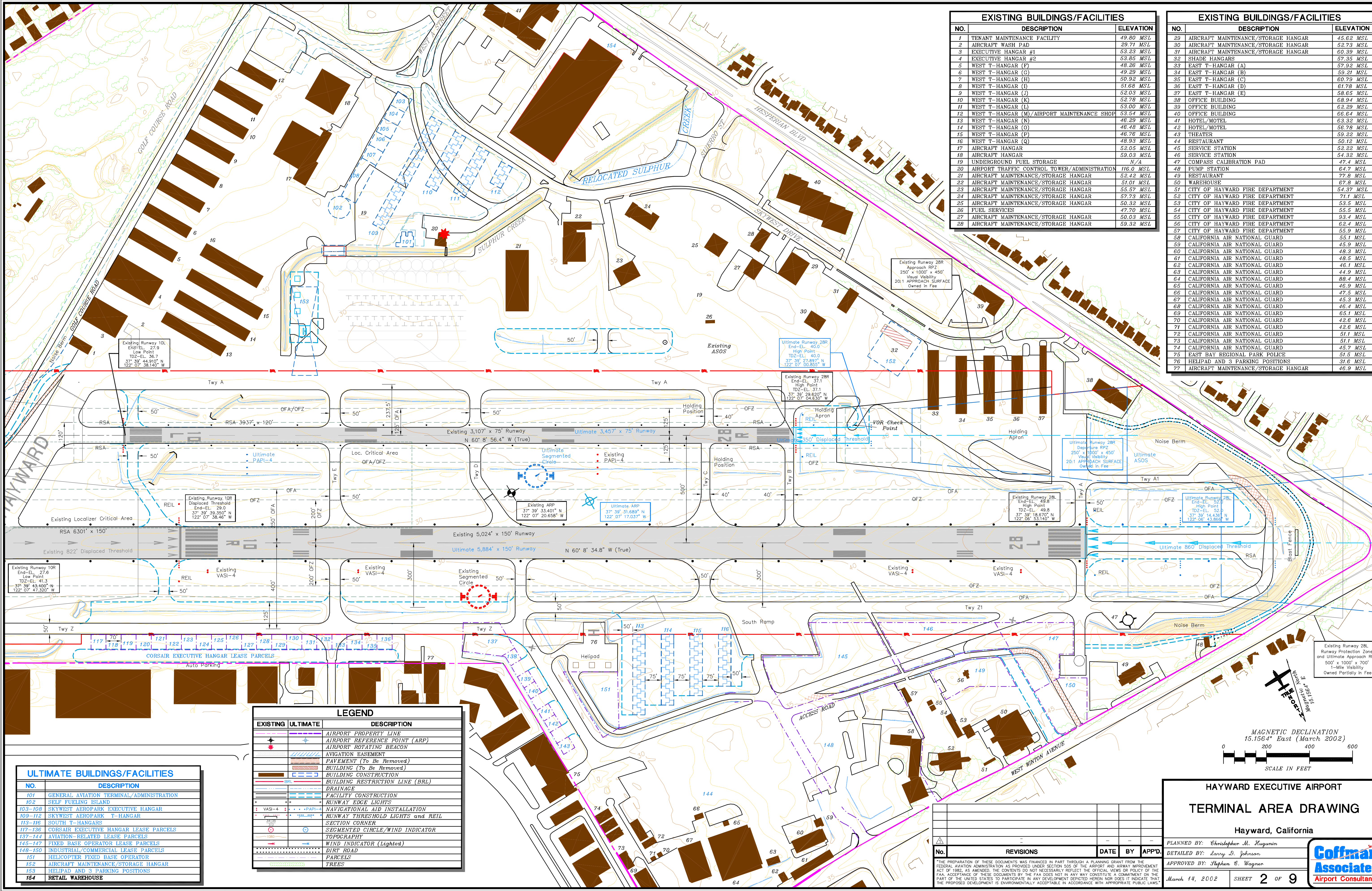
AIRPORT LAYOUT PLAN

Hayward, California

PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

March 14, 2002 SHEET 1 OF 9

Coffman Associates Airport Consultants



EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEVATION
1	TENANT MAINTENANCE FACILITY	49.80 MSL
2	AIRCRAFT WASH PAD	29.71 MSL
3	EXECUTIVE HANGAR #1	53.23 MSL
4	EXECUTIVE HANGAR #2	53.85 MSL
5	WEST T-HANGAR (F)	48.26 MSL
6	WEST T-HANGAR (G)	49.29 MSL
7	WEST T-HANGAR (H)	50.92 MSL
8	WEST T-HANGAR (I)	51.68 MSL
9	WEST T-HANGAR (J)	52.03 MSL
10	WEST T-HANGAR (K)	52.78 MSL
11	WEST T-HANGAR (L)	53.00 MSL
12	WEST T-HANGAR (M)/AIRPORT MAINTENANCE SHOP	53.54 MSL
13	WEST T-HANGAR (N)	46.29 MSL
14	WEST T-HANGAR (O)	46.48 MSL
15	WEST T-HANGAR (P)	46.76 MSL
16	WEST T-HANGAR (Q)	48.93 MSL
17	AIRCRAFT HANGAR	52.05 MSL
18	AIRCRAFT HANGAR	59.03 MSL
19	UNDERGROUND FUEL STORAGE	N/A
20	AIRPORT TRAFFIC CONTROL TOWER/ADMINISTRATION	116.0 MSL
21	AIRCRAFT MAINTENANCE/STORAGE HANGAR	52.42 MSL
22	AIRCRAFT MAINTENANCE/STORAGE HANGAR	51.01 MSL
23	AIRCRAFT MAINTENANCE/STORAGE HANGAR	55.57 MSL
24	AIRCRAFT MAINTENANCE/STORAGE HANGAR	57.73 MSL
25	AIRCRAFT MAINTENANCE/STORAGE HANGAR	50.32 MSL
26	FUEL SERVICES	47.70 MSL
27	AIRCRAFT MAINTENANCE/STORAGE HANGAR	50.03 MSL
28	AIRCRAFT MAINTENANCE/STORAGE HANGAR	59.32 MSL

EXISTING BUILDINGS/FACILITIES

NO.	DESCRIPTION	ELEVATION
29	AIRCRAFT MAINTENANCE/STORAGE HANGAR	45.62 MSL
30	AIRCRAFT MAINTENANCE/STORAGE HANGAR	52.73 MSL
31	AIRCRAFT MAINTENANCE/STORAGE HANGAR	60.39 MSL
32	SHADE HANGARS	57.35 MSL
33	EAST T-HANGAR (A)	57.92 MSL
34	EAST T-HANGAR (B)	59.21 MSL
35	EAST T-HANGAR (C)	60.79 MSL
36	EAST T-HANGAR (D)	61.78 MSL
37	EAST T-HANGAR (E)	58.65 MSL
38	OFFICE BUILDING	68.94 MSL
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42	HOTEL/MOTEL	56.78 MSL
43	THEATER	59.22 MSL
44	RESTAURANT	50.12 MSL
45	SERVICE STATION	52.22 MSL
46	SERVICE STATION	54.32 MSL
47	COMPASS CALIBRATION PAD	47.4 MSL
48	PUMP STATION	64.7 MSL
49	RESTAURANT	77.8 MSL
50	WAREHOUSE	67.8 MSL
51	CITY OF HAYWARD FIRE DEPARTMENT	54.37 MSL
52	CITY OF HAYWARD FIRE DEPARTMENT	71.1 MSL
53	CITY OF HAYWARD FIRE DEPARTMENT	53.5 MSL
54	CITY OF HAYWARD FIRE DEPARTMENT	55.5 MSL
55	CITY OF HAYWARD FIRE DEPARTMENT	93.4 MSL
56	CITY OF HAYWARD FIRE DEPARTMENT	62.4 MSL
57	CITY OF HAYWARD FIRE DEPARTMENT	55.9 MSL
58	CALIFORNIA AIR NATIONAL GUARD	55.1 MSL
59	CALIFORNIA AIR NATIONAL GUARD	45.9 MSL
60	CALIFORNIA AIR NATIONAL GUARD	48.3 MSL
61	CALIFORNIA AIR NATIONAL GUARD	48.5 MSL
62	CALIFORNIA AIR NATIONAL GUARD	46.1 MSL
63	CALIFORNIA AIR NATIONAL GUARD	44.9 MSL
64	CALIFORNIA AIR NATIONAL GUARD	88.4 MSL
65	CALIFORNIA AIR NATIONAL GUARD	46.9 MSL
66	CALIFORNIA AIR NATIONAL GUARD	47.5 MSL
67	CALIFORNIA AIR NATIONAL GUARD	45.3 MSL
68	CALIFORNIA AIR NATIONAL GUARD	46.4 MSL
69	CALIFORNIA AIR NATIONAL GUARD	65.1 MSL
70	CALIFORNIA AIR NATIONAL GUARD	42.6 MSL
71	CALIFORNIA AIR NATIONAL GUARD	42.6 MSL
72	CALIFORNIA AIR NATIONAL GUARD	51.1 MSL
73	CALIFORNIA AIR NATIONAL GUARD	51.1 MSL
74	CALIFORNIA AIR NATIONAL GUARD	45.7 MSL
75	EAST BAY REGIONAL PARK POLICE	51.5 MSL
76	HELIPAD AND 3 PARKING POSITIONS	31.6 MSL
77	AIRCRAFT MAINTENANCE/STORAGE HANGAR	46.9 MSL

ULTIMATE BUILDINGS/FACILITIES

NO.	DESCRIPTION
101	GENERAL AVIATION TERMINAL/ADMINISTRATION
102	SELF FUELING ISLAND
103–108	SKYWEST AEROPARK EXECUTIVE HANGAR
109–112	SKYWEST AEROPARK T-HANGAR
113–116	SOUTH T-HANGARS
117–136	CORSAIR EXECUTIVE HANGAR LEASE PARCELS
137–144	AVIATION-RELATED LEASE PARCELS
145–147	FIXED BASE OPERATOR LEASE PARCELS
148–150	INDUSTRIAL/COMMERCIAL LEASE PARCELS
151	HELICOPTER FIXED BASE OPERATOR
152	AIRCRAFT MAINTENANCE/STORAGE HANGAR
153	HELIPAD AND 3 PARKING POSITIONS
154	**RETAIL WAREHOUSE**

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT
		PAVEMENT (To Be Removed)
		BUILDING (To Be Removed)
		BUILDING CONSTRUCTION
BRL		BUILDING RESTRICTION LINE (BRL)
		DRAINAGE
		FACILITY CONSTRUCTION
		RUNWAY EDGE LIGHTS
VASI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY THRESHOLD LIGHTS and REIL
34 35 3 2		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)
		DIRT ROAD
		PARCELS
		TREES

No.	REVISIONS	DATE	BY	APP'D.
1	–	–	–	–

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HAYWARD EXECUTIVE AIRPORT

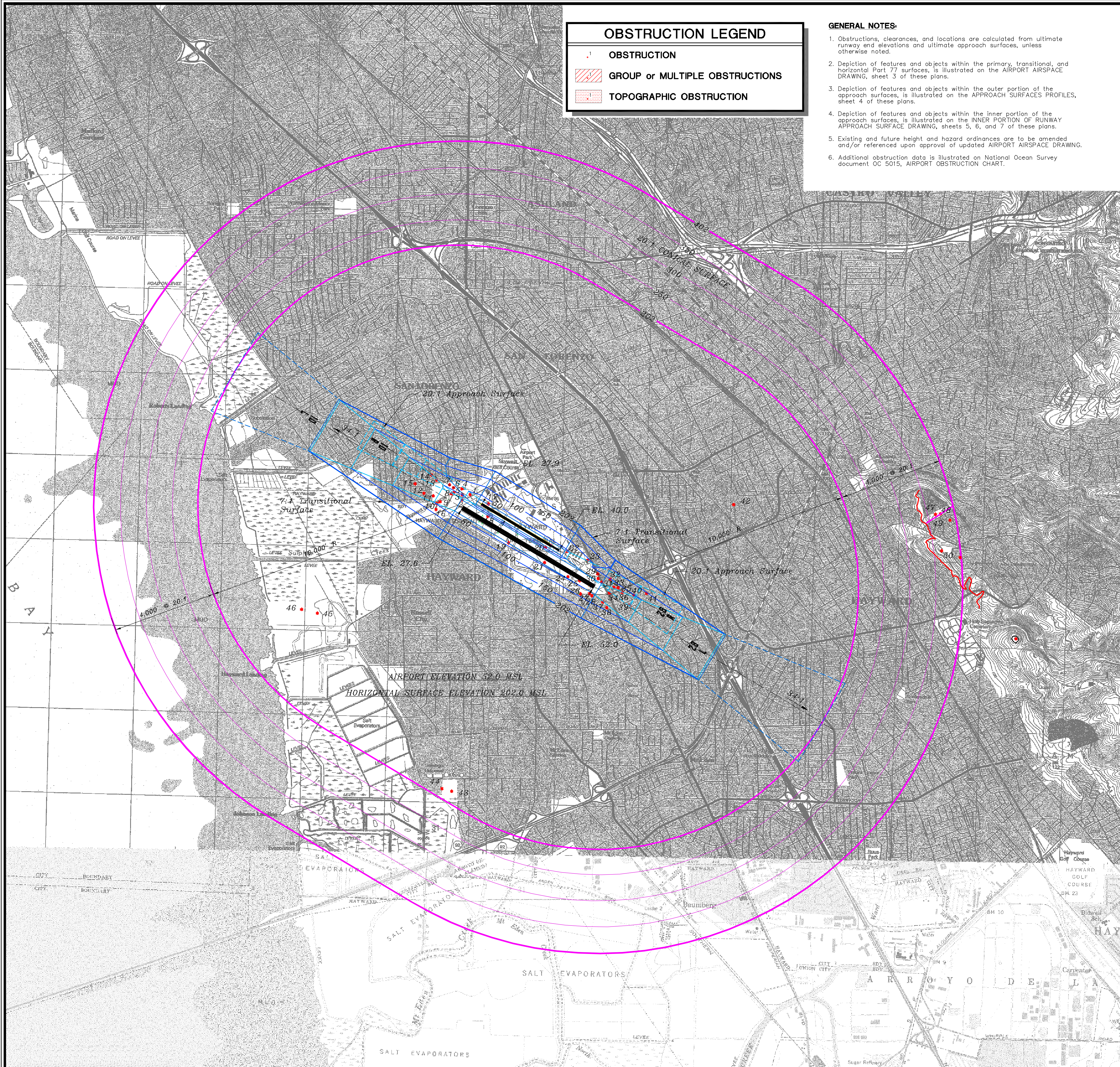
TERMINAL AREA DRAWING

Hayward, California

PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

March 14, 2002

Coffman Associates
Airport Consultants



OBSTRUCTION LEGEND

- OBSTRUCTION
- GROUP or MULTIPLE OBSTRUCTIONS
- TOPOGRAPHIC OBSTRUCTION

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, and horizontal Part 77 surfaces, is illustrated on the AIRPORT AIRSPACE DRAWING, sheet 3 of these plans.
3. Depiction of features and objects within the outer portion of the approach surfaces, is illustrated on the APPROACH SURFACES PROFILES, sheet 4 of these plans.
4. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWING, sheets 5, 6, and 7 of these plans.
5. Existing and future height and hazard ordinances are to be amended and/or referenced upon approval of updated AIRPORT AIRSPACE DRAWING.
6. Additional obstruction data is illustrated on National Ocean Survey document OC 5015, AIRPORT OBSTRUCTION CHART.

OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. TREE	49 MSL	20:1 APPROACH SURFACE	47 MSL	2'	REQUEST AERONAUTICAL STUDY
2. OL ON DME	44 MSL	7:1 TRANSITIONAL SURFACE	28 MSL	16'	FIXED BY FUNCTIONAL PURPOSE
3. TREE	60 MSL	20:1 APPROACH SURFACE 7:1 TRANSITIONAL SURFACE	59 MSL 53 MSL	1' 7'	TRIM
4. TREE	70 MSL	20:1 APPROACH SURFACE	66 MSL	4'	TRIM
5. TREE	69 MSL	20:1 APPROACH SURFACE 7:1 TRANSITIONAL SURFACE	75 MSL 44 MSL	0' 25'	TRIM
6. TREE	84 MSL	20:1 APPROACH SURFACE 7:1 TRANSITIONAL SURFACE	81 MSL 66 MSL	3' 18'	TRIM
7. TREE	92 MSL	20:1 APPROACH SURFACE 7:1 TRANSITIONAL SURFACE	90 MSL 71 MSL	2' 21'	TRIM
8. TREE	60 MSL	34:1 APPROACH SURFACE	41 MSL	19'	TRIM
9. TREE	61 MSL	34:1 APPROACH SURFACE	47 MSL	14'	TRIM
10. TREE	69 MSL	34:1 APPROACH SURFACE	49 MSL	20'	TRIM
11. TREE	96 MSL	34:1 APPROACH SURFACE	57 MSL	39'	TRIM
12. TREE	71 MSL	34:1 APPROACH SURFACE	68 MSL	3'	TRIM
13. TREE	70 MSL	34:1 APPROACH SURFACE	63 MSL	7'	TRIM
14. TREE	81 MSL	34:1 APPROACH SURFACE	71 MSL	10	TRIM
15. TREE	82 MSL	34:1 APPROACH SURFACE	81 MSL	1'	TRIM
16. TREE	86 MSL	7:1 TRANSITIONAL SURFACE	79 MSL	7'	TRIM
17. WINDSOCK	34 MSL	PRIMARY SURFACE	28 MSL	6'	"NO ACTION"
18. WINDSOCK	35 MSL	PRIMARY SURFACE	32 MSL	3'	"NO ACTION"
19. OL ON LIGHTED WINDSOCK	55 MSL	PRIMARY SURFACE	35 MSL	20'	"NO ACTION"
20. WINDSOCK	43 MSL	PRIMARY SURFACE	37 MSL	6'	"NO ACTION"
21. ROD ON OL ANEMOMETER	61 MSL	PRIMARY SURFACE	35 MSL	26'	TO REMAIN LIGHTED
22. HANGAR	58 MSL	20:1 APPROACH SURFACE	44 MSL	14'	20:1 THRESHOLD SITING SURFACE
23. TREE	104 MSL	7:1 TRANSITIONAL SURFACE	86 MSL	18'	TRIM
24. WINDSOCK	51 MSL	PRIMARY SURFACE	50 MSL	1'	"NO ACTION"
25. GROUND	49 MSL	EXT. 34:1 APPROACH SURFACE	48 MSL	1'	REQUEST AERONAUTICAL STUDY
26. TREE	96 MSL	7:1 TRANSITIONAL SURFACE	90 MSL	6'	TRIM
27. TREE	74 MSL	7:1 TRANSITIONAL SURFACE	64 MSL	10'	TRIM
28. LIGHT STANDARD	71 MSL	7:1 TRANSITIONAL SURFACE	68 MSL	3'	REQUEST AERONAUTICAL STUDY
29. TREE	100 MSL	20:1 APPROACH SURFACE 7:1 TRANSITIONAL SURFACE	119 MSL 87 MSL	0' 13'	REQUEST AERONAUTICAL STUDY
30. TREE	71 MSL	7:1 TRANSITIONAL SURFACE	67 MSL	4'	REQUEST AERONAUTICAL STUDY
31. TREE	101 MSL	20:1 APPROACH SURFACE 7:1 TRANSITIONAL SURFACE	134 MSL 62 MSL	0' 39'	REQUEST AERONAUTICAL STUDY
32. TREE	108 MSL	20:1 APPROACH SURFACE 7:1 TRANSITIONAL SURFACE	145 MSL 103 MSL	0' 5'	REQUEST AERONAUTICAL STUDY
33. TREE	90 MSL	7:1 TRANSITIONAL SURFACE	75 MSL	15'	REQUEST AERONAUTICAL STUDY
34. LIGHT STANDARD	83 MSL	34:1 APPROACH SURFACE	64 MSL	19'	REQUEST AERONAUTICAL STUDY
35. POLE	92 MSL	7:1 TRANSITIONAL SURFACE	83 MSL	9'	REQUEST AERONAUTICAL STUDY
36. TREE	100 MSL	34:1 APPROACH SURFACE	77 MSL	23'	REQUEST AERONAUTICAL STUDY
37. TREE	92 MSL	7:1 TRANSITIONAL SURFACE	68 MSL	24'	REQUEST AERONAUTICAL STUDY
38. TREE	98 MSL	7:1 TRANSITIONAL SURFACE	87 MSL	11'	REQUEST AERONAUTICAL STUDY
39. ANTENNA	125 MSL	34:1 APPROACH SURFACE	95 MSL	30'	REQUEST AERONAUTICAL STUDY
40. TREE	117 MSL	7:1 TRANSITIONAL SURFACE	97 MSL	20'	REQUEST AERONAUTICAL STUDY
41. ANTENNA on OL BUILDING	152 MSL	7:1 TRANSITIONAL SURFACE	145 MSL	7'	REQUEST AERONAUTICAL STUDY
42. TANK	219 MSL	HORIZONTAL SURFACE	202 MSL	17'	REQUEST AERONAUTICAL STUDY
43. OL RADIO TOWER	233 MSL	HORIZONTAL SURFACE	202 MSL	31'	TO REMAIN LIGHTED
44. OL RADIO TOWER	234 MSL	HORIZONTAL SURFACE	202 MSL	32'	TO REMAIN LIGHTED
45. ROD ON STROBE LIGHTED RADIO TOWER	222 MSL	HORIZONTAL SURFACE	202 MSL	20'	TO REMAIN LIGHTED
46. ROD ON STROBE LIGHTED RADIO TOWER	226 MSL	HORIZONTAL SURFACE	202 MSL	24'	TO REMAIN LIGHTED
47. GROUND	399 MSL	20:1 CONICAL SURFACE	364 MSL	35'	REQUEST AERONAUTICAL STUDY
48. TRANSMISSION TOWER	537 MSL	20:1 CONICAL SURFACE	374 MSL	163'	REQUEST AERONAUTICAL STUDY
49. GROUND	500 MSL	20:1 CONICAL SURFACE	389 MSL	111'	REQUEST AERONAUTICAL STUDY
50. TREE	439 MSL	20:1 CONICAL SURFACE	365 MSL	74'	REQUEST AERONAUTICAL STUDY

TRUE NORTH
Magnetic North 15.1564° E

MAGNETIC DECLINATION
15.1564° East (March 2002)

0 2000 4000 6000
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
1	–	–	–	–

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HAYWARD EXECUTIVE AIRPORT

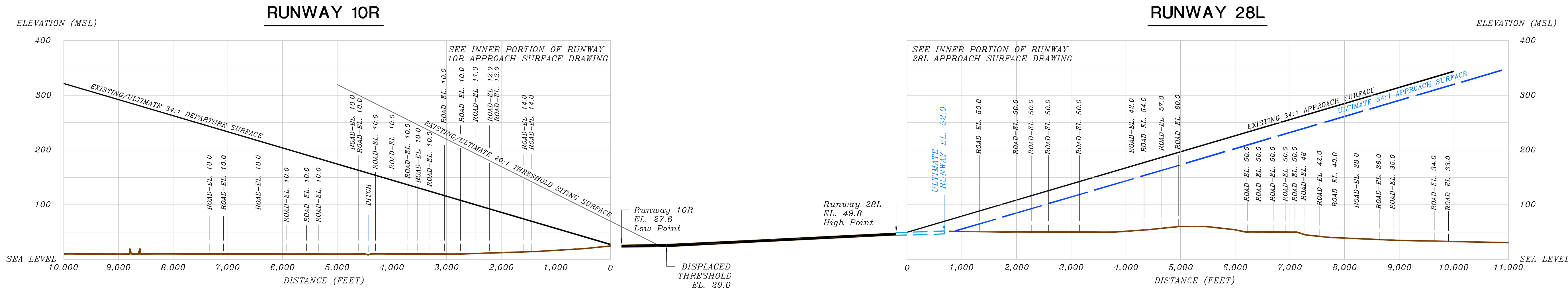
AIRPORT AIRSPACE DRAWING

Hayward, California

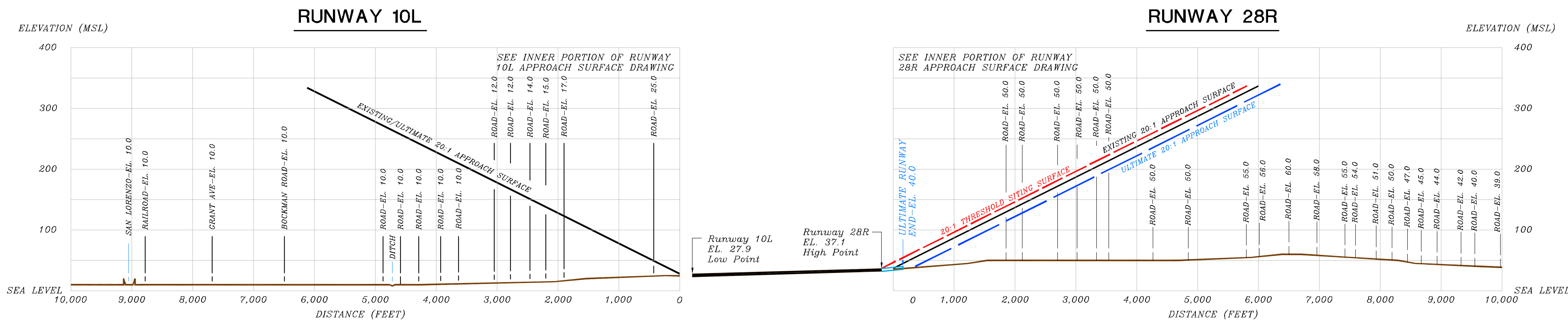
PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

March 14, 2002

Coffman Associates
Airport Consultants



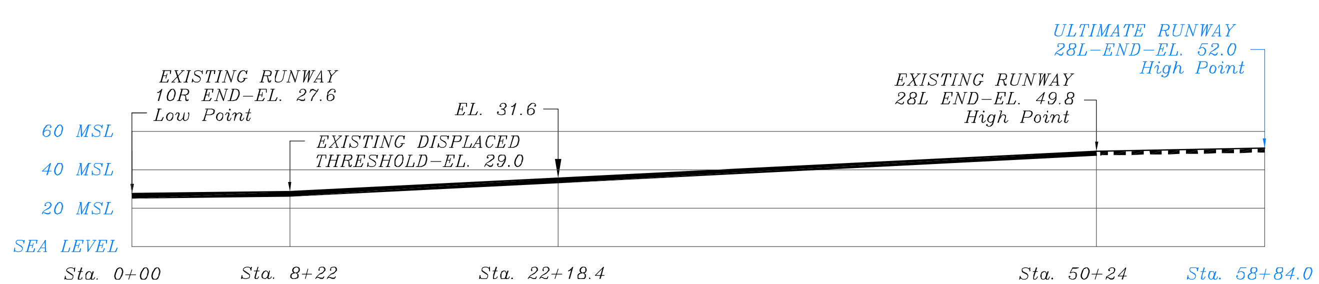
RUNWAY 10R-28L APPROACH SURFACES PROFILES



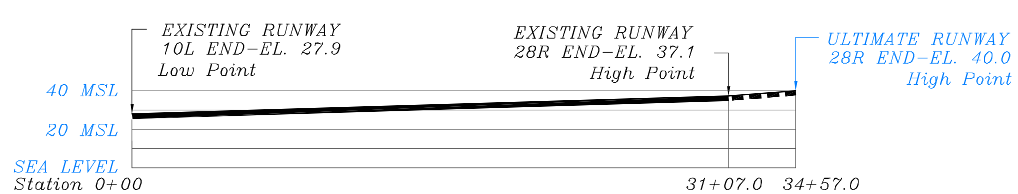
RUNWAY 10L-28R APPROACH SURFACES PROFILES

RUNWAY APPROACH SURFACE OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
SEE SHEET 5, 6 and 7	–	–	–	–	See Inner Portion of Runway Approach Surfaces Drawings

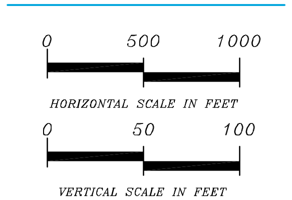


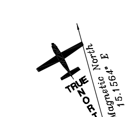
ULTIMATE 5,884' x 150' RUNWAY 10R-28L PROFILE



ULTIMATE 3,107' x 75' RUNWAY 10L-28R PROFILE

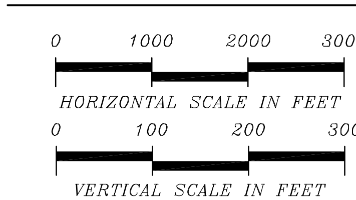
ULTIMATE RUNWAY PROFILES





MAGNETIC DECLINATION
15.1564° East (March 2002)

RUNWAY APPROACH SURFACES PROFILES



GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
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3. Depiction of features and objects within the outer portion of the approach surfaces, is illustrated on the APPROACH SURFACES PROFILES, sheet 4 of these plans.
4. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF RUNWAY APPROACH SURFACE DRAWING, sheets 5, 6, and 7 of these plans.
5. Existing and future height and hazard ordinances are to be amended and/or referenced upon approval of updated AIRPORT AIRSPACE DRAWING.

