AIRPORT LAND USE COMPATIBILITY PLAN

Imperial County Airports

Revision date: June, 1996

APPROVAL TRACKING

AMENDED AIRPORT LAND USE COMPATIBILITY PLAN

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Introduction

FUNCTION AND AUTHORITY

The basic purpose of airport land use commissions is to help ensure that proposed development in the vicinity of airports will be compatible with airport activities.

This *Airport Land Use Compatibility Plan* sets forth the criteria and policies which the Imperial County Airport Land Use Commission will use in assessing the compatibility between the principal airports in Imperial County and proposed land use development in the areas surrounding them. The emphasis of the Plan is on review of local general and specific plans, zoning ordinances, and other land use documents covering broad geographic areas. Certain individual land use development proposals also may be reviewed by the Commission as provided for in the policies enumerated in the next chapter. The Commission does not have authority over existing incompatible land uses or the operation of any airport.

The Plan specifically pertains to the land uses surrounding the following seven airports (Figure 1A):

- Brawley Municipal Airport.
- Calexico International Airport.
- Calipatria Municipal Airport.
- Holtville Airport.
- Imperial County Airport.
- Salton Sea Airport.

- Naval Air Facility El Centro.

Additionally, the Plan provides guidance for Commission review of new airports and heliports proposed for construction in the County.

State Statutes

The statutory authority for establishment of airport land use commissions and the adoption of airport land use compatibility plans is provided in the California Public Utilities Code, Sections 21670 et seq. (Chapter 4, Article 3.5 of the State Aeronautics Act). Every county in which a public-use airport is located is required to establish an airport land use commission. The commissions' charge is expressly stated as being:

> *... to protect public health, safety, and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around public airports to the extent that these areas are not already devoted to incompatible uses.*

As a means of fulfilling this responsibility, each commission is required to formulate a comprehensive land use plan for the areas surrounding the airports within its jurisdiction. The plan must reflect the anticipated growth of the airports during at least the next 20 years. Limitations on building heights, restrictions on the use of land, and standards for building construction can be specified in the plan.

The state legislation establishing airport land use commissions was originally enacted in 1967. Since that time, several major revisions and numerous minor ones have been adopted. Appendix A of this document contains the complete text of the state law as of November 1995.

IMPERIAL COUNTY AIRPORT LAND USE COMMISSION

The Imperial County Airport Land Use Commission is organized in the basic manner provided by state law, two county representatives, two representatives of the cities in the County, two representatives of the airport managers, and one general public representative. Staff for the Commission is provided by the Imperial County Planning/Building Department.

The Commission adopted an *Airport Land Use Plan* in September 1982. The earlier plan applied to the same airports as the current plan, except that Holtville Airport was not included. The present plan represents a complete revision and replacement of the 1982 document. In preparing the new plan, key objectives have been to reflect subsequent revisions in state law, to incorporate the most recent concepts in airport

land use compatibility planning, and to eliminate ambiguities contained in the previous *Airport Land Use Plan* policies.

The Commission adopted this *Airport Land Use Compatibility Plan* on June 5, 1991, and is preparing this revision.

RELATIONSHIP TO LOCAL JURISDICTIONS AND PLANS

The fundamental relationships between the Imperial County Airport Land Use Commission and local jurisdictions, as well as between the *Airport Land Use Compatibility Plan* and local land use plans, is set by state law. Although the Commission functions under the general auspices of Imperial County government, it is not controlled by the county. In this regard, the Airport Land Use Commission is more equivalent to the Imperial County Local Agency Formation Commission (LAFCO) than to the County Planning Commission. Within the bounds provided by state law, the decisions of the Commission, including the adoption of this plan are final. Other than through its larger representation on the Commission, the county does not have any greater legal authority over the Commission than do the individual cities in the county.

The major power which the local governments hold over the Airport Land Use Commission is the ability to override certain of the Commission's decisions. If the Commission rules that a local plan or land use action is inconsistent with the Commission's plan, state law allows the local agency to overrule the Commission by a two-thirds vote of its governing body. Before doing so, the local agency must hold a public hearing on the matter and must make specific findings that the proposed action is consistent with the purposes of the state law. However, if a public agency overrides an Airport Land Use Commission decision regarding an airport not operated by that agency, state law (Section 21678) provides that the airport operator "... shall be immune from liability for damages to property or personal injury caused by or resulting directly or indirectly from the public agency's decision to override the commission's action or recommendation."

USING THIS DOCUMENT

This *Airport Land Use Compatibility Plan* document is divided into three parts:

- Part I - Policies;
- Part II - Supporting Information; and
- Part III -Appendices.

Policies

The compatibility criteria, compatibility maps, and review process policies set forth in Part I (Chapters 2 and 3) are the core of the document. The most vital pieces of these chapters are the Compatibility Criteria table in Chapter 2 and the Compatibility Map for each airport in Chapter 3. The table and maps provide a single, combined set of zones and associated criteria covering each of the basic types of airport impacts Ä noise, safety, airspace, and overflight. This combined approach is intended as a means of facilitating projected review. It is anticipated that the compatibility of the majority of land use proposals can be evaluated with reference to these elements alone. More detailed supporting criteria policies and policies applicable to individual airports are provided as clarification and to aid in review of proposals that are not clearly compatible or incompatible.

An important point to note about this plan is that the criteria are performance oriented rather than list oriented. That is, the criteria contain standards to be achieved (e.g., occupancy limits), rather than a list of specific uses which are permitted in each zone. This format directly relates a concern (e.g., safety) to a criterion (e.g., occupancy limits).

State law requires that local entities, including the county, submit copies of their general and specific plans, and future amendments, to the Commission for review as to consistency with the Commission's plan. When the local jurisdictions modify their individual land use plans to be consistent with this *Airport Land Use Compatibility Plan*, they have the option of developing a detailed land use list by applying the performance criteria to the individual land use designations included in their locals plans and zoning ordinances.

Additional Contents

Part II of the document contains background information used in development of the policies. Chapter 4 supplies essential data regarding each of the airports and their environs. Chapters 5 through 8 address the basic concepts and issues of airport/land use noise and safety compatibility. Chapter 9 discusses some of the strategies which local jurisdictions can use to implement the *Airport Land Use Compatibility Plan* criteria and policies. Chapter 10 reviews the consistency between the *Compatibility Plan* and current local plans and zoning.

The final part of the document, Part III, includes the text of essential state and federal laws and regulations, plus various materials useful in implementation of the Plan.

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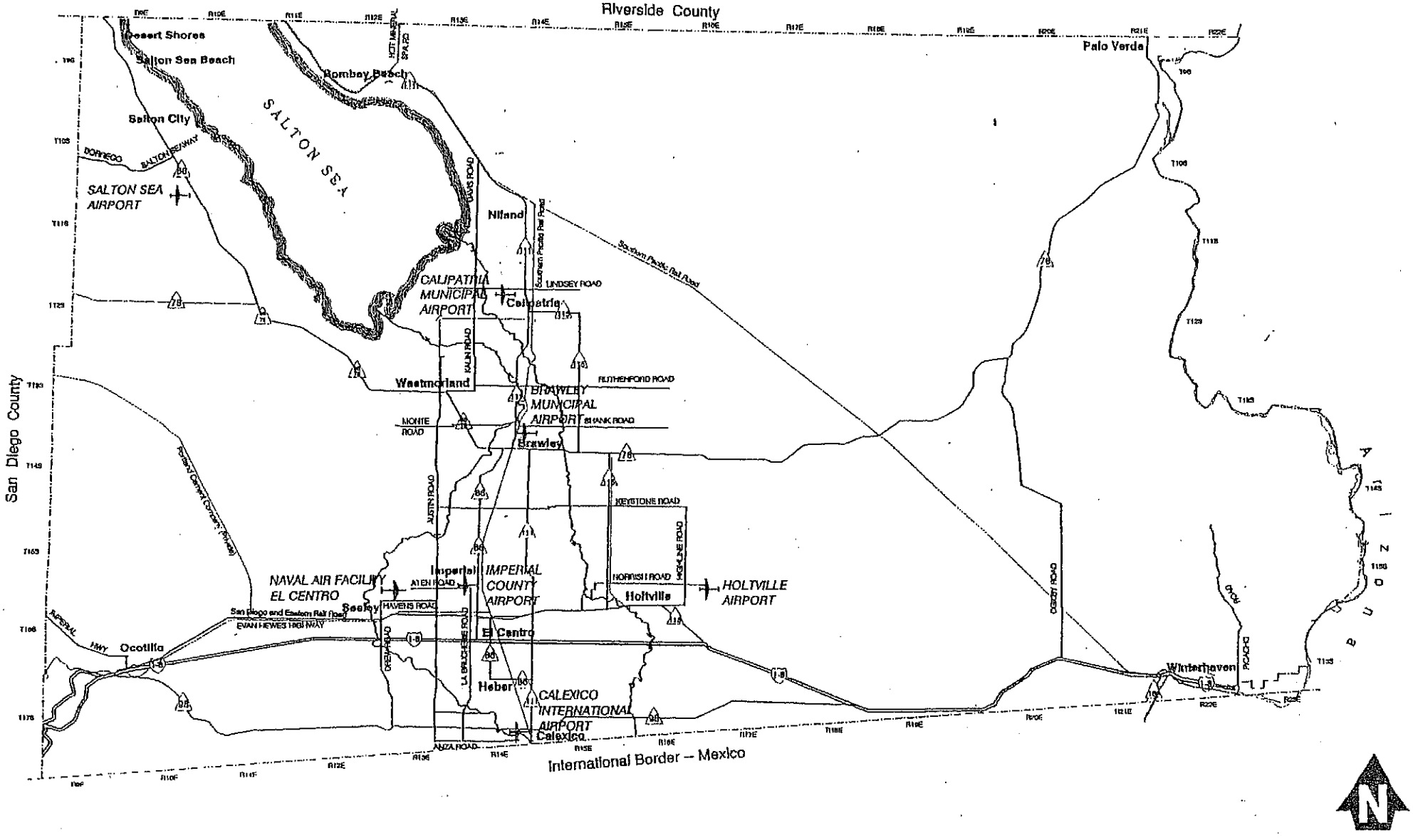

Airport Locations

Imperial County

FIGURE 1A

airport land use compatibility plan

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Policies

1.SCOPE OF REVIEW

1. Geographic Area of Concern

The Imperial County Airport Land Use Commission's planning area encompasses:

1. *Airport Vicinity* - All lands on which the uses could be negatively affected by present or future aircraft operations at the following airports in the County and lands on which the uses could negatively affect said airports. The specific limits of the planning area for each airport are depicted on the respective *Compatibility Map* for that airport as presented in Chapter 3.

   (a) Brawley Municipal Airport.

   (b) Calexico International Airport.

   (c) Calipatria Municipal Airport.

   (d) Holtville Airport.

   (e) Imperial County Airport.

   (f) Salton Sea Airport.

   (g) Naval Air Facility El Centro.

2. *Countywide Impacts on Flight Safety* - Those lands, regardless of their location in the County, on which the uses could adversely affect the safety of flight in the County. The specific uses of concern are identified in Paragraph 2.

3. *New Airports and Heliports* - The site and environs of any proposed new airport or heliport anywhere in the County. The Brawley Pioneers Memorial Hospital has a heliport area on-site.

2. Types of Airport Impacts

The Commission is concerned only with the potential impacts related to aircraft noise, land use safety (with respect both to people on the ground and the occupants of aircraft), airspace protection, and aircraft over-flights. Other impacts sometimes created by airports (e.g., air pollution, automobile traffic, etc.) are beyond the scope of this plan. These impacts are within the authority of other local, state, and federal agencies and are addressed within the environmental review procedures for airport development.

3. Types of Actions Reviewed

1. *General Plan Consistency Review* - Within 180 days of adoption of the *Airport Land Use Compatibility Plan*, the Commission shall review the general plans and specific plans of affected local jurisdictions to determine their consistency with the Commission's policies. Until such time as (1) the Commission finds that the local general plan or specific plan is consistent with the *Airport Land Use Compatibility Plan*, or (2) the local agency has overruled the Commission's determination of inconsistency, the local jurisdiction shall refer all actions, regulations, and permits (as specified in Paragraph 3) involving the airport area of influence to the Commission for review (Section 21676.5 (a)).

2. *Statutory Requirements* -As required by state law, the following types of actions shall be referred to the Airport Land Use Commission for determination of consistency with the Commission's plan *prior to their approval* by the local jurisdiction:

(a) The adoption or approval of any amendment to a general or specific plan affecting the Commission's geographic area of concern as indicated in Paragraph 1 (Section 21676 (b)).

(b) The adoption or approval of a zoning ordinance or building regulation which (1) affects the Commission's geographic area of concern as indicated in Paragraph 1 and (2) involves the types of airport impact concerns listed in Paragraph 2 (Section 21676 (b)).

(c) Adoption or modification of the master plan for an existing public-use airport (Section 21676 (c)).

(d) Any proposal for a new airport or heliport whether for public use or private use (Section 21661.5).

3. *Other Project Review* - State law empowers the Commission to review additional types of land use "actions, regulations, and permits" involving a question of airport/land use compatibility if either: (1) the Commission and the local agency agree that these types of individual projects shall be reviewed by the Commission (Section 21676.5 (b)); or (2) the Commission finds that a local agency has not revised its general plan or specific plan or overruled the Commission and the Commission requires that the individual projects be submitted for review (Section 21676.5 (a)). For the purposes of this plan, the specific types of "actions, regulations, and permits" which the Commission shall review include:

a) Any proposed expansion of a city's sphere of influence within an airport's planning area.

b) Any proposed residential planned unit development consisting of five or more dwelling units within an airport's planning area.

c) Any request for variance from a local agency's height limitation ordinance.

d) Any proposal for construction or alteration of a structure (including antennas) taller than 150 feet above the ground anywhere within the County.

e) Any major capital improvements (e.g., water, sewer, or roads) that would promote urban development.

f) Proposed land acquisition by a government entity (especially, acquisition of a school site).

g) Building permit applications for projects having a valuation greater than $500,000.

h) Any other proposed land use action, as determined by the local planning agency, involving a question of compatibility with airport activities.

4. Review Process

1. *Timing of Project Submittal* - Proposed actions listed in Paragraph 3.1 must be submitted to the Commission for review prior to approval by the local government entity. All projects shall be referred to the Commission at the earliest reasonable point in time so that the Commission's review can be duly considered by the local jurisdiction prior to formalizing its actions. At the local government's discretion, submittal of a project for Airport Land Use Commission review can be done before, after, or concurrently with review by the local planning commission or other local advisory bodies.

2. *Commission Action Choices* - When reviewing a land use project proposal, the Airport Land Use Commission has a choice of either of two actions: (1) find the project *consistent* with the *Airport Land Use Compatibility Plan*; or, (2) find the project *inconsistent* with the Plan. In making a finding of inconsistency, the Commission may note the conditions under which the project would be consistent with the Plan. The Commission cannot, however, find a project consistent with the Plan subject to the inclusion of certain conditions in the project.

3. *Subsequent Review*- Once a project has been found consistent with the *Airport Land Use Compatibility Plan*, it need not be referred for review at subsequent stages of the planning process (e.g., for a general plan amendment and again for a zoning change) unless: (1) major changes to the project are made during subsequent review and consideration by the local jurisdiction; or (2) the local jurisdiction agrees that further review is warranted.

4. *Response Time* - The Airport Land Use Commission must respond to a local agency's request for a consistency determination on a project within 60 days from date of acceptance/referral (Section 21676 (d)). If the Commission fails to make the determination within that period, the proposed action shall be deemed consistent with the *Airport Land Use Compatibility Plan*. Regardless of Commission action or failure to act, the proposed action must also comply with other applicable local, state, and federal regulations and laws.

(a) Matters referred to the Commission for review shall be deemed complete upon the date when all materials and information necessary for processing a project have been confirmed as received by Commission staff. Staff will inform the applicant, or local jurisdiction, in writing within ten working days after receipt of an item for consideration, whether more information is necessary or if the item will then be deemed complete and scheduled for formal review by the Commission.

(b) Necessary information may include final plans, acousitical reports, FAA Aeronautical Studies when deemed necessary for Commission review by staff. This procedure does not apply to screen check or draft environmental impact report responses which staff will respond to within the specified review period. Such official written confirmation of acceptance of a referral by staff within ten working days shall initiate the sixty-day review period pursuant to Public Utilities Code, Section 21676(d). If the applicant, or local jurisdiction, is not contacted by Commission staff by the sixth business day, they should contact the Planning/Building Department to verify receipt of the original referral package. Upon receipt of a complete referral for Commission review and consideration, the Commission Secretary shall schedule and agendize said referral for the appropriate Airport Land Use Commission meeting.

5. *Airport Master Plans* - When reviewing airport master plans for existing airports, the Commission has three action choices:

(a) Find the airport master plan consistent with the *Airport Land Use Compatibility Plan*.

(b) Disapprove the airport master plan on the basis that it is inconsistent with the Commission's Plan.

(c) Modify the *Airport Land Use Compatibility Plan* (after duly noticed public hearing) to reflect the assumptions and proposals in the airport master plan.

6. *New Airports and Heliports* - When reviewing proposals for new airports or heliports, the Commission's choices of action are:

(a) Approve the proposal as being consistent with the specific review policies listed in Section 2.3 below.

(b) Approve the proposal and adopt a Compatibility Plan for that facility. Adoption of such a plan is required if the airport or heliport will be a public-use facility.

(c) Disapprove the proposal on the basis that the noise, safety impacts it would have on surrounding land uses are not adequately mitigated.

2. PRIMARY REVIEW POLICIES

1. Land Use Actions

1. *Project Submittal Information* - A proposed land use action submitted to the Commission for review shall include the following information:

(a) An accurately scaled map showing the relationship of the project site to the airport boundary and runways.

(b) If applicable, a detailed site plan showing ground elevations, the location of structures, open spaces, and water bodies, and the heights of structures and trees.

(c) A description of permitted or proposed land uses and restrictions on the uses.

(d) For residential uses, an indication of the potential or proposed number of dwelling units per acre; or, for non-residential uses, the number of people potentially occupying the total site or portions thereof at any one time.

2. *Primary Criteria* - The compatibility of land uses in the vicinity of the airports covered by this plan shall primarily be evaluated in terms of: (1) the Compatibility Criteria table (Table 2A) and accompanying notes; (2) the Compatibility Plan for each airport; and (3) specific policies established for individual airports.

3. *Supporting Policies* - Additional evaluation criteria are provided in the Supporting Policies which follow. The Commission may refer to these additional policies to clarify or supplement its review.

4. *Reconstruction* - Where an *existing* incompatible development has been partially or fully destroyed, it may be allowed to be rebuilt to a density not exceeding that of the original construction. This exception does not apply within compatibility Zones A and B, unless the reconstruction qualifies as infill under paragraph 2.1.5 or special provisions are established in Chapter 3 (Imperial County Airport policies page 3-10).

5. *Infill* - Where substantial incompatible development already exists, additional infill development of similar land uses may be allowed to occur even if such land uses are to be prohibited elsewhere in the zone. This exception does not apply within the Compatibility Zone A. Projects can be considered "infill" if they meet *all* of the following criteria, other than as noted in Chapter 3 (see Imperial County Airport policies page 3-10):

(a) The Airport Land Use Commission has determined that "substantial development" already exists.

(b) The project site is bounded by uses similar to those proposed.

(c) The proposed project would not extend the perimeter of the area developed with incompatible uses.

(d) The proposal does not otherwise increase the intensity and/or incompatibility of use through use permits, density transfers or other strategy.

(e) The infill area has been identified by the local jurisdiction in its general plan or related document and approved by the Commission.

2. Master Plans for Existing Airports

1. *Project Submittal Information* - An airport master plan submitted to the Commission for review shall contain sufficient information to enable the Commission to adequately assess the noise, safety, overflight, and height restriction impacts of airport activity upon surrounding land uses. A master plan report should be submitted, if available. At a minimum, information to be submitted shall include:

(a) A layout plan drawing of the proposed facility showing the location of: (1) property boundaries; (2) runways or helicopter takeoff and landing areas; and (3) runway protection zones or helicopter approach/departure zones.

(b) Airspace surfaces in accordance with Federal Aviation Regulations, Part 77.

(c) Activity forecasts, including the number of operations by each type of aircraft proposed to use the facility.

(d) Proposed flight track locations and projected noise contours or other relevant noise impact data.

(e) A map showing existing and planned land uses in the vicinity of the proposed airport or heliport.

(f) Identification and proposed mitigation of impacts on surrounding land uses.

2. *Substance of Review* - When reviewing airport master plans, the Commission shall determine whether activity forecasts or proposed facility development identified in the plan differ from the forecasts and development assumed for that airport in this *Airport Land Use Compatibility Plan*. Attention should specifically focus on:

(a) Activity forecasts that are: (1) significantly higher than those in the *Airport Land Use Compatibility Plan*; or which (2) include a higher proportion of larger or noisier aircraft.

(b) Proposals to: (1) construct a new runway or helicopter takeoff and landing area; (2) change the length, width, or landing threshold location on an existing runway; or (3) establish an instrument approach procedure.

3. *Consistency Determination* - The Commission shall determine whether the proposed airport master plan is consistent with the *Airport Land Use Compatibility Plan*. The Commission shall base its determination of consistency on findings that the forecasts and development identified in the airport master plan would not result in greater noise, overflight, and safety impacts or height restrictions on surrounding land uses than are presently assumed in the *Airport Land Use Compatibility Plan*.

3. Plans for New Airports or Heliports

1. *Project Submittal Information* - When submitted to the Commission for review, a proposal for a new airport or heliport shall include the same types of information required by Paragraph 2.1.

2. *Substance of Review* - In reviewing proposals for new airports and heliports, the Commission shall focus on the noise, safety, overflight, and height limit impacts upon surrounding land uses.

(a) Other types of environmental impacts (e.g., air quality, water quality, natural habitats, vehicle traffic, etc.) are not within the scope of Commission review.

(b) The Commission shall evaluate the adequacy of the facility design (in terms of federal and state standards) only to the extent that it affects surrounding land use.

(c) The Commission must base its review on the proposed airfield design. The Commission does not have the authority to require alterations to the airfield design.

3. *Airport/Land Use Relationships* - The review shall examine the relationships between existing and planned land uses in the vicinity of the proposed airport or heliport and the impacts that the proposed facility would have upon these land uses. Questions to be considered should include:

(a) Would the existing or planned land uses be considered incompatible with the airport or heliport if the latter were already in existence?

(b) What measures are included in the airport or heliport proposal to mitigate the noise, safety, and height restriction impacts on surrounding land uses? Such measures might include: (1) location of flight tracks so as to minimize the impacts; (2) other operational procedures to minimize impacts; (3) acquisition of property interests (fee title or easements) on the impacted land.

3. SUPPORTING COMPATIBILITY CRITERIA

1. Noise

1. *Projected Noise Levels* - The evaluation of airport/land use noise compatibility shall consider the *future* Community Noise Equivalent Level (CNEL) contours of each airport. These contours are calculated based upon aircraft activity forecasts which are set forth in adopted airport master plans or which are considered by the Commission to be plausible (refer to Chapter 4 for noise exposure maps). The Commission should periodically review the projected noise level contours and update them if appropriate.

2. *Application of Noise Contours* - The locations of CNEL contours are one of the factors used to define compatibility zone boundaries and criteria. It is intended that noise compatibility criteria be applied

at the general plan, specific plan, or other broad-scale level. Because of the inherent variability of flight paths and other factors that influence noise emissions, the depicted contour boundaries are not absolute determinants of the compatibility or incompatibility of a given land use. Noise contours can only quantify noise impacts in a general manner; except on large parcels or blocks of land, they should *not* be used as site design criteria.

3. *Noise Exposure in Residential Areas* - The maximum CNEL considered normally acceptable for residential uses in the vicinity of the airports covered by this plan is 60 dBA.

4. *Noise Exposure for Other Land Uses* - Noise level standards for compatibility with other types of land uses shall be applied in the same manner as the above residential noise level criteria. Examples of acceptable noise levels for other land uses in an airport's vicinity are presented in Table 2B.

5. *Other Noise Factors* - The extent of outdoor activity associated with a particular land use is an important factor to be considered in evaluating its compatibility with airport noise. In most locations, noise level reduction measures are only effective in reducing interior noise levels.

6. *Single-Event Noise Levels* - Single-event noise levels should be considered when evaluating the compatibility of highly noise-sensitive land uses such as schools, libraries, and outdoor theaters. Single-event noise levels are particularly important in areas which are regularly overflown by aircraft, but which do not produce significant CNEL contours. Flight patterns for each airport (illustrated in Chapter 4) should be considered in the review process. Acoustical studies or on-site noise measurements may be required to assist in determining the compatibility of sensitive uses.

2. Safety

1. *Objective* - The intent of land use safety compatibility criteria is to minimize the risks associated with an off-airport aircraft accident or emergency landing.

(a) Risks both to people and property in the vicinity of an airport and to people on board the aircraft shall be considered.

(b) More stringent land use controls shall be applied to the areas with greater potential risk.

2. *Risks to People on the Ground* - The principal means of reducing risks to people on the ground is to restrict land uses so as to limit the number of people who might gather in areas most susceptible to aircraft accidents.

(a) A method for determining the concentration of people for various land uses is provided in Appendix C.

3. *Land Uses of Particular Concern* - Land uses of particular concern are ones in which the occupants have reduced effective mobility or are unable to respond to emergency situations. Schools, hospitals, nursing homes, and other uses in which the majority of occupants are children, the elderly, and the handicapped shall be prohibited within Compatibility Zones A, B, and C.

4. *Other Risks* - Any use involving the potential for aboveground explosion or the release of toxic or corrosive materials shall be prohibited in Compatibility Zones A and B.

5. *Open Land* - In the event that an aircraft is forced to land away from an airport, the risks to the people on board can best be minimized by providing as much open land area as possible within the airport vicinity. This concept is based upon the fact that the large majority of aircraft accidents occurring away from an airport runway are controlled emergency landings in which the pilot has reasonable opportunity to select the landing site.

(a) To qualify as open land, an area must be: (1) free of structures and other major obstacles such as walls, large trees, and overhead wires; and (2) have minimum dimensions of at least 75 feet by 300 feet. Roads and automobile parking lots are acceptable as open land areas if they meet the preceding criteria.

(b) Open land requirements for each compatibility zone are to be applied with respect to the entire zone. Individual parcels may be too small to accommodate the minimum-size open area requirement. Consequently, the identification of open land areas must initially be accomplished at the general plan or specific plan level or as part of large-acreage projects.

(c) Clustering of development and providing contiguous landscaped and parking areas is encouraged as a means of increasing the size of open land areas.

(d) Building envelopes and the approach zones should be indicated on all development plans and tentative maps within an airport's planning area in order to assure that individual development projects provide the open land areas identified in a general plan, specific plan, or other large-scale plan.

3. Airspace Protection

1. *Height Limits* - The criteria for limiting the height of structures, trees and other objects in the vicinity of an airport shall be set in accordance with Part 77, Subpart C, of the Federal Aviation Regulations and with the United States Standard for Terminal Instrument Procedures (TERPS). Airspace plans for each airport which depict the critical areas for airspace protection are provided in Chapter 4.

2. *Avigation Easement Dedication* - The owner of any property proposed for development within Compatibility Zones A and B shall be required to dedicate an avigation easement to the jurisdiction owning the airport.

(a) The avigation easement shall: (1) provide the right of flight in the airspace above the property; (2) allow the generation of noise and other impacts associated with aircraft overflight; (3) restrict the height of structures, trees and other objects; (4) permit access to the property for the removal or aeronautical marking of objects exceeding the established height limit; and (5) prohibit electrical interference, glare, and other potential hazards to flight from being created on the property. An example of an avigation easement is provided in Appendix E.

(b) Within Compatibility Zones A and B, height restrictions of less than 35 feet may be required.

(c) The ALUC adopted an Avigation Easement and Release which is in Exhibit E-4 in the appendices.

3. *Minimum Restriction* - Other than within Compatibility Zones A and B, no restrictions shall be set which limit the height of structures, trees, or other objects to less than 35 feet above the level of the ground on which they are located even if the terrain or objects on the ground may penetrate Federal Aviation Regulations Part 77 surfaces.

In locations within Compatibility Zones C and D where the ground level exceeds or comes within 35 feet of a Part 77 surface, dedication of an avigation easement limiting heights to 35 feet shall be required in accordance with Paragraph 3. (This policy may be applicable to future airports; there are no such locations near the existing airports in Imperial County.)

3. *FAA Notification* - Proponents of a project which may exceed a Part 77 surface must notify the Federal Aviation Administration as required by FAR Part 77, Subpart B, and by the California State Public Utilities Code Sections 21658 and 21659. (Notification to the Federal Aviation Administration under FAR Part 77, Subpart B, is required even for certain proposed construction that does not exceed the height limits allowed by Subpart C of the regulations. Refer to Appendix B for the specific Federal Aviation Administration notification requirements.)

(a) Local jurisdictions shall inform project proponents of the requirements for notification to the Federal Aviation Administration.

(b) The requirement for notification to the Federal Aviation Administration shall not necessarily trigger review of an individual project by the Airport Land Use Commission if the project is otherwise in conformance with the compatibility criteria established in the *Airport Land Use Compatibility Plan*.

(c) Any project coming before the Airport Land Use Commission for reason of height-limit issues shall include a copy of FAR Part 77 notification to the Federal Aviation Administration.

4. *Other Flight Hazards* - Land uses which may produce hazards to aircraft in flight shall not be permitted within any airport's planning area. Specific characteristics to be avoided include: (1) glare or distracting lights which could be mistaken for airport lights; (2) sources of dust, steam, or smoke which may impair pilot visibility; (3)

sources of electrical interference with aircraft communications or navigation; and (4) any use which may attract large flocks of birds, especially landfills and certain agricultural uses.

4. Overflight

1. *Nature of Impact* - All locations within an airport's planning area are regarded as potentially subject to routine aircraft overflight. Although sensitivity to aircraft overflights varies from individual to individual, overflight sensitivity is particularly important within residential land uses.

   (a) Local jurisdictions shall establish some method of providing notification to prospective buyers of new residential property within an airport's planning area (all compatibility zones). Appropriate measures may include requiring the dedication of avigation or overflight easements, deed noticing, or real estate disclosure statements. Regardless of the methods chosen, the notification shall: (1) indicate the general characteristics of current and projected future airport activity; (2) note that the property is subject to routine overflight by aircraft at low altitudes (at or below traffic pattern altitude); and (3) provide positive assurance that a prospective buyer has received this information. (Refer to Chapter 9 for examples of buyer awareness measures that can be implemented by local land use jurisdictions.)

   (b) Local jurisdictions are encouraged to extend the above or similar buyer awareness program to existing residential property within the airport planning areas.

Land Use Conversion - The compatibility of uses in the airport planning areas shall be preserved to the maximum feasible extent. In large part because of the existing agricultural character of Imperial County, there is presently a high degree of land use compatibility among the existing and planned land uses in the vicinity of the airports in the County. The conversion of land from existing or planned agricultural, industrial or commercial use to residential uses within any airport's traffic area (Compatibility Zones A, B, and C) is strongly discouraged.

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Table 2A

Compatibility Criteria

Imperial County Airport Land Use Compatibility Plan

Zone	Location	Impact Elements	Maximum Densities		Required Open Land[3]
			Residential (du/ac)[1]	Other Uses (people/ac)[2]	
A	Runway Protection Zone or within Building Restriction Line	· High risk · High noise levels	0	10	All Remaining
B1	Approach/Departure Zone and Adjacent to Runway	· Substantial risk - aircraft commonly below 400 ft. AGL or within 1,000 ft. of runway · Substantial noise	0.1	100	30%
B2	Extended Approach/Departure Zone	· Significant risk – aircraft commonly below 800 ft. AGL · Significant noise	1	100	30%
C	Common Traffic Pattern	· Limited risk – aircraft at or below 1,000 ft. AGL · Frequent noise intrusion	6	200	15%
D	Other Airport Environs	· Negligible risk · Potential for annoyance from overflights	No Limit	No Limit	No Requirement

Zone	Additional Criteria		Examples	
	Prohibited Uses	Other Development Conditions	Normally Acceptable Uses[4]	Uses Not Normally Acceptable[5]
A	· All structures except ones with location set by aeronautical function · Assemblages of people · Objects exceeding FAR Part 77 height limits · Hazards to flight[6]	· Dedication of avigation easement	· Aircraft tiedown apron · Pastures, field crops, vineyards · Automobile parking	· Heavy poles, signs, large trees, etc.
B1 and B2	· Schools, day care centers, libraries · Hospitals, nursing homes · Highly noise-sensitive uses · Above ground storage · Storage of highly flammable materials · Hazards to flight[6]	· Locate structures maximum distance from extended runway centerline · Minimum NLR[7] of 25 dBA in residential and office buildings · Dedication of avigation easement	· Uses in Zone A · Any agricultural use except ones attracting bird flocks · Warehousing, truck terminals · Single-story offices	· Residential subdivisions · Intensive retail uses · Intensive manufacturing or food processing uses · Multiple story offices · Hotels and motels
C	· Schools · Hospitals, nursing homes · Hazards to flight[6]	· Dedication of overflight easement for residential uses	· Uses in Zone B · Parks, playgrounds · Low-intensity retail, offices, etc. · Low-intensity manufacturing, food processing · Two-story motels	· Large shopping malls · Theaters, auditoriums · Large sports stadiums · Hi-rise office buildings
D	· Hazards to flight[6]	· Deed notice required for residential development	· All except ones hazardous to flight	

Table 2A Continued
Compatibility Criteria

Imperial County Airport Land Use Compatibility Plan

NOTES

1 Residential development should not contain more than the indicated number of dwelling units per gross acre. Clustering of units is encouraged as a means of meeting the Required Open Land requirements.

2 The land use should not attract more than the indicated number of people per acre at any time. This figure should include all individuals who may be on the property (e.g., employees, customers/visitors, etc.). These densities are intended as general planning guidelines to aid in determining the acceptability of proposed land uses.

3 See Policy 2.5.

4 These uses typically can be designed to meet the density requirements and other development conditions listed.

5 These uses typically do not meet the density and other development conditions listed. They should be allowed only if a major community objective is served by their location in this zone and no feasible alternative location exists.

6 See Policy 3.4

7 NLR = Noise Level Reduction; i.e., the attenuation of sound level from outside to inside provided by the structure.

BASIS FOR COMPATIBILITY ZONE BOUNDARIES

The following general guidelines are used in establishing the Compatibility Zone boundaries for each civilian airport depicted in Chapter 3. Modifications to the boundaries may be made to reflect specific local conditions such as existing roads, property lines, and land uses. Boundaries for NAF El Centro are modified in recognition of the differences between civilian and military aircraft characteristics and flight tracks.

A The boundary of this zone for each airport is defined by the runway protection zones (formerly called runway clear zones) and the airfield building restriction lines.

Runway protection zone dimensions and locations are set in accordance with Federal Aviation Administration standards for the proposed future runway location, length, width, and approach type as indicated on an approved Airport Layout Plan. If no such plan exists, the existing runway location, length, width, and approach type are used.

The building restriction line location indicated on an approved Airport Layout Plan is used where such plans exist. For airports not having an approved Airport Layout Plan, the zone boundary is set at the following distance laterally from the runway centerline:

Visual runway for small airplanes	370 feet
Visual runway for large airplanes	500 feet
Nonprecision instrument runway for large airplanes	500 feet
Precision instrument runway	750 feet

These distances allow structures up to approximately 35 feet height to remain below the airspace surfaces defined by Federal Aviation Regulations Part 77.

B1 The outer boundary of the Approach/Departure Zone is defined as the area where aircraft are commonly below 400 feet above ground level (AGL). For visual runways, this location encompasses the base leg of the traffic pattern as commonly flown. For instrument runways, the altitudes established by approach procedures are used. Zone B1 also includes areas within 1,000 feet laterally from the runway centerline.

B2 The Extended Approach/Departure Zone includes areas where aircraft are commonly below 800 feet AGL on straight-in approach or straight-out departure. It applies to runways with more than 500 operations per year by large aircraft (over 12,500 pounds maximum gross takeoff weight) and/or runway ends with more than 10,000 total annual takeoffs.

C The outer boundary of the Common Traffic Pattern Zone is defined as the area where aircraft are commonly below 1,000 feet AGL (i.e., the traffic pattern and pattern entry points). This area is considered to extend 5,000 feet laterally from the runway centerline and from 5,000 to 10,000 feet longitudinally from the end of the runway primary surface. The length depends upon the runway classification (visual versus instrument) and the type and volume of aircraft accommodated. For runways having an established traffic solely on one side, the shape of the zone is modified accordingly.

D The outer boundary of the Other Airport Environs Zone conforms with the adopted Planning Area for each airport.

sm/Impcrit.

Table 2B
Noise Compatibility Criteria

LAND USE CATEGORY	CNEL, dBA 50-55	55-60	60-65	65-70	70-75
Residential					
single family, nursing homes, mobile homes,	+	0	-	--	--
multi-family, apartments, condominiums	++	+	0	--	--
Public	+	0	-	--	--
schools, libraries, hospitals,	+	0	0	-	--
churches, auditoriums, concert halls,	++	++	++	++	0
transportation, parking, cemeteries					
Commercial and Industrial	++	+	0	0	-
offices, retail trade,	++	++	+	0	0
service commercial, wholesale trade, warehousing,	++	++	++	+	+
light industrial, general manufacturing, utilities,					
extractive industry					
Agricultural and Recreational	++	++	++	++	+
cropland	++	+	0	0	-
livestock breeding	++	+	+	0	-
parks, playgrounds, zoos	++	++	+	0	0
golf courses, riding stables,	++	+	+	0	-
water recreation	+	0	-	--	--
outdoor spectator sports					
amphitheaters					

LAND USE AVAILABILITY	INTERPRETATION/COMMENTS
++ Clearly Acceptable	The activities associated with the specified land use can be carried out with essentially no interference from the noise exposure.
+ Normally Acceptable	Noise is a factor to be considered in that slight interference with outdoor activities may occur. Conventional construction methods will eliminate most noise intrusions upon indoor activities.
0 Marginally Acceptable	The indicated noise exposure will cause moderate interference with outdoor activities and with indoor activities when windows are open. The land use is acceptable on the conditions that outdoor activities are minimal and construction features which provide sufficient noise attenuation are used (e.g., installation of air conditioning so that windows can be kept closed). Under other circumstances, the land use should be discouraged.
- Normally Unacceptable	Noise will create substantial interference with both outdoor and indoor activities. Noise intrusion upon indoor activities can be mitigated by requiring special noise insulation construction. Land uses which have conventionally constructed structures and/or involve outdoor activities which would be disrupted by noise should generally be avoided.
-- Clearly Unacceptable	Unacceptable noise intrusion upon land use activities will occur. Adequate structural noise insulation is not practical under most circumstances. The indicated land use should be avoided unless strong overriding factors prevail and it should be prohibited if outdoor activities are involved.

RC/sm/ALUCT2B.

3

Individual Airport Policies and Compatibility Maps

GENERAL

The Compatibility Maps contained in this chapter are to be used in conjunction with the Compatibility Criteria set forth in Table 2A.

The Compatibility Zones shown on each map represent areas in which the land use compatibility concerns are similar in character. The zone boundaries reflect a composite of the four basic compatibility concerns - noise, safety, overflight, and airspace.

