RIVERSIDE ENERGY RESOURCE CENTER
SMALL POWER PLANT EXEMPTION
RESPONSE TO CEC DATA REQUESTS
04-SPPE-01

Technical Area: Land Use

BACKGROUND

Pages 112 and 115 of the Small Power Plant Exemption Application discuss the Jurupa Area Land Use Plan and its relationship to the proposed project. In order to more fully assess the project's consistency with the plan, please provide the following.

Data Request 46: Please provide Appendix L (and it's summarized version in Table 5) of the Jurupa Area Plan.

Response: Table 5 and Appendix L are attached.

Data Request 47: Please provide Figure 5 of the Jurupa Area Plan.

Response: Figure 5 is attached.

Table 5: Land Use Compatibility Guidelines for Airport Safety Zones for French Valley, Desert Center, Blythe, Corona, Chiriaco Summit, Banning, Desert Resorts Regional, and Riverside Airports

Safety Zone	Maximum Population Density	Maximum Coverage by Structures	Land Use
ETZ - Emergency Touchdown Zone	0 [1]	0 [1]	No significant obstructions [2]
ISZ - Inner Safety Zone	0 [1]	0 [1]	No petroleum or explosive No above-grade powerlines
OSZ - Outer Safety Zone	Uses in structures [3]: 25 persons/ac. (see text in the source document for the Comprehensive Land Use Plan for explanation) Uses not in structures: 50 persons/ac.	25% of net area	No residential No hotels, motels No restaurants, bars No schools, hospitals, government services No concert halls, auditoriums No stadiums, arenas No public utility stations, plants No public communications facilities No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.
ERC - Extended Runway Centerline Zone	3 du/net acre Uses in structures [3]: 100 persons/ac.(see text in the source document for the Comprehensive Land Use Plan for explanation)	50% of gross area or 65% of net area whichever is greater	No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials. [4]
TPC - Traffic Pattern Zone	Not Applicable	50% of gross area or 65% of net area whichever is greater	Discourage schools, auditoriums, amphitheaters, stadiums [5] Discourage uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials. [4,5]

NOTES:

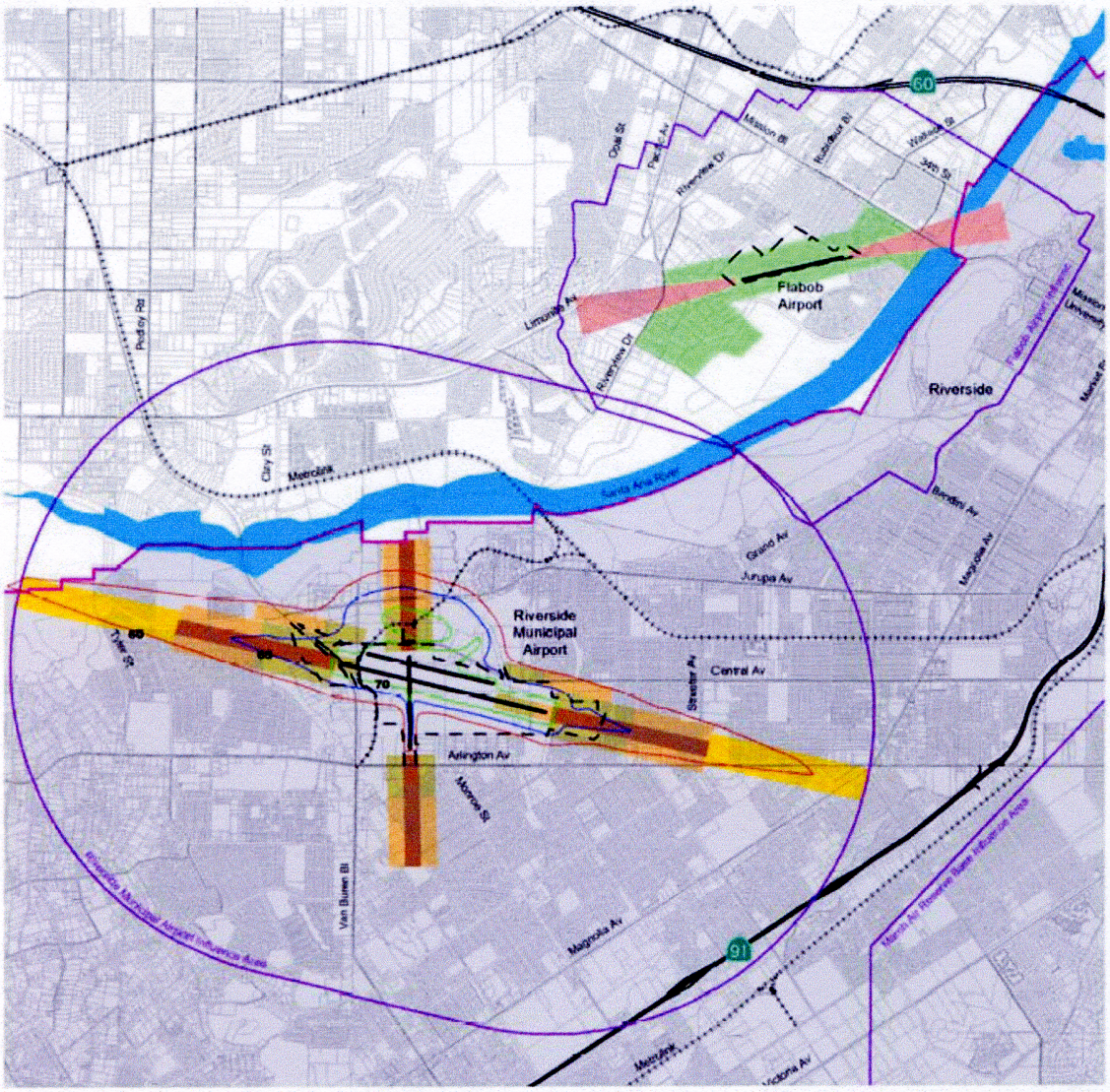
A. The following uses shall be prohibited in all airport safety zones:
   (1) Any use which would direct a steady light or flashing light or red, white, green, or amber colors associated with airport operations toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport, other than an FAA approved navigational signal light or visual approach slope indicator.
   (2) Any use which would cause sunlight to be reflected toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport.
   (3) Any use which would generate smoke or water vapor or which would attract large concentrations or birds, or which may otherwise affect safe air navigation within the area.
   (4) Any use which would generate electrical interference that may be detrimental to the operation of aircraft and/or aircraft instrumentation.

B. Avigation easements shall be secured through dedication for all land uses permitted in any safety zone.

---

1. No structures permitted in ETZ or ISZ.
2. Significant obstructions include, but are not limited to, large trees, heavy fences and walls, tall and steep berms and retaining walls, non-frangible street light and sign standards, billboards.
3. A "structure" includes fully enclosed buildings and other facilities involving fixed seating and enclosures limiting the mobility of people, such as sports stadiums, outdoor arenas, and amphitheaters.
4. This does not apply to service stations involving retail sale of motor vehicle fuel if fuel storage tanks are installed underground.
5. Within the TPZ safety zone, a variety of land uses are to be discouraged from being developed. When development of these uses is proposed, the Airport Land Use Commission shall require the applicant to show that alternative locations have been considered and are not feasible. The applicant shall then be directed to consider a development plan that will minimize the exposure to hazard as much as possible. This might involve reducing structure heights, reducing lot coverage, or reducing there overall scale of the project, considering satellite locations for some of the proposed functions of the facility.
   Land uses described as "uses to be discouraged" which were lawfully established prior to the adoption of the Comprehensive Land Use Plan shall be permitted to be modified or enlarged provided that avigation easements are granted to Riverside County.

Source: Extracted from Riverside County Airport Land Use Commission Comprehensive Land Use Plan



- Airport Boundary
- Airport Influence Policy Area
- Emergency Touchdown Zone
- Inner Safety Zone
- Outer Safety Zone
- Extended Runway Centerline
- Safety Zone Area I
- Areas of Additonal Safety Concerns
- Area Plan Boundary
- Incorporated City
- 60 CNEL Noise Contour
- 65 CNEL Noise Contour
- 70 CNEL Noise Contour

Source Information: Riverside County.
The video data shown on this map is 1996.
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JURUPA AREA PLAN
RIVERSIDE MUNICIPAL AIRPORT AND FLABOB AIRPORT INFLUENCE POLICY AREA

Figure 5

APPENDIX L

RIVERSIDE MUNICIPAL AIRPORT COMPREHENSIVE LAND USE PLAN

CITY OF RIVERSIDE
AND
COUNTY OF RIVERSIDE
AIRPORT LAND USE COMMISSION

APRIL 1998

ARIES CONSULTANTS LTD.

RIVERSIDE MUNICIPAL AIRPORT
COMPREHENSIVE LAND USE PLAN

Prepared for

CITY OF RIVERSIDE

AND

COUNTY OF RIVERSIDE
AIRPORT LAND USE COMMISSION

The preparation of this report was financed in part
through a California Aid to Airports Program Grant from the
State of California, Department of Transportation, Division of Aeronautics.

April 1998

Prepared by

ARIES CONSULTANTS LTD.

TABLE OF CONTENTS

Section		Page
FORWARD		
1	INTRODUCTION	1-1
	1.1 Purpose and Scope	1-1
	1.2 Legal Authority	1-1
2	RIVERSIDE MUNICIPAL AIRPORT AND ENVIRONS	2-1
	2.1 Airport Location	2-1
	2.2 Airport Characteristics	2-1
	2.2.1 Existing Airport Facilities	2-1
	2.2.2 Future Airport Facilities	2-8
	2.3 Airport Environs	2-15
	2.3.1 Regional Setting	2-15
	2.3.2 Existing Land Use and Zoning	2-16
	2.3.3 General Plan Land Use	2-19
3	LAND USE COMPATIBILITY GUIDELINES	3-1
	3.1 Introduction	3-1
	3.2 California Airport Land Use Planning Guidelines	3-1
	3.3 Noise Compatibility Guidelines	3-2
	3.4 Safety Compatibility Guidelines	3-2
	3.4.1 Inner Safety Zone	3-4
	3.4.2 Outer Safety Zone	3-4
	3.4.3 Emergency Touchdown Zone	3-7
	3.4.4 Traffic Pattern Zone	3-7
	3.4.5 Extended Runway Centerline Zone	3-7
	3.4.6 Special Considerations in all Safety Zones	3-8
	3.5 Airport Vicinity Height Guidelines	3-9
	3.6 Summary - Airport Influence Area	3-11

TABLE OF CONTENTS -- continued

Section		Page
4	AIRPORT NOISE INFLUENCE AREA ISSUES AND ALTERNATIVES	4-1
	4.1 Introduction	4-1
	4.2 Noise Methodology	4-1
	4.3 INM Input Data	4-2
	4.3.1 Aircraft Activity Data	4-3
	4.3.2 Flight Profiles and Tracks	4-3
	4.4 INM Output	4-3
	4.4.1 Existing 1989 Aircraft Noise	4-8
	4.4.2 Future 2010 Aircraft Noise	4-8
	4.5 Noise Impacts and Issues	4-9
	4.5.1 Impacts on Existing Land Use	4-9
	4.5.2 Impacts on Future Land Use	4-11
	4.5.3 Planning Issues	4-14
5	AIRPORT SAFETY INFLUENCE AREA ISSUES AND ALTERNATIVES	5-1
	5.1 Introduction	5-1
	5.2 Areas of Safety Concern	5-1
	5.3 Safety Issues	5-4
	5.3.1 Inner Safety Zone	5-4
	5.3.2 Outer Safety Zone	5-9
	5.3.3 Emergency Touchdown Zone	5-15
	5.3.4 Extended Runway Centerline Zone	5-19
	5.3.5 Traffic Pattern Zone	5-21
	5.3.6 Summary of Issues in Safety Zones	5-22
	5.4 Potential Land Use Measures	5-23
	5.5 Summary	5-25

TABLE OF CONTENTS -- continued

Section		Page
6	AIRPORT HEIGHT INFLUENCE AREA ISSUES AND ALTERNATIVES	6-1
	6.1 Introduction	6-1
	6.2 Height Protection Areas	6-1
	6.2.1 Primary Surface	6-4
	6.2.2 Approach Surface	6-4
	6.2.3 Transitional Surface	6-4
	6.2.4 Horizontal Surface	6-5
	6.2.5 Conical Surface	6-5
	6.3 Height Protection Issues	6-5
	6.3.1 Existing Penetrations and Topography	6-5
	6.3.2 Current Height Limits in Zoning Ordinances	6-6
	6.3.3 Summary of Height Control Issues	6-8
	6.4 Potential Land Use Management Measures	6-8
	6.5 Summary	6-9
7	COMPREHENSIVE AIRPORT LAND USE PLAN	7-1
	7.1 Introduction	7-1
	7.2 Airport Influence Area	7-1
	7.3 Land Use Compatibility Standards	7-3
	7.3.1 Noise Compatibility Standards	7-3
	7.3.2 Safety Compatibility Standards	7-8
	7.3.3 Height Standards	7-12
	7.4 Infill Policies	7-13
	7.5 Related Land Use Policies	7-13
	7.5.1 Findings as to Similar Uses	7-13
	7.5.2 Findings for Land Uses Which are to be Discouraged	7-14

TABLE OF CONTENTS -- continued

Section		Page
8	IMPLEMENTATION PLAN	8-1
	8.1 Adoption of Plan	8-1
	8.2 Update and Amendment of Plan	8-1
	8.3 Administration of Plan	8-2
	8.3.1 Scope of ALUC Development Review Responsibilities	8-2
	8.3.2 Coordination with Local Governments	8-2
	8.3.3 County Geographic Information System	8-3
	8.3.4 Criteria for ALUC Review of General Plan Amendments	8-4
	8.4 Recommended Action by Local Governments	8-4
	8.4.1 General Plan Amendments	8-4
	8.4.2 Noise and Avigation Easements	8-4
	8.4.3 FAR Part 150 Noise Study	8-5
	8.4.4 Airport Height Restrictions Overlay Zoning	8-5
	8.4.5 Building Code Amendments	8-5
	8.4.6 Subdivision Regulations	8-5
9	REFERENCES	9-1

TABLE OF CONTENTS - continued

LIST OF TABLES

Table		Page
1	Controlling Obstacles or Obstructions	2-7
2	Forecast Annual Aircraft Operations by Aircraft Type - Median Case Forecast and Worst Case Forecast	2-11
3	Land Use Guidelines for Noise Compatibility	3-3
4	Land Use Compatibility Guidelines for Airport Safety Zones	3-5
5	1989 Aircraft Activity Assumptions	4-4
6	Forecast 2010 Aircraft Activity Assumptions - Worst Case	4-5
7	Land Areas Affected by 1989 Noise Contours (Organized by General Land Use Type)	4-10
8	Land Areas Affected by 2010 "Worst Case" Noise Contours (Organized by General Land Use Type)	4-12
9	FAR Part 77 Dimensions	6-3
10	Building Height Restrictions Under FAR Part 77 Surfaces	6-7
11	Land Use Standards for Noise Compatibility	7-5
12	Land Use Compatibility Guidelines for Airport Safety Zones for Riverside Municipal Airport	7-9

TABLE OF CONTENTS -- continued

LIST OF FIGURES

Figure		Page
1	Location Map	2-2
2	Existing Airport Facilities	2-3
3	Air Traffic Patterns	2-5
4	2010 Airport Master Plan	2-9
5	Airport Vicinity Existing Land Use Patterns	2-17
6	Airport Vicinity Zoning Patterns	2-18
7	Suggested Airport Safety Zones Off Runway Ends	3-6
8	FAR Part 77 Typical Civil Airport Imaginary Surfaces	3-10
9	1989 CNEL Noise Contours	4-6
10	2010 CNEL Noise Contours - Worst Case Forecast	4-7
11	Airport Safety Zones	5-2
12	FAR Part 77 Surfaces	6-2
13	Airport Influence Area	7-2
14	Airport Influence Area - Noise and Safety	7-4

Section 1.0

INTRODUCTION

1.1 PURPOSE AND SCOPE

The Comprehensive Land Use Plan for Riverside Municipal Airport is intended to protect and promote the safety and welfare of residents of the Airport vicinity and users of the Airport while ensuring the continued operation of the Airport. Specifically, the plan seeks to protect the general public from the adverse effects of aircraft noise, to ensure that people and facilities are not concentrated in areas susceptible to aircraft accidents, and to ensure that no structures or activities encroach upon, or adversely affect, the use of navigable airspace.

The Comprehensive Land Use Plan must be based upon an adopted Airport Master Plan or a Federal Aviation Administration (FAA) approved Airport Layout Plan. A Master Plan for the Riverside Municipal Airport was adopted by the City of Riverside on June 1, 1993. The adopted Master Plan, associated environmental documentation, and the FAA approved Airport Layout Plan provide the foundation for this Comprehensive Airport Land Use Plan (CLUP). Implementation of this plan will promote compatible development in the Airport vicinity and restrict incompatible development, thus allowing for the continued operation of the Airport.

1.2 LEGAL AUTHORITY

Public Utilities Code of the State of California, Sections 21670 et seq. requires the establishment of an Airport Land Use Commission (ALUC), and defines its range of responsibilities, duties and powers.

Section 21675 requires that each County ALUC formulate a comprehensive land use plan for the area surrounding each public use airport within the County. The resulting airport land use plan impacts the General Plans of jurisdictions in the airport's vicinity, who must either modify their respective General Plans to achieve consistency with the CLUP, or overrule the ALUC with specific findings that existing plans are consistent with the purposes of State aeronautics law. (See additional discussion in Section 8.) Since the City of Riverside must ultimately consider the ALUC's CLUP for Riverside Municipal Airport, the City as owner and operator of the Airport took the initiative to develop this plan for the ALUC's consideration.

In defining the scope of an airport comprehensive land use plan, Section 21675 of the PUC specifies that such plans will:

" . . . provide for the orderly growth of each public airport and the area surrounding the airport within the jurisdiction of the Commission, and will safeguard the general welfare of the inhabitants within the vicinity of the airport and the public in general. The Commission plan shall include a long-range master plan that reflects the anticipated growth of the airport during at least the next 20 years. This plan shall not be inconsistent with the State Master Airport Plan. In formulating a land use plan, the Commission may develop height restrictions on buildings, may specify use of land, and may determine building standards, including soundproofing adjacent to airports, within the planning area. The comprehensive land use plan shall not be amended more than once in any calendar year.

The policies and standards used in developing this plan reflect those currently used by the Riverside County ALUC. Certain policies addressing the City's unique need for "infill" guidance have been added.

Section 2.0

RIVERSIDE MUNICIPAL AIRPORT AND ENVIRONS

2.1 AIRPORT LOCATION

Riverside Municipal Airport is owned and operated by the City of Riverside, in Riverside County, California. The Airport is located about 5 miles southwest of downtown Riverside, as shown on Figure 1. Streets surrounding the Airport include Van Buren Boulevard (west); Central Avenue (north); Hillside Avenue (east); and Arlington Avenue (south). Access to the Airport is via Airport Drive from Arlington Avenue.

2.2 AIRPORT CHARACTERISTICS

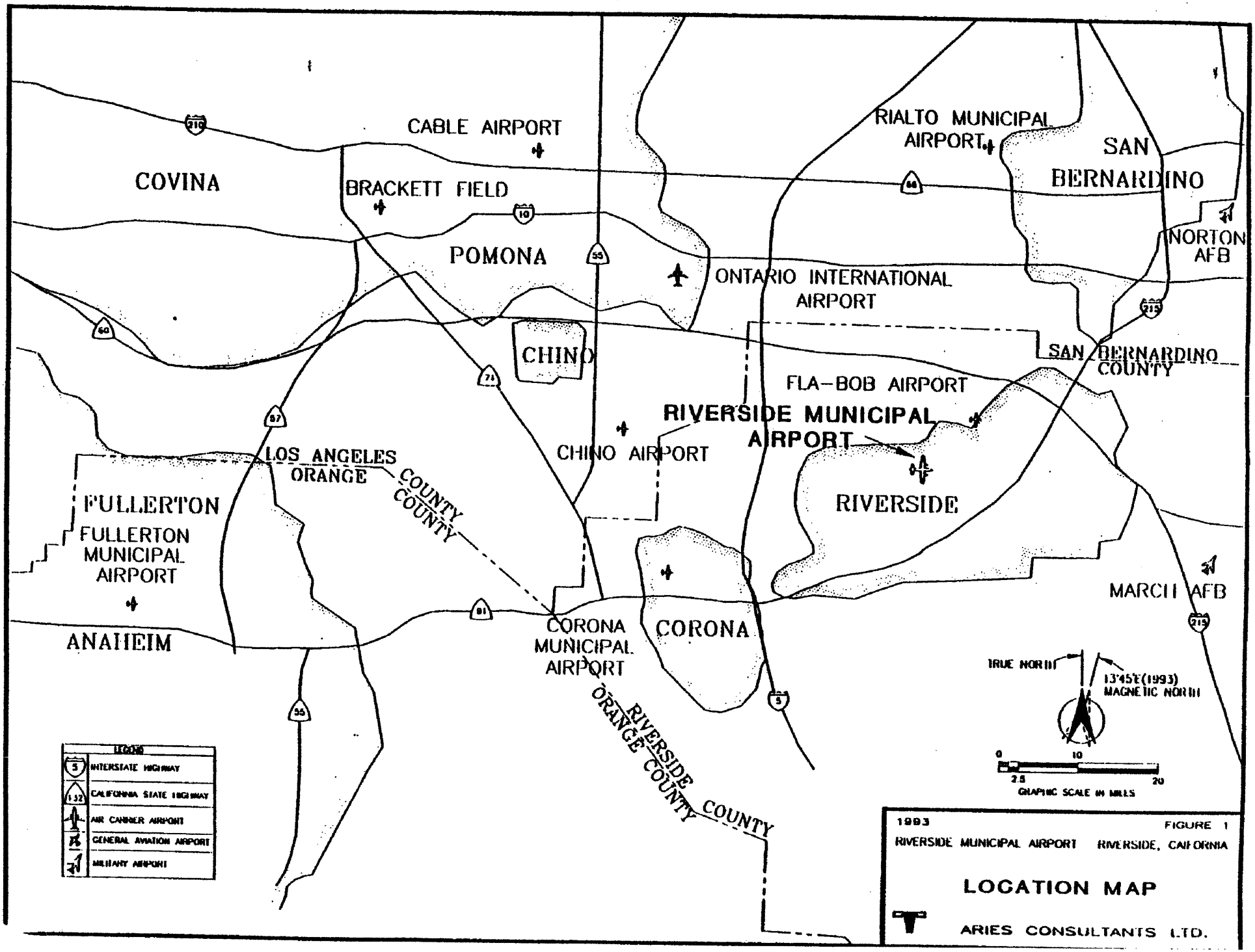
The Riverside Municipal Airport Master Plan describes existing and future development at the Airport. The following information is extracted from the Master Plan. Included are summaries of: the airport layout with emphasis on the runways and other key facilities and services; type of runway approach, including known obstructions; airspace and air traffic control, with emphasis on approach and departure paths and traffic patterns; and aircraft operations levels.

2.2.1 Existing Airport Facilities

The Riverside Municipal Airport encompasses approximately 447 acres of land at an elevation of 816 feet above mean sea level (MSL). For purposes of this report, the existing facilities description is limited to the airfield, airspace, approach areas and obstructions, navigation and landing aids, and meteorological conditions. Additional details about these and other subjects can be obtained from the Airport Master Plan.

Airfield

The airfield consists of two runways, as illustrated on Figure 2. Runway 9-27 is the main runway with a length of 5,400 feet and width of 100 feet. Runway 16-34 is a crosswind runway with a length of 2,850 feet and width of 60 feet. Runways 9, 16, and 27 have the full runway length available for takeoff and landing rollout. Runway 34 has a displaced threshold of 580 feet, providing 2,270 feet for landing rollout, with the full runway length available for takeoff.


CABLE AIRPORT
COVINA
BRACKETT FIELD
POMONA
RIALTO MUNICIPAL AIRPORT
SAN BERNARDINO
NORTON AFB
ONTARIO INTERNATIONAL AIRPORT
CHINO
SAN BERNARDINO COUNTY
FLA-BOB AIRPORT
RIVERSIDE MUNICIPAL AIRPORT
CHINO AIRPORT
LOS ANGELES COUNTY
ORANGE COUNTY
FULLERTON
FULLERTON MUNICIPAL AIRPORT
RIVERSIDE
MARCH AFB
ANAHEIM
CORONA MUNICIPAL AIRPORT
CORONA
RIVERSIDE COUNTY
ORANGE COUNTY
TRUE NORTH
13°45'E (1993) MAGNETIC NORTH
0 10
2.5 20
GRAPHIC SCALE IN MILES
LEGEND
INTERSTATE HIGHWAY
CALIFORNIA STATE HIGHWAY
AIR CARRIER AIRPORT
GENERAL AVIATION AIRPORT
MILITARY AIRPORT
1993
FIGURE 1
RIVERSIDE MUNICIPAL AIRPORT RIVERSIDE, CALIFORNIA
LOCATION MAP
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The existing taxiway system provides access to and from the airfield for arriving and departing aircraft. A full-length parallel taxiway serves Runway 9-27 on the south side. A parallel taxiway serves Runway 16-34, except for that portion of the runway south of the displaced threshold. Part of this taxiway is on the west side of Runway 16-34 north of the main runway and part is on the east side south of the main runway.

The current estimated maximum gross weight of aircraft (runway pavement strengths), by aircraft gear configuration, are as follows:

	Aircraft maximum gross weight (pounds)		
Runway	Single-wheel	Dual-wheel	Tandem
9-27	48,000	70,000	110,000
16-34	40,000	50,000	80,000

Airspace and Air Traffic Control

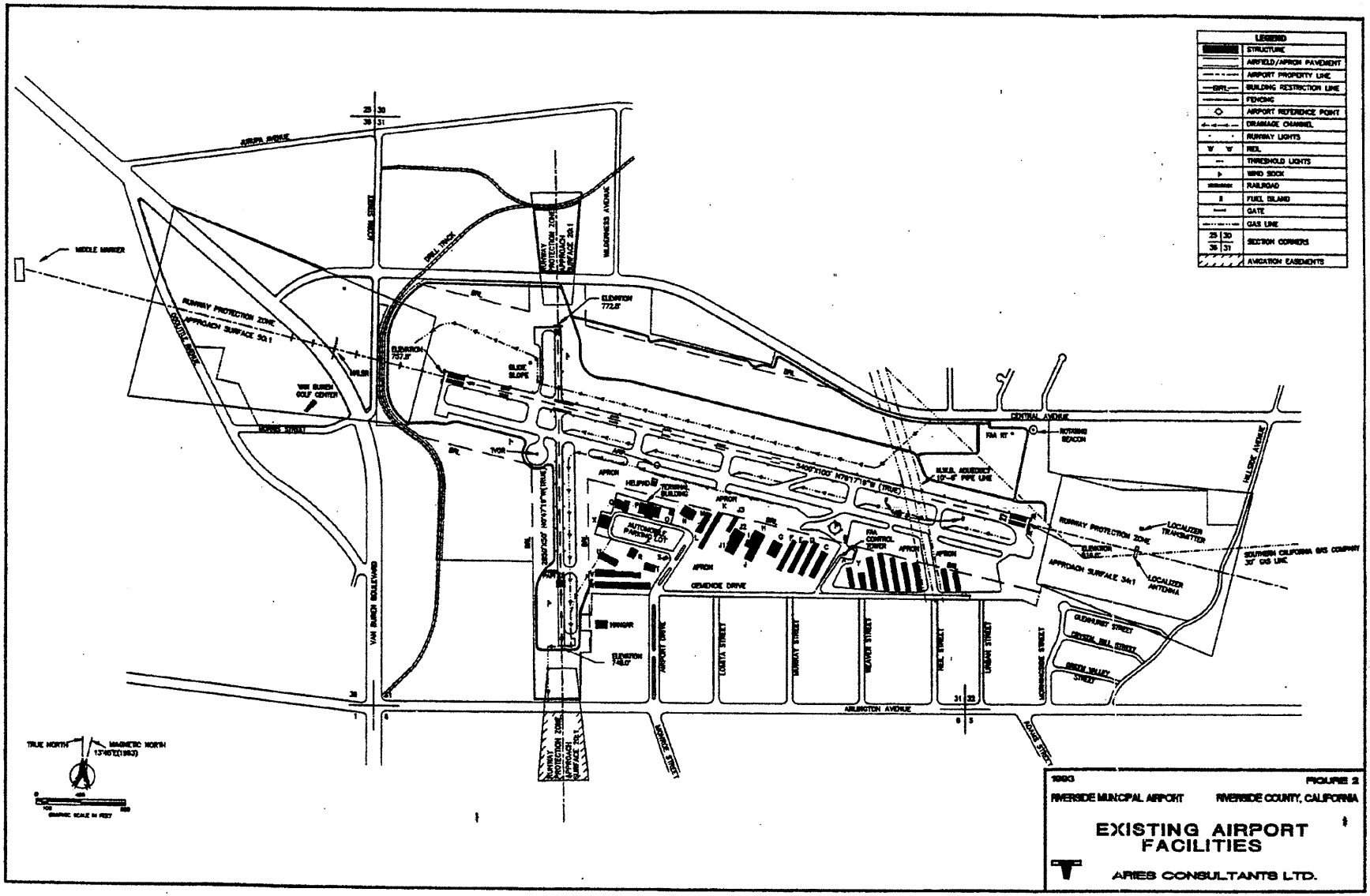
The Riverside Municipal Airport Air Traffic Control Tower (ATCT) provides air traffic control (ATC) for all aircraft within the Airport Traffic Area, including operational areas on the ground at the Airport. The Airport Traffic Area is generally defined as the area within 5 statute miles of the Airport from the surface of the earth up to, but not including, 3,000 feet above the elevation of the Airport. The Riverside ATCT has restricted visibility in operational areas adjacent to and along the southern part of Runway 16-34. Other ATC facilities that serve the Airport include the Los Angeles Air Route Traffic Control Center (ARTCC) and the Ontario Terminal Radar Approach Control (TRACON).