No.	REVISIONS	DATE	BY	APP'D.
1	–	–	–	–

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HAYWARD EXECUTIVE AIRPORT

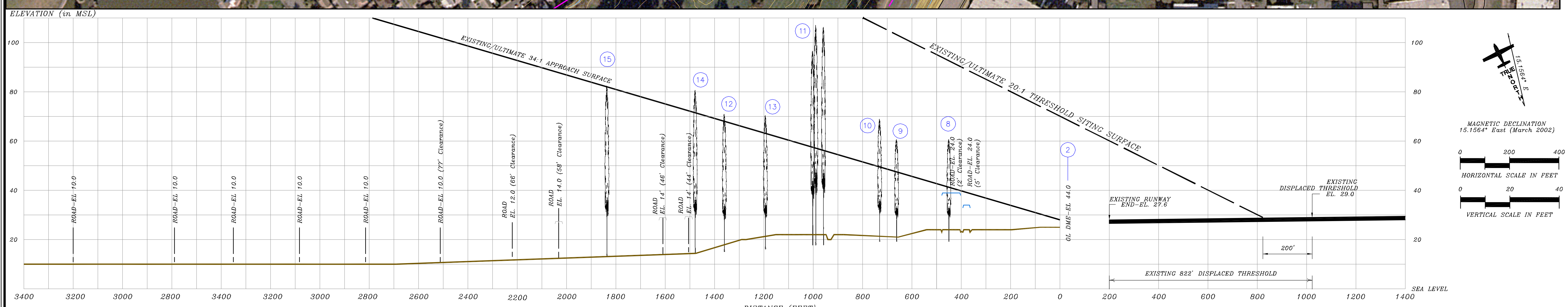
APPROACH SURFACES PROFILES

Hayward, California

PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

March 14, 2002 SHEET 4 OF 9

Coffman Associates
Airport Consultants



OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
2. OL ON DME	44 MSL	PRIMARY SURFACE	28 MSL	16'	"NO ACTION"
8. TREE	60 MSL	34:1 APPROACH SURFACE	41 MSL	19'	TRIM
9. TREE	61 MSL	34:1 APPROACH SURFACE	47 MSL	14'	TRIM
10. TREE	69 MSL	34:1 APPROACH SURFACE	49 MSL	20'	TRIM
11. TREE	96 MSL	34:1 APPROACH SURFACE	57 MSL	39'	TRIM
12. TREE	71 MSL	34:1 APPROACH SURFACE	68 MSL	3'	TRIM
13. TREE	70 MSL	34:1 APPROACH SURFACE	63 MSL	7'	TRIM
14. TREE	81 MSL	34:1 APPROACH SURFACE	71 MSL	10'	TRIM
15. TREE	82 MSL	34:1 APPROACH SURFACE	81 MSL	1'	TRIM

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Distance for road obstructions and clearances reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.

No.	REVISIONS	DATE	BY	APP'D.
1	–	–	–	–

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HAYWARD EXECUTIVE AIRPORT

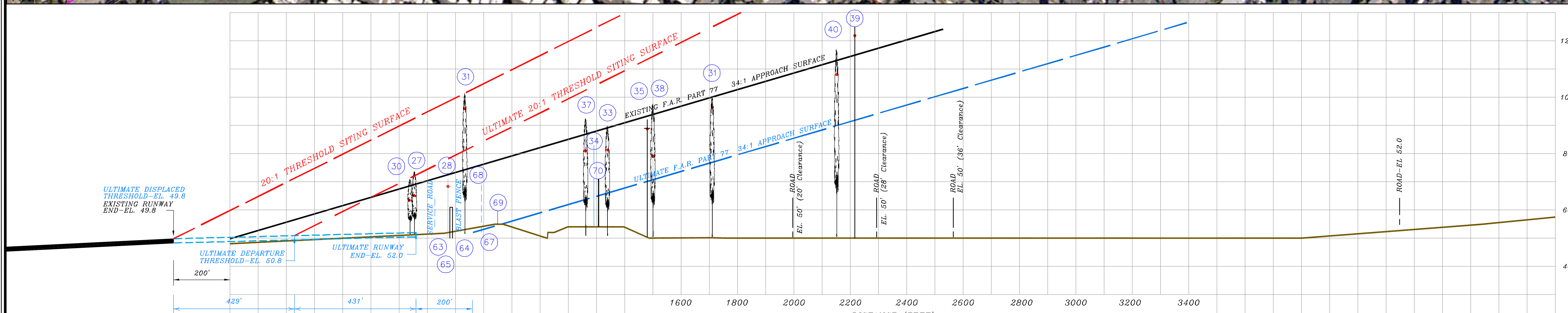
INNER PORTION OF RUNWAY 10R APPROACH SURFACE DRAWING

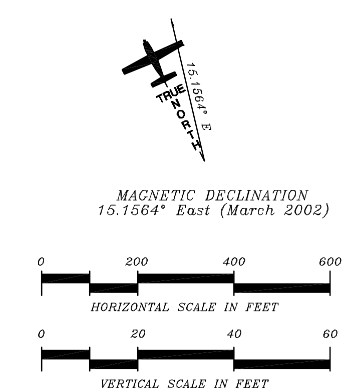
Hayward, California

PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

March 14, 2002 SHEET 5 OF 9

Coffman Associates Airport Consultants





0 200 400 600 800 1000 1200 1400

OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
27. TREE	74 MSL	EXT. 34:1 APPROACH SURFACE	69 MSL	5'	TRIM
		7:1 TRANSITIONAL SURFACE	64 MSL	10'	
28. LIGHT STANDARD	71 MSL	EXT. 34:1 APPROACH SURFACE	72 MSL	0'	REQUEST AERONAUTICAL STUDY
		7:1 TRANSITIONAL SURFACE	68 MSL	3'	
30. TREE	71 MSL	EXT. 34:1 APPROACH SURFACE	69 MSL	2'	REQUEST AERONAUTICAL STUDY
		7:1 TRANSITIONAL SURFACE	67 MSL	4'	
31. TREE	101 MSL	EXT. 34:1 APPROACH SURFACE	74 MSL	27'	REQUEST AERONAUTICAL STUDY
		7:1 TRANSITIONAL SURFACE	62 MSL	39'	
33. TREE	90 MSL	EXT. 34:1 APPROACH SURFACE	89 MSL	1'	REQUEST AERONAUTICAL STUDY
		7:1 TRANSITIONAL SURFACE	75 MSL	15'	

OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
34. LIGHT STANDARD	83 MSL	34:1 APPROACH SURFACE	67 MSL	19'	AC 150/5300 APPENDIX 2
35. POLE	92 MSL	7:1 TRANSITIONAL SURFACE	83 MSL	9'	REQUEST AERONAUTICAL STUDY
36. TREE	100 MSL	34:1 APPROACH SURFACE	77 MSL	23'	AC 150/5300 APPENDIX 2
37. TREE	92 MSL	7:1 TRANSITIONAL SURFACE	68 MSL	24'	REQUEST AERONAUTICAL STUDY
38. TREE	98 MSL	7:1 TRANSITIONAL SURFACE	84 MSL	14'	REQUEST AERONAUTICAL STUDY
39. ANTENNA	125 MSL	34:1 APPROACH SURFACE	92 MSL	33'	AC 150/5300 APPENDIX 2
40. TREE	117 MSL	7:1 TRANSITIONAL SURFACE	97 MSL	20'	REQUEST AERONAUTICAL STUDY
63. BERM	58.2 MSL	PRIMARY SURFACE	52 MSL	6'	AC 150/5300 APPENDIX 2
64. BLAST FENCE	61 MSL	PRIMARY SURFACE	52 MSL	9'	AC 150/5300 APPENDIX 2
65. BERM	62 MSL	PRIMARY SURFACE	52 MSL	10'	AC 150/5300 APPENDIX 2
66. SERVICE ROAD	50 MSL (60')	PRIMARY SURFACE	52 MSL	8'	AC 150/5300 APPENDIX 2
67. WEST WINTON AVE.	48 MSL (63')	34:1 APPROACH SURFACE	52 MSL	11'	AC 150/5300 APPENDIX 2
68. HESPERIAN BLVD.	52 MSL (67')	34:1 APPROACH SURFACE	52 MSL	15'	AC 150/5300 APPENDIX 2
69. GROUND	55 MSL	34:1 APPROACH SURFACE	53 MSL	2'	AC 150/5300 APPENDIX 2
70. ROAD	54 MSL (71')	34:1 APPROACH SURFACE	53 MSL	18'	AC 150/5300 APPENDIX 2

2800 3000 3200 3400 3000 3200

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Distance for road obstructions and clearances reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.

No.	REVISIONS	DATE	BY	APP'D.
	–	–	–	–

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HAYWARD EXECUTIVE AIRPORT

INNER PORTION OF RUNWAY 28L APPROACH SURFACE DRAWING

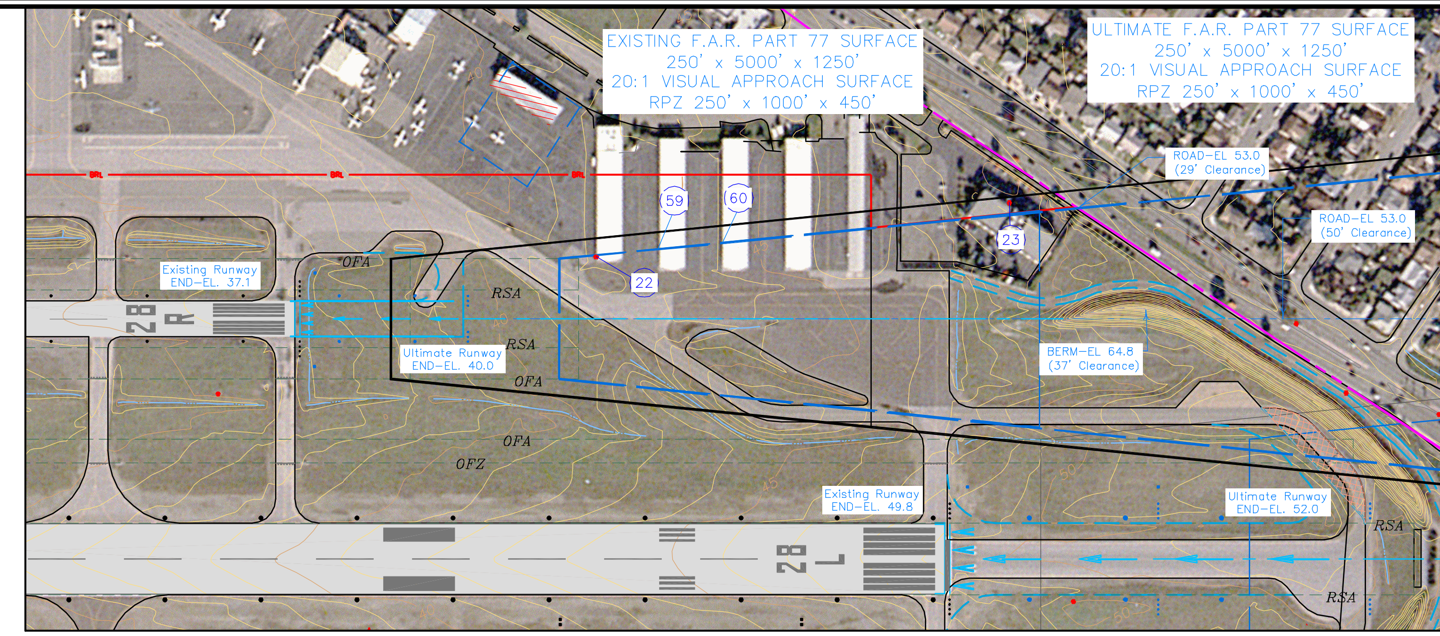
Hayward, California

PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

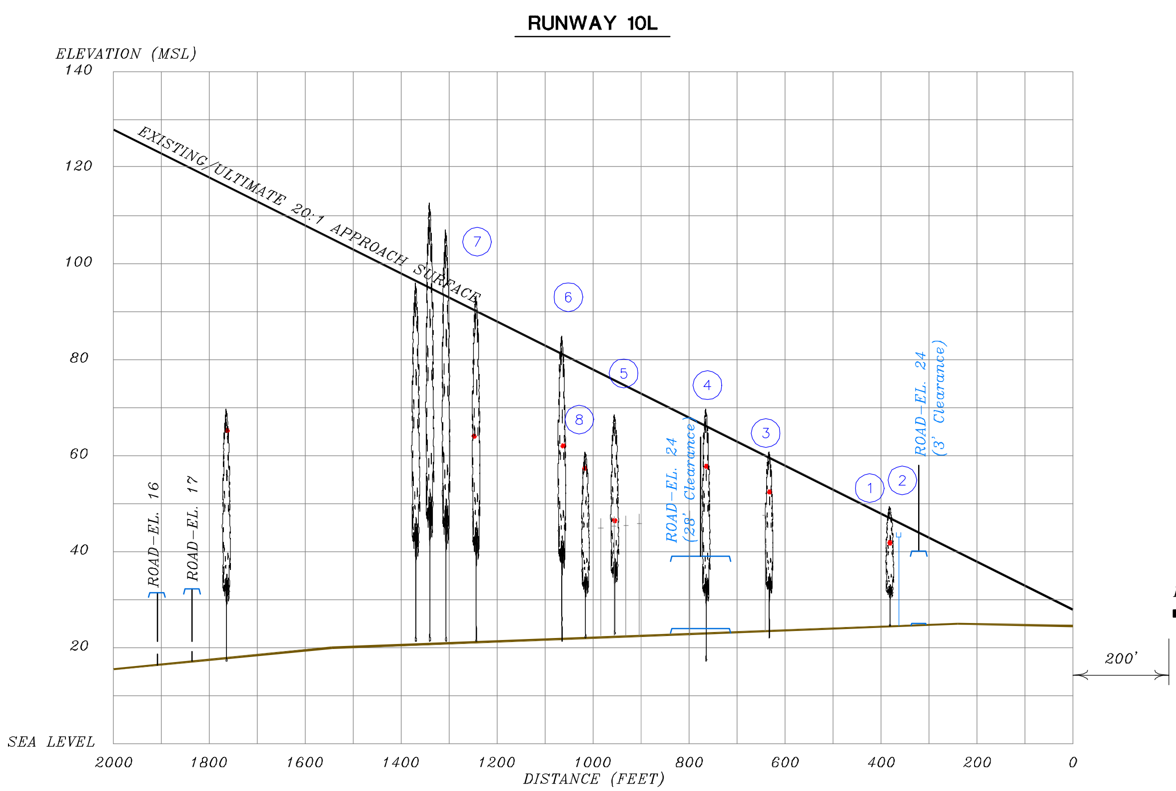
March 14, 2002

SHEET 6 OF 9

Coffman Associates
Airport Consultants

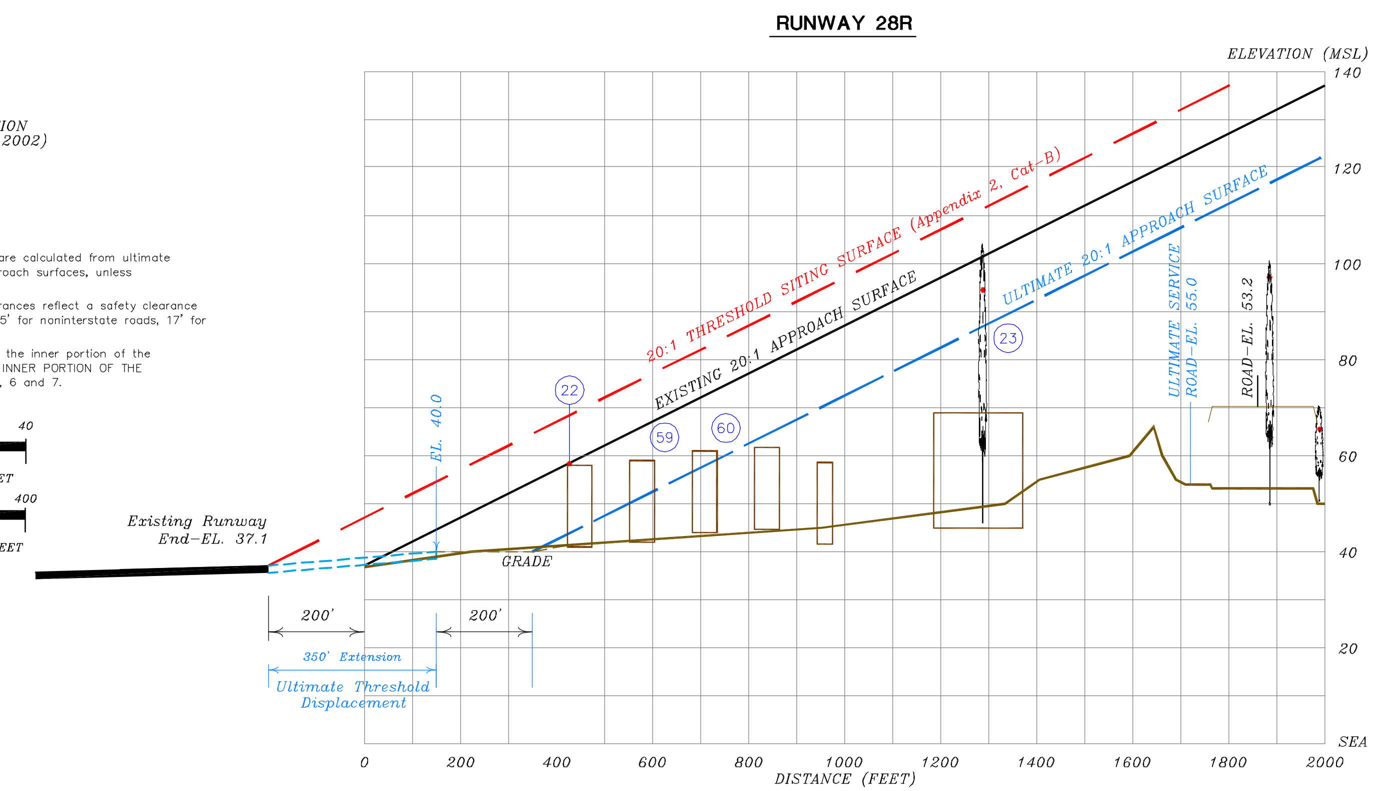


RUNWAY 10L



MAGNETIC DECLINATION
15.1564° East (March 2002)

RUNWAY 28R



GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Distance for road obstructions and clearances reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.
3. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the INNER PORTION OF THE APPROACH SURFACE DRAWING, sheets 5, 6 and 7.

VERTICAL SCALE IN FEET (0, 20, 40)

HORIZONTAL SCALE IN FEET (0, 200, 400)

RUNWAY 10L OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. TREE	49 MSL	20:1 APPROACH SURFACE	47 MSL	2'	REQUEST AERONAUTICAL STUDY
2. OL ON DME	44 MSL	7:1 TRANSITIONAL SURFACE	28 MSL	16'	"NO ACTION"
3. TREE	60 MSL	20:1 APPROACH SURFACE	59 MSL	1'	TRIM
		7:1 TRANSITIONAL SURFACE	53 MSL	7'	
4. TREE	70 MSL	20:1 APPROACH SURFACE	66 MSL	4'	TRIM
5. TREE	69 MSL	20:1 APPROACH SURFACE	75 MSL	0'	TRIM
		7:1 TRANSITIONAL SURFACE	44 MSL	25'	
6. TREE	84 MSL	20:1 APPROACH SURFACE	81 MSL	3'	TRIM
		7:1 TRANSITIONAL SURFACE	66 MSL	18'	
7. TREE	92 MSL	20:1 APPROACH SURFACE	90 MSL	2'	TRIM
		7:1 TRANSITIONAL SURFACE	71 MSL	21'	
8. TREE	60 MSL	34:1 APPROACH SURFACE	41 MSL	19'	TRIM
9. TREE	61 MSL	34:1 APPROACH SURFACE	47 MSL	14'	TRIM

RUNWAY 28R OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
22. HANGAR	58 MSL	20:1 APPROACH SURFACE	44 MSL	14'	AC150/5300-13 APPENDIX 2
23. TREE	104 MSL	7:1 TRANSITIONAL	86 MSL	18'	TRIM/REMOVE
59. HANGAR	59 MSL	20:1 APPROACH SURFACE	50 MSL	9'	REQUEST AERONAUTICAL STUDY
60. HANGAR	61 MSL	20:1 APPROACH SURFACE	56 MSL	5'	REQUEST AERONAUTICAL STUDY

No.	REVISIONS	DATE	BY	APP'D.
1	–	–	–	–

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HAYWARD EXECUTIVE AIRPORT
INNER PORTION OF RUNWAY 10L-28R APPROACH SURFACE DRAWING
Hayward, California

PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

March 14, 2002 SHEET 7 OF 9

Coffman Associates Airport Consultants

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT
		PAVEMENT (To Be Removed)
		BUILDING (To Be Removed)
		BUILDING CONSTRUCTION
BRL		BUILDING RESTRICTION LINE (BRL)
		DRAINAGE DITCH
		FACILITY CONSTRUCTION
		FENCING
		RUNWAY EDGE LIGHTS
VASI–4	PAPI–4	NAVIGATIONAL AID INSTALLATION (GVGI)
		RUNWAY THRESHOLD LIGHTS and REIL
34 35 / 3 2		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080		TOPOGRAPHY
		WIND INDICATOR (Lighted)
		DIRT ROAD
		PARCELS

AIRPORT LAND USE LEGEND

- AIRFIELD OPERATIONS
- GENERAL AVIATION TERMINAL COMPLEX
- NON-AVIATION RELATED REVENUE SUPPORT
- RECREATIONAL (Golf Course)
- AVIATION RELATED REVENUE SUPPORT
- GENERAL AVIATION REVENUE SUPPORT
- GROUND ACCESS/VEHICULAR CIRCULATION

MAGNETIC DECLINATION
15.1564° East (March 2002)

0 400 800 1200
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
1	–	–	–	–

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HAYWARD EXECUTIVE AIRPORT

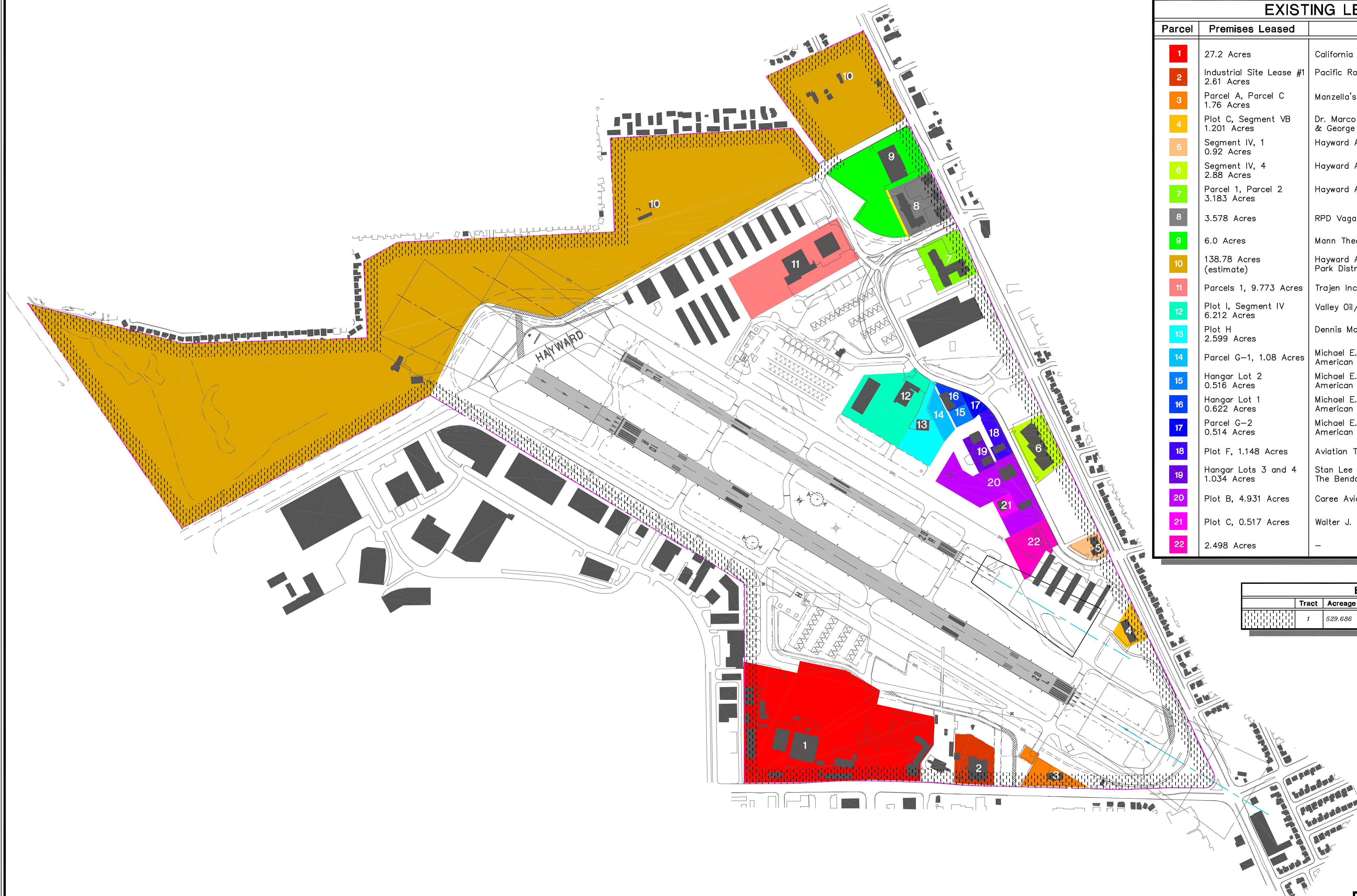
ON-AIRPORT LAND USE DRAWING

Hayward, California

PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

March 15, 2002 — SHEET 8 OF 9

Coffman Associates
Airport Consultants



EXISTING LEASEHOLD DATA

Parcel	Premises Leased	Lessee	Period/Expiration
1	27.2 Acres	California Air National Guard	2/24/1949–6/30/2014
2	Industrial Site Lease #1 2.61 Acres	Pacific Roller Die	4/1/1965–6/30/2013
3	Parcel A, Parcel C 1.76 Acres	Manzella's Seafood Loft	2/1/1973–1/31/2023
4	Plot C, Segment VB 1.201 Acres	Dr. Marco Chavez & George Chavez	8/1/1970–7/31/2020
5	Segment IV, 1 0.92 Acres	Hayward Airport Associates No.1	7/2/1984–10/10/2038
6	Segment IV, 4 2.88 Acres	Hayward Airport Associates No. 4	9/24/1984–9/23/2038
7	Parcel 1, Parcel 2 3.183 Acres	Hayward Airport Associates No. 6	7/15/1988–10/10/2038
8	3.578 Acres	RPD Vagabond Associates	9/11/1972–12/31/2022
9	6.0 Acres	Mann Theaters	1/25/1972–12/31/2022
10	138.78 Acres (estimate)	Hayward Area Recreation and Park District	7/1/1963–9/30/2004
11	Parcels 1, 9.773 Acres	Trajen Inc.	12/31/2048
12	Plot I, Segment IV 6.212 Acres	Valley Oil/Gull DBA Valley Oil Company	7/31/2007
13	Plot H 2.599 Acres	Dennis McDonald	6/30/2013
14	Parcel G–1, 1.08 Acres	Michael E. and Frances Coutches DBA American Aircraft Sales Company	12/31/2010
15	Hangar Lot 2 0.516 Acres	Michael E. and Frances Coutches DBA American Aircraft Sales Company	12/31/2010
16	Hangar Lot 1 0.622 Acres	Michael E. and Frances Coutches DBA American Aircraft Sales Company	2008
17	Parcel G–2 0.514 Acres	Michael E. and Frances Coutches DBA American Aircraft Sales Company	12/31/2010
18	Plot F, 1.148 Acres	Aviation Training, Inc.	8/31/2015 (Includes three 5 year options)
19	Hangar Lots 3 and 4 1.034 Acres	Stan Lee and Gary Lee Silverstein DBA The Bendor Company	2007
20	Plot B, 4.931 Acres	Caree Aviation Academy	6/30/2013
21	Plot C, 0.517 Acres	Walter J. Imbrulia	2011
22	2.498 Acres	–	–

EXISTING AIRPORT DATA

	Tract	Acreage	Property Interest	Acquisition Date	Project No.
	1	529.686	FEE SIMPLE	April 16, 1947	Quit Claim Deed USA to the City of Hayward

TRUE NORTH

MAGNETIC DECLINATION
15.1564° East (March 2002)

0 400 800 1200
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
1	–	–	–	–

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HAYWARD EXECUTIVE AIRPORT

AIRPORT PROPERTY MAP

Hayward, California

PLANNED BY: Christopher M. Hugunin
DETAILED BY: Larry D. Johnson
APPROVED BY: Stephen C. Wagner

March 15, 2002 *SHEET* 9 *OF* 9

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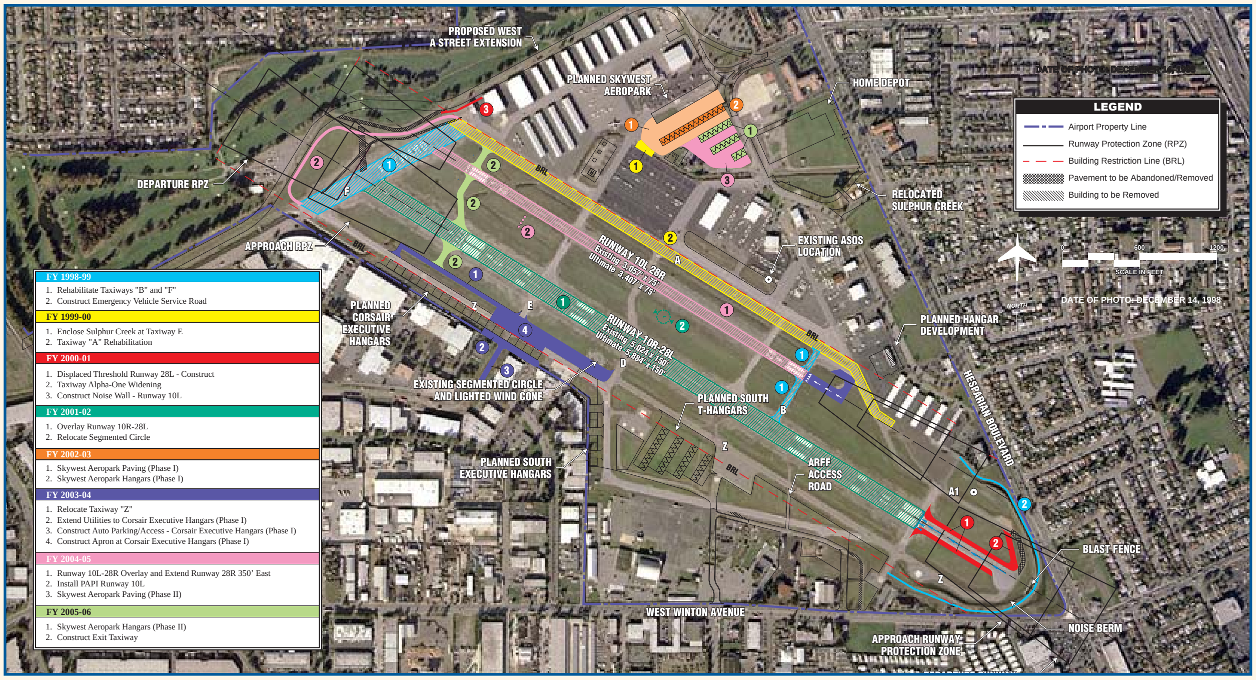
HAYWARD AIRPORT

Chapter Six
FINANCIAL PLAN

FINANCIAL PLAN

HAYWARD AIRPORT



The successful implementation of the Hayward Executive Airport Master Plan will require sound judgement on the part of the City of Hayward. Among the more important factors influencing decisions to carry out a recommendation are timing and airport activity. Both of these factors should be used as references in plan implementation.