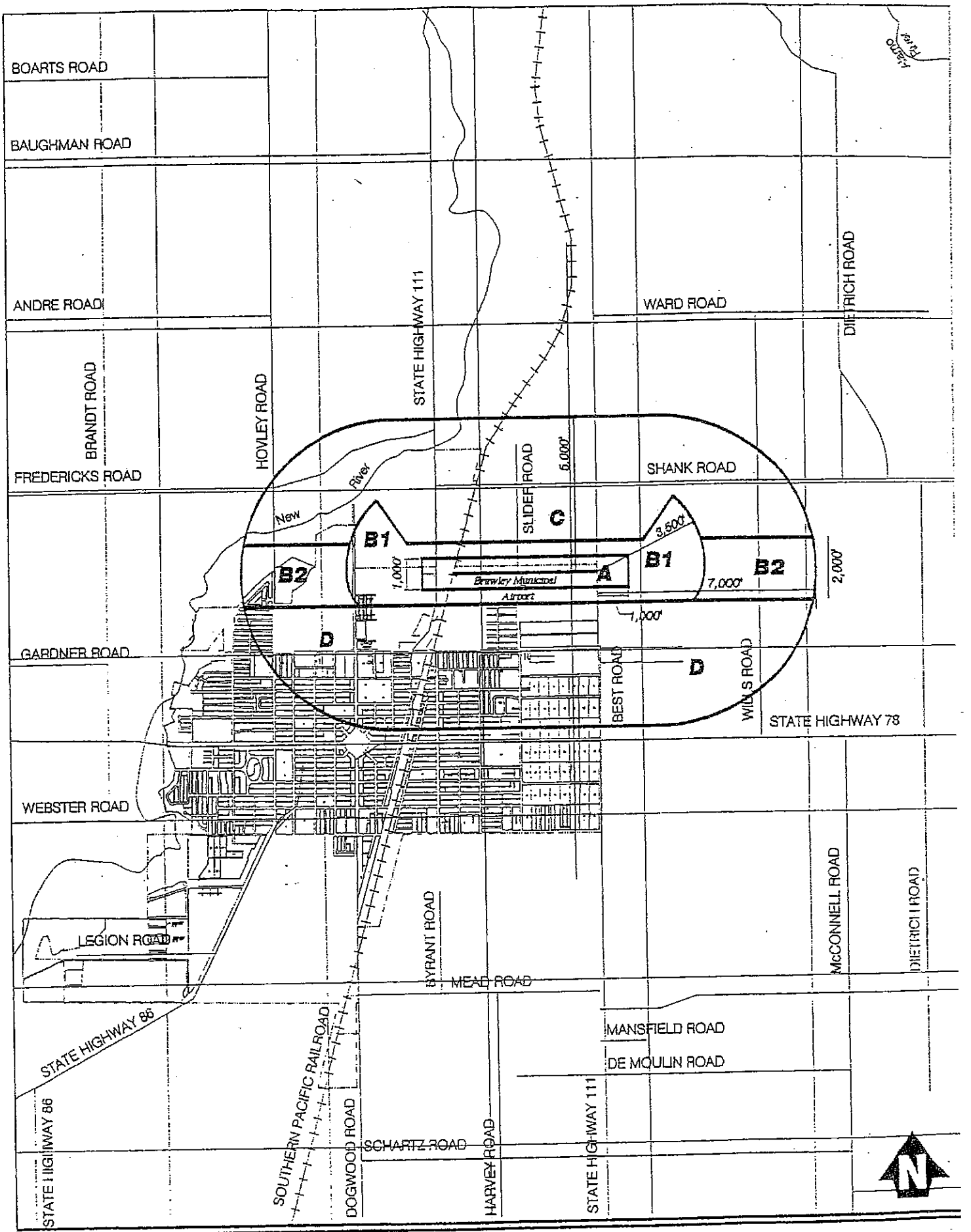
Initially, the impact area for each of these compatibility concerns was delineated for a set of runways having different approach types (visual versus straight-in nonprecision), type of civilian aircraft accommodated (single-engine and light twins versus turboprops, business jets, etc.), and activity level. Next, several composite templates were prepared. These templates were then applied to each airport runway and modified to take into account aircraft traffic pattern restrictions, distinct geographic features on the ground, and other factors peculiar to each individual airport. Zone boundaries for Naval Air Facility El Centro were developed from maps contained in the *Air Installation Compatible Use Zones* report for that airport.

INDIVIDUAL AIRPORT POLICIES

The policies listed in Chapter 2 are intended to apply broadly to all of the airports in Imperial County. In some instances, however, policies addressing concerns specific to a single airport are necessary. Such policies are presented on the following pages.

Brawley Municipal Airport

- The City of Brawley is currently updating the master plan for the Brawley Municipal Airport. The Master Plan should be updated in approximately 6 months. (Pursuant to Memo dated January 3, 1996).
-
- The update to the City of Brawley General Plan was approved by the City Council on April 3, 1995. The update to Brawley's Zoning Ordinance was approved by the City Council on April 17, 1995. (Pursuant to Memo dated January 3, 1996).



Compatibility Map

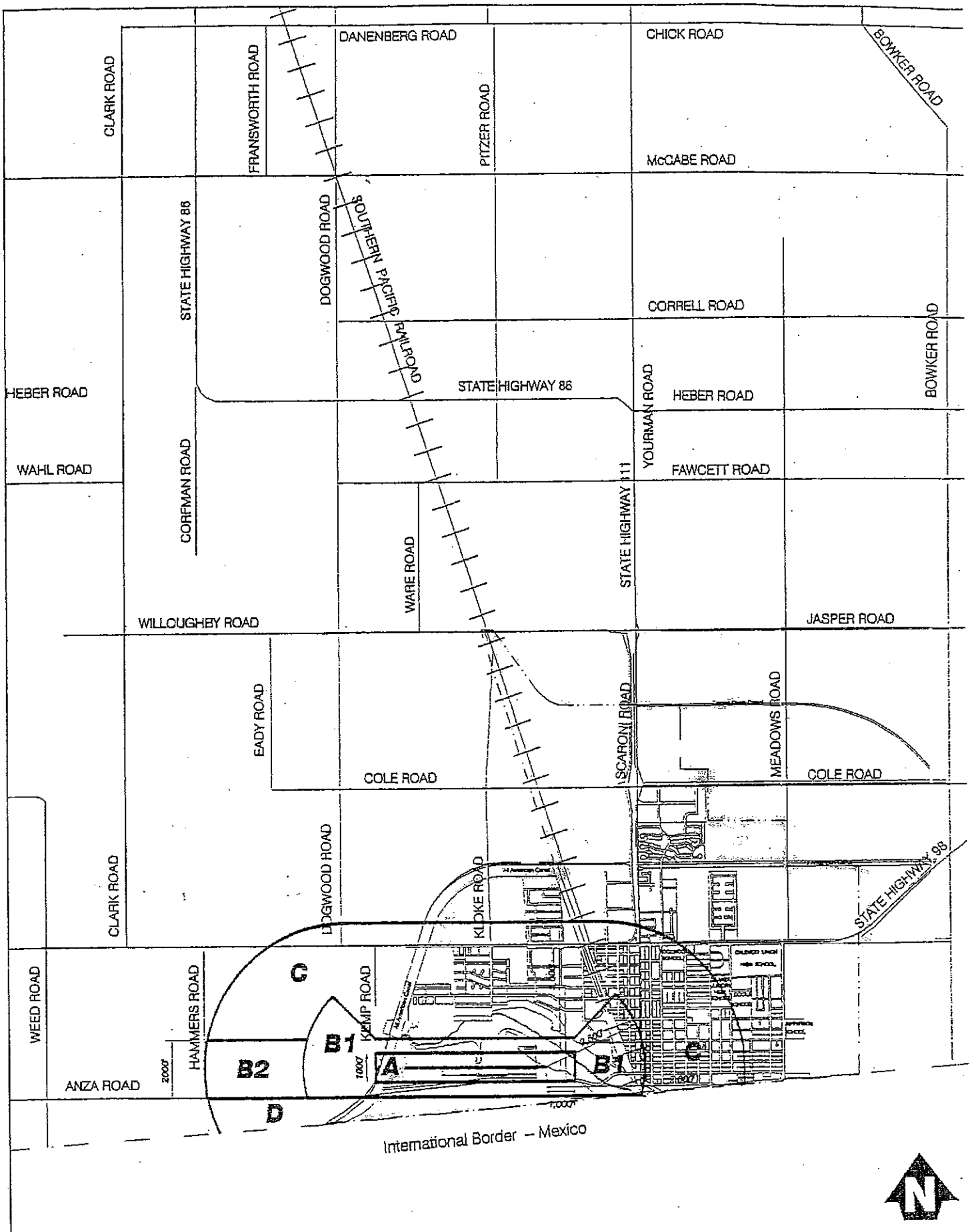
Brawley Municipal Airport

FIGURE 3A

airport land use compatibility plan

Calexico International Airport

- None.



Compatibility Map

Calexico International Airport

FIGURE 3B

airport land use compatibility plan

Calipatria Municipal Airport

- None.

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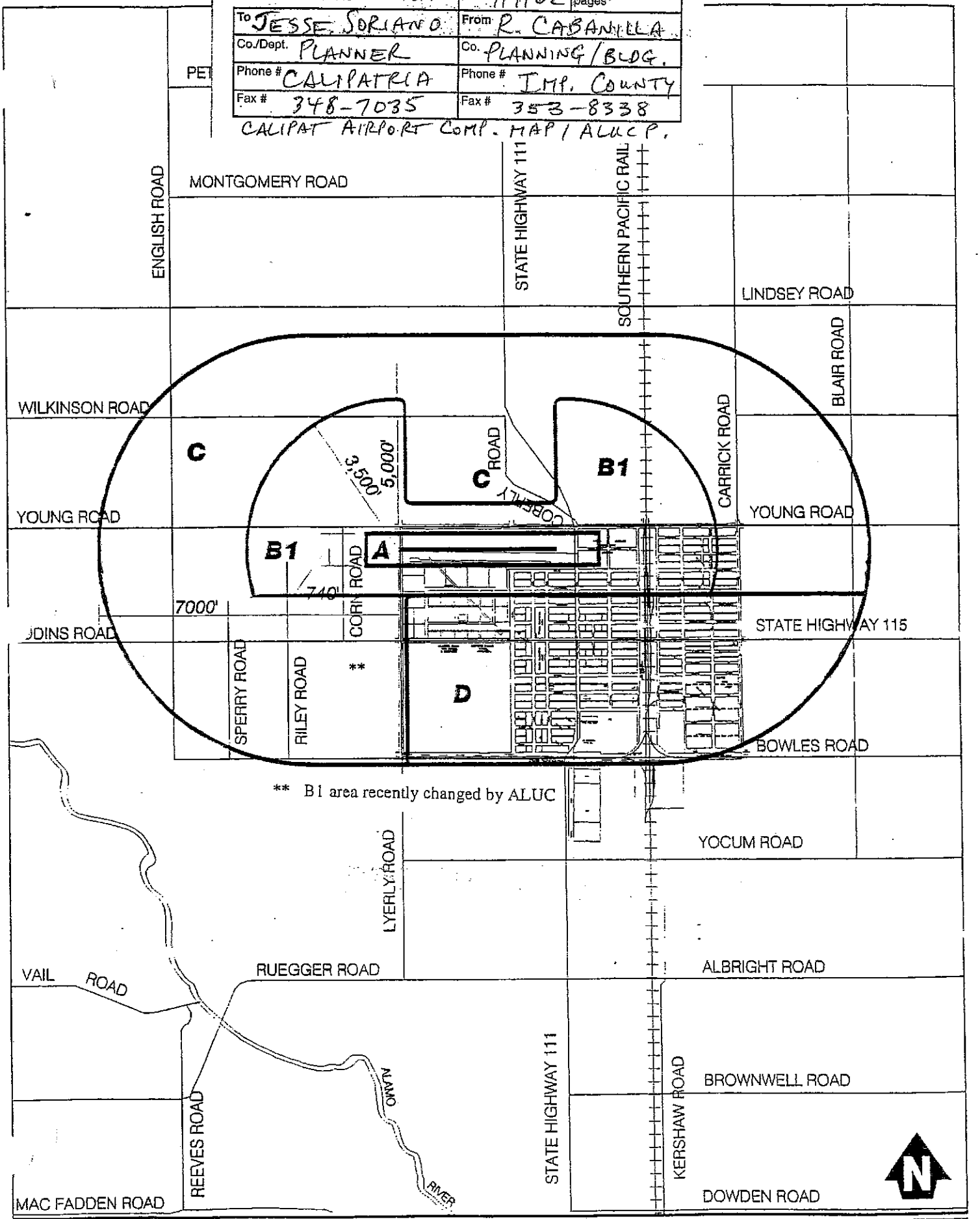
To JESSE SORIANO	From R. CABANILLA
Co./Dept. PLANNER	Co. PLANNING/BLDG.
Phone # CALIPATRIA	Phone # IMP. COUNTY
Fax # 348-7035	Fax # 353-8338

CALIPAT AIRPORT COMP. MAP / ALUCP.



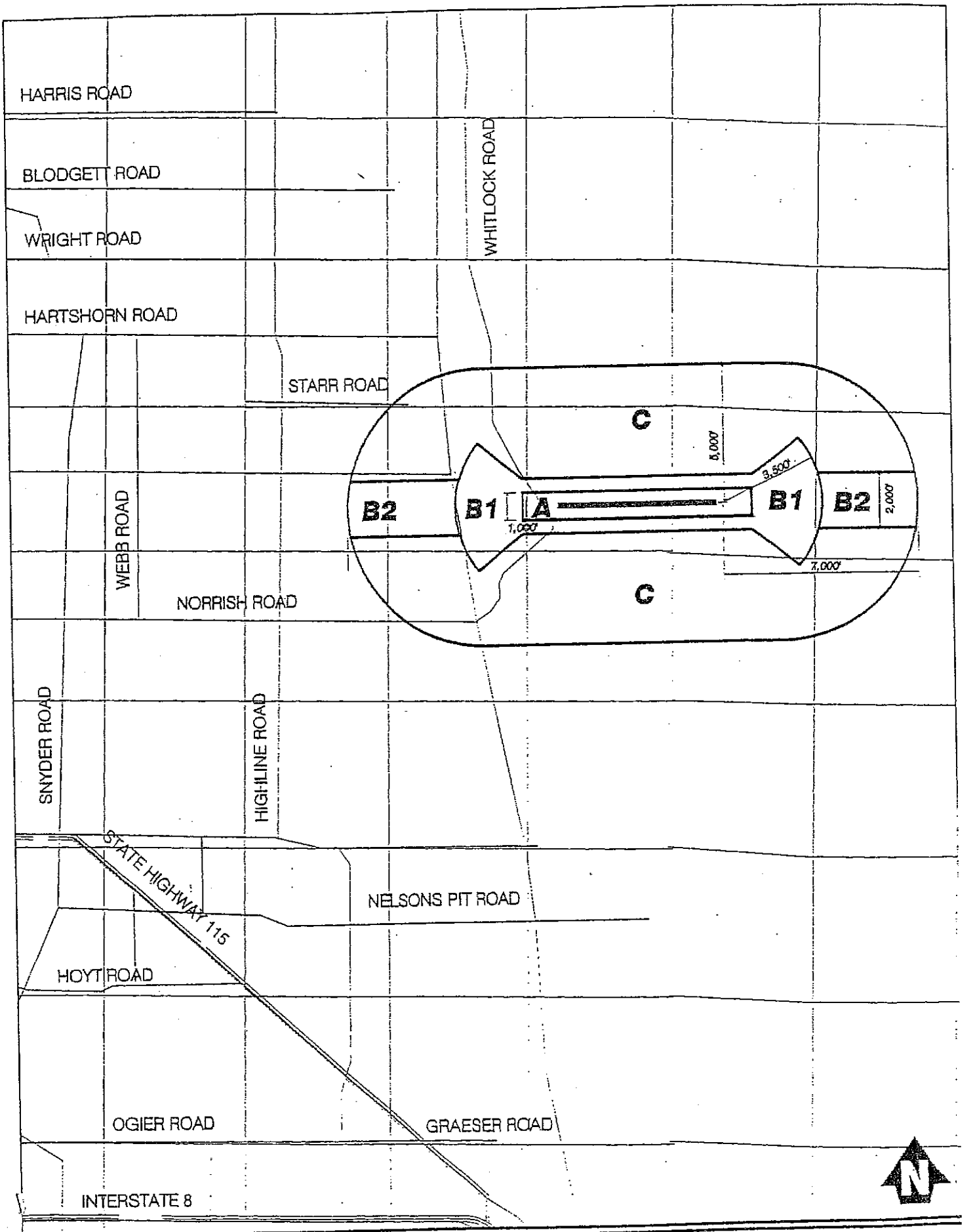
Compatibility Map

Calipatria Municipal Airport

FIGURE 3C

Holtville Airport

- None.



Compatibility Map
Holtville Airport

FIGURE 3D

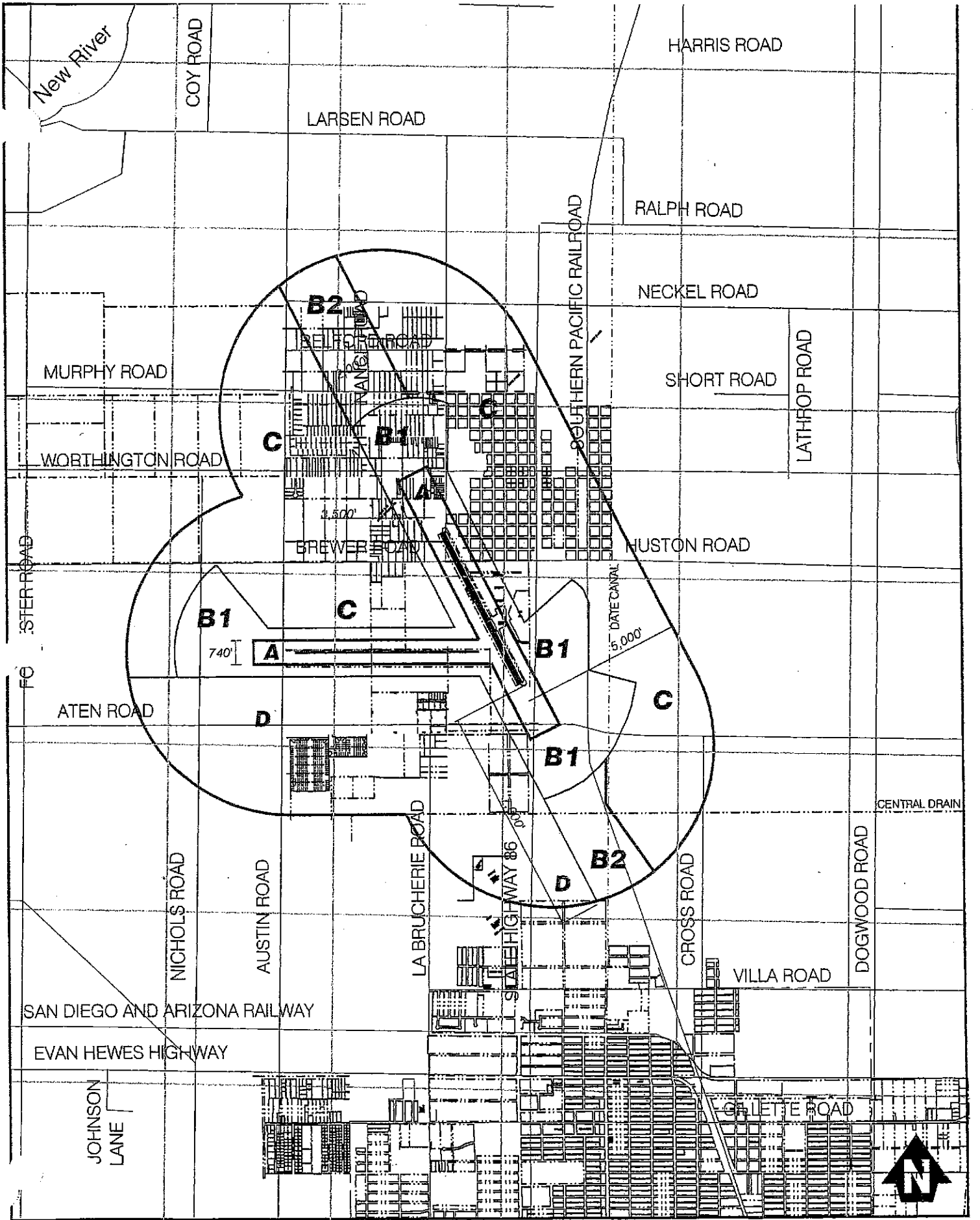
airport land use compatibility plan

Imperial County Airport

- None.

3.1 The Chapter 2 policy regarding infill (paragraph 2.1.5) specifically applies to the Imperial County Airport B1 Zone and potentially to portions of the C Zone as well. As part of the process of modifying its general plan for consistency with this compatibility plan, the City of Imperial should map the areas where it considers existing development to have passed the criteria established by the infill policy.

3.2 Reconstruction (as defined by Paragraph 2.1.4 in Chapter 2) is permitted without exception in the Imperial County Airport B1 Zone.



Compatibility Map

Imperial County Airport

FIGURE 3E

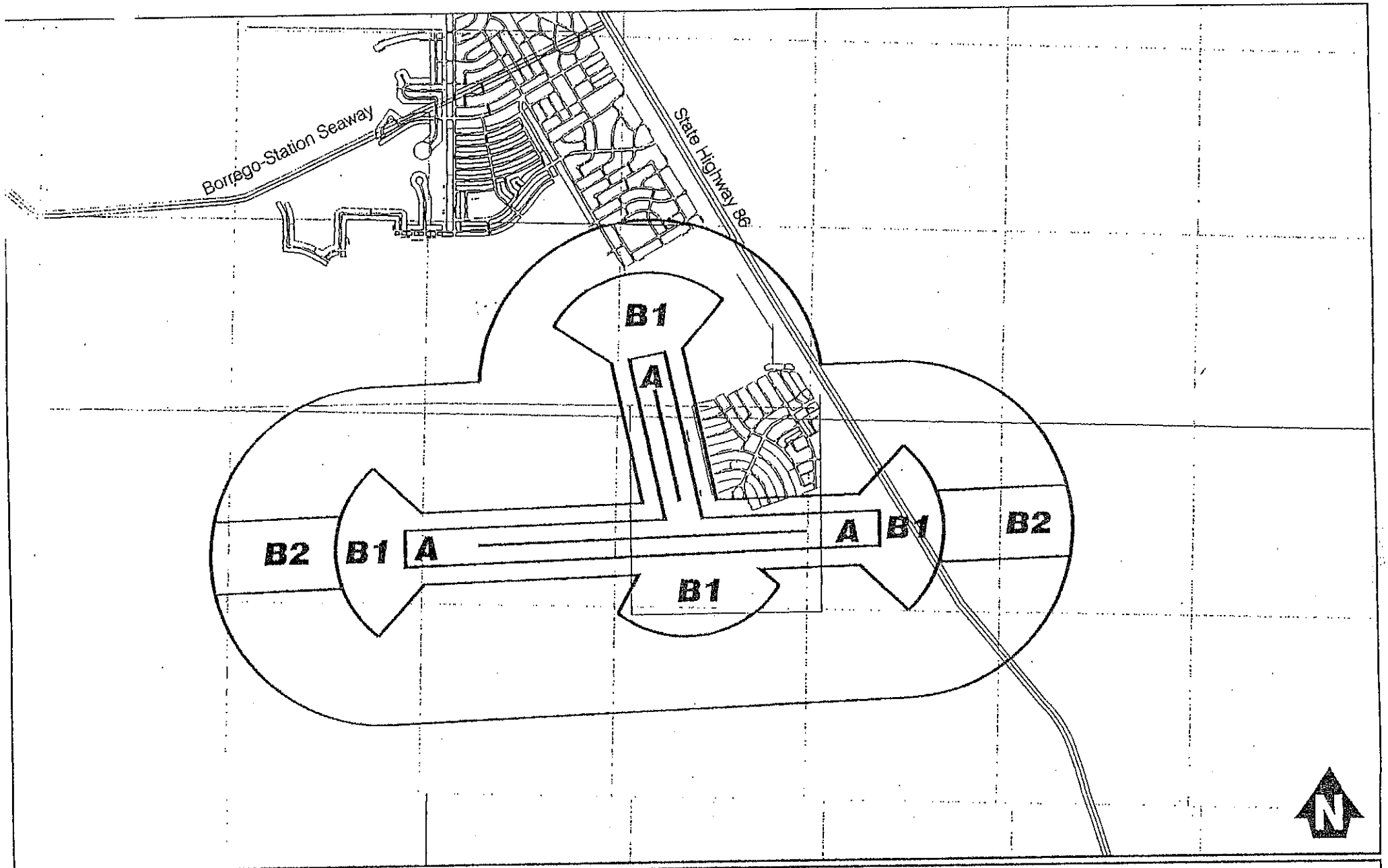
airport land use compatibility plan

K:\ALUC\3E-CORRE.DWG

UPDATED: September 16, 2004 - Map Correction on compatibility outlines.

Salton Sea Airport

Compatibility Map is based upon a proposed concept of the future configuration of the airport. It will need to be modified to reflect future design changes.



Compatibility Map
Salton Sea Airport

FIGURE 3F
airport land use compatibility plan

Naval Air Facility El Centro

- The Naval Air Facility El Centro Compatibility Zones depicted on the accompanying Compatibility Map are derived from the Air Installation Compatible Use Zones (AICUZ) developed for the air base by the Navy. The relationships are as follows:

  - The AICUZ Clear Zone and Setback Area, Accident Potential Zone I (APZ I), and CNEL 75+ dBA Area are included in the *Airport Land Use Compatibility Plan* Compatibility Zone "A".

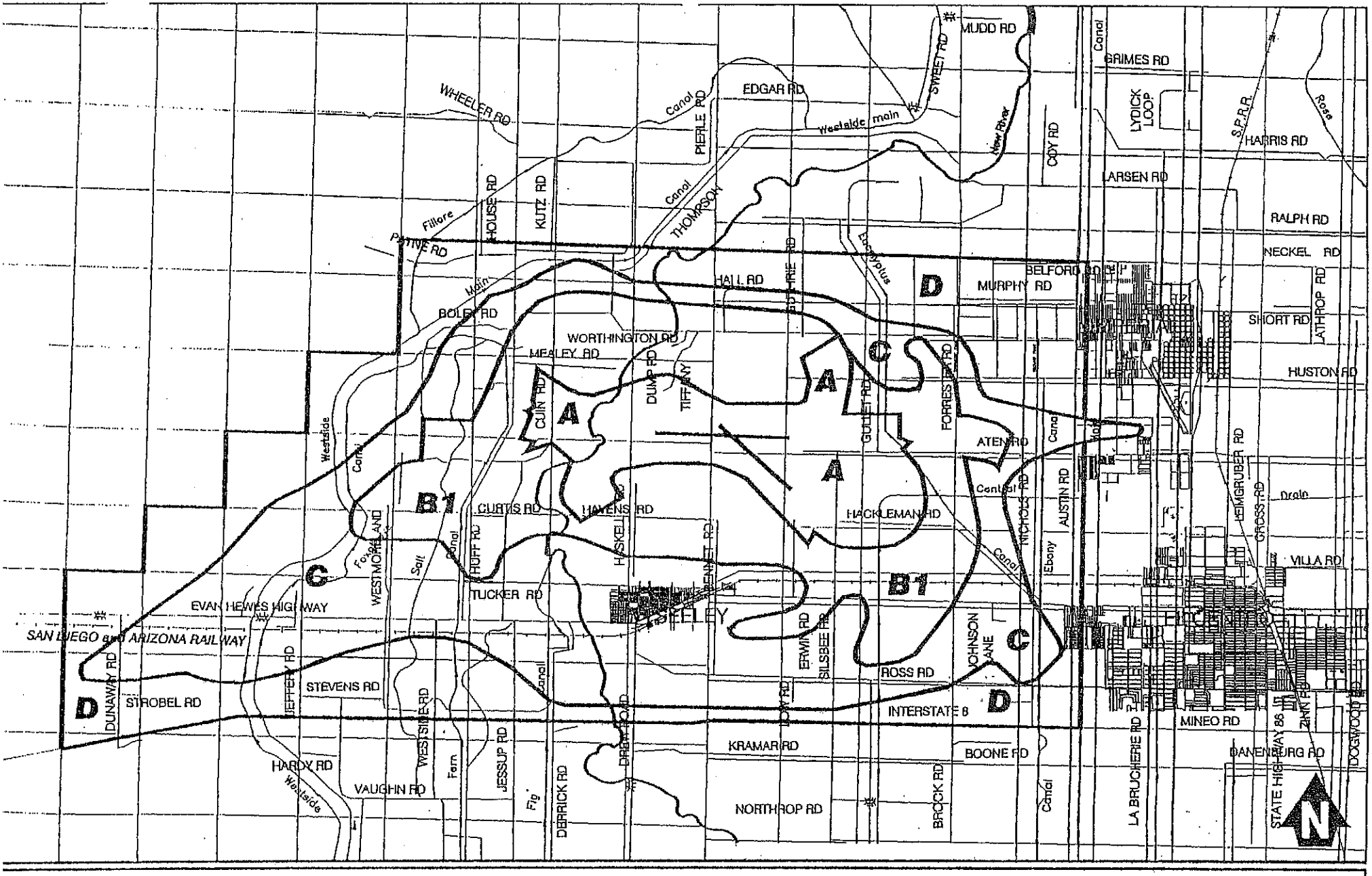
  - The AICUZ Accident Potential Zone II (APZ II) and CNEL 65-75 dBA Area comprise Compatibility Zone "B1".

  - The CNEL 60 dBA contour depicted in the *AICUZ* report defines the limits of Compatibility Zone "C".

- The Suggested Land Use Compatibility criteria included in the *AICUZ* report are consistent in many respects with the criteria in the *Airport Land Use Compatibility Plan* and may be useful as supplementary guidelines. Any discrepancies, however, are to be resolved in favor of the *Airport Land Use Compatibility Plan* criteria.

  NAF will be updating their AICUZ document due to changes in the different types of aircraft utilizing the Naval Air Facility (El Centro).

sm/Imp-3Fin.



Compatibility Map

Naval Air Facility El Centro

FIGURE 3G

airport land use compatibility plan

4

Background Data
Imperial County Airports

INTRODUCTION

This chapter contains background information relevant to land use compatibility planning for the areas surrounding each of the seven airports covered by the *Airport Land Compatibility Plan*. The information is current as of 1995-1996.

For each airport, the following information is presented:

- **Overview** - A short discussion of the major airport/land use compatibility issues presently existing or anticipated in the future.
- **Airport Environs** - A description of existing and planned land uses in the airport vicinity.
- **Land Use Map** - A simplified map of proposed land uses in the surrounding area.
- **Airport Features**- A listing of the principal physical features and services of the airport. The emphasis is on data having potential implications for land use compatibility.
- **Airport Plan** - A diagram of the airport layout. Runways, runway protection zones, and airport boundaries are emphasized.
- **Airport Activity** - Data regarding current and potential future airport activity. The future levels are for an indefinite time frame. Given recent federal and state projections of general aviation activity, this time frame is expected to be well beyond 20 years.
- **Noise Impact Area** - A map depicting future noise impacts of the airport. The contours are generated from the future activity levels indicated in the airport activity table.
- **Airspace Plan** - An illustration of the height limit surfaces defined by Part 77 of the Federal Aviation Regulations.

The airports are included in the following order:

- Brawley Municipal Airport.
- Calexico International Airport.
- Calipatria Municipal Airport.
- Holtville Airport.
- Imperial County Airport.
- Salton Sea Airport.
- Naval Air Facility El Centro.

Brawley Municipal Airport

OVERVIEW

In recent years, the City of Brawley has made significant efforts to upgrade its airport and maintain it as an attractive facility. An old crosswind runway has been phased out and excess lands designated for use as an industrial park. Access road improvements are being made. Additionally, an Airport Master Plan, adopted in 1988, calls for development of a new terminal building and numerous new T-hangar units, some replacing the existing old structures.

With regard to the airport's impacts on surrounding land uses, the City has also taken steps to assure a continued high level of compatibility. The principal measure has been the *General Plan* designation of property adjacent to the airport for future industrial development. The Public Safety/Noise Element of the City of Brawley's General Plan has policies regarding the Airport.

Concerns nonetheless remain as to the adequacy of existing or proposed compatibility measures. Most important is that the continuing expansion of the city is changing the character of the land uses surrounding the airport. At present, most of the lands to the west, north, and east of the airport are agricultural. Even though the *General Plan* indicates that the adjoining lands will become industrial rather than residential or other incompatible use, residential uses are proposed for areas less than 2,000 feet west of the runway end as well as in other relatively close-in areas. City policy allows residential development within the 65-dBA Community Noise Equivalent Level. These concerns are only partially mitigated by the city's policy to obtain avigation easements as a condition for approval of residential subdivisions in these areas.

Another concern is that there are no adopted measures to assure that the nearby industrial development will be optimally compatible with the airport. However, the runway protection zones have been incorrectly located on the Airport Layout Plan (based upon criteria in Federal Aviation Administration Advisory Circular 150/5300-13, *Airport Design)*, thus leaving the outer portions of them unprotected by the proposed measures. Also, safety factors in the areas beyond the runway protection zones are not considered.

The City of Brawley is currently updating the master plan for the Brawley Municipal Airport. The Master Plan should be updated in approximately 6 months. (Per Memo dated January 3, 1996).

Table 4A

Airport Environs

Brawley Municipal Airport

AIRPORT LOCATION AND ACCESS

- Located in northeast corner of city of Brawley, approximately 2.5 miles from city center.
- Airport property entirely within city limits.
- Western runway approach zone and inner 0.5 mile of eastern runway approach zone within city limits.
- Airport bordered by Southern Pacific Railroad line on west and Best Road on east.
- Access via Eastern Avenue and Jones Street on south side of airport.

EXISTING AIRPORT AREA LAND USES

General Character

- Airport is on edge of urban area; new urban development is occurring nearby, especially on south and west.
- Predominantly agricultural lands to north and east.

Runway Approaches

- Runway 8 (west) Approach – Rail line, Highway 111, and industrial uses close in; multi-family residential complex at 0.5 miles from runway end; new single-family residential subdivision at 0.6 miles.
- Runway 26 (east) Approach – Agricultural lands.

Traffic Pattern

- Predominantly agricultural lands beneath traffic pattern north of airport, except for limited industrial uses along rail line and highway to northwest.
- No traffic pattern over urban area to south.

LOCAL LAND USE PLANS AND ZONING

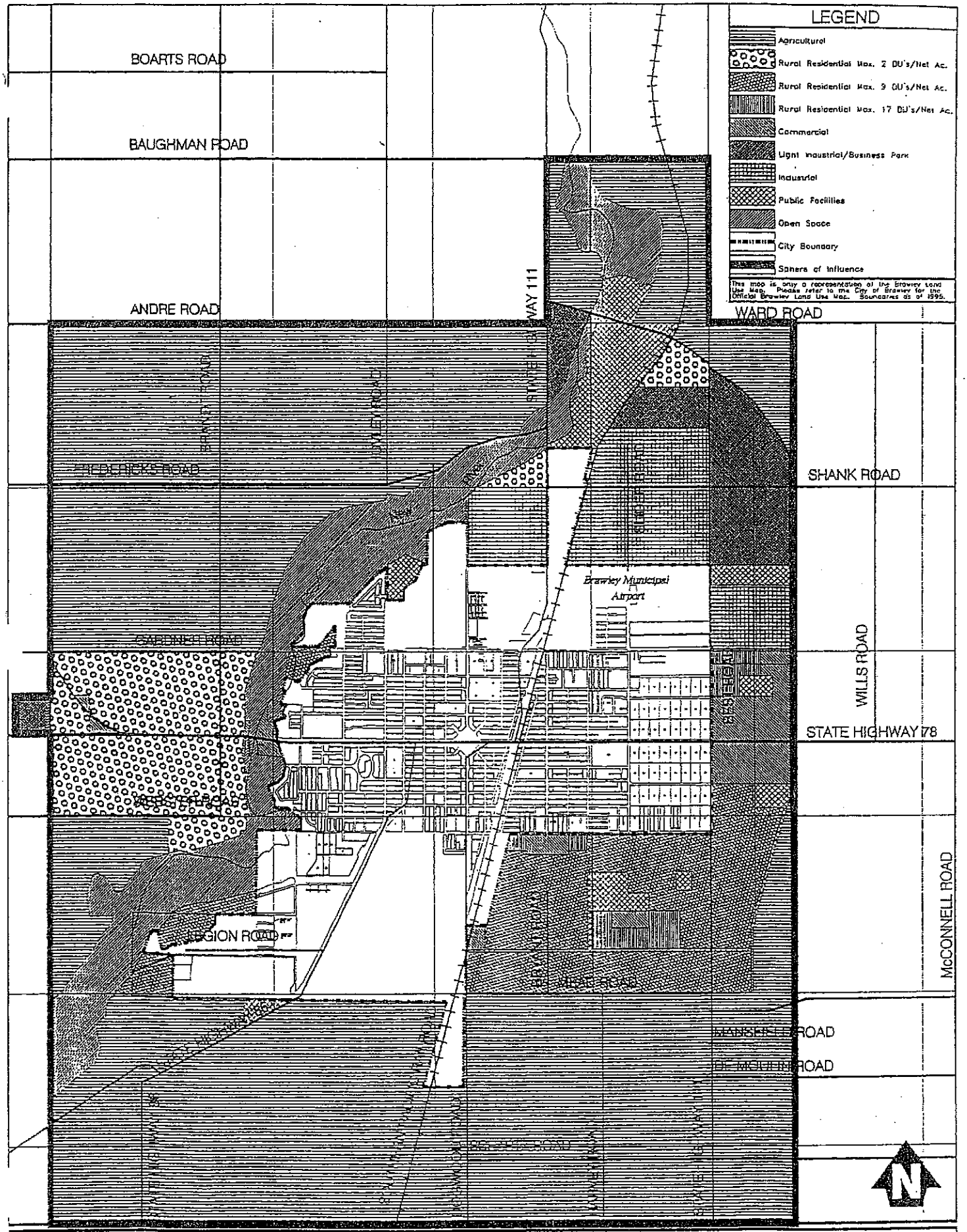
- City sphere of influence extends 0.5 miles north and east of airport.
- *City of Brawley General Plan* adopted April 1995.
  - Industrial uses shown for areas along north and east sides of airport and near western runway protection zone.
  - Open space indicated for eastern runway protection zone; current county zoning is agricultural.
  - Residential areas planned to west and northwest in existing or planned city limits.

PLANNED DEVELOPMENT IN AIRPORT AREA

- New residential subdivisions under construction west of airport; other development anticipated in near term.

ESTABLISHED APPROACH PROTECTION MEASURES

- Standard avigation easement obtained by city on new residential subdivision west of airport.



Background Data

Land Use Map - Brawley Municipal Airport

FIGURE 4A

Table 4B

Airport Features

Brawley Municipal Airport

AIRPORT PROPERTY

- ***Ownership*** – City of Brawley.
- ***Size*** – 160 acres.
- ***Elevation*** – -128 ft. MSL (below sea level)

AIRPORT PLANNING

- ***Adopted Plans*** – Airport Master Plan adopted by City, July 1988; Airport Layout Plan not FAA approved as of October 1990.
- ***Planned Improvements*** – Runway widening; additional aircraft parking, primarily T-hangars.

BUILDING AREA

- ***Location*** – South side of runway.
- ***Aircraft Parking Capacity*** – 80 tiedowns; 62 T-hangars.
- ***Other Major Facilities*** – FBO hangar/office.
- ***Services*** – One multi-service fixed base operation (fuel, supplies, major repairs, aircraft rental, charter, and flight instruction).

RUNWAY SYSTEM

Runway 8-26

- ***Critical Aircraft*** – Small business jet.
- ***Classification*** – Basic Utility Stage II existing, General Utility Stage II proposed; Airport Reference Code B-II.
- ***Dimensions*** – 4,447 feet long, 60 feet wide (proposed 75 feet wide); Ruwnay 8 threshold displaced 780 feet; Runway 26 threshold displaced 395 feet.
- ***Lighting*** – Medium intensity edge lights; visual approach slope indicator at both runway ends.
- ***Surface*** – Asphalt, very good condition.