Aircraft traffic patterns at Riverside Municipal Airport are illustrated on Figure 3. These flight paths are general in nature since each aircraft flies a slightly different path.

Riverside Municipal Airport has four instrument approach procedures:

- An instrument landing system (ILS) for Runway 9;
- A VOR approach to Runway 9;
- VOR approaches to the Airport from both the east and south with circling minimums only.

Left turn rectangular VFR airport traffic patterns have been established for Runways 9, 27, and 34, as shown generally on Figure 3. A right turn rectangular VFR airport traffic pattern has been established fur Runway 16. However, left or right turn traffic



1993

FIGURE 2

RIVERSIDE MUNICIPAL AIRPORT — RIVERSIDE COUNTY, CALIFORNIA

EXISTING AIRPORT FACILITIES

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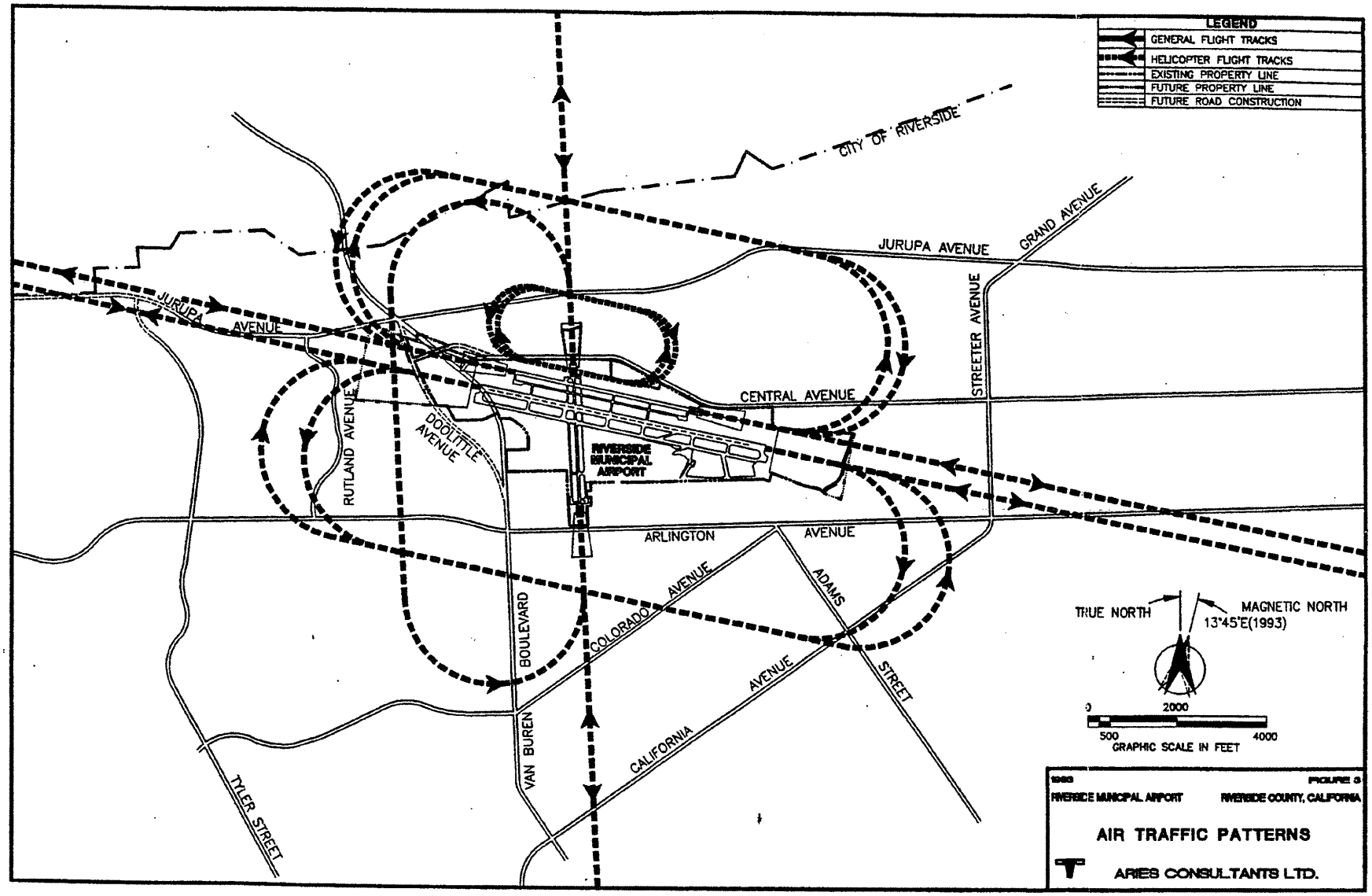
LEGEND
GENERAL FLIGHT TRACKS
HELICOPTER FLIGHT TRACKS
EXISTING PROPERTY LINE
FUTURE PROPERTY LINE
FUTURE ROAD CONSTRUCTION
CITY OF RIVERSIDE
JURUPA AVENUE
GRAND AVENUE
JURUPA AVENUE
STREETER AVENUE
CENTRAL AVENUE
RUTLAND AVENUE
DOOLITTLE AVENUE
RIVERSIDE MUNICIPAL AIRPORT
ARLINGTON AVENUE
COLORADO AVENUE
ADAMS STREET
VAN BUREN BOULEVARD
CALIFORNIA AVENUE
TYLER STREET
TRUE NORTH
MAGNETIC NORTH
13°45'E(1993)
0
2000
500
4000
GRAPHIC SCALE IN FEET
1993
FIGURE 3
RIVERSIDE MUNICIPAL AIRPORT
RIVERSIDE COUNTY, CALIFORNIA
AIR TRAFFIC PATTERNS
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may be assigned by the tower to facilitate the flow of air traffic, depending on the direction of arrival aircraft. Traffic pattern altitudes are 1,816 feet MSL for light aircraft and 2,316 feet MSL for turbine engine and large aircraft.

A helicopter training practice area has been established immediately north of the Airport. This area is rectangular in shape and approximately 1 nautical mile long and one-half nautical mile wide. Its long side is parallel to Runway 9-27. The pattern altitude is 1,300 feet MSL or 500 feet above ground level (AGL). During Santa Ana wind conditions (about 5 percent of the year) aircraft operations take place on Runway 16 - 34, which places the helicopter training area immediately west of this runway on three pads on the west end of Taxiway A.

Navigation and Landing Aids

Runway 9-27 is painted with precision instrument runway markings, equipped with medium intensity runway lights (MIRL), and has a Category I instrument landing system (ILS). In addition, Runway 9 is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR). Runway 27 has nonprecision instrument runway markings, a visual approach slope indicator (VASI-4), and runway end identifier lights (REIL).

Runway 16-34 is painted with basic runway markings and equipped with medium intensity runway lights (MIRL) north of the displaced threshold on Runway 34. A precision approach path indicator (PAPI) is installed on Runway 34.

Approach Area and Obstructions

Federal Aviation Regulations (FAR) Part 77, entitled "Objects Affecting Navigable Airspace," defines imaginary surfaces that are used to identify obstructions. (See Sections 3.5 and 6.0 for additional discussion of these surfaces.) The information presented in Table 1 compares FAR Part 77 approach slopes to existing obstacle/ obstruction controlled approach slopes and also provides descriptive information about the controlling obstacle/obstruction.

Runway protection zones (formerly called clear zones) are established off each runway end for the purpose of protecting the innermost portion of the approach area from future encroachment. The information below defines the existing runway protection zones for each runway.

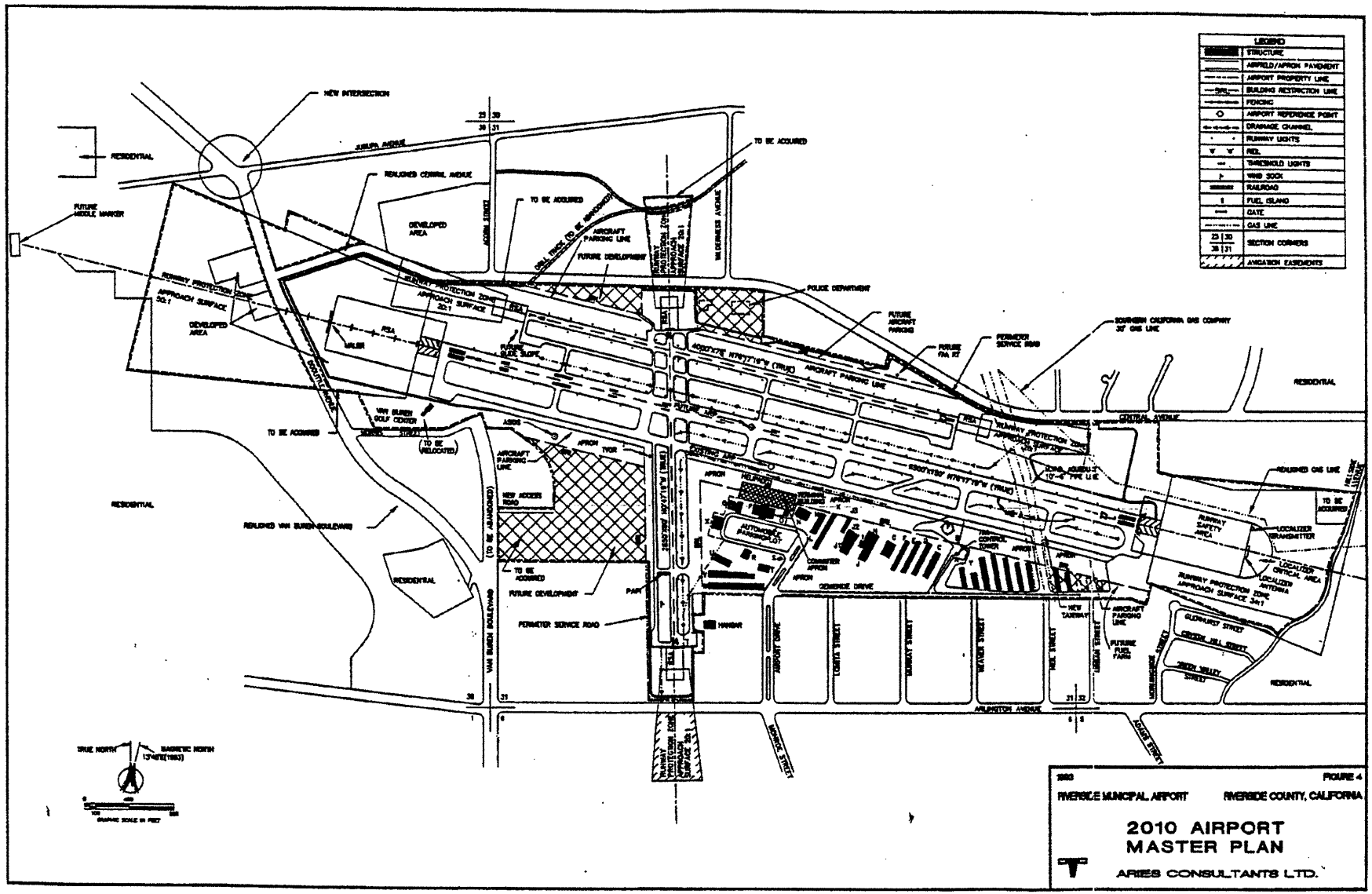
Table 1

CONTROLLING OBSTACLES OR OBSTRUCTIONS
Riverside Municipal Airport

Runway		Part 77 Slope	Actual Slope	Controlling Obstacle/Obstruction		
No.	Elev.			Type	Elev.	Location
9	758	50:1	20:1	Railroad	783	550 feet along extended centerline of runway and to the north and south
16	772	20:1	37:1	Railroad	795	875 feet along extended centerline of runway and to the east and west
27	816	20:1	34:1	None		
34	748	20:1	36.5:1[a]	Pole	774	970 feet along and 20 feet east of extended runway centerline

a. The obstacle/obstruction controlled approach surface for the displaced threshold on Runway 34 is 45:1.

Source: FAA Form 5010-1 Airport Master Record



2003 FIGURE 4

RIVERSIDE MUNICIPAL AIRPORT RIVERSIDE COUNTY, CALIFORNIA

2010 AIRPORT MASTER PLAN

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Runway	Protection Zone	Length (feet)	Inner Width (feet)	Outer Width (feet)
9	Precision	2,500	1,000	1,750
27	Nonprecision	1,700	1,000	1,510
16	Visual	1,000	250	450
34	Visual	1,000	250	450

As a condition for receiving certain grants, the FAA requires that the airport owner have adequate property interest in the runway protection zones (RPZs). Portions of the Runway 9 and Runway 27 RPZ's fall outside the Airport boundary and are not under the Airport's control. Similarly for Runways 16 and 34, major portions of the respective RPZ's extend beyond the Airport boundary. The City has an avigation easement over the area outside the Airport property line for Runway 34, but not for similar portions of the other runways.

Meteorological Conditions

When the visibility is equal to or greater than 3 statute miles and the ceiling is equal to or greater than 1,000 feet, aircraft may operate under visual flight rules (VFR). When either the ceiling or the visibility falls below the specified minimum criterion, aircraft using the Airport must operate under instrument flight rules (IFR). Riverside Municipal Airport experiences weather that is below VFR minima about 15 percent of the time - approximately 1,300 hours per year. Of these 1,300 hours, approximately 20 percent, or 260 hours per year, occur at ceiling and visibility values that are below precision instrument approach minima (ceiling between 700 and 1,000 feet and/or visibility between 1 and 3 miles). During these periods, the Airport is likely to be closed for landings although some takeoffs may occur. Under present conditions, the Airport is effectively closed to landing traffic approximately 3 percent of the time due to low ceiling or visibility.

2.2.2 Future Airport Facilities

The 2010 Airport Master Plan for Riverside Municipal Airport is illustrated on Figure 4. The Plan integrates long-term airfield and terminal area requirements with current and forecast aviation needs and airport access and parking needs. It represents a guide for airport development through 2010 and indicates possible developments beyond 2010 for which land should be reserved at this time.

The primary functional areas of the Plan that relate to noise, safety and height issues are described below.

Aircraft Operations Forecast

Historically, aircraft operations at the Airport reached a peak of 173,304 operations in 1979 and declined slowly to a level of about 123,268 operations in 1986, a loss of about 29 percent. This decline reflects a national trend during the 1980's. Increased insurance and training costs, a reduction in the number of ex-military pilots, the end of the Veteran's Bill providing financial assistance for pilot training, and the increased costs of aircraft equipment and operating expenses all contributed to this decline. Between 1986 and 1991, the number of aircraft operations at the Airport has risen to just over 200,000 by 1991, a gain of about 62 percent since 1986.

One of the principal reasons for the recent rise in operations has been an increase in the training of foreign helicopter pilots. These students receive both fixed-wing and helicopter training and the associated "touch-and-go" practice activities serve to increase the total number of aircraft operations. Another reason for this increase is the relocation of aircraft from other airports to Riverside Municipal Airport.

One issue raised during development of the recently adopted Master Plan was the magnitude of future helicopter operations, particularly those associated with foreign pilot training. Helicopters are not specifically identified in the count of annual aircraft operations, however, the FAA Air Traffic Control Tower (ATCT) at Riverside estimates that in 1991, helicopters accounted for 30 to 35 percent of total operations, or about 60,000 operations.

Various sources have estimated that by 2010 helicopter operations alone could reach 250,000 operations per year. However, there are several reasons not to expect the helicopter operations to reach the maximum level suggested. Riverside Municipal Airport is not the only location in the area providing such training, and there is competition from other training facilities. Although the demand is high at present, it is unlikely to continue throughout the 20 year forecast period. The current best estimate is that demand for such helicopter training is likely to continue to increase for several more years then, as the program shifts from one aimed at developing a base of new pilots to one aimed at the replacement of trained pilots, operations will begin to decline, perhaps significantly. Since neither the increase nor the decline can be accurately estimated, the maximum level of helicopter operations were treated as a "Worst Case" situation.

As a result, the Master Plan SEIR analyzed future operations estimates with and without the helicopter pilot training activity. These two aircraft operations forecasts are presented in Table 2. The "Median Case" forecast represents the expected growth of aircraft operations presented in the Master Plan. The Median Case includes helicopter operations, but excludes the extensive growth associated with foreign pilot

Table 2

FORECAST ANNUAL AIRCRAFT OPERATIONS
BY AIRCRAFT TYPE
Riverside Municipal Airport
1988-2010

MEDIAN CASE FORECAST

Aircraft Type	1988	1995	2000	2005	2010
Single-Engine Piston	98,011	122,470	130,630	138,960	150,000
Twin-Engine Piston	27,083	35,910	39,960	44,370	50,000
Twin-Engine Turboprop	1,050	11,450	11,850	12,250	13,850
Helicopter (Single-Engine)	2,571	3,140	3,270	3,410	3,600
Business Jet (Twin-Engine)	1,303	2,030	2,490	3,010	3,650
TOTALS	130,018	175,000	188,200	202,000	221,100

WORST CASE FORECAST

Aircraft Type	1988	1995	2000	2005	2010
Single-Engine Piston	98,011	122,470	130,630	138,960	150,000
Twin-Engine Piston	27,083	35,910	39,960	44,370	50,000
Twin-Engine Turboprop	1,050	11,450	11,850	12,250	13,850
Helicopter (Single-Engine)	2,571	129,140	227,270	240,410	253,600
Business Jet (Twin-Engine)	1,303	2,030	2,490	3,010	3,650
TOTALS	130,018	301,000	412,200	439,000	471,100

Sources: Riverside Municipal Airport 2010 Master Plan
Aries Consultants Ltd.

training. The "Worst Case" adds the foreign pilot training. In 2010, helicopter operations make up less than 2 percent of operations in the Median Case and 54 percent of total operations in the Worst Case.

Airfield

The recommended 2010 airfield configuration retains the two existing runways and provides for extension of existing Runway 9-27 (which will become Runway 9R-27L) to the west and provides for a new parallel Runway 9L-27R. Runway 16-34 is retained at its present length. Runway projects include:

- Runway 9R-27L is lengthened from 5,400 feet to 6,500 feet and widened 25 feet on either side for a 150 feet total width;
- Runway safety areas extending 1,000 feet beyond the physical ends of Runway 9R-27L, and 500 feet wide, are recommended;
- Provide blast pads 200 feet long and 150 feet wide at each end of Runway 9R-27L;
- Relocate the Instrument Landing System [Glide Slope Facility, Medium Intensity Approach Lighting System with Runway Alignment Indicator (MALSR) Lights and Middle Marker] on Runway 9R;
- Build a new 4,000-foot by 75-foot Runway 9L-27R at 500 feet (measured centerline-to-centerline) north of Runway 9R-27L;
- Provide runway safety areas extending 300 feet beyond the physical ends of Runway 9L-27R and 150 feet wide;
- Eliminate displaced threshold on Runway 34 and widen Runway 16-34 to 60 feet;
- Provide runway safety areas extending 300 feet beyond the physical ends of Runway 16-34 and 150 feet wide

The Master Plan recommends full-length parallel taxiways to the south of each of the parallel runways (9-27) and on both sides of Runway 16-34. The new portions of the planned taxiway system include an extension of the east-west parallel, along with the extension of Runway 9R-27L, to the west; extension to the north and south of the apron taxiway on the east side of Runway 16-34; a new taxiway along the west side

of the southern portion of Runway 16-34, south of Runway 9R-27L; and a new parallel taxiway, to the south, along the complete length of Runway 9L-27R.

Three or more new helipads, to be used primarily for training, are provided for in the Master Plan. One would be separated from the main Runway 9R-27L by 300 feet to the north. The second helipad would be separated from Runway 9R-27L by 500 feet to the north. The third helipad would be separated from the second helipad by 200 feet to the north.

Airfield lighting projects include:

- High intensity runway lighting (HIRL) along the existing and extended Runway 9R-27L;
- Medium intensity runway lighting (MIRL) along Runway 9L-27R;
- Medium intensity taxiway lights (MITL) are recommended along new taxiways.

Land Acquisition

The Master Plan recommends that the City acquire certain lands for the development of a precision instrument runway protection zone for extended Runway 9R, and space for additional aviation and aviation-related facilities. Recommended land acquisition areas are identified on Figure 4 and described below. Only two of the nine areas are not airfield or safety related. All properties in the runway protection zones (as measured from the ultimate planned-for runway lengths) are recommended to be acquired in fee title. In those areas beyond the ends of the runways where land acquisition is infeasible, or not pursued by the City, avigation easements should be acquired. Land acquisition or avigation easements would be subject to actual appraisals and negotiations and any existing development would be relocated in accordance with State and Federal guidelines.

Recommended land acquisition projects include:

- Five acres west of the railroad and east of Van Buren Boulevard for future development;
- Two acres south of Central Avenue and east of Acorn Street right-of-way for future development;
- Five acres north of Central Avenue for the Runway 16-34 protection zone (completed south of railroad).

- Two acres in Runway 9-27 protection zone to the west (completed);
- Properties in Runway 9-27 protection zone to the east;
- Developed properties in Runway 9-27 protection zone to the west of Doolittle Avenue;
- Properties in Runway 9-27 protection zone to the west of Doolittle Avenue;
- Properties in Runway 16-34 protection zone to the north of railroad track;
- Property for future middle marker to the west.

Airspace and Air Traffic Control

Existing Air Traffic Control (ATC) facilities are adequate for the forecast operations, although the proximity of other airports adds delays that might not otherwise be incurred.

Navigational and Landing Aids

Several projects are intended to relocate or improve navigational and landing aids:

- The extension of Runway 9-27 will require relocation of the existing glide slope and approach lighting system to relate to the new runway threshold;
- Distance Measuring Equipment (DME) should be co-located with the ILS localizer for Runway 9;
- Preserve potential for an omnidirectional approach lighting system (ODALS) on Runway 27L;
- Plan precision approach path indicators (PAPI) for Runways 9L, 9R, 16 and 27R; and
- Request FAA to replace the existing VOR-A approach to the Airport from the east and to provide a nonprecision approach to the Airport from the south if they intend to remove the TVOR.

Approach Areas and Obstructions

The Master Plan identified controlling obstructions for each existing runway end (see Table 1 in Section 2.2.1). The railroad located 550 feet west of the Runway 9 threshold is a controlling obstruction recommended for removal. Since Runway 9-27 is planned for extension to the west, the railroad will need to be relocated. If the railroad is not abandoned, it should be relocated approximately 1,900 feet to the west. The controlling obstacles for the other runway ends are below the FAR Part 77 surfaces.

To enhance safety, several runway protection zone projects are recommended.

- Provide a relocated precision instrument runway protection zone for Runway 9R with the runway extension to the west;
- Retain a nonprecision instrument runway protection zone for Runway 27L;
- Retain visual runway protection zones for existing Runway 16-34 and provide for new Runway 9L-27R;

2.3 AIRPORT ENVIRONS

This section documents existing and future land use and development patterns in the vicinity of the Airport. The purpose is to define the nature and extent of nearby development and its relationship to the Airport. The information developed here will be further evaluated in later sections to determine the compatibility of these land uses to the Airport and its operations.

2.3.1 Regional Setting

The City of Riverside is the County Seat for Riverside County and is influenced by growth in Riverside County and other surrounding areas. From 1960 through 1990 the population of Riverside County increased from 311,700 to about 1 million persons, an annual average increase of about 4.7 percent. Surrounding areas include San Bernardino and Orange Counties, which have grown at average annual rates of 3.2 percent and 4.1 percent respectively and currently have a combined population of about 3.6 million persons.

Between now and 2010 these three counties are expected to continue to grow, but at reduced rates. Orange County is expected to grow the slowest over this period with an annual average increase of about 1.3 percent. San Bernardino County is expected to grow at a rate of about 2.6 percent. The combined population of these two counties

is expected to reach about 5.2 millions persons. Riverside County is expected to grow the fastest at an annual rate of about 3.0 percent, reaching a population of about 1.8 million persons by 2010.

2.3.2 Existing Land Use and Zoning

Land use patterns and existing zoning in the vicinity of Riverside Municipal Airport are illustrated on Figures 5 and 6, respectively. The predominant land use in the Airport vicinity is low and medium density residential development, which is defined to include densities up to about 8 dwelling units per gross acre (du/ac) or about 6.5 dwelling units per net acre. Such development is found to the west, south and east of the Airport. Higher density residential development (greater than 8 du/ac) is scattered throughout the area with many units located along Magnolia Avenue southeast of the Airport, along Arlington Avenue east and west of the Airport, and along Van Buren Boulevard generally south of the Airport.

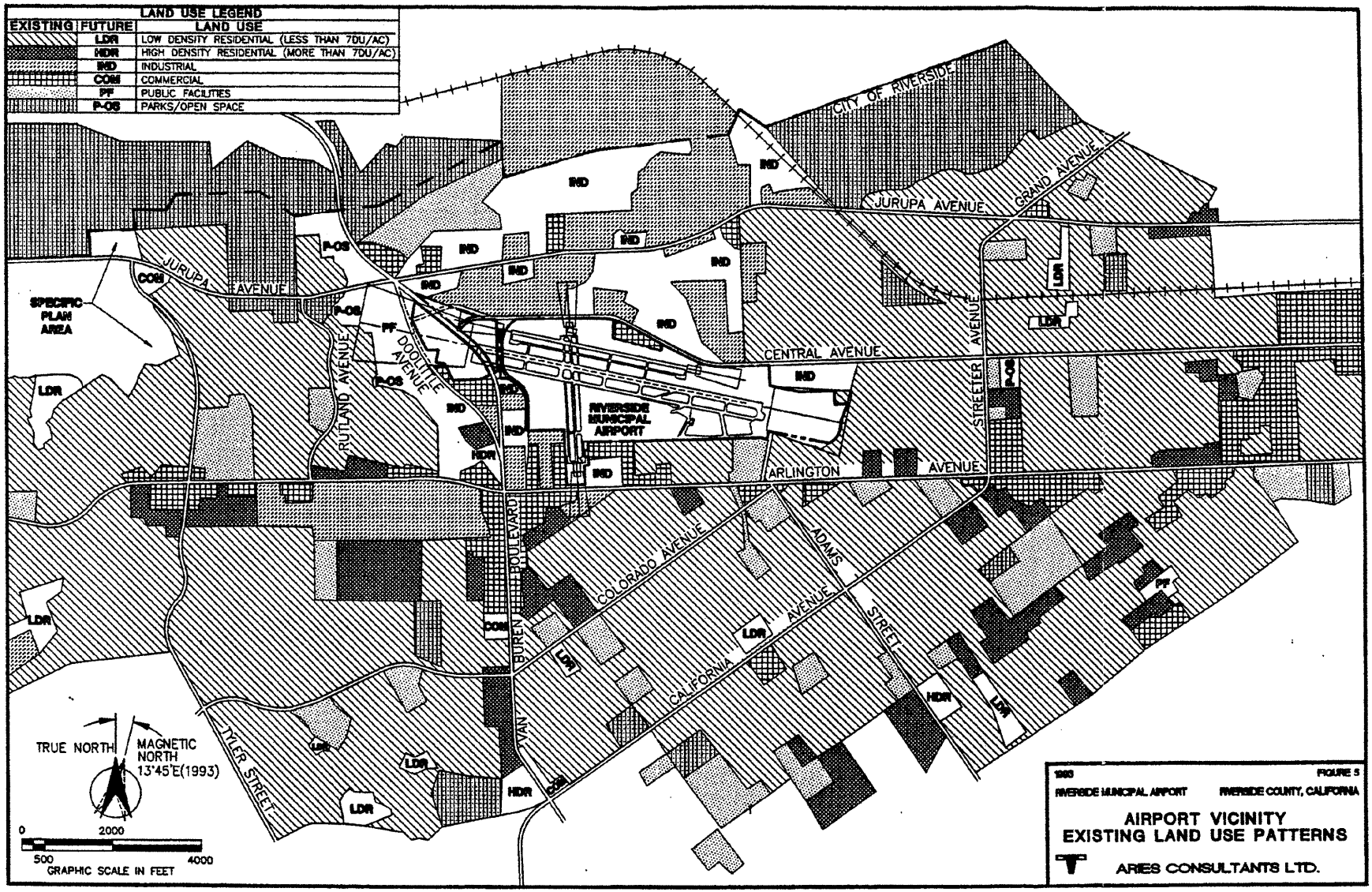
Areas immediately north and west of the Airport are zoned primarily for industrial purposes. These industrial areas are still in the development stage and considerable amounts of vacant developable land are available. This area also includes the City's sewage treatment plant northwest of the Airport.