Experience has indicated that major problems have materialized from the standard format of Master Plan documents which have used time as the primary reference for implementing recommended improvements. These problems center around the plan's inflexibility and inherent inability to deal with new issues that develop from unforeseen changes that may occur after it is completed. The demand-based format used in the development of this master plan has attempted to deal with this issue by linking improvements to verifiable activity levels.

While it is necessary for scheduling and budgeting purposes to consider the timing of airport development, the actual need for facilities is established by airport activity. Tracking airport activity levels and then comparing these to forecast activity levels and facility requirements provides decision-makers with the ability to anticipate and plan for when actual facilities are needed.

The presentation of the financial plan has been organized into two sections. First, the airport development schedule is presented in narrative and graphic form. Secondly, airport improvement funding sources on the Federal, State and local levels are identified and discussed.

AIRPORT DEVELOPMENT SCHEDULE AND COST SUMMARIES

Once the specific needs and improvements for the airport have been established, the next step is to determine a realistic schedule and costs for implementing the plan. The airport development schedule presented in this chapter outlines the costs for each recommended project, the timing for implementation and estimates the Federal funding eligibility for each airport improvement project. The local share costs for completing the recommended improvements are also projected. The program outlined on the following pages has been evaluated from a variety of perspectives and represents the culmination of a comparative analysis of basic budget factors, demand and priority assignments.

Individual project cost estimates were increased by 30 percent to account for engineering and other contingencies that may be experienced during the implementation of the project and are in current (1999) dollars. Due to the conceptual nature of a master plan, implementation of capital improvement projects should occur only after further refinement of their design and costs through engineering and/or architectural analyses. Capital costs in this chapter should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficient for performing the feasibility analyses in this chapter.

Since forecast demand and operational changes can change, frequently on short notice, the airport development schedule has been divided into planning horizons, reflecting short term (0-5 years), intermediate term (6-10 years) and long term (11-20 years) goals and needs. Planning horizons are intended to reflect the fact that many future improvements for the airport are demand-based, rather than time-based, and that the actual need to improve facilities will be linked to specific activity levels. The airport development schedule should be viewed as a fluid document which can be modified to reflect actual airport activity needs.

The short-term planning period covers items of highest priority. Because of their priority, these are the only items scheduled year-by-year so as to be easily incorporated into local and Federal programming. When short term planning horizon activity levels are reached, it will be time to program for the intermediate term based upon the next level of projected activity. Similarly, when these activity levels are reached, it will be time to program for long term activity levels.

Table 6A compares aircraft storage hangar demand to the proposed hangar development scheduling included in the Airport Development Schedule on **Exhibit 6A**. As shown in the table, a strong demand for aircraft storage facilities is expected through the planning period.

97MP17-6A-4/3/00

DESCRIPTION	TOTAL COST	FAA ELIGIBLE	LOCAL SHARE
SHORT TERM PLANNING HORIZON			
FY 1998-99			
1. Runway/Taxiway Signage/Marking Phase II	$146,000	$131,400	$14,600
2. Rehabilitate Taxiways "B" and "F"	232,000	208,800	23,200
3. Construct Emergency Vehicle Service Road	68,000	61,200	6,800
Subtotal FY 1998-99	**$446,000**	**$401,400**	**$44,600**
FY 1999-00			
1. Enclose Sulphur Creek at Taxiway E	$392,000	$0	$392,000
2. Taxiway "A" Rehabilitation	459,000	413,100	45,900
3. Rehabilitate Entrance Taxiway Runway 28L - Design Only	70,000	63,000	7,000
4. Runway/Taxiway Signage/Marking Phase III	300,000	270,000	30,000
Subtotal FY 1999-00	**$1,221,000**	**$746,100**	**$474,900**
FY 2000-01			
1. Displaced Threshold Runway 28L - Construct	$560,000	$504,000	$56,000
2. Taxiway Alpha-One Widening	34,000	30,600	3,400
3. Construct Noise Wall - Runway 10L	150,000	135,000	15,000
Subtotal FY 2000-01	**$744,000**	**$669,600**	**$74,400**
FY 2001-02			
1. Overlay Runway 10R-28L	$1,000,000	$900,000	$100,000
2. Relocate Segmented Circle	13,000	11,700	1,300
Subtotal FY 2001-02	**$1,013,000**	**$911,700**	**$101,300**
FY 2002-03			
1. Skywest Aeropark Paving (Phase I)	$393,000	$353,700	$39,300
2. Skywest Aeropark Hangars (Phase I)	650,000	0	650,000
Subtotal FY 2002-03	**$1,043,000**	**$353,700**	**$689,300**
FY 2003-04			
1. Relocate Taxiway "Z"	$551,000	$495,900	$55,100
2. Extend Utilities to Corsair Executive Hangars (Phase I)	87,000	0	87,000
3. Construct Auto Parking/Access - Corsair Executive Hangars (Phase I)	174,000	0	174,000
4. Construct Apron at Corsair Executive Hangars (Phase I)	437,000	393,300	43,700
Subtotal FY 2003-04	**$1,249,000**	**$889,200**	**$359,800**
FY 2004-05			
1. Runway 10L-28R Overlay and Extend Runway 28R 350 East	$500,000	$450,000	$50,000
2. Install PAPI Runway 10L	65,000	58,500	6,500
3. Skywest Aeropark Paving (Phase II)	393,000	353,700	39,300
Subtotal FY 2004-05	**$958,000**	**$862,200**	**$95,800**
FY 2005-06			
1. Skywest Aeropark Hangars (Phase II)	$678,000	$610,200	$67,800
2. Construct Exit Taxiway	264,000	237,600	26,400
Subtotal FY 2005-06	**$942,000**	**$847,800**	**$94,200**
TOTAL SHORT TERM PLANNING HORIZON	**$7,616,000**	**$5,681,700**	**$1,934,300**
INTERMEDIATE TERM PLANNING HORIZON			
1. Construct West Perimeter Service Road	123,000	110,700	12,300
2. Install REILs Runway 10L	130,000	117,000	13,000
3. Construct Public Terminal Building	834,000	0	834,000
4. Construct Auto Parking Terminal Building	45,500	0	45,500
5. Expand Portions of North Apron	686,600	617,940	68,660
6. Extend Utilities Corsair Executive Hangars (Phase II)	101,400	0	101,400
7. Construct Auto Parking/Access - Corsair Executive Hangars (Phase II)	300,300	0	300,300
8. Construct Apron at Corsair Executive Hangars (Phase II)	843,700	759,330	84,370
9. Construct Transient Helipad - North Side	336,100	302,490	33,610
TOTAL INTERMEDIATE TERM PLANNING HORIZON	**$3,400,600**	**$1,907,460**	**$1,493,140**
LONG TERM PLANNING HORIZON			
1. Construct T-Hangar Access Taxilanes - South T-Hangars	$559,000	$503,100	$55,900
2. Construct 52 T-Hangars - South T-Hangars	1,352,000	0	1,352,000
3. Construct Auto Parking/Access- South Executive Hangars	31,900	0	31,900
4. Extend Utilities to South Executive Hangars	71,000	0	71,000
5. Construct Apron at South Executive Hangars	74,800	67,320	7,480
6. Construct South Access Roads	132,900	0	132,900
7. Pavement Preservation	1,000,000	900,000	100,000
TOTAL LONG TERM PLANNING HORIZON	**$3,221,600**	**$1,470,420**	**$1,751,180**
TOTAL PROGRAM	**$14,238,200**	**$9,059,580**	**$5,178,620**

Exhibit 6A
AIRPORT DEVELOPMENT SCHEDULE

TABLE 6A
Hangar Demand/Capacity Comparison

	Existing	Short Term	Intermediate Term	Long Term
Aircraft Requiring Hangar Area	509	547	575	632
Aircraft which can be accommodated in Hangars [1]	268-318	268-318	337-414	350-445
Aircraft to be accommodated by Proposed Development				
SkyWest Aeropark Executive Hangars		11-29		
SkyWest Aeropark T-Hangars		51		
Corsair Executive Hangars		7-16	13-31	
South Executive Hangars				6-18
South T-Hangars				52
Total Aircraft Accommodated During Planning Period	268-318	337-414	350-445	408-515
Deficiency	191-241	133-210	130-225	117-224

[1] Intermediate and Long Term totals include development proposed in the preceding planning period

The following sections describe each planning horizon in more detail. **Table 6B** summarizes total development costs by planning horizon.

TABLE 6B
Summary of Total Development Costs

	Total Cost	Federally Eligible	Local Share
Short Term Planning Horizon	$7,616,000	$5,681,700	$1,934,300
Intermediate Term Planning Horizon	3,400,600	1,907,460	1,493,140
Long Term Planning Horizon	3,221,600	1,470,420	1,751,180
Total Development	$14,238,200	$9,059,580	$5,178,620

SHORT TERM PLANNING HORIZON IMPROVEMENTS

As indicated above, the short term planning horizon is the only development stage that is correlated to time due to development within this initial period being concentrated on the most immediate needs of the airport. Therefore, the program is presented year-by-year to assist in capital improvement programming. The short term planning horizon outlines the capital needs of the airport for fiscal years (FY 1998-1999 to FY 2005-2006). Short term planning horizon improvements are estimated to cost approximately $7.6 million and are summarized on **Exhibit 6A**.

FY 1998-1999 and FY 1999-2000

The primary projects included in FY 1998-1999 and FY 1999-2000 reflect projects currently funded under Federal Aviation Administration (FAA) grants AIP-10 and AIP-11. These combined grants are anticipated to fund a number of pavement rehabilitation and construction projects at the airport. Projects include rehabilitating Taxiways B, F, and A, paving the east emergency vehicle access road, and improving airfield signage and markings. This includes adding new directional signs and upgrading older signs.

FY 2000-2001

Development within this fiscal year is directed towards widening the Runway 28L entrance taxiway to the same width as Runway 10R-28L, widening Taxiway A1 and constructing a noise wall at the Runway 10L end.

As discussed in detail within this report, the Runway 28L entrance taxiway is recommended for widening to same width as Runway 10R-28L. This will enable the entrance taxiway to be designated as part of the runway and utilized for departures to the northwest. The intent is to provide for a departure point further southeast than presently provided on the runway to allow pilots and aircraft to more easily and quickly climb to a safe altitude over the airport and initiate departure turns over the airport. This is done to support current noise abatement procedures which attempt to avoid direct overflights of the San Lorenzo neighborhood to the northwest. Additionally, should aircraft need to directly overfly the San Lorenzo neighborhood, these aircraft would be at a higher altitude which can reduce the impacts of overflight noise.

An added benefit is that pilots can more easily comply with the requirements of the Aircraft Noise Ordinance since their departure point is located further from the noise monitoring stations. Pilots will also benefit from the increase in altitude gained through departing further to the southeast. This enables aircraft to be at a higher altitude over the noise monitors which can reduce the noise levels over the monitor.

A portion of Taxiway A1 is planned to be widened and relocated to provide sufficient wingtip clearance between the noise berm and aircraft accessing the Runway 28L end and meet FAA design standards for taxiway object free areas.

The development of a noise wall near the Runway 10L holding apron is also programmed for this fiscal year. This noise wall is intended to reduce aircraft run-up noise levels as aircraft prepare for departure to the southeast. Since most aircraft must be aligned with the prevailing wind during pre-flight run-up procedures, most run-up noise is presently directed towards the San Lorenzo neighborhood to the northwest. As presently envisioned, the noise wall would extend for approximately 400 feet and follow the alignment of Golf Course Road.

FY 2001-2002

The overlay of Runway 10R-28L is programmed for this fiscal year. This is expected to involve a three-inch asphalt overlay. This improvement is not intended to increase the pavement strength of the runway.

The segmented circle and lighting wind cone are planned to be relocated to the center of the airfield between Runway 10R-28L and Runway 10L-28R. This will provide for the relocation of Taxiway Z in 2003-2004 and development of the Corsair Executive Hangars.

FY 2002-2003

Development within this fiscal year is focused on completing Phase I development for the SkyWest Aeropark. The SkyWest Aeropark is a hangar development area planned for the vacant area adjacent to the airport traffic control tower (ATCT). As planned, this area has been reserved for the development of executive hangars (assumed to be developed privately) and T-hangars (assumed to be developed by the Airport.

Phase I includes paving taxilanes for the executive hangars and 25-unit T-hangar building. This includes widening Taxiway E to provide dual taxilane access to the SkyWest Aeropark area. Sulphur Creek will need to be placed within a culvert prior to hangar construction. This culvert is required to provide the widened taxiway entrance to the hangar area. This project is programmed in FY 1999-2000. SkyWest Drive must also be relocated prior to developing hangars in this area. The SkyWest Drive relocation will be funded separately by the City of Hayward. A final project in this fiscal year is relocating the segmented circle and wind cone to allow for the relocation of Taxiway Z and remove these facilities from the Runway 10R-28L object free area.

FY 2003-2004

Development within this fiscal year is focused on providing infrastructure improvements for the development of a series of executive hangars along the southern airport boundary. Referred to as the Corsair Executive Hangars, this area presently has 20 designated hangar parcels which can accommodate storage hangars to 3,600 square feet (60' x 60').

Development within this fiscal year completes Phase I development of the Corsair Executive Hangar area. This includes relocating a 1,973-foot portion of Taxiway Z (north of Taxiway D) 100 feet to the north to the same lateral distance as the southwest portion of Taxiway Z. Only the portion of the taxiway necessary for the development of the hangars is planned to be relocated in an effort to not cross Sulphur Creek. Additional projects programmed for this fiscal year include apron expansion, roadway and parking development and the extension of primary utility lines to the executive hangar parcels.

As planned, the Airport would complete all infrastructure improve-ments for the Corsair Executive Hangar area. All hangars would be developed privately through long term lease agreements. Phase I includes providing for development on the first seven hangar parcels.

Since Calstar Aviation is located along Taxiway Z, it will be necessary to increase the apron area adjacent to their hangar once Taxiway Z is relocated to the north to ensure that airfield access is retained for this business. This is included in the apron development costs.

FY 2004-2005

Development within this fiscal year is concentrated on rehabilitating the Runway 10L-28R pavement surface through an overlay project and extending Runway 28R 350 feet southeast. Similar to Runway 28R, the extension of Runway 28R to the southeast is planned to move this departure threshold further to the southeast to aid pilots in complying with the Aircraft Noise Ordinance and noise abatement procedures and reduce aircraft noise and overflights over the San Lorenzo neighborhood to the northwest.

The installation of a precision approach path indicator (PAPI) to Runway 10L is programmed for this fiscal year. The PAPI will assist pilots in determining the correct descent path to the Runway 10L threshold and ensure that aircraft do not fly too low over residential development to the northwest.

Phase II paving for the SkyWest Aeropark is to be completed in this fiscal year. This includes constructing the remaining taxilanes.

FY 2005-2006

The development of an additional runway exit taxiway midway between Taxiway D and Taxiway F is programmed for this fiscal year. This taxiway is planned to provide a direct connection to the West T-hangar and apron area. This taxiway will serve to increase airfield safety and efficiency by reducing the amount of time that aircraft occupy the runway. This taxiway is planned to extend from Taxiway A to Taxiway Z and has been positioned to avoid crossing Sulphur Creek. SkyWest Aeropark hangar, Phase II development is programmed for this fiscal year. This includes developing the final 26 T-hangars in this area.

Exhibit 6B provides a graphical depiction of the primary airfield and landside improvements programmed for the short term planning horizon.

INTERMEDIATE TERM PLANNING HORIZON

Improvements programmed for the intermediate term planning horizon include service road construction, continued hangar development, and

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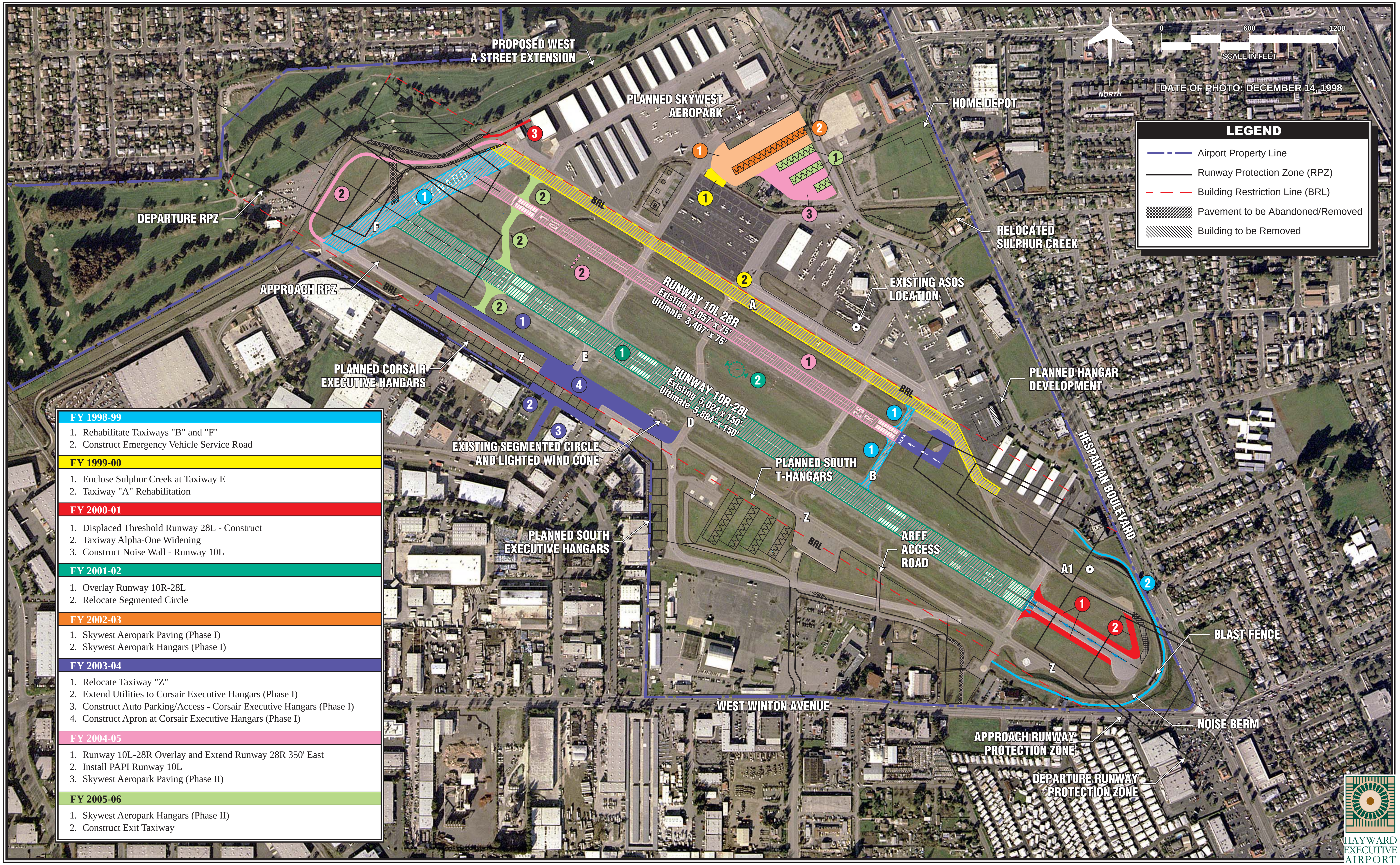


Exhibit 6B
SHORT TERM PLANNING
HORIZON IMPROVEMENTS

terminal complex improvements. Intermediate term planning horizon improvements are estimated to cost $3.4 million and are summarized on **Exhibit 6A**. **Exhibit 6C** provides a graphical depiction of the primary airfield and landside improvements programmed for the intermediate term planning horizon.

The west perimeter service road presently extends along the northwest side of Taxiway D and is located within the Runway 10R runway safety area and object free area. This road is planned to be relocated to remove this roadway from these safety areas. This road is expected to follow the existing Golf Course Road alignment to ensure adequate clearance at the Runway 10L end. This road is also planned to provide direct access to the localizer antenna, located north of Taxiway F.

The installation of runway end identifier lights (REILs) are programmed for this fiscal year. REILs will aid pilots in distinguishing the Runway 28L threshold lighting from other runway ends.

The primary terminal complex improvement is the construction of a public terminal building adjacent to the existing ATCT and airport administration building. As planned this building would provide services for pilots and airport visitors. This building is also planned to accommodate airport administration offices.

The full development of the Corsair Executive Hangar area is programmed for the intermediate term planning horizon. Improvements include developing the remaining access roads, parking areas, utility extensions and apron development. Completing these improvements can allow for the development of an additional 13 lease parcels. The development ofseven lease parcels was programmed for the short term planning horizon.

An expansion of the north apron is included in this planning horizon. This project will pave portions of the north apron which are currently unpaved. This is intended to provide larger operational areas adjacent to existing hangar areas. The existing airport surface observation system (ASOS) will need to be relocated prior to expanding the apron. The FAA owns and operates the ASOS. The relocation of the ASOS will be at their discretion.

The development of the north helipad and helicopter parking positions is programmed for this planning horizon. The helipad is planned to be developed along the northwest portion of the transient apron, bordering Sulphur Creek. The helipad is expected to serve helicopter operations for the north side of the airport. Presently, there are no dedicated helicopter facilities on the north side of the airport.

LONG TERM PLANNING HORIZON

Long term planning horizon improvements are estimated to cost $3.2 million and are summarized on **Exhibit 6A**. The improvements programmed for the long term planning horizon focus on development south of Taxiway Z to meet projected demand. This includes developing T-hangars along Taxiway Z between the south apron and south helipad, and provisions for the development of a series of executive hangar parcels along Taxiway D. This includes roadway, apron and utility improvements. Proposed roadway improvements are also included in this planning horizon. These roadway improvements will promote the leasing of a variety of general aviation and industrial/commercial lease parcels as shown in the recommended airport plan.

A total of $1,000,000 ($100,000 annually) is included in the long term planning horizon for pavement preservation activities. Pavement preservation activities typically include applying a slurry seal to rejuvenate and protect the pavement surface, crack sealing, and/or small pavement repairs.

Exhibit 6C provides a graphical depiction of the primary airfield and landside improvements programmed for the long term planning horizon.

AIRPORT DEVELOPMENT AND FUNDING SOURCES

Financing future airport improvements will not rely exclusively upon the financial resources of the City of Hayward. Airport improvement funding assistance is available through various grant-in-aid programs at both the State and Federal levels. The following discussion outlines the key sources for airport improvement funding and how they can contribute to the successful implementation of this master plan.

FEDERAL AID TO AIRPORTS

The United States Congress has long recognized the need to develop and maintain a system of aviation facilities across the nation for national defense and promotion of interstate commerce. Various grant-in-aid programs to public airports have been established over the years for this purpose. The current Federal grant-in-aid program is the Airport Improvement Program (AIP), which was established in 1982. AIP has been reauthorized several times since 1982; however, the authorized spending levels have varied annually.

The most recent appropriation for the AIP was included in the Fiscal Year (FY)1999 Omnibus Appropriations Act which appropriated $975 million for the AIP through March 31, 1999 - half of the $1.95 billion obligational authority for the year. Congress failed to pass a full year reauthorization of the AIP due to conflicts surrounding capacity "slot" allotments at four major airports and existing service rules at Washington National Airport. While attempting to resolve these issues, Congress passed two short-term appropriations of the AIP during FY 1999. Full FY 1999 funding was not authorized until September 1999, near the end of the fiscal year. A funding program for FY 2000 has been established at $1.95 billion by both the House and Senate appropriation committees.

97MP17-6C-4/3/00

Exhibit 6C
INTERMEDIATE TERM AND LONG TERM
PLANNING HORIZON IMPROVEMENTS

The funding levels authorized in the legislation are not always the levels appropriated in the annual Congressional budget process. In fiscal year 1996, the AIP authorized level was $2.161 billion, but only $1.45 billion was appropriated. Only $1.46 billion of the authorized $2.28 billion was appropriated in 1997. For fiscal year 1998, $1.7 billion of the authorized $2.347 billion was appropriated.

The source for AIP funds is the Aviation Trust Fund. The Aviation Trust Fund was established in 1970 to provide funding for aviation capital investment programs (e.g., facilities and equipment, research and development, and grants for airport development and expansion projects). The FAA's operations account is also financed through the Aviation Trust Fund. The Aviation Trust Fund is funded by Federal user fees and taxes on airline tickets, aviation fuel, and various aircraft parts.

AIP funds are distributed each year by the FAA under authorization from the United States Congress. A portion of each year's authorized level of AIP funding is distributed to all eligible commercial service airports through an entitlement program that guarantees a minimum level of Federal assistance each year. These dollars are calculated based upon enplanement and cargo service levels.

The remaining AIP funds are distributed by the FAA to airports based upon the priority of the project for which they have requested Federal assistance through Federal discretionary apportionments. A National Priority Ranking System is used to evaluate and rank each airport project. Those projects with the highest priority are given preference in receiving discretionary funding.

As is evident from the airport development schedule cost summaries, the City of Hayward will rely on Federal discretionary funding to implement many of the development needs for the airport. An important point to consider is that Federal discretionary funding is not guaranteed each year for the airport.

In California, airport development projects at general aviation airports that meet FAA's eligibility requirements receive 90 percent funding from the AIP. Eligible projects include any public use facility such as airfield and apron improvements. Revenue generating improvements such as fuel facilities and hangars are generally not eligible for AIP funding. FAA has historically not funded these types of facilities, but currently are under review by the agency for consideration as an eligible airport improvement in the future.

FAA FACILITIES AND EQUIPMENT PROGRAM

The Airway Facilities Division of the FAA administers the national Facilities and Equipment (F&E) Program. This annual program provides funding for the installation and maintenance of various navigational aids and equipment for the national airspace system and airports. Under the F&E program, funding is provided for FAA air traffic control towers, en route navigational aids such as VORs, on-airport navigational aids such as PAPIs and approach lighting systems. For FY 2000, the House and Senate appropriation committees have approved a funding level of $2.075 billion for this program.

As activity levels and other development warrant, the airport may be considered by the FAA Airways Facilities Division for the installation and maintenance of navigational aids through the F&E program. The proposed lighting aids for Runway 10L-28R could be funded through this program.

STATE AID TO AIRPORTS

In support of the State airport system, the California Transportation Commission (CTC) also participates in State airport development projects. An Aeronautics Account has been established within the State Transportation Fund from which all airport improvement monies are drawn. Tax revenues from the sale of general aviation jet fuel ($0.02 per gallon) and Avgas ($0.18 per gallon) are collected and deposited in the Aeronautics Account to support the State airport system development program.

The California Transportation Commission has established three grant programs to distribute funds deposited in the Aeronautics Account: Annual Grants, Acquisition and Development (A & D) Grants, and AIP Matching Grants. Another funding source provided by the CTC is low interest loans. Each item is briefly discussed below.

Annual Grants

Annual Grants are distributed by the CTC for projects considered for "airport and aviation purposes" as defined in the State Aeronautics Act. All public use airports, with the exception of reliever and commercial service airports, are eligible for this annual $10,000 grant. As a reliever airport, Hayward Executive Airport is not eligible for this grant.

Acquisition and Development (A & D) Grants

A & D Grants are designed to provide funding to airports for the purpose of land acquisition and development. This grant has a minimum allocation level of $10,000 and provides up to $500,000 per fiscal year (maximum allowable funding to a single airport yearly). Grant requests are initiated through the CIP process and require a local match of 10 to 50 percent of the project's cost. Unlike Annual Grants, all airports are eligible for the A & D grant.

AIP Matching Grants

The AIP grant is distributed for the purpose of aiding an airport with the local match of a Federally funded improvement project. In order to be eligible for an AIP Matching Grant, the project must have been included in the State CIP and the sponsor must have accepted a Federal AIP Grant for the project. This grant provides 4.5 percent of the project's eligible cost (i.e. 5 percent of the AIP Grant) and counts towards the yearly $500,000 maximum grant disbursement level. As illustrated by **Exhibit 6A,** a majority of the projects within the CIP reflect eligibility for matching funds provided by the State.

California Airport Loan Program

The loan program provides funding for all airports within the State of California which are owned by an eligible public agency and open to the public without exception. These loans provide funding to eligible airports for construction and land acquisition projects which will benefit the airport and improve its self-sufficiency. The loans can be used for any airport related project and the funding limits are not bound by law or regulation. The amount of the loan is determined in accordance with project feasibility and the sponsor's financial status. Terms of the loan provide 8 to 15 years for its payback and the interest rate is based upon the most recent State bond sale.

Table 6C summarizes the proposed airport improvement projects through the planning period which are eligible for State grant assistance. As shown in the table, the City of Hayward is eligible for approximately $503,310 in funding assistance should the City of Hayward actively pursue State grants.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. Additionally, the City of Hayward would need to fund projects not eligible for grant assistance.

There are several alternatives for local finance options for future development at the airport, including airport earnings or reserves, direct funding from the City, issuing bonds and leasehold financing.

Airport Operating Fund

The City of Hayward operates the airport as an enterprise fund in accordance with typical accounting principles for governmental agencies. Included in the enterprise fund is the maintenance of accounts for operating revenues and expenditures. **Table 6D** provides a summary of fiscal year (FY) 1998-1999 actual revenues and expenditures and a five-year cash flow projection prepared by the City of Hayward.

The primary revenue sources for the airport are aircraft storage hangar, building and land rentals. Land rentals include both aviation-related and non-aviation-related lease revenues. Additional revenue is generated from fees on the sale of aviation fuels and tiedown fees. The airport also receives property tax revenues on based aircraft.

Operating expenses include personnel, maintenance and repairs and materials supplies and expenses. Personnel expenses are the largest expense category and include airport administration and maintenance staff positions. The maintenance and repair category includes facility maintenance charges. Operating transfers are charges paid to the City Department. This includes debt payments, insurance, and administrative charges.