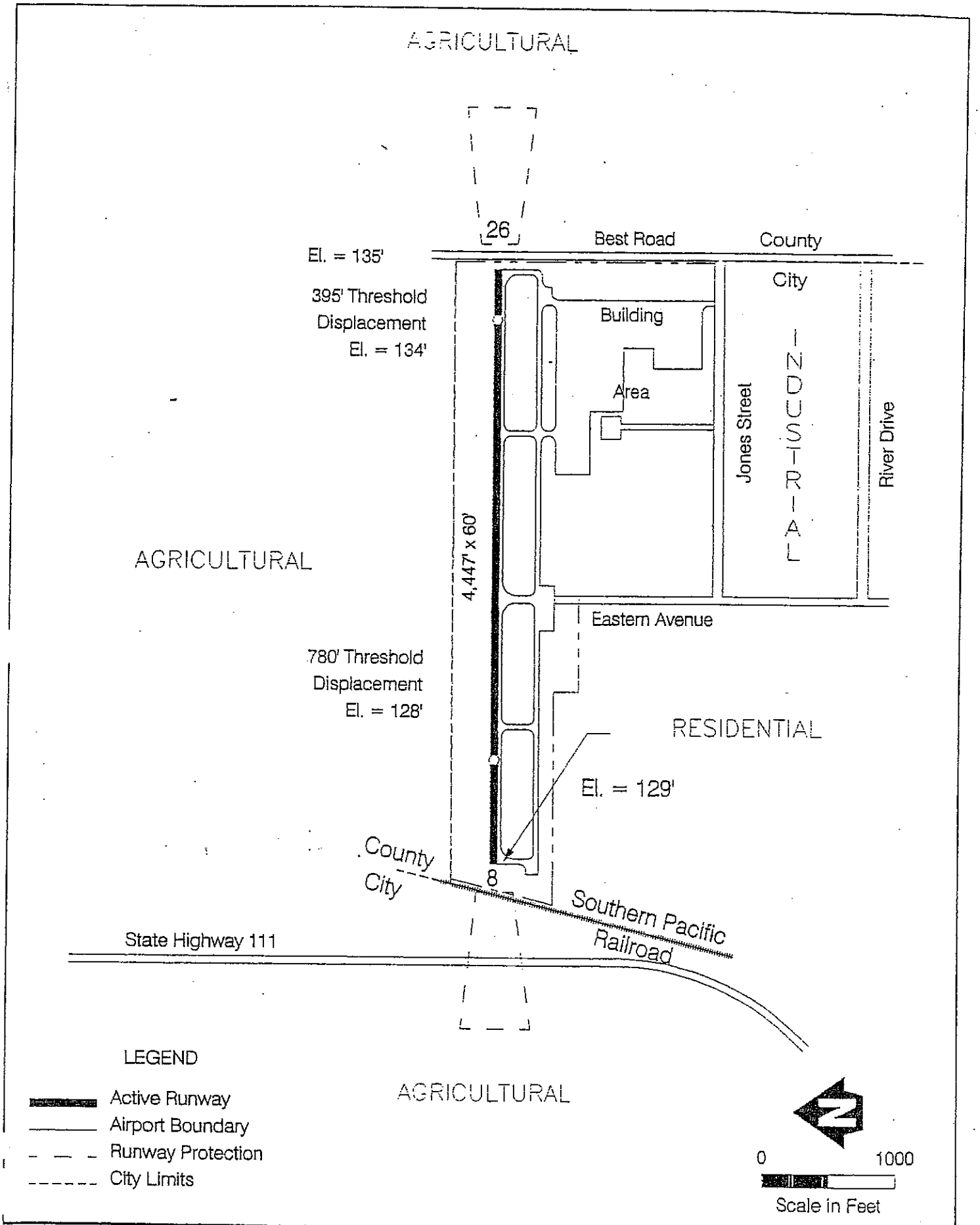
RUNWAY APPROACHES

Runway 8

- ***Approach Type*** – Visual; also circling VOR approach (minimum altitude 629 feet AGL).
- ***Runway Protection Zone*** – Portion covered by avigation easement; remainder not on airport property.
- ***Approach Obstacles*** – Power line (170± feet from runway end); railroad track (200± feet from runway end).

Runway 26

- ***Approach Type*** – Visual; also circling VOR approach (minimum altitude 629 feet AGL).
- ***Runway Protection Zone*** – Portion covered by avigation easement; remainder not on airport property.
- ***Approach Obstacles*** – Road (100 feet from runway end).



Background Data

Airport Plan - Brawley Municipal Airport

FIGURE 4B

Table 4C

Airport Activity

Brawley Municipal Airport

BASED AIRCRAFT

Total	72

AIRCRAFT OPERATIONS

	Current	*Future*[b]
Total		
Annual	65,500	111,200
Average Day	179	305
Distribution		
Single-Engine	40.0%	82.5%
Twin-Engine	9.5%	16.5%
Turboprop	0.3%	0.5%
Agricultural 50.0%	[c]	
Business Jets	0.0%	
0.5% [d]		
Helicopters 0.2%	0.0%	

TIME OF DAY DISTRIBUTION

		Current	*Future*[b]
Single-Engine			
Day	(0700-1900)	84.0%	84.0%
Evening	(1900-2200)	15.0%	15.0%
Night	(2200-0700)	1.0%	1.0%
Twin-Engine			
Day	(0700-1900)	89.0%	89.0%
Evening	(1900-2200)	10.0%	10.0%
Night	(2200-0700)	1.0%	1.0%
Turboprop and Business Jets			
Day	(0700-1900)	95.5%	95.5%
Evening	(1900-2200)	4.5%	4.5%
Night	(2200-0700)	0.0%	0.0%
Agricultural			
Day	(0700-1900)	10.0%	[c]
Evening	(1900-2200)	15.0%	[c]
Night	(2200-0700)	75.0%	[c]

RUNWAY USE DISTRIBUTION

	Current [a]	*Future* [b]
All Aircraft		
All Operations.		
Runway 8	10.0%	
40%		
Runway 26	90.0%	
60%		

No designated calm-wind runway.

Ag aircraft regularly takeoff on Runway 8, land on Runway 26.

FLIGHT TRACK DATA

Pattern Altitude – 800 feet AGL, propeller aircraft; 1,200 feet AGL, jets.

Right traffic on Runway 26 (no south side pattern).

On takeoff, no turns until airport boundary.

NOTES

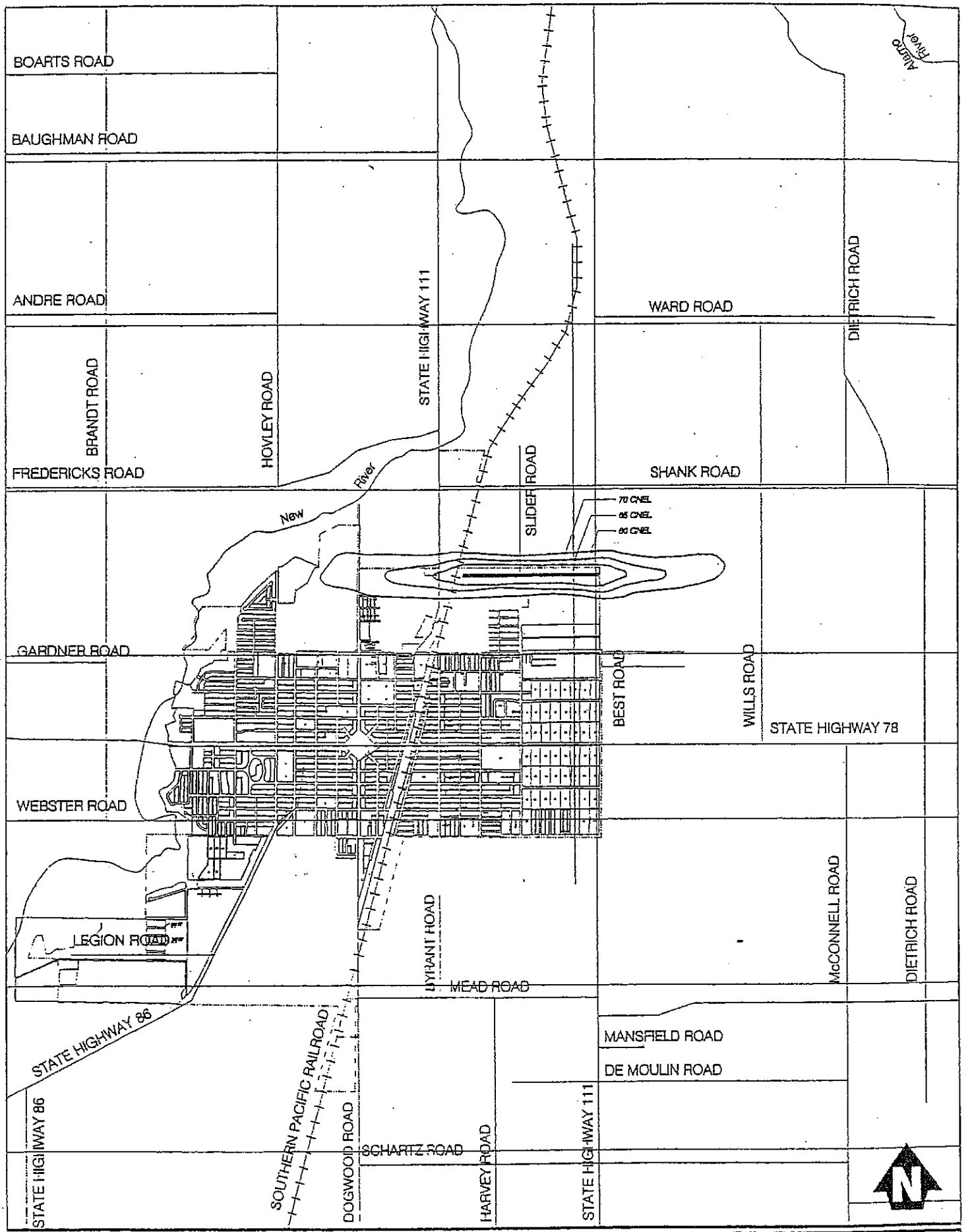
[a] Source: Airport Manager and 1988 *Airport Master Plan.*

[b] *Airport Master Plan* projections for 2008.

[c] Mentioned in *Airport Master Plan* text, but not separated from single-engine aircraft in noise model input.

[d] Noise contours contained in *Airport Master Plan* assume Lear 25 as future business jet at airport; use of a quieter business jet model in the noise contour calculations would likely reduce the size of the contours illustrated on the facing page.

RC/sm/BWCT8L4.

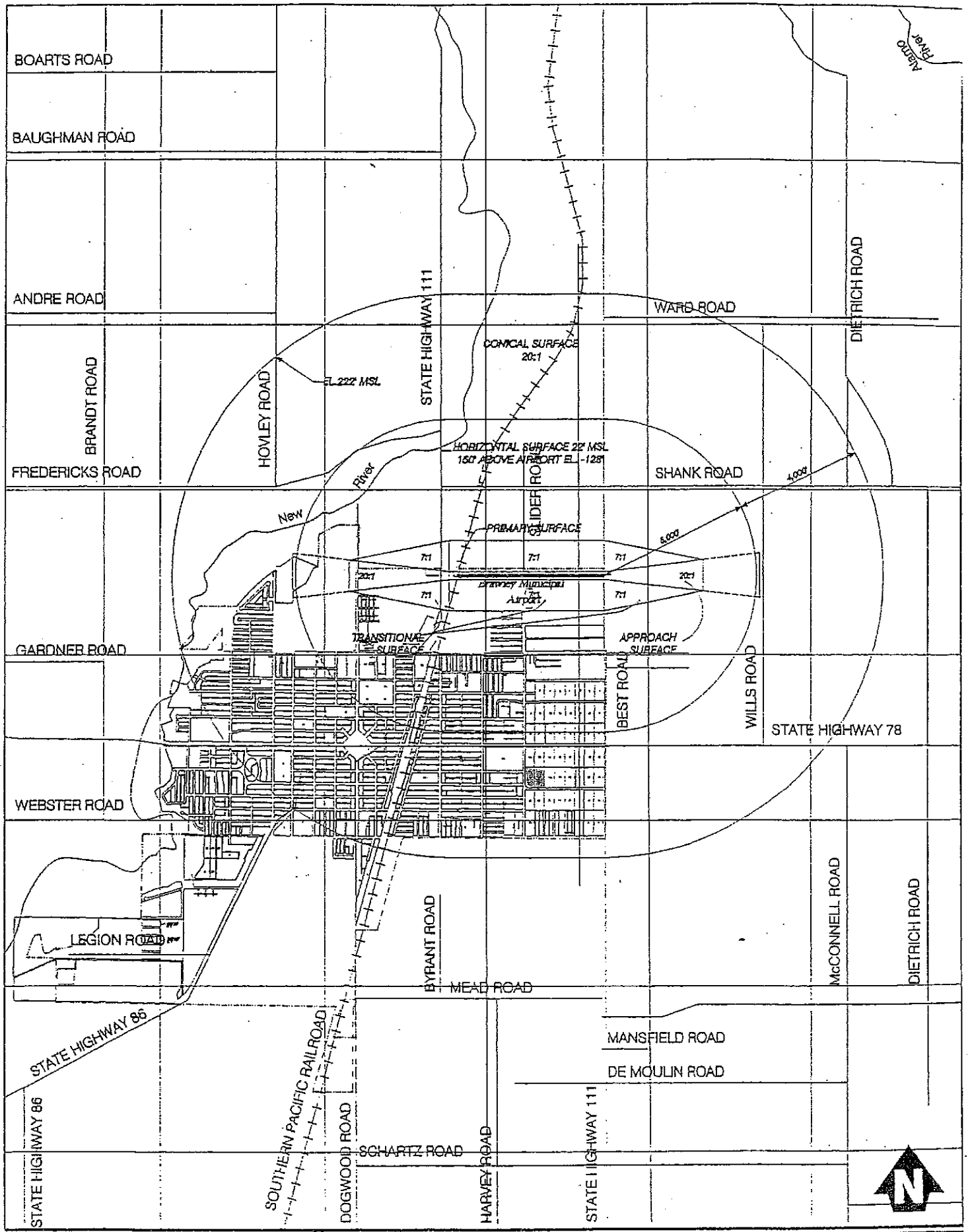


Background Data

Noise Impact Area - Brawley Municipal Airport

FIGURE 4C

airport land use compatibility plan



Background Data

Airspace Plan - Brawley Municipal Airport

FIGURE 4D

airport land use compatibility plan

Calexico International Airport

OVERVIEW

As an Airport of Entry designated by the U.S. Customs Service, Calexico International Airport serves an important regional as well as local aviation role. A high percentage of the airport activity is by transient aircraft; the based aircraft population numbers only 32.

The airport has changed very little over the past decade. Currently, though, the City of Calexico has just completed federal-aid projects that extended the runway and taxiway 300 feet beyond the former west boundary. (Actually adding 390 feet of usable pavement), a new lighting system of variable intensity with pilot activated operation, lighted the power pole west of the All-American Canal, topped trees acquired land for the extension, and obtained an avigation easement west of the canal that permitted topping all obstructures above the 20 feet approach or the 3 setting of the VASI. Long-range plans also call for construction of limited additional aircraft apron and a new terminal building.

Measures to assure land use compatibility around the airport have been spotty on the part of both the city and the county. In recent years, the majority of new residential development in the city has occurred north of the airport, beneath the downwind leg of the traffic pattern. To the east, a large shopping center has been built in the runway approach zone a third of a mile from the runway end. These uses are marginally compatible with the airport activity.

No avigation easement dedication requirements or buyer awareness programs have been implemented. Current city and county land use plans for the airport area dating from 1975 and 1982, respectively, briefly mention airport noise, but give little other recognition to airport/land use compatibility issues or planning criteria. Additional residential development is planned for north of the airport. Lands to the west remain designated for agricultural use, but no permanent measures to assure compatibility have been taken except for an avigation easement west of the canal.

Table 4D

Airport Environs

Calexico International Airport

AIRPORT LOCATION AND ACCESS

- Located in southwest corner of city of Calexico, approximately 1.0 mile west of city center.
- **Existing airport property, except easement area, entirely within city limits.**
- **Western runway approach zone, beyond 800 feet from runway end, in county jurisdiction; eastern runway approach zone in city limits.**
- Airport bordered by Anza Road on south, New River on northeast and north, and All American Canal on west.
- International border 1,300± feet south of runway.
- Access via Anza Road.

EXISTING AIRPORT AREA LAND USES

General Character

- Airport surrounded on three sides by urban development.
- Land to west remains agricultural.
- International border adjoins south edge of airport property.

Runway Approaches

- **Runway 8 (west) Approach – Agricultural lands; All American Canal 800 feet from proposed runway end; house in approach zone, 300 feet beyond canal. Lighted power line west of canal below 20:1.**
- Runway 26 (east) Approach – Truck parking 800 feet from runway end; retail shopping center at 1,700 feet; edge of central business district at 0.6 mile.

Traffic Pattern

- New residential subdivisions beneath downwind leg of traffic pattern.
- Beneath Runway 26 base leg are mostly industrial uses plus a community baseball field.
- No traffic pattern on south side of airport over residential areas of Mexicali, Mexico.

LOCAL LAND USE PLANS AND ZONING

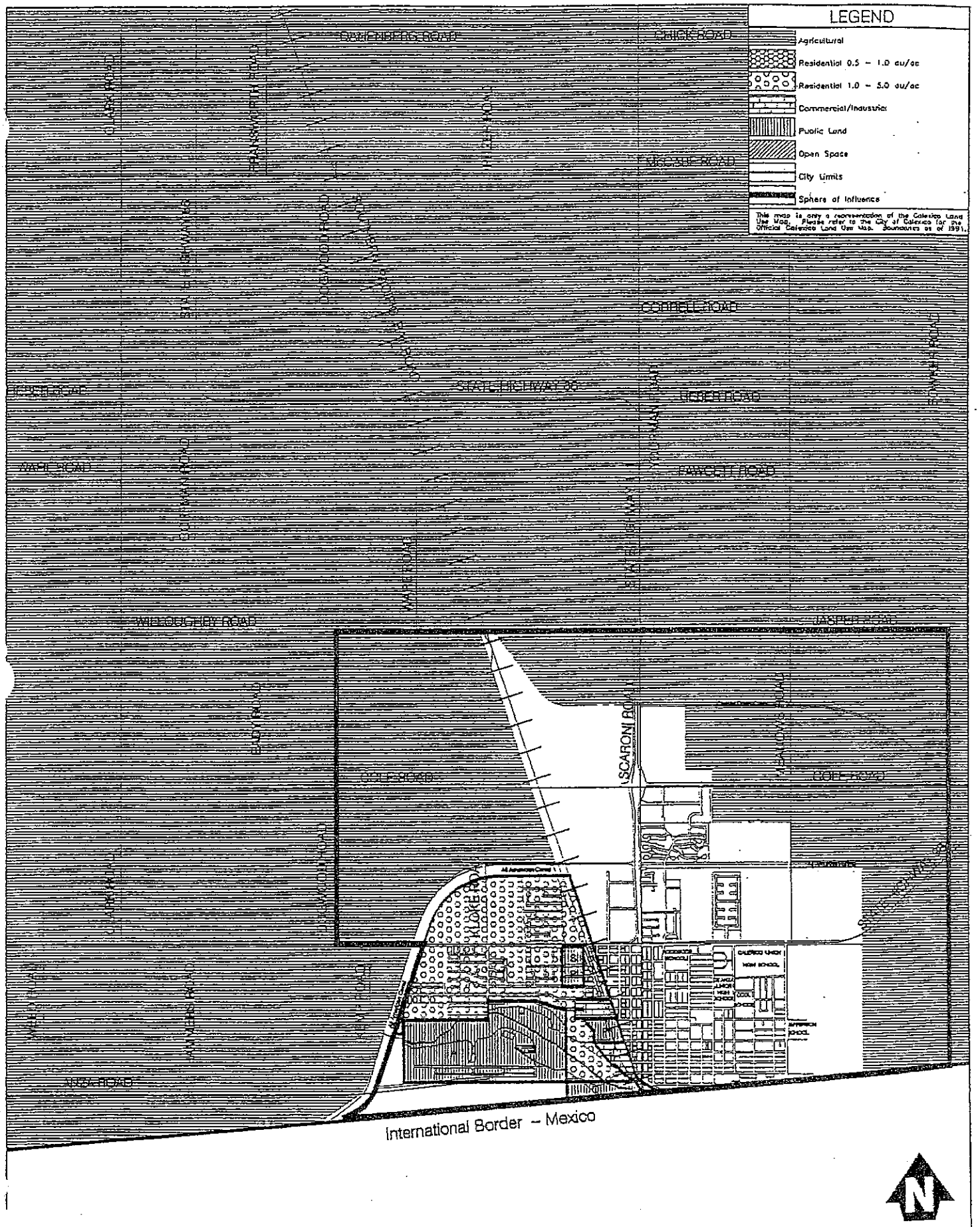
- Sphere of influence coincides with city limits in airport vicinity.
- *City of Calexico General Plan*, dating from 1975, in the process of being updated as of 1992.
  - Noise Element of 1975 plan says new residential development not permitted where existing transportation noise levels exceed normal residential noise levels.
  - No other references to airport/land use compatibility noted.
- Imperial County planning for area set forth in *Calexico Planning Unit – Current Land Use Plan*, adopted 1982. Plan refers to need for "appropriate" height limits and restrictions on land use based upon noise impacts.

PLANNED DEVELOPMENT IN AIRPORT AREA

- Additional residential subdivisions planned north of airport.
- Commercial/industrial uses planned for city and privately owned land between airport and international border.
- Area west of airport to remain agricultural and in county jurisdiction.

ESTABLISHED APPROACH PROTECTION MEASURES

- No city overlay zone or other specific compatibility measures.



Background Data

Land Use Map - Calexico International Airport

FIGURE 4E

airport land use compatibility plan

Table 4E

Airport Features

Calexico International Airport

AIRPORT PROPERTY

- *Ownership* – City of Calexico.
- *Size* – **242 acres, existing.**
- *Elevation* – **3.6 feet MSL.**

AIRPORT PLANNING

- *Adopted Plans – Airport Layout Plan* **adopted by City in 1989; not FAA approved as of December 1995.**
- *Planned Improvements*
  - **Development of new terminal area at center of runway.**
  - Relocation of Airport Road along south side of property.
  - Development of nonaviation uses on airport property south of road.

BUILDING AREA

- *Location* – Narrow strip along south edge of runway plus T-hangar and FBO area in northeast corner of property.
- *Aircraft Parking Capacity* – 60 tiedowns; 10 T-hangars.
- *Other Major Facilities*
  - Administration building and restaurant on south side.
  - T-hangar and FBO building on north side.
- *Services*
  - Fuel (including jet fuel) by city.
  - U.S. Customs inspection.
  - FBO's provide pilot supplies, aircraft maintenance, major repairs, aircraft charter.

RUNWAY SYSTEM

Runway 8-26

- *Critical Aircraft* – Small business jet.
- *Classification* – General Utility Stage I, existing and proposed; Airport Reference Code B-II.
- *Dimensions*
  - **4,507 feet long, 70 feet wide existing.**
  - Runway 26 threshold displaced 170 feet; to remain.
- *Lighting*
  - Medium intensity edge lights.
  - Visual approach slope indicators at both ends of runway.
- *Surface* – Asphalt, good condition.

RUNWAY APPROACHES

Runway 8

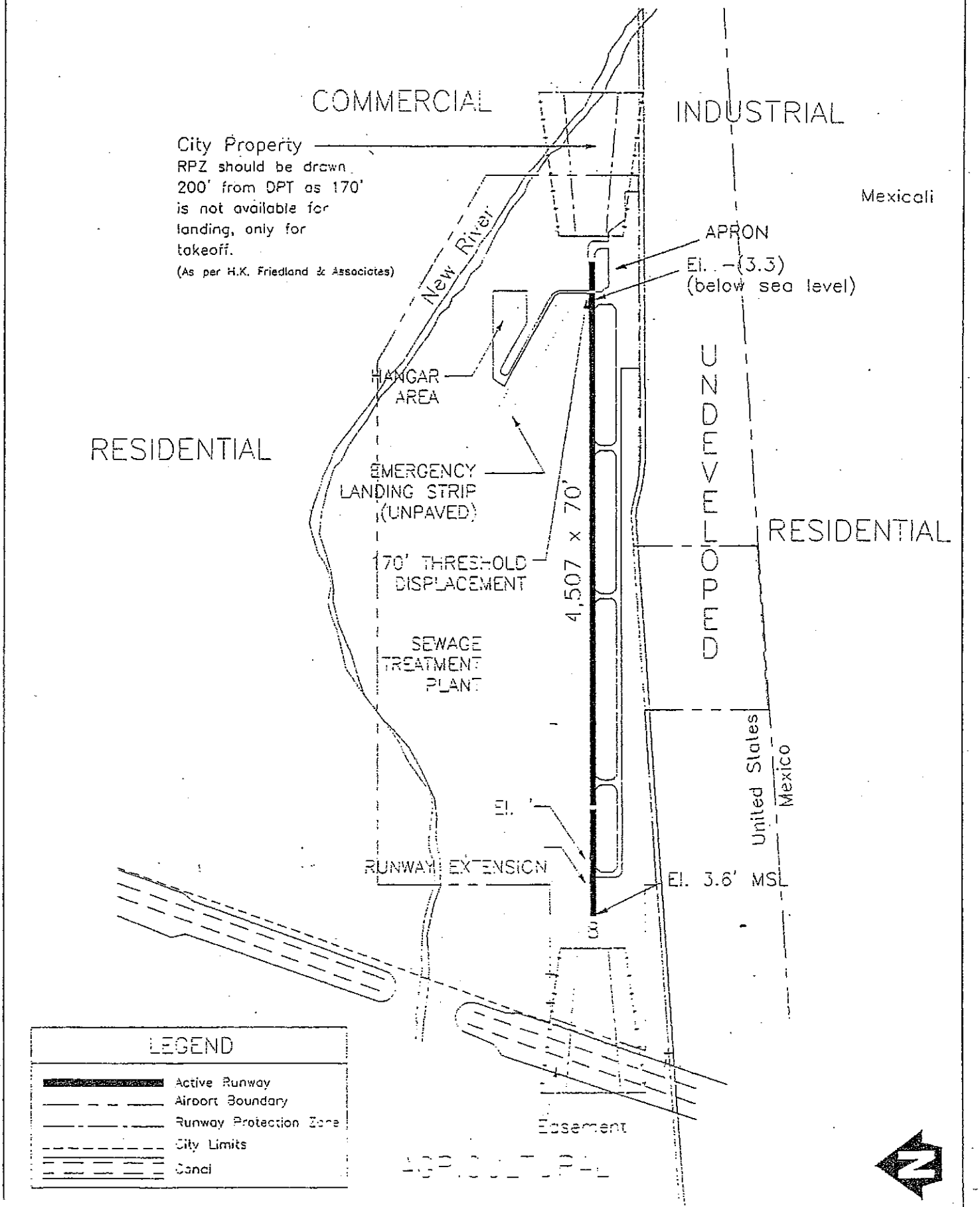
- *Approach Type* –; **Current approaches are visual but land and easements acquired for future non-precision.**
- *Runway Protection Zone*

RPZ is on airport property except over All-American Canal, and avigation easement west of canal.

- *Approach Obstacles* – **Pole line west of canal lighted.**

Runway 26

- *Approach Type* – **Current approaches are visual but land and easements acquired for future non-precision.**
- *Runway Protection Zone*
  - **Existing visual RPZ and future non-precisions RPZ are on airport property, City-owned property east of airport 30 feet below runway is used for truck storage.**
- *Approach Obstacles* – Treeshold displaced for safety from 30 feet drop off.



Background Data

Airport Plan - Calexico International Airport

FIGURE 4F

airport land use compatibility plan

Table 4F

Airport Activity

Calexico International Airport

BASED AIRCRAFT

	Current[a]	*Future*[b]
Total	32	

AIRCRAFT OPERATIONS

	Current[a]	*Future*[b]
Total		
Annual	25,000	60,000
Average Day	68	164
Distribution		
Single-Engine	81.0%	72.5%
Twin-Engine	13.0%	16.0%
Turboprop	3.5%	7.5%
Agricultural	3.0%	2.5%
Business Jets	0.5%	1.5%
Helicopters 0.0%	0.5%	

TIME OF DAY DISTRIBUTION

		Current[a]	*Future*[b]
All Aircraft			
Day	(0700-1900)	90.0%	
Evening	(1900-2200)	9.0%	Same
Night	(2200-0700)	1.0%	

RUNWAY USE DISTRIBUTION

	Current [a]	*Future* [b]
All Aircraft		
Takeoffs/Touch & Goes		
Runway 8	20.0%	
Runway 26	80.0%	
Same		

	Current [a]	*Future* [b]
Landings		
Runway 8	30.0%	
Runway 26	70.0%	

FLIGHT TRACK DATA

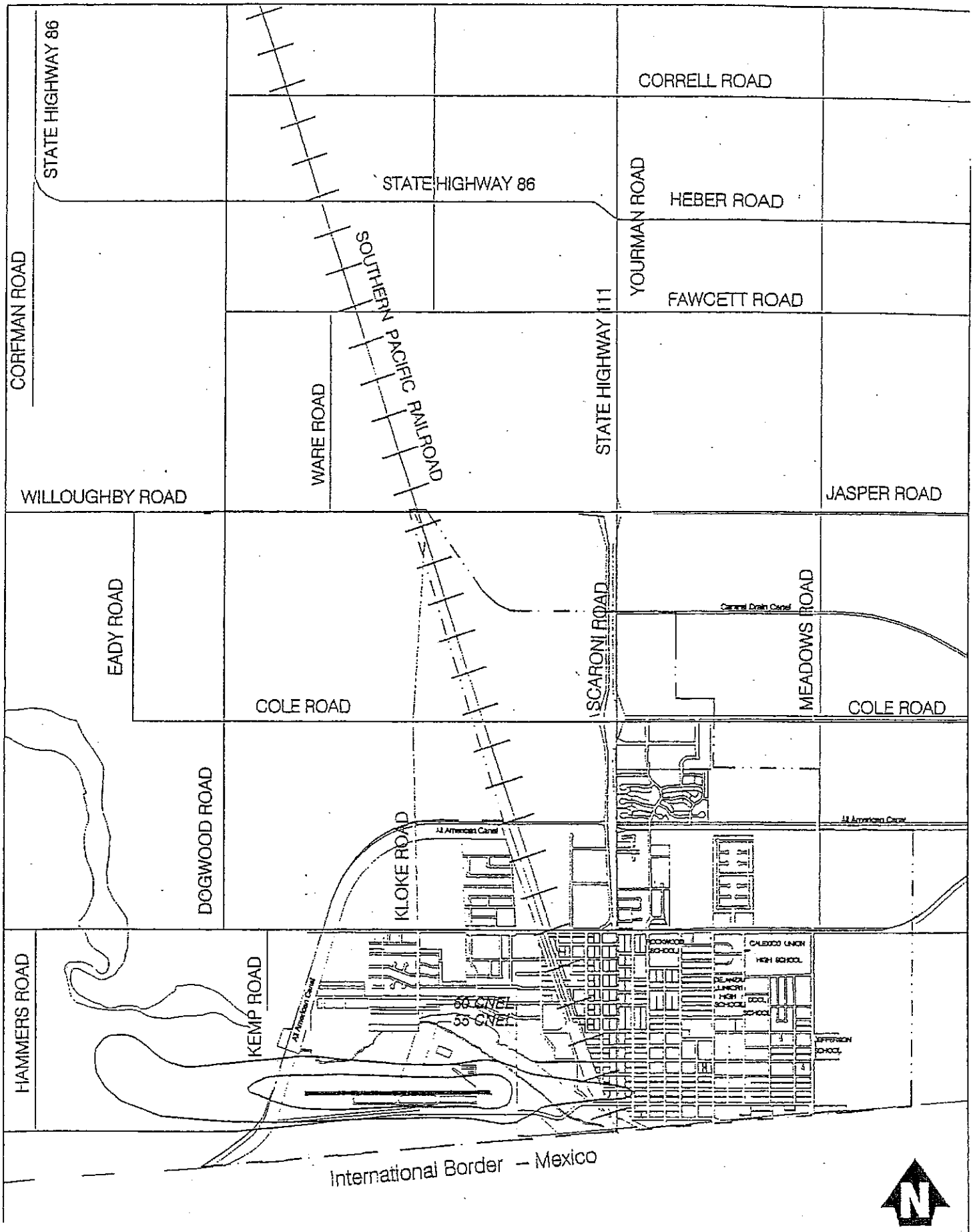
- Pattern Altitude – 800 feet AGL.
- Right traffic on Runway 26 (no south side pattern).
- No straight-in approach to Runway 26.

NOTES

[a] Estimated 1995 activity levels.

[b] Assumed future (beyond 20 years) activity levels for airport/land use compatibility planning purposes.

RC/sm/ClxAllTb.

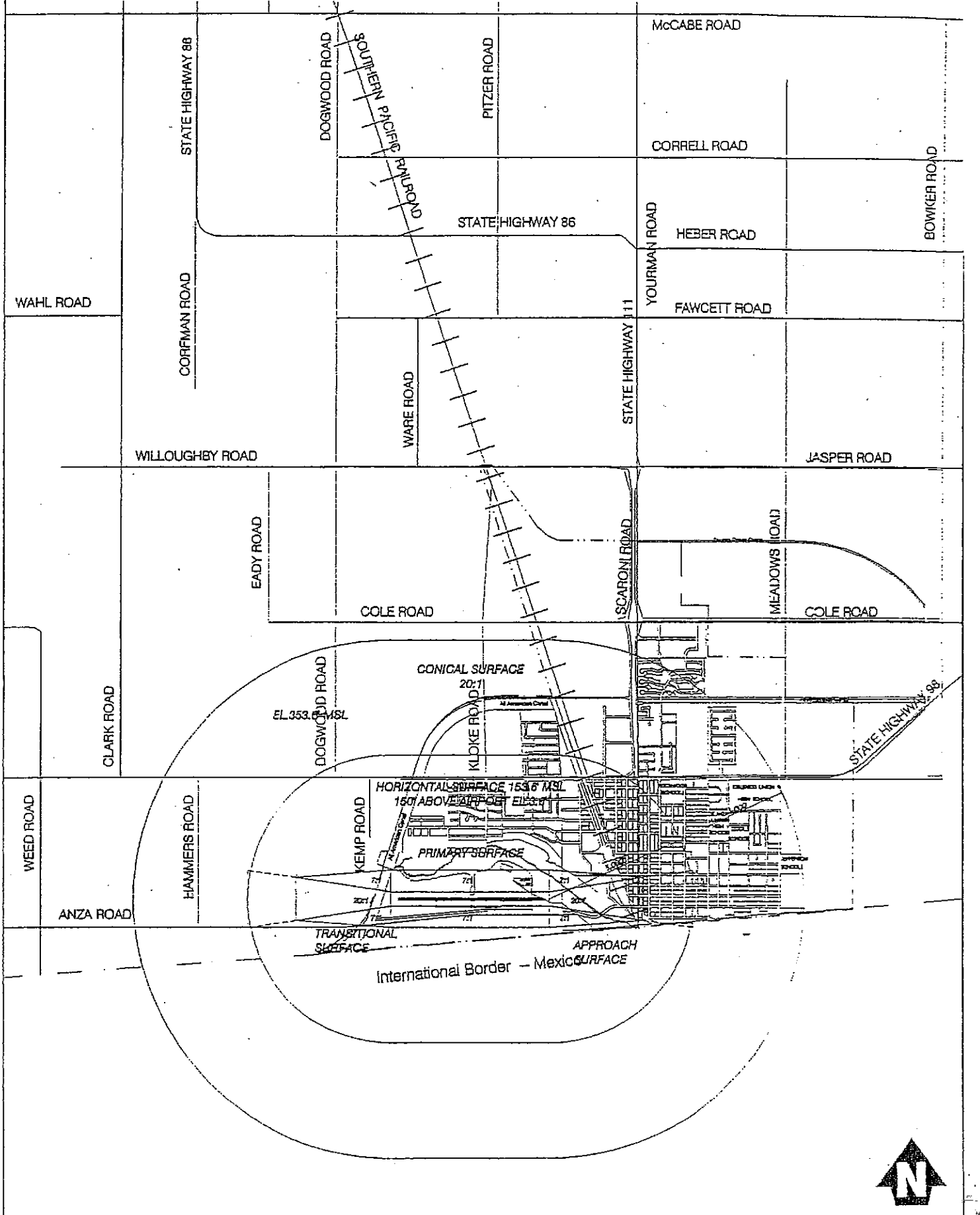


Background Data

Noise Impact Area - Calexico International Airport

FIGURE 4G

airport land use compatibility plan



Background Data

Airspace Plan - Calexico International Airport

FIGURE 4H

airport land use compatibility plan

Calipatria Municipal Airport

OVERVIEW

Both physically and functionally, Calipatria Municipal Airport is fundamentally a paved, agricultural strip. Almost all of the based aircraft are agricultural aircraft and these aircraft generate some 90% of the total operations. No fuel or other services are available to the general public. Most non-agricultural based and transient aircraft use nearby Brawley Municipal Airport.

Facilities at the airport are minimal. There are no tiedowns or hangar spaces for non-agricultural aircraft. The unlighted, 3,440-foot long runway is nearly 1,000 feet shorter than any of the other runways at public use airports in the County.

Land use compatibility measures for the airport have also been minimal. Most of the runway protection zones at both ends of the runway lie beyond the airport property boundaries. Height limit zoning ordinances, adopted by both the city and the County, are outdated. Several houses have been built in recent years immediately west of the runway, the County's A-1 zoning for this area allows residences on half-acre lots. Land within the city limits to the east of the runway is zoned commercial and industrial, but there are no aviation-related restrictions on the intensity of use.

Continuation of the status quo is the most likely immediate future for the airport. No improvements to the airport are currently contemplated and no change in the character of the activity is anticipated. *Airport Land Use Compatibility Plan* policies regarding the airport need to reflect the airport's predominantly agricultural-aircraft role and the unusual aspects of the operations by these aircraft.

In the longer term, the airport's future is less certain. The new state prison, constructed in 1990 three miles north of the city, is expected to produce substantial demand for new housing in the Calipatria area. The manner in which the airport relates to long-term plans for development of the community is also undetermined. There has been some local discussion of moving the airport to a new site farther from town, but no specific actions have been taken. At such time as new plans for either the existing or a new airport are approved, adjustments to the *Airport Land Use Compatibility Plan* will be necessary.

Table 4G

Airport Environs

Calipatria Municipal Airport

AIRPORT LOCATION AND ACCESS

- Located in northwestern corner of city of Calipatria, approximately 0.5 mile from city center.
- Airport property entirely within city limits.
- Eastern runway approach zone in city limits; western runway approach zone in unincorporated area of county.
- Airport bordered by Main Street on south, Lyerly Road on west, Young Road on north, State Highway 111 on east, and Delta Road and International Street on southeast.
- Access is via Main Street.

EXISTING AIRPORT AREA LAND USES

General Character

- Airport is on edge of urban area.
- Predominantly agricultural lands to north and west.

Runway Approaches

- Runway 8 (west) Approach – Road at 200 feet from runway end; several new rural residences at 1,500± feet; other areas agricultural field crops.
- Runway 26 (east) Approach – Industrial storage/trucking uses on east side of highway 415 feet from runway end; additional similar uses within 4,000± feet.

Traffic Pattern

- Agricultural lands beneath traffic pattern north of airport.
- No traffic pattern over urban area to south; high school bordering south side of airport not normally overflown.

LOCAL LAND USE PLANS AND ZONING

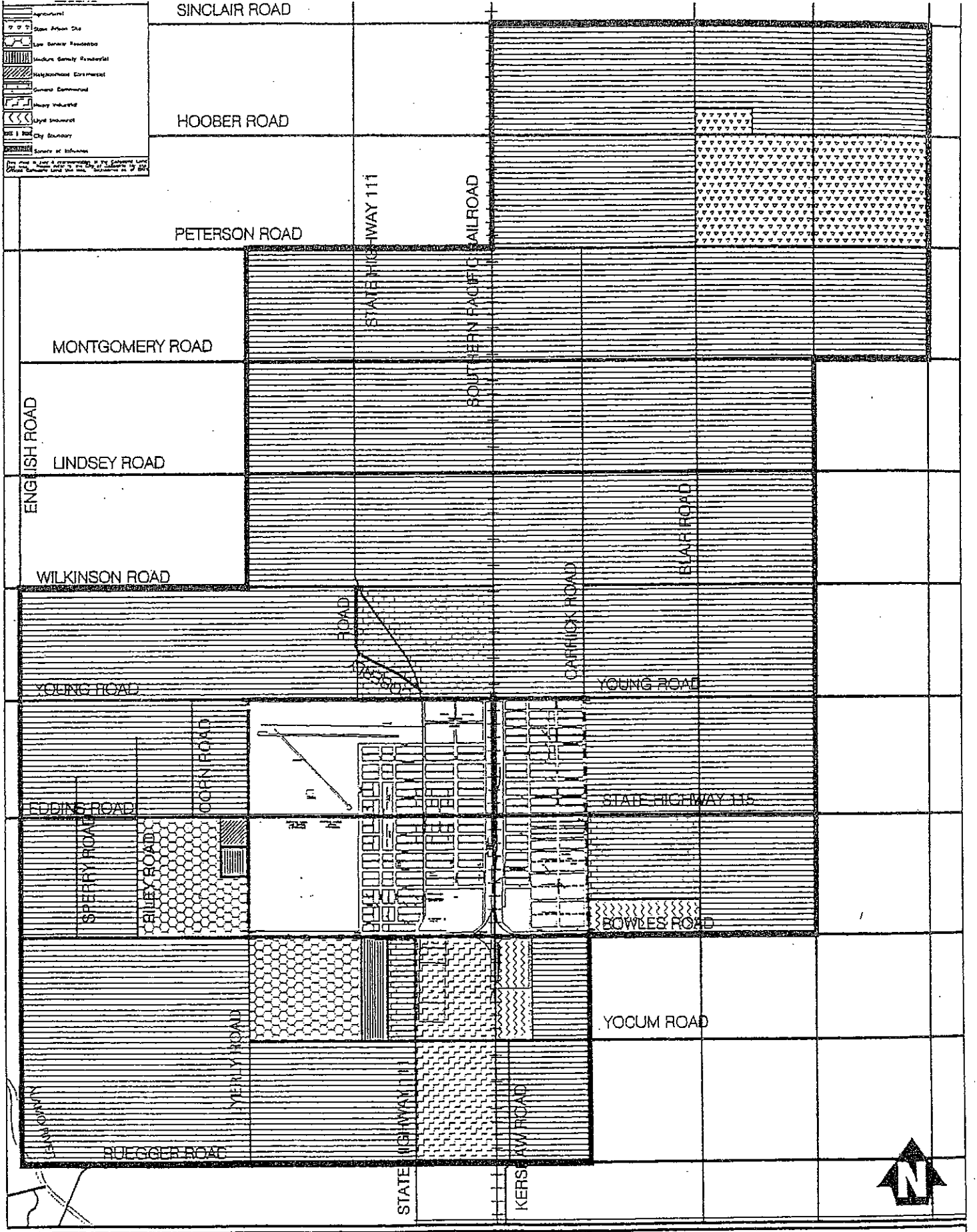
- East approach and land to south in city limits; city sphere of influence extends north of airport; to west, sphere of influence ends at airport boundary.
- *City of Calipatria General Plan* adopted 1992.
- County zoning for area west of airport is A-1 (Light Agriculture); designation permits residential development on half-acre lots.