Retail and office commercial uses are scattered along the principal arterial roads in the Airport vicinity. Many such uses are found along Arlington Avenue with retail concentrations at the intersections with Van Buren Boulevard and with Streeter Avenue, and with office concentrations at the intersection with Palm Avenue. Additional office commercial uses can be found scattered within the industrial areas.

Schools, hospitals, nursing homes and other institutional or public uses are also scattered throughout the vicinity area.

Parks and dedicated open spaces are similarly scattered. The Santa Ana Regional Park located north of the Airport along the Santa Ana River is a major park and recreational resource.

In addition to the vacant lands in the industrial areas, there are scattered vacant parcels in residential and commercial areas. These are expected to develop generally in accordance with existing zoning. Some of the larger parcels, particularly those west of the Airport, may develop under specific plan provisions or as mixed use planned development.

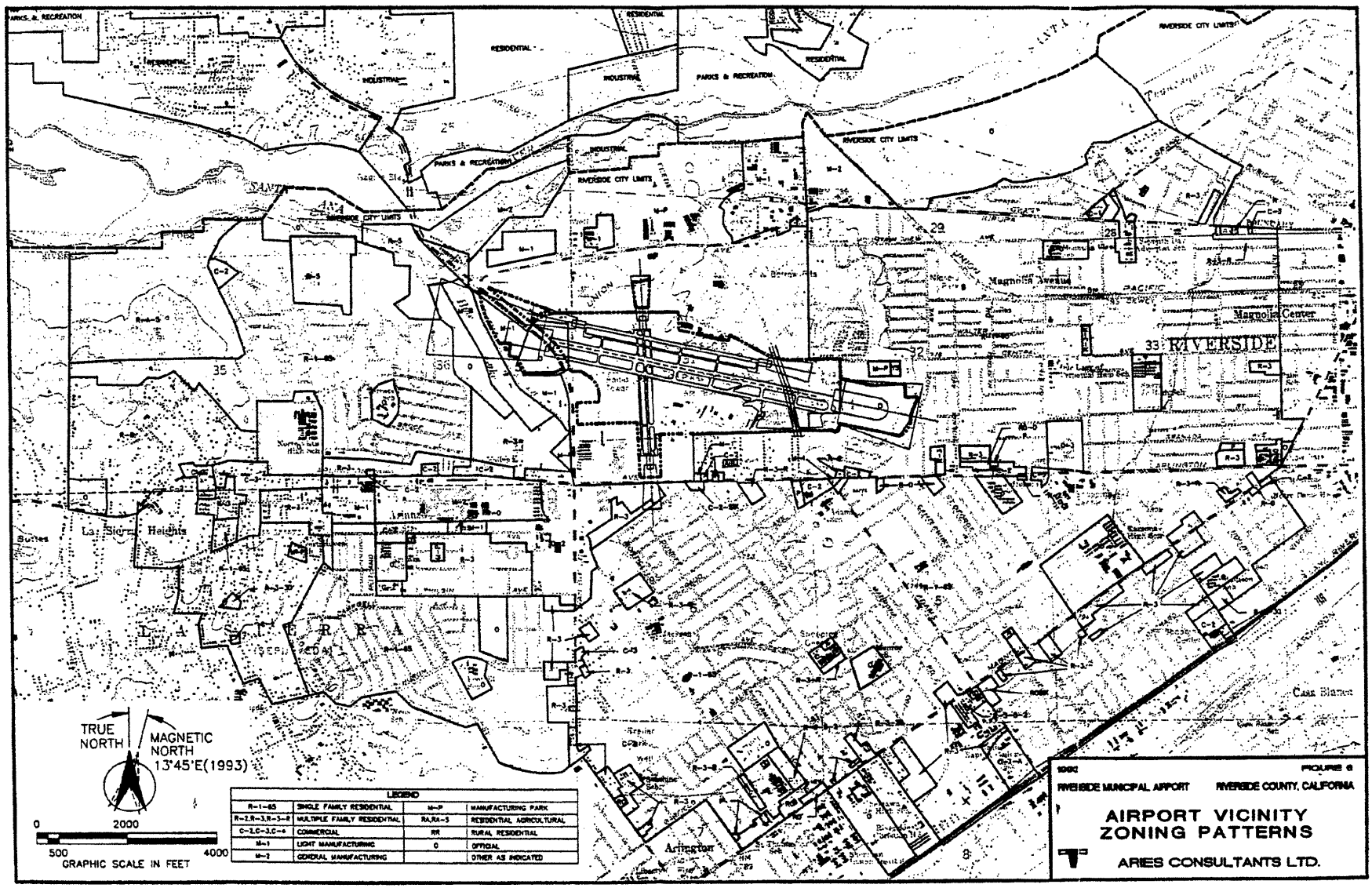


1993 FIGURE 5

RIVERSIDE MUNICIPAL AIRPORT RIVERSIDE COUNTY, CALIFORNIA

AIRPORT VICINITY EXISTING LAND USE PATTERNS

ARIES CONSULTANTS LTD.



1992 FIGURE 6

RIVERSIDE MUNICIPAL AIRPORT RIVERSIDE COUNTY, CALIFORNIA

AIRPORT VICINITY ZONING PATTERNS

ARIES CONSULTANTS LTD.

2.3.3 General Plan Land Use

Most of the area surrounding the Airport is already developed. General Plan Land Use patterns generally reflect existing land use patterns, as shown on Figure 5.

The City is currently updating its General Plan. Since most of the area surrounding the Airport is already developed and development patterns are already established, there are few changes expected in the Airport vicinity. Figure 5 identifies expected future land uses on existing vacant property. These future land uses are based on the existing General Plan.

Section 3.0

LAND USE COMPATIBILITY GUIDELINES

3.1 INTRODUCTION

This section presents land use compatibility guidelines which have been established by the Riverside County Airport Land Use Commission for use in comprehensive land use planning within airport influence areas. These guidelines are intended to provide a common approach for identifying potential areas of incompatibility and for establishing land use criteria at each of the County's airports.

While providing a basis for a common analytical approach, the guidelines do provide for some flexibility in making specific determinations as to land use compatibility in any given situation. The many differences among the various airports in the County and in their environs makes it prudent to ensure that appropriate variations may be made to meet special circumstances in order to protect the public health, safety, and welfare. When variations are necessary, specific findings justifying the variations should be made and included in the Comprehensive Land Use Plan.

3.2 CALIFORNIA AIRPORT LAND USE PLANNING GUIDELINES

Aircraft noise is often the most disturbing environmental impact associated with the operation of an airport. As jet aircraft came into common use at civilian airports in the 1960's, public concern about aircraft noise became a serious issue. This concern was heightened as the environmental movement of the 1970's gathered steam. In response to these concerns, Congress and some state legislatures, in addition to numerous Federal and state agencies, began developing programs and guidelines to promote aircraft noise abatement and compatible development within noise-impacted areas.

At the same time, concern was growing in the aviation community about burgeoning urban development in the vicinity of airports. The development boom of the 1950's and 1960's, following the long slow-growth period of the 1930's and 1940's, corresponded with a sharp growth in aviation. Not only was noise a concern, but the safety of persons on the ground and in the air became an increasing concern with the construction of tall buildings and towers near airports and increasing development of all kinds within airport approaches.

In California, the state legislature responded to these public concerns by enacting the law mandating the creation of Airport Land Use Commissions and the preparation of

comprehensive land use plans for all public airports in each county (Public Utilities Code, Chapter 4, Art. 3.5). In order to assist Airport Land Use Commissions in implementing the provisions of the law, the California Department of Transportation prepared a reference guide for local agencies. Published in 1983, the Airport Land Use Planning Handbook provides planning guidelines and suggestions based on a review of the research on noise and safety issues and a review of comprehensive land use plans in force at the time the document was prepared.

For purposes of preparing comprehensive land use plans for airports in Riverside County, the guidelines presented in the Airport Land Use Planning Handbook are used as described in this section. Because the state guidelines are not rigidly defined, but provide for local adjustments based on local conditions and concerns, some refinements in the state guidelines have been made for use in the County. Furthermore, the state guidelines are somewhat general. It is possible that additional detail will need to be developed to provide specific land use planning and regulation in certain airport areas. Such adjustments will be considered for each airport as needed.

3.3 NOISE COMPATIBILITY GUIDELINES

Table 3 shows the noise compatibility guidelines intended for use in the County. These are based on the guidelines suggested by the State of California in the 1983 Airport Land Use Planning Handbook. At general aviation airports, the guidelines call for discouraging new single-family dwellings and prohibiting mobile homes, within the 60 dB CNEL contour. Where homes are permitted within the 60 dB CNEL, the need for sound insulation should be studied and noise easements should be acquired.

Within the 65 dB CNEL, new residential construction should not be allowed. New hotels or motels are permissible if the need for sound insulation is studied. Institutional uses should be discouraged within the 65-70 dB CNEL range. If no alternative location is available, the need for sound insulation should be studied before the institution is built. Commercial, industrial, and recreational uses are considered compatible with noise levels between 65 and 70 dB CNEL.

3.4 SAFETY COMPATIBILITY GUIDELINES

The State has suggested the creation of five safety zones around airports. The zones are intended to promote land use planning and regulation which in turn promotes the safety of persons on the ground while reducing the risks of serious harm to aircraft crews and passengers making forced landings in the immediate airport environs.

Table 3

LAND USE GUIDELINES FOR NOISE COMPATIBILITY

Type of Airport/ Land Use	55–60 CNEL	60–65 CNEL	65–70 CNEL	70–75 CNEL	75–80 CNEL	80+ CNEL
Air Carrier and Military						
Residential/Lodgings		■ Potential for annoyance exists; identify high complaint areas. ■ Determine whether sound insulation requirements should be established for these areas. ■ Require acoustical reports for all new construction. ■ Noise easements should be required for new construction.	■ Discourage new single family dwellings ■ Prohibit mobile homes. ■ New construction or development should be undertaken only after an analysis of noise reduction requirements is made and needed noise insulation is included in the design. ■ Noise easements should be required for new construction. ■ Develop policies for "infill".	■ New construction or development of residential uses should not be undertaken. ■ New hotels and motels may be permitted after an analysis of noise reduction requirements is made and needed noise insulation is included in the design.	■ New hotels and motels should be discouraged.	
General Aviation						
Residential/Lodgings	■ Potential for annoyance exists; identify high complaint areas. ■ Determine whether sound insulation requirements should be established for these areas. ■ Noise easements should be required for new construction. ■ Discourage residential use underneath the flight pattern.	■ Discourage new single family dwellings. ■ Prohibit mobile homes. ■ New construction or development should be undertaken only after analysis of noise reduction an requirements is made and needed noise insulation is included in the design. ■ Noise easements should be required. ■ Develop policies for "infill."	■ New construction or development of residential uses should not be undertaken. ■ New hotels and motels may be permitted after an analysis of noise reduction requirements is made and needed noise insulation is included in the design.	■ New hotels and motels should be discouraged.		
All Airports						
Public/Institutional		■ Satisfactory with little noise impact and requiring no special noise insulation requirements for new construction.	■ Discourage institutional uses. ■ If no other alternative location is available, new construction or development should be undertaken only after an analysis of noise reduction requirements is made and needed noise insulation is included in the design.	■ No new institutional uses should be undertaken.		
Commercial			■ Satisfactory with little noise impact and requiring no special noise insulation. Requirements for new construction.	■ New construction or development should be undertaken only after an analysis of noise reduction requirements is made and needed insulation features included in the design. Noise reduction levels of 25–30 dB will be required.	■ New construction or development should be undertaken only after an analysis of noise reduction requirements is made and needed noise insulation features included in the design. Noise reduction levels of 25–30 dB will be required.	■ New construction or development should not be undertaken unless related to airport activities or services. Conventional construction will generally be inadequate and special noise insulation features should be included in the construction.
Industrial				■ Satisfactory with little noise impact and Requiring no special noise insulation requirements for new construction.	■ New construction or development should be undertaken only after an analysis of noise reduction requirements is made and needed noise insulation features included in the design. ■ Measures to achieve noise reduction of 25–35 dB must be incorporated in Portions of building where the public is received and in office areas.	■ New construction or development should not be undertaken unless related to airport activities or services. Conventional construction will generally be inadequate and special noise insulation features should be included in the construction.
Recreation/ Open Space			■ Satisfactory, with little noise impact and requiring no special noise insulation for new construction. ■ Outdoor music shells and amphitheater should not be permitted.	■ Parks, spectator sports, golf courses and agricultural generally satisfactory with little noise impact. ■ Nature areas for wildlife and zoos should not be permitted.	■ Land uses involving concentrations of people (spectator sports and some recreational facilities) or of animals (livestock farming and animal breeding) should not be permitted.	

Source: Airport Land Use Planning Handbook, A Reference Guide for Local Agencies, prepared for California Department of Transportation, Division of Aeronautics, by Metropolitan Transportation Commission and Association of Bay Area Governments, 1983, p.5

The State provides for several options in the definition of the safety zone boundaries and in the scope of land use regulations applying within the boundaries. The specific scope of the guidelines proposed for use in Riverside County are described in Table 4 and discussed further below. All but the Traffic Pattern Zone (TPZ) zone are shown on Figure 7.

3.4.1 Inner Safety Zone

The Inner Safety Zone (ISZ) is an area immediately off the runway end, 1,500 feet wide and from 1,320 to 2,500 feet long. The length of the zone varies depending on the type of runway approach and the type of aircraft using the runway. The shorter distance is for visual runways serving single and twin-engine propeller aircraft. The longer distance is for precision and non-precision instrument runways or runways serving jet aircraft. By their nature, instrument runways are used during bad weather and periods of poor visibility. Those are also periods of increased accident risk. Jet aircraft tend to be larger than propeller aircraft and operate at higher speeds, thus creating the risk of more severe damage on the ground in the event of an accident.

Of the five safety zones, this is the area with the greatest aircraft accident risk. At most airports, the FAA-defined runway protection zone (RPZ), a trapezoidal area, will lie within the ISZ. At airports with precision instrument runways, however, the outermost corners of the RPZ will extend just outside the ISZ. (See Figure 7.) In such cases, the boundaries of the ISZ should be adjusted to include all of the RPZ.

Within the Inner Safety Zone, no structures should be permitted. Storage of petroleum products and explosive materials should not be permitted, nor should petroleum or natural gas pipelines or above-grade powerlines.

3.4.2 Outer Safety Zone

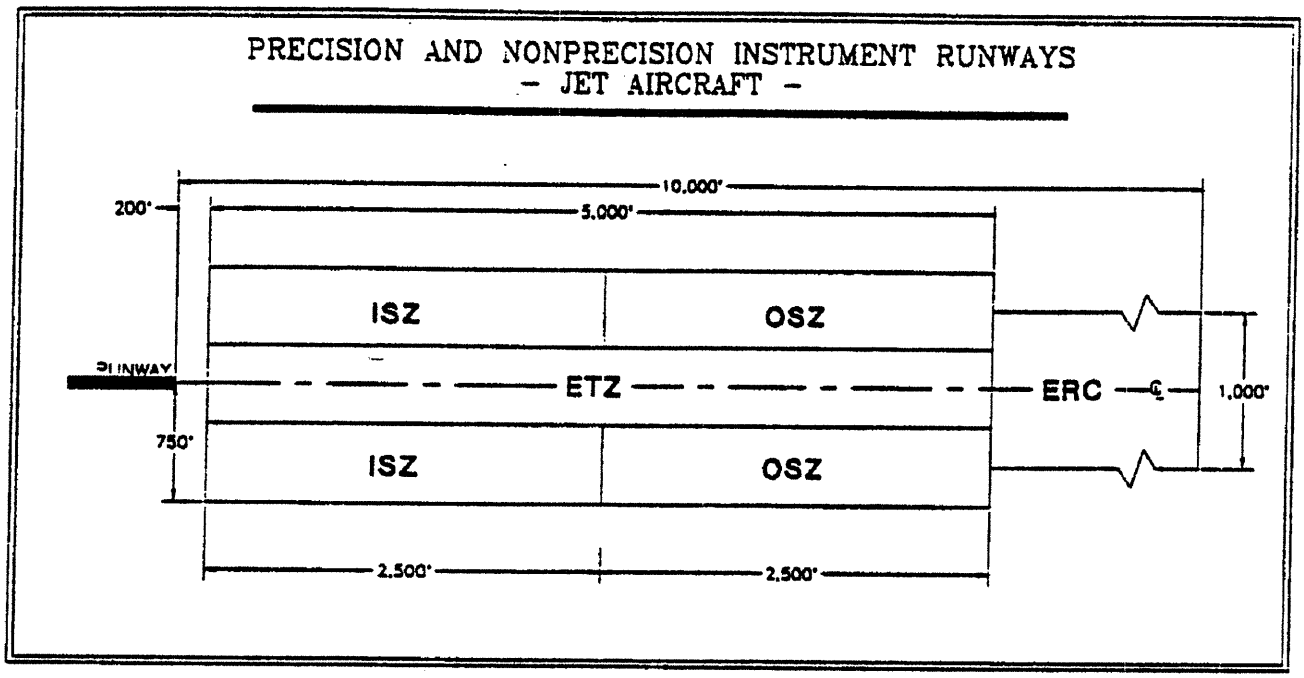
The Outer Safety Zone (OSZ) is an area along the extended runway centerline immediately beyond the ISZ. It is 1,500 feet wide and ranges from 2,180 to 2,500 feet long. The length is based on the same factors as the Inner Safety Zone. Within the OSZ, the density of the population in structures would be limited to 25 persons per acre or 150 persons per building, whichever is less. For uses not in structures, the density would be limited to 50 persons per acre. Structures should not cover more than 25 percent of individual property. Land uses that concentrate people at single locations should be prohibited within the OSZ. These include dwellings; hotels/ motels; places of public assembly (schools, hospitals, government services, concert halls, auditoriums, stadium, and arenas). Vital public services including public utility stations and plants including electric power and telephone switching stations as well as industries handling flammable materials should also be prohibited within the OSZ.

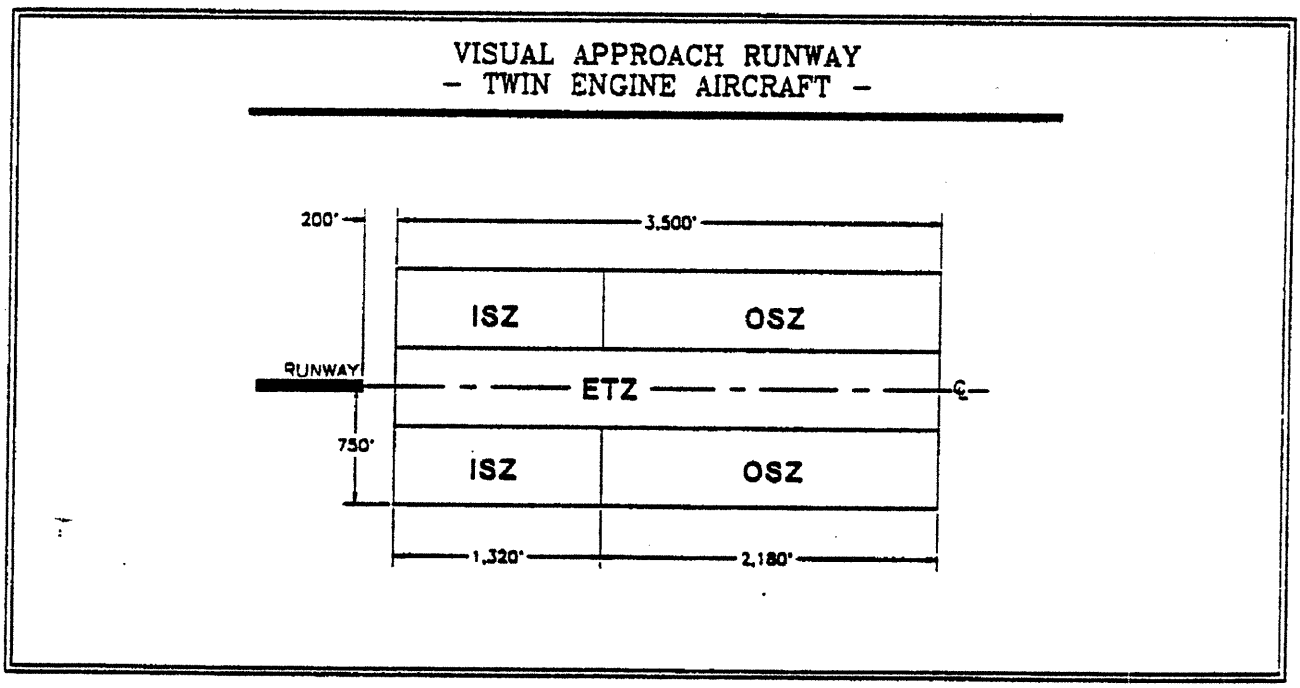
Table 4

LAND USE COMPATIBILITY GUIDELINES FOR AIRPORT SAFETY ZONES[1, 2]

Safety Zone	Maximum Population Density	Maximum Coverage By Structures	Land Use
ETZ — Emergency Touchdown Zone	0[3]	0[3]	No significant obstructions[4]
ISZ — Inner Safety Zone	0[3]	0[3]	No petroleum or explosives No above-grade powerlines
OSZ — Outer Safety Zone	Uses in structures:[5] 25 persons/ac. OR 150 persons/bldg. (see text for explanation) Uses not in structures: 50 persons/ac.	25% of net area	No residential No hotels, motels No restaurants, bars No schools, hospitals, government services No concert halls, auditoriums No stadiums, arenas No public utility stations, plants No public communications facilities No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials
ERC — Extended Runway Centerline Zone	3 du/net acre Uses in structures[5]: 75 persons/ac. or 300 persons/bldg. (see text for explanation)	50% of gross area or 65% of net area, whichever is greater	No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.[6]
TPZ — Traffic Pattern Zone	Not Applicable	50% of gross area or 65% of net area, whichever is greater	Discourage schools, auditoriums, amphitheaters, stadiums Discourage uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.[6]

1. The following uses shall be prohibited in all airport safety zones:
   a. Any use which would direct a steady light or flashing light of red, white, green, or amber colors associated with airport operations toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport, other than an FAA-approved navigational signal light or visual approach slope indicator.
   b. Any use which would cause sunlight to be reflected towards an aircraft engaged in an initial straight climb following takeoff or towards an aircraft engaged in a straight final approach towards a landing at an airport.
   c. Any use which would generate smoke or water vapor or which would attract large concentrations of birds, or which may otherwise affect safe air navigation within the area.
   d. Any use which would generate electrical interference that may be detrimental to the operation of aircraft and/or aircraft instrumentation.
2. Avigation easements shall be secured through dedication for all land uses permitted in any safety zones.
3. No structures permitted in ETZ or ISZ.
4. Significant obstructions include but are not limited to large trees, heavy fences and walls, tall and steep berms and retaining walls, non-frangible street light and sign standards, billboards.
5. A "structure includes fully enclosed buildings and other facilities involving fixed seating and enclosures limiting the mobility of people, such as sports stadiums, outdoor arenas, and amphitheaters.
6. This does not apply to service stations involving retail sale of motor vehicle fuel if fuel storage tanks are installed underground.





SOURCE: Airport Land Use Planning: A Reference and Guide for Local Agencies, prepared for California Department of Transportation, Division of Aeronautics, by the Metropolitan Transportation Commission and Association of Bay Area Government.

LEGEND

OSZ - OUTER SAFETY ZONE
ISZ - INNER SAFETY ZONE
ETZ - EMERGENCY TOUCHDOWN ZONE
ERC - EXTENDED RUNWAY CENTERLINE

FIGURE 7

SUGGESTED AIRPORT SAFETY ZONES OFF RUNWAY ENDS
RIVERSIDE MUNICIPAL AIRPORT

3.4.3 Emergency Touchdown Zone

The Emergency Touchdown Zone (ETZ) is a 500-foot wide area extending to the end of the OSZ. It is intended as an emergency landing area. Within this area, no structures or significant obstructions should be permitted.

3.4.4 Traffic Pattern Zone

The Traffic Patten Zone (TPZ) is the area around the airport which is most frequently overflown by aircraft and within which the local traffic pattern is located. For the sake of clear and unambiguous definition of the area, the boundaries should be set at the outer edge of the horizontal surface based on FAR Part 77. The horizontal surface extends 5,000 feet off the ends and sides of the runway primary surface with only visual approaches and off utility runways with non-precision approaches. The surface extends 10,000 feet off the ends and sides of the runway primary surface with precision approaches and off runways classified as "larger than utility" with non-precision approaches. These are reasonably close approximations of the limits of a traffic pattern area for these different runways and approaches.

Within the TPZ, maximum dwelling unit density should be limited to 0.4 to 3.0 units per acre, depending on the prevailing need for developable land for housing. This corresponds to minimum lot sizes of 2.5 acres down to 14,520 square feet. The 2.5 acre minimum is consistent with the policy language in the Riverside County Comprehensive Plan and has been the policy of the Riverside County Airport Land Use Commission for several years. The 14,520 square feet minimum is based on various comprehensive land use plans reviewed by the State as presented in the 1983 Airport Land Use Planning Handbook.

Structures within the TPZ should occupy no more than 50 percent gross lot area or 65 percent net lot area, whichever is greater. This would help to ensure that emergency landing areas are available within this area of frequent low-level overflights.

While it may be impractical in all areas to encourage strict land use controls within the TPZ, certain uses should be discouraged in the area. These include schools, auditoriums, amphitheaters, stadiums and other similar places of public assembly. Industries involved in the primary handling of flammable materials should also be discouraged in the TPZ.

3.4.5 Extended Runway Centerline Zone

The Extended Runway Centerline Zone (ERC) would apply only off the ends of precision or non-precision instrument runways or runways serving jet aircraft. It is

1,000 feet wide and extends 5,000 feet beyond the Outer Safety Zone (OSZ). These types of approach typically occur in bad weather and during periods of poor visibility. The California Airport Land Use Planning Handbook notes that poor visibility has been a contributing factor in accidents where aircraft undershot the approach course.

Within the ERC, land uses involving large concentrations of people should be discouraged. These would include churches, schools, auditoriums, major office developments, shopping centers, hospitals, stadiums and other uses where large concentrations of people occur.

3.4.6 Special Considerations in all Safety Zones

Particularly hazardous land uses should be prohibited in all designated safety zones. These include those which would cause smoke, water vapor, or light interference, thus impeding the pilot's ability to see the airfield. Other uses which cause electrical interference with aircraft navigational and communications equipment also should be prohibited in the airport vicinity. Other inappropriate uses include those which attract large numbers of birds. Examples include landfills and some types of food processing plants involving outdoor storage of grain and other raw materials or food by-products.

- The Airport Land Use Planning Handbook offers the following descriptions of land uses which are considered hazardous and should be prohibited within all airport safety zones:

- Any use which would direct a steady light or flashing light of red, white, green, or amber colors associated with airport operations toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport, other than an FAA approved navigational signal light or visual approach slope indicator.