TABLE 6C CALTRANS Eligible Improvements		
DESCRIPTION	TOTAL COST	CALTRANS ELIGIBLE
SHORT TERM PLANNING HORIZON		
FY 1998-1999		
1. Runway/Taxiway Signage/Marking Phase II 2. Rehabilitate Taxiways "B" and "F" 3. Construct Emergency Vehicle Service Road	$146,000 232,000 68,000	$7,300 11,600 3,400
Subtotal FY 1998-1999	$446,000	$22,300
FY 1999-2000		
1. Taxiway "A" Rehabilitation 2. Rehabilitate Entrance Taxiway Runway 28L - Design Only 3. Runway/Taxiway Signage/Marking Phase III	$459,000 70,000 300,000	$22,950 3,500 15,000
Subtotal FY 1999-2000	$829,000	$41,450
FY 2000-2001		
1. Displaced Threshold Runway 28L - Construct 2. Taxiway Alpha-One Widening 3. Construct Noise Wall - Runway 10L	$560,000 34,000 150,000	$28,000 1,700 7,500
Subtotal FY 2000-2001	$744,000	$37,200
FY 2001-2002		
1. Overlay Runway 10R-28L 2. Relocate Segmented Circle	$1,000,000 13,000	$50,000 650
Subtotal FY 2001-2002	$1,013,000	$50,650
FY 2002-2003		
1. SkyWest Aeropark Paving (Phase I)	$393,000	$19,650
FY 2003-2004		
1. Relocate Taxiway "Z" 2. Construct Apron at Corsair Executive Hangars (Phase I)	$551,000 437,000	$27,550 21,850
Subtotal FY 2003-2004	$988,000	$49,400
FY 2004-2005		
1. Runway 10L-28R Overlay and Extend Runway 28R 350 ft. East 2. Install PAPI Runway 10L 3. SkyWest Aeropark Paving (Phase II)	$500,000 65,000 393,000	$25,000 3,250 19,650
Subtotal FY 2004-2005	$958,000	$47,900
FY 2005-2006		
1. SkyWest Aeropark Hangars (Phase II) 2. Construct Exit Taxiway	$678,000 264,000	$33,900 13,200
Subtotal FY 2005-2006	$942,000	$47,100
TOTAL SHORT TERM PLANNING HORIZON	$6,313,300	$315,650

TABLE 6C (Continued) CALTRANS Eligible Improvements		
DESCRIPTION	**TOTAL COST**	**CALTRANS ELIGIBLE**
INTERMEDIATE TERM PLANNING HORIZON		
1. Construct West Perimeter Service Road	$123,000	$6,150
2. Install REILs Runway 10L	130,000	6,500
3. Expand Portions of North Apron	686,600	34,330
4. Construct Apron at Corsair Executive Hangars (Phase II)	843,700	42,185
5. Construct Transient Helipad - North Side	336,100	16,805
TOTAL INTERMEDIATE TERM PLANNING HORIZON	$2,119,400	$105,970
LONG TERM PLANNING HORIZON		
1. Construct T-Hangar Access Taxilanes – South T-Hangars	$559,000	$27,950
2. Construct Apron at South Executive Hangars	74,800	3,740
3. Pavement Preservation	1,000,000	50,000
TOTAL LONG TERM PLANNING HORIZON	$1,633,800	$81,690
TOTAL PROGRAM	$10,066,200	$503,310

The airport's debt service is related to T-hangar construction. According to City records, the certificates of participation (COP) issued for the construction of T-hangars in 1986 are scheduled to be retired in 2003. These COPs have a remaining principal balance of approximately $750,000 and interest due of approximately $156,000. Annual payments on these COPs total approximately $230,000.

As shown in **Table 6D**, the Hayward Executive Airport presently enjoys a strong financial position. The airport operating fund is generating a net income. Additionally, the airport has increased retained earnings over the previous five years.

The operating revenues for the airport can be expected to increase in the future as activity grows and future hangar development areas are developed, the south side of the airport is developed and nonaviation-related development continues along Hesperian Boulevard. While future operating expenses can be expected to increase as the result of additional personnel and maintenance expenses, future operating revenue increases are expected to offset these additional costs.

While total debt service requirements are presently declining, total debt service may increase in the future should the City of Hayward develop the T-hangars and finance the T-hangars with some form of long term debt financing. The debt financing costs can be expected to be amortized through hangar rental revenues.

TABLE 6D
Airport Operating Revenues 5-Year Projections
Hayward Executive Airport

	Actual 1998-1999	1999-00	2000-01	2001-02	2002-03	2003-04
REVENUES						
Building Rent	$45,039	$46,500	$46,500	$46,500	$46,500	$46,500
Hangar Rent[1]	723,233	732,613	732,613	754,591	754,591	777,229
Land Rent[2]	614,119	651,000	657,510	664,085	670,726	677,433
Future Expected Land Rents*	0	0	200,000	438,000	438,000	438,000
Tie-Down Rent	25,119	25,119	25,119	25,119	25,119	25,119
Permits	2,863	2,855	2,855	2,855	2,855	2,855
Transit A/C Parking	1,439	1,000	1,000	1,000	1,000	1,000
Commissions[3]	287,542	291,855	296,233	300,676	305,187	309,764
Other Income	5,385	1,500	1,500	1,500	1,500	1,500
Property Tax (A/C)	96,271	98,196	100,160	102,164	104,207	106,291
Interest Income[4]	132,931	148,000	110,829	72,082	73,579	75,672
TOTAL REVENUES	$1,933,941	$1,998,639	$2,174,319	$2,408,573	$2,423,264	$2,461,383
EXPENSES						
Employee Services[5]	$640,554	$675,889	$705,997	$727,177	$748,992	$771,462
Maint. & Utilities[5]	111,771	128,258	128,437	132,290	136,259	140,347
Supplies & Services[5]	206,877	283,728	277,525	283,851	294,426	303,259
Interdept. Charges[5]	65,414	69,807	70,057	71,458	72,887	74,345
Capital Acquisitions	37,159	11,000	7,000	7,000	7,000	7,000
State Loan (Principal)	10,327	10,326	10,326	10,327	10,327	10,327
State Loan (Interest)	10,964	10,177	9,390	8,601	7,815	6,240
TOTAL EXPENSES	$1,083,066	$1,189,185	$1,208,732	$1,242,704	$1,277,707	$1,312,980
TRANSFERS TO OTHER FUNDS						
Admin. Overhead[6]	$149,501	$149,501	$149,501	$152,491	$155,541	$158,652
Liability Insurance	33,514	33,514	33,514	33,514	33,514	33,514
Future Expected Debt Service	0	210,000	210,000	210,000	210,000	210,000
Hangar Debt (COP)[7]	233,220	234,120	233,610	236,600	----	----
Total Transfer Funds	$416,235	$627,135	$626,625	$632,605	$399,055	$402,166
TOTAL EXPENSES AND TRANSFERS	$1,499,301	$1,816,320	$1,835,357	$1,875,309	$1,676,761	$1,715,145
NET OPERATING INC. / <DEC.>	$434,640	$182,319	$338,962	$533,264	$746,502	$746,218
WORKING CAPITAL	$3,208,547	$2,962,866	$2,801,828	$2,135,092	$2,381,594	$2,427,812
CIP Transfer to 632[8]	$428,000	$500,000	$1,200,000	$500,000	$700,000	$800,000
ENDING WORKING CAPITAL BALANCE[9]	$2,780,547	$2,462,866	$1,601,828	$1,635,092	$1,681,594	$1,627,812

Assumptions:
1. Hangar rent increases projected at 3% every other year.
2. Land rent does not include new development. Other lease adjustments estimated at an overall average of 1% per year after FY 1999-00.
3. Commissions are comprised of Fuel Flowage, Festival Theater % rent, and Golf Course % rent.
4. Interest income estimated at 4.5% of ending Operating Fund Balance.
5. Automatic 3% increase (commencing 2001-02) for the following: Maintenance & Utilities; Supplies & Services; Interdepartmental Charges and Employee Services; Sulphur Creek maintenance and landscaping expenses. Actual expenses may be less.
6. Automatic 2% increase commencing 2001-02 for Administrative Overhead. Actual expense may be less.
7. Hangar Debt Service per COP debt redemption schedule. Final payment: April 2003.
8. Operating Funds transferred to Capital Improvement Fund for anticipated Master Plan Projects.
9. MINIMUM Working Capital Fund Balance established at $1.5 million.

Source: City of Hayward * Home Depot

Bonds

There are several municipal bonding options available to the City of Hayward including: general obligation bonds, limited obligation bonds, and revenue bonds. General obligation bonds are a common form of municipal bond which is issued by voter approval and is secured by the full faith and credit of the City. City tax revenues are pledged to retire the debt. As instruments of credit, and because the community secures the bonds, general obligation bonds reduce the available debt level of the community. Due to the community pledge to secure and pay general obligation bonds, they are the most secure type of municipal bond and are generally issued at lower interest rates and carry lower costs of issuance. The primary disadvantage of general obligation bonds are that they require voter approval and are subject to statutory debt limits. This requires that they be used for projects that have broad support among the voters, and they be reserved for projects that have highest public priorities. In contrast to general obligation bonds, limited obligation bonds (sometimes referred to as a Self Liquidating Bonds) are secured by revenues from a local source. While neither general fund revenues nor the taxing power of the local community is pledged to pay the debt service, these sources may be required to retire the debt if pledged revenues are insufficient to make interest and principal payments on the bonds. These bonds still carry the full faith and credit pledge of the local community and therefore are considered, for the purpose of financial analysis, as part of the debt burden of the local community. The overall debt burden of the local community is a factor in determining interest rates on municipal bonds.

There are several types of revenue bonds, but in general they are a form of municipal bond which is payable solely from the revenue derived from the operation of a facility that was constructed or acquired with the proceeds of the bonds. For example, a Lease Revenue Bond is secured with the income from a lease assigned to the repayment of the bonds. Revenue bonds have become a common form of financing airport improvements. Revenue bonds present the opportunity to provide those improvements without direct burden to the taxpayer. Revenue bonds normally carry a higher interest rate because the lack the guarantees of general and limited obligation bonds.

Another source for funding is a certificate of participation. Certificates of participation are similar to lease revenue bonds, except that they normally do not constitute indebtedness under constitutional or statutory debt limits. In general, they are a form of security which allows the purchaser of the certificate to participate in the income stream of the improvement. The City-owned and managed T-hangars were developed in this manner. Future T-hangars facilities could be developed in a similar manner.

Leasehold Financing

Leasehold financing refers to a developer or tenant financing improvements under a long-term ground lease. The obvious advantage of such an arrangement is that it relieves the community of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a municipal agency, produces a unique set of problems. In particular, it is more difficult to obtain private financing as only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases normally provide for the reversion of improvements to the lessor at the end of the lease term, which reduces their potential value to a lender taking possession. Also, companies that want to own their property as a matter of financial policy may not locate where land is only available for lease. The City of Hayward has used long-term lease arrangements successfully to finance capital improvements at the airport in the past. Most hangar facilities were developed with private funds under a long-term ground lease with the City. Future executive hangars and industrial/commercial development parcels at the airport can be developed in a similar manner.

Developing Sites for Lease

As detailed in the recommended airport plan, a number of development lease sites have been designated on the airport. There are several options which can be considered for facility development on these parcels. The most obvious is private development on each lease parcel by the leaseholder. As discussed previously, this is commonly done with long term lease agreements. Other options are available to the City as well. The City has the option of developing future lease parcels for individual tenants, or of entering into a master ground lease with a private developer who would perform the necessary development and offer both sites and buildings to tenants.

Master ground leases offer a substantial financial advantage to a private developer as there are not up-front acquisition costs and lease payments are fully deductible for tax purposes, whereas owned land cannot be depreciated. This option could be structured as a straight ground lease or as a joint venture. Under a master ground lease to a developer, the City would not be involved in the construction, financing, sale, or lease of buildings for tenants.

Developing Buildings for Sale or Lease

There may be circumstances where the City will want to participate in the construction of facilities, either as part of a joint venture or to provide inducements to attract certain tenants. The simplest way to do this is to underwrite the construction and financing of those facilities, keeping them in City ownership and leasing them to tenants.

As a joint venture partner, the City would provide funds for construction and permanent financing. A joint venture could be structured so that the various benefits would be available for each partner according to their highest use; for example: tax benefits such as depreciation would go to the private developer while cash income would go to the City. This could be used successfully to fund individual buildings for specific tenants, where lower rents could be charged in exchange for partial ownership, producing income from both rents and interest payments.

These financing techniques offer marketing inducements, as they assume the City can obtain lower-cost funds than are available in the private market. These lower costs can then be passed through to the development process to reduce lower rental rates. To avoid the appearance of unfairly competing with the private sector, it will be important to establish comparable market rental rates.

Hangar Development Comparison

As mentioned previously, the City of Hayward has a number of options when considering the development of future hangar facilities at the airport. These include: 1) developing the hangars with a combination of City resources and Federal grant funds; 2) developing the hangars with a combination of City resources, federal grant funds and private resources; and 3) allowing for the private development of the hangars and related infrastructure improvements.

Option 1 allows the City of Hayward to construct apron and taxilane improvements with Federal grant funds while developing the hangars with City resources. This follows a similar pattern used to develop T-hangars in the past. The second option would involve the City completing non-eligible infrastructure improvements (i.e. roadway and utilities) with City resources and apron and taxilane improvements with Federal grant funds. The hangar facilities would be constructed privately under a long term ground lease agreement. An important consideration for following this option is to ensure the apron and taxilane improvements would comply with Federal grant assurances regarding Exclusive Rights. To comply with this grant assurance, the City would need to demonstrate that the apron/taxilane area would not be constructed to benefit a single user. The third option involves the private development of the hangars and related infrastructure improvements under a long term ground lease with the airport.

When compared, Option 1 requires the commitment of a larger amount of City resources than do Options 2 and 3.

Option 1 also requires that the City incur the cost of financing, however; these costs can be amortized and recovered through lease payments. The second and third options reduce the amount of the funds required by the City of Hayward for the improvements since these rely on private funding of the hangar facilities. In fact, Option 3 requires no City resources since all development is assumed privately.

Table 6E compares T-hangar rental rates for both the proposed SkyWest Aeropark T-hangars and South T-hangars following the three options discussed above. For this analysis, development costs are assumed to be same for both the City or private developer. In Options 1 and 2, all matching costs for federal apron/taxilane development are assumed to be funded with City resources. The Sulphur Creek culvert is assumed to be funded by the City in all scenarios. All utility costs are incorporated into T-hangar costs.

TABLE 6E
T-Hangar Lease Rate Comparison

	Option 1	Option 2	Option 3
Proposed SkyWest Aeropark T-hangars			
Development Costs Apron/Taxilanes Hangars	 $0 $1,326,000	 $0 $1,326,000	 $785,000 $1,326,000
Minimum Monthly Lease Rate	$219 [1]	$271 [2,3]	$418 [2,3]
Comparable Rental Rate [4]	$347	$347	$347
Net Monthly Revenue to Airport (each hangar)	$128[5]	$23[6]	$23[6]
Proposed South T-Hangars			
Development Costs Apron/Taxilanes Hangars	 $0 $1,352,000	 $0 $1,352,000	 $559,000 $1,352,000
Minimum Monthly Lease Rate	$219 [1]	$276 [2,3]	$380 [2,3]
Comparable Rental Rate [4]	$347	$347	$347
Net Monthly Revenue to Airport (each hangar)	$128[5]	$23[6]	$23[6]

[1] Amortized at 6% over 15 years, equal payments
[2] Amortized at 8% over 15 years, equal payments
[3] Includes ground lease at $0.20 per square-foot annually
[4] Existing Large Hangar Lease Rate
[5] Comparable Rental Rate Less Amortization
[6] Ground Lease Revenue Only

For each option, the minimum monthly lease rate was determined by dividing by the monthly amortization costs by the proposed number of T-hangars. For Options 2 and 3, the recovery of ground lease revenues due to the City was also included. A lower annual percentage rate is assumed for the City amortization due its bonding capabilities.

As shown in the table, since the City can construct hangars without incurring ground lease payments and can take advantage of lower financing costs, the City can construct the proposed T-hangars at a lower monthly costs than private developers. In this manner, the hangar rental rates can be more competitive with regional airports.

Constructing the hangars with City resources can also provide for a larger net revenue to the City. As shown in the table, a comparable hangar at Hayward Executive Airport has a monthly rental rate of $347. Assuming a $219 monthly amortization payment for each hangar, the City can realize a net revenue of $128 for each hangar unit, or $6,528 for the 51 hangars proposed to be developed in the SkyWest Aeropark hangar area. In Options 2 and 3, the City can only realize the revenue gained through the ground lease, which is equal to $23 per hangar unit, or $1,196 for the 51 hangars proposed to be developed in the SkyWest Aeropark hangar area.

The proposed development schedule for Hayward Executive Airport has assumed that the City of Hayward would construct any future T-hangars and provide infrastructure improvements (i.e. apron, utilities, parking and access) for the SkyWest, Corsair and South Executive Hangars.

In this manner, the City can maintain a competitive rental structure for the T-hangars. Developing the T-hangars in this manner also makes maximum use of federal funding for apron and taxilane development. This also provides long term revenue source for the airport, at rates higher than can be realized through ground leases only.

Additionally, this provides for direct management and maintenance of the T-hangars and T-hangar waiting list. When privately developed, the City may not have total control over uses in the T-hangars. In many cases, this leads to hangars being used for non-aviation purposes. Additionally, the private developer could reduce rental rates below existing City T-hangar rates to attract aircraft owners to the privately-developed hangars.

The development of the SkyWest, Corsair and South Executive hangars as proposed provides for maximum flexibility for individual users to custom build facilities to meet their needs. This offers an advantage over T-hangars and existing City executive hangars which cannot be modified for an individual users needs.

Developing the executive hangars with a combination of City and federal funds ensures a competitive lease structure for hangar development since apron and infrastructure improvement costs may not need to be incorporated into the lease structure as they would be when developed entirely by a private developer. Additionally, since the City would be functioning as the developer for this hangar area, the City would have greater control over proposed developments in this area and management of the area after development.

DEVELOPMENT FUNDING SUMMARY

As was mentioned previously, a significant portion of the development funding is assumed to be provided by State and Federal grants. Even though the airport enjoys a strong financial situation, the airport could not pursue the proposed development independently. The City of Hayward will need to actively pursue both Federal and State funding throughout the planning period to ensure that the capital program can be implemented. If funding is not available some key projects may need to be delayed until funding is secured.

In keeping with local goals, the airport is self-supporting. Specifically, the airport generates a net income annually and operates without subsidies from the City of Hayward general fund. Additionally, the airport maintains approximately $1.5 million in cash reserves available for emergency operations, should this be required.

All projected local matching funds can be expected to be paid by the airport through operating revenues. The largest matching requirement anticipated through the planning period is approximately $152,000. As shown in **Table 6D**, the airport has generated an operating net income in excess of $434,000 in FY 98-99. The airport is expected to generate a net income in each of the next five fiscal years of between $182,000 and $746,000.

Long term debt financing is expected for T-hangar development. Long term debt financing has been used successfully in the past to fund T-hangar development at the airport. General obligation bonds appear to be too restrictive for these purposes. Revenue bonds or certificates of participation provide the best means for financing future T-hangar development since hangar rental revenues could be used to amortize debt financing costs.

However, the financing of the improvements should be reviewed when development occurs. As discussed previously, there are options, particularly for the executive hangar areas and lease parcels areas, which would not require utilizing City funds. This refers to the option of entering into a master ground lease for the area, with a private developer providing all financing.

Financing future roadway, parking and utility improvements for the south side of the airport will likely require 100 percent local funding, since these costs may not be eligible for FAA or State grant assistance. Apron improvements in these areas are eligible for both FAA and State grant assistance. It may be difficult to gain voter approval for general obligation bonds for these projects as they are limited in scope and do provide a direct public benefit such as roadway improvements or parks. Revenue bonds could be used as ground lease revenues could be pledged to retire the debt service.

SUMMARY

The best means of beginning the implementation of recommendations of this master plan is to first recognize that planning is a continuous process that does not end with completion of the master plan. Rather, the ability to continuously monitor the existing and forecast status of airport activity must be provided and maintained. The basic issues upon which this Master Plan is based will remain valid for several years. As such, the primary goal is for the airport to evolve into a facility that will best serve the air transportation needs of the region and to evolve into a self-supporting economic generator for the City of Hayward.

In this master plan, focusing on the timing of airport improvements was necessary. However, the actual need for facilities is more appropriately established by airport activity levels rather than a specified date. For example, projections have been made as to when to construct additional T-hangars. However, in reality, the time frame in which additional facilities are needed may be substantially different. Actual demand may be slower than expected. On the other hand, high levels of demand may establish the need to accelerate the development of the T-hangars. Although every effort has been made in this master planning process to conservatively estimate when facility development may be needed, aviation demand will dictate when facility improvements need to be accelerated or delayed.

The real value of a usable master plan is that it keeps the issues and objectives in the mind of the user so that he or she is better able to recognize change and its effect. In addition to adjustments in aviation demand, decisions made as to when to undertake recommended improvements in this master plan will impact the period that the plan remains valid. The format used in this plan is intended to reduce the need for costly updates. Updating can be done by the user, improving the plan's effectiveness.

In summary, the planning process requires the City of Hayward to consistently monitor the progress of the airport in terms of total aircraft operations, total based aircraft, and overall aviation activity. Analysis of aircraft demand is critical to the exact timing and need for new airport facilities. The information obtained from continually monitoring airport activity will provide the data necessary to determine if the development schedule should be accelerated or delayed.

HAYWARD
AIRPORT

Appendix A
GLOSSARY & ABBREVIATIONS

Appendix A

GLOSSARY OF TERMS

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): see declared distances.

AIR CARRIER: an operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transport mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRPORT REFERENCE CODE (ARC): a coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT ELEVATION: The highest point on an airport's usable runway expressed in feet above mean sea level (MSL).

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRCRAFT APPROACH CATEGORY: a grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- *Category A:* Speed less than 91 knots.
- *Category B:* Speed 91 knots or more, but less than 121 knots.
- *Category C:* Speed 121 knots or more, but less than 141 knots.
- *Category D:* Speed 141 knots or more, but less than 166 knots.
- *Category E:* Speed greater than 166 knots.

AIRPLANE DESIGN GROUP (ADG): a grouping of aircraft based upon wingspan. The groups are as follows:

- *Group I:* Up to but not including 49 feet.
- *Group II:* 49 feet up to but not including 79 feet.
- *Group III:* 79 feet up to but not including 118 feet.
- *Group IV:* 118 feet up to but not including 171 feet.
- *Group V:* 171 feet up to but not including 214 feet.
- *Group VI:* 214 feet or greater.

AIR TAXI: An air carrier certificated in accordance with FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): a central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling, and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): a facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

ALERT AREA: see special-use airspace.

ANNUAL INSTRUMENT APPROACH (AIA): an approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): an airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: the altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

AUTOMATIC DIRECTION FINDER (ADF): an aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AUTOMATED WEATHER OBSERVATION STATION (AWOS): equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dewpoint, etc...)

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): the continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

BASE LEG: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

BEARING: the horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: a barrier used to divert or dissipate jet blast or propeller wash.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on the airport.

CIRCLING APPROACH: a maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

CLASS A AIRSPACE: see Controlled Airspace.

CLASS B AIRSPACE: see Controlled Airspace.

CLASS C AIRSPACE: see Controlled Airspace.

CLASS D AIRSPACE: see Controlled Airspace.

CLASS E AIRSPACE: see Controlled Airspace.

CLASS G AIRSPACE: see Controlled Airspace.

CLEAR ZONE: see Runway Protection Zone.

CROSSWIND: wind flow that is not parallel to the runway of the flight path of an aircraft.

COMPASS LOCATOR (LOM): a low power, low/medium frequency radiobeacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONTROLLED AIRSPACE: airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- *CLASS A:* generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- *CLASS B:* generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

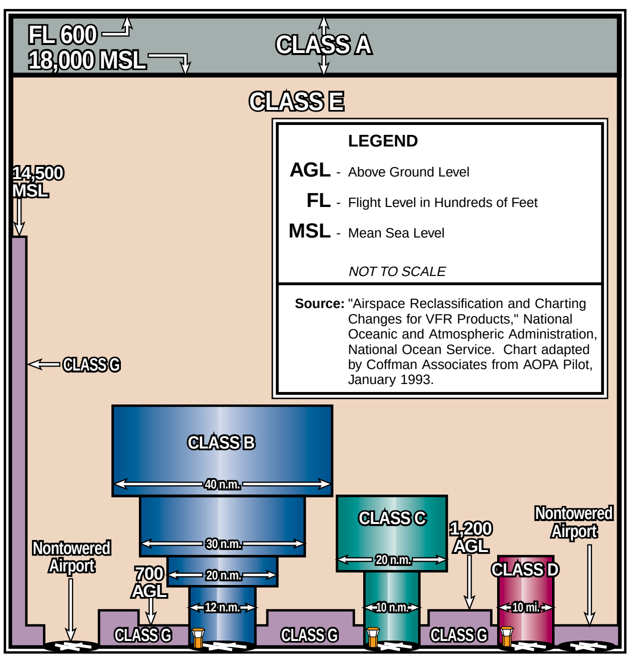
- *CLASS C:* generally, the airspace from the surface to 4,000 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- *CLASS D:* generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airport that have an operational control tower. Class D air space is individually tailored and configured to encompass published instrument approach procedures.
Unless otherwise authorized, all

persons must establish two-way radio communication.

- *CLASS E:* generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- *CLASS G:* generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.



CONTROLLED FIRING AREA: see special-use airspace.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

DECLARED DISTANCES: The distances declared available for the airplane's take-off runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- *TAKEOFF RUNWAY AVAILABLE (TORA):* The runway length declared available and suitable for the ground run of an airplane taking off;

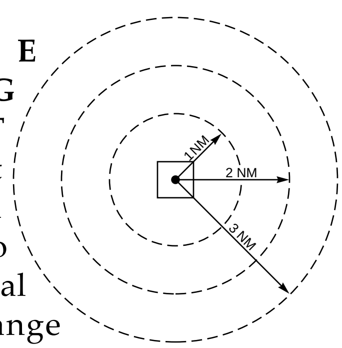
- *TAKEOFF DISTANCE AVAILABLE (TODA):* The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA;

- *ACCELERATE-STOP DISTANCE AVAILABLE (ASDA):* The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff; and

- *LANDING DISTANCE AVAILABLE (LDA):* The runway length declared available and suitable for landing.

DISPLACED THRESHOLD: a threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range



distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in A-weighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ENPLANED PASSENGERS: the total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and non-scheduled services.

FINAL APPROACH: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

FRANGIBLE NAVAID: a navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

GENERAL AVIATION: that portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM: See "GPS."

GPS - GLOBAL POSITIONING SYSTEM: A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

HELIPAD: a designated area for the takeoff, landing, and parking of helicopters.

HIGH-SPEED EXIT TAXIWAY: a long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

INSTRUMENT APPROACH: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

LANDING DISTANCE AVAILABLE (LDA): see declared distances.

LOCAL TRAFFIC: aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch-and-go training operations.

LOCALIZER: The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): a facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LORAN: long range navigation, an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran is used for enroute navigation.

MICROWAVE LANDING SYSTEM (MLS): an instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS AREA (MOA): see special-use airspace.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not effected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: the runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

NAVAID: a term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc..)

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NONDIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NONPRECISION APPROACH PROCEDURE: a standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

OBJECT FREE AREA (OFA): an area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

OPERATION: a take-off or a landing.

OUTER MARKER (OM): an ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline indicating to the pilot, that he/she is passing over the facility and can begin final approach.

PRECISION APPROACH: a standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- *CATEGORY I (CAT I):* a precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.

- *CATEGORY II (CAT II):* a precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.

- *CATEGORY III (CAT III):* a precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION OBJECT FREE AREA (POFA): an area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PROHIBITED AREA: see special-use airspace.

REMOTE COMMUNICATIONS OUTLET (RCO): an unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering enroute clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): see remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: an airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: see special-use airspace.

RNAV: area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used enroute and for approaches to an airport.

RUNWAY: a defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY BLAST PAD: a surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash.

RUNWAY END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: the average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY SAFETY AREA (RSA): a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISUAL RANGE (RVR): an instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

RUNWAY VISIBILITY ZONE (RVZ): an area on the airport to be kept clear of permanent objects so that there is an unobstructed line-of-site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

SEGMENTED CIRCLE: a system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: an area adjacent to the edge of paved runways, taxiways or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SPECIAL-USE AIRSPACE: airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- *ALERT AREA:* airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.

- *CONTROLLED FIRING AREA:* airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.

- *MILITARY OPERATIONS AREA (MOA):* designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.

- *PROHIBITED AREA:* designated airspace within which the flight of aircraft is prohibited.

- *RESTRICTED AREA:* airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- *WARNING AREA:* airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): a pre-planned IFR departure procedure.

STANDARD TERMINAL ARRIVAL (STAR): a pre-planned IFR arrival procedure.

STOP-AND-GO: a procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STRAIGHT-IN LANDING/APPROACH: a landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

TACTICAL AIR NAVIGATION (TACAN): An ultra-high frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA): see declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA): see declared distances.

TAXILANE: the portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: a defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY SAFETY AREA (TSA): a defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TETRAHEDRON: a device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

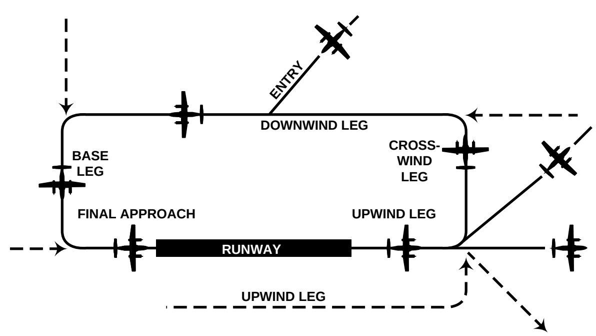
THRESHOLD: the beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: an operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

TOUCHDOWN ZONE LIGHTING (TDZ): Two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.

UNICOM: A nongovernment communication facility which may provide

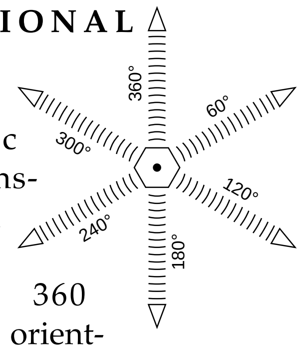


airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE STATION (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.



VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION/TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

WARNING AREA: see special-use airspace.