PLANNED DEVELOPMENT IN AIRPORT AREA

- New state prison constructed 3 miles northeast of town; facility expected to generate major demand for additional housing in area.
- New sewage treatment plant recently constructed northwest of town will serve prison and has capacity to serve housing development.

ESTABLISHED APPROACH PROTECTION MEASURES

- *Airport Approaches Zoning Ordinance* adopted by city in 1992.
  - Limits height of structures in accordance with FAR Part 77.
  - Restricts other uses hazardous to flight within areas underlying any FAR Part 77 zone.
  - Ordinance not updated to reflect closure of crosswind runway or relocation of primary runway.



Background Data

Land Use Map - Calipatria Municipal Airport

FIGURE 4I

airport land use compatibility plan

Table 4H

Airport Features

Calipatria Municipal Airport

AIRPORT PROPERTY

- ***Ownership*** – City of Calipatria.
- ***Size*** – 200 acres.
- ***Elevation*** – -180 feet MSL (below sea level).

AIRPORT PLANNING

- ***Adopted Plans*** – Airport Layout Plan drawing prepared 1977; does not reflect subsequent runway construction.
- ***Planned Improvements*** – None currently planned for existing site; some consideration has been given to closing the airport and developing a new facility east of town.

BUILDING AREA

- ***Location*** – Southwest corner of property.
- ***Aircraft Parking Capacity*** – Limited apron space mostly used by agricultural aircraft.
- ***Other Major Facilities*** – One large FBO maintenance hangar/office occupied by agricultural operator.
- ***Services*** – Airport is primarily used for crop dusting operations; no fuel or other services available to the general public.

RUNWAY SYSTEM

Runway 8-26

- ***Critical Aircraft*** – Light twin.
- ***Classification*** – Basic Utility Stage II existing; Airport Reference Code B-I.
- ***Dimensions*** – 3,440 feet long, 50 feet wide.
- ***Lighting*** – Not lighted.
- ***Surface*** – Asphalt, good condition.

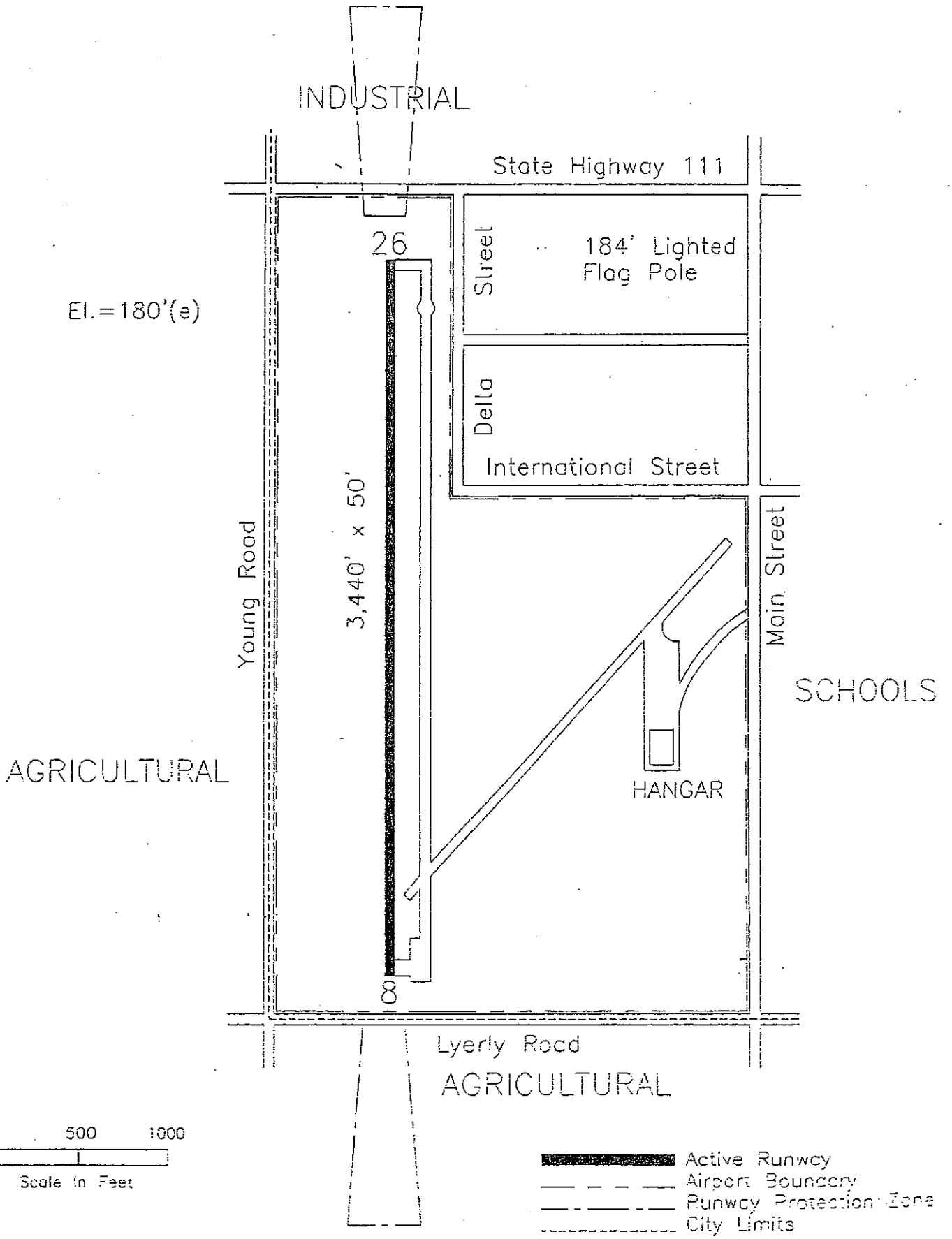
RUNWAY APPROACHES

Runway 8

- ***Approach Type*** – Visual.
- ***Runway Protection Zone*** – Mostly beyond airport property limits.
- ***Approach Obstacles*** – Road (200 feet from runway end).

Runway 26

- ***Approach Type*** – Visual.
- ***Runway Protection Zone*** – Mostly beyond airport property limits.
- ***Approach Obstacles*** – Road (415 feet from runway end); 184-foot tall flag pole (1,500± feet south of runway end – not in approach surface).



Background Data

Airport Plan - Calipatria Municipal Airport

FIGURE 4J

airport land use compatibility plan

Table 4I

Airport Activity

Calipatria Municipal Airport

BASED AIRCRAFT

	Current[a]	*Future*[b]
Total	18	40

AIRCRAFT OPERATIONS

	Current[a]	*Future*[b]
Total		
Annual	12,000	22,000
Average Day[c]	33	60
Distribution		
Single-Engine	9.0%	Same
Twin-Engine	1.0%	
Agricultural		
Standard Piston	29.0%	
Radial	29.0%	
Turboprop	29.0%	
Helicopters	3.0%	

TIME OF DAY DISTRIBUTION

		Current[a]	*Future*[b]
Non-Agricultural			
Day	(0700-1900)	89.0%	Same
Evening	(1900-2200)	10.0%	
Night	(2200-0700)	1.0%	
Agricultural			
Day	(0700-1900)	20.0%	Same
Evening	(1900-2200)	15.0%	
Night	(2200-0700)	65.0%	

RUNWAY USE DISTRIBUTION

	Current[a]	*Future*[b] [b]
All Aircraft		
All Operations		
Runway 8	15.0%	
Runway 26	85.0%	

FLIGHT TRACK DATA

- Pattern Altitude – 800 feet AGL.
- Right traffic on Runway 26.
- Agricultural aircraft traffic is dispersed in all directions from airport, but planes generally avoid overflight of city; departure turns typically begin a short distance beyond runway end; normal en route altitude is 400 feet AGL.

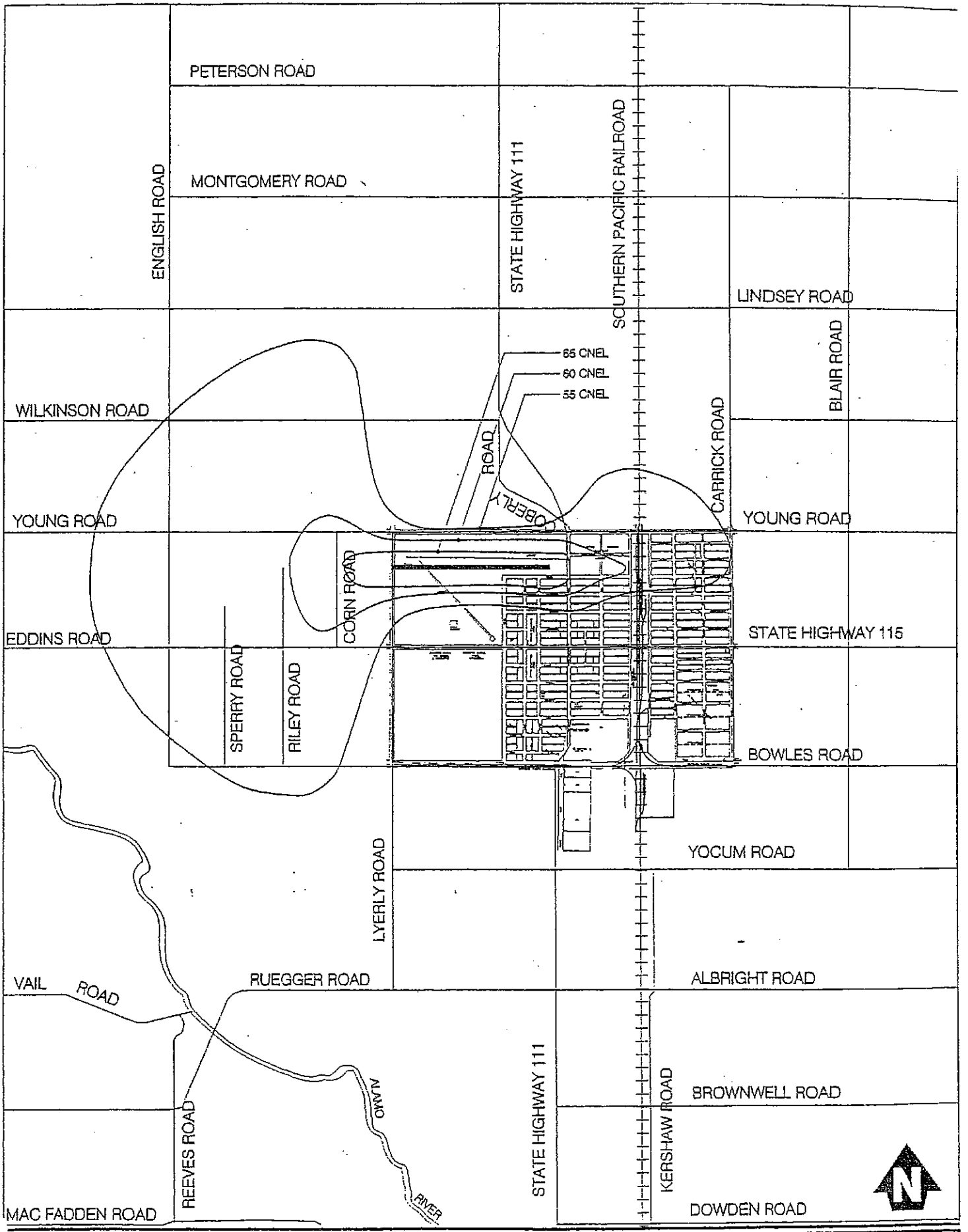
NOTES

[a] Estimated 1990 activity levels.

[b] Assumed future (beyond 20 years) activity levels for airport/land use compatibility planning purposes.

[c] Peak usage normally follows a rainfall while unpaved agricultural landing strips are too wet for use; 150± operations may occur on such days. Busy season for agricultural operators is August to May.

[d] The unusual noise impact contours shown on the previous page reflect the atypical flight characteristics of agricultural aircraft – relatively high noise levels, low flight altitude, turns close to the runway, and lack of a standard traffic pattern – together with the fact that these aircraft comprise the predominant usage of the airport. Noise contours normally close both because less noise reaches the ground as aircraft reach higher altitudes and because the dispersion of flight tracks brings fewer aircraft over any given spot. At Calipatria Municipal Airport

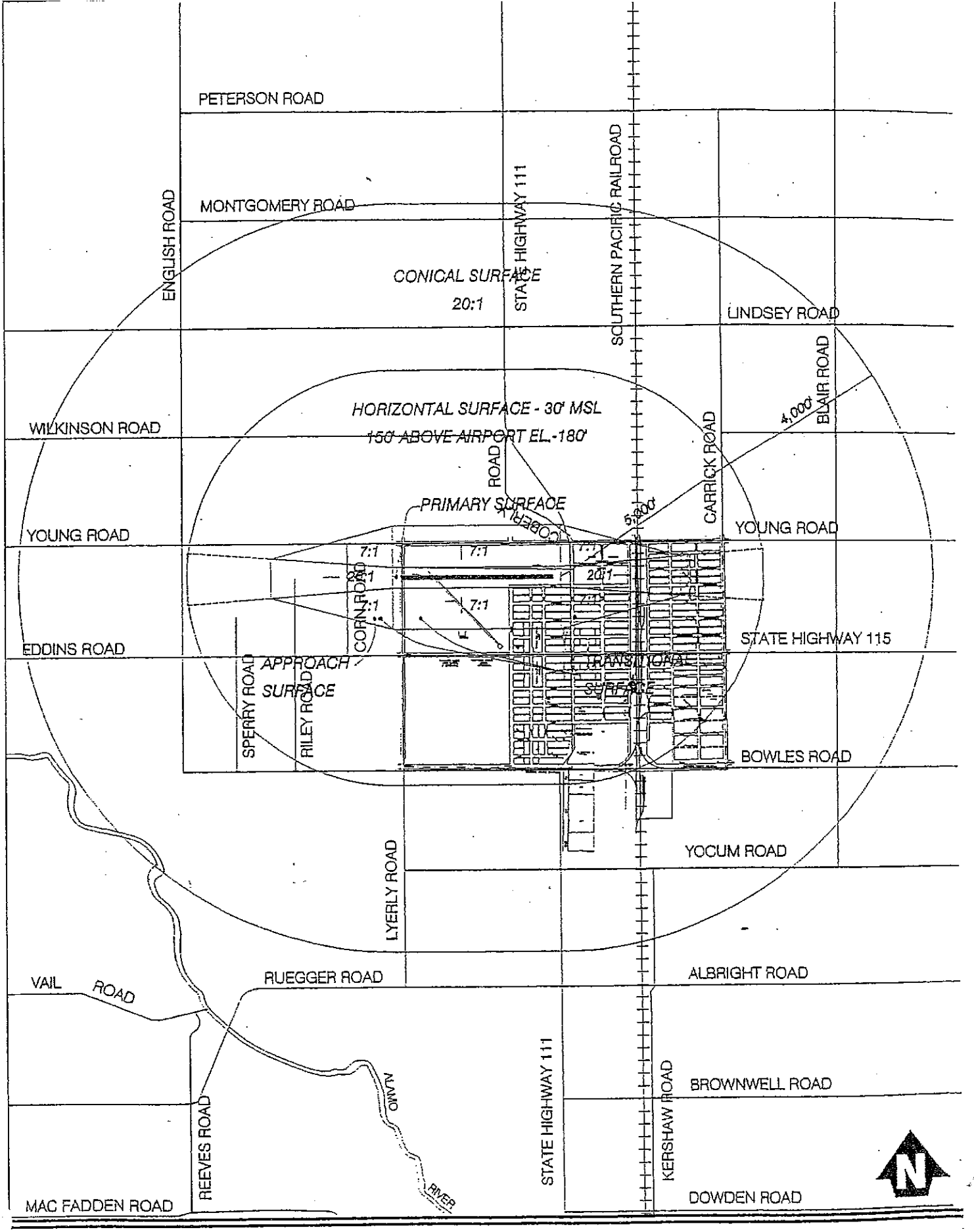


Background Data

Noise Impact Area - Calipatria Municipal Airport

FIGURE 4K

airport land use compatibility plan



Background Data

Airspace Plan - Calipatria Municipal Airport

FIGURE 4L

airport land use compatibility plan

Holtville Airport

OVERVIEW

Constructed as the Auxiliary Air Station Holtville by the U.S. Navy during World War II, Holtville Airport is now owned and operated by the County of Imperial. It has the longest and widest runway (plus a second, closed runway) and greatest acreage of any of the six public-use airports in the county, but it has essentially no other facilities. There are no hangars or other significant structures on the property and the access road gate is normally locked.

Usage of the airport is limited. Civilian aviation operations are rare. Most of the activity is generated by military aircraft based at Marine Corps Air Station Yuma and Naval Air Facility El Centro. The County Director of Airports monitors scheduling of this activity which, during peak periods, can be quite heavy. The majority of the operations are by helicopters. No counts or even reliable estimates of total operations are available, however.

The future of Holtville Airport is also uncertain. As of late 1990, the property is under lease to a private organization that had planned to develop a combat aircraft museum. The concept has not come to fruition, however, and likelihood of any development occurring now appears very low.

Another concept that has been suggested for the Holtville site is construction of a "wayport," a super regional airport hub that would primarily serve as a place where passengers would transfer between long-haul flights and ones serving communities in the region. The merits of this concept continue to be discussed nationally, but no commitments either to the idea or to specific sites have been made. If a regional hub airport is ever constructed at Holtville, it would bear little relationship to the existing airport. New runways, major terminal facilities, and vastly greater property would be required.

Finally, return of the airport to military control is an alternative which may be also considered.

Land uses surrounding Holtville Airport are entirely compatible with the existing and foreseeable future aviation activity. To the north, east, and south is undeveloped desert and to the west are agricultural lands. The nearest community is the town of Holtville, six miles west. The potential for incompatible development in the vicinity is minimal.

Table 4J

Airport Environs

Holtville Airport

AIRPORT LOCATION AND ACCESS

- Located east of City of Holtville, approximately 6 miles from city center.
- Airport property entirely in unincorporated area of county.
- Access via Norrish Road at southwest corner of property.

EXISTING AIRPORT AREA LAND USES

General Character

- Desert; undeveloped; mostly in U.S. Bureau of Land Management ownership.
- Eastern edge of irrigated farmland bordered by East Highline Canal 0.5± west of airport boundary.

Runway Approaches

- Runway 8 (west) Approach – Vacant land; agricultural lands beyond 0.5 mile.
- Runway 26 (east) Approach – Vacant land.

Traffic Pattern

- Vacant land.

LOCAL LAND USE PLANS AND ZONING

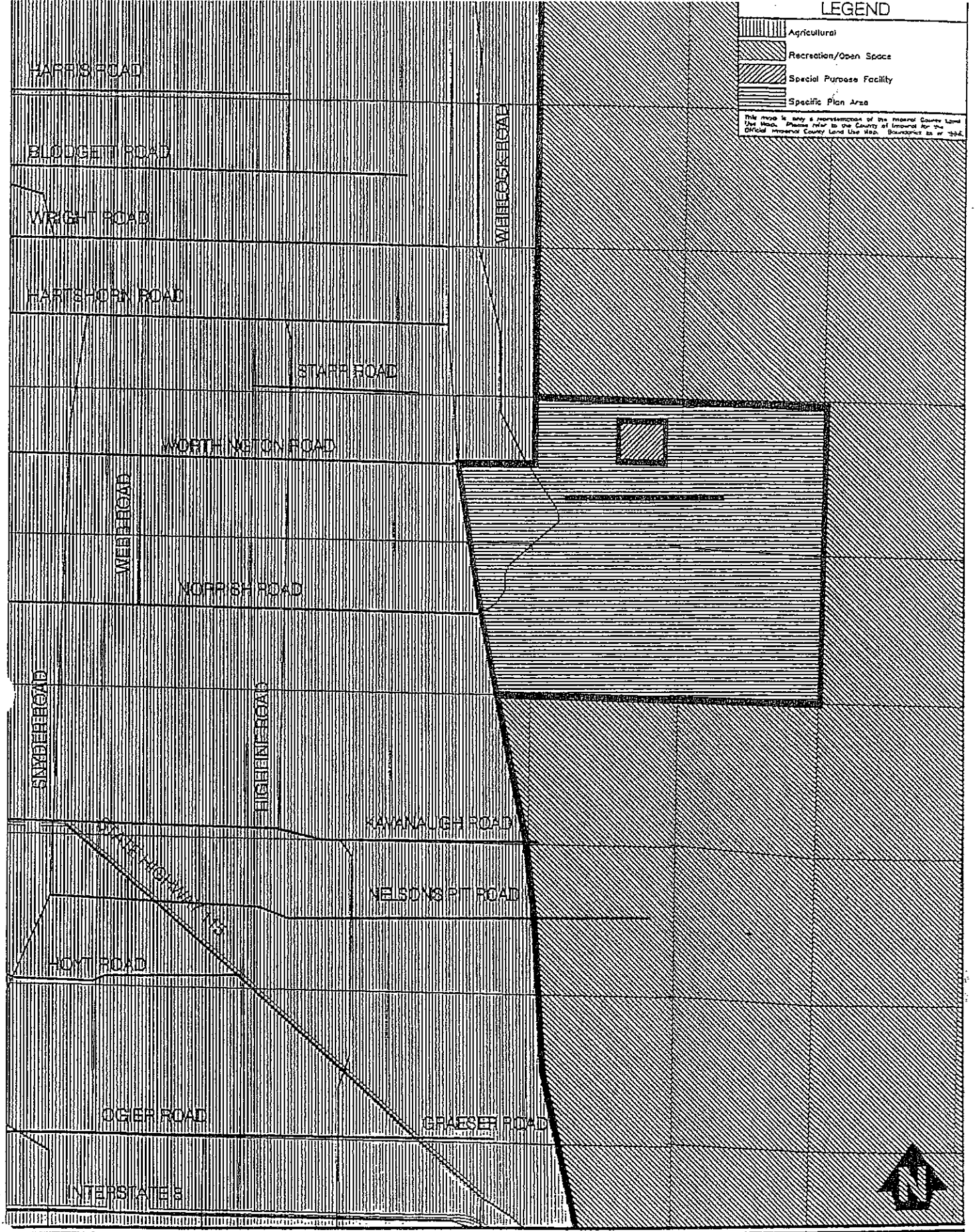
- Airport property shown as special purpose facility on County's Land Use Element Map.
- Located beyond City of Holtville sphere of influence.

PLANNED LAND USE DEVELOPMENT IN AIRPORT AREA

- Proposed Combat Heritage Foundation aviation museum on site and adjacent private property.
- Contemplated regional hub airport encompassing existing airport site.

ESTABLISHED APPROACH PROTECTION MEASURES

- None.



Background Data

Land Use Map - Holtville Airport

FIGURE 4M

airport land use compatibility plan

Table 4K

Airport Features

Holtville Airport

AIRPORT PROPERTY

- ***Ownership*** – County of Imperial.
- ***Size*** – 1,100 acres.
- ***Elevation*** – 59 feet MSL.

AIRPORT PLANNING

- ***Adopted Plans*** – Airport Layout Plan adopted by County in 1975 and approved by FAA.
- ***Planned Improvements***
  - Extensive building area development indicated on ALP; not currently being pursued.
  - Majority of airport property, except runway and immediately adjacent land, leased in 1984 to Combat Heritage Foundation for a period of 99 years; intention has been to develop an aviation museum; progress has been minimal and no significant improvements have been constructed as of 1990.
  - Some discussion has occurred regarding the site as a potential regional hub airport.

BUILDING AREA

- ***Location*** – South side of runway.
- ***Aircraft Parking Capacity*** – Undefined.
- ***Other Major Facilities*** – Abandoned northwest/southeast runway and connecting taxiway.
- ***Services*** – None; airport unattended.

RUNWAY SYSTEM

Runway 8-26

- ***Critical Aircraft*** – Undetermined.
- ***Classification*** – General Utility, Stage II; Airport Reference Code B- III.
- ***Dimensions*** – 6,000 feet long, 150 feet wide.
- ***Lighting*** – None.
- ***Surface*** – Concrete; fair condition.

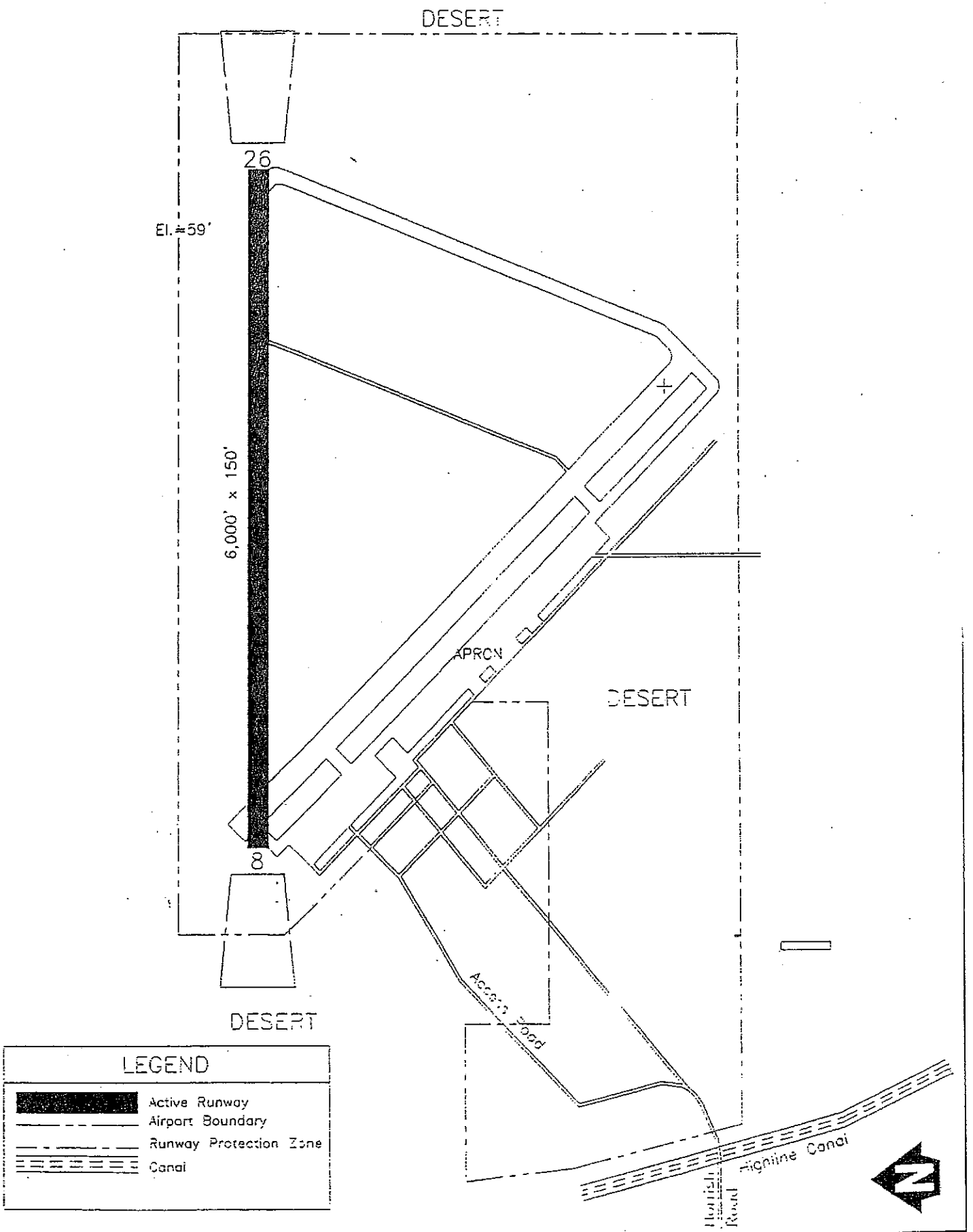
RUNWAY APPROACHES

Runway 8

- ***Approach Type*** – Visual
- ***Runway Protection Zone*** – On airport property.
- ***Approach Obstacles*** – None.

Runway 26

- ***Approach Type*** – Visual.
- ***Runway Protection Zone*** – On airport property.
- ***Approach Obstacles*** – None.



Background Data

Airport Plan - Holtville Airport

FIGURE 4N

airport land use compatibility plan

Table 4L

Airport Activity

Holtville Airport

BASED AIRCRAFT

	Current	Future[b]
Total	0	Uncertain

AIRCRAFT OPERATIONS

	Current	Future[b]
Total		
Annual	45,000	Uncertain
Average Day		
Distribution		
Single-Engine	Some	Uncertain
Twin-Engine		
Turboprop - Twin		
Agricultural		
Business Jets		
Helicopters - Military	Frequent	
4-Engine Prop - Military	Some	

TIME OF DAY DISTRIBUTION

		Current	Future[b]
Fixed Wing Aircraft			
Day	(0700-1900)	Most	
Evening	(1900-2200)	Some	Uncertain
Night	(2200-0700)	Some	
Helicopters			
Day	(0700-1900)	Some	
Evening	(1900-2200)	Some	Uncertain
Night	(2200-0700)	Most	

RUNWAY USE DISTRIBUTION

	Current [a]	Future [b]
All Aircraft		
All Operations		
Runway 8	20.0%	Uncertain
Runway 26	80.0%	

FLIGHT TRACK DATA

Civilian aircraft traffic pattern altitude – 800 feet AGL.

Standard left-hand pattern, **runway 8; right-hand pattern runway 26.**

NOTES

[a] Most current aviation usage of the airport is by military aircraft. Aircraft types include the C-130 and various types of helicopters. Helicopter activity is predominantly nighttime training touch-and-goes. No useful information is available by which to judge total operations levels; past estimates have been as high as 45,000 annual operations.

[b] The high degree of variability and uncertainty regarding future activity levels precludes useful forecasting.

RC/sm/HltAllTb.

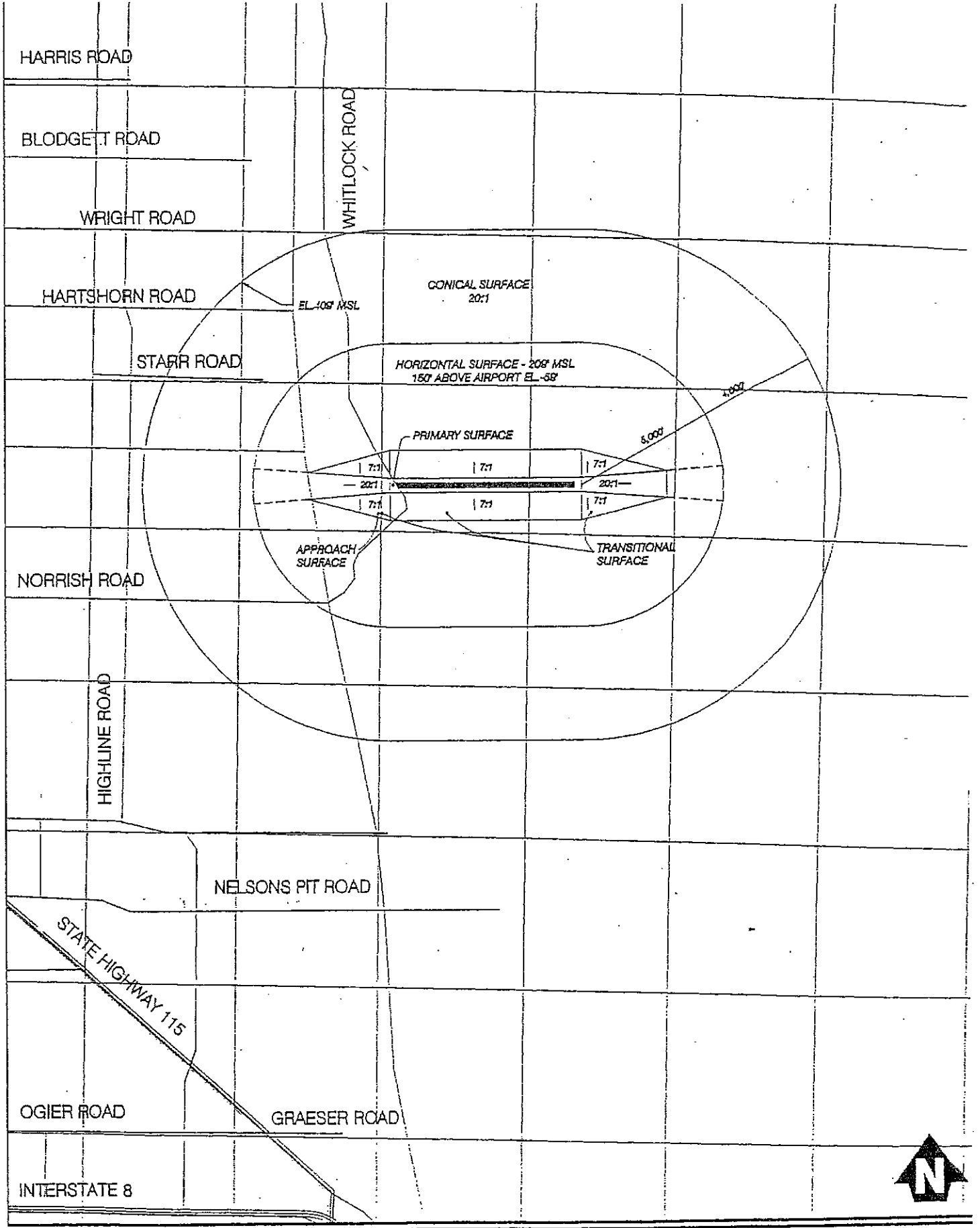
Future usage uncertain

Noise contours not developed

Figure 40

Noise Impact Area

Holtville Airport



Background Data

Airspace Plan - Holtville Airport

FIGURE 4P

airport land use compatibility plan

Imperial County Airport

OVERVIEW

Centrally located amidst the Imperial Valley communities, the Imperial County Airport is the sole airline airport in the county. Scheduled airline service is currently provided by twin-engine turbo-prop aircraft, but jet aircraft (specifically the DC-9-30) have operated at the airport in the past. The airport also has a significant volume of general aviation activity.

Although convenient for users, the airport's central location presents problems in terms of land use compatibility. The airport lies within the southern portion of the City of Imperial and just beyond the northern edge of the City of El Centro. Some agricultural uses remain, primarily to the east and west, but the urban growth of the two cities is gradually enveloping the airport.

Land use planning efforts by the City of Imperial and the County Airport Land Use Commission have specifically considered the airport's impacts, but the focus has almost exclusively been on noise impacts occurring north and south of the primary runway. Little attention has been given to safety concerns beyond the runway protection zones or to the broader overflight issues. The fact that the airport is county owned and operated, but situated within the city's jurisdiction adds to the complexity of airport/land use compatibility planning.

Additional complexities result from the Imperial County Airport's airspace interactions with NAF El Centro, four miles to the west. These interactions restrict the location of the airport traffic pattern as well as other operationally related options that might otherwise be considered to minimize the airport's impacts on surrounding land uses.

Another issue to be considered with respect to development of a compatibility plan for Imperial County Airport is the character and volume of future aircraft operations. Noise contours included in the previous *Airport Land Use Plan* are predicated upon more than double the number of operations now considered plausible within the next 20 years. Also, the mix of aircraft apparently included models of airline and business jets that are much noisier than most jets now in use. The effect of these changes is that the noise contours prepared for the current document are approximately 5 dBA smaller than those contained in the previous plan. Single-event noise levels, safety considerations, and overflight impacts consequently take on increased significance in compatibility planning for the airport.

Table 4M

Airport Environs

Imperial County Airport

AIRPORT LOCATION AND ACCESS

- Located in southern part of city of Imperial, within 0.8 mile of city center.
- Central area of city of El Centro situated approximately 3.0 miles south.
- All runway approaches in city of Imperial sphere of influence to a distance of at least 1,500 feet from runway ends.
- City of El Centro sphere of influence begins approximately 0.8 miles southeast of approach to Runway 32.
- Access via State Highway 86 on east side of airport.

EXISTING AIRPORT AREA LAND USES

General Character

- Urban uses on some sides; agricultural lands elsewhere, but disappearing close in.

Runway Approaches

- Runway 14 (northwest) – City of Imperial water plant (600 feet from runway end); rural residential (1,100 feet).
- Runway 32 (southeast) – Highway 86 (1,000 feet); drive-in theater (2,000 feet); urban residential (1.5 miles).
- Runway 8 (west) – Agricultural lands.
- Runway 26 (east) – Highway 86 (1,700 feet); agricultural lands beyond.

Traffic Pattern

- Suburban residential to northwest; expected to extend southward beneath downwind leg of Runway 14-32 pattern.
- No Runway 14-32 traffic pattern on southwest side because of airspace conflict with NAF El Centro.
- Airport property and existing agriculture, future residential below downwind leg for Runway 8-26.
- No Runway 8-26 traffic pattern on south side because of airspace conflict with NAF El Centro.

LOCAL LAND USE PLANS AND ZONING

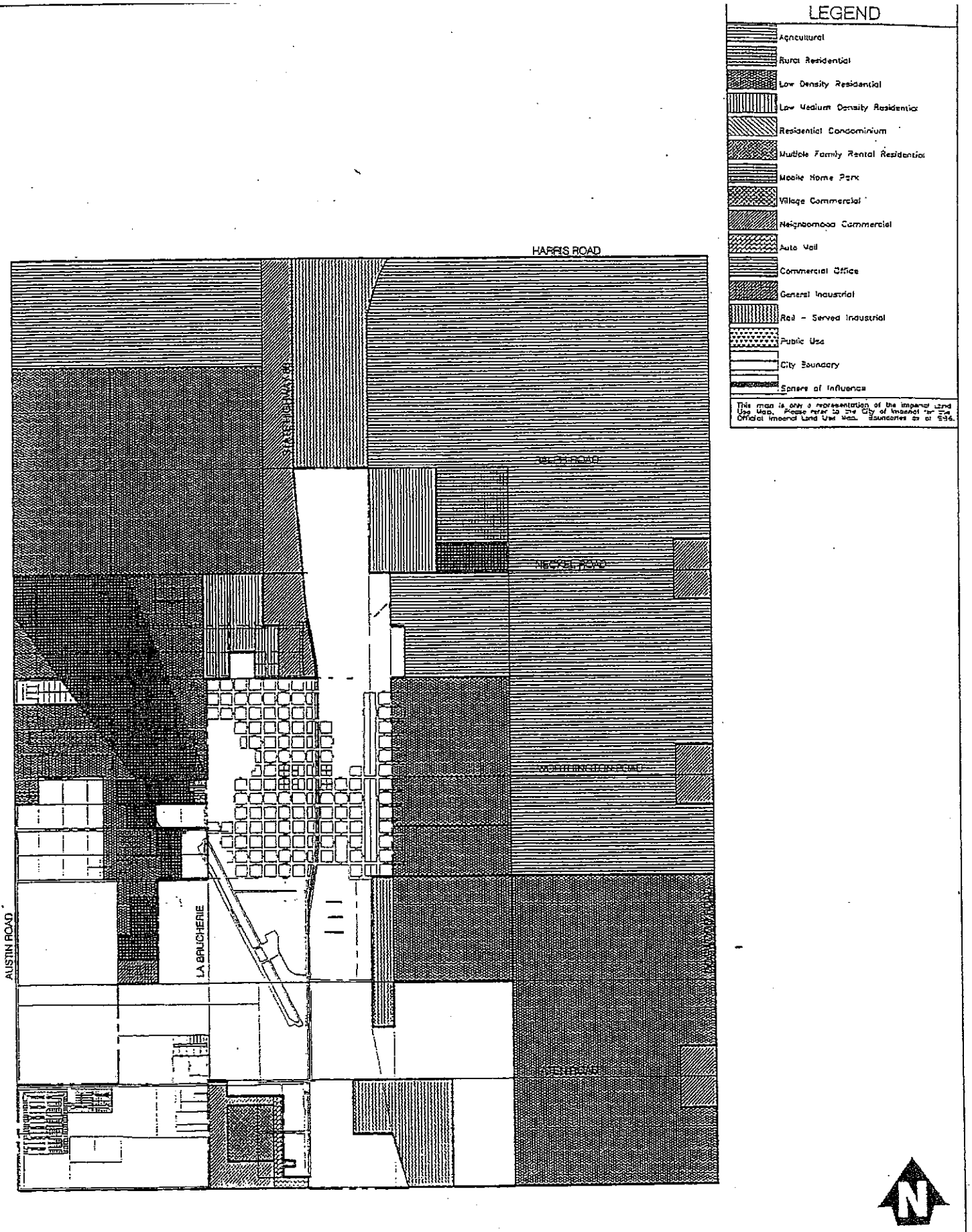
- *City of Imperial General Plan* adopted April 1989.
  - Mostly rural residential land uses (0.5-1.0 dwelling units per acre) planned between runways and northwest of airport.
  - Plan refers to 1991 *Airport Land Use Plan* and the need to limit development in critical areas near the airport. Existing incompatible uses will continue to be permitted.
  - Noise Element sets 60 dBA CNEL as maximum acceptable noise exposure for rural and single-family areas; 65 dBA CNEL as maximum for multi-family.
- *El Centro General Plan* revised December 20, 1989.
  - Circulation Element notes that airport is currently unsuitable to jets because it is largly surrounded by residential and industrial development. Joint use of the Navy base is mentioned as an alternative.
  - Safety Element sets no restrictions on uses near airport, but supports measures to create public awareness of its proximity.
  - Noise Element sets 60 dBA CNEL as maximum exterior noise exposure for residential areas other than multi-family where 65 dBA is allowable.
- *Imperial County General Plan,* revised 1993, applies to airport area.
  - County zoning for lands west and northwest of airport, within City of Imperial sphere of influence, is Light Agricultural (A-1); this designation allows residential development of 0.5-acre lots.