- Any use which would cause sunlight to be reflected toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport.

- Any use which would generate smoke or which would attract large concentrations of birds, or which may otherwise affect safe air navigation within this area.

- Any use which would generate electrical interference that may be detrimental to the operation of aircraft and/or aircraft instrumentation.

The Airport Land Use Commission also requires that avigation easements be obtained for all properties affected by the airport safety zones. Avigation easements grant an airport the right to perform aircraft operations over the designated property, including operations that might cause noise, vibration, and other effects. This easement may also include specific prohibitions on the uses for which the property may be developed. Maximum heights of structures and other objects may also be specified.

3.5 AIRPORT VICINITY HEIGHT GUIDELINES

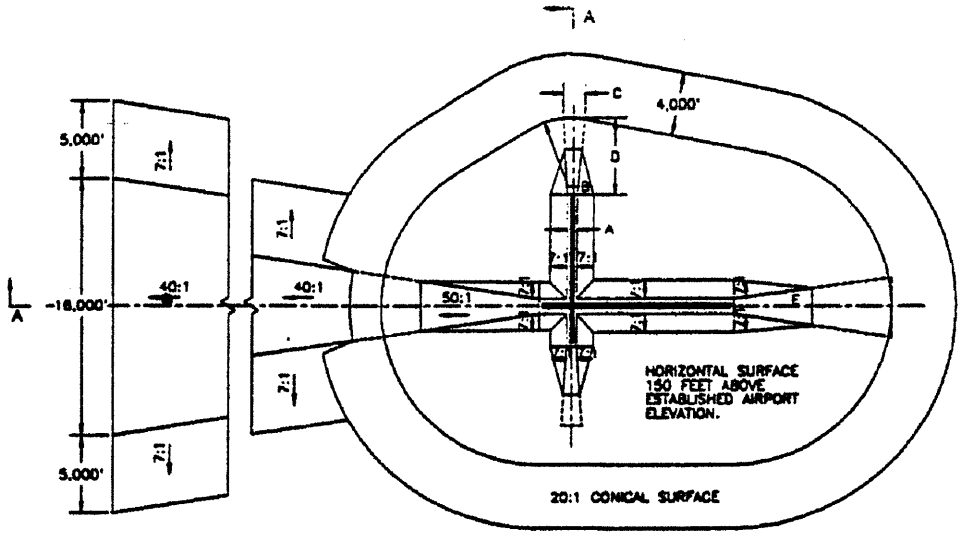
Airport vicinity height limitations are required for two reasons. The first is to protect the public safety, health, and welfare by ensuring that aircraft can safely fly in the airspace around an airport. This protects both the interest of those in the aircraft and those on the ground who could be injured in the event of an accident. Secondly, height limitations are required to protect the operating capability of airports, thus preserving an important part of the State's transportation system. The Federal government has developed standards for determining obstructions in the navigable airspace. Federal Aviation Regulations (FAR) Part 77 defines a variety of imaginary surfaces around airports. Each surface is defined at a certain altitude around the airport. Figure 8 shows the range of imaginary surfaces addressed in FAR Part 77.

The dimensions of the surfaces vary depending on the type of approach to the runways, as Figure 8 illustrates. Non-precision runways have larger surfaces and flatter approach slopes than visual runways. Precision instrument runways have still larger surfaces and flatter approaches than nonprecision runways.

FAA uses these FAR Part 77 obstructions standards not as absolute height limits, but as elevations above which structures may constitute a safety problem. Any penetrations of the FAR Part 77 surfaces are subject to review on a case-by-case basis. If a safety problem is found to exist, FAA will issue a determination of a hazard to air navigation. FAA does not have the authority to prevent the encroachment. It is up to the local zoning authorities to enforce the FAA recommendation.

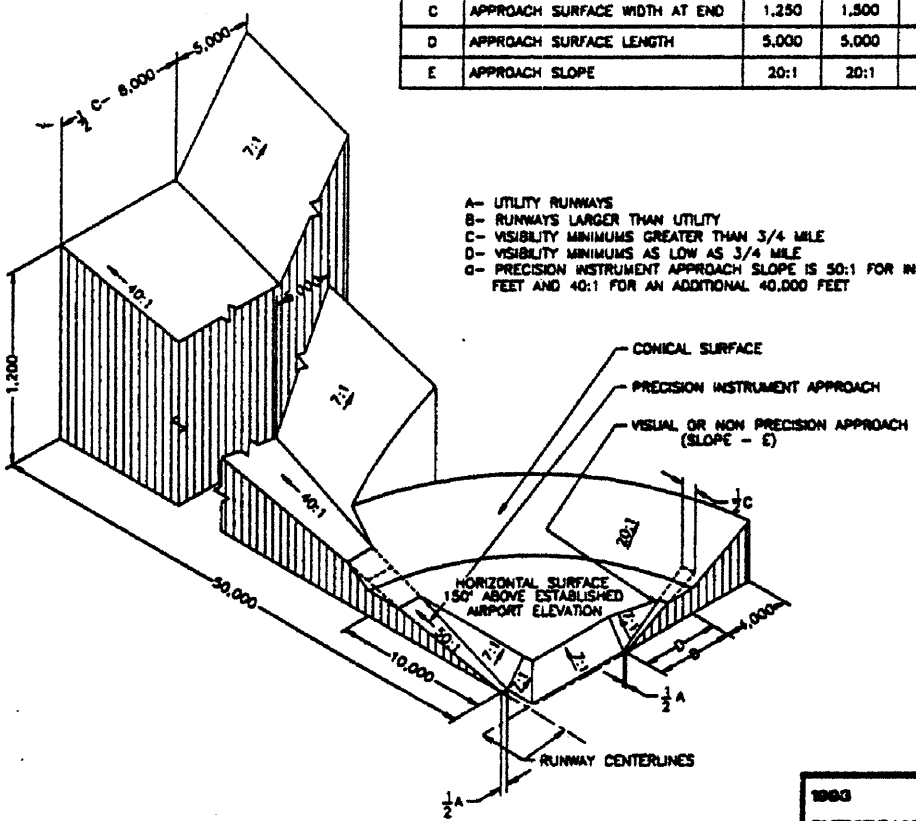
The California Airport Land Use Planning Handbook states the following with respect to height limitation standards:

> "While it is important to understand that these (FAR Part 77) are in fact review standards, it is equally important to recognize that these standards provide a reasonable and defensible balance between the needs of the airspace users and the rights of property owners beneath the flight patterns. In this regard, the use of FAR Part 77 obstruction standards as recommended height limits is appropriate."



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON - PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON - PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	a
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	a

A- UTILITY RUNWAYS
B- RUNWAYS LARGER THAN UTILITY
C- VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D- VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
a- PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

1993 FIGURE 8

RIVERSIDE MUNICIPAL AIRPORT RIVERSIDE COUNTY, CALIFORNIA

FAR PART 77 TYPICAL CIVIL AIRPORT IMAGINARY SURFACES

ARIES CONSULTANTS LTD.

The practice of using of FAR Part 77 standards as height limits has been widely followed by Airport Land Use Commissions in California. FAA has encouraged this by producing a model zoning ordinance to limit the height of objects around airports (FAA Advisory Circular 150/5190-4A, "A Model Zoning Ordinance to Limit Height of Objects Around Airports"). The model ordinance proposes the use of the FAR Part 77 surfaces as regulatory height limits. In view of the widespread acceptance of the FAR Part 77 criteria, they will be used as the basis for height limitations in this Comprehensive Land Use Plan.

3.6 SUMMARY — AIRPORT INFLUENCE AREA

This section has presented the overall planning guidelines and criteria to be used in developing the Comprehensive Land Use Plan for Riverside Municipal Airport. The noise and safety guidelines are based on the recommendations of the State of California as presented in the 1983 Airport Land Use Planning Handbook. The height guidelines are based on FAR Part 77 as recommended by the State in the Airport Land Use Planning Handbook.

For purposes of defining the "airport-influence area" around an Airport, the composite boundaries of the noise, safety and height influenced areas will be used. The outer boundaries of the noise-influence area correspond to the 60 CNEL contours of existing and forecast conditions. The outer boundary of the height-influence area is the edge of the conical surface and may include the approach surface for instrument approach runways. The outer boundary of the safety-influence area is the horizontal surface which lies within the conical surface.

Section 4.0

AIRPORT NOISE INFLUENCE AREA ISSUES AND ALTERNATIVES

4.1 INTRODUCTION

This section presents an analysis of existing and forecast noise conditions at Riverside Municipal Airport. The discussion includes an outline of the assumptions used in modeling these conditions, a presentation of the aircraft noise impacts and issues, and identification of alternative noise abatement actions.

4.2 NOISE METHODOLOGY

Noise Modeling

Aircraft noise levels for the Riverside Municipal Airport were estimated during the Airport master planning process using the Integrated Noise Model (INM), Version 3.9. The INM, which was developed by the Federal Aviation Administration, includes a data base of noise and operational characteristics for 81 aircraft types and variations. When a user specifies a particular aircraft class from the INM data base, the model automatically provides the necessary inputs concerning aircraft power settings, departure and arrival profiles and associated noise levels. The INM data base reflects many of the current aircraft fleet using the Airport.

In developing the noise contours, the INM actually "flies" the departure and arrival profiles of each selected aircraft along the designated flight tracks, then calculates and accumulates noise exposure levels within a grid around the Airport. The INM then draws lines between grid points with like noise values, in a manner similar to "connecting the dots", to form the noise contours.

Noise Descriptor

The noise descriptor used in the analysis is the Community Noise Equivalent Level (CNEL). The CNEL is the State of California standard noise level descriptor (California Administrative Code, Title 21). The CNEL descriptor is a method of averaging single-event noise levels over a typical 24-hour day, applying a 5 decibel (dB) penalty to noise events occurring during evening hours (7 P.M. to 10 P.M.) and a 10 decibel (dB) penalty to noise events occurring during nighttime hours (10 P.M. to 7 A.M.). The final CNEL value expresses the 24-hour average of the summed

energy adjusted events. This value is also assumed to represent the annual average daily condition, so that noise measured in CNEL on a given day may be either less than, or greater than, the annual average.

The FAA accepts CNEL as a measure of cumulative noise exposure that is essentially equivalent to FAA's Day-Night Average Sound Level (L_{dn}) standard. The L_{dn} standard differs from the CNEL in that L_{dn} does not provide a penalty for evening hour (7 P.M. to 10 P.M.) operations.

Noise Measurements

To supplement the noise modeling effort, a noise measurement program was designed to quantify cumulative and single event noise levels in the vicinity of Riverside Municipal Airport. Four measurement sites were established: two east of the Airport and two west of the Airport, all generally along the extended centerline of the runway at distances ranging from about 2,000 feet to 4,500 feet from the ends of Runway 9-27. Two sites were utilized for both cumulative and single-event noise measurements using automated systems which operated continuously over a 7-day period at each location. At the remaining two sites trained personnel quantified aircraft noise levels using hand-held instrumentation, and identified aircraft types and operational procedures.

The measurements were taken during the period between October 19 and 25, 1989. No unusual noise sources were observed in the immediate vicinity of the Airport during these measurements. None of the measurement sites were adjacent to major roadways and traffic noise was considered a component of ambient noise levels. Additional details about the measurement instruments used, and other results, can be found in Appendix B of the Riverside Municipal Airport Master Plan Supplemental Environmental Impact Report. These measurements were compared to noise levels predicted by the INM and aided in calibrating and validating the model.

4.3 INM INPUT DATA

The INM utilizes the following information about an airport:

- The types of aircraft, often referred to as the "mix" of aircraft;
- Runway configuration;
- Aircraft flight track definition;
- Aircraft stage length;

- Aircraft departure and approach profiles;
- Aircraft traffic volume;
- Flight track utilization by aircraft types.

The remainder of this section describes the key input variables as they are influenced by activities at Riverside Municipal Airport.

4.3.1 Aircraft Activity Data

Annual average day aircraft operations assumptions for 1989 by aircraft type and time of day are presented in Table 5. Runway use factors for 1989 are also presented in the lower portion of Table 5. Similar operations data and runway-use assumptions for the "Worst Case" forecast of aviation activity are presented in Table 6. The Median Case forecast of aircraft operations, presented in the Riverside Master Plan Supplemental Environmental Impact Report, was not used because the Worst Case forecast results in a larger noise impact area and therefore a greater influence area.

4.3.2 Flight Profiles and Tracks

The INM allows the user to define the flight profiles and flight tracks, although the data base includes standard flight profiles for 81 commercial, military and general aviation aircraft. The INM data base was modified so that predicted single event noise levels obtained at the noise monitoring sites more closely matched measured noise levels. The modifications involved use of a revised noise/distance curve for twin-engine aircraft, a revised takeoff profile for single-engine aircraft, and new FAA data for helicopter operations.

4.4 INM OUTPUT

Information from Tables 5 and 6 were used to produce the 1989 and 2010 CNEL noise contours presented on Figures 9 and 10, respectively. Noise contours representing the 60, 65 and 70 dB CNEL values are illustrated. The generalized flight tracks used in the noise modeling process are also shown. The flight tracks define areas of the community with the greatest concentration of aircraft overflights.

Table 5

1989 AIRCRAFT ACTIVITY ASSUMPTIONS
Riverside Municipal Airport

Aircraft Operations by Time of Day - Annual Average Day

Aircraft Type	1989 Total	Percent Daily Operations		
		Day	Evening	Night
Single-engine propellor	156.327	80	18	2
Twin-engine propellor				
- Piston	8.200	90	9	1
- Turboprop	0.820	90	9	1
Helicopter	0.142	90	9	1
Business Jet	0.983	90	9	1
Military	0.273	90	9	1

Runway Use Factors by Time of Day

Runway	Percent Use Factor		
	Day	Evening	Night
09	9	9	90
27	89	89	10
16	0	0	0
34	2	2	0

Source: Brown-Buntin Associates, Inc.

Table 6

FORECAST 2010 AIRCRAFT ACTIVITY ASSUMPTIONS
WORST CASE
Riverside Municipal Airport

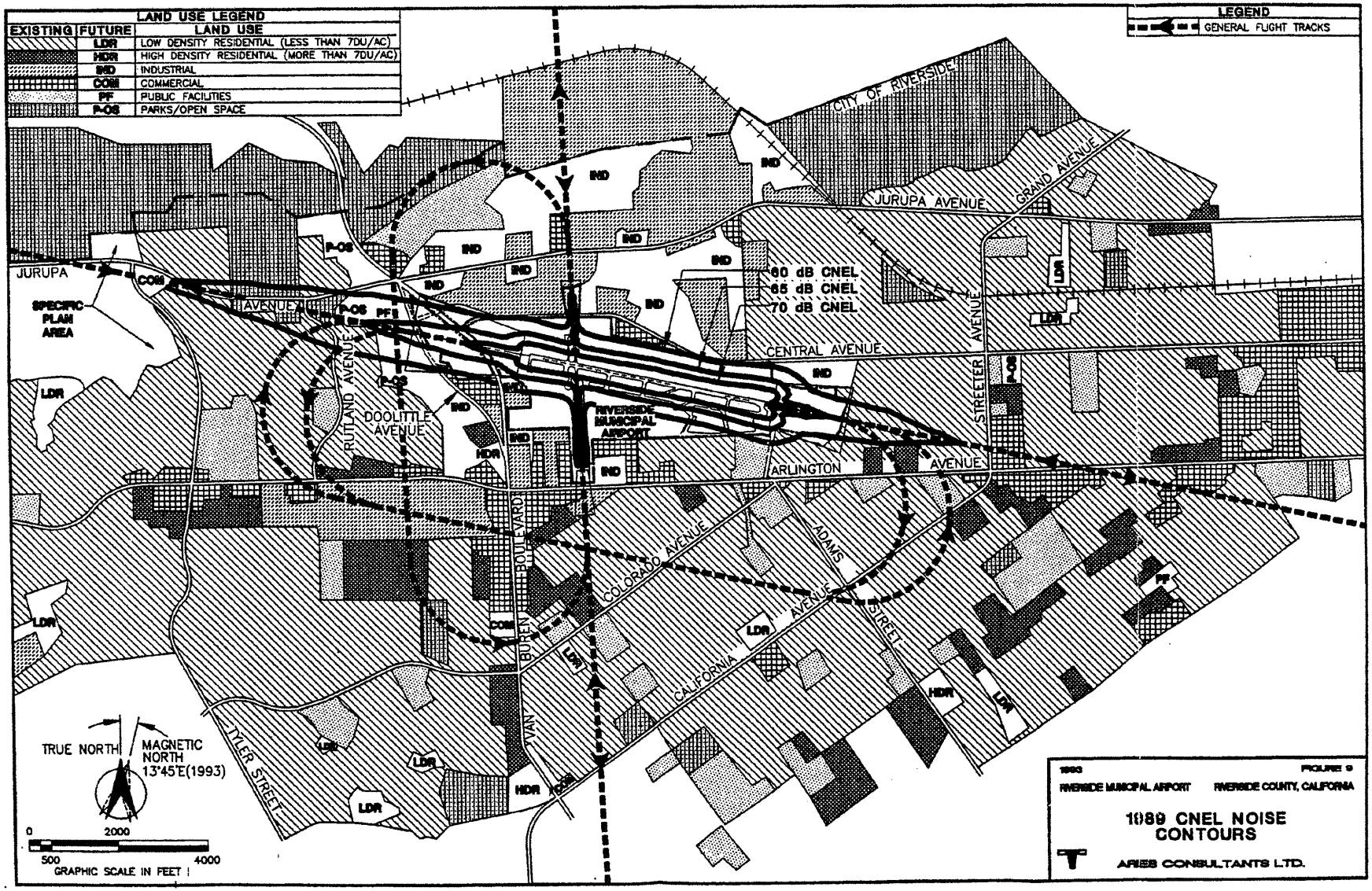
Aircraft Operations by Time of Day - Annual Average Day

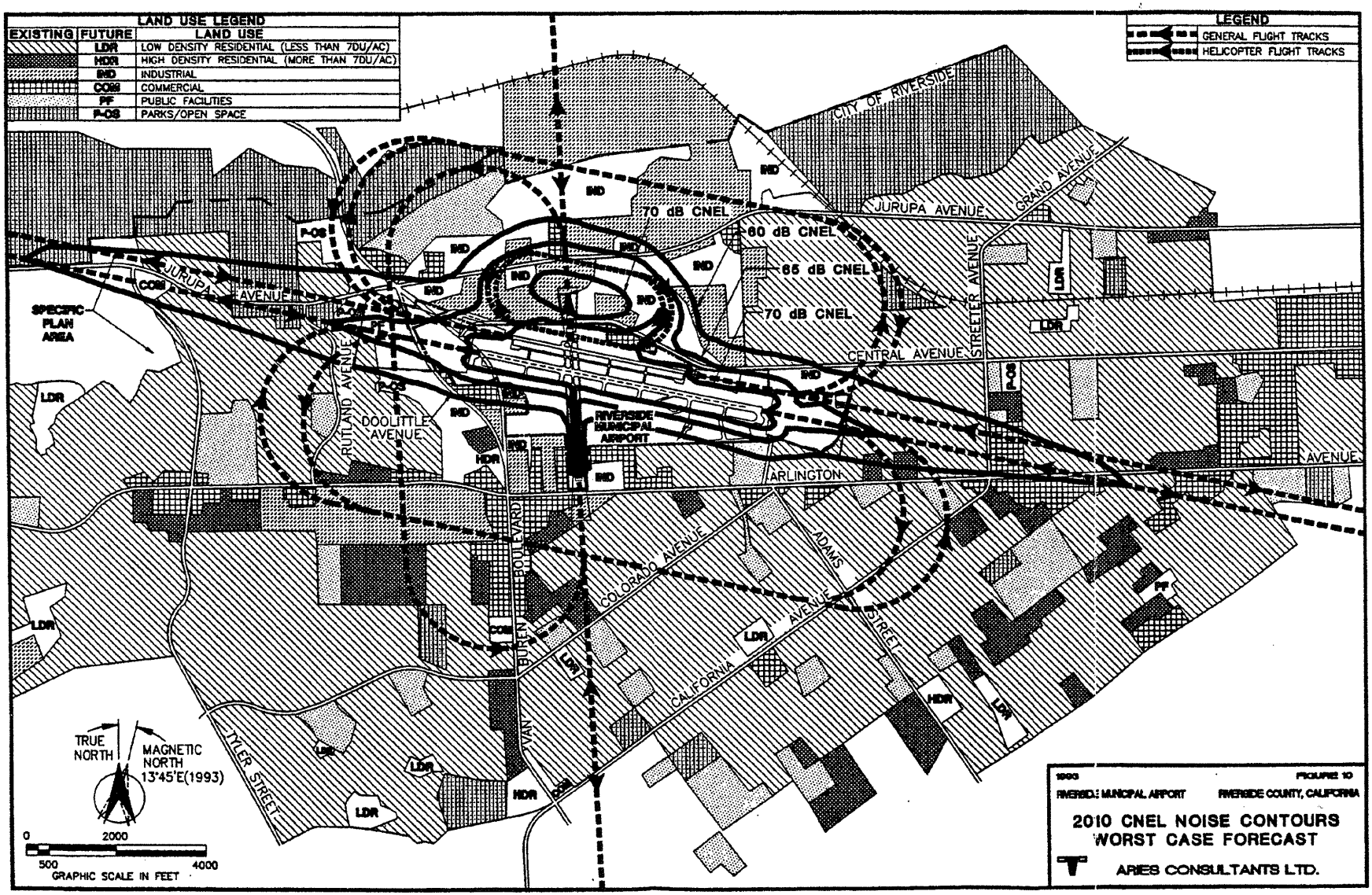
Aircraft Type	2010 Total	Percent Daily Operations		
		Day	Evening	Night
Single-engine propeller	410.9	80	18	2
Twin-engine propeller				
- Piston	137.0	90	9	1
- Turboprop	2.9	90	9	1
Helicopter	684.9	90	9	1
Business Jet	11.4	90	9	1
Commuters	35.1	90	9	1

Runway Use Factors by Time of Day

Runway	Percent Use Factor		
	Day	Evening	Night
09	9	9	90
27	89	89	10
16	0	0	0
34	2	2	0

Source: Brown-Buntin Associates, Inc.


LAND USE LEGEND
EXISTING
FUTURE
LAND USE
LDR LOW DENSITY RESIDENTIAL (LESS THAN 7DU/AC)
HDR HIGH DENSITY RESIDENTIAL (MORE THAN 7DU/AC)
IND INDUSTRIAL
COM COMMERCIAL
PF PUBLIC FACILITIES
P-OS PARKS/OPEN SPACE
LEGEND
GENERAL FLIGHT TRACKS
CITY OF RIVERSIDE
JURUPA AVENUE
GRAND AVENUE
JURUPA
AVENUE
SPECIFIC PLAN AREA
60 dB CNEL
65 dB CNEL
70 dB CNEL
CENTRAL AVENUE
STREETER AVENUE
RUTLAND AVENUE
DOOLITTLE AVENUE
RIVERSIDE MUNICIPAL AIRPORT
ARLINGTON
AVENUE
VAN BUREN BOULEVARD
COLORADO AVENUE
ADAMS STREET
CALIFORNIA AVENUE
TYLER STREET
TRUE NORTH
MAGNETIC NORTH 13°45'E(1993)
0
2000
500
4000
GRAPHIC SCALE IN FEET
1993
FIGURE 9
RIVERSIDE MUNICIPAL AIRPORT
RIVERSIDE COUNTY, CALIFORNIA
1989 CNEL NOISE CONTOURS
ARIES CONSULTANTS LTD.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HELICOPTER FLIGHT TRACKS
CITY OF RIVERSIDE
JURUPA AVENUE
GRAND AVENUE
70 dB CNEL
60 dB CNEL
65 dB CNEL
70 dB CNEL
STREETER AVENUE
CENTRAL AVENUE
SPECIFIC PLAN AREA
RUTLAND AVENUE
DOOLITTLE AVENUE
RIVERSIDE MUNICIPAL AIRPORT
ARLINGTON AVENUE
COLORADO AVENUE
ADAMS STREET
CALIFORNIA AVENUE
VAN BUREN BOULEVARD
TYLER STREET
TRUE NORTH
MAGNETIC NORTH 13°45'E(1993)
0
2000
500
4000
GRAPHIC SCALE IN FEET
1993
FIGURE 10
RIVERSIDE MUNICIPAL AIRPORT
RIVERSIDE COUNTY, CALIFORNIA
2010 CNEL NOISE CONTOURS
WORST CASE FORECAST
ARIES CONSULTANTS LTD.

4.4.1 Existing 1989 Aircraft Noise

The total land areas encompassed by the 1989 aircraft noise contours illustrated on Figure 9 are summarized below.

Gross Area Within 1989 Noise Contours

CNEL Value	Sq. Miles	Acres
Within 60	0.76	487.0
Between 60 and 65	0.48	304.6
Within 65	0.29	182.4
Between 65 and 70	0.16	102.3
Within 70	0.13	80.1

The 60 dB CNEL noise contour extends approximately 2,500 feet to the east of the existing Airport property line and approximately 6,000 feet to the west of the existing Airport property line. The contours are larger west of the Airport because the wind direction onto the Airport is predominantly from the west and therefore the predominant take off direction is to the west. The 65 dB CNEL contour is contained within the existing Airport property line to the north, east and south of the Airport, but extends approximately 1,500 feet outside the existing property line to the west. The 70 dB CNEL contour is fully contained within the existing Airport property line.

4.4.2 Future 2010 Aircraft Noise

The total land areas encompassed by the Worst Case 2010 aircraft noise contours illustrated on Figure 10 are summarized below.

Gross Area Within 2010 (Worst Case) Noise Contours

CNEL Value	Sq. Miles	Acres
Within 60	1.84	1,180.5
Between 60 and 65	1.07	683.3
Within 65	0.78	497.2
Between 65 and 70	0.45	287.4
Within 70	0.33	209.8

By 2010, under Worst Case Conditions, the 60 dB CNEL noise contour extends approximately 6,500 feet to the east of the future Airport property line (6,625 feet to the east of the existing Airport property line) and approximately 7,750 feet to the west

of the future Airport property line (9,125 feet from the existing Airport property line). Due to the significant increase in helicopter operations in the Worst Case, the noise contours expand considerably to the north creating a doughnut shaped impact area. The 60 dB CNEL contour in this area extends on average about 2,200 feet north of Central Avenue, which forms the northern Airport property line for both existing and future conditions.

The 65 dB CNEL contour east of the Airport extends approximately 750 feet east of the future Airport property line (875 feet east of the existing Airport property line). West of the Airport, the 65 dB CNEL contour extends approximately 560 feet west of the future Airport property line (1,880 feet west of the existing Airport property line). North of the Airport, helicopter operations expand the 65 dB CNEL an average of 1,730 feet north of Central Avenue.

The 70 dB CNEL contour is actually split into two areas. The first area is located mostly within the existing Airport boundary. The exception is a narrow handle-like area that extends 750 feet northeast of Central Avenue along the planned helicopter training flight tracks. The second area creates the hole in the doughnut shaped area north of the Airport shown on Figure 10. On average, the northernmost portion of this second area extends 970 feet north of Central Avenue.

4.5 NOISE IMPACTS AND ISSUES

4.5.1 Impacts on Existing Land Use

A further breakdown of the 1989 noise impacted areas by type of land use affected is shown in Table 7. As noted in Table 7, the acreage includes local streets and therefore represents gross rather than net acres. The numbers presented for all non-airport land use types represent total acreage outside the future Airport boundary. The numbers presented in parentheses represent a breakdown by land use type of lands identified for future expansion of the Airport. To calculate total land areas affected outside the existing Airport boundary the numbers in parentheses should be added to the numbers without parentheses for each respective land use type.