ABBREVIATIONS

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach light ing system with sequenced flashers (CAT II configuration)

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire-fighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulations

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity for air craft with dual-wheel type landing gear

DTWL: runway weight bearing capacity for aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LOC: ILS localizer

LOM: compass locator at ILS outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system

MALSR: medium intensity approach lighting system with sequenced flashers

MALSR: medium intensity approach lighting system with runway alignment indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076 .1 feet)

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rulemaking

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW: public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

RCO: remote communications outlet

REIL: runway end identifier lighting

RNAV: area navigation

RPZ: runway protection zone

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with sequenced flashers

SSALR: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel type landing gear

STWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TACAN: tactical air navigational aid

TORA: takeoff runway available

TODA: takeoff distance available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collo-cated

Appendix B
ECONOMIC BENEFIT STUDY

HAYWARD
AIRPORT

EXECUTIVE SUMMARY

This report presents the results of a study of the economic benefits of Hayward Executive Airport for fiscal year 1999.

The Hayward Executive Airport, located just west of the central business district in the City of Hayward, California, provides general aviation services for both recreational and business flyers.

The airport service area extends beyond the City of Hayward. While many owners of based aircraft live in the City of Hayward, others have residences as far away as Daly City or San Jose. Similarly, the most frequently cited destination for air visitors arriving at the airport is the City of Hayward, but many travel to San Francisco and other Bay Area locations during their trip.

PURPOSE OF THE STUDY

Airports contribute measurable benefits through the output, earnings and jobs associated with economic activity both on and off the airport. The purpose of this study was to analyze economic activity related to Hayward Executive Airport and quantify the economic benefits associated with the presence of the airport. The study was designed to answer two main questions:

1. What economic benefits were created in the service area by the presence of the airport?

2. What economic benefits were created within the City of Hayward by the presence of the airport?

MEASURING ECONOMIC BENEFITS

Airports influence the regional economy in many ways. As a transportation center, an airport facilitates commerce through the movements of air passengers and cargo, usually with shorter time to destination than other modes of transport.

Airports bring essential services to a community, including enhanced medical care (such as air ambulance service), support for law enforcement and fire control, and courier delivery of mail and high value parcels. These services raise the quality of life for residents and maintain a competitive environment for economic development.

Although these advantages created by the presence of an airport are significant and widely acknowledged, they are also difficult to measure. In studying airport benefits, regional analysts have emphasized indicators of economic activity for airports that can be quantified, such as dollar value of production of output, number of jobs created, and earnings of workers.

The methodology followed in analysis of the economic importance of an airport has its basis in the seminal work of pioneers of regional economics such as Walter Isard (see Walter Isard, *Methods of Regional Analysis: An Introduction to Regional Science*, New York, Technology Press of MIT, 1960). A later highly influential work from Miernyk explored interindustry relationships underlying regional economic growth and development (see William Miernyk, *Regional Analysis and Regional Policy*, Cambridge, Oelgeschlager, Gunn & Hain, 1982).

During ensuing decades, students of airport economic analysis developed a literature that refined techniques for evaluating the economic influence of airports. Examples include the private sector study by Wilbur Smith Associates, *The Economic Impact of Civil Aviation on the US Economy*, 1989; the Air Transport Association of America, *How to Do an Airport Economic Impact Study*, Washington DC, 1980; and The Federal Aviation Administration, *Estimating the Regional Economic Significance of Airports*, Washington DC, 1992.

This study of the economic benefits of Hayward Executive Airport analyzes the impact of the airport using an approach that is consistent with the existing literature on airport benefit analysis as well as modern methods used to evaluate private sector facilities such as high technology manufacturing plants or other public facilities such as sports stadiums.

Economic benefits for this study were defined as output, employment, and earnings related to the presence of the airport.

The Hayward Executive Airport is a source of economic output (the production of aviation services) which creates employment and earnings for workers on site. In addition, visitors who arrive by air at the airport create demand for goods and services off the airport, such as lodging and auto rental. This spending produces revenues for firms in the hospitality sector as well as employment and earnings.

Output in dollars can be measured from either side of the producer/consumer transaction. From the perspective of the supplier of goods and services, the dollar value of output is equal to the revenues received by that producer. From the viewpoint of the consumer, the dollar value of the goods and services of output is equal to the amount that the consumer spent to purchase that output.

It is usually more feasible (and accurate) to collect sales data from business firms rather than from the vast number of customers. In airport impact methodology, revenues (or sales) as reported by business firms are used to capture both sides of the market exchange process for those firms providing aviation goods and services on the airport. In this study, therefore, revenues (or sales) for private businesses were used as a measure of the value of economic output of private producers on the airport.

In addition to the private businesses located on Hayward Executive Airport, there are also government agencies that make expenditures in the economy as they produce services for the community. In any given year, expenditures for government agencies are determined by the agency budget. In this study, the budgets of government agencies were defined as an indicator of the dollar value of government output.

The combined sales of on-airport firms and the budgets of on-airport government agencies were utilized to measure the value of output on the airport for FY 1999. The value of output produced off-airport by suppliers of goods and services to air visitors was measured by spending as reported on visitor surveys.

Employment is a measure of the number of jobs supported by the revenues created by the presence of Hayward Executive Airport. Employment in private firms and government agencies was tallied to determine the number of jobs due to the presence of the airport.

Earnings represent the dollar value of payments received by workers (as wages) and business proprietors (as income) who create the goods and services that are sold to produce revenues.

Information was collected directly from suppliers and users of aviation services to measure economic activity created by the presence of the airport. Sources of information included interviews and surveys of based aircraft owners, on-airport employers, government agencies, and general aviation travelers who used the airport during the FY 1999 period.

SOURCES OF ECONOMIC BENEFITS

Economic benefits (output, employment and earnings) are created when economic activity takes place both on and off the airport. The three sources of economic benefits are (1) on-airport benefits, (2) air visitor benefits and (3) induced (or multiplier) benefits. The economic benefits of Hayward Executive Airport by source and location are shown in Table 1.

On-Airport Benefits

There were thirty-one on-site aviation employers located on Hayward Executive Airport in FY 1999. Aviation related businesses on the airport include a full range of FBO services, aircraft maintenance, flight training, pilot supplies, and aircraft charter and sales. In addition, there are four government offices including FAA, the airport administration, the East Bay Regional Park District, and the Air National Guard.

Surveys were sent to business managers and government agency directors on the airport to collect information on revenues, payroll and employment.

Including the revenues and employment created by outlays for airport capital projects, these economic units reported benefits of:

- **$33.1 Million Revenues**
- **$9.6 Million Earnings**
- **313 On-Airport jobs**

Because the airport is located within the City of Hayward, the on-airport benefits are included in the summation of City of Hayward benefits at the bottom of Table 1.

Air Visitor Benefits

An additional source of aviation-related spending comes from visitors to the area that arrive at Hayward Executive Airport. When air travelers make off-airport expenditures these outlays create revenues (sales) for firms that supply goods and services to visitors.

During FY 1999 there were 13,048 transient (visiting) general aviation aircraft and more than 27,000 air travelers that arrived at Hayward Executive Airport.

Surveys were mailed to air visitors to obtain information on visitor spending by category during their stay in the area. Expenditures reported by travelers arriving at Hayward Executive Airport were used to measure the dollar value of revenues from air visitors.

Visitors traveling for business or personal reasons spent for lodging, food and drink, entertainment (such as golf), retail goods and services, and ground transportation including auto rental and taxis.

General aviation travelers and other visitors created visitor benefits in the airport service area of:

- **$5.5 Million Revenues**
- **$1.2 Million Earnings**
- **75 Jobs in the Hospitality Sector**

Forty-two percent of visitor survey respondents designated the City of Hayward as the primary destination for their trip to the area. Spending by those visitors who stated their destination as the City of Hayward resulted in visitor benefits within the City of Hayward of

- **$2.5 Million Revenues**
- **$537,432 Earnings**
- **34 Jobs in the Hospitality Sector**

Induced Benefits (Multiplier Effects)

Induced benefits are the multiplier effects of the on-airport and visitor benefits that occur as the initial dollars injected into the economy are respent to create additional economic activity.

Multiplier effects come into play when, for example, an aircraft mechanic's wages are spent to purchase food, housing, clothing, and medical services in the local community.

These "second round" dollars stimulate more jobs and earnings in the economy of the region, creating a multiplier or secondary impact of additional or "induced" revenues, jobs and earnings.

Based on the 1973 Nobel Prize work of Wassily Leontief, economists have developed multiplier factors to calculate the impact of successive rounds of spending on revenues, earnings, and employment. The U. S. Bureau of Economic Analysis publishes multipliers for states, including California, that are widely accepted for public policy analysis.

These Regional Input Output Modeling System (RIMS II) multipliers were used in the current study for seven industrial sectors (transportation, lodging, retail, eating places, entertainment, business services and construction) to estimate multiplier benefits. Adjustments were applied for the City of Hayward, as explained in a later section of this report.

The initial revenue stream in the service area of $38.6 million created by the presence of Hayward Executive Airport stimulated induced revenues in the airport service area of $51.6 million, creating an additional 468 jobs with earnings of $11.6 million (Table 1).

The induced or multiplier benefits to the City of Hayward were smaller, due to "leakages" of spending from Hayward to the rest of the service area. For example, when on-airport firms make purchases from suppliers located outside of Hayward, dollars flow out of Hayward and reduce the magnitude of induced benefits within the city.

Induced benefits from multiplier effects within the City of Hayward were computed as

- **$18.1 Million Revenues**
- **$3.9 Million Earnings**
- **158 Jobs**

Total Benefits

The sum of on-airport benefits, visitor benefits, and induced benefits is the total benefits of $90.2 million revenues, $22.3 million in earnings, and 856 jobs supported in the Hayward Executive Airport service area.

Total benefits to the City of Hayward were

- **$53.7 Million Revenues**
- **$14.0 Million Earnings**
- **505 Jobs**

The largest single component to the City of Hayward is the on-airport benefits of $33.1 million of revenues, 313 jobs and $9.6 million of earnings. On-airport revenues accounted for 62 percent of the total value of output supported by the presence of the airport. Visitor revenues made up about 5 percent of the total revenues; combined on-airport and visitor revenues were two-thirds of the total.

The induced component accounted for one third of output within the City of Hayward due to the presence of the airport.

TABLE 1
Summary of Economic Benefits: FY 1999
Hayward Executive Airport

	BENEFIT MEASURES		
	Revenues	**Earnings**	**Employment**
On-Airport Benefits* Aviation Businesses FBO Services Aircraft Maintenance Government Agencies Administration Capital Projects ****All Within City of Hayward***	**$33,065,300**	**$9,572,709**	**313**
Air Visitor Benefits Lodging Food/Drink Retail Goods/Services Entertainment Ground Transport	**5,487,000**	**1,177,545**	**75**
Within City of Hayward	***2,504,012***	***537,432***	***34***
Sum of On Airport & Visitor Benefits	**38,552,300**	**10,750,254**	**388**
Within City of Hayward	***35,569,312***	***10,110,141***	***347***
Induced Benefits	**51,612,695**	**11,559,123**	**468**
Within City of Hayward	***18,098,493***	***3,898,265***	***158***
TOTAL BENEFITS	**$90,164,995**	**$22,309,376**	**856**
Within City of Hayward	***$53,667,805***	***$14,008,406***	***505***

ON-AIRPORT BENEFITS

This section provides more detail on the economic benefits associated with activity on site at Hayward Executive Airport. Values shown for revenues (sales), employment and earnings do not include multiplier effects of induced benefits.

Table 2 illustrates the data on revenues, employment and earnings obtained from mail surveys and interviews conducted with airport tenants during 1999.

Copies of the surveys used to compile these figures are included in this report as Appendix A. To encourage employers to release confidential figures on employment, earnings and revenues, those responding to the surveys were told that the figures would be used only as aggregate totals for each category. Therefore, details on employment by individual respondents are not presented in Table 2.

Revenues From Private Employers

On-airport private aviation operations created revenues of $25.9 million in FY 1999. There were 27 private employers on the airport during the FY 1999 study period providing or using aviation related services.

Full service FBO activities include complete service and maintenance, fueling, and line services for based aircraft and transient travelers. Airport businesses provide flight training, aircraft sales and rental, aircraft charter and pilot supplies.

Other aviation related businesses at the airport include air courier services, air ambulance, air tours, and specialized maintenance services such as upholstery and detailing. This study did not include non-aviation businesses such as restaurants, motels, theaters, and others located on or nearby the Hayward Executive Airport.

Budgets of Government Agencies

The budgets of government agencies were used to measure the impact of spending flows on the economy. Government agencies on Hayward Executive Airport include the airport administration, the Air National Guard, the East Bay Regional Park District helicopter unit and the FAA air traffic control tower. The combined budgets summed to $6.0 million in FY 1999.

Capital Projects

Capital projects are vital for airports to maintain safety and provide for growth. Capital spending for airport improvements also creates jobs and injects dollars into the local economy. During the FY 1999 period, $1.1 million was invested in capital improvements at Hayward Executive Airport. Projects ranged from signs to noise monitoring improvements to outlays for maintenance on grounds, buildings, and hangars.

Employment and Earnings

Surveys and interviews with on-airport employers provided a tally of 230 private sector jobs on the airport. These private business employees on the airport brought home annual earnings of $6.5 million. With the addition of an annual average of 10 construction workers, the private employment on the airport was 240 workers in FY 1999 and earnings of $7.0 million.

The 73 persons employed by government had annual earnings of $2.6 million in FY 1999. Government employment accounted for 23 percent and private sector employment accounted for 77 percent of workers on the airport.

Summary of On-Airport Benefits

On-airport activity at Hayward Executive Airport created $33.1 million in revenue flows. These revenues supported employment of 313 workers on the airport, with earnings of $9.6 million.

TABLE 2
On-Airport Benefits: Revenues, Earnings and Employment
Hayward Executive Airport

	BENEFIT MEASURES		
	Revenues	**Earnings**	**Employment**
Airport Businesses FBO Services Air Courier Air Ambulance Aircraft Maintenance Fuel and Line Services Sales, Charter &Rental Pilot Training & Supplies	**$25,944,000**	**$6,541,000**	**230**
Government Agencies FAA Tower Air National Guard Airport Administration East Bay Regional Park Dst.	**6,041,300**	**2,599,709**	**73**
Capital Projects	**1,080,000**	**432,000**	**10**
ON-AIRPORT BENEFITS	**$33,065,300**	**$9,572,709**	**313**

Source: Survey of airport employers, 1999.

AIR VISITOR BENEFITS

Hayward Executive Airport attracts visitors from throughout the Western region and the nation who come to the area for both business and personal travel. This section provides detail on economic benefits from general aviation flyers who visited the airport in FY 1999. Values shown for spending (revenues), employment and earnings do not include multiplier effects of induced benefits.

General Aviation Visitors

There were a total of 13,048 transient general aviation aircraft arrivals at Hayward Executive Airport during FY 1999. Some visitors stopped only briefly at the airport, some stayed for most of a day, and some stayed overnight. Overnight visitors represented 39 percent and day visitors made up 61 percent of the transient GA aircraft arriving at Hayward Executive Airport (Table 3).

TABLE 3
General Aviation Aircraft
Hayward Executive Airport

Item	Annual Value
Transient AC Arrivals	13,048
Percent Overnight AC	39%
Overnight Transient AC	5,144
Percent One Day AC	61%
One Day Transient AC	7,904

Source: visitor survey, 1999

A questionnaire was administered to general aviation travelers to gather information on purpose of travel, length of stay, destination, and expenditures by category of spending for visitors. Separate analyses were conducted for those travelers who reported an overnight stay and those whose visit was one day or less in duration.

The largest proportion of travel parties (42 percent) listed the City of Hayward as the primary destination for their travel (Table 4). Other East Bay locations accounted for 34 percent of travel, and 15 percent of visitors cited San Francisco as their primary destination. Other parts of the Bay Area were listed by 9 percent of visitors.

TABLE 4
Primary Destination of Visitors
Hayward Executive Airport

Destination	Percent
City of Hayward	42%
Other East Bay	34%
San Francisco	15%
Other Bay Area	9%
TOTAL	100%

Source: visitor survey, 1999

Overnight GA Visitors

The travel patterns underlying the calculation of overnight GA visitor economic benefits are shown in Table 5. There were 5,144 overnight aircraft at Hayward Executive Airport during FY 1999, and the average party size was 2.0 persons, including the aircraft pilot. The average stay for overnight visitors was 3.0 nights. Average spending per aircraft was reported as $933 including all outlays for all travelers on their overnight trip to the area.

The leading reason for travel stated on the survey forms completed by general aviation overnight visitors was "personal or family visit" (52%).

Next in importance was “business” (41%), followed by “tourism” (7%).

TABLE 5 General Aviation Overnight Visitors Hayward Executive Airport	
Item	**Annual Value**
Transient AC Arrivals	**13,048**
Overnight Transient AC	**5,144**
Avg. Party Size	**2.0**
Average Stay (nights)	**3.0**
Spending per Aircraft	**$933**
Source: visitor survey, 1999	

With an average travel party of 2.0 persons, the 5,144 arriving overnight general aviation aircraft carried a total of 10,288 visitors to Hayward Executive Airport in FY 1999. Applying the reported proportion of those who listed Hayward as their primary destination (42 percent), there were 4,321 visitors to the City of Hayward that arrived by general aviation aircraft for an overnight stay (Table 6).

Multiplying the average stay of 3.0 nights by 10,288 visitors gives a total of 30,864 visitor days in the entire service area for those travelers who stayed overnight. The share of visitor days for the City of Hayward was 12,963.

Each arriving overnight aircraft at Hayward Executive Airport had an economic value of $933 in spending, not including secondary effects of induced spending. Multiplying $933 per aircraft by 5,144 aircraft yields total overnight visitor spending of $4,799,352 within the airport’s service area.

Based on the 42 percent of visitors who listed the City of Hayward as their primary destination, the revenues from overnight general aviation travelers who visited Hayward were $2,015,728 in FY 1999. Overnight visitors averaged expenditures of slightly more than $155 per visitor day during their stay in the City of Hayward in FY 1999.

The remainder of overnight visitor spending, summing to $2,783,624, was spent by travelers who went elsewhere in the East Bay area, to San Francisco, or other destinations in Northern California.

TABLE 6
General Aviation Overnight Visitor Spending
Hayward Executive Airport

Item	Airport Service Area	City of Hayward	Remainder of Service Area
Number of GA Visitors	**10,288**	**4,321**	**5,867**
Number of Visitor Days	**30,864**	**12,963**	**17,901**
TOTAL EXPENDITURES	**$4,799,352**	**$2,015,728**	**$2,783,624**

Note: Hayward share estimated as 42 percent of total based on visitor survey responses, 1999.

Detail on spending per overnight aircraft is shown in Table 7. The largest spending category is retail outlays for goods and service, which accounted for 32 cents of each visitor dollar and averaged $295 per aircraft per trip. Almost all travel parties reported some retail spending, with several spending more than $1,000 during their trip. Total retail outlays for the study period by overnight GA visitors exceeded $1.5 million.

TABLE 7
Spending Per Overnight Aircraft
Hayward Executive Airport

Category	Spending	Percent
Lodging	$268	29
Food/Drink	217	23
Retail	295	32
Entertainment	64	7
Transportation	89	9
TOTAL	$933	100

Note: Expenditures per aircraft are for all survey respondents, including those who had no outlays for some of the categories shown.

Source: Visitor survey, 1999

Lodging expenditures were made by two out of three (66%) general aviation travelers. The average lodging expenditure per overnight aircraft was $268. Lodging accounted for 29 percent of spending per overnight aircraft arriving at Hayward Executive Airport.

The total impact on service area hotels and motels was $1.4 million of revenues created from spending by general aviation travelers. Spending on lodging in the City of Hayward was $579,009 (see Table 10 below for details).

Visitors traveling for business reasons were most likely to have outlays for lodging, while those citing personal reasons for their trip (52 percent) were least likely to incur lodging costs. Those traveling for personal reasons are often visiting friends and relatives and stay overnight with them instead of seeking lodging in a hotel or motel.

The average lodging outlay for those travel parties who actually stayed at a hotel or motel was $407 during their trip to the area. A significant proportion of general aviation travelers (17 percent) reported that they owned property in the area and stayed there during their visit.

Spending for food and drink accounted for 23 percent of the visitors' costs while in the Hayward Executive Airport area. The average outlay for food and drink per aircraft was $217, or $36 per person per day during the trip.

The entertainment and transportation categories tended to have wider variations in reported spending by survey respondents. Business travelers often reported no outlays for entertainment, while other travel parties reported spending several hundred dollars on entertainment during their stay in the service area. The average spending on entertainment was $64 per aircraft per trip. Expressed per person, entertainment spending was $32 per person per trip, and slightly more than $10 per person per day.

Sixty percent of travel parties reported some outlays for ground transportation during their stay. The average ground transport spending (auto rental and taxi) per aircraft was $89, including those respondents who incurred no costs for transportation. The average expenditure by those who did spend for ground transportation was $139, or an average daily cost of $46 per travel party.

Day Visitors

According to tie down records maintained by the airport administration, three out of five transient general aviation visitors to Hayward Executive Airport stayed in the service area for one day or less. In FY 1999, there were 7,904 aircraft that stopped at the airport for one day while the travel party had their aircraft serviced, pursued a personal activity or conducted business. The average travel party size was 2.2 persons (Table 8).

TABLE 8
General Aviation Day Visitors
Hayward Executive Airport

Item	Annual Value
One Day Transient AC	7,904
Avg. Party Size	2.2
Average Stay (Days)	1
Number of GA Visitors	17,389
Hayward Visitors	12,346
Spending per Aircraft	$87
Total Expenditures	$687,648
Hayward Expenditures	$488,284

Source: Visitor survey, 1999

The most frequently mentioned purpose for the one day visit was to purchase fuel (50 percent). Business travel was cited by 35 percent of respondents and 15 percent were traveling for personal reasons.

The number of visitor days created by one day aircraft was 17,389. One half of visitors (8,695) reported they did not leave the general area of the airport during their stop in Hayward. Therefore, expenditures by these visitors were made either on or nearby the airport. The number who left the airport for a one day visit to the City of Hayward was 3,651. The total number of one day visitors who stayed within the City of Hayward in FY 1999 was 12,346.

These visitors spent an amount reported as $39.55 per person per day, or an outlay for 2.2 persons per aircraft of $87 on their trip to the Hayward area.

Hayward Executive Airport records an average of 22 general aviation day visitor aircraft arriving each day of the year. The average daily impact from these travelers exceeds $1,900. General aviation day visitors spent $687,648 in the Hayward Executive Airport service area during FY 1999.

Multiplying $39.55 per person times 12,346 Hayward visitors results in an estimate for one day general aviation visitor spending of $488,284 within the City of Hayward for FY 1999.

TABLE 9
Spending Per Day Visitor Aircraft
Hayward Executive Airport

Category	Spending	Percent
Lodging	0	
Food/Drink	35	40
Retail	39	45
Entertainment	4	5
Transportation	9	10
TOTAL	$87	100

Note: Expenditures per aircraft are for all survey respondents, including those who had no outlays for some of the categories shown.

Source: Visitor survey, 1999

The largest category of spending by one day visiting travel parties was retail spending. This category does not include spending on fuel or aircraft maintenance services, but could include aircraft parts and supplies. The average retail outlay per aircraft was $39 (Table 9).

Spending for food and drink was the second largest category, at $35 per aircraft or approximately $16 per person.

Ground transportation for one day visitors was $9 per aircraft. While some one day visiting parties reported spending up to $100 for ground transport, those who stopped only for fuel did not leave the airport and therefore had no ground transportation expenses.

Similarly, most one day visitors had no entertainment expenses, resulting in average entertainment spending per aircraft of only $4 for the entire travel party.

Combined GA Visitor Spending Benefits

Table 10 shows the economic benefits resulting from spending in the region by combined overnight and day general aviation visitors arriving at Hayward Executive Airport.

There were 13,048 transient general aviation aircraft that brought visitors to the airport in FY 1999. Of these, 5,144 were arriving overnight general aviation aircraft and 7,904 were one day visiting aircraft. Each overnight travel party spent a reported average of $933 during their trip to the Hayward Executive Airport service area and travelers on each day visitor aircraft spent an estimated $87 per trip.

Multiplying the expenditures for each category of spending by the number of aircraft yields the total outlays for lodging, food and drink, transportation, entertainment, and retail spending due to GA visitors during the year. Spending is shown for the total service area, the City of Hayward, and the remainder of the service area.

Air visitor spending on goods and services during FY 1999 summed to $5,487,000 of revenues for service area firms in the lodging, food service, retail, entertainment and transportation sectors. There were 48,253 visitor days attributable to the presence of Hayward Executive Airport during the year. Sixty-six percent of visitor days were due to overnight GA travelers and thirty-four percent were one day visitors.

On an average day, there were 132 visitors in the service area that had arrived via GA aircraft at the airport. Average daily spending by GA air travelers was $15,033 within the total service area. The average economic impact of any arriving aircraft (combined overnight and day visitors) was $420.

General aviation visitors spent $2.5 million in the City of Hayward in FY 1999. On an average day there were 69 visitors to the City of Hayward that had arrived at the Hayward Executive Airport. The average economic impact of any arriving aircraft to the City of Hayward was $192. (This figure is derived by dividing visitor spending within the City of Hayward of $2,504,012 by 13,048 total transient aircraft.)

The largest spending category by general aviation visitors within the City of Hayward was retail outlays for goods and services, accounting for $856,234 of sales for Hayward establishments during the year.

While retail expenditures made up one third of the total GA visitor outlays in the City of Hayward during the 1999 study period, combined lodging and food service accounted for nearly 50 percent of visitor spending, exceeding $1.2 million.

Ground transport outlays in Hayward were over $240,000. Visitors to Hayward spent $160,721 on entertainment, the smallest spending category for general aviation air travelers to Hayward.

TABLE 10
Air Visitor Benefits
Expenditures By General Aviation Visitors: FY 1999
Hayward Executive Airport

Category	Spending per AC		Spending in Service Area	Spending in Hayward	Spending in Rest of Area
	Overnight	Day			
Lodging	$268		$1,378,592	$579,009	$799,583
Food/Drink	217	$35	1,392,888	665,266	727,622
Retail Sales	295	39	1,825,736	856,234	969,502
Entertainment	64	4	360,832	160,721	200,111
Ground Transport	89	9	528,952	242,782	286,170
TOTAL	$933	$87	$5,487,000	$2,504,012	$2,982,988

Source: Derived from Visitor Survey, 1999

Earnings and Employment Benefits

Table 11 presents the benefits of combined overnight and day GA visitors as measured by employment and earnings created in the Hayward Executive Airport service area. Of the spending of $5,487,000 created by GA visitors, an average of 22 cents of each dollar stayed in the airport service area as earnings to employees ($1,177,545) whose jobs were supported by this spending.

Based on average salaries as shown in Table 11 for each category of spending, an estimated 75 jobs in the Hayward Executive Airport service area were related to GA visitor spending. The largest service area employment category was 32 employees in eating and drinking establishments. Earnings were $348,222 for the year. The second greatest number of workers were in the lodging sector, where 22 jobs in the service area were due to the presence of general aviation travelers.

Although retail sales expenditures were almost two million dollars, these outlays only supported 10 jobs. This is because retail products are typically produced outside the service area and only a small proportion of "margin" stays in the local economy. In contrast, services are produced and consumed locally. Entertainment and ground transport spending combined for an additional 11 jobs in the service area labor force.

Visitor spending within the City of Hayward of $2.5 million supported 34 jobs in the tourism sector, with earnings for workers and proprietors of $537,432 (Table 11).

The greatest level of employment from air visitor spending in the City of Hayward was in eating and drinking places, with 15 jobs and earnings of $166,317. Second in importance within the City of Hayward was the lodging sector, with 9 jobs and earnings of $162,122.

TABLE 11
Air Visitor Benefits
Spending, Earnings and Employment From GA Visitors: FY 1999
Hayward Executive Airport

AIR VISITOR BENEFITS TO SERVICE AREA

Category	Service Area Spending	Service Area Earnings	Average Salary	Service Area Employment
Lodging	$1,378,592	$386,006	$ 17,890	22
Food/Drink	1,392,888	348,222	10,790	32
Retail Sales	1,825,736	217,263	20,770	10
Entertainment	360,832	93,816	16,110	6
Ground Transport	528,952	132,238	29,619	5
SERVICE AREA	$5,487,000	$1,177,545		75

AIR VISITOR BENEFITS TO CITY OF HAYWARD

Category	Hayward Spending	Hayward Earnings	Average Salary	Hayward Employment
Lodging	$579,009	$162,122	$ 17,890	9
Food/Drink	665,266	166,317	10,790	15
Retail Sales	856,234	102,748	20,770	5
Entertainment	160,721	45,549	16,110	3
Ground Transport	242,782	60,696	29,619	2
CITY OF HAYWARD	$2,504,012	$ 537,432		34

Notes: Spending for service area and City of Hayward based on responses to visitor survey, 1999. Earnings column derived from "percent to labor" data reported in *Census of Retail Trade* and *Census of Service Industries*, U. S. Department of Commerce. Percentages are lodging 28%; food service 25%; retail 12%; entertainment 26%; ground transport 25%. Salaries are from *County Business Patterns*, U. S. Census Bureau, 1997, converted to 1999 wage rates for Alameda County. Employment is not necessarily full time equivalents; includes full and some part time workers, figures rounded to head counts

INDUCED BENEFITS: MULTIPLIER EFFECTS

The output, employment, and earnings from on-airport activity and visitor spending represent the primary benefits from the presence of Hayward Executive Airport. For the service area, these benefits summed to $38.6 million of output (measured as revenues to firms and budgets of government agencies), 388 jobs, and earnings to workers and proprietors of $10.8 million.

Within the City of Hayward, the benefits of on-airport activity and visitor spending summed to $35.6 million of output, 347 jobs and $10.1 million in earnings (see Table 1).

These figures for initial economic activity created by the presence of the airport do not include the "multiplier effects" that result from additional spending induced in the economy to produce the initial goods and services.

Production of outputs requires inputs in the form of supplies and labor. Purchase of inputs creates additional revenues, employment and earnings due to the presence of the airport that should be included in total benefits of the airport.

In the simple hypothetical example shown in the box, an FBO receives $3,000 revenue for painting an aircraft. The increase in the value of regional output is therefore $3,000. Inputs for the painting job include paint purchased for $2,000 and payments to a worker of $200. The proprietor retains $800.