PLANNED DEVELOPMENT IN AIRPORT AREA

- New commercial development under construction along Highway 86 south of airport.
- Lands west of airport to be annexed to City of Imperial; new residential development expected in near term.

ESTABLISHED APPROACH PROTECTION MEASURES

- General land use and noise policies as noted above.



Background Data

Land Use Map - Imperial County Airport

FIGURE 4Q

airport land use compatibility plan

Table 4N

Airport Features

Imperial County Airport

AIRPORT PROPERTY

- ***Ownership*** – County of Imperial.
- ***Size*** – 429 acres.
- ***Elevation*** – **-56 feet MSL (below sea level).**

AIRPORT PLANNING

- ***Adopted Plans*** – Airport Master Plan prepared 1974; Airport Layout Plan prepared 1979, last updated 1988.
- ***Planned Improvements***
  - Runway widening.
  - Runway approach zone property acquisition (on Airport Layout Plan, not being pursued).
  - Visual Glide Slope Indicator, Runway 14.
  - Additional aircraft parking, primarily T-hangars.

RUNWAY SYSTEM

Runway 14-32

- ***Critical Aircraft***
  - Current – Twin turboprop commuter, up to 30 passengers.
  - Future – Small to medium-sized airline jet such as 737-300 (DC-9 has operated at airport in past).
- ***Classification*** – **Commercial; Airport Reference Code B-III.**
- ***Dimensions*** – 5,304 feet long, 100 feet wide existing, 150 feet wide planned.
- ***Lighting***
  - Medium-intensity edge lights.
  - Visual approach slope indicator, Runway 32
- ***Surface*** – Asphalt, good condition.

Runway 8-26

- ***Critical Aircraft*** – Twin-engine, propeller.
- ***Classification*** – General Utility, Stage I; Airport Reference Code B-II.
- ***Dimensions*** – 4,500 feet long, 75 feet wide.
- ***Lighting***
  - Medium-intensity edge lights.
  - Visual approach slope indicator, Runway 26.
- ***Surface*** – Asphalt, very good condition.

BUILDING AREA

- ***Location*** – East side of primary runway.
- ***Aircraft Parking Capacity*** – 100±.
- ***Other Major Facilities***
  - Airline terminal building.
  - Airport manager's office building.
  - FBO hangars.
  - Air traffic control tower (closed).
  - Motel and restaurant (closed).
- ***Services***
  - Scheduled airline.
  - Automobile rental.
  - FBO's provide fuel (including jet fuel), pilot supplies, aircraft maintenance, major repairs, avionics service, aircraft charter, flight instruction, agricultural applications.

RUNWAY APPROACHES

Runway 14

- ***Approach Type*** – Visual; also circling VOR approach (minimums 556 feet AGL).
- ***Runway Protection Zone*** – Mostly on airport property or City of Imperial water plant land.
- ***Approach Obstacles*** – None.

Runway 32

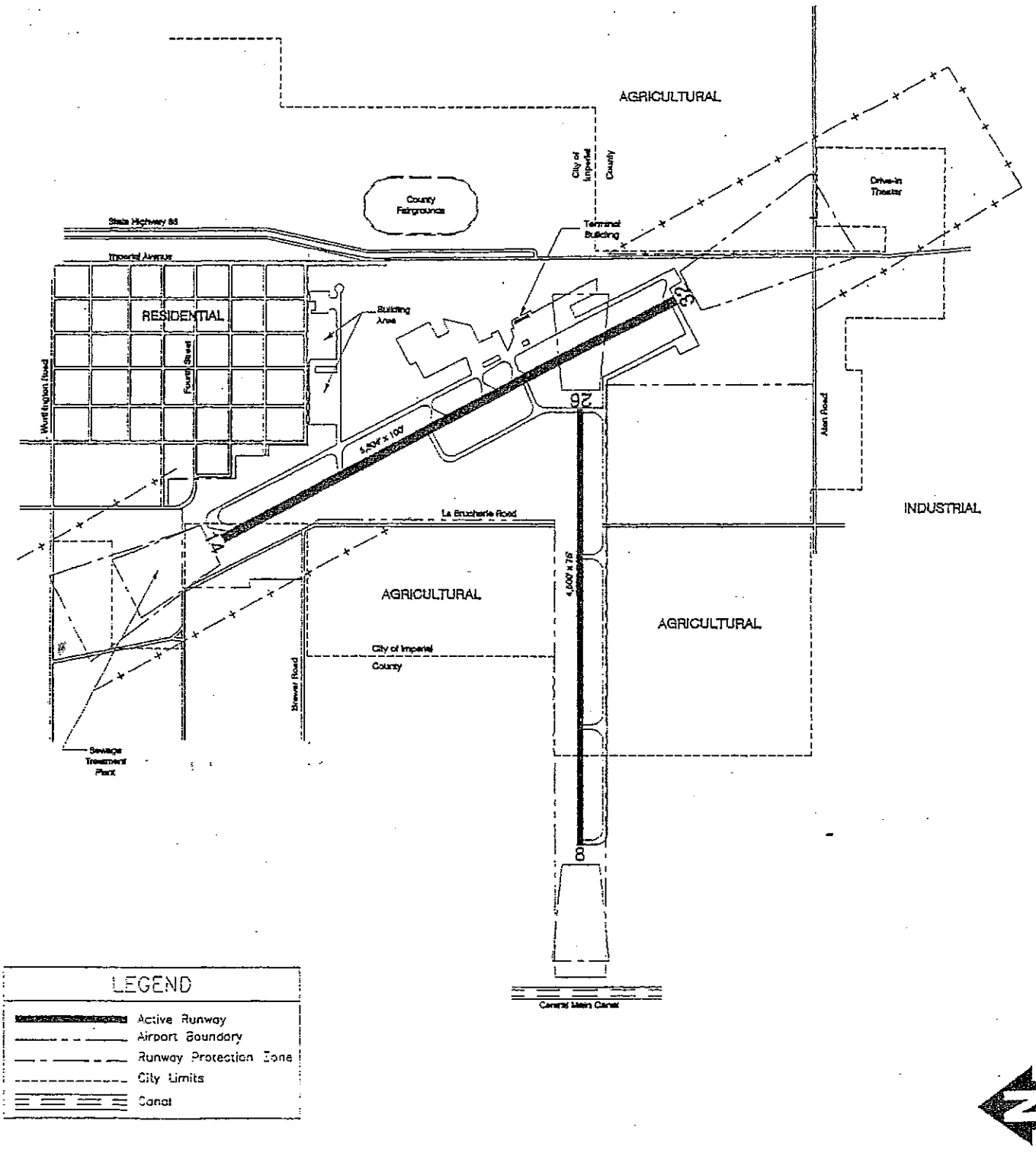
- ***Approach Type*** – Visual; also circling VOR approach.
- ***Runway Protection Zone*** – Mostly on airport property or protected by easement.
- ***Approach Obstacles*** – Road (900 feet from runway end, on centerline).

Runway 8

- ***Approach Type*** – Visual; also circling VOR approach.
- ***Runway Protection Zone*** – Mostly on airport property.
- ***Approach Obstacles*** – Power line (1,600± feet from runway end).

Runway 26

- ***Approach Type*** – Visual; also circling VOR approach.
- ***Runway Protection Zone*** – On airport property.
- ***Approach Obstacles*** – None.



Background Data

Airport Plan - Imperial County Airport

FIGURE 4R

airport land use compatibility plan

Table 40

Airport Activity

Imperial County Airport

BASED AIRCRAFT

	Current	*Future*[b]
Total	85	

AIRCRAFT OPERATIONS

Total		
Annual	61,000	102,000
Average Day	167	280
Distribution		
Single-Engine		63.7%
Twin-Engine		17.6%
Turboprop		13.7%
Agricultural	[c]	
Business Jets		2.9%
Helicopters	[d]	
Airline Jets (737-300 or equiv.)		2.1% [e]
Touch-and-Goes		
Single-Engine, Fixed Propeller		37.0%
Single-Engine, Variable Propeller		10.0%
Twin-Engine, Piston		5.0%

TIME OF DAY DISTRIBUTION

		Current[a]	*Future*[b]
All Aircraft except Airline Jets			
Day	(0700-1900)		87.0%
Evening	(1900-2200)		10.0%
Night	(2200-0700)		3.0%
Airline Jets			
Day	(0700-1900)		66.7%
Evening	(1900-2200)		33.3%
Night	(2200-0700)		0.0%

RUNWAY USE DISTRIBUTION

	Current[a]	*Future*[b]
All Aircraft except Airline Jets		
Takeoffs		
Runway 14		15.0%
Runway 32		70.0%
Runway 8		0.0%
Runway 26		15.0%
Landings		
Runway 14		15.0%
Runway 32		70.0%
Runway 8		1.0%
Runway 26		14.0%
Touch & Goes		
Runway 14		15.0%
Runway 32		70.0%
Runway 8		0.0%
Runway 26		15.0%
Airline Jets		
Takeoffs and Landings		
Runway 14		15.0%
Runway 32		85.0%

FLIGHT TRACK DATA

Pattern altitudes
Runway 14-32: 1,000 feet.
Runway 8-26: 800 feet.

Runways 14 and 8 – left traffic.

Runways 32 and 26 – right traffic.

To avoid NAF El Centro airspace, Runway 26 departures required to turn right to minimum heading of 310°, stay east of Forrester Road, and remain below 1,000 feet AGL for 3.0 miles if northbound; left turns following takeoff not permitted.

NOTES

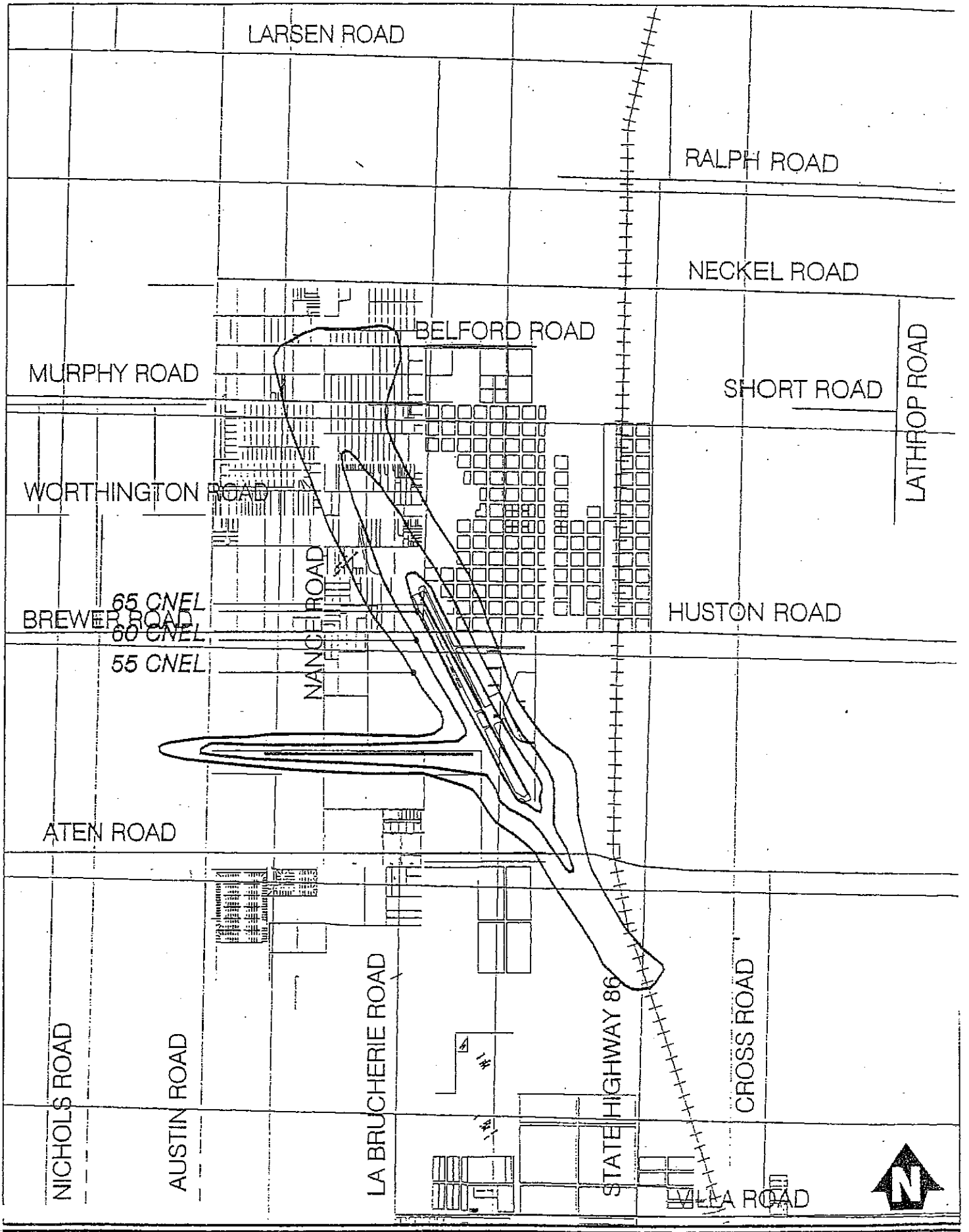
[a] Airport Manager's estimated 1989 aircraft operations, 1990 based aircraft.

[b] Assumed future (beyond 20 years) activity levels for airport/land use compatibility planning purposes.

[c] Occasional usage; operations included with single-engine aircraft.

[d] Occasional usage; operations not modeled.

[e] 3.0 flights per day.

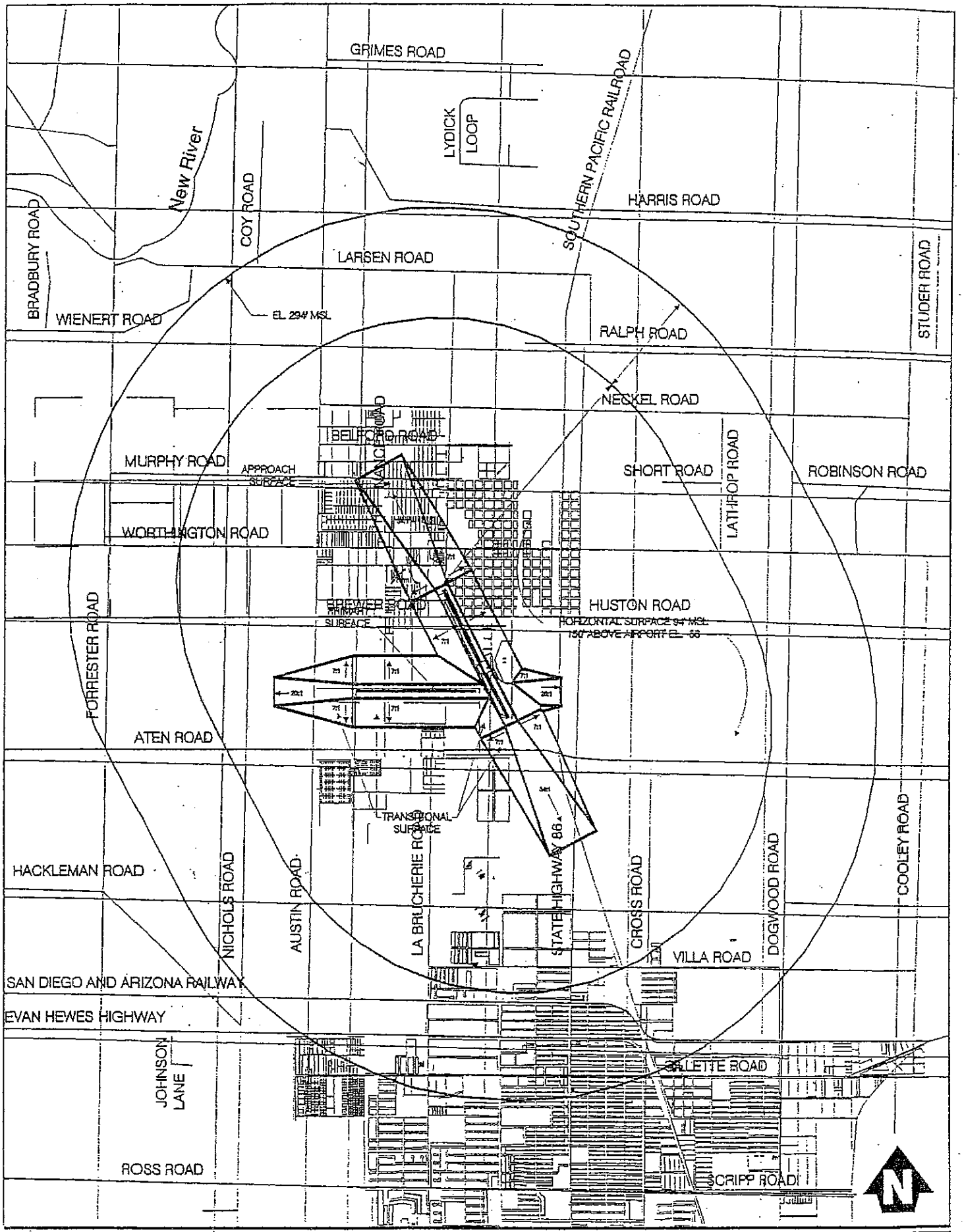


Background Data

Noise Impact Area - Imperial County Airport

FIGURE 4S

airport land use compatibility plan



Background Data

Airspace Plan - Imperial County Airport

FIGURE 4T

airport land use compatibility plan

Salton Sea Airport

OVERVIEW

Salton Sea Airport is a privately owned facility built in 1978 to serve the proposed new town of Salton City. The town is planned to have an ultimate population of 25,000 to 30,000. To date, however, the population remains minimal and activity at the airport is negligible.

Airport facilities consist of a single, unpaved runway, a hangar building and a small aircraft parking area. Long-standing plans call for construction of a 9,000-foot long primary east-west runway (the existing runway would be paved and extended to serve as a parallel taxiway), plus construction of a north/south runway. This expansion plan is a long-term concept; it appears unlikely to be implemented within the foreseeable future.

Lands in the approaches of the existing runway, as well as beneath the traffic pattern to the south, are undeveloped and planned to remain that way. No measures specifically focusing on airport/land use compatibility have been adopted. Nonetheless, compatibility problems are unlikely to occur within the foreseeable future. Additional controls, beyond the ones in this *Airport Land Use Compatibility Plan* may be necessary if rapid growth of the community and/or the airport activity becomes imminent.

Table 4P

Airport Environs

Salton Sea Airport

AIRPORT LOCATION AND ACCESS

- Located 3 miles south of the unincorporated community of Salton City, approximately 4 miles from southwest edge of Salton Sea.
- Airport and approaches totally in county jurisdiction.
- Airport bordered by State Highway 86 on the east.
- Access via Airpark Drive on north side of airport.

EXISTING AIRPORT AREA LAND USES

General Character

- Partially developed residential subdivision associated with airport located north of runway.
- Other nearby area predominantly undeveloped.

Runway Approaches

- Runway 7 (west) Approach – No development.
- Runway 25 (east) Approach – Highway 86 at 0.5± miles.

Traffic Pattern

- Open land south of airport.
- No traffic pattern over developed area on north side.

LOCAL LAND USE PLANS AND ZONING

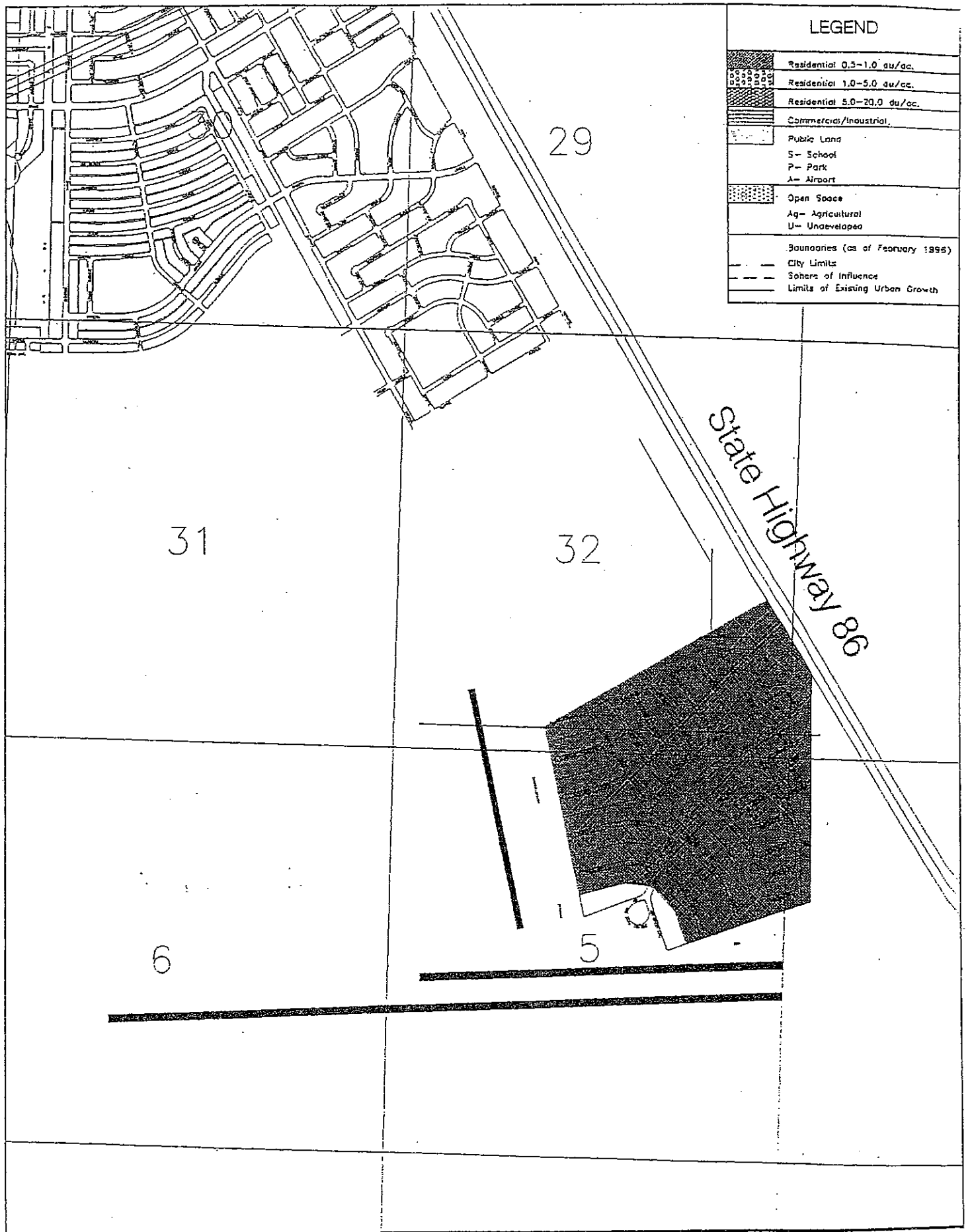
- *Imperial County General Plan*, adopted in 1993, is current land use plan for area.
- *Salton City Area Zoning Map*, last updated 1984, illustrates extensive proposed development of Salton City community.

PLANNED DEVELOPMENT IN AIRPORT AREA

- Airport owners have long-standing plans for a resort development north of the airport. Ultimate population of the community proposed to be 25,000 to 30,000.
- Airport and property to east, north, and west are within sphere of influence for Coachella Valley Water District.

ESTABLISHED APPROACH PROTECTION MEASURES

- None.



Background Data

Land Use Map - Salton Sea Airport

FIGURE 4U

airport land use compatibility plan

Table 4Q

Airport Features

Salton Sea Airport

AIRPORT PROPERTY

- ***Ownership*** – Private.
- ***Size*** – 210 acres.
- ***Elevation*** – -85 feet MSL (below sea level).

AIRPORT PLANNING

- ***Adopted Plans*** – None.
- ***Planned Improvements*** – Possible crosswind runway and extension of primary runway to as much as 9,000 feet.

BUILDING AREA

- ***Location*** – North side of runway.
- ***Aircraft Parking Capacity*** – Small, unpaved area.
- ***Other Major Facilities*** – Maintenance hangar and adjacent office.
- ***Services*** – None.

RUNWAY SYSTEM

Runway 7-25

- ***Critical Aircraft*** – Light twin-engine propeller.
- ***Classification*** – Basic Utility Stage II; Airport Reference Code B-I, small aircraft.
- ***Dimensions*** – 5,000 feet long, 75 feet wide.
- ***Lighting*** – Low-intensity runway edge lighting (not operational as of mid 1990).
- ***Surface*** – Compacted gravel; fair condition.

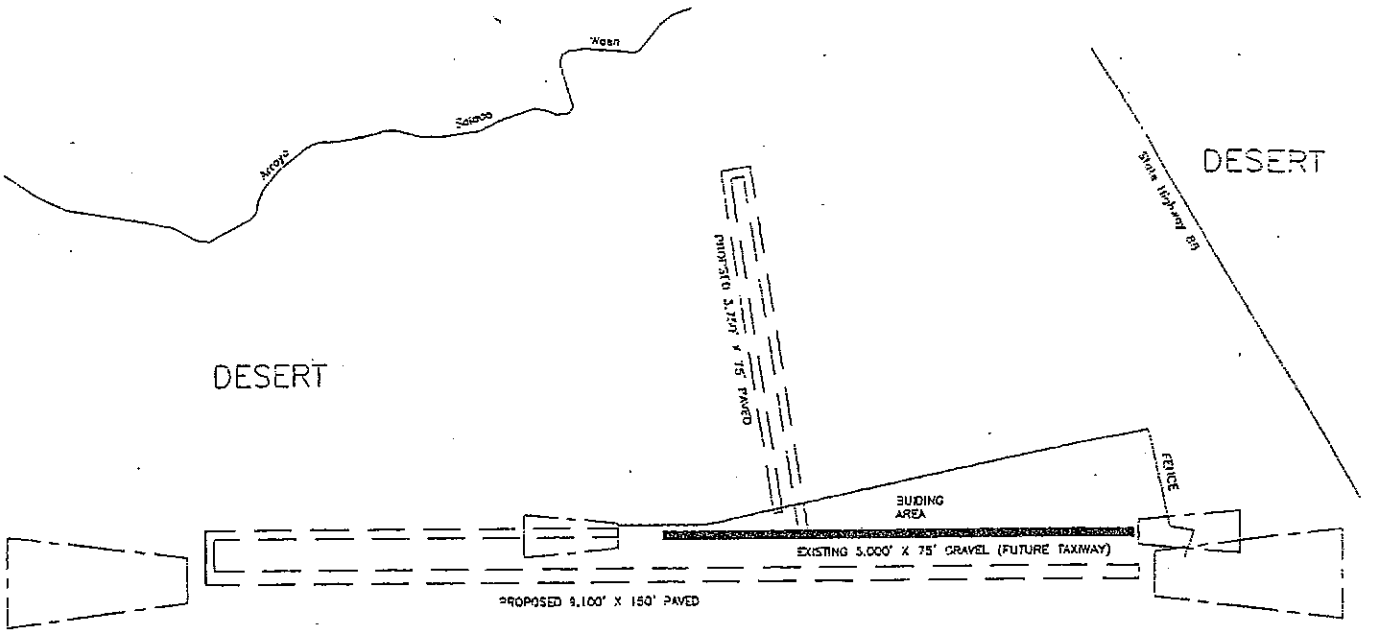
RUNWAY APPROACHES

Runway 7

- ***Approach Type*** – Visual.
- ***Runway Protection Zone*** – On apparent airport property.
- ***Approach Obstacles*** – None.

Runway 25

- ***Approach Type*** – Visual.
- ***Runway Protection Zone*** – On apparent airport property.
- ***Approach Obstacles*** – None.



Note: Proposed layout represents only a general concept, not a detailed plan.

Property line is not defined.

LEGEND
Active Runway
Runway Protection Zone

0 1000

Scale in Feet

Background Data

Airport Plan - Salton Sea Airport

FIGURE 4V

airport land use compatibility plan

Table 4R

Airport Activity

Salton Sea Airport

BASED AIRCRAFT

	Current	*Future*[b]
Total	2 [c]	

AIRCRAFT OPERATIONS

	Current	*Future*[b]
Total		
Annual	500	1,000
Average Day	1	3
Distribution		
Single-Engine	90.0%	Same
Twin-Engine	10.0%	

TIME OF DAY DISTRIBUTION

		Current[a]	*Future*[b]
All Aircraft			
Day	(0700-1900)	85.0%	Same
Evening	(1900-2200)	10.0%	
Night	(2200-0700)	5.0%	

RUNWAY USE DISTRIBUTION

		Current [a]	*Future* [b]
All Aircraft			
All Operations			
	Runway 7	20.0%	Same
	Runway 25	80.0%	

FLIGHT TRACK DATA

- Pattern Altitude – 800 feet AGL.
- Right traffic on Runway 7 (no north side pattern).

NOTES

[a] Estimated 1990 activity levels.

[b] Assumed future (beyond 20 years) activity levels for airport/land use compatibility planning purposes.

[c] On adjacent property.

Noise contours (CNEL 65 cBA) based upon activity levels indicated in Table 4R remain on runway.

Usage of expanded airport undetermined.

Figure 4W

Noise Impact Area
Salton Sea Airport

Expanded runway configuration uncertain.

Airspace plan not prepared.

Figure 4X

Airspace Plan
Salton Sea Airport

Naval Air Facility El Centro

OVERVIEW

NAF El Centro occupies some 2,300 acres of land near the edge of the Imperial Valley, seven miles west of El Centro. The base primarily serves as a training facility for naval air squadrons. The majority of the aircraft operations are simulated aircraft carrier landings and touch-and-go practice flights by various types of Navy attack, fighter, and submarine patrol aircraft.

In the past, the air base has been listed by the Department of Defense as potentially subject to closure in response to future national budget cuts. There are no definite actions in this direction, however, and the Navy is currently acquiring property and operating the facility on the basis that it will remain open indefinitely. Land use compatibility planning for the surrounding area should also proceed on the same premise.

An *Air Installation Compatible Use Zones* (AICUZ) plan for NAF El Centro was completed under the auspices of the Navy in 1990. The plan provides extensive data regarding the noise and safety impacts of the current base operations. Particularly noteworthy is the extensiveness of the noise impact area compared to that found at the public-use airports in the county. The 60-dBA Community Noise Equivalent Level contour, for example, extends as far east as the Imperial County Airport.

Another component of the AICUZ plan is a set of recommendations, utilizing standard Department of Defense guidelines, regarding maintenance of land use compatibility in the vicinity of the air base. The primary implementation strategy is to rely upon local land use controls. Acquisition of fee title is "considered only for properties which are essential for safe operations and only if other means of protection fail." Noise is not normally a factor in this regard. Similarly, easement acquisition is considered only if other means of protecting the compatible use zones fail. At the present time, the Navy owns essentially no property beyond two of the runway ends (some clear zone property acquisition is proposed) and less than a mile off the other two runways. Community Noise Equivalent Levels on portions of adjacent property exceed 80 dBA.

Also included in the AICUZ plan is a listing of the types of land uses considered compatible within each of the noise and safety impact zones. The Navy regards residential land uses as compatible within the 65-dBA Community Noise Equivalent Level. More restrictive on land uses are the Accident Potential Zones which extend some 2.8 miles from the ends of the east/west primary runway and also encompass the principal closed flight-training pattern.

Existing land uses in the vicinity of the air base are generally compatible. The only concentrated development nearby is the community of Seeley, situated within the 60-dBA CNEL contour. However, certain areas are zoned for Light Agricultural uses, a designation that could allow residential development on half-acre lots. Construction of a new state prison west of Seeley increased the demand for new housing in the area.

Table 4S

Airport Environs

Naval Air Facility El Centro

AIRPORT LOCATION AND ACCESS

- Situated in western part of Imperial Valley, 7 miles west of central El Centro, and 1.5 mile north of unincorporated community of Seeley.
- Air base and environs all in unincorporated territory of Imperial County.
- Main Gate on south side of base with access via Bennett Road.

EXISTING AIRPORT AREA LAND USES

General Character

- Agricultural lands on all sides except for small town of Seeley (population 900) on south.

Runway Approaches

- Runway 8 (west) Approach – Agricultural lands; New River at 0.8 mile from runway end.
- Runway 26 (east) Approach – Agricultural lands; nearest road beyond 1.0 mile.
- Runway 12 (northwest) Approach – Agricultural lands; New river at 1.3 miles from runway end.
- Runway 30 (southeast) Approach – Agricultural lands; nearest road 0.8 mile from runway end.

Traffic Pattern

- Agricultural lands all around except community of Seeley 2.0 miles south of base.
- Cities of Imperial and El Centro lie about 5.0 miles east.

LOCAL LAND USE PLANS AND ZONING

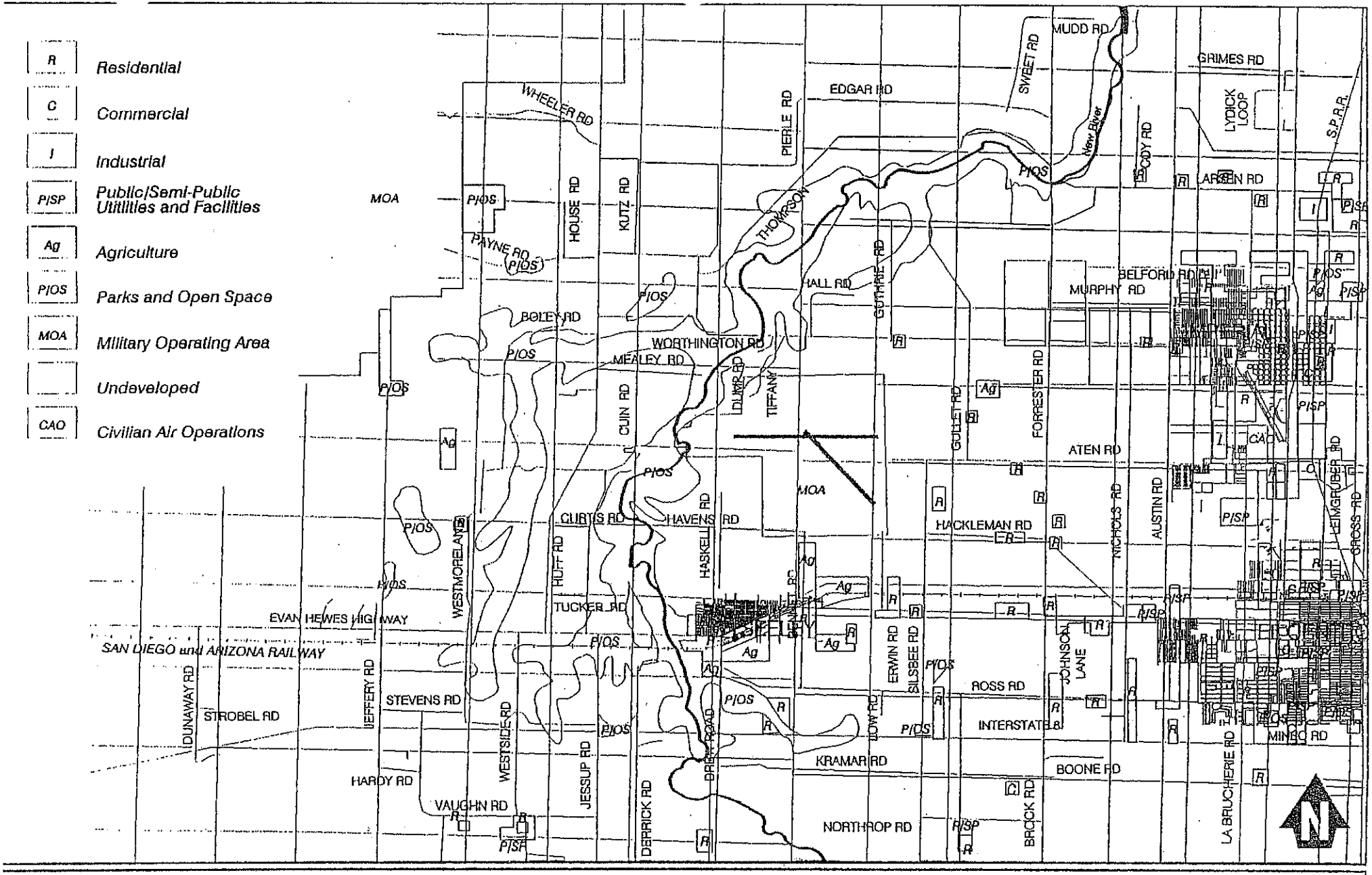
- *Imperial County General Plan*, dating from 1993 is current land use plan for area.
  - Air base shown as heavy industrial land use, surrounding area general agricultural, and river channel as preservation.
- County zoning designates most of surrounding areas as general or heavy agriculture; other uses include:
  - Residential and manufacturing zones in community of Seeley.
  - Light agricultural (A-1) zoning along Evan Hewes Highway, south of base, allows residential development on 0.5-acre lots.
- Western edge of spheres of influence of cities of Imperial and El Centro lie 3.3 miles east of base boundary.
- *El Centro General Plan* contains limited reference to the impacts of the air base.
  - Concept of promoting public awareness of air base's safety impacts is supported.
  - Base generates occasional noise complaints in city.
  - Joint-use of base for commercial service is mentioned as a possible alternative to the Imperial County Airport.

PLANNED DEVELOPMENT IN AIRPORT AREA

- No major development anticipated in immediate vicinity; some residential growth likely in Seeley area and along Evan Hewes Highway.
- Construction of a new state prison planned for area several miles southwest of base.
- Westward expansion of cities of Imperial and El Centro is expected.

ESTABLISHED APPROACH PROTECTION MEASURES

- *Air Installation Compatible Use Zones* for air base, prepared for U.S. Navy in 1990, describes noise and safety impacts of the facility's aircraft operations and lists suggested land use compatibility for each impact zone.



Background Data

Land Use Map - Naval Air Facility El Centro

FIGURE 4Y

airport land use compatibility plan

Table 4T

Airport Features

Naval Air Facility El Centro

AIRPORT PROPERTY

- ***Ownership*** – United States Navy.
- ***Size*** – 2,286 acres fee title; 4 acres easements.
- ***Elevation*** – -47 ft. MSL (below sea level)

AIRPORT PLANNING

- ***Adopted Plans*** – *Air Installation Compatible Use Zones*, approved by Navy in 1990.
- ***Planned Improvements*** – Acquisition of clear zone property proposed, not budgeted.

RUNWAY SYSTEM

Runway 8-26

- ***Critical Aircraft*** – Military.
- ***Classification*** – Military.
- ***Dimensions*** – 9,500 feet long, 200 feet wide.
- ***Lighting*** – Medium intensity edge lights.
- ***Surface*** – Part concrete, part asphalt.

Runway 12-30

- ***Critical Aircraft*** – Military.
- ***Classification*** – Military.
- ***Dimensions*** – 6,823 feet long, 200 feet wide.
- ***Lighting*** – Medium intensity edge lights.
- ***Surface*** – Part concrete, part asphalt.

BUILDING AREA

- ***Location*** – Part west and part south of Runway 12-30.
- ***Aircraft Parking Capacity*** – Data not available.
- ***Other Major Facilities*** – Several large maintenance hangars; also nonaviation shops, storage, offices, housing, etc. on base.
- ***Services*** – Military use only.