Based on the criteria established by the Riverside County Airport Land Use Commission (ALUC), as described in Section 3, the commercial and industrial uses, as well as park and recreational uses are considered compatible below the 70 dB CNEL range. Residential and institutional land uses may or may not be compatible depending on whose noise compatibility standards are employed. The Federal Aviation Administration (FAA) and the Department of Housing and Urban Development (HUD) have adopted the 65 dB Ldn (approximately the 65 dB CNEL) as the threshold for

Table 7

LAND AREAS AFFECTED BY 1989 NOISE CONTOURS
(ORGANIZED BY GENERAL LAND USE TYPE)
Riverside Municipal Airport

Land Use	CNEL Values [1,2] 60 to 65		65 to 70	70+
Existing Airport	130.0		88.6	78.8
Airport Expansion Area	3.8		0.0	0.0
Low and Medium Density Residential (up to 8 du/ac)	77.5	(0.3)	0.0	0.0
High Density Residential (above 8 du/ac)	0.0		0.0	0.0
Commercial	2.0		0.0	0.0
Industrial	0.0		0.0	0.0
Institutional	12.2		4.7	0.0
Parks and Recreation	32.3		0.0	0.0
Arterial Streets Right-of-Way	10.2		4.3	1.3
Vacant	36.7	(3.5)	4.1	0.0

Notes: 1. Acreage includes local street right-of-ways and therefore represents gross acreage rather than net acreage.

2. Numbers in parentheses represent a breakdown of the acreage defined for the Airport Expansion Area by existing land use type.

Source: Aries Consultants Ltd.

residential land use compatibility. Based on these criteria, it was estimated that one house with an average population of about three persons was impacted by existing aircraft operations.

The ALUC has adopted the State Office of Noise Control standard of 60 dB CNEL as the threshold for future residential land use compatibility. The City of Riverside has also adopted this standard inrequiring acoustical studies and insulation as well as a guide for the location of residential land uses. New and existing residential units in the noise range between 60 and 65 dB CNEL are considered to be conditionally acceptable. Approximately 425 housing units with an estimated population of about 1,084 units are currently located within the area impacted by aircraft noise in the range between 60 and 65 dB CNEL.

In support of the criteria of conditional acceptability, in recent years the City of Riverside has been obtaining avigation easements for new residential developments that fall within the 60 dB CNEL or higher noise impacted areas. However, since this policy has been in force for only the last several years, the City does not have such easements for many homes in the impact areas east of the Airport, nor for some homes west of the Airport. The City also enforces standards for noise insulation with the result that interior noise levels of homes built with normal frame construction and dry wall interiors should be attenuated to the State standard of 45 dB CNEL. Again, this may have benefitted the newer residential areas west of the Airport and possibly some infill housing units. The City has also imposed a requirement that developers of residential uses in higher noise impacted areas dedicate avigation and noise easements which acknowledge the presence of the Airport and serves to warn prospective buyers that aircraft have a right to fly low over the property and to make noise.

4.5.2 Impacts on Future 2010 Land Use

Table 8 provides a further breakdown of the year 2010 Worst Case noise impacted areas by type of land use. The data represents total areas outside the future Airport boundary and uses gross rather than net acreage. The numbers in parentheses represent a breakdown by land use type of lands identified for future expansion of the Airport. To calculate total land areas affected outside the existing Airport boundary the numbers in parentheses should be added to the numbers without parentheses for each respective land use type.

All on-Airport land uses are considered compatible. Commercial and office uses outside the Airport boundary, as well as park and recreational uses, are considered compatible below 70 dB CNEL based on federal, state, and Riverside County ALUC criteria. Industrial uses are considered compatible up to 75 dB CNEL.

Table 8

LAND AREAS AFFECTED BY 2010 "WORST CASE" NOISE CONTOURS (ORGANIZED BY GENERAL LAND USE TYPE)
Riverside Municipal Airport

Land Use	CNEL Values [1,2] 60 to 65		65 to 70		70+	
Existing Airport	66.5		113.35		157.6	
Airport Expansion Area	6.5		2.8		3.0	
Low and Medium Density Residential (up to 8 du/ac)	265.9	(4.7)	4.9		0.0	
High Density Residential (above 8 du/ac)	5.6		0.0		0.0	
Commercial	34.9		6.0		4.8	
Industrial	44.2		53.6		22.7	(1.2)
Institutional	17.0		7.0		0.0	
Parks and Recreation	64.3		0.2		0.0	
Arterial Streets Right-of-Way	19.2		19.7	(7.0)	6.8	
Vacant	159.2	(1.7)	79.6	(0.8)	15.0	(1.8)

Notes:
1. Acreage includes local street right-of-ways and therefore represents gross acreage rather than net acreage.
2. Numbers in parentheses represent a breakdown of the acreage defined for the Airport Expansion Area by existing land use type.

Source: Aries Consultants Ltd.

Single and multiple family dwellings within the 60 to 65 dB CNEL noise range are conditionally acceptable land uses. It was estimated that approximately 1,546 housing units, with an estimated population of about 3,942 persons, fall within the 60 to 65 dB CNEL noise contour for the Worst Case forecast. As noted above, the City of Riverside has required avigation easements for new home construction in these conditional areas. Also the type of construction allowed must meet minimum standards for basic noise insulation which means the indoor noise levels should be attenuated to the State standard of 45 dB CNEL.

Residential and certain institutional land uses falling within the 65 dB CNEL or higher contour exceed FAA threshold limits for compatibility. It was estimated that 38 dwellings, with an associated population of about 97 persons, were likely to be noise impacted at levels exceeding 65 dB CNEL by Worst Case aircraft operations in 2010.

Although virtually all of the higher level noise impacts are located east and west of the Airport, the high levels of helicopter activity under Worst Case conditions is likely to be a source of annoyance for residential areas northeast and west of the Airport.

Helicopter operations were assumed to constitute 54 percent of all aircraft operations in the Worst Case forecast. Approximately 96 percent of all helicopter operations are training operations conducted within a fixed pattern north of the Airport, but the special characteristics of helicopter noise may increase its annoyance beyond predicted noise contours. Helicopter noise contains all of the components of propeller noise found in fixed-wing aircraft, but with one important addition - rotor or blade slap. Rotor or blade slap is a characteristic and very distinctive sound common only to helicopters. It is best described as a popping or "whup-whup" sound. With the increased use of turbine engines in helicopters, the roar of piston engines has been eliminated, and the blade slap is, therefore, more obtrusive. Whine from the turbine engines is also noticeable.

Helicopters performing training operations will follow an elliptical route generally centered to the east of the northern approach to Runway 16-34. As with other aircraft at Riverside Municipal Airport, helicopter takeoffs will be primarily to the west, with landings from the east. A helicopter generally rises from the ground at a faster rate than fixed-wing aircraft producing a smaller noise footprint on takeoff. On landing, however, the helicopter descends more gradually producing a long noise "tail". The "handle" type shape of the 70 Db CNEL contour north of the Airport (see Figure 10) is due to landing helicopters.

There are no residential land uses directly under the planned helicopter flight patterns. However, several residential units in areas northeast of the Airport fall within the 60 dB CNEL contour solely because of the helicopter operations. Also, many homes in

this same area will be able to see the helicopter operations area and are likely to be annoyed by the noise, even though the sound levels at that location may fall well below threshold values.

4.5.3 Planning Issues

Since the Airport Master Plan operations forecast was completed, the demand for helicopter training activities appears to have declined markedly. This appears to have been due to general economic conditions and increased competition for training services.

Even without the helicopters, noise levels in a portion of the vicinity planning area are likely to exceed the FAA threshold of 65 dB CNEL, if other non-helicopter operations reach forecast levels. Federally sponsored research to reduce aircraft noise at the source is not expected to have much effect on noise levels at general aviation type airports in the immediate future. While great strides have been made in reducing the noise of jet aircraft, with benefits accruing to persons living near large commercial airports, little has been accomplished in the technology to reduce the noise of general aviation piston driven aircraft. Even if a technological breakthrough were to occur, it would be many years before the benefits would be heard because the number of new general aviation aircraft being built is very small and retrofit programs are likely to be very expensive.

The major options available to local government include some or all of the following:

- Land use controls;
- Use of noise abatement procedures at the Airport. Some procedures are already in place at Riverside Municipal Airport;
- Adoption of realistic noise performance standards backed up with aggressive enforcement;
- Development of a periodic or continuous noise monitoring program to support an ongoing planning process or to support enforcement of noise performance standards;
- Development of a program to noise insulate affected properties in exchange for an avigation easement;
- Development of a program to purchase outright those properties where noise cannot be attenuated to acceptable levels.

Under current FAA criteria, the City of Riverside could seek assistance for some of these options from FAA. The range of assistance depends on the precise nature of the problem. Under Federal Aviation Regulations Part 150, the City of Riverside has applied for a planning grant to study how airport operations might be modified to reduce noise impacts. After the various operational options have been defined and approved by the FAA, other remedies such as the noise insulation or property purchase programs can be explored. It should be noted that these latter remedies would likely not be undertaken without first showing through actual measurements that the operational changes have not achieved the noise reductions anticipated, so that some degree of noise monitoring may be necessary from time to time.

This comprehensive land use plan is intended to address the range of alternatives that fall under the general heading of land use controls. In this regard, there are several vacant and developable properties located in the noise impact area to the west and north of the Airport where land use controls might prove of benefit to the City. The properties to the north are designated on the City's General Plan as industrial, which is in keeping with the current development pattern in that area. Such land uses would be compatible with the 60 to 70 dB CNEL noise levels expected in that area. Vacant properties to the west are designated for industrial and commercial uses in areas near the Airport, while areas further away are designated for residential uses or mixed residential and commercial uses. The commercial and industrial uses close in to the Airport would be fully compatible at levels up to 70 and 75 dB CNEL, respectively. Each could be conditionally acceptable at higher noise levels.

Residential development within the 60 to 65 dB CNEL noise range is conditionally acceptable and the City should continue to require noise insulation and the dedication of avigation and noise easements as conditions of approval. To the extent that a developer can arrange a particular site plan so that commercial and industrial uses are concentrated within the noise impact area and residential uses are placed outside the noise impact areas, the development would be considered compatible.

Residential development within the 65 dB CNEL or higher noise contour is incompatible and should not be allowed. However, there may be some properties within the 65 dB CNEL or higher noise contour, the size, lot configuration, and/or location of which provides no flexibility through the site planning process and for which none of the noise compatible land uses would be "neighborhood compatible". For properties with such limitations, the City of Riverside and the ALUC will need to consider an "infill" policy that may allow noise incompatible development to take place. At present, neither the City nor the ALUC have a specific infill policy.

The California Department of Transportation in its publication "Airport Land Use Planning Handbook" defined the infill concept and outlined a brief policy. Infill is the

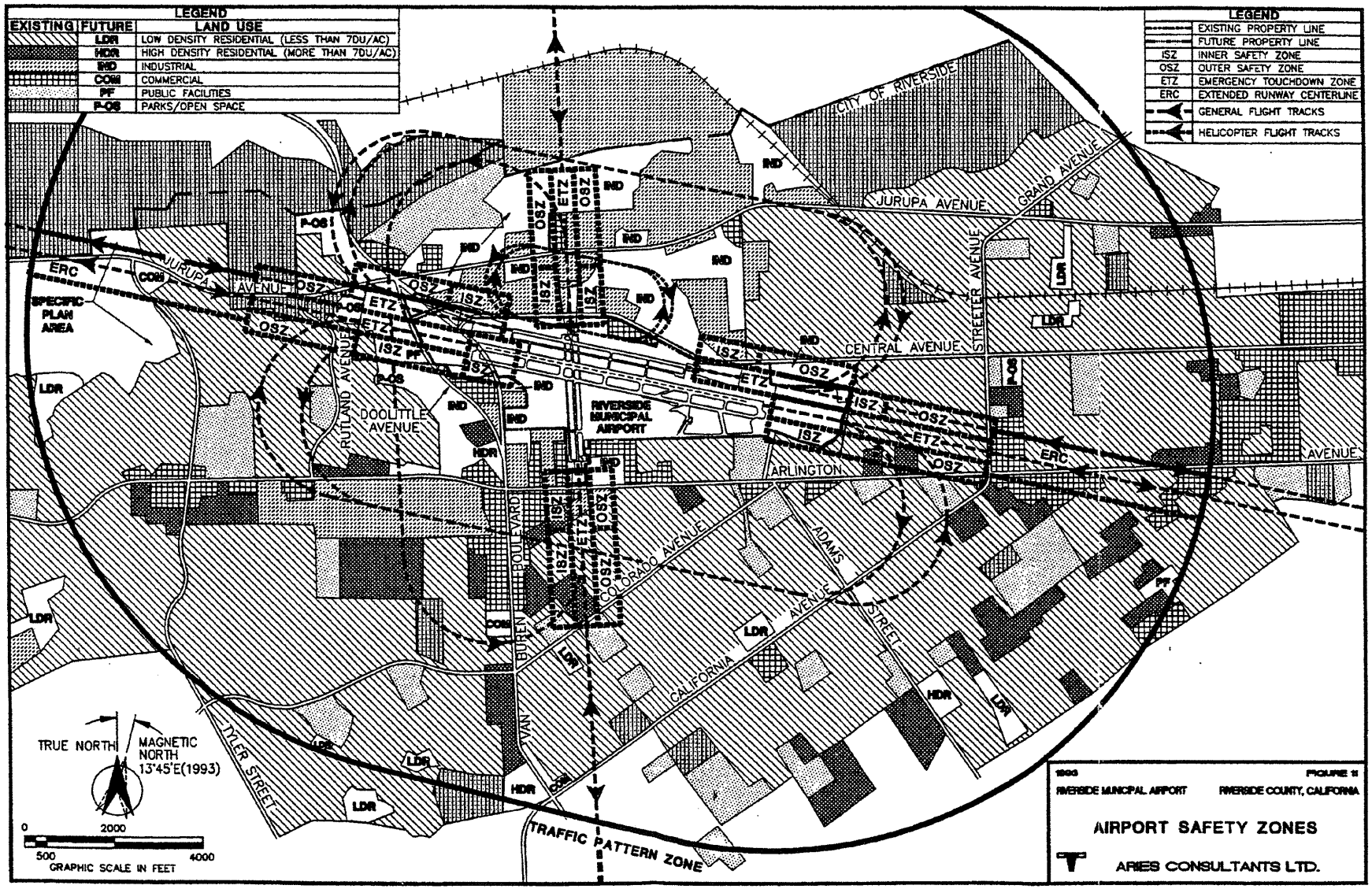
development of vacant parcels in areas that are already substantially developed for uses not ordinarily permitted by the compatibility criteria. The one policy cited permits infill in subdivided areas which are already 80 percent developed. The proposed development must be permitted under existing zoning and must be consistent with the prevailing use of the area. The following method is used to determine if a project qualifies as infill:

- A circle of defined radius is used to mark out the area within which the consistency test is to be applied. The example cited in the Handbook used a 250 foot radius. The circle (or other means of demarcating the property's influence area) should not be drawn so as to include water areas or unsubdivided land, if it is possible to draw the circle over subdivided land.

- At least 80 percent of the parcels within the influence area must be developed. The City and the ALUC could modify this percentage to some other value. The calculations for infill shall be based on the extent of development existing at the time of adoption of the plan, not at the time of the development.

- Proposed development must be consistent with the prevailing use of the surrounding area.

Such an infill policy qualification would also be applied to properties extensively damaged by fire, earthquake or other natural disaster. The infill policy qualifications might also apply to residential properties where the owners seek to make substantial improvements to the existing residential structure. Although not compatible within the 65 dB CNEL noise level, such residential units could qualify as a conditional use provided it meets increased noise insulation standards to achieve 45 dB CNEL noise levels indoors, and appropriate avigation and noise easements are dedicated to the City.


LEGEND
EXISTING FUTURE LAND USE
LDR LOW DENSITY RESIDENTIAL (LESS THAN 7DU/AC)
HDR HIGH DENSITY RESIDENTIAL (MORE THAN 7DU/AC)
IND INDUSTRIAL
COM COMMERCIAL
PF PUBLIC FACILITIES
P-OS PARKS/OPEN SPACE
LEGEND
EXISTING PROPERTY LINE
FUTURE PROPERTY LINE
ISZ INNER SAFETY ZONE
OSZ OUTER SAFETY ZONE
ETZ EMERGENCY TOUCHDOWN ZONE
ERC EXTENDED RUNWAY CENTERLINE
GENERAL FLIGHT TRACKS
HELICOPTER FLIGHT TRACKS
CITY OF RIVERSIDE
JURUPA AVENUE
GRAND AVENUE
STREETER AVENUE
CENTRAL AVENUE
ARLINGTON AVENUE
DOOLITTLE AVENUE
RUTLAND AVENUE
BURTON BOULEVARD
VAN BUREN BOULEVARD
COLORADO AVENUE
CALIFORNIA AVENUE
ADAMS STREET
TYLER STREET
SPECIFIC PLAN AREA
RIVERSIDE MUNICIPAL AIRPORT
TRAFFIC PATTERN ZONE
TRUE NORTH
MAGNETIC NORTH 13°45'E(1993)
0 2000 4000
500
GRAPHIC SCALE IN FEET
FIGURE 11
RIVERSIDE MUNICIPAL AIRPORT
RIVERSIDE COUNTY, CALIFORNIA
AIRPORT SAFETY ZONES
ARIES CONSULTANTS LTD.

Section 5.0

AIRPORT SAFETY INFLUENCE AREA ISSUES AND ALTERNATIVES

5.1 INTRODUCTION

Safety of people on the ground and in the air and the protection of property from airport-related hazards are among the responsibilities shared by the Airport owner and the Airport Land Use Commission. This section provides analysis of safety issues at Riverside Municipal Airport, defining the airport safety areas and discussing safety compatibility planning issues and alternatives.

5.2 AREAS OF SAFETY CONCERN

The general character of the Riverside County ALUC recommended airport safety zones and related land use compatibility guidelines are described in Section 3. The application of these safety zone standards at Riverside Municipal Airport takes into account the proposed parallel runway (Runway 9L-27R) and the extension of existing Runway 9-27 (future Runway 9R-27L). The results of applying these standards to Riverside Municipal Airport are illustrated on Figure 11. The safety zones for existing Runway 9-27 (future Runway 9R-27L) are based on the "Precision and Nonprecision Instrument Runway" standard discussed in Section 3.4 and illustrated earlier on Figure 7. The safety zones for Runway 16-34 and the proposed parallel Runway 9L-27R are based on the "Visual Approach Runway" standard also discussed in Section 3.4 and illustrated earlier on Figure 7.

West End of Runways 9R-27L and 9L-27R

The safety zones off the west end of existing Runway 9-27 (future Runway 9R-27L) begin 200 feet from the existing runway end and extend 11,100 feet westward. The initial 6,100 feet of these safety zones, which includes the Emergency Touchdown Zone (ETZ), Inner Safety Zone (ISZ), and Outer Safety Zone (OSZ) totals 1,500 feet wide. The 5,000 foot remainder, which includes the Extended Runway Centerline Zone (ERC), is 1,000 feet wide. Both sections are laterally centered on the extended centerline of the runway. The first 1,100 feet of these safety zones represent the future runway extension on the adopted Airport Master Plan; the remaining 10,000 feet constitutes the safety zones for the future extended runway.

The future construction of Runway 9L-27R (which necessitates relabeling existing Runway 9-27 to Runway 9R-27L) requires an additional set of safety zones that begin

200 feet from the future runway end and extend westward 3,500 feet. Due to differences in the end points of the future runway end and the lateral separation of the runways themselves, the safety zones for Runway 9L-27R overlay and expand the lateral width of the safety zones for Runway 9R-27L by 500 feet beginning at a point 617 feet from the end of the existing runway to a point 4,117 feet from the end of the existing runway. The overlaying of the safety zones has the effect of changing the designation of a 3,500-foot portion of the ISZ associated with Runway 9R-27L to the more restrictive Emergency Touchdown Zone (ETZ).

Of the 360 acres encompassed by the safety zones off the west ends of Runways 9L-27R and 9R-27L, almost 45 acres are enclosed within the existing Airport boundary. An additional 11 acres will be included within the future Airport boundary, based on the property acquisition recommendations of the recently adopted Airport Master Plan. The remaining 304 acres effect private and public lands beyond the future Airport boundary. If no additional lands are purchased for the Airport, the land area outside the existing Airport boundary affected by the ALUC safety zone standards totals 315 acres.

East End of Runways 9R-27L and 9L-27R

At the eastern end of existing Runway 9-27 (future Runway 9R-27L), the safety zones begin at a point 200 feet from the existing runway end and extend 10,000 feet eastward. The initial 5,000 feet of these safety zones include the ETZ, ISZ and OSZ, and total 1,5000 feet wide. The 5,000 foot remainder includes the ERC and is 1,000 feet wide. Both sections are laterally centered on the extended centerline of the runway.

Additional safety zones are required for Runway 9L-27R. These additional safety zones begin 200 feet from the future end of Runway 9L-27R and extend 3,500 feet eastward. They begin overlapping the safety zones for Runway 9R-27L at a point 2,018 feet from the future end of Runway 9L-27R (200 feet from the end of Runway 9R-27L) and continue overlapping for an additional 1,682 feet. In the overlap area, that portion of the ISZ associated with Runway 9R-27L is changed to the more restrictive ETZ.

The total area encompassed by the safety zones off the east ends of Runways 9L-27R and 9R-27L is 348 acres. Of these, about 44 acres are enclosed within the existing Airport boundary and an additional 3-plus acres are included within the future Airport boundary, if improvements follow the Airport Master Plan. The remaining 301 acres fall outside the future Airport boundary. If no additional lands are purchased for the Airport, the land area outside the Airport boundary affected by the ALUC safety zone standards is about 304 acres.

Runway 16-34

The safety zones off both the north and south ends of existing Runway 16-34 begin 200 feet from the existing physical end of the runway and extend outward 3,500 feet at a width of 1,500 feet centered on the extended runway centerline. Each safety zone area contains three subareas, the ETZ, ISZ and OSZ. Very little acreage encompassed by these safety areas at either end of this runway currently fall within the Airport boundary. Of the 121 acres within the safety zones at each end of the runway (a total of 242 acres), only about 10 acres on the north end and less than 3 acres on the south end are within the Airport boundary. Airport improvement plans would increase the acreage within the Airport boundary to over 111 acres on the north end. No additional land would be acquired on the south end. Remaining areas outside the Airport boundary are 11 acres on the north end and a little over 118 acres on the south end.

5.3 SAFETY ISSUES

In determining the impact of these safety zones on land use compatibility in the area surrounding Riverside Municipal Airport, it is necessary to compare the safety zone boundaries and associated land use compatibility guidelines, presented earlier in Table 4, with the future land use plan and existing zoning. The impacts presented in the following subsections address only the safety zones and compatibility guidelines discussed in Section 3.4. Alternatives to the proposed zones and guidelines are presented in Section 5.4.

5.3.1 Inner Safety Zone

Based on the standards established by the Riverside County ALUC, the Inner Safety Zone (ISZ) is intended to be very restrictive due to its proximity to the runway. The ISZ standards allow no structures, no above-ground powerlines, nor the storage of petroleum or explosives.

West End of Runways 9R-27L and 9L-27R

Due to spacing of these parallel runways, there is only one ISZ associated with Runway 9R-27L, located on the south side of this cluster of safety zones, and only one ISZ associated with Runway 9L-27R located on the north side of this cluster of safety zones.

The ISZ associated with Runway 9R-27L is 500 feet wide, 3,600 feet long, and encompasses just over 41 acres. Within the first 1,100 feet of this safety zone, which encloses less than 13 acres, much of the impacted area falls within the existing Airport boundary and will be used for the westward extension of Runway 9R-27L, as

recommended in the adopted Airport Master Plan. The Van Buren Golf Center, which is located on Airport property, falls within this area and is recommended to be relocated. That portion of this 1,100 foot section that lies outside the Airport boundary affects vacant industrial land east of Van Buren Boulevard (zoned M-P) and at least one existing commercial structure south of Morris Street on the west side of Van Buren Boulevard (zoned M-1). Neither the existing commercial uses nor the future industrial use meets the ALUC compatibility criteria for this safety zone.

Once Runway 9R-27L is extended, the ISZ will shrink by 1,100 feet. Except for the Van Buren Golf Center, the properties described above that currently would fall within this 1,100 foot section of the ISZ will no longer be impacted. The principal Airport related controlling mechanisms will become the building restriction line (see the Airport Master Plan, Figure 4, presented earlier) and FAR Part 77 imaginary surfaces (see discussion in Section 6).

The portion of the ISZ that remains after Runway 9R-27L is extended encloses almost 29 acres, and its dimensions conform to ALUC guidelines (2,500 feet long, 500 feet wide). This remaining ISZ area impacts some existing commercial development along the east side of Doolittle Avenue zoned M-1, a portion of an industrial facility west of Doolittle Avenue zoned M-P, vacant lands further to the west zoned M-P and O, and at its extreme western end at least eight single family properties zoned R-1-65. None of the existing land uses nor any of those allowed under existing zoning are compatible with ALUC criteria for this zone.

The summary table below illustrates the areas affected by this ISZ:

ISZ associated with Runway 9R-27L, West End

Land Use	Acreage (estimated)
Within Existing Airport	13.0
Within Recommended Airport Development Area	1.4
Total Within Future Airport	14.4
Single Family Residential	4.8
Retail & Office Commercial	3.2
Major Street ROW	4.4
Vacant	14.5 (1.4)
Total Acreage	41.3

The ISZ associated with Runway 9L-27R is 500 feet wide, 1,320 feet long, and encompasses approximately 15 acres. As shown in the summary table below, virtually all of this area lies outside the existing Airport boundary and overlays relatively new existing industrial development north of Central Avenue. One existing industrial plant and part of another fall within this area. This existing industrial development is not compatible with the ALUC's standards. A very small area of vacant industrial land also falls within this zone. The General Plan proposes industrial uses for this area and current M-P zoning thus promotes incompatible uses for vacant parcels.

ISZ associated with Runway 9L-27R, West End

Land Use	Acreage (estimated)
Within Existing Airport	0.1
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.1
Industrial	14.9
Vacant	0.2
Total Acreage	15.2

East End of Runways 9R-27L and 9L-27R

The spacing of these parallel runways creates a situation at the east end of these runways where there are two ISZ sections associated with Runway 9R-27L and only one ISZ section associated with Runway 9L-27R.

The ISZ associated with Runway 9R-27L consists of two areas. The larger area located on the south side of this cluster of safety zones is 500 feet wide, 2,500 feet long, and encompasses almost 29 acres. The second area is the remainder section of the ISZ that is overlayed by the ETZ of the parallel Runway 9L-27R. This remainder area is 818 feet long, 500 feet wide, and encompasses over 9 acres. About one-third of this two-section zone (over 9 acres) falls within the existing Airport boundary. Excluding major arterial rights of way, the remainder of the area consists of single family residential development, which is not compatible with the ALUC's criteria for this safety zone.

Based on an average density of 5.7 dwellings per gross acre, it is estimated that as many as 154 single family dwellings fall within the 27 acres impacted by these two

ISZ sections. Approximately 22 additional multiple family units may fall within these areas, based on an average density of 13 dwelling units per gross acre.

Approximately 3 acres of this single family development falls within the Airport's future development area. The Airport Master Plan recommended these lands be purchased to complete development of the Runway Protection Zone (RPZ) for Runway 9R-27L. The RPZ is a trapezoidal shaped area beginning 200 feet from the end of a runway and centered on the extended runway centerline. The dimensions of the RPZ are based on the type of approach to the runway and the size of aircraft using the runway. The RPZ is FAA's minimum requirement for safety at the end of a runway.

ISZ associated with Runway 9R-27L, East End

Land Use	Acreage (estimated)
Within Existing Airport	9.3
Within Recommended Airport Development Area	3.2
Total Within Future Airport	12.5
Single Family Residential	23.8 (3.2)
Multiple Family Residential	1.7
Arterial Street ROW	0.1
Total Acreage	38.1

The ISZ associated with Runway 9L-27R, located on the north side of this cluster of safety zones is 500 feet wide, 1,320 feet long, and encompasses approximately 15.15 acres. As shown in the summary below, less than one acre falls within the Airport. Outside the Airport boundary, this ISZ area impacts industrial and residential lands north of Central Avenue. One existing industrial plant, and about 9 existing single-family homes fall within this zone. The remainder of the impacted area is vacant. Much of the existing impacted industrial property consists of parking areas, although a portion of the plant building falls within the zone. None of these existing uses are compatible with the criteria suggested by the ALUC. The vacant lands are zoned M-P for industrial development and would create additional incompatible uses when developed.

ISZ associated with Runway 9L-27R, East End

Land Use	Acreage (estimated)
Within Existing Airport	0.8
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.8
Single Family	2.5
Industrial	7.8
Arterial Street ROW	1.3
Vacant	2.8
Total Acreage	15.2

Runway 16-34

Each end of Runway 16-34 has two ISZ zones flanking the emergency touchdown zone. Each of the four ISZ sections is 500 feet wide and 1,320 feet long, encompassing a little more than 15 acres. The total area affected at each runway end is 30.3 acres. At the north end of the runway, the ISZ areas overlay primarily existing industrial development and vacant lands located north of Central Avenue. Four existing industrial plants fall within these zones. The remaining vacant lands are zoned M-P, which can be developed with industrial uses. The table below summarizes the affected acreage.