EXAMPLE: INDUCED BENEFITS CREATED BY INPUTS TO PRODUCE OUTPUT

Economic Activity	Value of Output	Inputs Purchased	Earnings
1. FBO paints aircraft (Transaction: $3,000)	$3,000 (FBO)	$2,000 (FBO buys paint from wholesaler)	$200 (Painter) $800 (Proprietor)
2. Wholesaler sells paint to FBO (Transaction: $2,000)	$2,000 (Wholesaler)	$1,500 (Wholesaler buys paint from factory)	$500 (Proprietor)
3. Worker & proprietors spend to buy food (Transaction: $1,500)	$1,500 (Supermarket)	$1,200 (Supermarket buys food from distributor)	$300 (Proprietor)
Sum of 3 Stages	$6,500	$4,700	$1,800
Induced Component	$3,500	$2,700	$800

Note: Examples illustrating multiplier effects within various industries are found in the U. S. Department of Commerce Publication *Regional Multipliers*, U. S. Government Printing Office, Washington, D. C., 1997.

The example illustrates the basic concepts of input-output analysis. The output of any given industry requires purchases of inputs from other industries. While the paint used by the FBO is a

$2,000 input for the final painting job, the paint is an output valued at $2,000 by the wholesaler, and the paint sale adds $2,000 to the wholesaler's revenues.

The inputs for the wholesaler are paint purchased from the factory for $1,500 and the wholesaler's own labor input, compensated as proprietor's earnings of $500. Note the purchase of paint by the wholesaler for $1,500 from the factory only adds to the regional economic output if the factory is located within the region.

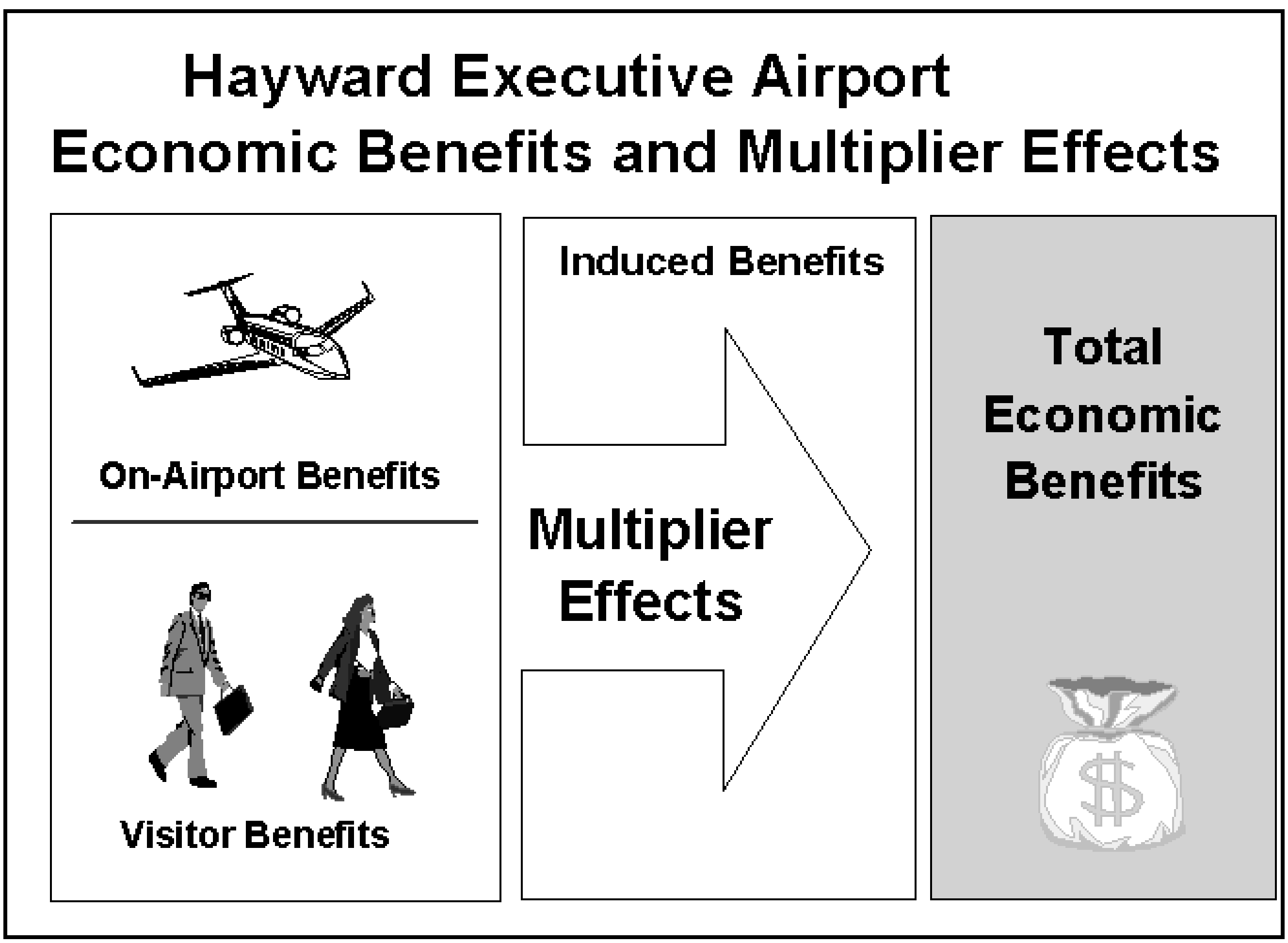
The example assumes that the FBO worker and each proprietor uses their $1,500 earnings to purchase food at a supermarket. This transaction adds $1,500 to total regional output.

At the conclusion of the three stages shown in the example, output has increased by $6,500 and earnings have increased by $1,800. The initial on-airport spending of $3,000 resulted in $6,500 of new output, and $3,500 of this was "induced" spending on inputs including supplies and labor.

Based on the Nobel Prize winning work of Wassily Leontief, analysts have developed statistical models to measure how the production of goods and services in one sector of the economy will stimulate additional output in other sectors through complex interindustry input-output relationships.

Airport benefit studies rely on multiplier factors from input-output models to estimate the impact of successive rounds of spending on output, earnings and employment to determine total benefits resulting from initial on-airport and visitor benefits, as illustrated in the figure below.

Many excellent sources exist that provide complete information on the historical development of input-output models and their current application. In addition to those mentioned earlier in this study, the reader is referred to Ronald Miller and Peter Blair, *Input-Output Analysis: Foundations and Extensions*, Prentice Hall, Englewood Cliffs, N.J., 1985.



The input-output method of analysis is so widely used for impact studies in the private and public sector that the U. S. Bureau of Economic Analysis has developed national input-output tables to derive multipliers for each of the states for 531 industries. These multipliers are part of the Regional Input-Output Modeling System (known as RIMS II). Information on the RIMS II multipliers, their development, and examples of usage are found in *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, U.S. Department of Commerce, Bureau of Economic Analysis, U. S. Government Printing Office, 1997. Analysts who conduct Economic Benefit studies of airports typically use the RIMS II multipliers.

Included among the RIMS II multipliers are "output" multipliers and "direct effect" multipliers for each of 531 industries. The multipliers have been calculated to take into account the "leakages" of spending for any region. In the paint example, the multipliers would account for the location of the paint factory outside the region, and the value of the output of the paint at the factory would not contribute to regional output or employment.

In the simple example of the aircraft painting job, the multiplier for output is equal to the numeric value of the ratio of total output to the initial output:

$6,500/$3,000 = 2.1667

The output multipliers are applied as follows. Assume the airport service area multiplier for lodging is 2.3442 and visitors to the service area spend $1,000,000 on lodging. Multiplying

$1,000,000 X 2.3442 = $2,344,2000

Therefore, a one million dollar increase in hotel sales in the service area results in new total economic activity of $2,344,200 after all successive rounds of respending are completed. Induced output is

$2,344,200 - $1,000,000 = $1,344,200

which indicates that the initial spending of $1 million induced additional spending of $1,344,200 in the regional economy.

The direct effect multiplier for earnings shows the dollar change in earnings for the service area economy due to a one dollar increase in earnings in a given industry, such as lodging.

The direct effect multiplier for employment shows the total change in jobs for the service area economy due to an increase of one job in the given industry.

The following six tables (Tables 12 - 17) show the multipliers used to compute induced benefits for (a) the service area of the Hayward Executive Airport and (b) the City of Hayward only.

The first three tables (Tables 12 - 14) include multipliers for the airport service area for output, earnings and employment. These are multipliers for California developed by the U. S. Department of Commerce and are similar to or in some cases more detailed than those recommended by Caltrans for airport economic impact studies.

The next three tables (Tables 15 - 17) show multipliers calculated for this study for the City of Hayward for output, earnings and employment. The Hayward multipliers are smaller than the service area multipliers, reflecting the fact that Hayward economic activity accounts for only a portion of service area impacts.

Analysts who work with regional multipliers have long recognized that smaller study areas will have smaller multipliers due to leakage of spending to other, larger economic areas.

Adjustments are often made using employment shares, income shares, or population shares (for example, a city accounting for half the county population would have a multiplier one half as large as the county multiplier).

In this study, three different sets of multipliers were used.

1. California multipliers from the RIMS II model of the U.S. Department of Commerce were used to measure induced benefits in the service area. The justification for the use of California multipliers is that the airport service area includes several counties in one of the largest economic areas in the nation. The Northern California area is essentially self-sufficient and it is reasonable to assume that industry relationships there are similar to the state as a whole.

2. Alameda County multipliers were used to provide a foundation for computing multipliers for the City of Hayward. The average Alameda County multiplier is 90.5 percent the size of the California multipliers, suggesting that Alameda County is also a highly self-sufficient economic area.

3. City of Hayward Multipliers were computed by using two separate ratios applied to Alameda County multipliers:

(A) Multipliers for on-airport activity were adjusted based on the proportion of based aircraft owners that reside within the city limits of Hayward. That proportion is 45 percent.

(B) Multipliers for off-airport activity were adjusted by the ratio of Hayward population to Alameda County population. That proportion is 8.9 percent.

Insufficient data on detailed employment by sectors in the City of Hayward economy prevented using multiplier adjustments based on employment. For on airport activity, the proportion of airport employees that actually reside in Hayward as a proportion of all employees would give some indication of the leakage of wages outside the city. For off-airport activity, using a population ratio instead of employment assumes that population is distributed among cities in the county the same as employment.

Output Multipliers - Service Area

Output multipliers show the increase in the value of output in the service area associated with an initial increase in demand for goods and services. In Table 12, on-airport economic activity that creates $31,985,300 in revenues for on-airport firms and agencies leads to additional revenues in the service area for supplier firms of $44,688,344. The sum of initial and induced revenues gives the total of $76,673,644 for on-airport activity.

Similar results hold for each category of visitor spending. Outlays by air visitors for hotels or other lodging in the amount of $1,378,592 create income for hotel workers and proprietors and also stimulate demand for various inputs to hotel operation such as utilities, business services, maintenance, supplies, insurance, etc. When workers spend their earnings and supplier businesses increase output, the result is induced revenues of $1,853,103. The sum of initial output and induced output is the total lodging output

$$\$1,378,592 + \$1,853,103 = \$3,231,695$$

The total can be found by application of the multiplier coefficient to the initial spending for lodging.

$$\$1,378,592 \text{ X } 2.3442 = \$3,231,695$$

Note that the total revenues include the initial lodging expenditures, implying that the multiplier must always be at least 1 even without induced effects. The induced benefits can be computed directly by subtracting 1 from the multiplier and again obtaining the product of the initial spending and the multiplier

$1,378,592 X 1.3442 = $1,853,103

Finally, by algebra, induced output for the lodging sector is equal to the difference between total output and initial output

$3,231,695 - $1,378,592 = $1,853,103

Total output (measured as revenues) for all aviation related sectors in the service area is the sum of initial revenues of $34,552,300 and induced revenues of $51,612,695, to provide total benefits in the service area of $90,164,995.

TABLE 12
Induced Benefits: Output Multipliers and Revenues Within the Airport Service Area
Hayward Executive Airport

Benefit Source	On-Airport & Visitor Revenues	Service Area Output Multipliers	Induced Revenues	Total Revenues
On-Airport Benefits:				
Airport Businesses and Agencies	$31,985,300	2.4307	$44,688,344	$76,673,644
Visitor Benefits:				
Hotel/Lodging	1,378,592	2.3442	1,853,103	3,231,695
Food and Drink	1,392,888	2.3012	1,812,426	3,205,314
Retail	1,825,736	2.3373	488,311	2,314,047
Entertainment	360,832	2.3165	475,049	835,881
Ground Transport	528,952	2.3268	701,814	1,230,766
Construction	1,080,000	2.4756	1,593,648	2,673,648
TOTALS	**$38,552,300**		**$51,612,695**	**$90,164,995**

Notes: Multipliers are California final demand output multipliers from *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, U.S. Department of Commerce, Bureau of Economic Analysis, U. S. Government Printing Office, 1992. Retail multiplier was adjusted to apply only to sales margin, estimated at 20% of total revenues. Cost of fuel sold was subtracted from on-airport revenues before applying multiplier. Total revenues are computed as the product of initial revenues and the output multiplier for each benefit source. Induced revenues are the difference between total revenues and initial revenues. Some entries may not compute exactly as shown due to rounding.

Earnings Multipliers - Service Area

Table 13 presents the application of earnings multipliers to obtain induced and total earnings within the service area due to initial economic activity associated with the presence of Hayward Executive Airport.

The multipliers are "direct effect" multipliers which show the change in total service area earnings that result from a one dollar change in earnings from each benefit source. Initial service area earnings of $10,750,254 lead to total earnings of $22,309,376. Induced earnings are $11,559,123. Each dollar of earnings, on the average, induces $1.07 of additional earnings in the service area.

TABLE 13
Induced Benefits: Earnings Multipliers and Earnings Within the Airport Service Area
Hayward Executive Airport

Benefit Source	On-Airport & Visitor Sector Earnings	Service Area Earnings Multipliers	Induced Earnings	Total Earnings
Airport Businesses and Agencies	$9,140,709	2.0426	$9,530,103	$18,670,812
Hotel/Lodging	388,006	2.4677	566,541	952,546
Food and Drink	348,222	2.1484	399,898	748,120
Retail	217,263	1.7958	172,898	390,160
Entertainment	93,816	2.4386	134,962	228,779
Ground Transport	132,238	1.7711	101,969	234,207
Construction	432,000	2.5111	652,752	1,084,752
TOTALS	**$10,750,254**		**$11,559,123**	**$22,309,376**

Notes: Multipliers are California direct effect earnings multipliers from *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, U.S. Department of Commerce, Bureau of Economic Analysis, U. S. Government Printing Office, 1992. Direct effect multipliers show the dollar increase in earnings in all industries in the airport service area for a one dollar change in earnings of each benefit source. For example, a one dollar increase in earnings to workers and proprietors in the lodging industry creates $2.4677 of earnings in the service area economy, including the initial dollar of earnings in the lodging industry. Some entries may not compute exactly as shown due to rounding.

Employment Multipliers - Service Area

Table 13 sets out employment multipliers for induced and total employment within the service area due to initial economic activity associated with the presence of Hayward Executive Airport.

The multipliers are "direct effect" multipliers which show the change in total service area employment that results from a change in one job in each benefit source. Initial service area employment of 388 workers leads to total employment of 856. Induced employment is 468 jobs.

Construction has the largest multiplier, reflecting high wages paid to workers that in turn create more jobs in the general service area economy.

As an overall average, each job created by initial aviation-related economic activity induces an additional 1.2 jobs in the service area.

TABLE 14
Induced Benefits: Employment Multipliers and Employment Within the Airport Service Area
Hayward Executive Airport

Benefit Source	On-Airport & Visitor Sector Employment	Service Area Employment Multipliers	Induced Employment	Total Employment
Airport Businesses and Agencies	303	2.2543	380	683
Hotel/Lodging	22	2.3947	30	52
Food and Drink	32	1.5044	16	49
Retail	10	1.6199	6	17
Entertainment	6	2.3664	8	14
Ground Transport	4	1.8705	4	8
Construction	10	3.2799	24	34
TOTALS	**388**		**468**	**856**

Notes: Multipliers are California direct effect employment multipliers from *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, U.S. Department of Commerce, Bureau of Economic Analysis, U. S. Government Printing Office, 1992. Direct effect multipliers show the increase in employment in all industries in the airport service area for change of one job for each benefit source. For example, one additional worker in the lodging industry creates 2.39 jobs in the service area economy, including the job in the lodging industry. Jobs are not adjusted to full time equivalent. Some entries may not compute exactly as shown due to rounding.

Output Multipliers - City of Hayward

Table 15 shows output multipliers for the City of Hayward. For on-airport activity, the multiplier value indicates that .5343 of the initial revenues stay within the City of Hayward as induced revenues. Initial output of $35.6 million due to the presence of the airport creates induced output of an additional $18.1 million of revenues within the City of Hayward. Total output (revenues) sum to $53.7 million.

TABLE 15
Induced Benefits: Output Multipliers Adjusted for City of Hayward
Hayward Executive Airport

Benefit Source	Hayward On-Airport & Visitor Revenues	Hayward Output Multipliers	Hayward Induced Revenues	Hayward Total Revenues
On-Airport Benefits:				
Airport Businesses and Agencies	$31,985,300	1.5343	$17,089,322	$49,074,622
Visitor Benefits Within Hayward				
Hotel/Lodging	579,009	1.2232	129,240	708,249
Food and Drink	665,266	1.2118	140,906	806,173
Retail	856,234	1.0428	36,604	892,838
Entertainment	160,721	1.2075	33,346	194,067
Ground Transport	242,782	1.2195	53,299	296,081
Construction	1,080,000	1.5702	615,775	1,695,775
TOTALS WITHIN CITY OF HAYWARD	**$35,569,312**		**$18,098,493**	**$53,667,805**

Notes: Multipliers are adjusted to City of Hayward from Alameda County final demand output multipliers derived from *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, U.S. Department of Commerce, Bureau of Economic Analysis, U. S. Government Printing Office, 1992. Retail multiplier was adjusted to apply only to sales margin, estimated at 20% of total revenues. Cost of fuel sold was subtracted from on-airport revenues before applying multiplier. Some entries may not compute exactly as shown due to rounding.

Earnings Multipliers - City of Hayward

Table 13 presents the application of earnings multipliers to obtain induced and total earnings within the City of Hayward due to initial economic activity associated with the presence of Hayward Executive Airport.

Most of the induced earnings are related to on-airport activity. The initial on-airport earnings of $9.1 million lead to induced earnings within the City of Hayward of $3.5 million. Overall from combined benefit sources, each dollar of earnings, on the average, induces 38 cents of additional earnings within the City of Hayward.

TABLE 16
Induced Benefits: Earnings Multipliers and Earnings Within the City of Hayward
Hayward Executive Airport

Benefit Source	Hayward On-Airport & Visitor Earnings	Hayward Earnings Multipliers	Hayward Induced Earnings	Hayward Total Earnings
Airport Businesses and Agencies	$9,140,709	1.3879	$3,545,775	$12,686,484
Hotel/Lodging	162,122	1.2461	39,906	202,248
Food and Drink	166,317	1.1854	30,827	197,144
Retail	102,748	1.1192	12,249	114,997
Entertainment	45,549	1.2102	9,568	55,117
Ground Transport	60,696	1.1207	7,329	68,204
Construction	432,000	2.5111	252,612	684,612
TOTALS	**$10,110,141**		**$3,898,265**	**$14,008,406**

Notes: Multipliers are direct effect earnings multipliers adjusted to City of Hayward from Alameda County direct effect earnings multipliers derived from *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, U.S. Department of Commerce, Bureau of Economic Analysis, U. S. Government Printing Office, 1992. Direct effect multipliers show the dollar increase in earnings in all industries in the City of Hayward for a one dollar change in earnings of each benefit source. For example, a one dollar increase in earnings to workers and proprietors in the lodging industry creates $1.2461 of earnings in the Hayward economy, including the initial dollar of earnings in the lodging industry. Some entries may not compute exactly as shown due to rounding.

Employment Multipliers - City of Hayward

Table 17 contains employment multipliers for induced and total employment within the City of Hayward due to initial economic activity associated with the presence of Hayward Executive Airport.

The 303 jobs on the airport contribute to an additional 144 jobs within the City of Hayward created when on-airport firms and agencies buy supplies or when on-airport workers buy goods and services using earnings from on-airport jobs.

Visitor sector multipliers are relatively small and only 5 additional jobs are induced within the City of Hayward by visitor activity. This is due to several factors including lower wages in the tourist sector which induce a smaller number of jobs in the general economy.

As an overall average, each job created by initial aviation-related economic activity induces approximately an additional .5 jobs in the City of Hayward..

TABLE 17
Induced Benefits: Employment Multipliers and Employment Within the City of Hayward
Hayward Executive Airport

Benefit Source	Hayward On-Airport & Visitor Employment	Hayward Employment Multipliers	Hayward Induced Employment	Hayward Total Employment
Airport Businesses and Agencies	303	1.4748	144	447
Hotel/Lodging	9	1.2342	2	11
Food and Drink	15	1.0759	1	16
Retail	5	1.0881	1	6
Entertainment	3	1.1870	1	4
Ground Transport	2	1.1418		2
Construction	10	1.8864	9	19
TOTALS	**347**		**158**	**505**

Notes: Multipliers are direct effect employment multipliers adjusted to City of Hayward from Alameda County direct effect employment multipliers derived from *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II)*, U.S. Department of Commerce, Bureau of Economic Analysis, U. S. Government Printing Office, 1992. Direct effect multipliers show the increase in employment in all industries in the City of Hayward for a change of one job for each benefit source. For example, one additional worker in the lodging industry creates 1.23 jobs in the Hayward economy, including the job in the lodging industry. Jobs are not adjusted to full time equivalent. Some entries may not compute exactly as shown due to rounding.

BASED AIRCRAFT BENEFITS

A survey of owners of aircraft based at Hayward Executive Airport was conducted to compile information on number and value of aircraft, annual expenditures and usage patterns, purpose of travel, average party size, and average distance flown per trip. Questions were also posed concerning the importance of the airport for residential location and businesses of flyers.

The average market value for the 423 aircraft based at Hayward Executive Airport was $64,365. The total value of all aircraft based at the airport was $27.2 million (Table 18).

The combined distance logged on based general aviation aircraft for personal and business travel summed to 7.4 million miles in FY 1999. The passenger miles, after accounting for party size, totaled 15.9 million.

TABLE 18
Based Aircraft Profile
Hayward Executive Airport

Item	Value
Number of Aircraft	423
Total Market Value	$27,226,219
Average Value	$64,365
Total Annual Outlays	$3,083,018
Average Annual Outlays	$7,288

Source: Based aircraft owner survey, 1999

An approximation of the dollar value of travel on based aircraft may be made by comparison with financial reports of scheduled air carriers, who report typical revenues per passenger mile in the range of 10 cents. Applying this value to passenger miles traveled on aircraft based at Hayward Executive Airport, the "airline equivalent" value of travel is $1.6 million.

This figure is an estimate, which does not include a measure of the economics gains such as those from business trips, which may have been substantial. Personal trips, such as those for medical reasons, often have high economic value as well. Further, the flexibility compared to scheduled airline travel and the time saved by general aviation travel compared to automobile use is not calculated here, but certainly has economic significance.

It is important for citizens and policy makers to be aware that these unmeasured but qualitative elements represent significant social and economic benefits created by airports for the regions which they serve. For example, convenient air transportation allows freedom for individuals to travel to satisfy their preferences for goods, services, and personal needs. Airports make the regional economy more competitive by providing businesses ready access to markets, materials and international commerce.

In addition to exerting a positive influence on economic development in general, aviation often reduces costs and increases efficiency in individual firms. Annual studies by the National Business Aviation Association show that those firms with business aircraft have sales 4 to 5 times larger than those that do not operate aircraft. In 1997, the net income of aircraft operating companies was 6 times larger than non-operators. Two thirds of the *Fortune* 500 firms operate aircraft and 88 percent of the top 100 have business aircraft (see National Business Aviation Association, *Fact Book*, 1998).

The presence of the airport as a factor affecting the personal quality of life and business success of aircraft owners was measured by survey questions asking respondents to rate the airport as "very important, important, slightly important, or not important" to their residential location decision and their business.

The survey results show that Hayward Executive Airport is a significant factor in determining where aircraft owners live. Survey respondents derived benefits from having the airport nearby their residences and their places of employment.

Four out of five aircraft owners (80 percent) said that the airport is "important" or "very important" to their residential location and nearly one half (48%) cited the airport as "very important." Further, more than one half (54%) stated that the airport is important or very important to their business.

TABLE 19
Based Aircraft - Use Patterns
Hayward Executive Airport

Type	Annual Trips
Avg. Number of Trips	52
Avg. Business Trips	11
Avg. Personal Trips	41
Percent Business Trips	21%
Percent Personal Trips	79%

Source: Based aircraft owner survey, 1999

Those who reported the airport as important to their business were also asked for information about their business. Firms represented by users of based aircraft for business purposes accounted for 5,028 employees in the service area, and the businesses of the combined respondents accounted for more than $500 million of annual sales.

A significant portion of the revenue created on the airport can be attributed to outlays by the owners of the 423 general aviation based aircraft for storage, maintenance, and operation of their aircraft throughout the year.

Owners reported expenditures averaging $7,288 per year on repairs, maintenance and operations. Using these values, the total spending created in the region due to outlays by aircraft owners can be estimated as $3.1 million in 1999. (Note that annual expenses for individual aircraft can vary greatly, depending on the size, technical specifications, and hours flown.)

Hayward Executive Airport based general aviation aircraft owners reported an average of 52 non-training trips per year, which is an average of 4.3 non-training trips per month, or approximately one per week (Table 19).

Overall, seventy nine percent of general aviation trips (41 trips per year) were for personal travel and twenty one percent of trips (11 per year) were for business purposes. However, 38 percent of aircraft owners reported some business use for their aircraft and among those who reported business use, the average was 23 trips for business purposes per year.

TABLE 20
Based Aircraft - Personal Use
Hayward Executive Airport

Item	Annual Value
Avg. Personal Trips	41
Total Personal Trips	17,343
Avg. Party Size	2.2
Avg. Round Trip Miles	293
Total Personal Miles	5,110,193
Total Passenger Miles	11,242,425

Source: Based aircraft owner survey, 1999

The typical round trip for pleasure, recreation or other personal reasons was 293 miles, with 2.2 persons in the travel party (Table 20). There were an estimated 17,433 trips for personal reasons during the year.

Aircraft at Hayward Executive Airport flew 5.1 million miles for personal reasons in 1999. With an average travel party of 2.2 persons, total non-business passenger miles flown during the year summed to 11.2 million.

The typical business use for a general aviation aircraft was 504 miles round trip with 2.0 persons in the travel party (Table 21). There were an estimated 4,627 business trips made from Hayward Executive Airport during the year.

TABLE 21
Based Aircraft - Business Use
Hayward Executive Airport

Item	Annual Value
Avg. Business Trips	11
Total Business Trips	4,627
Avg. Party Size	2.0
Avg. Round Trip Miles	504
Total Business Miles	2,330,105
Total Passenger Miles	4,660,210

Source: Based aircraft owner survey, 1999

This figure refers to private aircraft owners only and does not include the numerous trips made by charter aircraft, government flights supporting public safety, or air ambulance services. The economic valuation of these latter types of flights is captured in the revenues reported by businesses.

Hayward based aircraft flew 2,330,105 business miles in FY 1999. Passenger miles flown on business trips originating at Hayward Executive Airport summed to 4,660,210.

SUMMARY AND FUTURE IMPACTS

This study was designed to answer two questions about the benefits associated with Hayward Executive Airport:

1. What economic benefits were created in the service area by the presence of the airport during FY 1999?

2. What economic benefits were created within the City of Hayward by the presence of the airport in FY 1999?

Summary tables setting out the answers to these questions are shown on the following page. Economic benefits to the service area (including all of Alameda County and other portions of the Bay Area) are in Table 22-A.

Service area benefits without including multiplier effects are labeled as "primary benefits" in the table, and these include revenues of $38.6 million, 388 jobs and earnings to workers and proprietors of $10.8 million.

Including multiplier effects, total benefits to the service area are $90.2 million in revenues, 856 jobs and earnings of $22.3 million.

Economic benefits to the City of Hayward are shown in Table 22-B. The service area and the City of Hayward share the on-airport benefits, since the airport is located within the City of Hayward. On-airport benefits are revenues of $33.1 million with 313 jobs on the airport and earnings of $9.6 million.

Based on travel destinations as reported by visitors arriving at the airport, an estimated $2.5 million was spent by air visitors within the City of Hayward in FY 1999. This spending created 34 jobs with earnings of $537,432.

TABLE 22 - A
Service Area Benefits
Summary of Economic Benefits: FY 1999
Hayward Executive Airport

	Service Area Revenues	Service Area Earnings	Service Area Employment
On-Airport Activity	**$33,065,300**	**$9,572,709**	**313**
Air Visitors	**5,487,000**	**1,177,545**	**75**
Primary Benefits	***38,552,300***	***10,750,254***	***388***
Induced Benefits	**51,612,695**	**11,559,123**	**468**
Total Benefits	**$90,164,995**	**$22,309,376**	**856**

Note: Revenues, earnings and employment for FY 1999 reflect activity and spending associated with 153,618 operations.

TABLE 22 - B
City of Hayward Benefits
Summary of Economic Benefits: FY 1999
Hayward Executive Airport

	Hayward Revenues	Hayward Earnings	Hayward Employment
On-Airport Activity	**$33,065,300**	**$9,572,709**	**313**
Air Visitors	**2,504,012**	**537,432**	**34**
Primary Benefits	***35,569,312***	***10,110,141***	***347***
Induced Benefits	**18,098,493**	**3,898,265**	**158**
Total Benefits	**$53,667,805**	**$14,008,406**	**505**

Note: Revenues, earnings and employment for FY 1999 reflect activity and spending associated with 153,618 operations.

Combining on-airport and visitor benefits to the City of Hayward, the primary benefits (without multiplier benefits) of the airport were $35.6 million of revenues and 347 jobs with earning of $10.1 million.

Initial or primary spending recirculates in the local economy creating induced benefits from the presence of the airport. City of Hayward multipliers were derived from Alameda County multipliers to compute induced and total benefits of on-airport and visitor spending.