RUNWAY APPROACHES

Runway 8

- ***Approach Type*** – TACAN, non-precision circle-to-land.
- ***Clear Zone*** – On base property.
- ***Approach Obstacles*** – None.

Runway 26

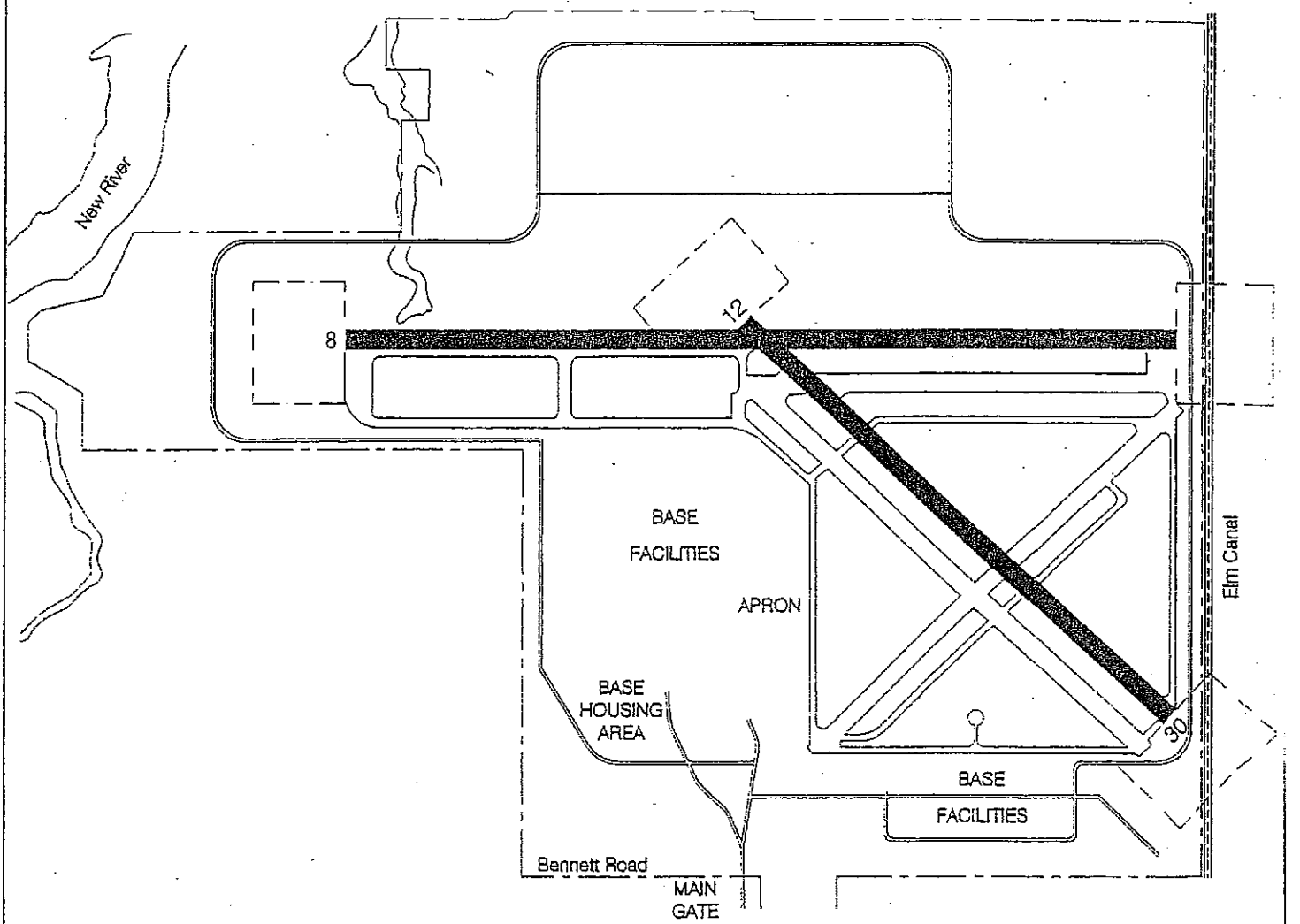
- ***Approach Type*** – TACAN, non-precision circle-to-land.
- ***Clear Zone*** – Mostly off base property; acquisition planned.
- ***Approach Obstacles*** – None.

Runway 12

- ***Approach Type*** – TACAN, non-precision circle-to-land.
- ***Clear Zone*** – On base property.
- ***Approach Obstacles*** – None.

Runway 30

- ***Approach Type*** – TACAN, non-precision circle-to-land.
- ***Clear Zone*** – Mostly off base property; acquisition planned.
- ***Approach Obstacles*** – None.



LEGEND

- Active Runway
- Airport Boundary
- Runway Protection Zone
- Canal

0 1500

Scale in Feet

N

Background Data

Airport Plan - Naval Air Facility El Centro

FIGURE 4Z

airport land use compatibility plan

Table 4U

Airport Activity

Naval Air Facility El Centro

BASED AIRCRAFT

	Current [a]	Future [b]
Total	Not Available	

AIRCRAFT OPERATIONS

	Current [a]	Future [b]
Total		
Annual	134,974	Same
Average Day	370	
Distribution		
S-3	38.1%	
A-4	24.7%	
A-6	9.4%	Same
A-7	3.3%	
F-14	14.4%	
Light Aircraft	2.8%	
Others	7.3%	
Touch-and-Goes (% of each type)		
S-3	95.6%	
A-4, A-6, A-7	28.6%	Same
F-14	64.0%	
Light Aircraft	28.6%	
Others	0.0%	

TIME OF DAY DISTRIBUTION

		Current [a]	Future [b]
S-3			
Day	(0700-1900)	60.5%	
Evening	(1900-2200)	34.5%	Same
Night	(2200-0700)	5.0%	
A-4, A-6, A-7, Light Aircraft			
Day	(0700-1900)	86.3%	
Evening	(1900-2200)	8.7%	
Night	(2200-0700)	5.0%	
F-14			
Day	(0700-1900)	72.6%	
Evening	(1900-2200)	22.4%	
Night	(2200-0700)	5.0%	
Others			
Day	(0700-1900)	77.4%	
Evening	(1900-2200)	17.6%	
Night	(2200-0700)	5.0%	

RUNWAY USE DISTRIBUTION

	Current [a]	Future [b]
Overall Operations		
(Varies by Aircraft Type)		
Runway 8	39.3%	
Runway 26	56.0%	Same
Runway 12	0.4%	
Runway 30	4.3%	

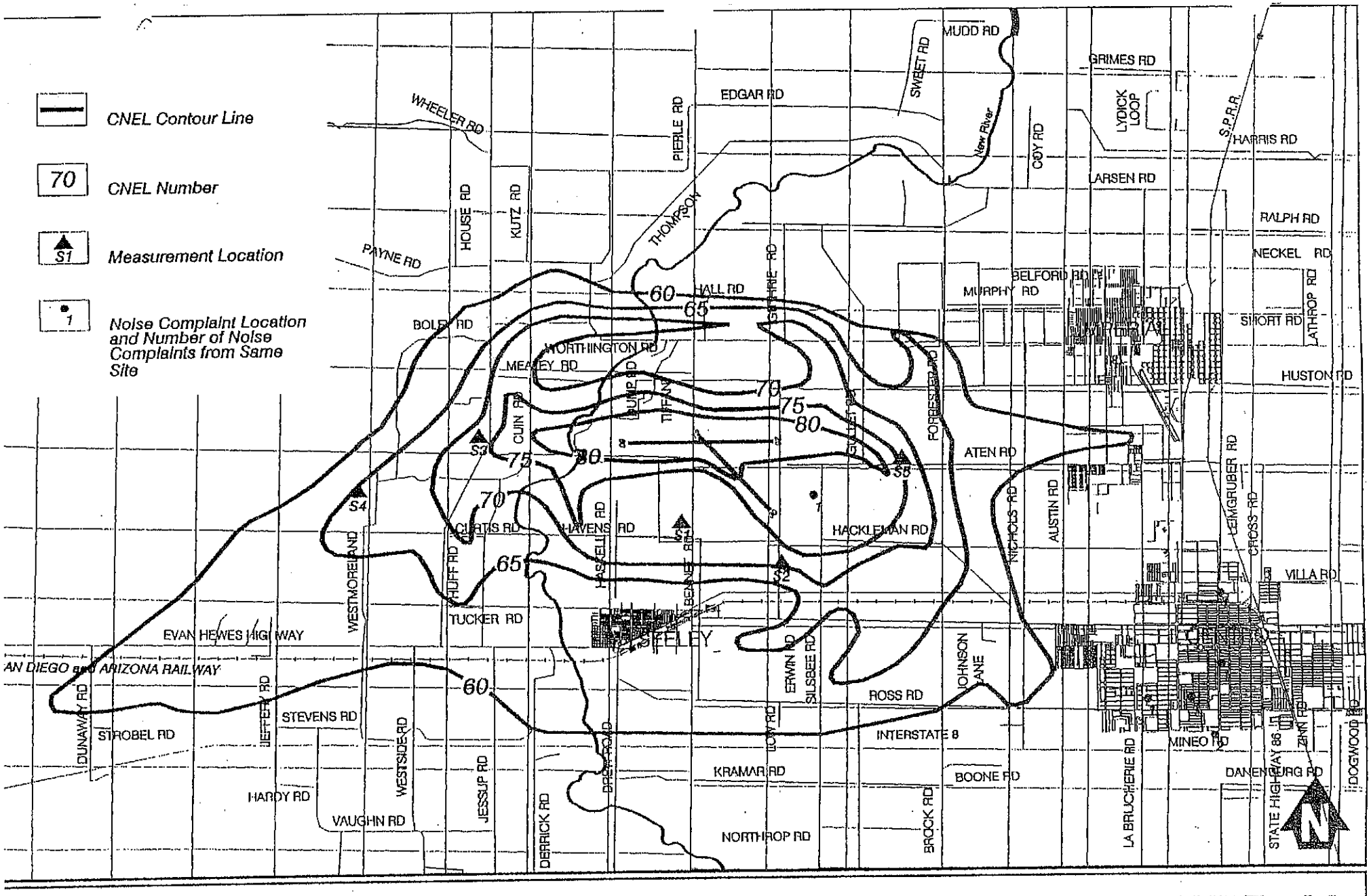
FLIGHT TRACK DATA

- Left turns in closed patterns.
- See AICUZ for details.

NOTES

[a] Actual 1987 activity levels. Source: *AICUZ.*

[b] For airport/land use compatibility planning purposes, future activity is assumed to be same as at present.

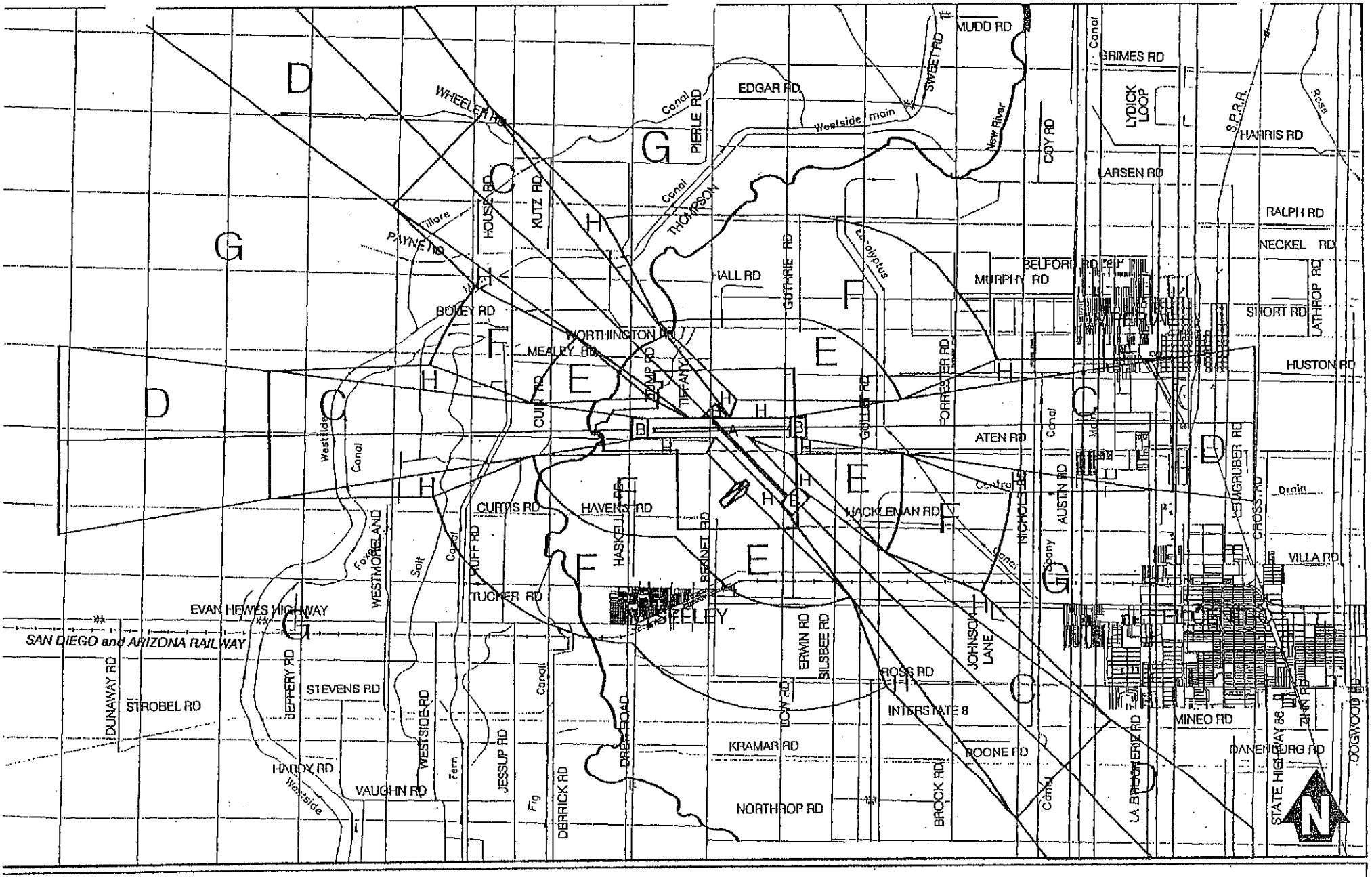


Background Data

Noise Impact Area - Naval Air Facility El Centro

FIGURE 4AA

airport land use compatibility plan



Background Data

Airspace Plan - Naval Air Facility El Centro

FIGURE 4AB

airport land use compatibility plan

Aircraft Accident Characteristics

AIRCRAFT OPERATIONAL PARAMETERS

Essential to any discussion of airports and their compatibility with surrounding land uses in terms of safety (and noise) is a basic understanding of aircraft operations under both normal and emergency conditions.

Normal Operations

Aircraft fly to and from airports under two different sets of federally defined operating procedures: Visual Flight Rules (VFR) and Instrument Flight Rules (IFR). VFR operating procedures are used when weather conditions (i.e., the horizontal visibility distance and the cloud ceiling height) permit pilots sufficient time to see a runway for landing as well as to see and avoid other aircraft in flight. IFR procedures apply when the weather conditions are below the minimums required for VFR. Under IFR procedures, pilots must rely on the aircraft's cockpit instrumentation, ground-based navigational aids, and (where available) air traffic control services. VFR and IFR procedures are applicable to both en route aircraft operations and to operations in the vicinity of an airport.

In Imperial County, instrument weather conditions occur infrequently. None of the civilian airports have a straight-in instrument approach procedure, although the Brawley Municipal and Imperial County airports have circling approaches with minimum descent altitudes below normal traffic pattern altitude. NAF El Centro also has a circling approach.

Visual Flight Rules Procedures

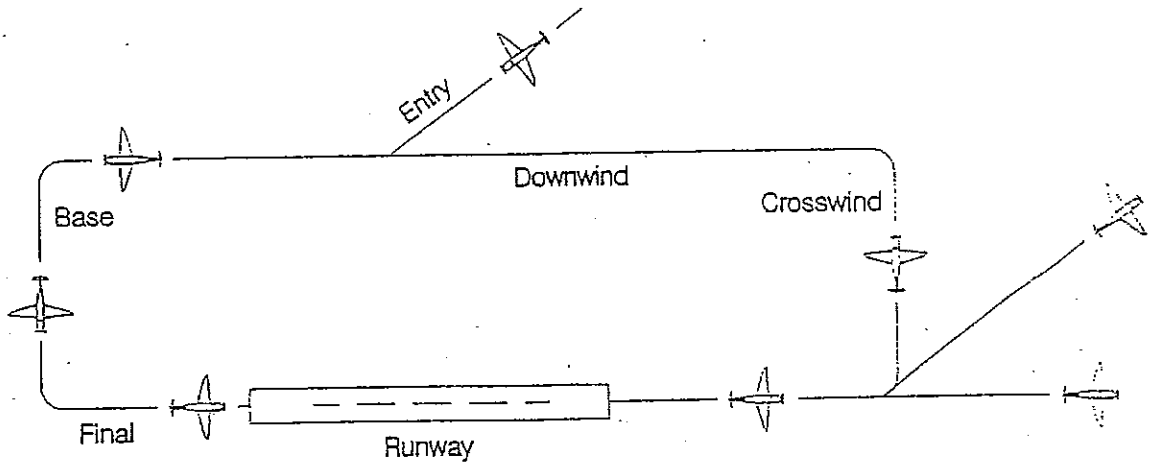
To facilitate the orderly, efficient, and safe operation of aircraft to and from airports, the Federal Aviation Administration has established standard aircraft traffic patterns. An airport traffic pattern is typically defined in terms of an altitude (or height above the airport) and a generalized routing. Most traffic patterns are 800 to 1,000 feet above the airport. The generalized routing is in the form of a racetrack-shaped path leading to and from the runway in use (Figure 5A.). Unless precluded by local conditions (e.g., terrain, sensitive land uses, airspace constraints, parallel runways, etc.), the standard traffic pattern uses left-hand turns.

It is important to realize that, although most pilots normally fly a standard pattern at a non-towered airport, use of the standard pattern is not mandatory. Depending upon the direction of flight, a pilot may make a "base entry" or "straight in" approach to landing and may depart the pattern at various points after takeoff. At towered airports, pilots often request the type of entry which will be most convenient to them. Air traffic controllers normally grant the request unless traffic congestion dictates the need for an alternate approach.

The existence of standard patterns tends to give people who are not pilots the idea that aircraft follow well-defined "corridors in the sky." The reality is that there is considerable variation in how pilots fly a standard pattern.

- For landings, pilots of average single-engine aircraft fly the downwind leg anywhere from ¼ to 1 mile from the runway. The base leg may extend even farther from the airport, particularly when other aircraft are in the traffic pattern. Also, there is a tendency by many pilots to fly a relatively wide pattern at airports with a long, wide runway even when no other aircraft are present. When larger and faster aircraft fly a standard pattern, it typically is farther out than the pattern flown by smaller aircraft. Often the pattern for these aircraft is so much farther out, that operationally it is as if these aircraft are making a straight-in approach.

- On takeoff, the normal procedure for small airplanes is to fly straight ahead until reaching an altitude of at least 400 feet above the airport. Depending upon runway length, aircraft type, air temperature, and pilot technique, this altitude may be reached over the end of the runway or not until nearly a mile from the runway end. Also, some pilots will begin a turn at a much lower altitude.



Note: Recommended standard left-hand pattern is depicted. Recommended standard right-hand pattern would be opposite.

Source: Airman's Information Manual, Federal Aviation Administration, January 11, 1990; Figure 4-5.

Aircraft Accident Characteristics

Standard Traffic Patterns

FIGURE 5A

Emergency Conditions

A common type of aircraft takeoff emergency is loss of power (complete or partial engine failure for either mechanical reasons or due to lack of fuel). Wind and weather conditions are additional frequent factors in both takeoff and landing emergencies. Pilot actions and aircraft performance under these circumstances both have consequences with regard to whether an accident will occur and, if so, how severe it will be.

Pilot Actions

Pilots are taught a set of procedures to follow if an engine stops running. Most critical is to keep the aircraft under control. Next is to attempt to determine the problem and, if possible, restart the engine. If an emergency landing becomes inevitable, the pilot will then try to find a reasonable spot to put the aircraft down.

When the emergency occurs while approaching or departing an airport, the initial reaction is usually to attempt to land on the runway. If a landing traffic pattern is flown at a normal altitude and distance from the runway, a runway landing may be possible. On takeoff, however, the aircraft is headed away from the runway and a runway landing becomes difficult or, at low altitudes, impossible. Loss of control of the aircraft, resulting in a spinning descent toward the ground, may result. In the few moments that a pilot may have available in which to select an off-airport emergency landing site, there is no certainty that the best site can be spotted, particularly at night, or that it can be reached. A large, flat, open area is preferable; but, if one cannot be found, a small open space or a street or parking lot are often the best candidates. Usually, an effort will be made to avoid buildings, large trees, and other such objects. Smaller objects, such as ditches and wires, may not be obvious until it is too late to avoid them.

Aircraft Performance

The performance of an aircraft following an engine failure varies to some extent from model to model, but most of the basic parameters are the same. One major difference among aircraft types is between single-engine and twin-engine airplanes. An obvious, but very important, difference between the two is that a twin can experience an engine failure without having a complete loss of power. As a result, under many conditions, it is possible for an airborne twin-engine airplane to have an engine failure without being forced to land as is unavoidably the case for a single-engine plane.

It is important to emphasize that, with either type of aircraft, an engine failure does not necessarily mean that the plane will go out of control and drop from the sky. Indeed, if

control is maintained, most airplanes can glide as far as 1,000 feet for every 100 feet of altitude. At a 1,000-foot traffic pattern altitude, for example, an airplane could travel nearly two miles before reaching the ground.

The capability of an airplane to remain under control following an engine failure is dependent upon its speed. For a single-engine plane, the critical speed is its stall speed. A twin-engine plane has two additional milestone speeds which it passes as it accelerates through a normal takeoff sequence: minimum control speed and single-engine climb speed.

- **Stall Speed (V_s)** - This is the minimum speed at which an aircraft, either single- or twin-engine, can fly. At lower speeds, the flow of air over the wing does not generate enough lift to match the aircraft's weight. If engine failure occurs before this speed is reached during the takeoff run, the aircraft would remain on the ground and maximum braking should be applied to bring the aircraft to a stop. If the engine failure occurs during a landing or while in level flight, it is essential that the aircraft remain above stall speed. The aircraft's speed can be controlled by the descent rate and, on a twin, by use of the remaining engine. Failure to remain above stall speed results in an uncontrolled descent and can be a factor in accidents involving engine failure, especially in single-engine planes. A significant factor to note is that an airplane's stall speed is higher during a turn (i.e., it can stall more readily) than it is in straight flight. This is the reason why a pilot's attempt to return to the runway following a takeoff engine failure can have serious consequences.

- **Minimum Control Speed (V_{mc})** - Below this speed, a twin-engine airplane cannot be controlled with full power on one engine and the other engine failed. Airflow across the rudder does not generate enough yawing force to overcome the asymmetrical thrust of a single engine operating away from the aircraft centerline. Engine failure below this speed requires a reduction in power on the good engine in order to maintain directional control. During a takeoff, the aircraft would either remain on the ground or would, if properly handled, return immediately to the ground in a controlled manner and maximum braking then applied (V_{mc} is typically attained while the aircraft is either still on the runway or only a few feet above it). Because of a twin-engine airplane's asymmetrical thrust characteristics, lack of immediate and proper pilot response during a engine failure on takeoff is more likely to lead to an uncontrolled accident than is the case with a single-engine plane.

- **Single-Engine Climb Speed (V_{se})** - At less than this speed, a twin-engine airplane cannot climb on a single engine even using full power to that engine. If an engine fails below this speed, it is possible to stretch a controlled descent; however, the aircraft is expected to return to the ground. Engine failure at a speed above V_{se} should not necessitate a forced landing because the aircraft is capable of using the

remaining engine to climb to an altitude from which a return to the airport for a safe emergency landing can be made.

ACCIDENT LOCATION

There are two distinct approaches that can be taken in assessing the potential for an aircraft accident to occur in any given location around an airport. One is to examine statistical evidence gathered from accidents experienced historically at an airport or group of airports. The other method is to evaluate where an aircraft would come down under the circumstances in which problems are most likely to happen. Being based upon actual events, rather than theory, the former approach is the ideal method of analysis. The limited available statistical base on accident locations, however, dictates that consideration also be given to the theoretical approach when evaluating airport area land use risks.

Historical Accident Experience

National Data

Although a substantial amount of data is available regarding various aspects of aircraft accidents, comparatively little of it is tabulated in terms of the precise location of accident sites with respect to the associated airport runway. The National Transportation Safety Board, the primary repository of aircraft accident data in the U.S., merely summarizes accident locations as being "on airport," "in traffic pattern," "within ½ mile," "within ½ to 1 mile," etc. This deficiency is significant because data on both the distance and direction from the runway are needed to properly assess off-airport accident potential. At some airports, "in traffic pattern" or "within ½ mile" can also be "on airport."

Some data on accident locations was compiled in 1973 in a study conducted for the California State Assembly Committee on Natural Resources and Conservation (Air Safety Publications - 1973). This report notes that of 4,954 civil aircraft accidents investigated by the National Transportation Safety Board in 1970, 48.5% occurred within the airport boundary and 37.9% happened more than one mile from an airport. This leaves 13.6%, or 672 accidents nationwide, which occurred off airport property but within one mile.

The report states that the one-mile distance:

> " .... is a reasonable measure of the region of influence between an airport and its surrounding community. It encloses the entire traffic pattern and most departing aircraft have made their initial power reduction and assumed normal climb attitude within that distance. On instrument approaches, the minimum descent altitude is usually reached within that area."

The Assembly Committee's 1970 figures are very similar to ones compiled from NTSB data by Hodges & Shutt for a five-year period, 1974 through 1978 (Figure 5B.). Over this time span, 15.5% of all serious general aviation aircraft accidents took place in the off-airport, within-one-mile zone. The one-to-five-mile range adds another 6.7%.

Survey of Specific Airports

In order to obtain more precise data regarding the location of off-airport accident sites, Hodges & Shutt conducted a survey of busy general aviation airports in California and elsewhere in the U.S. Accident data was requested from a total of 23 airports and responses were received from 14.

California Airports

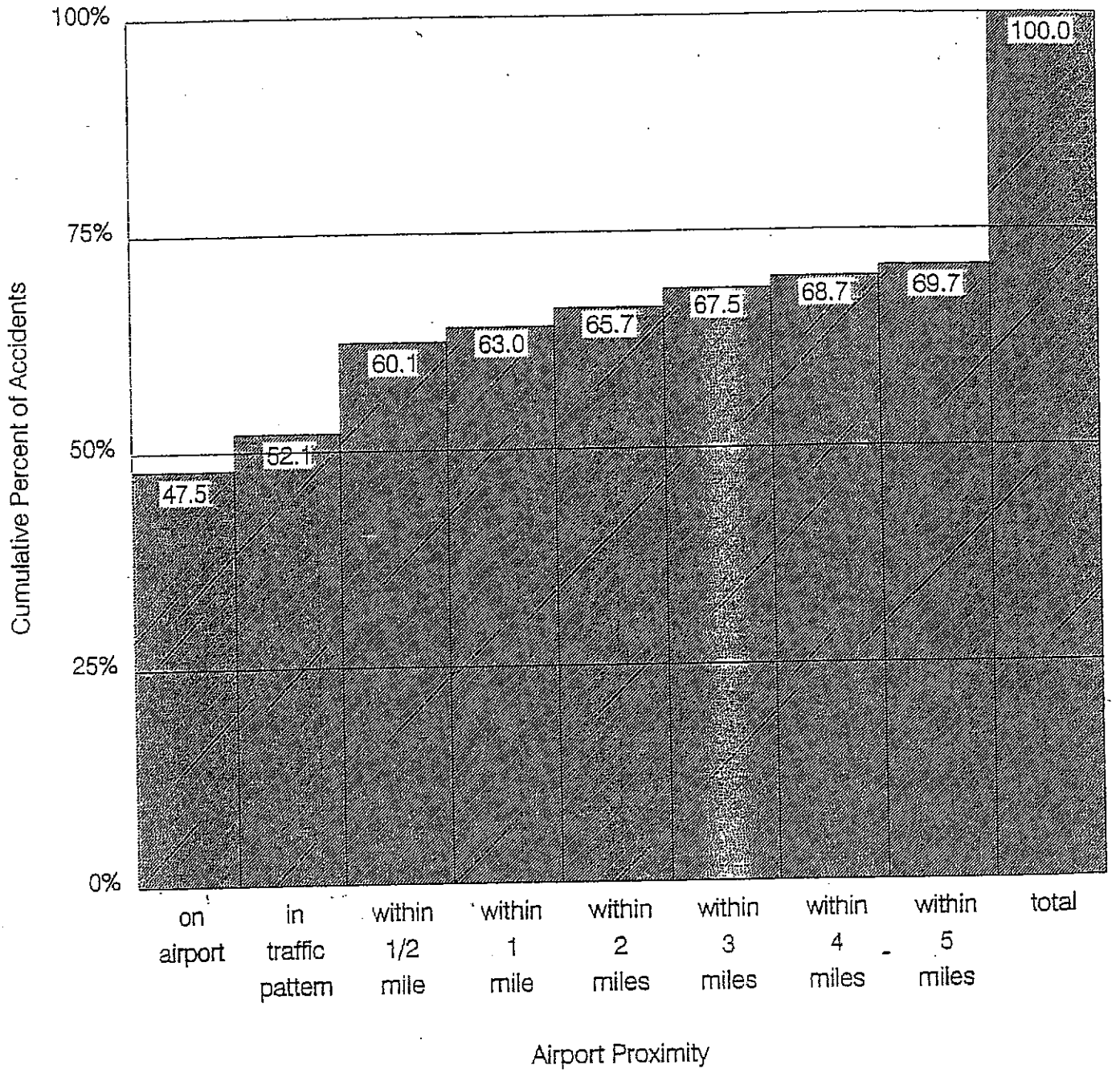
Buchanan Field	Concord, California
Chino Airport	Chino, California
Fullerton Municipal Airport	Fullerton, California
Hayward Air Terminal	Hayward, California
John Wayne Airport	Santa Ana, California
Palo Alto Airport	Palo Alto, California
Reid-Hillview Airport	San Jose, California
South County Airport	San Martin, California
Torrance Municipal Airport	Torrance, California

Other Airports

Bowman Field	Louisville, Kentucky
Merrill Field Airport	Anchorage, Alaska
North Perry Airport	Fort Lauderdale, Florida
Opa Locka Airport	Opa Locka, Florida
Spirit of St. Louis Airport	St. Louis, Missouri

The data collected represented a total of 70 accidents. The time span involved varied from airport to airport; the median was about seven years. Figure 5C depicts the spatial distribution of accidents with respect to the runway involved. The location of crash sites for accidents occurring during departures were plotted relative to the departure end of the runway; no adjustment was made for the varying lengths of the runways (the runway lengths range from 2,500 to 8,000 feet, with the median being about 3,100 feet). The crash sites for arrival accidents are plotted with respect to the intended landing runway.

Although this sampling of data is unquestionably quite limited, it begins to give a better sense both of where accidents can be expected to occur and of the differences between takeoff and landing accident sites. Much more extensive research is necessary to broaden the data base and further refine the analysis.

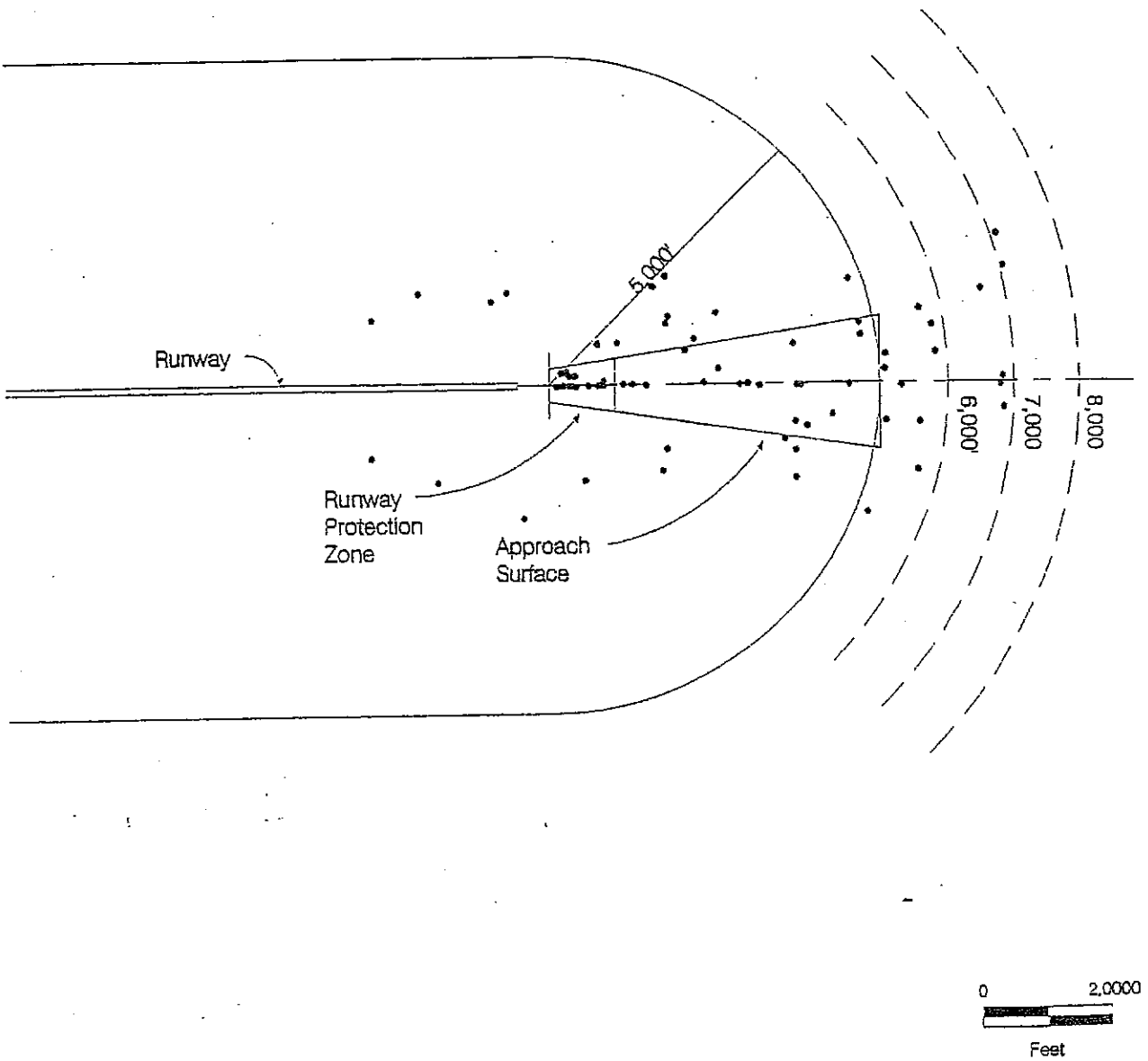


Source: N.T.S.B. Annual Review of Aircraft Data
U.S. General Aviation Calendar Years 1974-1978
Data is not published in this format for later years

Aircraft Accident Characteristics

Proximity of General Aviation Accidents to Nearest Airport

FIGURE 5B



- Accident site

Note: Data complied from 14 general aviation airports.
Runway protection zone and approach surface assumes a nonprecision approach to a utility runway.

Aircraft Accident Characteristics

Aircraft Accident Locations at General Aviation Airports

FIGURE 5C

Theoretical Areas of High Accident Probability

By assessing the circumstances under which off-airport accidents have typically occurred, a range of most-likely accident sites can be projected.

Landings

Most of the conditions likely to result in an off-airport landing accident put the aircraft close to the runway end. Indeed, the great majority of aircraft landing accidents take place on or immediately adjacent to the runway (usually hard or long landings, ground loops, etc.). One common type of accident results when the landing approach is lower than preferable and the pilot fails to add power soon enough to keep the aircraft in the air. Poor visibility, unexpected downdrafts, or tall objects beneath the final approach course can intensify the problem. Another prospective type of landing accident can occur if a pilot overshoots a turn from base to final and inappropriately cross controls the airplane rudder and ailerons while attempting to return to the runway alignment. The result can be a stall, spin, and uncontrolled crash.

Takeoffs

A much greater range of accident sites can be hypothesized for aircraft takeoffs than for landings. Of particular interest is identification of the scenarios which determine the maximum probable extent of this range. This analysis assumes the occurrence of an engine failure at the point during takeoff which results in the aircraft travelling the maximum distance from the runway end.

As suggested by the earlier discussion of aircraft performance, there are important differences between single- and twin-engine airplanes in terms of the conditions which produce a maximum theoretical trajectory.

- For a single-engine airplane, the maximum trajectory scenario involves engine failure at an altitude of about 400 feet. At this altitude, an aircraft cannot normally be turned around for a safe emergency landing back on the runway and the most prudent pilot action is to seek a landing site as close to straight ahead as possible.

- With a twin-engine airplane, the farthest probable accident site would result from an engine failure at a speed just below single-engine climb speed (V_{se}). When reaching this speed, the aircraft would normally be airborne by about 50 feet and be controllable, but it would be unable to climb. The theoretical maximum distance is

calculated based upon the assumption that the power to the remaining engine would be shut down at this point and the aircraft would then glide back to the ground. The trajectory could be continued over a longer distance by maintaining power in the one engine, but this procedure would not be necessary unless a better emergency landing site existed farther out the flight path than was available close in.

Given these assumptions, the following travel distances have been calculated for a range of single- and twin-engine airplanes. The distances are measured from the beginning of takeoff roll to the end of motion (i.e., the runway length is included).

Maximum Takeoff Trajectory

	Range	Mean
Single-Engine	6,500' - 9,000'	7,450'
Twin-Engine	3,750' - 5,150'	4,350'

NATURE OF IMPACT

The nature of the impact that occurs when a small aircraft lands off airport can vary from a nearly normal landing to a catastrophic crash. When the aircraft remains under control and a reasonably open emergency landing site can be found, the impact can be relatively minor, the potential for injury to people on the ground is very small and the aircraft occupants have a strong probability of surviving. The most serious accidents, in terms of risks to people on the ground as well as to the aircraft occupants, are those in which the pilot either: (1) loses control of the aircraft and, because of damage, low altitude, or improper procedures, is unable to regain control; or (2) is unable to select a reasonable forced landing spot because of darkness, fog, or the nonexistence of such a spot.

The following discussion examines available data and theoretical findings regarding the nature of impact between aircraft and other objects.

Table 5A

Accidents Involving Collisions

U.S. General Aviation 1974-1981

Object Struck	Annual Average	Percentage of All Accidents
Ground (uncontrolled), Ground (controlled), Ditches, Dirt Banks, Water, Etc.	861	20.9%
Trees, Crops	483	11.7%
Wires, Poles, Fences	389	9.5%
Houses, Other Buildings	26	0.6%
Automobiles	25	0.6%
Persons, Animals	8	0.2%
Airport Hazards (e.g., runway approach lights)	36	0.9%
Aircraft (one or both on ground)	36	0.9%
Aircraft (both in air)	66	1.6%
Other	167	4.0%
Total Collision Accidents	**2,097**	**51.0%**
Total General Aviation Accidents	**4,114**	**100.0%**

Notes: Data includes both primary accident types (i.e., accident began with the collision) and secondary accident types (i.e., something else happened which then resulted in a collision). A collision can be both a primary and a secondary accident type in the same accident - a few of these instances are included in the data, but others (especially ones in which a mid-air collision was the primary accident type) appear not to be.

Source: National Transportation Safety Board, *Annual Review of Aircraft Accident Data - U.S. General Aviation*, Calendar Years 1974 to 1981. Data is not published in this format for later years.

sm/CollTB5A.

Accidents Involving Collisions

No complete data specifically indicating nature of aircraft impact is available. Data on one general category of impact - collisions - are summarized in Table 5A for the 1974-1978 period. About half of all aircraft accidents have involved collisions, either as the first occurrence of the accident sequence or as a result of something else (e.g., mechanical failure or loss of directional control while landing) happening first. Collision with the ground, embankments, etc., was cited in 20% of the accidents over that period. A collision with a house or other building occurred in less than 1% of all accidents. It should be noted that this data does not necessarily reflect either the severity or the location of the impact: for example, it includes on-airport taxiing accidents as well as collisions, such as with power lines, after which the aircraft still safely landed on the runway.

Effects of an Aircraft Collision with a Typical House

As part of a previous research study (Hodges & Shutt - 1985), data was gathered regarding the probable effects of a small aircraft colliding with a typical house. The study determined that the variables involved are so great as to preclude definitive conclusions. The effects can only be estimated within a wide range of possibilities. Among the variables noted are:

- The aircraft weight.
- The speed of the aircraft, both horizontally and vertically, at the time of the collision.
- The angle of contact with the structure (i.e., glancing or head-on).
- The aircraft attitude when the collision occurs.
- The composition of the building surface struck by the aircraft.
- The occurrence of fire after the impact.