ISZ's associated with Runway 16-34, North End

Land Use	Acreage (estimated)
Within Existing Airport	4.3
Within Recommended Airport Development Area	0.0
Total Within Future Airport	4.3
Industrial	16.5
Arterial Street ROW	1.7
Vacant	7.7
Total Acreage	30.3

At the south end of the Runway 16-34, the ISZ sections fall totally outside the Airport boundary. These zones impact existing commercial and industrial land uses along Arlington Avenue, as well as single and multifamily residential uses further south. An approximation of the acreages affected are presented below. Assuming an average density of 5.7 dwellings per gross acre for single family uses and 13 dwellings per gross acre for multiple family uses, approximately 115 housing units are impacted. None of these land uses are compatible with ISZ safety criteria.

ISZ sections associated with Runway 16-34, South End

Land Use	Acreage (estimated)
Within Existing Airport	0.0
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.0
Single Family Residential	8.0
Multiple Family Residential	5.3
Retail & Office Commercial	6.2
Industrial	4.9
Arterial Street ROW	1.7
Vacant	4.2
Total Acreage	30.3

5.3.2 Outer Safety Zone

Based on the ALUC's land use compatibility guidelines presented earlier in Table 4, several kinds of land uses should be prohibited in the Outer Safety Zone (OSZ), including residences, hotels or motels, restaurants and bars, various public assembly uses, and industries with flammable materials. Limits on the number of persons per acre and per building are advised (specifically: concentrations above 25 persons per acre, or above 150 persons per structure). Places of public assembly include schools, hospitals, government services, concert halls, auditoriums, stadiums, and arenas. The definition of public assembly also embraces any use that might serve as a constant attraction for large groups of persons, such that the above population concentration standards are exceeded.

West End of Runways 9R-27L and 9L-27R

- Due to the spacing between these parallel runways, three separate OSZ areas are created. The OSZ associated with Runway 9R-27L appears as two areas, while the third area is associated with Runway 9L-27R.

  The two OSZ areas associated with Runway 9R-27L are of different dimensions because the length of the northerly area is shorten by the Emergency Touchdown Zone of Runway 9L-27R. This northerly area is about 2,183 feet long, 500 feet wide, and encompasses approximately 25 acres. By contrast, the southerly area is 2,500 feet long, 500 feet wide, and encompasses about 29 acres. The summary table below combines the two areas.

OSZ associated with Runway 9R-27L, West End

Land Use	Acreage (estimated)
Within Existing Airport	0.0
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.0
Single Family Residential	32.6
Recreational/Open Space	14.5
Arterial Street ROW	4.3
Vacant	2.3
Total Acreage	53.7

  Evident in the above summary is the fact that considerable single family development is impacted. Based on an average density of 5.7 units per gross acre, it is estimated that approximately 185 existing dwelling units fall within these zones. Single family development is not compatible based on the ALUC's criteria. A considerable acreage of recreational and open space type land uses also falls within these two OSZ areas. Such uses are generally compatible unless they are used in such a way as to be considered places of public assembly (concentrations above 25 persons per acre, or above 150 persons per structure).

- The vacant land is currently zoned RA-5 and may be developed as part of a specific plan. The RA-5 zone allows development with a minimum lot size of 5 acres, so under existing zoning, approximately one dwelling could be built in this area. An

additional number of homes might be allowed under specific plan provisions. Based on the ALUC's safety criteria, residential uses should not be allowed within the area impacted by these safety zones. Compatible industrial or commercial development placed within these zones should meet the population density criteria suggested by the ALUC guidelines. This can be accomplished by orienting industrial and commercial development so that warehousing or other low population density functions fall within the impacted areas.

The OSZ associated with Runway 9L-27R begins at a point 1,520 feet from the future end of this runway. It extends an additional 2,180 feet at a width of 500 feet encompassing just over 25 acres. The intersection of Jurupa Avenue and Van Buren Boulevard falls within this zone. The City's General Plan indicates that Jurupa Avenue will ultimately be extended westward to link with sections of this road already constructed. As a result, a large portion of this safety zone is dedicated to arterial street rights of way, as noted in the summary table below.

OSZ associated with Runway 9L-27R, West End

Land Use		Acreage (estimated)
Within Existing Airport		1.0
Within Recommended Airport Development Area		0.0
Total Within Future Airport		1.0
Retail & Office Commercial		0.8
Industrial		2.3
Arterial Street ROW		3.4
Vacant		17.6
Vacant Single Family Residential -	2.5	
Vacant Industrial -	15.1	
Total Acreage		25.0

As noted in the table above, about 70 percent of this safety zone is currently vacant land zoned for industrial and medium density single family residential uses. The impacted future residential area is about 2.5 acres in size and, if developed, might yield about 14 residential units. Such uses in that area would be incompatible based on the ALUC's safety criteria. Due to the size of the vacant area, this incompatibility

could be avoided by incorporating various qualifying open space uses in the conflicting area and shifting the residential uses further north, perhaps at a higher density.

The vacant industrial area is quite large and such a future use is generally compatible in this zone. One existing industrial facility falls within this safety zone. If the future industrial uses employ flammable materials in their manufacturing processes, they could be incompatible. It is not know if the existing plant uses flammable materials in sufficiently large enough quantities, or stores what flammable materials they do use in such a way as to be considered incompatible.

The commercial land uses impacted by this OSZ area are north of Jurupa Avenue and east of Van Buren Boulevard. A commercial use in this area is generally compatible if population density limits are not exceeded. None of the existing structures on affected commercial properties fall within the safety zone, thus population density is not an issue and these uses are compatible.

East End of Runways 9R-27L and 9L-27R

Due again to the spacing between these parallel runways, three separate OSZ areas are created: two are associated with Runway 9R-27L and one is associated with Runway 9L-27R.

The two OSZ areas associated with the east end of Runway 9R-27L have the same dimensions. Each area is 2,500 feet long, 500 feet wide, and encompasses just under 29 acres. The total area for the two zones is just over 57 acres. The summary table below combines the two areas.

OSZ associated with Runway 9R-27L, East End

Land Use	Acreage (estimated)
Within Existing Airport	0.0
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.0
Single Family Residential	45.8
Multiple Family Residential	6.2
Retail & Office Commercial	2.6
Recreational / Open Space	≤0.1
Arterial Street ROW	2.7
Total Acreage	57.4

Single family residential uses predominate in this impacted area. Multiple family residential uses are also impacted. Based on an average gross density of 5.7 single family dwellings per acre and 13 multiple family dwellings per acre, approximately 342 dwellings fall within these zone areas. None of these residential uses are compatible with the criteria established by the ALUC. The commercial and recreational/open space uses are compatible provided they do not exceed the population density criteria. There are very few, if any, vacant lots and no large developable properties in these two impact areas.

The OSZ associated with Runway 9L-27R begins at a point 1,520 feet from the future end of this runway. It extends an additional 2,180 feet at a width of 500 feet encompassing just over 25 acres. The summary table below shows that the major impacts of this zone are confined to a small area of existing single family development along Central Avenue. Approximately 24 dwelling units may be within this area based on a gross density of 5.7 dwellings per acre.

OSZ associated with Runway 9L-27R, East End

Land Use	Acreage (estimated)
Within Existing Airport	1.1
Within Recommended Airport Development Area	0.0
Total Within Future Airport	1.1
Single Family Residential	4.2
Arterial Street ROW	2.6
Vacant	17.1
Total Acreage	25.0

The largest area affected within this zone area is vacant land located south of Central Avenue. This land is zoned for industrial uses, which are compatible under the ALUC's criteria for this zone.

Runway 16-34

Based on the visual approach standard there are two OSZ safety areas at each end of Runway 16-34. Each of the four OSZ areas associated with this runway begins at a point 1,520 feet from the existing physical end of this runway. It extends an additional 2,180 feet at a width of 500 feet encompassing just over 25 acres. The inner edge of these zones are located 250 feet to either side of the runway centerline, as extended.

The summary table below shows there are no major impacts in this zone at the north end of the runway. Impacted lands include existing commercial and industrial

development along Jurupa Avenue and vacant land further north toward the City's boundary and the Santa Ana River. The vacant lands are currently zoned M-P, which allows continuing industrial development. All of the existing and future uses are compatible with the ALUC's guidelines for this safety zone.

OSZ associated with Runway 16-34, North End

Land Use	Acreage (estimated)
Within Existing Airport	0.0
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.0
Retail & Office Commercial	2.9
Industrial	14.9
Arterial Street ROW	1.7
Vacant	30.6
Total Acreage	50.1

At the south end of Runway 16-34 there is considerably greater impact as shown by the table below. Existing residential development (both single family and multiple family) occupies more than 92 percent of the land area within these zones. These are not compatible uses. Using the assumed average densities of 5.7 dwellings per acre for single family and 13 dwellings per acre for multiple family, approximately 325 residential units are impacted in these two sections. Institutional uses along Colorado Avenue also fall within these areas and may or may not be compatible depending on the population density within existing structures. There are very few, if any, vacant lots and no large developable properties in these two impact areas.

OSZ associated with Runway 16-34, South End

Land Use	Acreage (estimated)
Within Existing Airport	0.0
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.0
Single Family Residential	37.9
Multiple Family Residential	8.4
Institutional/Public	2.7
Arterial Street ROW	1.1
Total Acreage	50.1

5.3.3 Emergency Touchdown Zone

The Emergency Touchdown Zone (ETZ) is a narrow band of land which allows the pilot to set an aircraft down in an emergency just after takeoff or on approach. No structures and no significant obstructions should be permitted within the ETZ, based on the ALUC's guidelines presented in Section 3.

West End of Runways 9R-27L and 9L-27R

The ETZ associated with Runway 9R-27L is 6,100 feet long and 500 feet wide encompassing just over 70 acres. The table summarizes the land uses impacted.

ETZ associated with Runway 9R-27L, West End

Land Use	Acreage (estimated)
Within Existing Airport	4.3
Within Recommended Airport Development Area	17.2
Total Within Future Airport	21.5
Single Family Residential	7.3
Recreational/Open Space	16.7
Arterial Street ROW	4.4
Vacant	20.1 (17.2)
Total Acreage	70.0

About 6 percent of this zone is contained within the existing Airport boundary and future development of the Airport is expected to increase the amount to almost 31 percent. Much of the existing vacant land lies just beyond the existing Airport boundary and is currently zoned M-1, M-P, or O. Either of these categories would allow incompatible development. Further away from the Airport boundary the zone impacts single family residential areas and recreational land uses. The recreational land uses are compatible if person density standards are not exceeded. The residential development is incompatible and although it is located no closer than 1,500 feet from the end of the future runway (over 3,200 feet from the existing runway end), these dwellings are at greater risk than in the other types of safety zones. Approximately 42 residential units may fall within this ETZ boundary, based on an average density of 5.7 dwellings per acre.

The ETZ associated with Runway 9L-27R is 500 feet wide and 3,500 feet long. This area is shorter than that for Runway 9R-27L due to the type of approach to the runway. Beginning at a point 1,062 feet from the physical end of the runway, this safety zone begins to overlay an ISZ area associated with Runway 9R-27L. The

overlay area extends to a point 3,700 feet from the runway end, which is the normal end point for the ETZ. Because ETZ criteria is more restrictive than ISZ criteria, ETZ criteria governs throughout the overlap area. Based on its dimensions, the ETZ encompasses just over 40 acres. The table summarizes the land uses impacted.

ETZ associated with Runway 9L-27R, West End

Land Use	Acreage (estimated)
Within Existing Airport	11.0
Within Recommended Airport Development Area	6.8
Total Within Future Airport	17.7
Arterial Street ROW	7.2 (5.6)
Vacant	15.2 (1.2)
Total Acreage	40.2

A large part of the ETZ lies within the existing Airport boundary. An additional small amount of currently vacant land is recommended to be part of the Airport's future development area. A large part of this ETZ is also dedicated to either existing or future arterial streets. Van Buren Boulevard, Doolittle Avenue (which will become realigned Van Buren Boulevard) and portions of existing and future realigned Central Avenue traverse this zone. The remainder of the zone is currently vacant land variously zoned M-1, M-P, and O. If allowed to develop in these or any other uses, any resultant population inside these structures would be at great risk.

All or portions of these lands could be developed under specific plan or planned development provisions creating the opportunity to allow development of the properties without placing structures within this safety zone. Since other adjacent safety zones have similarly severe requirements, the property owners would need to work closely with the City and, if necessary the ALUC, in developing these properties. ETZ criteria can be met by providing a passive open space corridor coincidental with the boundaries of the ETZ. If necessary to obtain no development in the ETZ, the City should also consider a transfer of development rights from this impacted area to other non-impacted developable properties in the City.

East End of Runways 9R-27L and 9L-27R

The ETZ associated with Runway 9R-27L lies adjacent to the ETZ area described above. The ETZ for this runway is 5,000 feet long, 500 feet wide, and encloses over 57 acres. About 32 percent of this area (about 18 acres) is part of the existing Airport. Proposed Airport development will add almost 3 acres of land through conversion of existing single family land uses. Single family land uses are the

predominant land use outside the Airport encompassing a total of almost 41 acres. Based on an average density of 5.7 dwellings per gross acre, approximately 217 dwellings may be located in this area. A very small section of existing multiple family development is also touched by this zone, but no units appear to be impacted. A very small section of existing retail commercial property at the far end of the zone is also affected. A summary of the acreages impacted is shown below.

ETZ associated with Runway 9R-27L, East End

Land Use	Acreage (estimated)
Within Existing Airport	18.3
Within Recommended Airport Development Area	2.8
Total Within Future Airport	21.1
Single Family Residential	35.4 (2.8)
Multiple Family Residential	≤0.1
Retail & Office Commercial	0.2
Arterial Street ROW	0.7
Total Acreage	57.4

The ETZ associated with the east end of Runway 9L-27R is 500 feet wide and 3,500 feet long encompassing a little more than 40 acres. Beginning at a point 1,062 feet from the physical end of the runway this safety zone begins to overlay an ISZ area associated with Runway 9R-27L. The overlay area extends to a point 3,700 feet from the end of Runway 9L-27R, which is the normal end point for the ETZ. The more restrictive ETZ criteria governs throughout the entire area. Land uses impacted by this zone are summarized below.

ETZ associated with Runway 9L-27R, East End

Land Use	Acreage (estimated)
Within Existing Airport	14.5
Within Recommended Airport Development Area	3.3
Total Within Future Airport	17.8
Single Family Residential	2.1 (2.1)
Vacant	20.3 (1.1)
Total Acreage	40.2

Only one single family dwelling is impacted by the criteria for this zone. The remainder of this ETZ area is either vacant or already part of the Airport. The vacant areas are zoned M-P, R-1-65 and YS. Any development in this ETZ area would be considered incompatible.

Runway 16-34

The ETZ area at the north end of Runway 16-34 is 3,500 feet long and 500 feet wide with an enclosed area of a little over 40 acres. Based on recommendations in the Airport Master Plan, the City recently purchased a portion of this ETZ area lying between Central Avenue northward to the industrial spur railroad. The remainder of this ETZ area includes existing commercial and industrial development with a large area of vacant land zoned M-P for manufacturing or industrial uses. The acreage of the various uses are summed below. All of these uses are, or would be, incompatible with the ALUC's criteria for this safety zone. Because of the higher risk associated with this area, developers of vacant lands and the City should work together to focus open space uses in the ETZ and cluster new industrial structures outside this area.

ETZ associated with Runway 16-34, North End

Land Use	Acreage (estimated)
Within Existing Airport	5.4
Within Recommended Airport Development Area	1.6
Total Within Future Airport	7.0
Retail & Office Commercial	4.6
Industrial	14.7 (1.6)
Arterial Street ROW	1.7
Vacant	12.2
Total Acreage	40.2

The impact of the ETZ area at the south end of Runway 16-34 is much greater. The size of the ETZ and enclosed area is identical to that at the north end of this runway. The enclosed land uses, however, are predominantly residential as noted in the summary below. Very little of this zone falls within the existing Airport boundary and no additional Airport development is planned within this zone.

ETZ associated with Runway 16-34, South End

Land Use	Acreage (estimated)
Within Existing Airport	2.7
Within Recommended Airport Development Area	0.0
Total Within Future Airport	2.7
Single Family Residential	21.8
Multiple Family Residential	7.3
Retail & Office Commercial	1.2
Industrial	4.1
Institutional and Public	1.4
Arterial Street ROW	1.7
Total Acreage	40.2

Based on an average single family density of 5.7 dwelling units per acre and an average multiple family density of 13 units per acre, approximately 207 residential units may be impacted in this zone. Impacted commercial development is located on the south side of Arlington Avenue and consists of storage facilities and several retail stores. Impacted institutional or public lands are located at the far south end of the zone and consist of portions of a public school facility.

5.3.4 Extended Runway Centerline Zone

The Extended Runway Centerline Zones (ERC) applies only off the ends of precision or non-precision instrument runways, or runways serving jet aircraft. Each zone is 1,000 feet wide and extends 5,000 feet outward from the end of the ETZ encompassing almost 115 acres. Although an instrument approach can be used in good weather, the risk associated with this zone occurs when aircraft are using the instrument approach in bad weather or during periods of poor visibility. Land uses involving large concentrations of people or encouraging public assembly should be discouraged. Housing density limits of 3 dwelling units per net acre and person density limits of 75 persons per acre or 300 persons per building are recommended by the ALUC's standards for this zone.

West End of Runway 9R-27L

The ERC at the west end of Runway 9R-27L begins at a point 6,300 feet from the end of existing Runway 9-27 and extends westward to beyond the City limits

northwest of the Airport. Impacted lands include single family residential areas, recreational lands, and vacant lands which are proposed as five-acre residential lots in the General Plan. All of these uses are compatible if population densities are sufficiently low. A breakdown of the respective acreage are provided below.

ERC associated with Runway 9R-27L, West End

Land Use	Acreage (estimated)
Within Existing Airport	0.0
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.0
Single Family Residential	35.5
Recreational/Open Space	23.2
Arterial Street ROW	5.0
Vacant	51.1
Total Acreage	114.8

Approximately 202 existing dwelling units fall within the ERC zone based on an average density of 5.7 dwelling units per gross acre. If the vacant lands (exclusive of future arterial roads - about 7.6 acres) are developed in five-acre lots in accordance with existing zoning, approximately 9 new dwellings would be added to the above number, producing 211 total units. At higher densities similar to existing developments (5.7 dwelling units per acre), approximately 248 homes would be added to the zone for a total of about 450 dwellings. At a density of 3 dwelling units per net acre (the ALUC standard) where the difference between net and gross is about 15 percent, the gross density would be 2.6 dwellings per acre producing about 113 new dwellings in this zone, for a total of about 315 dwellings.

East End of Runway 9R-27L

The ERC at the east end of Runway 9R-27L begins at a point 5,200 feet from the end of the existing Runway 9-27 and extends 5,000 feet to the edge of the horizontal surface. Arlington Avenue passes diagonally through this zone. Other principal land uses are single family residential and retial/office commercial as shown by the acreage below. At an average density of 5.7 dwellings per acre, there are approximately 364 single family dwellings within this ERC zone. The commercial development includes both office and retail functions lying along both sides of Arlington Avenue. Based

on the ALUC's criteria, the dwelling unit density is too high and in certain of the commercial uses the person density limits are likely to be exceeded, making these uses incompatible from a safety perspective.

ERC associated with Runway 9R-27L, East End

Land Use	Acreage (estimated)
Within Existing Airport	0.0
Within Recommended Airport Development Area	0.0
Total Within Future Airport	0.0
Single Family Residential	63.9
Multiple Family Residential	0.2
Retail & Office Commercial	43.0
Arterial Street ROW	7.7
Total Acreage	114.8

5.3.5 Traffic Pattern Zone

The Traffic Pattern Zone (TPZ) corresponds to the FAR Part 77 definition for the horizontal surface (see discussion in Section 6). Industries using flammable products and places of public assembly, including schools, hospitals, government services, concert halls, auditoriums, stadiums, arenas, as well as any use that might serve as a constant attraction for large groups of persons are to be discouraged. The horizontal surface for Riverside Municipal Airport encompasses an area of 10,380 acres.

The general pattern of flight tracks after construction of the parallel runway were shown earlier on Figure 3. Risks associated with the approach and departure tracks are essentially addressed by the previously discussed safety zones (ETZ, ISZ and OSZ). The TPZ primarily addresses the "racetrack" pattern, which represents aircraft circling around the Airport. Within the TPZ, it is the area under these circling flight tracks where the above listed land uses are most exposed to accident risk.

Most, if not all, of the land uses listed above are considered to be "institution" or "public" type uses. There are at least two or three City educational facilities that could be considered to be located under the flight tracks.

Approximately 15 percent of accidents are likely to occur in the traffic pattern and within 1 mile of the airport, based on research reported in CalTrans Airport Land Use

Planning Handbook (see Reference 4). This percentage excludes the immediate approach and departure areas which are primarily addressed by the other safety zones.

The desirable solution is to phase out these uses over time and relocate them outside the flight track impact areas. This is not practical because these uses serve the immediate neighborhoods in which they are located. An alternative would be to shift certain of the traffic patterns around or away from these uses because they are occupied continuously, or on a daily basis. If the City obtains an FAA Part 150 grant to study aircraft noise, one aspect of the analysis addresses how operations can be changed to reduce the noise impacts (see discussion under Section 4). The study findings could address how the changed operations reduce both the noise and accident risk at these critical land uses.

Since public and institutional land uses in the flight track impact areas are already established, future land use controls should focus on preventing further development of such incompatible uses. A 1,000 foot wide corridor centered under the traffic pattern flight tracks is a recommended area within which new hospitals, nursing homes, schools, and other similar institutional and public land uses should be restricted.

5.3.6 Summary of Issues in Safety Zones

The preceding discussion indicates that there is considerable existing development within the safety zone areas defined by the Riverside County ALUC criteria. If vacant lands are allowed to develop in accordance with existing zoning there will be considerable more development in areas considered to be of high risk relative to aircraft accidents. One purpose of the CLUP is to establish land use controls that do not create new safety risks and, if possible, reduce the risks that already exist.

Possible alternatives range from one extreme that focuses on maximizing public safety to the opposite extreme which focuses on minimizing public risk. Clearing existing development from the areas defined by these safety zones and restricting any further development from encroaching within these areas is the most desirable solution from the perspective of maximizing public safety. A workable solution needs to be found that balances public safety protection and the exposure to risk.

Some minor adjustments to the safety zones are also possible. For example, the ETZ and OSZ areas east of Runway 9R-27L could be adjusted slightly so that this outer boundary is coterminous with the right-of-way for Streeter Avenue. The outer boundaries of the ETZ and OSZ south of Runway 16-34 could also be made coterminous with the right-of-way for Colorado Avenue. The boundaries for all the

other zones would require a move significant adjustment, thereby defeating the true purpose of these zones, which is to identify areas where Airport operations pose a higher risk.

There are potential Airport operational changes that could be made, but these need to be considered within the broad spectrum of FAA regulations, airspace utilization and control, and a myriad of other factors that influence where aircraft fly. As opportunities arise in various Airport-related studies, the City could specify that safety-related issues also be examined.

There are also land use control measures that could be instituted to insure that the overall level of risk is not increased as the remainder of the Airport vicinity develops over the next 20 years. Some of these alternatives are discussed in the next section.

5.4 POTENTIAL LAND USE MEASURES

The major alternatives include some or all of the following:

- Adopt the ALUC standards for safety zones and land use compatibility.
- Develop a program to purchase existing safety-impacted lands.
- Establish criteria to determine under what circumstances or conditions the City and ALUC would allow normally-incompatible development - an "infill" policy with respect to safety zone impacts.

The ALUC's standards for safety generally reflect those identified by the California Department of Transportation in its Airport Land Use Planning Handbook. The standards reflect the measure of risk and while the standards could be altered administratively, the level of risk is far more difficult even to influence, much less change. Risk depends in part on human behavior and in part on the physical behavior of machines, both of which are known to fail on occasion, typically for reasons that are only discovered after the fact.

The fact that much of the area surrounding Riverside Municipal Airport is already developed presents a difficult choice for decision makers. Through land use controls alone, it will take a very long time, if ever, to achieve the desired safety standards. Many of the residential areas west of the Airport are relatively new and without outside influences will probably remain as residential areas for 40 to 60 years or longer. Applying the ALUC safety standards will introduce an element of change into the neighborhoods impacted by the various safety zones, since the compatibility criteria are designed to reduce human habitation in the safety zones. To the extent

that human habitation can be reduced without disrupting established neighborhood patterns provides the basis for necessary tradeoffs between protecting the public safety and reducing risk exposure.

The ALUC criteria are best applied to undeveloped lands where there is opportunity to design neighborhoods around the safety zone requirements, such as in the large currently vacant areas immediately west of the Airport. The application of safety zone criteria is also best applied to land use areas that for the most part are already compatible with the standards, such as in the manufacturing and industrial areas north of the Airport.

With regard to a policy for undeveloped lands, the following are recommended:

- Permitted uses shall be per the Zoning Ordinance, which in turn shall be as consistent as practical with the Land Use Element of the City's General Plan. The General Plan shall reflect the parameters of this Comprehensive Land Use Plan as closely as practical, but will also consider the existing development and property division patterns.

- Any land division for single family residential development purposes shall take into account the need for Airport-compatibility and the density approved may be less than that of already developed property in the surrounding neighborhood in the same zone.

- Developers of undeveloped property are encouraged to employ planned development or specific plan provision in safety zone impact areas, if the resulting design can achieve ALUC goals as expressed in this plan and the City's goals as expressed in the Land Use Element of the General Plan. In addition, developers should also be required to grant the City avigation and noise easements.

However, even in the mostly compatible industrial areas north of the Airport, and certainly in the mostly incompatible residential areas to the east, west and south, the application of ALUC standards could either make the property unusable or would introduce new land uses that are safety compatible but not with existing and planned future land use patterns. Where such conditions exist, the ALUC and the City need to define an infill policy.

"Infill" is the development of vacant or underutilized property in areas that are already substantially developed for uses not ordinarily permitted by the standard compatibility criteria. An infill policy would also be applied to affected properties extensively

damaged by fire, earthquake or other natural disaster, and to properties where the owners seek to make substantial improvements to established structures and land uses.

With regard to an infill policy, the following are recommended:

- The remodeling, expansion, or replacement of existing uses normally permitted as a matter of right by the zoning ordinance may be permitted within the confines of the existing parcel on which the use is located.

- Single family residences may be established on any undeveloped existing lot that is already property zoned and configured.

- The establishment or expansion of high-risk uses or places of public assembly, as defined by the ALUC, which requires a conditional use permit will not normally be permitted.

There are situations where public funds should be expended to extinguish development rights, because the property owner cannot use the property due to various Airport-related restrictions. This is particularly true in the Runway Protection Zone (RPZ) areas off each end of each runway. Runway Protection Zones (formerly called Clear Zones) are safety areas established by the Federal Aviation Administration (FAA) for protection of people and property on the ground. The RPZ areas at Riverside Municipal Airport are the trapezoidal areas shown off each runway end on Figure 11. FAA policy is that the Airport owner/operator have sufficient interest to control the use of lands in the RPZ areas. The Airport Master Plan recommended that most, if not all, of these RPZ areas be acquired by the City. Limited funds are available from FAA on a priority basis and the City has in place a long-term program to pursue the acquisitions of these lands. Federal funding is not available for the acquisition of lands outside the proposed Airport boundary.

5.5 SUMMARY

This section has reviewed the issues and impacts associated with the application of ALUC-adopted airport safety zones and land use compatibility criteria to Riverside Municipal Airport. Based on the existing predominantly single family residential development pattern, the impact of these safety standards would be significant. Almost 950 acres of land are affected by the proposed safety zones. Of this amount, almost 86 acres are part of the existing Airport and an additional 36 acres are a part of the adopted Airport development plan. A total of about 359 acres of existing single and multiple family residential development, estimated to include about 2,220 residential dwellings, are impacted outside the existing Airport boundary. Approximately 237 acres of impacted lands are vacant and of these about 40 acres would be converted to Airport use, if recommendations of the Airport Master Plan are

followed. The 300 or so vacant acres remaining are the principal focus of land use development policy in this plan. It is proposed that the City's General Plan be amended to reflect the safety parameters of this plan and that the General Plan and zoning ordinance be used to guide new development with the more restrictive of the two prevailing when inconsistencies arise.