The resulting total benefits to the City of Hayward from economic activity originating at Hayward Executive Airport included total revenues of $53.7 million, 505 jobs and earnings of $14 million.

Daily Benefits

Airports are available to serve the flying public every day of the year. On a typical day at Hayward Executive Airport, there are some 420 operations by aircraft in use for business, government, recreation, and training flights. During each day of the year in FY 1999, Hayward Executive Airport generated $147,000 revenues within its service area (see box).

Revenues and production support jobs, not only for the suppliers and users of aviation services, but throughout the economy. Each day Hayward Executive Airport provides 313 jobs directly on the airport and in total supports 505 local jobs in the City of Hayward. These workers brought home daily earnings of $38,000 for spending in the City of Hayward in FY 1999.

Hayward Executive Airport Daily Economic Benefits to City of Hayward

- **$147,000 Revenues**
- **505 Local Jobs Supported**
- **$38,000 Payroll Earned**
- **$6,860 Visitor Spending**
- **69 General Aviation Visitors**

General aviation travelers who arrived at Hayward Executive Airport contributed 25,309 visitor days of spending to the City of Hayward economy. On an average day there were 69 general aviation visitors in the service area, with average daily expenditures of $6,860.

Future Benefits

As aviation activity increases at the airport, the economic benefits may be expected to increase. The projections of future benefits shown here are based on an assumption that higher levels of airport operations will cause parallel increases in economic activity.

The projections for "Short Term," "Intermediate Term," and "Long Term" are not linked to specific years, but instead are associated with future levels of airport operations.

Estimated future benefits of the airport in the Short Term are based on growth of operations from the 1998 level of 153,618 to 173,200 per year. Projections for increases in economic benefits in the Short Term within the service area are shown in Table 23-A and for the City of Hayward in Table 23-B. Assuming commerce on the airport and in the community increases at the same pace, employment on the airport will increase to 342 workers. All of this activity will contribute to total benefits within the City of Hayward.

Increases in GA visitors will cause higher employment in the hospitality sector. Service area jobs related to air visitors will increase to 84 and visitor spending will rise to $6.2 million (measured in 1999 dollars).

Within the City of Hayward, the higher level of operations of 173,2000 will be associated with visitor spending of $2.8 million and 38 jobs (Table 23-B).

The primary benefits of the airport, as measured by revenues, will increase to $42.2 million in the service area. Including all multiplier effects, the total benefits rise to $98.9 million of revenues within the service area (Table 23-A).

The corresponding figures for the City of Hayward are primary benefits of $38.9 million and total benefits of $58.7 million, with 573 jobs and earnings of $16.5 million within the city in the Short Term.

The benefits for the Intermediate Term are based on 188,250 operations (Table 24-A and 24-B). The revenues of on-airport employers rise to $39.2 million, and the number of workers increases to 371. At this level of operations, projected visitor spending in the service area is $6.7 million, which brings primary benefits of $45.9 million of revenues, without multiplier effects. Including all multiplier effects, revenues rise to $107.5 million and the airport supports 961 jobs within the service area.

Intermediate Term benefits for the City of Hayward from 188,250 operations were estimated to rise to total benefits of $63.8 million, with 623 jobs supported and payroll of $17.9 million.

On-airport activity is the same magnitude for the City of Hayward as for the service area. Visitor spending within the City of Hayward is projected at $3.1 million in the intermediate term, slightly less than one half that for the total service area.

The projected benefits for the Long Term planning horizon are based on 221,800 operations (Table 25-A and 25-B). At this scope of activity, the airport service area has potential primary benefits of $54.1 million in revenues and, accounting for multiplier effects, total benefits of $126.6 million. The primary benefits for the City of Hayward are expected to rise to $49.8 million, and total benefits will be $75.1 million. Under the Long Term growth assumptions, the number of jobs supported in the City of Hayward by airport economic activity total 734 with earnings of $21.8 million.

TABLE 23-A
Service Area Benefits
Projections of Future Economic Benefits ($1999): Short Term
Hayward Executive Airport

	Service Area Revenues	Service Area Earnings	Service Area Employment
On-Airport Activity	**$36,062,531**	**$10,305,894**	**342**
Air Visitors	**6,186,439**	**1,327,649**	**84**
Primary Benefits	***42,248,970***	***11,633,543***	***426***
Induced Benefits	**56,632,856**	**12,550,680**	**516**
Total Benefits	**$98,881,826**	**$24,184,223**	**942**

Note: Revenues, earnings and employment for Short Term are based on activity and spending associated with 173,200 operations.

TABLE 23-B
City of Hayward Benefits
Projections of Future Economic Benefits ($1999): Short Term
Hayward Executive Airport

	Hayward Revenues	Hayward Earnings	Hayward Employment
On-Airport Activity	**$36,062,531**	**$10,305,894**	**342**
Air Visitors	**2,823,204**	**605,940**	**38**
Primary Benefits	***38,885,735***	***10,911,833***	***380***
Induced Benefits	**19,785,966**	**5,552,195**	**193**
Total Benefits	**$58,671,701**	**$16,464,028**	**573**

Note: Revenues, earnings and employment for Short Term are based on activity and spending associated with 173,200 operations.

TABLE 24 -A
Service Area Benefits
Projections of Future Economic Benefits ($ 1999): Intermediate Term
Hayward Executive Airport

	Service Area Revenues	Service Area Earnings	Service Area Employment
On-Airport Activity	$39,196,141	$11,201,412	371
Air Visitors	6,724,002	1,443,013	91
Primary Benefits	*45,920,143*	*12,644,425*	*462*
Induced Benefits	61,553,898	13,641,256	499
Total Benefits	$107,474,041	$26,285,681	961

Note: Revenues, earnings and employment for Intermediate Term are based on activity and spending associated with 188,250 operations.

TABLE 24 -B
City of Hayward Benefits
Projections of Future Economic Benefits ($ 1999): Intermediate Term
Hayward Executive Airport

	Hayward Revenues	Hayward Earnings	Hayward Employment
On-Airport Activity	$39,196,141	$11,201,412	371
Air Visitors	3,068,522	658,592	42
Primary Benefits	*42,264,663*	*11,860,004*	*413*
Induced Benefits	21,205,243	6,034,646	210
Total Benefits	$63,769,906	$17,894,649	623

Note: Revenues, earnings and employment for Intermediate Term are based on activity and spending associated with 188,250 operations.

TABLE 25-A
Service Area Benefits
Projections of Future Economic Benefits ($1999): Long Term
Hayward Executive Airport

	Service Area Revenues	Service Area Earnings	Service Area Employment
On-Airport Activity	**$46,181,694**	**$13,197,732**	**437**
Air Visitors	**7,922,357**	**1,700,188**	**108**
Primary Benefits	***54,104,051***	***14,897,920***	***545***
Induced Benefits	**72,524,062**	**16,072,407**	**661**
Total Benefits	**$126,628,113**	**$30,970,327**	**1,206**

Note: Revenues, earnings and employment for Long Term are based on activity and spending associated with 221,800 operations.

TABLE 25-B
City of Hayward Benefits
Projections of Future Economic Benefits ($1999): Long Term
Hayward Executive Airport

	Hayward Revenues	Hayward Earnings	Hayward Employment
On-Airport Activity	**$46,181,694**	**$13,197,732**	**437**
Air Visitors	**3,615,396**	**775,966**	**49**
Primary Benefits	***49,797,090***	***13,973,699***	***487***
Induced Benefits	**25,337,918**	**7,110,143**	**248**
Total Benefits	**$75,135,008**	**$21,083,842**	**734**

Note: Revenues, earnings and employment for Long Term are based on activity and spending associated with 221,800 operations.

APPENDIX

HAYWARD EXECUTIVE AIRPORT

ECONOMIC BENEFIT STUDY

SURVEY FORMS

HAYWARD EXECUTIVE AIRPORT EMPLOYER SURVEY

To All Airport Employers and Tenants:

*An Economic Benefit Study for Hayward Executive Airport will be included as part of the Master Plan now being prepared. Your cooperation is very much needed to compile meaningful economic data about the airport. This survey of employers will be handled with the **strictest confidentiality** by an independent consultant and only aggregate numbers will be used in publishing the data. If you have questions about the survey, please call Brent Shiner, Airport Manager, at 293-8678. **Please return the survey form in the postage paid return envelope within ten days.***

1. Please describe your **main business activity** (restaurant, aircraft maintenance, etc.)

   Type of business: ______________________________

2. How many **employees** do you have on the payroll at this time? ______________

3. Please estimate your **annual payroll** $ ______________

4. Please estimate your **annual operating costs** (do not include payroll but do include **cost of utilities, goods and services**) $ ______________

5. Please estimate **annual total sales** for your business

   a. EITHER indicate amount if you can release it $ ______________

   b. OR mark appropriate range on scale below

0	25	50	75	100	200	400	500	750	1	2	5	10
($ Thousands)									($ Millions)			

6. Name of person completing survey: ______________________________

Thank you for your cooperation!

HAYWARD EXECUTIVE AIRPORT BASED AIRCRAFT SURVEY

Dear Aircraft Owner:

*An Economic Benefit Study for Hayward Executive Airport will be included as part of the Master Plan now being prepared. Your cooperation is very much needed to compile meaningful economic data about the airport. This survey of aircraft owners will be handled with the **strictest confidentiality** by an independent consultant and only aggregate numbers will be used in publishing the data. If you have questions about the survey, please call Brent Shiner, Airport Manager, at 293-8678. **Please return the survey form in the postage paid return envelope within ten days.***

1. How many aircraft do you have based at Hayward Executive Airport? _________

2. Please estimate the market value of your aircraft. _________

3. Please estimate your annual outlays for fuel, maintenance, insurance, storage and other expenses associated with your aircraft. _________

4. Please estimate the annual number of (non- training) trips in your aircraft.

   Business _________ Personal ________

5. Please estimate average ROUND TRIP MILEAGE for a typical (non-training) trip.

   Business _________ Personal ________

6. What was the average number of persons on a typical trip?

   Business _________ Personal ________

7. Considering the location of your personal residence, how important is the airport as a factor determining where you have decided to live?

   Very Important ___ Important ___ Slightly Important ___ Not Important ___

8. Considering your business or employment, how important is the airport as a factor determining the location, operation and success of this business?

   Very Important ___ Important ___ Slightly Important ___ Not Important ___

9. If the airport is important to your business or employment, please provide the information below:

   Number of Employees at Your Business ________ Annual Sales ________

Please Use Other Side For Comments or Suggestions About Airport

Thank you for your cooperation!

HAYWARD EXECUTIVE AIRPORT GA VISITOR SURVEY

Dear Aircraft Owner:

*Your aircraft appears on our listing of visitors to Hayward Executive Airport during the past year. We are asking your assistance in completion of this **confidential** questionnaire to measure the economic benefits from spending by GA visitors. The information will help us improve services for General Aviation travelers. If you have questions about the survey, please call Brent Shiner, Airport Manager, at 510-293-8678. **Please return the survey form in the enclosed envelope within ten days.***

1. What was the main **purpose** of your most recent visit to the Hayward area?

   Fuel stop only _____ Business trip _____ Tourism/sightseeing ______ Personal/family visit ______

2. How many **people** were in your travel party? Circle : 1 2 3 4 or more (specify) ____________

3. Where was your **primary destination** while in the area? Did not leave airport ___________

   City of Hayward ______ Other East Bay _____ San Francisco _____ Other ________________________

4. Did you stay at a home or property you own in the area? Yes _____ No _____

5. How many **nights** was your aircraft parked at Hayward Executive Airport?

   Circle: None (day trip) 1 2 3 4 or more (specify) ___________

6. Please estimate **spending by your ENTIRE TRAVEL PARTY** on your visit to this area. Do not include expenditures for aircraft fuel or FBO services. Please circle the closest figure.

   Hotel/Lodging:

   None $50 75 100 125 150 200 300 400 500 600 700 800 or more (specify) ____________

   Restaurant Food and Drink:

   None $10 25 50 75 100 125 150 175 200 300 400 500 600 or more (specify) ____________

   Retail Spending for Goods and Services (include groceries but not entertainment)

   None $10 25 50 75 100 125 150 175 200 300 400 500 600 or more (specify) ____________

   Entertainment (Golf, Movies, etc.):

   None $10 25 50 75 100 125 150 175 200 300 400 500 600 or more (specify) ____________

   Ground Transportation Including Auto Rental:

   None $10 25 50 75 100 125 150 175 200 300 400 500 600 or more (specify) ____________

Thank you for your cooperation!

HAYWARD
AIRPORT

Appendix C
AIRCRAFT NOISE ORDINANCE REVIEW

Appendix C
AIRCRAFT NOISE ORDINANCE REVIEW

Advances in aviation and navigation technology has made it necessary to review the assumptions the Hayward Executive Aircraft Noise Ordinance is based upon to insure the ordinance is meeting its designed objectives. The objectives of the Aircraft Noise Ordinance are as follows:

- Reduce the number of aircraft operations that generate excessive noise resulting in consistent complaints.

- Reduce aircraft noise decibel levels in response to the environmental concerns of the community without impairing the ability of the airport to serve the general aviation needs of the community and the national air transportation system.

- Adopt reasonable rules that would be legally defensible.

- To implement noise enforcement standards allowing operators of aircraft which exceed established noise levels the flexibility to modify their aircraft or otherwise bring their performance standards into compliance with the noise ordinance.

The review of the noise ordinance will include a brief discussion of the ordinance and how it is enforced, a correlation of historical aircraft operations and exceedances, a correlation of historical complaints and exceedances, and a comparison of the aircraft types exceeding the noise limits outlined in Federal Aviation Administration (FAA) Advisory Circular (AC) 36-3G-Estimated Airplane Noise Levels in A-Weighted Decibels (AC 36-3G superceded AC36-3F in 1996). This review will also determine the aircraft types that are banned from the airport according to the noise ordinance and discuss potential refinement options to the ordinance.

AIRCRAFT NOISE ORDINANCE

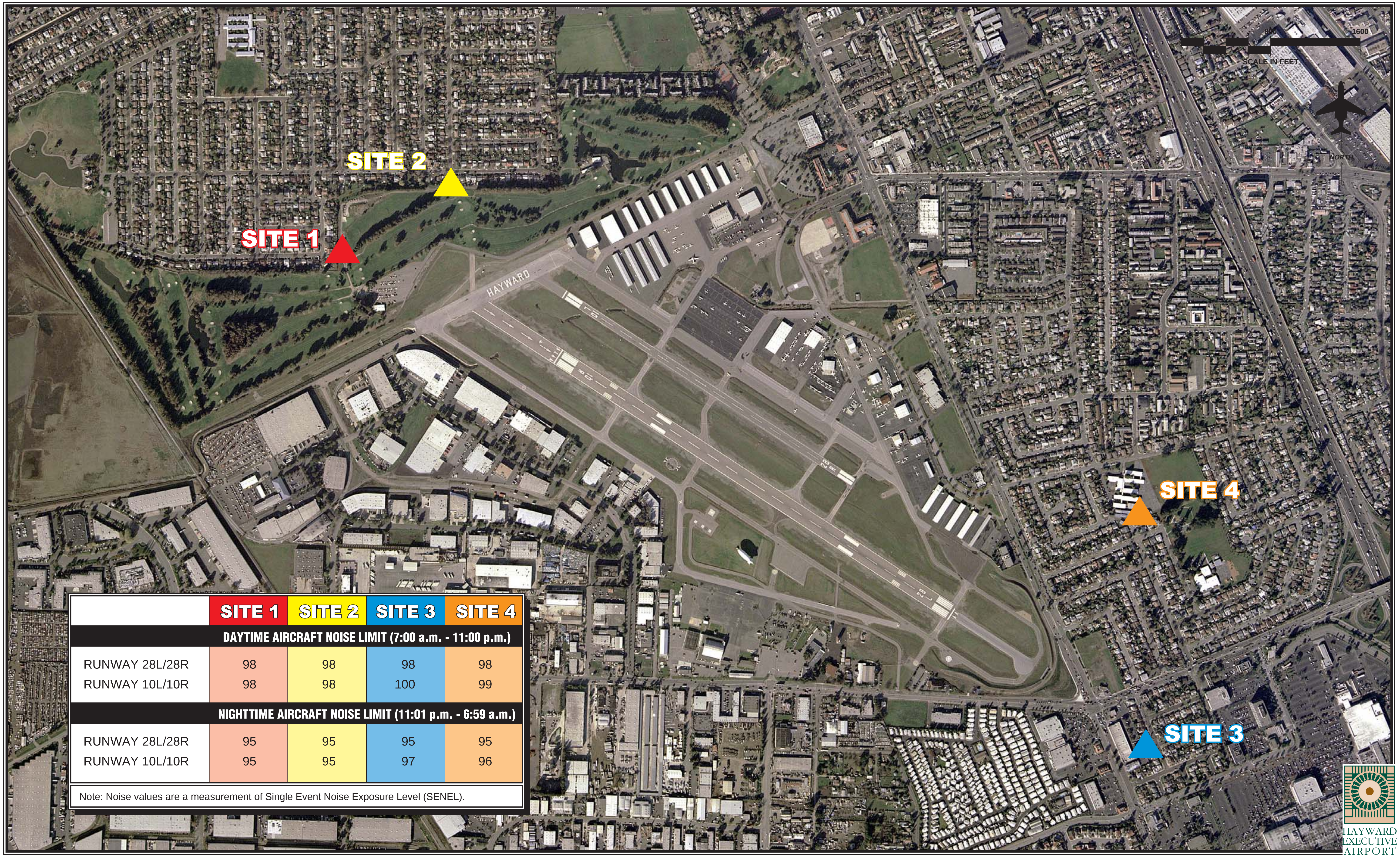
On January 1, 1988, the Hayward City Council enacted an interim aircraft noise ordinance. This interim ordinance was a temporary measure until a performance-based noise ordinance could be developed and implemented. The interim ordinance set noise decibel limits for aircraft based upon AC 36-3F Estimated Airplane Noise Levels in A-Weighted Decibels. AC 36-3F is a published list of certified maximum A-weighted decibel levels for all fixed-wing aircraft on takeoff and approach as measured at 6,500 meters from beginning of takeoff roll and 2,000 meters from the landing threshold.

A permanent noise monitoring system consisting of four noise monitors was installed in November 1988. Data collected from these monitors during a 19 month test period and an analysis of information from AC-36-3F provided the basis for setting maximum aircraft noise limits at each noise monitor for both daytime and nighttime aircraft operations. **Exhibit C1** depicts the noise monitor locations and maximum aircraft noise limits for each monitor by runway and time of day.

An aircraft is considered in violation of the Aircraft Noise Ordinance during the daytime if it exceeds the maximum noise limit at one of the permanent noise monitors or exceeds 77 dBA on takeoff as published in AC 36-3F. During the nighttime hours, an aircraft is in violation if it exceeds the maximum noise limit at one of the permanent noise monitors or exceeds 73 dBA on takeoff as published in AC 36-3F. Exceptions to the ordinance are as follows:

- All Stage 3 aircraft;
- Aircraft operated by the United States or State of California;
- Law enforcement, emergency, fire, rescue, or medical aircraft operated by any county, city, subdivision, or special district when operating is an emergency situation;
- Aircraft used for emergency purposes during an emergency that has been officially proclaimed by competent authority;
- Civil Air Patrol when engaged in actual search and rescue missions;
- Aircraft operating under a declared in-flight emergency;

97MP17-C1-10/1/99



	SITE 1	SITE 2	SITE 3	SITE 4
DAYTIME AIRCRAFT NOISE LIMIT (7:00 a.m. - 11:00 p.m.)				
RUNWAY 28L/28R	98	98	98	98
RUNWAY 10L/10R	98	98	100	99
NIGHTTIME AIRCRAFT NOISE LIMIT (11:01 p.m. - 6:59 a.m.)				
RUNWAY 28L/28R	95	95	95	95
RUNWAY 10L/10R	95	95	97	96

Note: Noise values are a measurement of Single Event Noise Exposure Level (SENEL).

Exhibit C1
NOISE MONITOR LOCATIONS

- Aircraft operating as a declared air ambulance emergency flight for medical purposes;
- Aircraft engaged in takeoffs or landings while conducting tests under the direction of the Airport Director.

The enforcement of the Aircraft Noise Ordinance is done by downloading noise events from the noise monitoring system and determining aircraft noise exceedances. Aircraft noise exceedances are than correlated with recordings of the tower and other airport radio frequencies to determine aircraft identification numbers. The aircraft identification number can be used to determine the aircraft type and owner. Aircraft generating more than 77 dBA daytime/73 dBA nighttime per AC 36-3F or not exempt according to the list above are deemed in violation of the Aircraft Noise Ordinance.

The first violation of the Aircraft Noise Ordinance results in a citation being issued. The second violation within a three year period results in a fine of up to $500 and/or a suspension of airport privileges for up to one year or both. The third violation within a three year period results in a fine up to $500 and/or a suspension of airport privileges for up to three years or both.

AIRCRAFT NOISE EXCEEDANCES, VIOLATIONS, AND COMPLAINTS

The number of exceedances at the noise monitors since 1993 have fluctuated from a high of 276 in 1994 to a low of 103 in 1997. The number of exceedances do not correspond to operation levels at the airport. Operations were down six percent from 1993 to 1994 when the highest number of exceedances were recorded. Operations were up 17 percent from 1994 to 1997 when the lowest number of exceedances occurred. **Table C1** summarizes the number of exceedances at the noise monitors since 1993.

TABLE C1
Aircraft Noise Exceedances
Hayward Executive Airport

Year	Operations	Exceedances	Violations	Exceedances as a percentage of operations	Violations as a percentage of operations
1993	167,813	157	3	0.09%	0.00%
1994	157,772	276	7	0.17%	0.00%
1995	157,601	181	7	0.11%	0.00%
1996	184,496	143	5	0.08%	0.00%
1997	185,281	103	25	0.06%	0.01%
1998	157,496	130	24	0.08%	0.02%

Source: Hayward Executive Airport Records and Analysis By Coffman Associates

The number of violations to the Aircraft Noise Ordinance remained very low between 1993 to 1996, ranging from 3 to 7 violations. A small increase to 25 violations occurred in 1997. This seems to correlate well with the increase in operations in 1997, but noise monitor exceedances were at an all time low. The number of violations remained fairly stable in 1998 with 24 violations, but operations dropped by 15 percent and exceedances increased by 26 percent. **Table C1** also summarizes the number of violations since 1993.

Overall, the number of exceedances and violations as a percentage of total operations in the last six years has remained below 0.20 percent. Total operations at Hayward Executive Airport appear to have very little bearing on the number of noise monitor exceedances or violations.

Noise Monitor 1 recorded the most total exceedances, 68, of the four noise monitors. Noise Monitors 3 and 4 each recorded 27 and Noise Monitor 4 had only eight exceedances during 1998. **Table C2** summarizes the monthly aircraft noise exceedances by each noise monitor for 1998.

TABLE C2
1998 Monthly Exceedances By Noise Monitor
Hayward Executive Airport

	Noise Monitor								
	1		2		3		4		
Month	**Takeoff**	**Landing**	**Takeoff**	**Landing**	**Takeoff**	**Landing**	**Takeoff**	**Landing**	**Total**
Jan.	7	1	6	0	3	0	2	0	19
Feb.	7	0	2	0	6	0	0	0	15
Mar.	6	0	2	0	0	0	1	0	9
Apr.	3	0	1	0	0	1	0	0	5
May.	4	2	2	0	0	0	1	0	9
Jun.	9	0	3	0	0	9	1	0	22
Jul.	8	0	5	0	0	1	1	0	15
Aug.	6	0	1	0	1	0	0	0	8
Sep.	3	0	2	0	0	2	2	0	9
Oct.	5	0	0	0	0	0	0	0	5
Nov.	3	0	1	0	1	1	0	0	6
Dec.	3	1	2	0	1	1	0	0	8
Total	64	4	27	0	12	15	8	0	130

A majority of the exceedances that occur at the airport are due to aircraft on takeoff. Approximately 111 of the 130 exceedances in 1998 were caused by aircraft departing the airport. Noise Monitors 1 and 2 recorded the most takeoff exceedances with 64 and 27 respectively. Noise Monitor 3 recorded the most landing exceedances with 15.

The exceedance data in **Table C2** correlates with how the airport operates most of the time. Runway 10R-28L is the primary runway with runway 28L used for departure a majority of the time. Runway 10L-28R is generally used by smaller general aviation aircraft and is closed when the Airport Traffic Control Tower (ATCT) is closed (9:00 p.m. to 7:00 am.).

Noise complaints at Hayward Executive Airport generally correspond to the number of operations at the airport. When aircraft operations decreased from 1993 (167,813 operations) to 1995 (157,601 operations), noise complaints decreased. When aircraft operations increased in 1996 (184,496 operations) and 1997 (185,281 operations), noise complaints increased. However, the sharp increase in noise complaints from 1996 (167 complaints) to 1997 (540 complaints) is disproportionate to the 0.4 percent increase in total operations. In addition, the number of exceedances recording during 1997 was at an all time low, 103. A review of noise complaint data indicated that many of the noise complaints 379 in 1997 and 305 in 1998 came from two households. The noise complaints by these households by and large do not correlate with aircraft noise exceedances of the Aircraft Noise Ordinance. It should also be noted that the increase in noise complaints may also be due to a group of citizens who are actively soliciting aircraft noise complaints. **Table C3** summarizes noise complaints for Hayward Executive Airport.

TABLE C3
Aircraft Noise Complaints
Hayward Executive Airport

Year	Operations	Complaints	Households Filing a Complaint	Exceedance	Complaints due to exceedance	Complaints as a percentage of operations
1993	167,813	295	90	157	106	0.18%
1994	157,722	221	92	276	151	0.14%
1995	157,601	147	58	181	72	0.09%
1996	184,496	167	77	143	74	0.09%
1997	185,281	540	122	103	25	0.29%
1998	157,496	444	65	130	30	0.28%

Source: Hayward Airport Records

The number of noise complaints caused by aircraft exceedances has declined in the last five years, dropping from 151 in 1994 to 30 in 1998. The decline in noise complaints caused by aircraft exceedances appears to indicate that either the sensitivities of area residents to noise are changing or they are concerned by aircraft overflights. However, the number of aircraft noise complaints is very small when compared to total aircraft operations. An average of less than 0.20 percent of the aircraft operations generated a noise complaint over the last six years.

AIRCRAFT ACCEPTABLE AND UNACCEPTABLE UNDER THE AIRCRAFT NOISE ORDINANCE

AC 36-3G, the advisory circular version that supercedes AC 36-3F, is used in this ordinance review as an initial filter when determining if an aircraft is capable of operating at Hayward Executive Airport within the Aircraft Noise Ordinance. Aircraft owners/pilots, however, can request a test flight if their aircraft is not listed in AC 36-3G or does not meet the daytime/nighttime noise limits without penalty. The flight test evaluates an aircraft based on the noise monitor noise limits on both arrival and departure. Therefore, even if an aircraft is certified in AC 36-3G as making more noise than the Aircraft Noise Ordinance allows, the use of quiet flying procedures or aircraft modifications may allow the aircraft to operate at Hayward Executive if the aircraft passes the flight test.

There are 853 aircraft and variations of aircraft specified on AC 36 -3G. Only 275 of the aircraft listed in AC 36-3G are capable of operating at Hayward Executive Airport due to the runway pavement strength limitations. Currently Runway 10R-28L is strength rated for 30,000 lbs. single wheel load (SWL) and 75,000 lbs. duel wheel load (DWL). Runway 10L-28R currently has a pavement strength of 13,000 lbs. SWL.

209 of the 275 aircraft (7,640) capable of operating at Hayward Executive Airport generate 73 dBA or less on takeoff. These aircraft meet both the daytime noise limit of 77 dBA and nighttime noise limit of 73 dBA and therefore are allowed to operate 24-hours a day. These aircraft are listed in **Table C4**. In addition, Stage 3 aircraft are exempt for the noise ordinance. Therefore, Stage 3 aircraft capable of operating at the airport that generate more than 77 dBA are included at the bottom of the **Table C4**.

There are 25 aircraft that generate between 73 dBA and 77 dBA on takeoff capable of operating at the airport according to AC 36-3G. These aircraft are allowed to operating only during the daytime hours (7:00 a.m. to 11:00 p.m.) according to the Aircraft Noise Ordinance. These aircraft are listed in **Table C5**. **Table C6** lists the remaining 41 aircraft that are capable of operating at the airport (less than 75,000 lb.) but are prohibited from operating at the airport, one to take-off noise.

A review of the aircraft types that violated the Aircraft Noise Ordinance in 1998 include the Lear 24D, Lear 25, DC-3, B-60 Duke, Bonanza A36, Cessna 206, Cessna Centurion, Aero Commander, T-28C Experimental, and a P-51D Mustang. Only the Lear 24D, Lear 25, and the DC-3 aircraft generate more than 77 dBA on departure according to AC-36-3G. The T-28C Experimental and the P-51D Mustang are not listed in AC-36-3G. The B-60 Duke, Bonanza A36, Cessna 206, Cessna Centurion, Aero Commander all generate below 73 dBA on departure according to AC-36-3G but exceeded the noise limits at one of the noise monitor locations. **Table C7** summarizes the aircraft types that violated the Aircraft Noise Ordinance in 1998.

As indicated **Table C7**, 16 of the 24aircraft that violated the Aircraft Noise Ordinance were unacceptable according to AC 36-3G or are not on the list. The remaining eight aircraft should have been able to operate at the airport but improper pilot technique or modifications to the aircraft prevented these aircraft from meeting the noise limits of the ordinance.