The research entailed a search for previous studies on the subject, review of historical accident records, and interviews with building demolition experts and aircraft salvage companies. To the extent that any meaningful conclusions can be reached from the data obtained, they can be summarized as follows:

- General aviation aircraft collisions with buildings of any kind, and residences in particular, happen infrequently. The data in Table 5A (for an eight-year period)

indicates an annual average of 26 occurrences for the entire nation; data for a more extensive period (19 years) listed in Table 5B averages about 30. Of these collisions, over half have been with buildings on the airport. *Collisions with off-airport residences averaged approximately 6 per year, nationally, through 1982.*

- Aircraft are not designed for collisions. The disintegration of the wings and fuselage of a small, general aviation aircraft as it collides with a building dissipates much of the energy that would otherwise be delivered to the structure.

- The above two conclusions notwithstanding, the potential effects of an aircraft colliding with a typical house range from insignificant to catastrophic. Neither data nor analyses can predict the actual effects of a particular incident.

Non-Occupant Injuries

Injuries to people on the ground (i.e., people who are not occupants of the aircraft) as a result of general aviation aircraft accidents occur even less frequently than collisions with buildings. Most such incidents take place on-airport. National data on injuries to people in buildings is shown for a 19-year period in the previously referenced Table 5B. Over the period examined, less than two accidents per year resulted in injuries to people in a building.

Single-Engine versus Twin-Engine Airplanes

Although the probable effects of the crash of a single-engine airplane compared to that of a twin are not orders of magnitude different, there are significant distinctions. The relative risk of injury to people or damage to property on the ground is a function of the aircraft operating energy (weight and speed) and the probability of an accident occurring. Single- and twin-engine planes differ in both of these parameters.

- **Operating Energy** - There is virtually no weight overlap between the two categories of aircraft. The heaviest single-engine airplane in the general aviation fleet weighs approximately the same as the lightest twin. There is more of an overlap with regard to speed, but, on the whole, twins fly faster.

- **Probability of Accident** - As indicated above, the ability of a twin-engine airplane to continue, under many circumstances, to fly on one engine, reduces the frequency of accidents.

Table 5B

General Aviation Accidents Involving Buildings

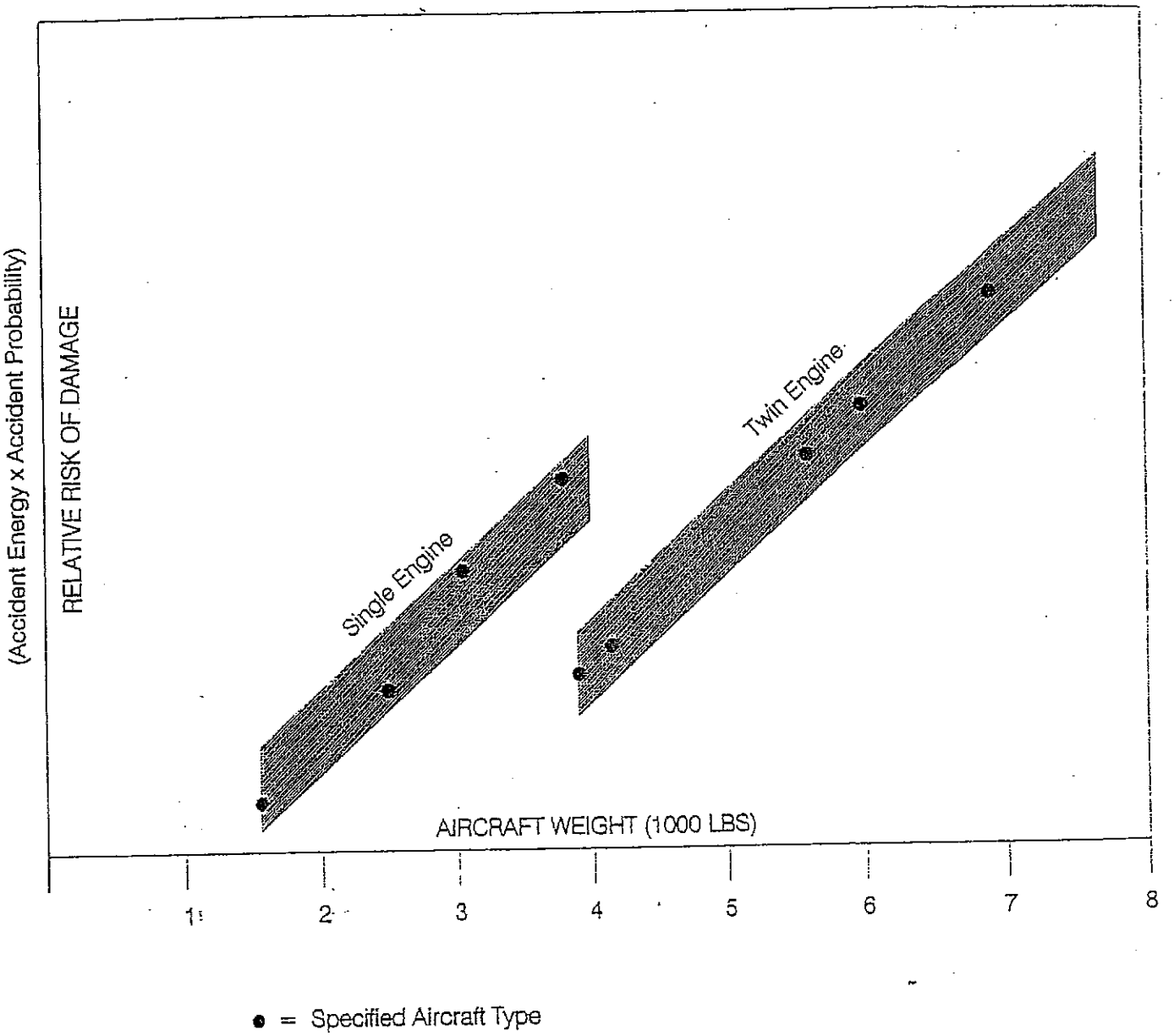
United States 1964-1982

	General Aviation Accidents Involving Buildings			Accidents Involving Injuries to People in Buildings	
	Total	Off Airport	Residences	Total	Residences
1964	54	17	4	0	0
1965	37	16	3	2	1
1966	42	11	6	2	2
1967	37	12	5	0	0
1968	26	10	2	0	0
1969	25	9	4	0	0
1970	29	17	10	3	1
1971	21	8	6	1	1
1972	25	11	3	3	2
1973	32	16	3	3	0
1974	18	5	2	0	0
1975	30	10	6	1	1
1976	21	10	4	1	0
1977	34	18	12	4	4
1978	27	16	9	4	4
1979	27	15	8	3	3
1980	24	9	8	5	3
1981	23	10	4	1	0
1982	31	20	17	2	2
Total	563	240	116 *	35	24
Annual Average	*29.6*	*12.6*	*6.1*	*1.8*	*1.3*

* Includes 13 on-airport residences.

Note: Published data not available for more recent years.

Source: AOPA - 1985, *Airports Good Neighbors to Have*



Aircraft Accident Characteristics

Relative Accident Risks by Type of Aircraft

FIGURE 5D

airport land use compatibility plan

A conceptual diagram of the relative risks associated with single-engine versus twin-engine airplanes is depicted in Figure 5D. The diagram suggests that at an aircraft weight of approximately 4,000 pounds, the relative risk of damage drops in the transition between the two aircraft types. This is conceptually supportable in that the operating energy of the heaviest single and the lightest twin are equivalent, whereas the accident probability is less for the twin. The risk of damage for the heaviest single-engine plane in the fleet appears to be equivalent to the risk of damage for a twin-engine airplane in the 5,500-to-6,500-pound range.

OTHER CHARACTERISTICS

Data on other selected characteristics of general aviation aircraft accidents have been examined in search of any trends that might have a bearing on off-airport safety. Although the data cited here, as well as much of that noted above Ä is for the late 1970's, data for more recent years likely would be similar in nature. From the more limited recent data that is available, the most noteworthy fact is that the rate of general aviation accidents has declined from approximately 12.6 per 100,000 aircraft hours in 1978 to 7.9 in 1988, as well as from 5.6 per 100,000 departures in 1978 to 4.9 in 1988 (AOPA - 1990).

Phase of Operation

The data in Table 5C indicates the relative frequency with which accidents occur during different phases of aircraft operation. Landing accidents are the most common. Two-thirds of these, however, take place during the level off/touchdown/rollout process (i.e., on or near the runway) rather than in the traffic pattern or during final approach. The phases of operation most likely to produce near-airport accidents (as opposed to on-airport or en route) are initial climb, in traffic pattern, final approach, and go-around/missed approach (data on phase of operation by accident location is not available). Among these operational phases, the initial climb and the similar go-around/missed approach phases account for 60% of the accidents. As might be expected, near-airport accidents tend to be more severe than on-airport accidents. Some 33% of the accidents occurring during the initial climb, in traffic pattern, final approach and go-around/missed approach phases resulted in serious or fatal injuries, compared to only 7% for the operational phases which normally would result only in on-airport accidents.

Time of Day

Table 5D reveals that nearly 89% of all general aviation accidents take place during dawn, daylight, or dusk, with about 11% occurring in hours of darkness (officially, one hour after sunset to one hour before sunrise). No definitive data is available on the percentage of all aircraft takeoffs and landings made at night, but a reasonable estimate is 7% to 10%. Considered together, these figures indicate that the nighttime accident rate is greater than the daytime rate, but not substantially so. The greater difference between daytime and nighttime accidents is their severity. About 24% of dawn/daylight/dusk accidents involve serious or fatal injuries, compared to nearly 47% of the night accidents. Once again, there is no available data as to the relationship between time of occurrence and airport proximity of accidents. It might be concluded that the need for open, emergency landing areas is more critical around airports which have night activity than around ones used solely in daylight; this conclusion is tempered, however, by the fact that pilots might not be able to spot such areas in the dark unless they are highly familiar with the airport activity.

Weather

Weather conditions affect safety in much the same way that conditions of light affect it. Poor visibility, whether because of clouds or darkness, eliminates some of the margin of safety that better flying conditions allow. The available data categorizes weather conditions according to the flying rules that prevail: Visual Flight Rules (VFR), Instrument Flight Rules, "see and be seen", are in effect at an airport when the visibility is at least 3 miles and the ceiling at least 1,000 feet above ground level. Poorer conditions require the use of Instrument Flight Rules, the pilot guides the aircraft by reference to electronic signals rather than visually, and coordination between aircraft is provided by FAA air traffic control. "Below minimums" refers to when conditions are so poor that landings cannot be made even with IFR. These minimums vary from airport to airport. The vast majority of accidents occur during VFR weather since most flying is limited to these conditions (less than half of non-student pilots nationwide are certified for instrument flying and only about 30% of California public-use airports have instrument approaches). As might be expected, however, the severity of IFR accidents is substantially greater than those under VFR (67% involve severe of fatal injuries versus 23% for VFR).

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Table 5C

Accident Distribution by Phase of Operation

U.S. General Aviation 1974-1979

Phase of Operation	Percent of Total Accidents	Proportion Involving Serious/Fatal Injury
Static	0.8%	51%
Taxi	3.7%	4%
Takeoff	19.5%	23%
run	4.8%	7%
initial climb	12.3%	31%
other	2.4%	12%
In Flight	33.7%	45%
Landing	41.5%	14%
in traffic pattern	2.1%	46%
final approach - VFR	6.6%	28%
final approach - IFR	0.9%	68%
roll	12.6%	2%
go-around/missed approach	2.7%	30%
other	3.4%	31%
Unknown	0.8%	77%
TOTAL	100.0%[1]	27%

[1] Total number of accidents records for the six-year period was 25,963

Source: National Transportation Safety Board, Annual Review of Aircraft Accident Data - U.S. General Aviation, Calendar Years 1974-1979. Data is not published in this format for later years.

Table 5D

Accident Distribution by Conditions of Light

U.S. General Aviation 1974-1979

Conditions of Light	Percent of Total Accidents	Proportion Involving Serious/Fatal Injury
Dawn	1.4%	27%
Daylight	83.3%	24%
Dusk	3.8%	26%
Night (dark)	9.1%	50%
Night (moonlight/bright)	1.7%	28%
Unknown	0.7%	46%
TOTAL	100.0% [1]	27%

[1] Total number of accidents records for the six-year period was 25,963.

Source: National Transportation Safety Board, Annual Review of Aircraft Accident Data - U.S. General Aviation, Calendar Years 1974-1979. Data is not published in this format for later years.

6

Safety Compatibility Policy Issues

INTRODUCTION

At the center of the airport/land use safety compatibility issue is the concept of risk. Two components contribute to the risk posed by potential aircraft accidents:

- The *frequency* component - the portion that measures the probability of an aircraft accident occurring; and

- The *severity* component - the portion that addresses the consequences of the accidents that occur. Additionally, aircraft accident severity can be assessed with respect both to people and property on the ground and to the occupants of the aircraft involved in an accident.

Airport land use commissions have virtually no authority to implement measures affecting the frequency of aircraft accidents. They can influence the severity component to the extent that severity is affected by the land uses at an accident site and elsewhere in an airport vicinity. This influence, though, extends only to proposed future land uses- ALUC's have no powers over existing land uses.

This chapter discusses the types of land use controls that an ALUC can establish for the purposes of safety compatibility around airports. Some of the issues that need to be considered in development of the associated policies are addressed as well.

SAFETY ZONE ALTERNATIVES

As might be concluded from the lack of definitive accident-location data, airport safety zones can take a variety of shapes and sizes and be divided into various numbers of segments with differing levels of land use restrictions. The areas most susceptible to aircraft accidents, the *Runway Protection Zones* (previously called *Clear Zones*), are well defined in FAA regulations. Beyond these boundaries, significant differences occur from one jurisdiction to another. In each case, the intent is that the safety zones correlate with the accident potential to which the encompassed lands are exposed.

One approach to assessing alternative safety zone configurations is to determine the percentage of accident sites contained within safety zones of equal area, but different shape. Figure 6A presents this analysis for the accident-site data obtained from the 14 airports previously mentioned. Each line on the graph represents a rectangular safety area with a given aspect ratio (i.e., the ratio of length to width). The smaller the aspect ratio, the more long and narrow the shape of the area encompassed. The point demonstrated by the graph is that a long, narrow shape safety area will generally include more accident sites than a short, wide safety area of equal acreage.

This finding confirms the earlier observation that aircraft accidents, particularly arrival accidents, tend to cluster along the extended runway centerline. The graph in Figure 6B further illustrates this fact.

Further refinements of the concept can be made by introducing trapezoidal or other shaped safety areas. The basic conclusion, though, would not be altered.

OPEN SPACE FACTORS

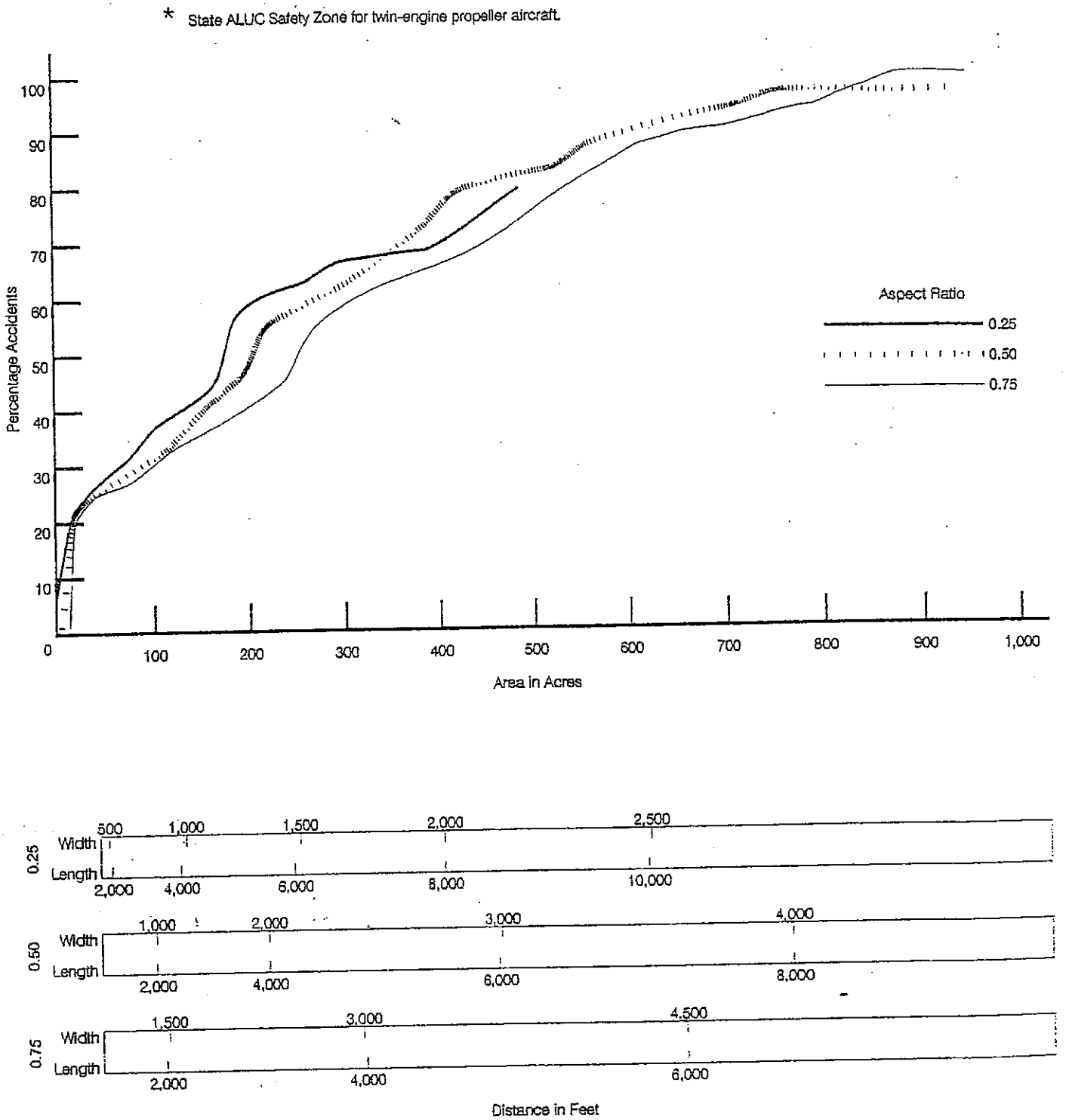
As discussed previously, the pilot of a disabled aircraft will, if possible, tend to aim the aircraft toward some form of open space when an off-airport emergency landing is inevitable. This tendency raises two questions:

- How much open space can be found around busy, urban, general aviation airports?
- Is there a greater propensity for off-airport aircraft accidents to occur in open spaces than elsewhere in the airport's environs?

Airport Environs Open Space

Of the 14 responding airports in a recent accident survey done by Hodges & Shutt, open space information was obtained from 12. Table 6A summarizes the data. To provide some commonality among the airports, the environs examined for each airport were defined as being the area encompassed by the Federal Aviation Regulations Part 77 surface for utility-category (accommodating aircraft weighing up to 12,500 pounds), visual or nonprecision runways (i.e., all areas within 5,000 feet of the end of any runway's primary surface). The total airport environs acreages differ for each airport because of the differing lengths and configurations of the runways.

Open space for each airport was determined by examination of aerial photographs. Four categories of open space were considered:



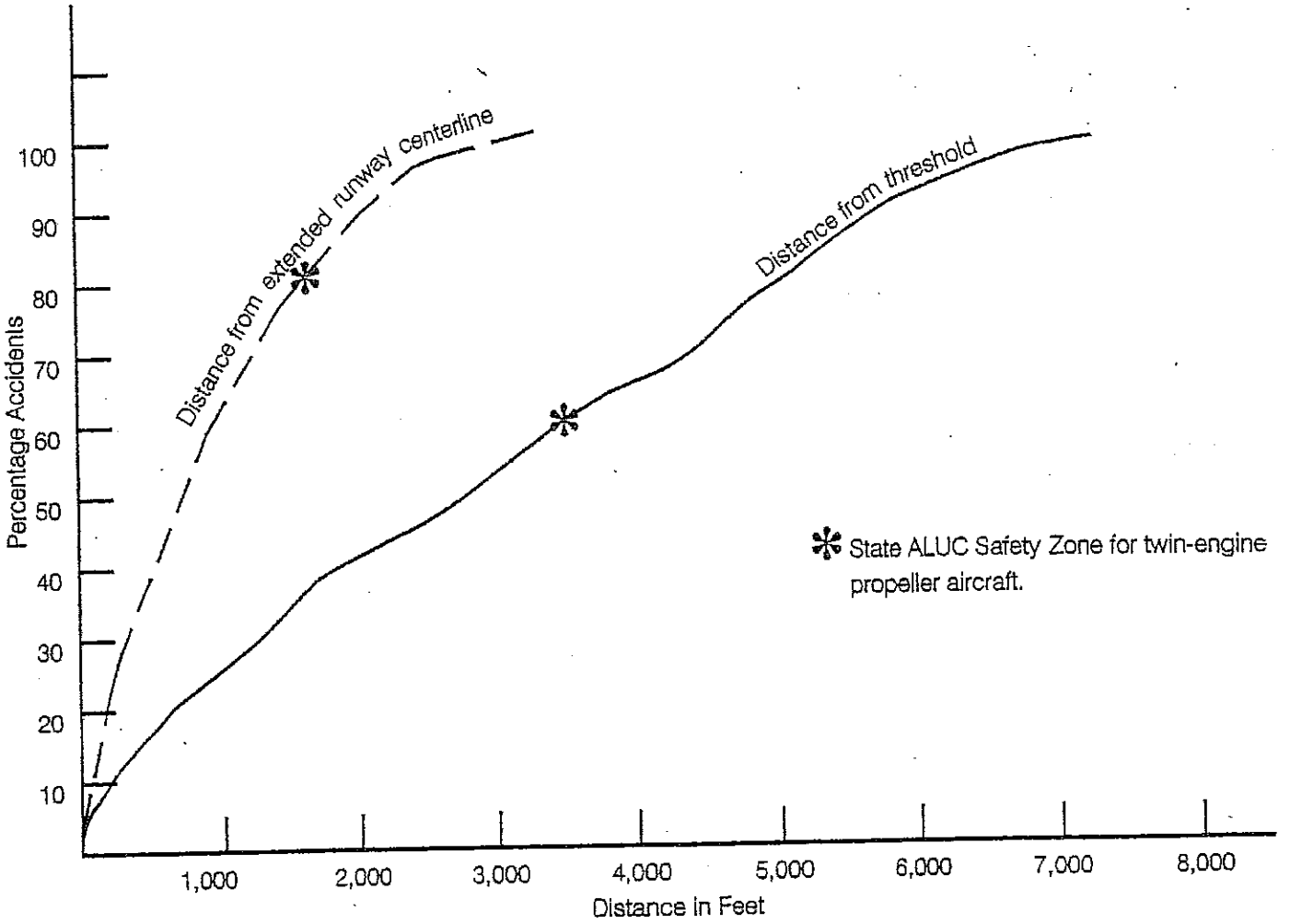
Source: Hodges & Shutt survey of 14 U.S. airports.
Annual operations at airports ranged from 150,000 to 300,000.
All airports had air traffic control towers.

Safety Compatibility Policy Issues

Comparison of Safety Zone Aspect Ratios

FIGURE 6A

airport land use compatibility plan



Source: Hodges & Shutt survey of 14 U.S. airports.
Annual operations at airports ranged from 150,000 to 300,000.
All airports had air traffic control towers.

Safety Compatibility Policy Issues

Accident Locations versus Distance from Runway

FIGURE 6B

Table 6A

Open Space in the Vicinity of Urban General Aviation Airports

Airport		Lakes/ Reservoirs/ Flood Plains		Open Parks/ Recreational Facilities/ School Grounds		Agricultural/ Undeveloped Lands		On Airport Property		Total Open Space	Total Airport Vicinity	Total Open Space
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	Acres	%
Bowman Field	KY	0	0	161	7	201	9	153	6	515	2,350	22
Buchanan Field	CA	48	1	67	2	283	8	80	2	478	3,500	13
Fullerton Muni	CA	0		97	4	130	5	10	1	237	2,380	10
Hayward Air Terminal	CA	0		128	4	129	4	90	3	347	3,000	11
John Wayne	CA	0		130	4	234	7	238	8	602	3,100	19
North Perry	FL	7	1	8	1	423	10	335	8	773	3,980	19
Opa Locka	FL	174	3	352	7	35	1	525	10	1,086	5,060	21
Palo Alto	CA	1,212	53	163	7	0	0	22	1	1,397	2,295	61*
Reid-Hillview	CA	52	2	150	6	99	4	79	3	380	2,380	18
South County	CA	0	0	0	0	1,108	42	87	4	1,105	2,390	46
Spirit of St. Loui	MO	0	0	0	0	1,930	47	167	4	2,097	4,080	51
Torrance Muni	CA	0	0	0	0	62	2	89	3	151	3,000	5
Average										764	3,126	25

* San Francisco Bay: 770 acres

sm/OpenSpac.

- Agricultural and undeveloped lands.
- Water bodies and flood plains.
- Open parks, recreational facilities, and school grounds.
- On-airport property.

Only those open spaces larger than about 2 to 3 acres were included in the computations. No attempt was made to identify steep terrain, ditches, fences, posts, trees, or other such individual obstacles that may occur in the otherwise open areas. Roads and auto parking lots were not included in the tabulation.

The results indicate that open space comprises from as little as 5% to over 60% of the overall environs of the studied airports. The average for the 12 airports is 25%. For all but three of the airports, agricultural and undeveloped lands comprised the largest category of existing open space, thus posing the question of whether the land will remain open in the future.

Relationship of Open Space to Aircraft Accident Sites

A comparison between the aircraft accident sites and the open spaces around each of the 12 airports reveals that some 33% of the accidents appear to have occurred within these areas. Although this percentage is higher than the 25% figure that would be expected from a purely random distribution of accident locations in the airports' environs, it is not enough higher to be statistically conclusive. A much greater sampling of aircraft accident locations plus better data as to whether the accident sites were indeed in open areas would be necessary to provide a more definitive conclusion.

LAND USE RESTRICTIONS

There are three basic purposes for establishment of safety-related land use restrictions in the environs of an airport:

- To avoid hazards which can cause an aircraft accident;
- To protect people and property on the ground when accidents occur; and
- To minimize injury to the occupants of aircraft involved in accidents.

The first of these objectives seeks to reduce the frequency with which accidents occur; the latter two address the severity of the accidents that happen. Although the approaches to achieving each of these objectives overlap in many respects, they also have important differences. The following discussion highlights basic safety compatibility concepts and issues.

Hazards to Flight

Hazards to flight fall into two basic categories:

- Obstructions to the airspace required for flight to, from, and around an airport; and
- Other forms of interference with safe flight, navigation, or communication.

Airspace Obstructions

The airspace needed for operation of aircraft around an airport is defined by Part 77 of the Federal Aviation Regulations and, for airports with instrument approaches, by the U.S. Standards for Terminal Instrument Procedures (TERPS). In most circumstances, the latter is the less restrictive set of criteria.

Limiting the heights of structures to the heights indicated by the Part 77 surfaces provides an ample margin of safety for normal aircraft operations. The guidance provided by Part 77 is not absolute, however. Deviation from the Part 77 standards does not necessarily mean that a safety hazard exists, only that offending objects must be evaluated by the Federal Aviation Administration and that mitigative actions such as marking or lighting be taken if appropriate.

In some locations, such as adjacent to a runway, objects exceeding the Part 77 height limits may not be regarded as a hazard. On the other hand, tall objects in the approach corridors may pose risks even though they do not penetrate the defined Part 77 surfaces. Such objects also can adversely affect the minimum instrument approach altitudes allowed in accordance with TERPS standards.

Other Flight Hazards

Other land use characteristics can also affect flight safety. The characteristics can be visual, electronic, or physical in nature. Visual hazards include distracting lights (particularly lights which can be confused with airfield lights), glare, and sources of smoke. Electronic hazards include any uses which interfere with aircraft instruments or radio communication. The principal physical hazards, other than the height of structures, are bird strikes. Although the risk of bird strikes is most serious along the corridors required for takeoffs and landings, the concern extends to elsewhere in the airport vicinity. Any land uses which can attract birds should be avoided, but those which are artificial attractors are particularly inappropriate because they generally need not be located near airports.

Protecting People and Property on the Ground

Regardless of measures taken to prevent near-airport aircraft accidents, some inevitably occur. The most effective means of limiting the severity component of the risks of injury to persons or damage to property on the ground due to these accidents is to control the density and type of land use development in the areas most susceptible to having an accident. The question this poses is one of how much control is appropriate when protecting against a type of event that has a very low likelihood of occurring, but which may have significant consequences if it does. Although there are no absolute answers to this question, there are several important issues to consider.

Form of Restriction

Restrictions on airport area land use can take various forms. The primary intent, however, usually is to limit the number of people in the accident-prone areas. Limiting the potential property damage is generally considered less of a priority. In this context, the basic measure of land use restrictiveness thus is the number of people per acre. Two sets of variables in this basic measure are:

- **Gross Acre versus Net Acre** -The area to be reviewed can be measured in terms of the entire area, regardless of streets or parcel lines (its gross acreage) or the area of a given parcel (the net acreage). Because safety area land use restrictions are more effective when applied at a general plan or large development level than they are for small, individual parcels, measurement on a gross acre basis is more suitable. Gross acreage is also easier to calculate.

- **Average versus at Any Time** - Limitations on the numbers of people per acre sometimes are stated as a never-to-exceed maximum and sometimes as an average measured over an indicated period (typically 2, 8, or even 24 hours). A combination of the two also is possible (e.g., an average of *x* people per acre over an 8-hour period, not to exceed 2*x* at any time). It is recommended that restrictions be stated as a never-to-exceed maximum and the level set accordingly. This is the same approach as that taken by fire codes for buildings. An averaging approach assumes that an accident will not occur when a higher-than-average number of people is present.

Acceptable Development Density

The question of where to set density limits is dependent upon the degree of accident risk - the frequency (or probability) and the severity, that the community finds acceptable. The available accident location data (the limited study cited earlier together with other, more extensive, but less precise, data) clearly indicate that accident probabilities increase with closer proximity to runway ends both because of the greater concentration of aircraft over those areas and because the aircraft are flying at low altitude.

Federal Aviation Administration guidelines recommend that, whenever possible, airports should directly own the locations most critical to safety, the runway protection zones. These areas should be limited to little, if any, development and as few people as possible.

At most airports, the majority of property beyond the runway protection zones is typically in private ownership. The FAA offers no specific guidance regarding land use restrictions in this area. Nonetheless, the FAA recognizes that safety concerns extend beyond the runway protection zones by making acquisition of additional property eligible for federal grants.

Some airports and local communities have set development density limitations ranging between 10 and 100 people per acre for various parts of runway approach corridors. To put these figures into perspective, the following examples are cited:

- A single-story office structure having one occupant per 100 square feet of floor area (the maximum occupancy load allowed under the Uniform Building Code) and covering 25% of the lot would have 100 people per acre.

- Typical light industrial uses tend to average 35 to 50 people per acre, as do two-story motels.

- Shopping centers are likely to average about 75 people per acre during busy periods.

- Restaurants may have over 100 people per acre; fast-food restaurants can exceed 150.

- Residential land uses are usually measured in terms of dwelling units per acre rather than people per acre; however, assuming a typical subdivision density of 4 to 6 dwelling units per acre and an average of 4 people in each residence, the number

of people per acre would range from 16 to 24 under normal circumstances. Clearly, the densities can be much greater on special occasions.

An additional factor to be taken into account in protecting people on the ground is their ability to move out of harm's way. Certain types of land uses consequently are considered unacceptable in vulnerable areas regardless of the number of people present. Primary among such uses are elementary and secondary schools, hospitals, and nursing homes.

Clustering Versus Spreading of Development

Given that the tradeoffs between safety and economic concerns usually dictate some amount of development near airports, particularly those in urban areas, a question to be considered is whether it is better for this development to be clustered or spread out.

- The premise behind the concept of clustering is that, in most off-airport accidents, the aircraft are under some degree of control when forced to land. Clustering thus allows a greater amount of open space toward which the pilot can aim. In addition to reducing the risks for people on the ground, open space also provides benefits for aircraft occupants, as addressed below. The disadvantage of clustering is that it allows an increased number of people to be in the potential impact area of an uncontrolled crash.

- A uniform spreading of development, on the other hand, provides fewer emergency landing spots and increases the chance of someone on the ground being injured. On the plus side, however, a uniform distribution of development limits the maximum number of people who could possibly be in an impact area.

A compromise between these two strategies probably represents the optimum approach in most cases. This approach entails limiting the maximum occupancy level of a small area, but otherwise clustering development so as to provide the greatest amount of large open areas.

Uses in Structures versus Ones Not in Structures

Sometimes a distinction is made between the acceptable number of people per acre in land uses where people are outdoors versus those where the people are in a building or other enclosed area.

- The theory is that people outdoors have more of a chance to see a plane coming as well as more directions in which they can move to vacate the impact area. A greater concentration of people thus is often considered acceptable for such land uses.

- Buildings, on the other hand, provide substantial protection from the crash of a small airplane, particularly when the aircraft is still under control as it descends. If a fire subsequently ensues, historically, a relatively infrequent occurrence, it is unlikely to engulf the entire building instantly.

Taking both of these factors into account, it is suggested that, for airports used only by small aircraft, the acceptable number of people in a given area be equal for uses in or not in structures. For airports used by business jets and other medium to large aircraft, a greater restriction on the number of people in structures is appropriate.

Minimizing Injury to Aircraft Occupants

As suggested above, the premise behind land use controls intended to minimize the severity of injury to aircraft occupants in the event of an off-airport accident is that, in most instances, aircraft are under control during the descent. If the aircraft has sufficient altitude, the pilot has some choice as to where to attempt an emergency landing. In circumstances involving an aircraft that is out of control as it descends, the character of the land uses below are not likely to have a significant effect on the survivability of the crash.

An open space does not have to be very large to enable a successful emergency landing. The objective is for the occupants to survive the accident with limited injury. Damage to the aircraft is irrelevant in these circumstances. An area as small as 75 feet by 300 feet (about 0.5 acre or the size of a football field) can be adequate for a survivable emergency landing in a small plane if the area is relatively free of objects such as overhead lines and large trees and poles that can send the plane out of control at the last moment. Because the pilot's discretion in selecting an emergency landing site is reduced when the aircraft is at low altitude, open areas preferably should be larger and spaced more closely in those locations overflown at low altitude. The chance of a pilot seeing and successfully landing in a small open space also would be increased if there are more such spots from which to choose.

INVERSE CONDEMNATION

A frequently mentioned concern with regard to establishment of airport/land use restrictions for safety purposes, as well as for noise, is that they might constitute inverse condemnation, a taking of private property without just compensation. The discussion in this section examines the issue of inverse condemnation as it applies to airport compatibility planning. The emphasis is on the operational implications of inverse condemnation.

The material is presented from a professional planning perspective. It is not a legal opinion.

Legal Basis for Regulation

A land use regulation must not be so restrictive that it causes a "taking" of a landowner's property without just compensation. This legal directive is derived from the Fifth Amendment to the United States Constitution which states "nor shall property be taken for public use, without just compensation." In the context of land use regulation, a property can be said to have been taken by inverse condemnation if a land use regulation or decision is so restrictive as to deprive the land owner of all reasonable use of the property. The application to airport approach protection measures is generally the same as for other purposes of land use regulation.

In California, the ability for local governments to regulate land use is an exercise of the police power granted by Article XI of the California Constitution. The enabling legislation for airport land use commissions is contained in Article 3.5 of the California Aeronautics Act. State, as well as federal, courts have upheld local land use regulations as long as: (1) they serve a legitimate governmental purpose; and (2) the application of the regulation to a specific property substantially serves that interest (the "nexus" test).

Defining the Public Purpose

It is generally easier to demonstrate a legitimate public purpose when a land use regulation "prevents a harm" rather than "confers a benefit;" however, this guideline is far from absolute. In the specific case of airport land use commissions, state enabling legislation clearly defines the purpose as being "to protect public health, safety, and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards...."

Regulation of land uses to assure compatibility with airport activities is widely held to be a legitimate public purpose. It is, after all, the purpose for the creation of airport land use commissions. However, there is a body of legal opinion which suggests that some approach protection measures (including avigation easements) are merely a transfer of rights from one private party to other private parties. That is, land owners adjacent to an airport give up certain rights (e.g., ability to build structures which would penetrate FAR Part 77 surfaces) which are then given to the users of the airport. In this legal view, no legitimate public purpose is being served and the action is not a valid exercise of the police power. If this view is accepted, any taking must be compensated.

Determining When a Taking Has Occurred

It is important to realize that the courts (including the United States Supreme Court) have found it a difficult task to determine when land use decisions constitute a taking. There is no set formula that can be used to determine when compensation is due a land owner. The courts have held that whether the need for compensation exists depends upon the particular circumstances of each case.

For a taking to have occurred, the property owner must be left without an economically viable use. The courts look to the value remaining in the property, *not* the value that was taken. Local land use regulations that have taken over 90% of the value of an individual's land have been upheld in the courts. Generally, the greater the range of remaining permitted uses, the easier it is to avoid a successful inverse condemnation suit.

Local governments are largely free to change land use designations and zoning at their discretion. These decisions are generally held to be legislative acts and courts will not substitute their judgment for those of elected officials. A landowner does not have "vested rights" to current zoning unless he/she has:

- A valid building permit;
- A vesting subdivision map; and
- A development agreement with the local government.

Vesting of rights to current zoning does not occur solely because a developer has constructed infrastructure (e.g., roads, and water lines).

Operational Implications

State law does not give ALUC's direct authority over land use. Implementation of an ALUC's policies is accomplished by the relevant city or county, to the extent that the local government concurs with the ALUC's policies. Therefore, it is a legitimate question whether it is possible for an ALUC to institute a taking through inverse condemnation. The local agency which implements the policies could be more readily sued. However, since the question here concerns the limitations which inverse condemnation presents in implementation of approach protection measures, the issue of which local agency could most readily be sued is not directly of interest.

Based upon the existing case law, limitations on occupant density, building height and similar measures can be implemented without inverse condemnation being a major concern. These types of limitations typically leave a wide range of economically viable uses. Retention of open space in a highly urbanized area is more likely to legitimately raise the issue of inverse condemnation. The ability to successfully preserve the remaining open space in the vicinity of urban airports will depend upon how two questions are answered:

- How are "open space" uses are defined?

- What percentage of each remaining parcel must be devoted to open space?

Defining Open Space

A definition of open space uses must be based upon a clear vision of the purpose of the open space. If the purpose of the open space is to provide emergency landing sites, the land would ideally be similar to a runway: free of structures, trees and water features; relatively smooth; and level.

If open space is defined to mean "no development" the potential for a successful inverse condemnation suit is quite high. No development is generally only a viable land use designation if the property's environmental constraints make development infeasible or inappropriate. If no development is the desired end, fee simple acquisition of the property would be the most appropriate implementation measure.

Alternatively, open space can be defined to include a range of uses which typically contain large amounts of land without structures and with low occupancy levels. In rural locations, agriculture (with some restrictions) is the ideal private use. However, in urban areas, there are only a few viable private uses which fit within the definition of open space.

- **Field Crops** -Flowers and specialty crops may be able to generate enough revenue to be supportable in a urban area. Many of these uses continue to operate in urbanized areas. A broader range of agricultural uses are practical in predominantly agricultural areas such as Imperial County.

- **Golf Courses** - Given the high demand experienced by existing golf courses, a new golf course could be a profitable enterprise. However, golf courses require a substantial amount of land, particularly for a standard 18-hole facility.

- **Cemeteries** - Space for both human and pet cemeteries is extremely limited in highly urbanized locations; it is uncertain whether these uses would be viable in a commercial sense.

Unfortunately, this list of open space uses is so limited that inverse condemnation would remain a serious concern. However, if automobile parking lots are included in the definition of acceptable private open space, the list becomes more viable. Clearly, parking lots do not make desirable emergency landing sites, but they are generally preferable to buildings. Based upon anecdotal information, it appears that landing in a parking lot seldom injures those on the ground and is often survivable for occupants of light aircraft. Adding parking lots to the list of permitted open space uses could leave sufficient residual uses to avoid a taking if the open space zone was applied only to portions of the remaining open parcels. It might be possible to zone an entire parcel for open space uses if adjacent parcels are under the same ownership and a broad range of uses is permitted on the adjacent parcels.