It was also proposed that in the case of new single family residential development, the need for airport compatibility shall be balanced with neighborhood needs. Developers are encouraged to utilize planned development and specific plan provisions to obtain development plans that meet both stringent safety criteria and good neighborhood planning.

A range of infill policies are recommended to address the development of vacant parcels in areas already substantially developed. In situations where remodelling, expansion and replacement are necessary, such actions would be allowed within defined limits.

Section 6

AIRPORT HEIGHT INFLUENCE AREA ISSUES AND ALTERNATIVES

6.1 INTRODUCTION

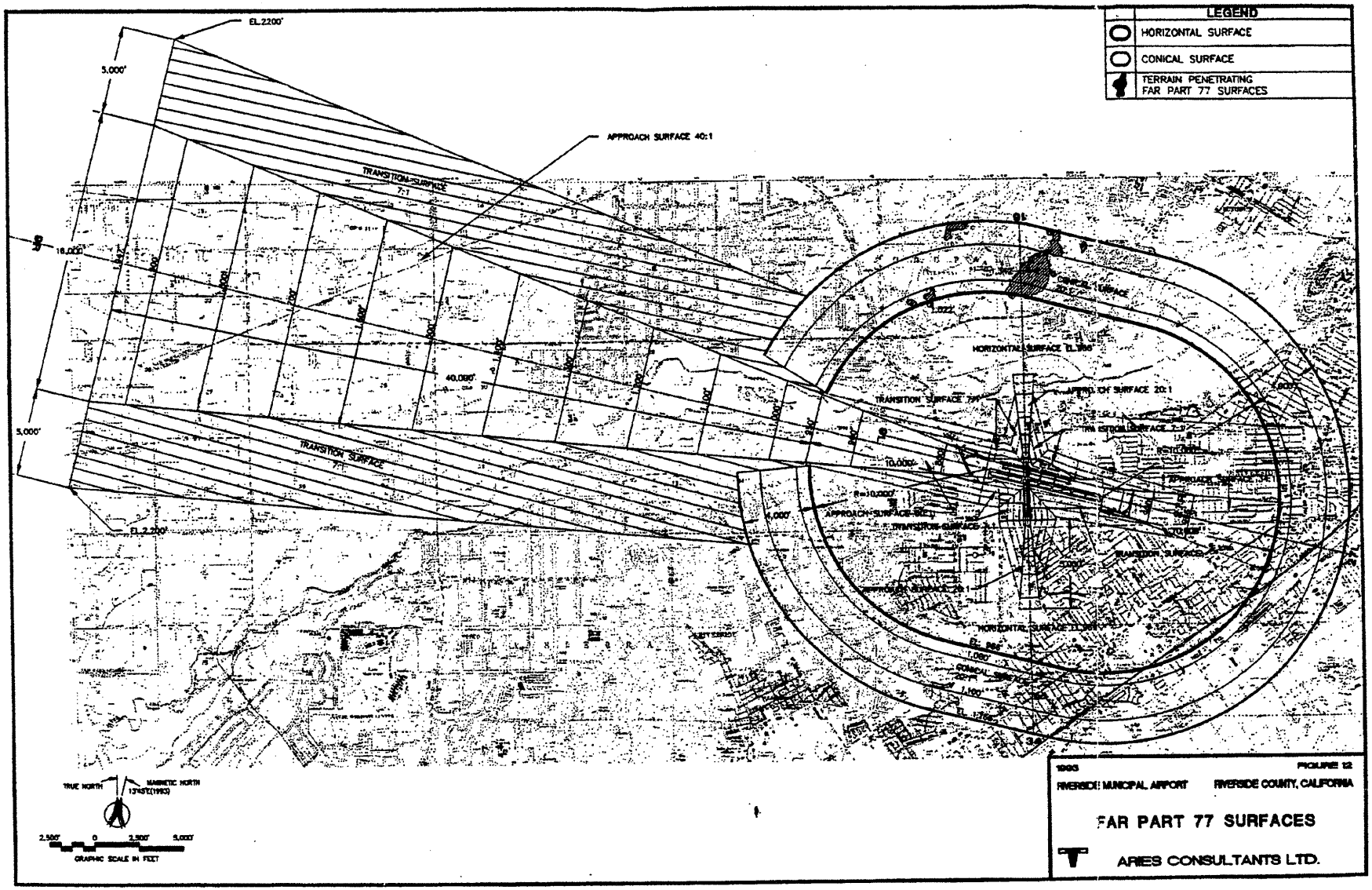
Federal Aviation Regulations (FAR) Part 77, "Objects Affecting Navigable Airspace," establishes imaginary surfaces for airports and runways as a means to identify objects that are obstructions to air navigation. The Riverside County ALUC has adopted the FAR Part 77 standards as height protection guidelines as discussed in Section 3.5. This section reviews the application of the FAR Part 77 imaginary surfaces to the Riverside Municipal Airport.

6.2 HEIGHT PROTECTION AREAS

In the context of this Comprehensive Land Use Plan, the imaginary surfaces in FAR Part 77 are intended to guide the review of proposed tall structures in the vicinity of the Riverside Municipal Airport. Proposed penetrations through these imaginary surfaces should be evaluated by FAA for a hazard determination. FAR Part 77 does not authorize the FAA to regulate land use in the airport vicinity. An FAA finding that a proposed penetration is hazardous is an advisory ruling and does not necessarily stop a project. Since land use control is delegated to local government, FAA can only recommend that height controls be incorporated into the local zoning ordinance. To facilitate the use of FAR Part 77 criteria in the zoning ordinance, FAA has published, "A Model Zoning Ordinance to Limit Height of Objects Around Airports," (see FAA Advisory Circular 150/5190-4A, December 14, 1987.

Figure 8 presented earlier in Section 3 illustrates FAR Part 77 surfaces at a typical airport. They define a bowl-shaped surface with ramps sloping up from each runway end. The dimensions of each surface vary depending on the runway classification and approach. The standards of FAR Part 77 applicable to Riverside Municipal Airport are based on a precision approach for existing Runway 9 (future Runway 9R), a nonprecision approach for Runway 27 (future Runway 27L), and a visual approach for all other runways.

A layout of the FAR Part 77 surfaces for Riverside Municipal Airport is presented on Figure 12 and shows all of the area within the conical surface. Dimensions for these various surfaces are listed in Table 9. Each FAR Part 77 surface is discussed in the sections that follow.



1993 FIGURE 12

RIVERSIDE MUNICIPAL AIRPORT RIVERSIDE COUNTY, CALIFORNIA

FAR PART 77 SURFACES

ARIES CONSULTANTS LTD.

Table 9

FAR PART 77 DIMENSIONS
Riverside Municipal Airport

	Runway					
	9(9R)	**9L**	**16**	**27R**	**27(27L)**	**34**
Runway Type	Precision	Visual	Visual	Visual	Nonprecision	Visual
Primary Surface						
Length (ft.)	6,900	4,400	3,250	4,400	6,900	3,250
Width (ft.)	1,000	250	250	250	1,000	250
Approach Surface						
Slope	50:1 & 40:1	20:1	20:1	20:1	34:1	20:1
Length (ft.)						
Inner Width (ft.)	1,000	250	250	250	1,000	250
Outer Width (ft.)	16,000	1,250	1,250	1,250	3,500	1,250
Transitional Surface						
Slope	7:1	7:1	7:1	7:1	7:1	7:1
Horizontal Surface						
End Radius (ft.)	10,000	N/A	N/A	N/A	10,000	N/A
Conical Surface						
Slope	20:1	N/A	N/A	N/A	20:1	N/A
Width (ft.)	4,000				4,000	

Note: N/A = Not Applicable. This is because 5,000 feet of this surface is overshadowed by main Runway 9R-27L radius of 10,000 feet. Conical surface is also based on the main runway (9R-27L).

Source: Riverside Municipal Airport 2010 Master Plan

6.2.1 Primary Surface

The primary surface is in the immediate runway area. Its surface is the ground elevation of the runway. It extends 200 feet off each runway end and varies in width depending on the type of runway. At Riverside Municipal Airport, the primary surface for future Runway 9R-27L is 1,000 feet wide and 6,900 feet long. The primary surface for future Runway 9L-27R is 250 feet wide and 4,400 feet long. The primary surface for Runway 16-34 is 250 feet wide and 3,250 feet long. These surfaces are all contained within the Airport boundary.

6.2.2 Approach Surface

The approach surface is a trapezoidal area extending outward and sloping upwards from the end of the primary surface. The approach slope, width, and length vary depending on the type of runway approach. At Riverside Municipal Airport, existing Runway 9 (future Runway 9R) has a precision approach with an approach slope of 50:1 (horizontal distance to vertical distance) for the first 10,000 feet (measured horizontally from the end of the primary surface) and 40:1 for an additional 40,000 feet. The approach surface for this runway is considered a critical surface over its entire length. Because it has a high ratio of horizontal to vertical distance, this surface rises very gradually and does not penetrate the horizontal surface. The other end of the existing runway, Runway 27 (future Runway 27L), has a non precision approach and the approach slope is 34:1 extending outward 10,000 feet from the end of the primary surface.

Existing Runway 16-34 and future Runway 9L-27R each have a visual approach on each runway end with an approach slope of 20:1 extending 5,000 feet from the representative ends of the primary surface. The approach surface for future Runway 9L intersects and rises above the horizontal surface at a point about 4,300 feet from the primary surface. The approach surface for future Runway 27R intersects and rises above the horizontal surface at a point about 3,000 feet from the primary surface. The approach surface for Runway 16 intersects and rises above the horizontal surface at a point about 3,900 feet from the primary surface. The approach surface for Runway 34 intersects and rises above the horizontal surface at a point about 4,400 feet from the primary surface. Since the horizontal surface is lower than the approach surfaces beyond the intersection points, it becomes the controlling surface between the intersection point and the outer edge of the horizontal surface.

6.2.3 Transitional Surface

Transitional surfaces with a slope of 7:1 are defined between the sides of the primary surface and the approach surface upward and outward to the horizontal surface.

6.2.4 Horizontal Surface

The horizontal surface is a flat plane 150 feet above the airport field elevation. Its outer boundary is 10,000 feet from the primary surface for all runways other than visual and utility runways, which are 5,000 feet. The horizontal surface is a reasonable representation of the outer limits of a typical airport traffic pattern area, as discussed earlier in Section 5.3.4.

At Riverside Municipal Airport, the dimensions of the horizontal surface are defined by future Runway 9R-27L. The boundaries are set at a radius of 10,000 feet from the point where the extended runway centerline intersects the primary surface (200 feet from the physical end of the runway pavement). The elevation of the horizontal surface is 966 feet above Mean Sea Level (MSL).

6.2.5 Conical Surface

The conical surface slopes upward from the horizontal surface at a rate of 20:1 extending 4,000 feet outward from the horizontal surface. This standard applies at all airports. At Riverside Municipal Airport, the elevation at the outer edge of the conical surface is 1,166 feet MSL.

6.3 HEIGHT PROTECTION ISSUES

6.3.1 Existing Penetrations and Topography

At the present time there are no penetrations of the approach surfaces for existing Runway 9 (future Runway 9R). Ground and trees penetrate the northern edge of the approach surface to existing Runway 27 (future Runway 27L), from about 150 feet to 600 feet out form the end of the primary surface. The removal of these penetrations are provided for in the Airport Master Plan. There are presently no other penetrations to the existing or proposed approach surfaces.

There are minor penetrations close in to the transition surfaces associated with future Runways 27L and 27R. These are all located within the Airport boundary and will be managed as part of the Airport's future development. There are presently no other penetrations to the transition surfaces.

There are also acceptable penetrations of the horizontal and conical surfaces at a distance between about 9,500 feet and 14,000 feet directly north of the Airport. These penetrations include terrain, trees, and structures. These penetration areas fall outside the City of Riverside boundary, and development in this area is controlled by Riverside County. Generally, any structure in this area 35 feet high or less would not

be considered a hazard. Nonetheless, before building permits are issued in these areas, planned structures within these penetration areas should be reviewed for their height impacts.

There is also an area of high terrain just south of the point where the approach surface for existing Runway 9 (future Runway 9R) passes under the conical surface. While this terrain does not penetrate the approach surface, structures placed on the terrain would likely do so. As with terrain areas that do penetrate, structures 35 feet high or less would not be considered a hazard. Structures higher than 35 feet should be reviewed for their height impacts.

6.3.2 Current Height Limits in Zoning Ordinances

The height of structures permitted by local zoning ordinances is an important consideration in height protection planning. As noted above, in Riverside County areas where terrain penetrates, or nearly penetrates, the FAR Part 77 imaginary surfaces, certain height limitations should be imposed. The 35 foot height limits suggested above provide a reasonable range of uses, if development is not restricted for other reasons, such as steep slopes.

Table 10 summarizes existing building height restrictions for those City of Riverside zoning districts found under the FAR Part 77 surfaces. Generally, in residentially zoned areas, building heights range from 20 feet to 35 feet, in manufacturing zones they range from 45 feet to 55 feet, and in the office and retail commercial zones designated in the Airport vicinity heights can range to 75 feet. The City also has an "Airport zone," which is a stand-alone zoning district (as opposed to a combining or overlay district) intended for aviation, industrial, service, and commercial uses related to, compatible with, or convenient for airport operations. There are no Airport-zone districts designated in the Airport vicinity, however. The City zoning ordinance also contains the "S", Height of Buildings, Combining Zone within which all construction is limited to specified heights. The "S" zone has not heretofore been applied in the Airport vicinity to mitigate height safety concerns.

There is no specific reference in the "S" zoning district regulations, or in the entirety of the zoning ordinance, to the FAR Part 77 imaginary surfaces. However, for the past several years development projects involving questionable structure height have routinely been referred to the Airport Director for review.

Generally, the combination of terrain and the height limits of the zones under the FAA Part 77 surfaces are not in conflict. There is at least one location where the potential for conflict exists, although it is currently being managed. In the approach to Runway

Table 10

BUILDING HEIGHT RESTRICTIONS UNDER FAR PART 77 SURFACES
Riverside Municipal Airport

Zoning District		Maximum Allowed Building Height (feet)
Symbol	Name	
RA	Residential Agricultural	35
RA-5	Residential Agricultural applied to Environmentally Sensitive Areas	35
RR	Rural Residential	35
R-1-65	Single Family Residential	35
R-2	Two Family Residential (Duplex)	35
R-3	Multiple Family Residential (1 Unit per 1,500 square feet of lot area)	30
R-3-R	Multiple Family Residential (1 Unit per 2,500 square feet of lot area)	20
R-3-30	Multiple Family Residential (1 Unit per 3,000 square feet of lot area	30
RO	Restricted Office	40
C-2	Restricted Commercial	75
C-3	General Commercial	75
Y5	Contractor's Storage Yard	20
MP	Manufacturing Park	45
M-1	Light Manufacturing	45
M-2	General Manufacturing	55
AIR	Airport Zone	45
O	Official	--

Source: City of Riverside Zoning Ordinance

34, land south of Arlington Avenue is zoned C-2, which allows a building height of up to 75 feet. The City owns an avigation easement through this area and has in place the mechanism to maintain the height below the approach surface.

If a structure's height exceeds 200 feet at the site, the developer is required to obtain FAA review of the development (see FAR Part 77, Subpart B). For structures of lessor heights, local review procedures must be relied upon to protect against unwanted penetrations of the imaginary surfaces. Within the City of Riverside's portion of the Airport Influence Area, the City's design/development review and approval process, as well as the building permit approval process, provides opportunities to review proposed structural heights. In areas outside the City of Riverside's sphere of influence, Riverside County's approval process, and/or those of the ALUC are needed to provide the necessary review.

6.3.3 Summary of Height Control Issues

Based on present zoning in the Airport vicinity and current maximum height limits in the zoning regulations, the potential for incompatible land uses is greatly reduced. The opportunity for a structure to exceed FAR Part 77 imaginary surfaces height controls exists through the issuance of conditional use permits, although the City's development review and approval process should identify such problems. The FAR Part 77 surfaces, which are not currently used as a controlling vertical elevation in the Airport vicinity should be incorporated into the zoning ordinance.

6.4 POTENTIAL LAND USE MANAGEMENT MEASURES

Height protection can readily achieved through overlay zoning. The FAA's model height protection overlay zoning would be an appropriate model for the City of Riverside to consider.

Administration of height control regulations deserves careful consideration. It might be appropriate to adopt the FAR Part 77 imaginary surfaces as the height control zoning map for the Riverside Municipal Airport. At present there are no height incompatible structures and the adoption of these height restrictions would ensure that future structures are subject to proper reviews and appropriate limitations. City maps would need to be marked to identify the area which is height sensitive. Where standard zoning height restrictions of the underlying zones are not adequate protection, overlay zoning would be applied. Any request for height variances that requires notification to the FAA Administrator in accordance with FAR Part 77, Subpart B, should be reviewed by the ALUC.

If the City of Riverside wished to approve requested height variances, approval should be conditioned upon a finding by the FAA that no hazard would be created by the penetration. The developer would file FAA Form 7460-1, "Notice of Proposed Construction or Alteration," with the FAA. In addition, compliance with the conventional City standards relating to variances should be ensured.

At such time when the City completes its geographic information system (GIS), or possibly in conjunction with Riverside County's GIS, the height overlay zoning could be put into the system as a three dimensional map. With the availability of such three dimensional maps, developers, various City administrative agencies (planning, zoning, and airport administration), as well as the ALUC, would be able to perform a quick and inexpensive penetration evaluation of any proposed structure.

6.5 SUMMARY

Based on current FAR Part 77 criteria, as applied to the existing and proposed future Riverside Municipal Airport, there are no critical obstructions of navigable airspace. However, current height limits in the City of Riverside's Zoning Ordinance do not provide the protection necessary to ensure that the special height limit requirements of the Airport are maintained in the future.

The current process of determining compliance with Airport related height restrictions does not legislatively incorporate FAA Part 77 standards and depends on the diligence and analytical capabilities of the individuals performing development reviews.

It is recommended that the City use FAA's publication, "A Model Zoning Ordinance to Limit Height of Objects Around Airports," (FAA Advisory Circular 150/5190-4A) as the basis for adopting height overlay zoning. Additionally, it is recommended that the City use its own GIS, or Riverside County's GIS, as an aid to administration of the height overlay zoning ordinance.

Section 7

COMPREHENSIVE AIRPORT LAND USE PLAN

7.1 INTRODUCTION

This section presents the recommended Comprehensive Land Use Plan for the Riverside Municipal Airport. It includes a description of the Airport Influence Area, land use compatibility standards, and related land use policies.

It is important to understand that this is a draft plan. The draft plan will be reviewed by the Airport Commission, Environmental Protection Commission, Planning Commission, and City Council, in addition to local citizens. One or more public meetings or hearings on the plan will be held by each of these various City approving authorities. Following action by the City Council, a final recommended plan will be forwarded to the Riverside County Airport Land Use Commission for their action. After the ALUC considers this plan and adopts a Comprehensive Land Use Plan for the Riverside Municipal Airport, the City must go through the process of bringing the City's General Plan into consistency with the adopted CLUP, or adopt findings as required by State Law. The language used in this section reflects the fact that this Plan ultimately represents an adopted plan of the ALUC.

7.2 AIRPORT INFLUENCE AREA

The "Airport Influence Area" is that area within which the Riverside County Airport Land Use Commission exercises its responsibilities under the California Public Utilities Code, Chapter 4, Article 3.5, Section 21670 et seq. The Airport Influence Area is also the area within which the City of Riverside must consider specific changes to land use policy as they might relate to aircraft noise, safety, and height restrictions.

As discussed in Section 3.6, the Airport Influence Area is defined by the ALUC as the outer boundary created by overlaying the FAR Part 77 surfaces, the 60 dB CNEL noise contour and the airport safety zones. Figure 13 illustrates the Airport Influence Area at Riverside Municipal Airport. The overall size of the Airport Influence Area at Riverside Municipal Airport is governed by the outer edges of the FAR Part 77 surfaces due to the precision approach to Runway 9 (future Runway 9R) and the non-precision approach to Runway 27 (future Runway 27L). The main portion of the Airport Influence Area is the area circumscribed by the conical surface, while the trapezoidal- shaped area of the Runway 9 approach extends westward more than

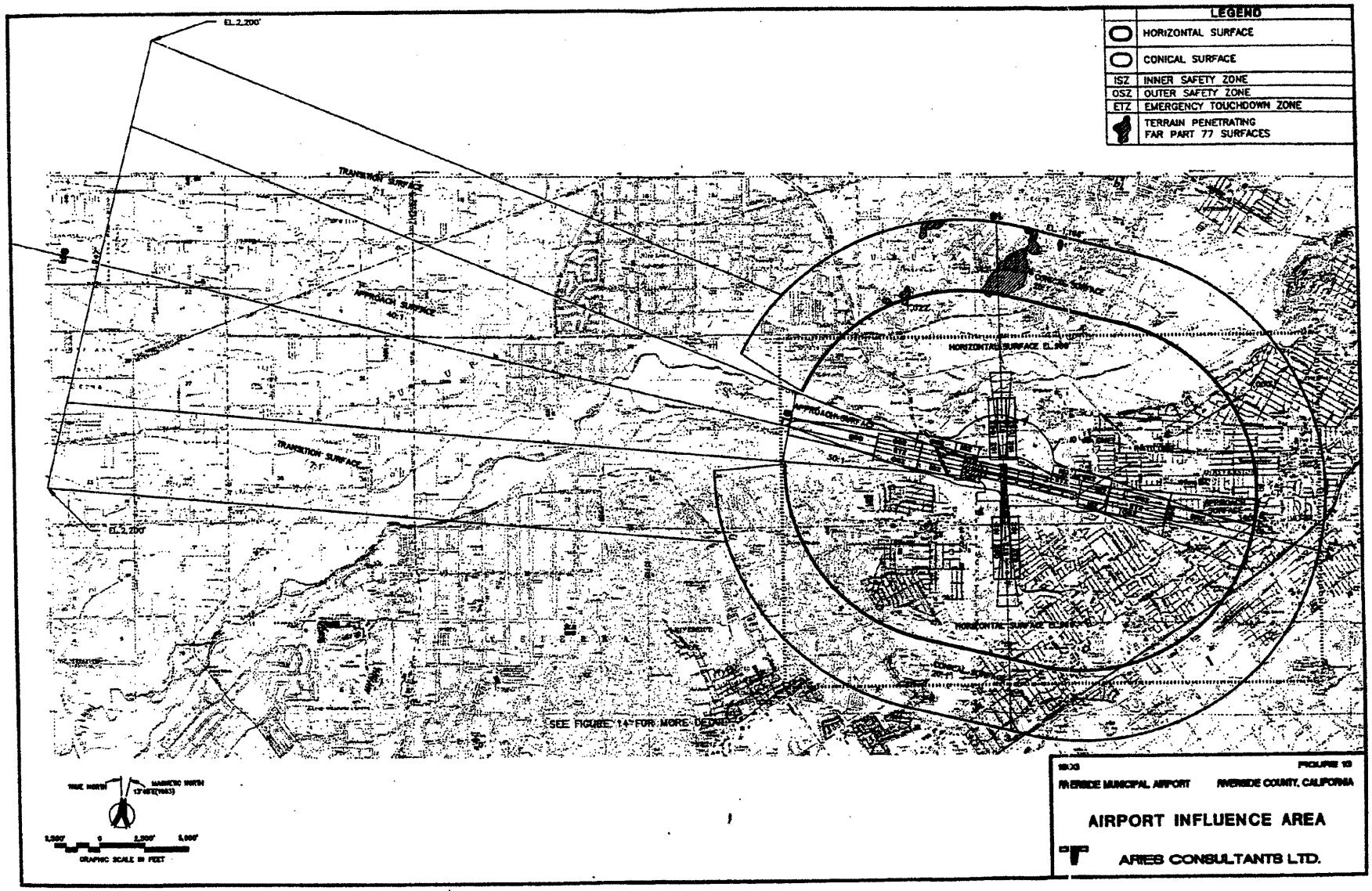


FIGURE 13

RIVERSIDE MUNICIPAL AIRPORT RIVERSIDE COUNTY, CALIFORNIA

AIRPORT INFLUENCE AREA

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50,000 feet (almost 9.5 miles). A "close up" view of the main portion of the Airport Influence Area is shown on Figure 14. This portion of the Airport Influence Area includes the 60 dB CNEL noise contour for the year 2010, the airport safety areas, and remaining portions of the various FAR Part 77 surfaces.

7.3 LAND USE COMPATIBILITY STANDARDS

Land use compatibility standards within the Airport Influence Area at Riverside Municipal Airport are based on three separate considerations: airport noise, safety, and height. The appropriate standards apply only within the subject's impact area. For example, the noise compatibility standards apply only within the 60 CNEL contour.

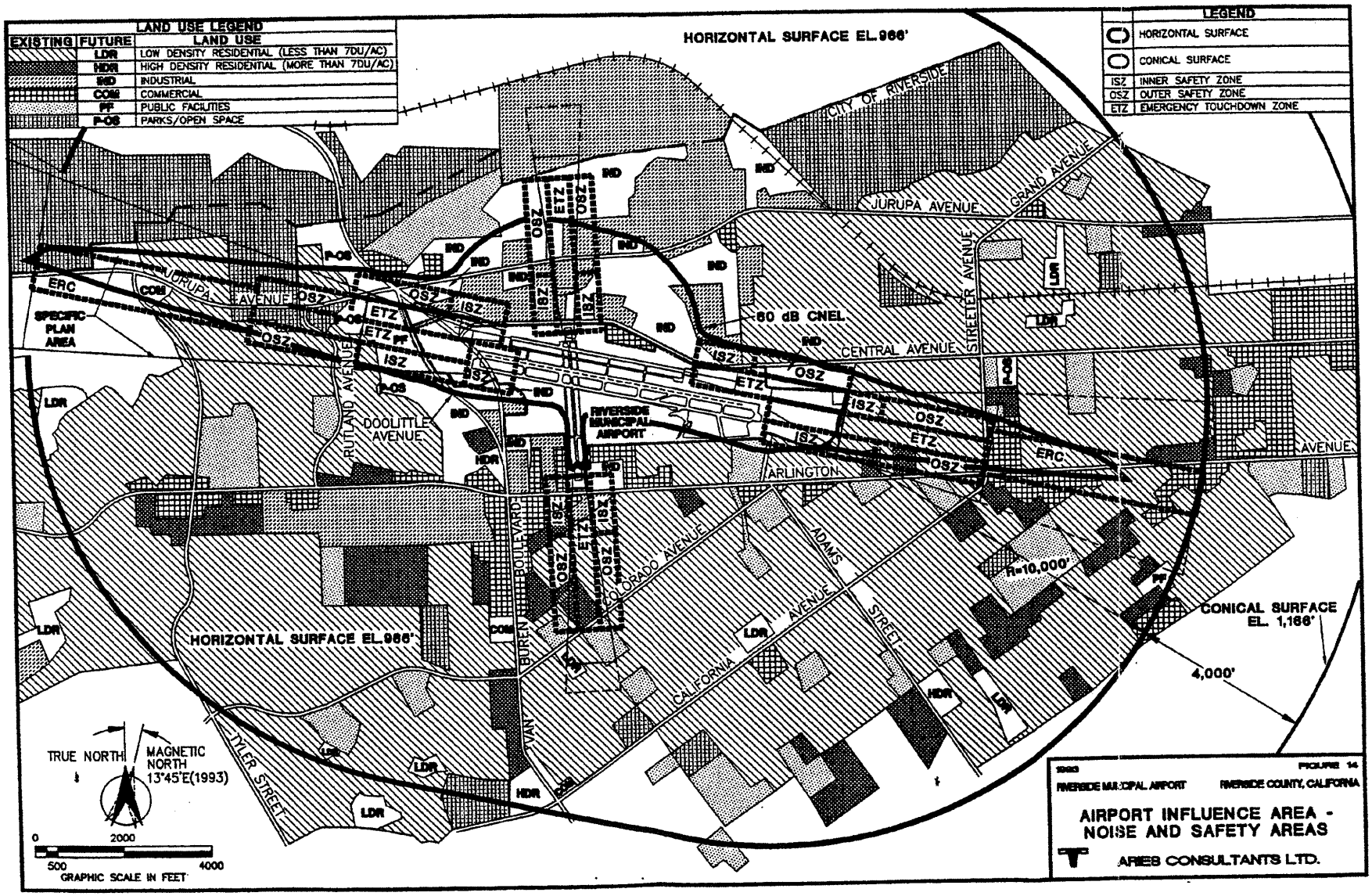
The compatibility criteria are based on the policy guidelines discussed in Section 3 and the analysis in Sections 6, 7, and 8. Where needed, they have been refined for specific application at the Riverside Municipal Airport.