TABLE C4
Acceptable Aircraft Under The Aircraft Ordinance
Hayward Executive Airport

Manufacturer	Airplane	Engine	GTOW[1] x 1,000 lbs	Takeoff dBA
AEROSPATIALE	ATR42-300	PW120/HS 14SF5	37	68.40
AEROSPATIALE	ATR42-300	PW120/HS 14SF5	34.72	66.5
AEROSPATIALE	ATR42-320	PW121/HS 14SF5	37	67.70
AEROSPATIALE	ATR42-320	PW121/HS 14SF5	36	66.70
AEROSPATIALE	ATR72-200	PW124/HS 14SF11	44	70.70
AEROSPATIALE	ATR72-210	PW127/HS 14SF11	49	72.30
AEROSPATIALE	ATR72-210	PW127/HS 247F	49	67.00
AEROSPATIALE	ATR72-210	PW127/HS 247F	47	66.40
AEROSPATIALE	ATR72-210	PW127/HS 14SF11	47	71.80
AEROSPATIALE	SN601 CORVETTE	JT15D-4	14	63.80
BEECH	76	I0-360-A1G6D	4	62.00
BEECH	77	O-235-L2C	2	56.00
BEECH	1900/1900C	PT6A-65B	17	66.50
BEECH	300/300C KING AIR	PT6A-60A	14	64.70
BEECH	35-B33	I0-470-K	3	71.00
BEECH	35-C33A	I0-520-B	3	70.00
BEECH	58 (2BLD)	I0-520-C	5	67.00
BEECH	58 (3BLD)	IO-520-C	5	63.00
BEECH	58/58A BARON (3BLD)	IO-550-C	6	65.10
BEECH	58P	TSIO-520WB	6	66.00
BEECH	58TC	TSIO-520-WB	6	67.00
BEECH	65 QUEENAIR	IGSO-480-A1B6	8	65.90
BEECH	99A	PT6A-27	10	66.00
BEECH	A100	PT6A-28	12	62.00
BEECH	A-23	IO-360-A	2	58.00
BEECH	A24R	I0-360-A1B6	3	65.00
BEECH	A36	IO-520-BA	4	71.00
BEECH	A36 BONANZA	IO-550-B	4	67.80
BEECH	B100 KINGAIR	TPE-331-6	12	61.50
BEECH	B200/T/CT/C;C-12F(4BLD)	PT6A-42	13	66.10
BEECH	B36TC BONANZA	TSIO-520U	4	71.00
BEECH	B55	IO-470-L	5	73.00
BEECH	B55(3BLD)	IO-470-L	5	71.00
BEECH	B60	TI0-541-E1C4	7	63.00
BEECH	B80	IGS0-540-A1D	9	66.00
BEECH	BEECHJET 400	JT15D-5	16	71.80
BEECH	C23	0-360-A4K	3	59.00
BEECH	C24R	IO-360-A1B6	3	63.00
BEECH	C90	PT6A-21	10	68.00
BEECH	C99 AIRLINER	PT6A-34	11	71.10
BEECH	D95A TRAVELAIR	IO-320-B1B	4	58.00
BEECH	E55 (2 BLD)	I0-520-C	5	67.00
BEECH	E55 (3BLD)	IO-520-C	5	63.00
BEECH	F33A	I0-520-B	3	70.00
BEECH	F90 KINGAIR	PT6A-135	11	62.00
BEECH	H18	R-985AN-14B	10	69.60
BEECH	K35,M35	IO-470-C	3	70.00
BEECH	SUPER KINGAIR 200	PT6A-41	13	68.80
BEECH	SUPER KINGAIR B200	PT6A-41	13	68.80
BEECH	SUPER KINGAIR B200T/CT	PT6A-42	13	68.80
BEECH	V35B (3BLD)	I0-520-B	3	69.00
BELLANCA	17-30A	I0-540-T4B5D	3	65.00
BELLANCA	7GCAA	0-320-A2B	2	51.00
BELLANCA	8GCBC	0-360-C2E	2	58.00

TABLE C4 (Continued)
Acceptable Aircraft Under The Aircraft Ordinance
Hayward Executive Airport

Manufacturer	Airplane	Engine	GTOW[1] x 1,000 lbs	Takeoff dBA
BRITTEN-NORMAN	ISLANDER BN-2B	O-540-E4C5	6	68.00
CANADAIR	CHALLENGER CL-600	ALF-502L	40	66.90
CANADAIR	CHALLENGER CL-600	ALF-502L	41	67.50
CANADAIR	CHALLENGER CL-601	CF34-1A	43	66.40
CANADAIR	CHALLENGER CL-601	CF34-3A/A1/A2	45	66.50
CANADAIR	CHALLENGER CL-601	CF34-1A	45	67.00
CANADAIR	RJ (CL-600-2B19)	CF34-3A1	48	62.70
CANADAIR	RJ (CL-600-2B19)	CF34-3A1	53	67.20
CASA AIRCRAFT	C-212-CC	TPE 331-10/10R-501C/511C	17	65.70
CASA AIRCRAFT	C-212-CD	TPE 331-10R-512C/502C	17	64.70
CASA AIRCRAFT	C-212-CE	TPE 331-10R-512C/502C	17	64.70
CASA AIRCRAFT	C-212-CF	TPE 331-10R-501C/511C	17	65.70
CASA AIRCRAFT	C-212-DE	PT6A-5B	17	68.00
CASA AIRCRAFT	C-212-DF	TPE 331-10R-502C/512C/513C	17	64.70
CASA AIRCRAFT	CN-235-100	CT7-9C	33	68.80
CASA AIRCRAFT	CN-235-200	CT7-9C	35	70.10
CESSNA	150	0-200-A	2	56.00
CESSNA	152	0-235-L2C	2	55.00
CESSNA	172	O-320-E2D	2	61.00
CESSNA	180	O-470-J	3	69.00
CESSNA	206	IO-520-A	3	70.20
CESSNA	210	IO-520-L	4	71.40
CESSNA	401	TSIO-520-E	6	67.00
CESSNA	404	GTSIO-520-M	8	61.00
CESSNA	500	JT15D-1	11	67.00
CESSNA	560	JT15D-5A	16	68.70
CESSNA	150M	O-200-A	2	55.00
CESSNA	170B	C-145-2H	2	68.00
CESSNA	172N	0-320-H2AD	2	63.00
CESSNA	177RG	I0-360-A1B6	3	65.00
CESSNA	182P	O-470-S	3	70.00
CESSNA	182Q	0-470-U	3	69.00
CESSNA	185F	I0-520-D	3	66.00
CESSNA	310Q	I0-470-V0	5	68.00
CESSNA	310R	TSIO-520-BB	6	65.00
CESSNA	320C	TSI0-470-D	5	70.00
CESSNA	337H	IO-360-G	5	70.00
CESSNA	340A	TSIO-520-MB	6	66.00
CESSNA	402C	TSIO-520-VB	7	68.00
CESSNA	414A	TSIO-520-N	7	67.00
CESSNA	421C	GTSIO-520-L	8	61.00
CESSNA	CARAVAN I	PT6A-114	7	64.90
CESSNA	CITATION I	JT15D-1A	12	67.30
CESSNA	CITATION II (550)	JT15D-4	13	62.60
CESSNA	CITATION II (550)	JT15D-4	15	67.40
CESSNA	CITATION III (650)	TFE731-3B-100S	22	69.30
CESSNA	CITATION III (650)	TFE731-3B-100S	22	69.30
CESSNA	CITATION III (650)	TFE731-3B-100S	22	68.80
CESSNA	CITATION JET (525)	FJ44-1A	10	60.30
CESSNA	CITATION ULTRA (560)	JT15D-5D	16	67.10
CESSNA	CITATION V (560)	JT15D-5A	16	69.40
CESSNA	CITATION VI (650)	TFE731-3C-100S	22	69.30
CESSNA	CITATION VII (650)	TFE731-4R-3S	22	65.40

TABLE C4 (Continued)
Acceptable Aircraft Under The Aircraft Ordinance
Hayward Executive Airport

Manufacturer	Airplane	Engine	GTOW[1] x 1,000 lbs	Takeoff dBA
CESSNA	CONQUEST I	PT6A-112	8	63.00
CESSNA	CONQUEST II	TPE-331-8	10	63.00
CESSNA	S550 (SII)	JT15D-4B	15	64.80
CESSNA	T210L	TSI0-520-R	4	73.00
CESSNA	T210M	TSI0-520-R	4	71.00
CESSNA	TU206G	TSI0-520-M	4	71.00
CLASSIC AIRCRAFT	WACO CLASSIC F-5	R-755-B2	3	57.80
DASSAULT	FALCON 10	TFE731-2	19	69.40
DASSAULT	FALCON 10	TFE731-2	19	69.40
DASSAULT	FALCON 20	CF700-2D2Q	29	71.40
DASSAULT	FALCON 200	ATF3-6A-4C	32	71.70
DASSAULT	FALCON 2000	CFE738-1-1B	37	64.00
DASSAULT	FALCON 20-C5/D5/E5	TFE731-5AR-2C	29	69.20
DASSAULT	FALCON 20-C5/D5/E5	TFE731-5AR-2C	29	72.00
DASSAULT	FALCON 20-D	CF700-2D-2 w/GE CID 65476	29	71.40
DASSAULT	FALCON 20-F5	TFE731-5AR-2C	29	70.60
DASSAULT	FALCON 20-F5	TFE731-5AR-2C	29	68.10
DASSAULT	FALCON 20-F5	TFE731-5AR-2C	29	70.60
DASSAULT	FALCON 50	TFE731-3-1C	39	70.90
DASSAULT	FALCON 50	TFE731-3-1C	39	70.90
DASSAULT	FALCON 900	TFE731-5BR-1C	47	69.90
DASSAULT	FALCON 900	TFE731-5AR-1C	46	71.20
DASSAULT	FALCON 900	TFE731-5AR-1C	46	69.20
DEHAVILLAND	DHC-6	PT6A-27	13	67.00
DEHAVILLAND	DHC-6	PT6A-27	13	67.00
DEHAVILLAND	DHC-7	PT6A-50	46	69.00
DEHAVILLAND	DHC-8 102	PW120	35	66.70
DEHAVILLAND	DHC-8 103	PW121	35	65.70
DEHAVILLAND	DHC-8 106	PW121	36	66.40
DEHAVILLAND	DHC-8 201/202	PW123	36	66.40
DEHAVILLAND	DHC-8 311	PW123	43	65.40
DEHAVILLAND	DHC-8 314	PW123	43	67.10
DORNIER	DORNIER 228	TPE-331-5-252D	13	66.30
EMBRAER	EMB 110-P2	PT6A-34	13	71.00
EMBRAER	EMB-120 BRASILIA	PW115	21	63.20
FAIRCHILD	SA226-AC METRO III	TPE-331-11U	15	69.20
FAIRCHILD	SA226-AT	TPE-331-3U-303G	13	71.00
FAIRCHILD	SA226-T	TPE-331-3U-303G	13	71.00
FAIRCHILD	SA226-T(B) MERLIN IIIB	TPE-331-10U	13	68.90
FAIRCHILD	SA226-TC METRO II	TPE-331-3UW-303G	13	71.00
FAIRCHILD	SA227-AT MERLIN III C	TPE-331-10U	13	69.50
FAIRCHILD	SA227-AT MERLIN IV C	TPE-331-11U	15	69.20
GULFSTREAM	112	IO-360-C1D6	3	63.00
GULFSTREAM	560E	GO-480-C1B6	7	59.00
GULFSTREAM	695	TPE-331-10	10	62.00
GULFSTREAM	680FL	IGSO-540-B1A	9	64.00
GULFSTREAM	690B	TPE-331-5-251K	10	66.00
GULFSTREAM	690C COMMANDER 840	TPE-331-5	10	61.30
GULFSTREAM	690D COMMANDER 900	TPE-331-5	11	61.70
GULFSTREAM	695 COMMANDER 980	TPE-331-10	10	62.00
GULFSTREAM	695A COMMANDER 1000	TPE-331-10	11	61.60
GULFSTREAM	AA-1B	O-235	2	57.10
GULFSTREAM	AA-5A	O-320-E2G	2	60.00

TABLE C4 (Continued)
Acceptable Aircraft Under The Aircraft Ordinance
Hayward Executive Airport

Manufacturer	Airplane	Engine	GTOW[1] x 1,000 lbs	Takeoff dBA
GULFSTREAM	AA-5B TIGER	O-360-A4K	2	57.40
GULFSTREAM	GA-7	O-320-D1D	4	63.00
GULFSTREAM	GULFSTREAM I	RR DART MK529	35	71.00
GULFSTREAM	GULFSTREAM IV	RR TAY 611-8	73	64.20
GULFSTREAM	GULFSTREAM IV - SP	RR TAY 611-8	75	64.90
IAI	1124 WESTWIND	TFE731-3-1G	23	67.40
IAI	1124A WESTWIND II	TFE731-3-1G	24	70.30
IAI	1124IW WESTWIND IW	TFE731-3-1G	24	71.70
IAI	1125 ASTRA	TFE731-3A-200G	24	70.30
IAI	1125 ASTRA	TFE731-3A-200G	25	72.10
JETSTREAM	JETSTREAM 31	TPE331-10U-501H	15	63.70
JETSTREAM	JETSTREAM 4100	TPE331-14-801H/802H/805H	24	72.50
JETSTREAM	JETSTREAM 4100	TPE331-14-801H/802H	23	71.60
LEARJET	LEARJET 31	TFE731-2-3B	17	68.90
LEARJET	LEARJET 35	TFE731-2	17	70.40
LEARJET	LEARJET 35 W/CENTURY III	TFE731-2	17	65.60
LEARJET	LEARJET 35A	TFE731-2	18	71.60
LEARJET	LEARJET 35A/36A	TFE731-2	18	65.10
LEARJET	LEARJET 36	TFE731-2	17	70.60
LEARJET	LEARJET 36 W/CENTURY III	TFE731-2	17	65.60
LEARJET	LEARJET 36A	TFE731-2	18	71.60
LEARJET	LEARJET 55	TFE731-3B	21	67.00
LEARJET	LEARJET 55B	TFE731-3A-2B	22	68.40
LEARJET	LEARJET 60	PW305A	23	60.90
MAULE	MX7-235	0540-JIA5D	3	63.20
MITSUBISHI	MU-2B-26A	TPE-331-5-252M	10	64.00
MITSUBISHI	MU-2B-36A	TPE-331-5-252M	11	66.00
MITSUBISHI	MU300 DIAMOND I	JT15D-4	14	71.90
MITSUBISHI	MU300-10 DIAMOND II	JT15D-5	16	71.80
MOONEY	M20C	0-360-A1D	3	65.00
MOONEY	M20J	I0-360-A1B6D	3	58.00
MOONEY	M20M	TIO-540-AF1A	3	63.90
MOONEY	M20M	TIO-540-AF1A	3	64.80
PIPER	601P	IO-540-S1A5	6	70.00
PIPER	CHEYENNE 400LS	TPE-331-14	12	57.00
PIPER	PA-18-150	0-320-A2B	2	53.00
PIPER	PA-23-250	IO-540-C4B5	5	68.00
PIPER	PA-24-260	IO-540-B1A5	3	65.00
PIPER	PA-28-140	O-320-E3D	2	60.00
PIPER	PA-28-151	O-320-E3D	2	60.00
PIPER	PA-28-161	O-320-D3G	2	59.00
PIPER	PA-28-181	O-360-A4M	3	60.00
PIPER	PA-28-200	I0-360-C1C	3	63.00
PIPER	PA-28-235	O-540-B4B5	3	72.00
PIPER	PA-28-236	O-540-J3A5D	3	68.00
PIPER	PA-28RT-201(2BLD)	I0-360-C1C6	3	67.00
PIPER	PA-28RT-201T(3BLD)	TSIO-360-FB	3	67.00
PIPER	PA-30 TWIN COMANCHE	IO-320-B	4	56.00
PIPER	PA-31-310	TI0-540-A2C	7	69.00
PIPER	PA-31-325	TIO-540-F2BD	7	70.00
PIPER	PA-31-350	TI0-540-J2BD	7	71.00
PIPER	PA-31T	PT6A-28	9	62.00
PIPER	PA-32-300	IO-540-K1G5D	3	71.00
PIPER	PA-32R-300	IO-540-K1G5D	4	71.00

TABLE C4 (Continued)
Acceptable Aircraft Under The Aircraft Ordinance
Hayward Executive Airport

Manufacturer	Airplane	Engine	GTOW[1] x 1,000 lbs	Takeoff dBA
PIPER	PA-32R-301	IO-540-K1G5D	4	70.00
PIPER	PA-32R-301T	TIO-540-S1AD	4	69.00
PIPER	PA-32RT-300	IO-540-K1A5D	4	71.00
PIPER	PA-34-200T	TSI0-360-E	5	64.00
PIPER	PA-34-220T	TSIO-360-KB	5	64.00
PIPER	PA-38-112	O-235-L2C	2	56.00
PIPER	PA-42 CHEYENNE	PT6A-41	11	70.30
PIPER	PA-44-180	O-360-E1A6D	4	62.00
PIPER	PA-44-180T(2BLD)	TO-360-E1A6D	4	62.00
PIPER	PA-44-180T(3BLD)	TO-360-E1A6D	4	60.00
PIPER	PA-46-31P MALIBU	TSIO-520-BE	4	70.00
PIPER	PA-602P	IO-540-AA1A5	6	66.00
PIPER	PA-60-600	IO-540-K1J5	6	66.00
RAYTHEON	HAWKER 125- 1A	TFE731-3-1H	21	70.40
RAYTHEON	HAWKER 125- 1A	TFE731-3-1H	21	70.40
RAYTHEON	HAWKER 125- 1A	TFE731-3-1H	22	71.20
RAYTHEON	HAWKER 125- 1A	TFE731-3-1H	22	71.20
RAYTHEON	HAWKER 125- 3A	TFE731-3-1H	22	71.20
RAYTHEON	HAWKER 125- 3A	TFE731-3-1H	22	71.20
RAYTHEON	HAWKER 125- 3A/RA	TFE731-3-1H	24	72.40
RAYTHEON	HAWKER 125- 3A/RA	TFE731-3-1H	24	72.40
RAYTHEON	HAWKER 125- 400A	TFE731-3-1H	24	72.40
RAYTHEON	HAWKER 125- 400A	TFE731-3-1H	24	72.40
RAYTHEON	HAWKER 125- 800A	TFE731-5R-1H	27	69.70
RAYTHEON	HAWKER 125- 800A	TFE731-5R-1H	27	69.70
RAYTHEON	HAWKER 125- 800A	TFE731-5R-1H	27	69.70
RAYTHEON	HAWKER 125- 800A	TFE731-5R-1H	27	69.70
RAYTHEON	HAWKER 125- 800XP	TFE731-5BR-1H	28	68.20
RAYTHEON	HAWKER 125-1000A	PW305	31	71.80
RAYTHEON	HAWKER 125-1000A	PW305	31	71.80
SAAB	2000	AE2100A	50	63.50
SAAB	SF340A (Dowty props)	GE CT7-5A2	27	62.70
SAAB	SF340B (Dowty props)	GE CT7-9B	29	63.40
SAAB	SF340B (Dowty props)	GE CT7-9B	29	64.10
SAAB	SF340B (HS14RF-19 props)	GE CT7-9B	29	64.20
SAAB	SF340B (HS14RF-19 props)	GE CT7-9B	29	63.50
SAAB FAIRCHILD	SF340	GE CT7-5A2	27	65.30
SAAB FAIRCHILD	SF340A (Dowty props)	GE CT7-5A2	28	62.90
SABRELINER CORP.	SABRE 65	TFE731-3R-1D	24	70.80
SHORTS	3-30	PT6A-45A	22	71.20
SHORTS	3-60	PT6A-65R	26	67.90
SHORTS	SD3-60-300	PT6A-67R	27	68.30
SHORTS	SKYVAN	TPE-331-201	13	71.60
Stage 3 Aircraft Exempt From the Aircraft Ordinance				
LOCKHEED	1329-25 JETSTAR	TFE731-3-IE	44	82.30
SABRELINER CORP.	SABRE 75A	CF700-2D-2	23	77.70
SABRELINER CORP.	SABRE 80	CF700-2D-2	23	79.60
SABRELINER CORP.	SABRE 80A	CF700-2D-2	26	80.50

Source: Federal Aviation Administration Advisory Circular 36-3G
1 Gross Takeoff Weight
Note: Due to the pavement strength (30,000 lbs single wheel and 75,000 lbs duel wheel) this aircraft contains only the aircraft that could potentially depart from Hayward Executive Airport based on gross takeoff weight.

TABLE C5
Acceptable Aircraft Under The Aircraft Ordinance (Daytime Only)
Hayward Executive Airport

Manufacturer	Airplane	Engine	GTOW[1] x 1,000 lbs	Takeoff[2] dBA
AEROSPATIALE	ATR72-200	PW124/HS 14SF11	49	73.20
AEROSPATIALE	MOHAWK 298	PT6A-45A	23	76.00
BEECH	C35	E-185-11	3	75.00
BEECH	E35	E-225-8	3	75.00
CESSNA	207	IO-520-F	4	74.30
DASSAULT	FALCON 20	CF700-2D-2	29	77.00
DASSAULT	FALCON 20	CF700-2D-2	29	77.00
FOKKER	F-27 MK500/600	MK552-7R	46	76.00
FOKKER	F-27 MK500/600	MK552-7R	45	75.30
FOKKER	F-27-100	RR DART6 MK514	39	76.00
FOKKER	F-28 MK4000	SPEY MK555-15H	73	75.50
GEN. DYNAMICS	CV-580	501-D13	55	74.30
GULFSTREAM	500S	IO-540-E1B5	7	76.00
LEARJET	LEARJET 24E	CJ610-6	13	73.10
LEARJET	LEARJET 24F	CJ610-6	13	74.60
LOCKHEED	1329-23 JETSTAR w/STAR 3	TFE731-3	44	74.70
LOCKHEED	1329-25 JETSTAR w/STAR 3	TFE731-3	45	75.00
RAYTHEON	HAWKER 125- 600A	TFE731-3-1H	26	75.80
RAYTHEON	HAWKER 125- 600A	TFE731-3-1H	26	75.80
RAYTHEON	HAWKER 125- 700A	TFE731-3R-1H	26	76.10
RAYTHEON	HAWKER 125- 700A	TFE731-3R-1H	26	76.10
RAYTHEON	HAWKER 125- 700A	TFE731-3-1H	24	75.40
RAYTHEON	HAWKER 125- 700A	TFE731-3-1H	24	75.40
RAYTHEON	HAWKER 125- 700A	TFE731-3-1H	26	75.80
RAYTHEON	HAWKER 125- 700A	TFE731-3-1H	26	75.80

Source: Federal Aviation Administration Advisory Circular 36-3G
1 Gross Takeoff Weight
2 Aircraft Noise Ordinance restricts nighttime noise levels to 73 dBA on takeoff based on AC 36-3F/3G.
Note: Due to the pavement strength (30,000 lbs single wheel and 75,000 lbs duel wheel) this aircraft contains only the aircraft that could potentially depart from Hayward Executive Airport based on gross takeoff weight.

TABLE C6
Unacceptable Aircraft Under The Aircraft Ordinance
Hayward Executive Airport

Manufacturer	Airplane	Engine	GTOW[1] x 1,000 lbs	Takeoff dBA
AEROSPATIALE	NORD-262C	BASTAN-VIIA	23	78.30
BAe	BAE-748 SERIES 2A	RR DART MK532-2L	45	78.00
BAe	BAe-748 SERIES 2B	MK535-W/HUSHKIT	47	78.00
BAe	BAe-748 SERIES 2B	RR-DART-MK535	47	78.30
BAe	VISCOUNT 745	RR DART6 MK510	73	78.10
DOUGLAS	DC-3	R-1830-90C	25	85.00
FAIRCHILD	F-27-F	RR DART MK529	39	77.30
FOKKER	F-27-200	MK532-7	44	78.00
FOKKER	F-27-500/600	MK532-7R	44	78.00
FOKKER	F-28 MK1000	SPEY MK555-15	65	79.20
FOKKER	F-28 MK1000	SPEY MK555-15	65	79.20
GEN. DYNAMICS	CV-440	R-2800	48	86.00
GULFSTREAM	GULFSTREAM II	SPEY MK511-8	66	84.20
GULFSTREAM	GULFSTREAM II	SPEY MK511-8	62	82.60
GULFSTREAM	GULFSTREAM II	SPEY MK511-8	62	82.60
GULFSTREAM	GULFSTREAM II	SPEY MK511-8	62	80.10
GULFSTREAM	GULFSTREAM IIB/GIII	SPEY MK511-8	70	82.80
GULFSTREAM	GULFSTREAM IIB/GIII	SPEY MK511-8	70	82.80
IAI	1121 COMMODORE	CJ610-5	19	89.70
IAI	1123 WESTWIND	CJ610-9	21	89.70
LEARJET	LEARJET 23	CJ610-1	13	84.70
LEARJET	LEARJET 24B/D	CJ610-6	14	77.80
LEARJET	W/RAISBECK	CJ610-6	14	80.60
LEARJET	LEARJET 24D	CJ610-6	14	80.60
LEARJET	LEARJET 24D	CJ610-6/8A	16	82.30
LEARJET	LEARJET 25 B/C/D/F XR	CJ610-6	15	82.80
LEARJET	LEARJET 25B/C	CJ610-6	15	79.70
LEARJET	LEARJET 25D	CJ610-6	15	79.70
LOCKHEED	LEARJET 25F	JT12A-8	42	88.70
MESSERSCHMITT	1329 JETSTAR	CJ610-9	20	89.70
MORANE-	HFB-320 HANSA	MARBORE VI C2	9	80.90
SAULNIER	MS 760B (PARIS II)	DART MK 542	54	81.00
NIHON	YS-11A-200	VIPER-522	21	83.10
RAYTHEON	HAWKER 125- 1A	VIPER-522	23	84.80
RAYTHEON	HAWKER 125- 3A/R	VIPER-522	23	84.80
RAYTHEON	HAWKER 125- 3A/RA	VIPER-522	24	85.30
RAYTHEON	HAWKER 125- 400A	VIPER 601-22	26	81.90
RAYTHEON	HAWKER 125- 600A	JT12A-8	20	83.40
SABRELINER CORP.	SABRE 40A	JT12A-8	20	84.70
SABRELINER CORP.	SABRE 60	JT12A-8	23	83.80
SABRELINER CORP.	SABRE 60A	JT12A-8	21	87.90
SABRELINER CORP.	SABRE 70			

Source: Federal Aviation Administration Advisory Circular 36-3G

1 Gross Takeoff Weight

Note: Due to the pavement strength (30,000 lbs single wheel and 75,000 lbs duel wheel) this aircraft contains only the aircraft that could potentially depart from Hayward Executive Airport based on gross takeoff weight.

TABLE C7 1998 Aircraft Noise Ordinance Violations By Aircraft Type Hayward Executive Airport			
Aircraft Type	**Operation Type**	**Runway Used**	**Number of Violations**
Unacceptable Aircraft Under AC 36-3G			
Lear 25	Takeoff	28L	5
Lear 25	Landing	28L	3
Lear 24	Takeoff	28L	3
Lear 24	Landing	10R	1
DC3	Takeoff	28L	1
Total			**13**
Aircraft Not Listed in AC 36-3G			
T-28C Experimental	Takeoff	28L	1
P-51D Mustang	Takeoff	28L	1
P-51D Mustang	Landing	28L	1
Total			**3**
Acceptable Aircraft Under AC 36-3G			
Beech 18	Takeoff	28L	1
Beech 60 Duke	Takeoff	10R	1
Beech Bonanza A36	Takeoff	28L	2
Cessna 206	Low Overhead Approach	N/A	1
Cessna 206	Takeoff	28R	1
Centurion	Takeoff	28R	1
Aero Commander	Takeoff	28L	1
Total			**8**
Source: Airport Records			

AIRCRAFT WITHIN THE NATIONAL BUSINESS AIRCRAFT FLEET WHICH ARE CAPABLE OF OPERATING WITHIN THE LIMITS OF THE NOISE ORDINANCE

AC 36-3F includes most aircraft certified for operation in the United States. This includes a wide range of aircraft, including commercial airline aircraft, which are not served by Hayward Executive Airport. Since the scope of AC 36-3F extends well beyond the aircraft using Hayward Executive Airport, a determination of the effects of the noise ordinance on the operating business aircraft has been examined.

The aircraft fleet mix of the members of the National Business Aviation Association (NBAA) has been reviewed to determine which aircraft in this fleet are affected by the Hayward Executive Airport noise ordinance. The NBAA was founded in 1947 to represent and protect the interests of the business aviation community. NBAA represents over 5,600 companies that own or operate general aviation aircraft as an aid to the conduct of their business, or are involved with business aviation.

As shown in **Table C8**, 6,756 aircraft are operated by members of the NBAA. Of this total, 112 aircraft cannot operate at Hayward Executive Airport since these aircraft exceed the pavement strength capabilities. Of the 6,644 aircraft which can operate within the pavement strength capabilities of Hayward Executive Airport, 554 cannot operate within the limits of the nosie ordinance. An additional 93 aircraft can only operate during daytime hours (7:00 a.m. to 11:00 p.m.).

When expressed as a percentage of the total NBAA fleet which can operate within the pavement strength capabilities of Hayward Executive Airport (6,644 aircraft), 90 percent of the NBAA national fleet (5,997 aircraft) can operate without restriction at Hayward Executive Airport. Only two percent of this fleet is restricted to daytime operations, while eight percent of the fleet cannot operate within the limits of the noise ordinance. It should be noted that the aircraft which can operate only during the day, or cannot meet the limits of the noise ordinance, are some of the oldest aircraft within the national fleet.

TABLE C8
NBAA Member Aircraft

Total NBAA Member Aircraft	6,756
Aircraft Exceeding Hayward Pavement Strength Capabilities	112
Total NBAA Member Aircraft Capable of Operating at Hayward	6,644
Aircraft Unacceptable Under Noise Ordinance	554
Aircraft Restricted to Daytime Operations	93
Total NBAA Member Aircraft Capable of Operating at Hayward Without Restriction	5,997

Source: NBAA

CONCLUSION

Total operations at Hayward Executive Airport appear to have very little bearing on the number of noise monitor exceedances, complaints, or Aircraft Noise Ordinance violations. The number of complaints have increased in the last two years, but this appears to be due to two households and their dislike for aircraft overflights and not increased noise because noise monitor exceedances are at all time lows. It should also be noted that the number of noise complaints continues to be very small when considering the number of operations the occur at Hayward Executive Airport.

While the ordinance appears to be effective at deterring louder aircraft from the Airport, it has not inhibited the increase in operations that occurred in the last six years. A majority of the ordinance violation are from aircraft that are unacceptable according to AC 36-3G. The small number of violations by aircraft acceptable according to AC 36-3G indicate that the performance based noise limits are properly set. Therefore, no adjustments are needed to the performance based or AC 36-3G sections of the Aircraft Noise Ordinance.

Computer and software technology improvements in noise monitor and radar flight tracking systems in recent years should be considered to replace the existing system. The current system is very labor and time intensive due to the need to manually correlate noise monitor exceedance data with recorded radio communications. Noise monitor and radar flight track system can be designed to correlate exceedance and aircraft type information automatically.