These land use compatibility standards are intended to be applied comprehensively. Where any parcels of land are subject to more than one set of land use compatibility standards, the most restrictive standard shall apply. For example, there are areas where the safety zones and the noise zones overlay one another. In many cases the safety zone criteria is more restrictive and would prevail.

7.3.1 Noise Compatibility Standards

Table 11 describes the land use guidelines for noise compatibility at the Riverside Municipal Airport. These guidelines reflect the State Office of Noise Control standards adopted by the Airport Land Use Commission as presented in Table 4 and discussed in Section 3. These noise compatibility standards are presented in a format similar to FAA's land use compatibility guidelines to make them simpler to understand and implement.

Wherever uses are described as "not compatible" in Table 11, the Airport Land Use Commission shall disapprove development applications which would introduce those uses into areas impacted by noise above the designated level unless adequate noise attenuation measures are included. For purposes of this plan the adequacy of noise attenuation measures shall be judged for both indoor and outdoor environments. The 60 dB CNEL noise contour for the "Worst Case" forecast of aircraft operations levels at Riverside Municipal Airport, illustrated on Figures 13 and 14, defines the area within which these standards apply.


LAND USE LEGEND
EXISTING
FUTURE
LAND USE
LDR LOW DENSITY RESIDENTIAL (LESS THAN 7DU/AC)
HDR HIGH DENSITY RESIDENTIAL (MORE THAN 7DU/AC)
IND INDUSTRIAL
COM COMMERCIAL
PF PUBLIC FACILITIES
P-OS PARKS/OPEN SPACE
LEGEND
HORIZONTAL SURFACE
CONICAL SURFACE
ISZ INNER SAFETY ZONE
OSZ OUTER SAFETY ZONE
ETZ EMERGENCY TOUCHDOWN ZONE
HORIZONTAL SURFACE EL.966'
CITY OF RIVERSIDE
JURUPA AVENUE
GRAND AVENUE
STREETER AVENUE
CENTRAL AVENUE
60 dB CNEL
SPECIFIC PLAN AREA
RUTLAND AVENUE
DOOLITTLE AVENUE
RIVERSIDE MUNICIPAL AIRPORT
ARLINGTON
AVENUE
VAN BUREN BOULEVARD
COLORADO AVENUE
ADAMS STREET
CALIFORNIA AVENUE
TYLER STREET
R=10,000'
CONICAL SURFACE EL. 1,166'
4,000'
TRUE NORTH
MAGNETIC NORTH 13°45'E(1993)
0 2000
500 4000
GRAPHIC SCALE IN FEET
1993
FIGURE 14
RIVERSIDE MUNICIPAL AIRPORT
RIVERSIDE COUNTY, CALIFORNIA
AIRPORT INFLUENCE AREA - NOISE AND SAFETY AREAS
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LAND USE	COMMUNITY NOISE EQUIVALENT LEVEL (CNEL) IN DECIBELS				
RESIDENTIAL	60-65	65-70	70-75	75-80	80+
RESIDENTIAL, OTHER THAN MOBILE HOMES AND TRANSIENT LODGINGS	N[4]	N[4]	N[4]	N	N
MOBILE HOME PARKS	N	N	N	N	N
TRANSIENT LODGINGS	Y	Y[1]	N	N	N
PUBLIC/INSTITUTIONAL					
SCHOOLS	Y	N	N	N	N
HOSPITALS AND NURSING HOMES	Y	N	N	N	N
CHURCHES, AUDITORIUMS, AND CONCERT HALLS	Y	N	N	N	N
GOVERNMENTAL SERVICES	Y	Y	Y[2]	Y[3]	N
TRANSPORTATION	Y	Y	Y[2]	Y[3]	N
PARKING	Y	Y	Y[2]	Y[3]	N
COMMERCIAL USE					
OFFICES, BUSINESS AND PROFESSIONAL	Y	Y	Y[2]	Y[3]	N
WHOLESALE AND RETAIL—BUILDING MATERIALS, HARDWARE AND FARM EQUIPMENT	Y	Y	Y[2]	Y[3]	N
RETAIL TRADE—GENERAL	Y	Y	Y[2]	Y[3]	N
UTILITIES	Y	Y	Y[2]	Y[3]	N
COMMUNICATION	Y	Y	Y[2]	Y[3]	N
INDUSTRIAL					
MANUFACTURING	Y	Y	Y	Y[3]	N
MINING, FISHING, RESOURCE EXTRACTION	Y	Y	Y	Y	Y
RECREATION/OPEN SPACE/AGRICULTURE					
OUTDOOR SPORTS ARENAS	Y	Y	Y	N	N
OUTDOOR MUSIC SHELLS, AMPHITHEATERS	Y	N	N	N	N
WILDLIFE EXHIBITS AND ZOOS	Y	Y	N	N	N
PARKS, RESORTS, AND CAMPS	Y	Y	Y	N	N
GOLF COURSES, RIDING STABLES, AND WATER RECREATION	Y	Y	Y	N	N
LIVESTOCK, FARMING AND BREEDING	Y	Y	Y	N	N
CROP RAISING	Y	Y	Y	Y	Y

SEE OTHER SIDE FOR KEY TO TABLE

TABLE 11

RIVERSIDE COUNTY LAND USE STANDARDS FOR NOISE COMPATIBILITY
RIVERSIDE MUNICIPAL AIRPORT

KEY TO TABLE 11

Y (Yes)	Land use and related structures compatible and permitted (subject to other local land use controls).
N (No)	Land use and related structures not compatible and not permitted within designated CNEL range.
Y[1]	Land use and related structures generally compatible provided that measures to achieve an outdoor to indoor noise level reduction (NLR) of 25 dB are incorporated into design and construction of sleeping rooms.
Y[2]	Land use and related structures generally compatible provided that measures to achieve an outdoor to indoor noise level reduction (NLR) of 30 dB are incorporated into design and construction of office areas and public reception and gathering areas within buildings.
Y[3]	Land use and related structures generally compatible provided that measures to achieve an outdoor to indoor noise level reduction (NLR) of 35 dB are incorporated into design and construction of office areas and public reception and gathering areas within buildings.
N[4]	Residences for caretakers or security personnel may be permitted as accessory uses to commercial or industrial uses. Measures to achieve the required outdoor to indoor noise level reduction (NLR) shall be incorporated into the design of the residences as follows: in the 60-70 dB CNEL range — 25 dB NLR in the 70-75 dB CNEL range — 30 dB NLR

The following discussion provides an additional interpretation of Table 11.

- With the exception of transient lodgings (e.g., hotels and motels) and caretaker residences, all new residential uses are considered incompatible with noise above 60 dB CNEL.

- Residences for caretakers or security personnel may be permitted as accessory uses to commercial or industrial uses in areas subject to noise up to 75 dB CNEL, if appropriate soundproofing measures are taken.

- Transient lodgings are compatible within the 60 to 65 dB CNEL range. Between 65 and 70 dB CNEL, they may be permitted provided that measures are taken to ensure sound insulation to achieve a 25 dB outdoor to indoor noise level reduction. Transient lodgings are not compatible with noise above 70 dB CNEL.

- Schools, hospitals, nursing homes, churches, auditoriums, and concert halls shall be considered noise-sensitive institutions. While they are compatible with noise levels between 60 and 65 dB CNEL, they are not compatible with noise levels above 65 dB CNEL.

- Other public and institutional uses, as well as commercial uses, are compatible with noise as high as 80 dB CNEL, although steps to ensure noise level reductions shall be taken when these uses are subject to aircraft noise above 70 dB CNEL.

- Manufacturing is considered compatible with noise levels up to 80 dB CNEL. Noise level reduction measures, however, shall be taken when manufacturing uses are proposed for areas impacted by noise above 75 dB CNEL.

- Mining and other resource extraction uses, as well as crop raising, are compatible with all aircraft noise levels.

- Most recreation and open space uses are compatible with noise levels up to 75 dB CNEL. These include outdoor sports arenas, parks, resorts, and camps, in addition to livestock feeding and breeding. Outdoor music shells and amphitheaters are not compatible with noise levels above 65 dB CNEL, and wildlife exhibits and zoos are not compatible with noise above 70 dB CNEL.

An avigation and noise easement is an effective mechanism to protect the Airport owner from noise challenges by a land owner when aircraft overfly the land owner's property. In addition to establishing the land use noise compatibility guidelines

presented in Table 11, the Airport Land Use Commission shall require avigation and noise easements as a condition of approval for all new development in the area circumscribed by the 60 dB CNEL noise contour illustrated on Figure 14.

Existing aircraft noise incompatible development located within the future 60 dB CNEL contour illustrated on Figure 14, shall not be declared a nonconforming use. However, any major remodeling of an existing residential structure located within the aircraft noise impact area that is not in conformance with the standards expressed in Table 11, shall be required to convey an avigation and noise easement to the City of Riverside as a condition of the improvement. For purposes of this plan, major remodeling of an existing structure occurs when the value of the proposed improvement is 30 percent or more of the assessed value of the house, exclusive of land.

7.3.2 Safety Compatibility Standards

Table 12 describes the safety compatibility standards at Riverside Municipal Airport. These are based on the guidelines discussed in Section 3, as refined based on subsequent consultations with local officials. The airport safety zones at Riverside Municipal Airport are shown on Figure 14. The dimensions of the safety areas were illustrated earlier on Figure 7. The boundaries of the safety zones shall be defined based on the airfield layout shown in the Riverside Municipal Airport 2010 Master Plan.

The safety zones are discrete and separate zones, rather than cumulative zones. The regulations applying in each zone shall be as described for that zone in Table 12. The following discussion provides an additional interpretation of Table 12.

- The Emergency Touchdown Zone (ETZ) is an area of maximum risk. Within the ETZ, no structures and no land uses involving concentrations of people shall be permitted. The ETZ dimensional standards are established in Section 3 and their specific locations are defined in Section 5. Vacant lands north of Runway 16-34 and west of Runways 9L-27R and 9R-27L provide the only opportunities to protect ETZ areas from future development. ETZ areas to the east of Runways 9L-27R and 9R-27L, as well as the ETZ south of Runway 16-34 are virtually fully developed with mostly incompatible land uses. These specific areas shall be treated as "infill" areas, where the infill policies presented in Section 7.4 shall apply.

- The Inner Safety Zone (ISZ) areas are also an area of significant risk because of their proximity to the runway. Within this zone, no structures are permitted nor are uses involving concentrations of people. No petroleum or explosives

Table 12

LAND USE COMPATIBILITY GUIDELINES FOR AIRPORT SAFETY ZONES FOR RIVERSIDE MUNICIPAL AIRPORT[1, 2]

Safety Zone	Maximum Population Density	Maximum Coverage By Structures	Land Use
ETZ — Emergency Touchdown Zone	0[3]	0[3]	No significant obstructions[4]
ISZ — Inner Safety Zone	0[3]	0[3]	No petroleum or explosives No above-grade powerlines
OSZ — Outer Safety Zone	Uses in structures:[5] 25 persons/ac. OR 150 persons/bldg. (see text for explanation) Uses not in structures: 50 persons/ac.	25% of net area	No residential No hotels, motels No restaurants, bars No schools, hospitals, government services No concert halls, auditoriums No stadiums, arenas No public utility stations, plants No public communications facilities No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials
ERC — Extended Runway Centerline Zone	3 du/net acre Uses in structures[5]: 75 persons/ac. or 300 persons/bldg. (see text for explanation)	50% of gross area or 65% of net area, whichever is greater	No uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.[6]
TPZ — Traffic Pattern Zone	Not Applicable	50% of gross area or 65% of net area, whichever is greater	Discourage schools, auditoriums, amphitheaters, stadiums Discourage uses involving, as the primary activity, manufacture, storage, or distribution of explosives or flammable materials.[6]

1. The following uses shall be prohibited in all airport safety zones:
   a. Any use which would direct a steady light or flashing light of red, white, green, or amber colors associated with airport operations toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport, other than an FAA-approved navigational signal light or visual approach slope indicator.
   b. Any use which would cause sunlight to be reflected towards an aircraft engaged in an initial straight climb following takeoff or towards an aircraft engaged in a straight final approach towards a landing at an airport.
   c. Any use which would generate smoke or water vapor or which would attract large concentrations of birds, or which may otherwise affect safe air navigation within the area.
   d. Any use which would generate electrical interference that may be detrimental to the operation of aircraft and/or aircraft instrumentation.
2. Avigation easements shall be secured through dedication for all land uses permitted in any safety zones.
3. No structures permitted in ETZ or ISZ.
4. Significant obstructions include but are not limited to large trees, heavy fences and walls, tall and steep berms and retaining walls, non-frangible street light and sign standards, billboards.
5. A "structure includes fully enclosed buildings and other facilities involving fixed seating and enclosures limiting the mobility of people, such as sports stadiums, outdoor arenas, and amphitheaters.
6. This does not apply to service stations involving retail sale of motor vehicle fuel if fuel storage tanks are installed underground.

or above ground powerlines shall be permitted. The ISZ dimensional standards are established in Section 3 and their specific locations are defined in Section 5. The ISZ area associated with the western end of Runway 9R-27L is still substantially undeveloped and can be protected from future development to a considerable extent. All other ISZ areas are mostly developed and shall be considered as "infill" areas, where the infill policies presented in Section 7.4 shall apply.

- The Outer Safety Zone (OSZ) areas are of moderate risk since they are located near the extended runway centerline, but are further from the runway itself. Within the OSZ areas, a variety of land uses shall be prohibited. These include residential uses, hotels and motels, various "public assembly" uses involving large concentrations of people, public utility stations and communications facilities, and industries who's primary activity involves the manufacture, storage, or distribution of explosives or flammable materials.

- Lot coverage by structures shall not exceed 25 percent of the net lot area. The intent of limiting structural coverage in OSZ is to reduce the risk of an aircraft colliding with a building while also improving the chance that a pilot could find open area in case of a controlled, forced landing.

The maximum population density for uses within the OSZ zone shall not exceed 25 persons per acre or 150 persons per building for uses in structures, whichever is less. The maximum population density for uses not in structures shall be 50 persons per acre.

The OSZ dimensional standards are established in Section 3 and their specific locations are defined in Section 5. The OSZ areas associated with both ends of Runway 9L-27R and the north end of Runway 16-34 are still substantially undeveloped and can be protected from future development. OSZ areas associated with both ends of Runway 9R-27L and the south end of Runway 16-34 are mostly developed and qualify for consideration as "infill" areas where the infill policies presented in Section 7.4 shall apply.

In those OSZ areas that do not qualify for treatment under the infill policies, the following methodology shall be used in determining whether a proposed structure complies with the population density requirements. (These are based on Appendix G of the Airport Land Use Planning Handbook, California Department of Transportation, July 1983.)

Step 1 Determine the net area, in acres, of the lot proposed for development.

Step 2	Divide the square footage of the proposed structure by the square footage per occupant required by the building code. This defines maximum building occupancy.
Step 3	Multiply the maximum occupancy (from Step 2) by 50 percent to determine the maximum number of persons actually expected to be present at any one time. If this exceeds 150, the uses is inconsistent with the standards and shall be revised. If this is less than 150, go to Step 4.
Step 4	Divide the "number of persons expected" (from Step 3) by the net lot area in acres (from Step 1). If this is less than 25 persons per acre, the use is consistent and permissible. If it exceeds 25 persons per acre, the use is inconsistent and shall be revised.

The Extended Runway Centerline (ERC) zone is established only for Runway 9R-27L, since existing Runway 9 (future Runway 9R) has a precision approach and existing Runway 27 (future Runway 27L) has a nonprecision approach. During normal weather conditions the ERC is an area of moderate risk. During weather conditions that require an instrument approach land uses in the ERC areas are at higher risk. Based on its location relative to the runway, virtually all land use types are allowed within the ERC. The exceptions are uses involving as the primary activity the manufacture, storage, or distribution of explosives or flammable materials, which are expressly prohibited. Additionally, population density is limited to 3 dwelling units per net acre or 75 persons per acre in structures. Maximum coverage of the ground by structures is limited to 50 percent of gross area or 65 percent of net area, whichever is greater.

The ERC area east of Runway 9R-27L is virtually fully developed and shall qualify as an infill area where the policies presented in Section 7.4 shall apply. The ERC area west of Runway 9R-27L is about 50 percent developed. Existing developed areas shall be treated as an infill area subject to policies presented in Section 7.4. Existing undeveloped areas shall be treated under the Land Use Compatibility guidelines outlined in Table 12.

The TPZ, Traffic Pattern Zone, extends to the outer edge of the FAR Part 77 horizontal surface. This is an area of lesser hazard compared with the other areas. No population or dwelling unit density limits apply within the TPZ. Maximum lot coverage shall be limited to 50 percent of the gross development area or 65 percent of the net lot area, whichever is greater.

Uses involving very large concentrations of people, such as schools, auditoriums, amphitheaters, and stadiums, shall be discouraged from being developed in this area. Uses involving the manufacture, storage, or distribution of explosives or flammable materials also shall be discouraged in the TPZ. (This shall not be applied to service stations involving retail sale of motor vehicle fuel where the fuel tanks are underground.) It is recognized that within the large area of the TPZ, it may not always be possible to prevent these uses given the practical constraints that often exist with facility siting. Where it is necessary to permit these uses, avigation easements shall be secured as a condition of development approval.

As noted in Table 12, several other uses posing risks to aircraft in flight shall also be prohibited within all safety zones. These involve uses which would cause confusing or blinding lights and reflections to be directed to aircraft in flight, uses causing smoke, water vapor, or gatherings of birds, or those causing electrical interference. Rather than straightforward land use restrictions, these may be considered performance standards. Only a few kinds of land uses have inherent attributes that would make them necessarily violate these standards. (Landfills and power generating plants are examples.) Many uses which might cause conflicts can be designed to avoid these problems. For example, businesses could design their lighting systems to avoid confusion with airfield lighting.

In addition to these land use restrictions, avigation easements shall be secured for all uses receiving development approval within any safety zone.

In those areas where existing development does not meet the criteria established above, normal repairs and remodeling of the interior spaces of the structures shall be allowed as a matter of right. The expansion or replacement of an existing use, however, shall be governed by infill policies defined in Section 7.4.

Property owners and developers are encouraged to use Specific Plan and planned development techniques to meet the safety criteria established in this plan. The City of Riverside should consider the transfer of development rights for those properties that could not be developed under normal circumstances, if the use of these concepts alone allow the development to meet the criteria of this plan.

7.3.3 Height Standards

The criteria defined in FAR Part 77 shall constitute the airport vicinity height standards at Riverside Municipal Airport. FAR Part 77 imaginary surfaces for the Airport are shown on Figure 12 in Section 6. The imaginary surfaces defined by this figure constitute height limits which shall not be exceeded by structures proposed for development beneath them.

7.4 INFILL POLICIES

Infill is the development of vacant or underutilized properties in areas that are already substantially developed with uses not ordinarily permitted by the compatibility criteria. These infill policies also apply to situations where properties have been extensively damaged by fire, earthquake, or other natural disasters. For purposes of this policy, "extensively damaged" means that the existing structure is "uninhabitable," as determined by City Building Codes, and must be rebuilt. The following polices apply specifically to the City of Riverside, and only in those safety impact zones designated in Section 7.3.2 as areas within which infill policy shall be applied. These policies are cumulative with other policies of this plan.

- The replacement of existing uses declared "uninhabitable," normally permitted as a matter of right by the zoning ordinance, may be permitted within the confines of the existing parcel on which the use is located. Replacement structures are limited in size to the number of square feet existing at the time this plan is adopted.

- Single-family residences may be established on any undeveloped existing lot that is already properly zoned and configured. No variances shall be allowed unless they existed at the time this plan was adopted.

- The establishment of high-risk uses or places of public assembly, as defined in this plan, which requires a conditional use permit, will not be permitted.

- In all applications of this infill policy, as a condition of approval, the property owner shall be required to execute an avigation easement. Also, if located within the 60 dB CNEL or above noise contour, as described in this plan, the property owner shall also be required to execute a noise easement.

- Replacement structures located within the 60 dB CNEL noise contour shall also be required to meet noise level reduction standards for the City of Riverside.

7.4.1 Nonconforming Approved Specific Plans

Officially approved specific plans within the Riverside Airport influence area shall be exempt from all requirements of this Comprehensive Land Use Plan with respect to land use, development density, and development intensity. All development approvals consistent with an approved specific plan (including, without limitation, zoning ordinances, building regulations, tentative and final subdivision maps, tentative and final parcel maps, conditional use permits, public use permits, variances, plot plans, grading permits, building permits, and occupancy permits) will also be exempt from all requirements of this Comprehensive Land Use Plan with respect to land use, development density, and development intensity.

Notwithstanding the foregoing exemption, the land use restrictions set forth in Note A to Table 12 and the Height standards set forth in Section 7.3.3 shall be applicable to development approvals within adopted specific plans.

7.4.2 Amendments to Approved Specific Plans

Any amendment to an approved specific plan which increases the density of development or increases the intensity of development shall comply with all standards and policies of this Comprehensive Land Use Plan for the portion of the approved specific plan covered by such amendment. Any specific plan amendment which does not increase the density of development or intensity of development shall be exempt from all requirements of this Comprehensive Land Use Plan to the same extent as provided for approved specific plans under Section 7.4.1, above. Any general plan amendment required in conjunction with a specific plan amendment shall be subject to the provisions of this Section 7.4.2. with respect to the specific plan amendment.

7.5 RELATED LAND USE POLICIES

7.5.1 Findings as to Similar Uses

Cases may arise where the Airport Land Use Commission must review a proposal for development of a land use which is not explicitly provided for by the land use standards of Figure 14 (noise compatibility) or Table 7 (safety compatibility). In such cases, the ALUC shall apply conventional rules of reason in determining whether or not the subject land use is substantially similar to any land use which is subject to regulation. In making these determinations, the ALUC shall review the background analysis presented in this Comprehensive Land Use plan document, including the technical appendices.

7.5.2 Findings for Land Uses Which are to be Discouraged

Within the TPZ safety zone, a variety of land uses are to be discouraged from being developed. When development of these uses is proposed, the Airport Land Use Commission shall require the applicant to show that alternative locations have been considered and are not feasible. The applicant shall then be directed to consider a development plan that will minimize the exposure to hazard as much as possible. This might involve reducing structure heights, reducing lot coverage, reducing the overall scale of the project, or considering satellite locations for some of the proposed functions of the facility.

Land uses described as "uses to be discouraged," which were lawfully established prior to the adoption of this Comprehensive Land Use Plan, shall be permitted to be modified or enlarged without being subject to any special reviews or approvals under the policies of the TPZ safety zone.

Section 8

IMPLEMENTATION PLAN

8.1 ADOPTION OF PLAN

Before adopting the Comprehensive Airport Land Use Plan (CLUP), the Riverside County Airport Land Use Commission (ALUC) shall consult with representatives of the City of Riverside, and hold a public hearing on the proposed plan. After considering the comments and concerns of agencies and citizens, the ALUC shall authorize any desired changes in the Plan and approve it as revised.

The approved Comprehensive Land Use Plan will become the ALUC's official land use policy document within the Airport Influence Area for Riverside Municipal Airport. Any rezoning and general plan amendments within the Airport Influence Area shall be subject to ALUC review. ALUC decisions and recommendations on such amendments, or on development actions proposed within the Airport Influence Area, that may come before the ALUC shall be based on the policies of the CLUP.

8.2 UPDATE AND AMENDMENT OF PLAN

The Riverside County Airport Land Use Commission and its staff, in consultation with the City of Riverside Planning Department and City Council, should keep the CLUP up-to-date. The plan should be reviewed as often as necessary, although according to state law, the ALUC may not amend the plan more than once per year.

It will be especially important to review the plan whenever the Airport Master Plan or Airport Layout Plan is amended. At the same time, it is important for the ALUC and the City to ensure that the CLUP is considered during any future master plan update studies.

The ALUC and the City are also expected to review the CLUP when new guidance documents are prepared by the California Department of Transportation. The Department of Transportation is now updating its "Airport Land Use Planning Handbook." It is important for the CLUP to consider the latest relevant information and research on noise, safety, and height compatibility issues, particularly when that information has been evaluated and weighed through an authoritative consultation process. The CLUP also should be reviewed by the ALUC and the City whenever experience indicates that unanticipated difficulties are being encountered that might be solved through appropriate amendments to the plan.

8.3 ADMINISTRATION OF PLAN

8.3.1 Scope of ALUC Development Review Responsibilities

The State Aeronautics Law (Public Utilities Code Chapter 4, Article 3.5) encourages local general plans and specific plans to be consistent with the adopted Comprehensive Land Use Plans of County Airport Land Use Commissions. It also authorizes the Airport Land Use Commission to review local development actions to ensure consistency with the Comprehensive Land Use Plan.

Where the local general plans or specific plans are not consistent with the Airport Comprehensive Land Use Plan, the local agency shall be notified by the ALUC. The local agency may overrule the ALUC after holding a public hearing and after making specific findings that the existing plans are compatible with the purposes of the aeronautics law. A two-thirds majority vote of the governing body is required. (see Section 21676(a).)

If the ALUC finds that the local agencies have not revised their general or specific plans, or overruled the ALUC with the required two-thirds vote, State law enables the ALUC to require that the local agencies submit all development actions, regulations, and permits to the ALUC for review. If the ALUC finds that the proposed action is not consistent with the Comprehensive Airport Land Use Plan, the local agency shall be so notified and shall hold a public hearing to reconsider its plan. The local agency may overrule the ALUC with a two-thirds vote of its governing body if it makes specific findings that the proposed action is consistent with the purposes of Section 21670 of the Aeronautics Law. (See Section 21676.5(b).)

Where the local agencies have amended their general and specific plans to be consistent with the Comprehensive Land Use Plan, or where they have overruled the ALUC's finding of inconsistency, then only general plan and specific plan amendments, new specific plan proposals, or zoning ordinance and building regulation proposals need to be referred to the ALUC for review. If the ALUC determines that the proposed action is not consistent with the Comprehensive Airport Land Use Plan, it shall inform the referring agency. After a public hearing, the local agency may overrule the ALUC with a two thirds vote of the governing body, if it makes specific findings that the proposed action is consistent with the purposes of Section 21670 of the Aeronautics Law. (See Section 21676(b).)

8.3.2 Coordination with Local Governments

The ALUC should ensure that proper coordination is established between its staff and local governments to ensure the efficient administration of the development review

8.3.4 Criteria for ALUC Review of General Plan Amendments

The City of Riverside and Riverside County may consider amendments of their general plans from time to time. The major consideration of the ALUC as it reviews future general plan amendments is to ensure that the standards of the CLUP are complied with.

In some noise and safety zones, the policies of this Plan prohibit or limit the density of residential development. This Plan has suggested the use of "density transfer" techniques, mixed use concepts, and specific plans, to allow a developer to balance the needs of the Airport and the needs of a specific development project. "Density transfer" is defined herein as a credit for unused residential development potential within the particular noise/safety zone which can be transferred to a part of the property outside the noise/safety zone. From the standpoint of airport compatibility, the ALUC encourages and will support plans which incorporate these techniques to achieve compatibility. This shall not be interpreted as acceptance of any waivers from the land use compatibility policies of this plan. The use of these various planning techniques shall be acceptable only if all land use policies within the Airport Influence Area are complied with.

For specific guidance in the review of general plan amendments, the ALUC shall consult Sections 4, 5, and 6 of the CLUP where noise, safety, and height issues and alternatives are discussed.

For specific guidance in the review of general plan amendments, the ALUC and City decision making bodies should consult Sections 3 through 7 of this Plan where noise, safety, and height issues and alternatives are discussed.

8.4 RECOMMENDED ACTION BY LOCAL GOVERNMENTS

8.4.1 General Plan Amendments

The Airport Land Use Commission should encourage the City of Riverside and Riverside County to amend their general plans to ensure compatibility with the CLUP.

8.4.2 Noise and Avigation Easements

The Airport Land Use Commission shall require noise and avigation easements be dedicated to the Airport owner for those areas that fall within the 60 dB CNEL or higher noise contour as depicted on Figure 14, presented in Section 7.