Percentage of Open Space

Open space- in the form of landscaping is a part of every new development project. It is appropriate to explore the potential for arranging the site design of new development near an airport to cluster the landscaping to create emergency landing sites. An alternative approach is to require greater amounts of landscaping than is typically required. To be of value, the minimum size necessary for an emergency landing site is at least a half acre. If a substantial amount of a parcel remained developable, it may be possible to avoid a successful inverse condemnation suit. This strategy is most likely to be viable on larger parcels.

ESTABLISHED SAFETY COMPATIBILITY CRITERIA

As might be surmised from the preceding discussion, the wide range of individual circumstances, community concerns, and other issues results in a variety of land use safety compatibility criteria and existing conditions in the vicinity of airports. There are no established nationwide safety zone regulations or other criteria beyond the runway protection zones defined by the Federal Aviation Administration. The paragraphs below summarize some of the land use safety compatibility criteria established by selected federal, state, and local agencies.

Federal

Federal Aviation Administration

FAA standards offer little guidance regarding off-airport land use safety other than in the context of airport design and airspace requirements.

- **Airport Design** - As noted previously, the FAA has defined criteria for the dimensions of the runway protection zones located at each end of a runway. Ideally, the entire runway protection zones should be clear of all objects. The FAA strongly recommends that airports own this property outright or, when this is impractical, to obtain easements sufficient to control the land use. Acquisition of this property is eligible for FAA grants. Beyond the runway protection zones, the FAA has no specific land use criteria other than the height of objects. However, property in the approach zones within a distance of 5,000 feet from the runway primary surface also potentially can be acquired with federal grants if necessary to restrict the use of the land to activities and purposes compatible with normal airport operations.

- **Airspace** - Part 77 of the Federal Aviation Regulations (FAR), *Objects Affecting Navigable Airspace*, has been adopted as a means of monitoring and protecting the airspace required for safe operation of aircraft at an airport. These regulations require that the FAA be notified of certain proposed construction or alteration of objects, whether permanent or temporary or of natural growth, within a specified vicinity of an airport. Standards for determining what constitutes an obstruction to air navigation also are established, defined in terms of imaginary surfaces in the airspace. Although Part 77 gives the FAA no authority to enforce the standards and nothing in the regulations prohibit a state or local government from taking actions which are contrary to the federal standards, by doing so, the owner of an airport may be found in noncompliance with the conditions for receipt of airport development grant funds and become ineligible for future grants.

U.S. Department of Defense

Safety compatibility criteria for military air bases are set forth through the Air Installation Compatible Use Zone (AICUZ) program. The objective of this program is to encourage compatible uses of public and private lands in the vicinity of military airfields through the local communities' comprehensive planning process.

AICUZ standards establish a clear zone and two Accident Potential Zones (APZ's) at each runway end, the dimensions varying depending upon the type of aircraft using the

runway. For runways used only by light aircraft, the zones each have a width of 1,000 feet wide and the lengths are 3,000 feet for the clear zone and 2,500 feet each for APZ I and II. The alignment may be altered to follow the primary flight tracks.

Within each zone, the compatibility or incompatibility of possible land uses is specified. For example, residential uses are considered incompatible in the clear zone and APZ I and compatible only at low densities in APZ II. Retail land uses are unacceptable in the clear zone and may or may not be compatible in the APZ's depending upon on the density of use.

State of California

State Regulations

California state laws and regulations pertaining to off-airport safety compatibility are found in two primary locations:

- **State Aeronautics Act** -As is true at the federal level, California state regulations provide little guidance with respect to airport/land use safety compatibility. Perhaps the most significant provision is to give the State Division of Aeronautics enforcement powers regarding FAR Part 77. Article 2.7 of the statue prohibits any person from constructing any structure of permitting any natural growth at a height which would constitute a hazard to air navigation as defined in FAR Part 77 unless a state permit or federal exemption is obtained. This regulation applies to objects located within one mile of an airport boundary.

- **State Education Code** -This state law requires that any school district proposing to acquire a school site located within two miles of an airport boundary notify the Department of Education of this intended action. The Division of Aeronautics is then required to investigate the site and report back to the Department of Education.

California Division of Aeronautics Airport Land Use Planning Handbook

This document, prepared and revised by the Division of Aeronautics in 1993, is intended as a guide for Airport Land Use Commissions and other local agencies. It contains no regulations, only recommendations. The suggested guidelines for safety zones are essentially a composite of the criteria found at that time in plans adopted by Airport Land Use Commissions throughout the state. Establishment of up to five separate zones is proposed:

- **Inner Safety Zone** -This zone normally either coincides with the runway protection zone (clear zone) or is a rectangular area encompassing it. The shape of the zone should be modified to reflect close-in arrival and departure path turns. No structures and few, if any, people (a maximum of 10 per acre at any one time) should be permitted.

- **Outer Safety Zone** - An extension of the inner safety zone, this zone should consist of either the FAR Part 77 approach zone or an equivalent rectangular area, modified as necessary to follow major flight tracks. The outer end of the zone should be located at the following distance from the runway primary surface, depending upon the type of aircraft utilizing the runway:

Single-engine general aviation aircraft	2,000 feet
Twin-engine general aviation aircraft	3,500 feet
Business and commercial jets and all precision instrument runways	5,000 feet

Recommended development criteria include:

- For uses in structures, no more than 25 people per acre at any time and no more than 150 people in any one building.

- For uses not in structures, no more than 50 people per acre at any time.

- Open areas, large enough and properly shaped and oriented to accommodate a forced, but controlled aircraft landing, should comprise 50% of the total zone. Streets and parking areas are to be considered open areas for the purposes of this computation.

- **Emergency Touchdown Zone** - This recommended zone consists of a 500-foot wide strip running the length of both the inner and outer safety zone. It should be free of all obstructions so as to allow for the emergency landing of aircraft.

- **Traffic Pattern/Overflight Zone** - Encompassing the common flight tracks to and from an airport, the limits of this zone can generally be defined by the FAR Part 77 horizontal surface. Large assemblages of people should be excluded and the lot coverage for commercial uses should not exceed 40% to 50%.

- **Extended Runway Centerline** - Applicable only to precision and nonprecision instrument runways, this zone is comprised of a 1,000-foot wide corridor extending 10,000 feet from the runway threshold. Uses involving large concentrations of people should be discouraged in this area.

Other Agencies

Oregon Aeronautics Division

A set of airport compatibility guidelines, similar in concept to those recommended by the California Division of Aeronautics, has been developed by the Oregon Aeronautics Division for use in that state. Two safety-related zones are proposed:

- **Clear Zone** - This area should be minimally used by people and be free of any construction or obstacle. Its dimensions are as provided in federal standards.

- **Approach Safety Zone** - The edges of this zone follow those of the FAR Part 77 approach surface. Its length should typically be 2,500 to 5,000 feet depending upon the airport type and local desires. At extremely busy airports with precision instrument approaches, a length greater than 5,000 feet may be appropriate. Uses in this zone should not attract large groups of people. Residential uses should be discouraged. Hospitals, rest homes, and other such uses should be excluded. Offices, service businesses, and some retail activities are conditionally acceptable.

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7
Noise Characteristics

INTRODUCTION

Noise is often defined as unwanted sound. A substantial amount of research has been done regarding the effects of noise on people; much of this research has specifically examined aircraft noise impacts. Although most of the latter deals with high-activity, airline airports, the basic concepts can be applied to small, general aviation facilities as well.

This chapter examines the basic characteristics of noise, particularly as it relates to airports. The discussion includes the physical properties of sound, the nature of airport noise, measures of environmental noise, and community reactions to noise. The next chapter addresses the land use planning implications created by airport noise.

PHYSICAL PROPERTIES OF SOUND

Sound is transmitted in the form of pressure waves. These waves are created by particles of air being displaced from and returning to an equilibrium position. As the particles are displaced, they bump into surrounding particles which bump into others and so on. In this manner, sound is transmitted through the atmosphere. Sounds are heard when the pressure waves of displaced air particles strike the eardrum, causing it to vibrate.

Measurement of Sound

There are three principal dimensions to sound waves: amplitude (intensity or loudness), frequency (pitch), and duration.

- **Intensity** - The intensity of sounds which are audible to the ear is commonly measured in "decibels" (abbreviated dB). The decibel scale ranges from 0 to 140, with 0 corresponding to the lowest sound level that the healthy, unimpaired human ear can detect. Unlike linear measures such as distance or weight, sound intensity is measured on a logarithmic scale. Each increase of 10 dB means that the acoustical energy is multiplied by 10, a sound of 70 dB is 10 times as intensive as one of 60 dB. However, the relative "loudness" of sound as perceived by the human ear does not closely match the actual relative amounts of sound energy. For example, while 70 dB is physically 10 times as intensive as 60 dB, listeners tend to judge it as only twice as "loud." A tabulation of approximate decibel levels generated by common indoor and outdoor sound sources is presented in Table 7A.

- **Frequency** - The frequency of a sound, its "highness" or "lowness", depends upon the relative rapidity of the vibrations by which it is produced. In a low-pitched tone, the sound waves are relatively far apart, while in a high-pitched one they are squeezed much closer together. Pitch is measured in cycles per second (also called hertz or hz). Although some "pure tone" sounds contain only one frequency, more often sound is a mixture of different frequencies.

- **Duration** - The third major dimension of sound is the length of time over which it occurs. Many sounds have a distinct beginning and ending; others, such as from aircraft overflights, gradually increase and decrease without a sharp definition of when they start or stop.

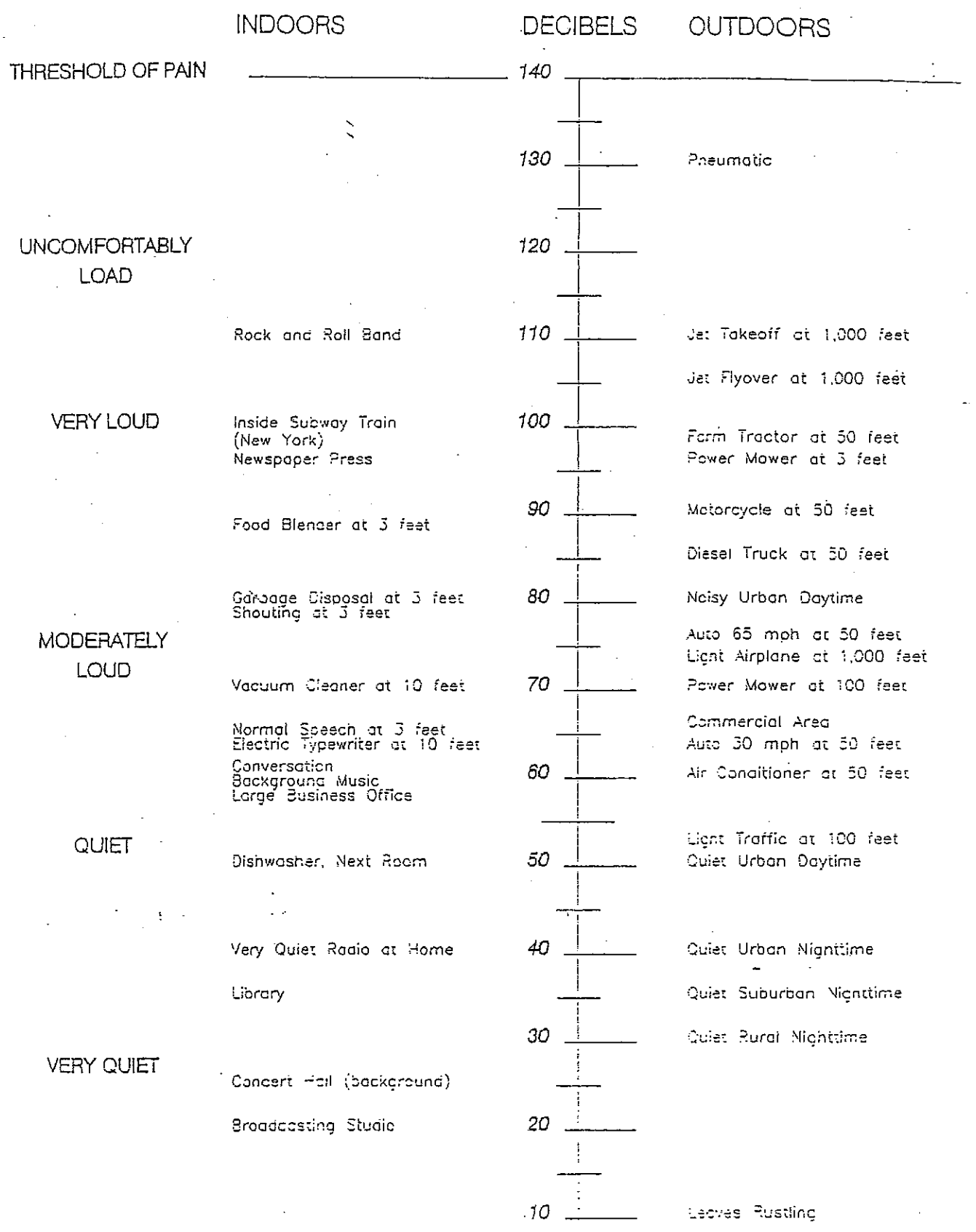
When heard by the human ear, the intensity and frequency of sounds are closely interrelated. Although people can hear sound frequencies as low as 20 hz and as high as 20,000 hz, they do not hear all frequencies in this range equally well. This means that people may assign a different "loudness" to two sounds having identical intensities but widely differing frequencies. Higher frequency sounds tend to seem louder to people than lower frequency sounds. Most environmental sound measurements consequently are weighted to simulate the varying frequency sensitivity of the human ear. The most commonly used weighting is the A-weighted decibel (abbreviated dBA).

Sound Attenuation

Among the basic characteristics of sound which are of particular interest in the discussion of aircraft-generated sounds is its attenuation or reduction over distance. Part of the reduction occurs because the sound energy is spread over a geometrically increasing area as the distance from the source increases. At sufficient distances from the source, the geometric spreading results in a 6 dB loss per doubling of distance. Additional attenuation results from absorption of the sound by the air and by the ground, structures, and other objects.

Sound propagation through the air is affected by meteorological conditions including air temperature, temperature inversions, humidity, wind speed, and air turbulence. Sounds travelling along a hard ground surface are attenuated by an additional 2.5 dB in 1,000 feet (compared to the attenuation in air alone) and tall grasses or shrubs can double this figure. Structures, terrain, or other barriers can provide significant attenuation for ground-to-ground sounds as well. Ground cover and objects on the ground, however, have little effect on air-to-ground sounds, such as those from aircraft.

The attenuation of sound from the exterior to the interior of a building is fairly consistent among structures of similar construction type. Table 7B indicates the amount of attenuation afforded by common types of building construction.



Noise Characteristics

Approximate Decibel Level of Common Sound Sources

TABLE 7A

airport land use compatibility plan

Table 7B

Noise Reduction Afforded by Common Building Construction

Construction Type	Typical Occupancy	General Description	Noise Level Reduction (NLR) in dBA
1	Residential, Commercial, Schools	Woodframing. Exterior stucco or wood sheathing. Interior drywall of plaster. Sliding glass windows. Windows partially open.	15-20
2	Same as 1 above	Same as 1 above, but windows closed.	25-30
3	Commercial, Schools	Same as 1 above, but windows are fixed 1/4 inch plate glass.	30-35
4.	Commercial	Steel or concrete framing. Curtain wall or masonry exterior wall. Fixed 1/4 inch plate glass windows.	30-40

Notes:

- Construction methods assume no special noise control provisions.
- The NLR range depends upon the openness of the windows, the degree of seal, and the window area involved.

Source: Paul S. Veneklasen & Associates (1973), "Noise Insulation Problems in Buildings".

EFFECTS OF NOISE ON PEOPLE

Types of Effects

Noise, especially aircraft noise, affects people and their activities in varied and complex ways. Three principal types of effects can be identified: physiological, behavioral, and subjective.

- *Physiological effects* can be either temporary or permanent. Among the temporary effects are startle reactions and the effects of sustained sleep interference. Hearing loss is the most obvious permanent effect of noise. Research indicates that off-airport aircraft noise, even from the loudest aircraft, is generally not severe enough to produce permanent or even sustained (after the noise ceases) physiological effects.

- *Behavioral effects* are usually measured in terms of interference with human activities. Speech interference and interference with the enjoyment of radio or television are the most often cited effects. Interference with concentration on mental activities and disruption of sleep are two others. Most of the readily identifiable aircraft noise effects fall into this category. Specific parameters of these effects are described below.

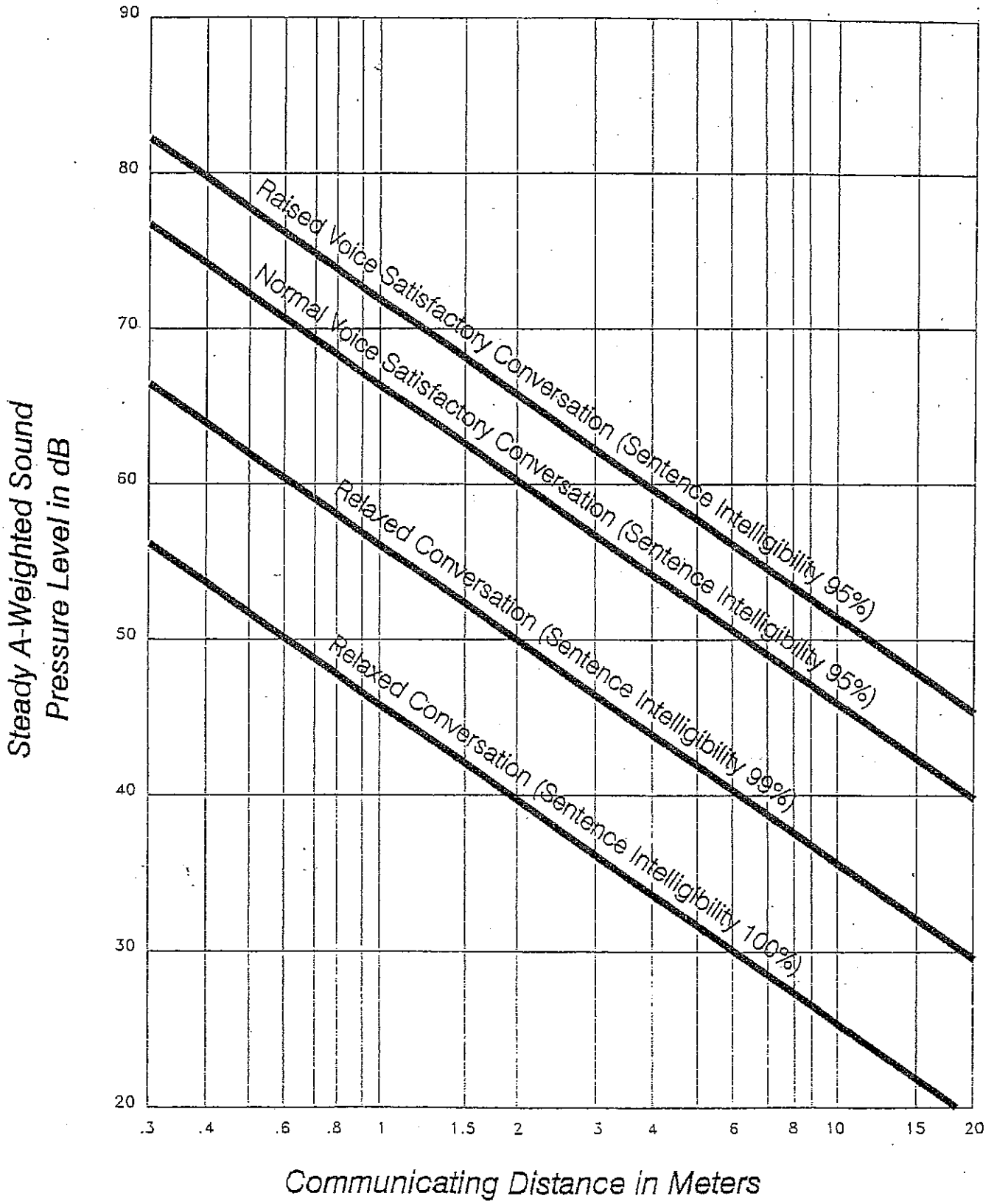
- *Subjective effects* are by their very nature unique to each individual and, therefore, difficult to quantify. Subjective effects of noise are commonly described in terms of "annoyance" or other similar terms. Some of the characteristics of annoyance effects are discussed in the next section.

Parameters of Human Reactions to Noise

Speech Communication

Scientific research has found that the maximum continuous sound level that will permit relaxed conversation with 100% intelligibility throughout a typical residential living room (talker/listener separation greater than approximately 3.5 feet) is 45 dBA (L_{eq} = 45 dBA). A 95% intelligibility, considered to be "satisfactory conversation", can be obtained with a steady sound level of up to 64 dBA.

Outdoors, because of the absence of reflecting walls to provide the reverberation found indoors, the sound level of speech as it reaches the ear generally continues to decrease with increasing distance between the talker and listener. In a steady background noise there



Noise Characteristics

Maximum Distances Outdoors Over Which Conversation is Considered to be Satisfactorily Intelligible in Steady Noise

FIGURE 7A

airport land use compatibility plan

comes a point, as the talker and listener increase their separation, where the decreasing speech signal is masked by the noise. This relationship is shown in Figure 7A.

Almost all fluctuating sound levels found in the everyday environment will, if averaged over a long time period, have less impact on speech intelligibility than a steady sound which has the same Equivalent Sound Level (L_{eq}) value. This occurs because most of the time the background noise level is less than the Equivalent Sound Level (because of the logarithmic base of sound intensity measurement, a loud sound need have only a relatively short duration to raise the L_{eq} substantially).

Sleep Disturbance

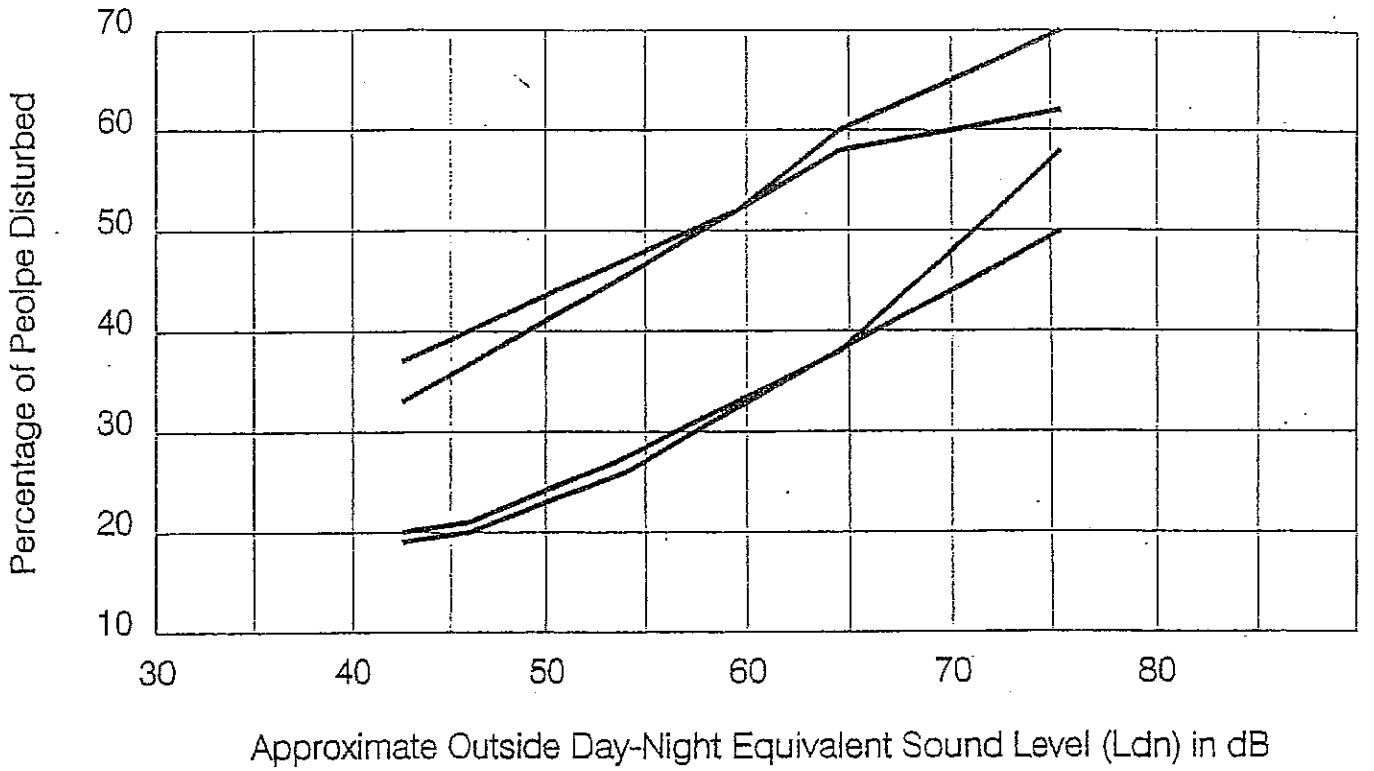
The extent to which environmental noise affects human sleep patterns varies greatly from individual to individual as well as from one time to another for any particular individual. Whether an individual is aroused by a noise depends upon the individual's sleep state, the loudness or suddenness of the noise, the information value of the noise, and other factors. Also, most people adapt over time to increased levels of noise during sleep.

Studies conducted of people living near airports and other noisy environments have found that sleep disturbance can occur at noise levels as low as 35 dBA. At noise levels above 45 dBA, sleep disturbance (although not necessarily awakening) becomes relatively common. Figure 7B illustrates the relationships between noise levels and sleep disturbance for aircraft noise near a busy airline airport.

An important point to recognize here is the distinction between individual noise events and ambient noise levels. When background noise levels are low, a single noise having a maximum intensity of 45 dBA may cause many people to awaken, particularly if they have not become accustomed to such noises. On the other hand, a relatively constant noise of about the same level, may well cause less of a sleep disturbance in the majority of people.

Overflight Annoyance Factors

As noted above, the extent to which people are annoyed by noise is largely a subjective reaction, one that varies widely from individual to individual. Consequently, it is difficult to relate the occurrence of annoyance reactions to any specific noise levels. Anecdotal information from airports which document the location of noise complaints suggests that people's perceptions of noise are shaped by their personal sensitivity, their perception of the importance/appropriateness of the event causing the noise, and their general expectations about noise.



KEY

1 = Startles

2 = Keeps from going to sleep

3 = Wakes up

4 = Disturbs Rest or Relaxation

Source: EPA - 1974, p. D-11

Noise Characteristics

Percentage of People Disturbed by Aircraft Noise for Reasons Concerned with Rest and Sleep

FIGURE 7B

airport land use compatibility plan

One explanation of annoyance effects, at least with regard to airports, is that they result from a combination of noise and safety concerns, with fear being an element of the equation. Although people generally do not fear aircraft noise itself, they may be fearful of an aircraft crashing onto their property, and it is the noise that mostly creates their awareness of the aircraft presence. The occurrence of annoyance impacts thus appears to be influenced by several factors related to the individuals affected, their attitudes toward aviation including their feelings regarding the importance of the particular activity, their understanding of how aircraft fly, and their knowledge of when and how often overflights occur, as well as by the actual noise levels and the altitude of the aircraft.

NATURE OF AIRPORT NOISE IMPACTS

Noise is often perceived to be the most significant of the adverse impacts associated with airport activity. To better understand airport noise impacts, it is important to recognize the variables involved with regard to different types of aircraft, the location where the noise occurs, and other factors such as pilot techniques.

Types of Aircraft

The noise emitted by different types of aircraft has distinctly different properties. Although there are also differences among specific makes and models of aircraft within each broad group, these distinctions are generally less pronounced.

Jet Airplanes

Both the character and the intensity of jet airplane noise has changed over time as new engine technologies have been developed and introduced into the airline and business jet aircraft fleets. The older, pure-jet engines produce noise that is both very loud and at the high end of the frequency spectrum. Newer generation, fan-jet engines, in which a substantial volume of the air entering the engine bypasses the combustion chamber, create noise that is comparatively lower both in intensity and frequency. The extent to which future technology can continue to reduce jet-engine noise is uncertain. Most of the overall noise level improvements at airports having jet activity are expected to result from the retirement of the older, louder jet aircraft.

Propeller Airplanes

The dominant noise from most propeller airplanes, whether they be driven by piston or turbojet engines, is from the propeller itself. Propeller airplane noise varies depending upon the number of engines, the rotational speed of the propellers, the number of blades on each propeller, and the pitch of the blades, as well as, to some extent, the type of engine.

Compared to jets, the majority of propeller airplanes emit significantly less noise when measured at equal distances from the aircraft. The size of the aircraft is a major factor in this distinction, however, most propeller airplanes flying today are substantially smaller and lighter than jets airplanes are. For aircraft of similar weight, the noise levels of aircraft that are propeller driven and those that have new-technology, fan-jet engines are not vastly different. Another factor affecting the relative noise levels generated by the two aircraft types is the takeoff climb profile. Because jets climb much more rapidly than typical propeller airplanes, the noise levels measured on the ground diminish rapidly with increased distance from the runway. Consequently, at points sufficiently far from the runway end, the higher altitude attained by jets may make them effectively quieter than propeller airplanes.

Helicopters

Helicopter noise has a character all its own. Although a portion of the noise emanates from the engines themselves, the uniqueness of helicopter noise is mostly due to the modulation of sound created by the relatively slow-turning main rotor. This sound modulation is referred to as *blade slap*. Blade slap is most pronounced during low-speed descents and high-speed cruise. To a listener on the ground, it is most audible as the aircraft approaches. Helicopters are also notable for creating vibration or rattle in structures.

Noise Location

Aircraft operating on or near an airport, generate noise both while in the air and on the ground.

Airborne Operations

The most extensive noise impacts are those created while the aircraft are in flight. These impacts are most concentrated near the runway ends, particularly the ends predominantly used for takeoffs, and secondarily along the common flight tracks. An important factor to comprehend in evaluating airport noise impacts is the wide variation in actual flight paths flown by the aircraft using an airport. As described in Chapter 5, even though airport traffic patterns may be standardized, they are not precisely located "highways in the sky."

Ground Operations

Aircraft ground operations create noise at several locations on an airport:

- **On the Runway** - Significant noise levels are generated behind an aircraft as full engine thrust is produced during acceleration to takeoff. On landing, power settings on most aircraft are low and the noise is minimal. The one significant exception is when jet aircraft use reverse thrust to decelerate after landing. This action can produce high noise levels in front and to the sides of the aircraft.

- **At Runway Holding Bays** - Pre-flight engine run-ups by piston aircraft are usually conducted at holding bays or other locations near the ends of runways. In nearby areas, the resulting noise levels frequently are greater than for takeoffs and landings.

- **Fixed Base Operations Areas** - Maintenance testing of aircraft engines requires the use of high power settings and resulting noise levels. This activity may occur in or near fixed base operations maintenance hangars or sometimes at other locations on an airport.

- **Other Operations Areas** - Aircraft use low power settings when taxiing between parking locations and a runway. For most aircraft, the resulting noise levels are minimal and not a factor off the airport property.

Other Variables

The noise levels experienced on the ground as an aircraft flies over are primarily dependent upon the inherent loudness of the aircraft, the aircraft's altitude, and the horizontal distance between the measuring site and the aircraft flight track. Other variables are also important, however:

- **Pilot Technique** - An important variable in aircraft noise is the pilot. Depending upon the techniques that the pilot employs, the same aircraft can generate significantly different noise levels. Conditions which produce some of the greatest noise variations include: the angle of climb while on takeoff (also affected by air temperature); the pitch setting on variable pitch propeller airplanes, especially at high takeoff power settings; power adjustments during takeoff by jet aircraft; and the airspeed and descent rate relationships that determine the extent of helicopter blade slap during landing operations. Pilot awareness of the aircraft configurations that create abnormally high noise levels can be a significant factor in helping to reduce airport noise impacts.

- **Air Temperature** - On hot days, aircraft cannot climb as rapidly as when temperatures are cooler. Takeoff noise impacts consequently are stretched out over a greater distance from the runway end.

- **Sound Wave Reflections** -The presence of nearby structures or steep terrain can cause sound wave reflections which may increase noise levels. Certain meteorological conditions, particularly a solid, low cloud cover, also can reflect sound back to the ground, resulting in higher noise levels.

MEASURING ENVIRONMENTAL NOISE

Measurement of sound is a relatively straight-forward and objective process. Environmental noise, however, is comprised of a multitude of varying sounds having different intensities, frequencies, and durations, and stemming from different sources. Moreover, to be useful, measures of environmental noise must take into account the ways in which noise affects people.

Types of Noise Metrics

Some assessment of the effects of noise on people can be made relative to a specific decibel value. Noise in the everyday environment, however, fluctuates considerably from loud one moment to quiet the next. Historically, federal and state agencies have sought an acceptable means of expressing average noise levels. The averaging can be with respect to a single event or a number of events over a specified time period.

Single-Event Metrics

The average for an individual event, such as an aircraft overflight, is often computed in terms of the Sound Exposure Level (SEL) or the Single Event Noise Exposure Level (SENEL). (The latter term is used in California, the former is adopted by the U.S. Environmental Protection Agency and the Federal Aviation Administration). SEL and SENEL values are identical. SEL and SENEL measure the A-weighted sound level integrated over the entire noise event above a threshold level and normalized to a referenced duration of one second. Hence, they give the level of a continuous one-second sound which contains the same amount of energy as the complete noise event.

Note that, while the SEL and SENEL are measured in terms of the A-weighted sound level scale, they are generally not equal to the maximum A-level occurring during the noise event. Aircraft noise events last more than one second; therefore, SEL/SENEL values are higher than the maximum A-level for the same events.

Composite Noise Metrics

In order to provide a single measure of continuous or multiple noise events over an extended period of time, various composite or average noise level metrics or descriptors have been devised.

A standard measure of sound level averaged over a longer time is the Equivalent Sound Level (abbreviated L_{eq}). L_{eq} is an objective measure of sound in that it is a function solely of a mathematical relationship between decibels and time.

As noted above, much of the human response to noise is subjective, however. Human sensitivity to noise varies considerably depending upon the circumstances in which the noise occurs. Probably most important among these variations is that people tend to be more sensitive to nighttime noises than they are to ones occurring in the day. Some explanation for this is that, in most communities, exterior background noises generally drop at night from daytime levels. Also, the activity in most households decreases at night, lowering the

internally generated noise levels. Noise events consequently become more intrusive at night because a noise of a given intensity will normally extend farther above the nighttime background noise level than above the daytime background level.

To account for this change in sensitivity, a weighting or penalty is often assigned to nighttime noise levels. The amount of weight and the time period over which it is applied differs depending upon the noise assessment method used (appropriate values can be approximately determined by research, but selection of a specific value is inherently somewhat subjective). Mostly, a 10 dBA weight is used, i.e., nighttime noise events are assumed to be 10 dBA louder than they actually are. This figure corresponds to the drop in background noise level which studies have found takes place between daytime and nighttime in a typical community.

The time-weighted noise metric adopted by the Environmental Protection Agency and the Federal Aviation Administration is the *Day-Night Average Sound Level* (L_{dn}). It applies a nighttime penalty of 10 dBA to noise events occurring between 10 p.m. and 7 a.m. A similar metric, the one used in California, is the *Community Noise Equivalent Level* (CNEL). In addition to the nighttime penalty, the CNEL methodology applies an evening weighting of 5 dBA to noise events occurring between 7 p.m. and 10 p.m. Because the L_{dn} and CNEL equations are logarithmic, a 10 dBA penalty on a single event is identical to counting the same event ten times and a 5 dBA penalty is equivalent to counting the event three times. To facilitate the calculations, the equivalent operations method is used.

Calculations of L_{dn} or CNEL noise contours for an airport are normally done with a computer program. The Federal Aviation Administration's Integrated Noise Model (INM) is the program used in most cases. The program considers such factors as:

- The sound level transmitted by individual operations of each type of aircraft using the airport.
- The number of operations by each aircraft type.
- The time of day when the operations occur.
- Runway utilization and aircraft flight track geometry.
- The takeoff and landing profiles of each aircraft type.

Community Reactions to Noise

In the same manner that composite noise metrics are used to represent the overall noise impacts of an airport, the effects of noise must be examined not just in terms of the physiological, behavioral, and subjective effects on individuals, but also with respect to the reactions of the community as a whole.

There are two basic approaches that can be taken in evaluating community reactions to noise. One is in terms of direct actions taken (complaints, law suits, etc.). The other is through the responses to social surveys. The former approach is valuable in that it focuses on individual airports. Social surveys, on the other hand, help in determining whether the reactions of a particular community are typical of other communities having similar levels of noise exposure. Some general findings regarding community reactions to noise include the following:

- Reactions to noise vary from community to community even when the extent of the impact is similar. Among the community characteristics which have an apparent influence on the reactions are: normal background noise levels in the community; previous experience with noise; the role and significance of the airport in the community; climate and the extent of outdoor living; and socioeconomic factors.

- The majority of available data on community reactions involves typical urban residential communities. Table 7C was developed by the Environmental Protection Agency to provide corrections for the circumstances of a specific community; the corrections result in a "normalized" L_{dn} for intruding noise. Taking these corrections into account, it has typically been found that:

  - No community reaction to an intruding noise can be expected when the normalized L_{dn} of identifiable intruding noise is within 5 dBA of the L_{dn} which exists in the absence of that noise;

  - Widespread complaints may be expected when the noise exceeds the background by 5 dBA; and

  - Vigorous community reaction can be expected when the excess approaches 20 dBA.

In a typical community, about 10% of the population is so sensitive to noise that they object to any noise not of their own making. On the other hand, about 25% of the population seems to be practically imperturbable: they do not complain even in very severe noise exposures. Noise abatement efforts which focus on the middle two-thirds of the population are therefore generally most effective.

- Some studies have concluded that airport noise adversely affects property values in the airport vicinity. The extent of this impact differs from community to community and is difficult to ascertain because of the many other variables in community characteristics that are involved. All of the generally available data concerns airline airports. The extent to which noise at typical general aviation airports influences nearby property values is not known.

Limitations of Composite Noise Metrics

Composite noise metrics such as L_{dn} and CNEL have been in use since the 1970's and other similar metrics were in existence earlier. Most of the research conducted in development of these metrics and the land use standards associated with them was done near busy, urban airports and highways. The application of these metrics to lower-volume transportation noise sources, such as most general aviation airports, has long produced some inconsistencies between the measured noise level and community reactions. Among the apparent shortcomings of composite noise metrics with regard to general aviation airports are:

- General aviation flight track locations vary widely. Determining their location is difficult and the noise impact calculation computer program is limited in the number of tracks that can reasonably be modeled. By contrast, at airline airports, instrument approach and departure procedures limit the variety of flight track locations and locational data is often available from computerized flight control records.

- Occasional very loud individual noise events, especially those occurring at night, often generate the majority of noise complaints, but they may have little effect on the noise contours.

- Seasonal variations in aircraft activity levels are not reflected. This can be particularly significant at many airports because the highest activity levels typically occur in the summer when outdoor residential living and open windows in dwellings are most common.

- Noise contours seldom reflect the impacts of noise events which occur frequently, but which have relatively low decibel levels. Traffic pattern overflight noise is the prime example.

- Because of the many variables and assumptions associated with their computation, composite noise contours are usually considered to have an accuracy of approximately ±3 dBA. Noise contour locations are often inappropriately used to precisely determine the acceptability or unacceptability of a particular land use at a specific site without appreciation of the fuzziness of the noise contour location.

Toward the end of the 1980's, several events, again arising from airline aircraft activity, have focused attention on the limitations of composite noise contours. These events have included:

- Creation of new air traffic routes by the Federal Aviation Administration as part of the Expanded East Coast Plan in February 1987.

- A Notice Of Proposed Rulemaking issued by the FAA in March 1987 to set en route noise rules for propfan engines.

- Announcement by the U.S. Forest Service that it is considering using a measure of noise detectibility to determine public response to en route aircraft noise in wilderness areas.

Because of these events, there has been mounting political pressure as well as increased interest among acoustics specialists to replace or supplement L_{dn}/CNEL with some measure of single-event noise. The subject is continuing to be studied by the FAA, other governmental agencies, and technical groups. As of mid-1990, no single-event noise measure has been formally proposed by the FAA.

8
Noise Compatibility Policy Issues

ESTABLISHED REGULATIONS AND POLICIES

The discussion in the preceding chapter provides a theoretical foundation for the development of airport/land use noise compatibility policies. Other factors to consider are the established regulations and policies adopted by various Federal and State agencies.

Laws and statutes enacted by the U.S. Congress and the California State Legislature typically set general requirements and the authority for administrative adoption of more detailed regulations and policies. With respect to airports, most of the administrative actions are taken by the Federal Aviation Administration and the California Division of Aeronautics. These laws and regulations establish the basis for local development of airport plans, analyses of airport impacts, and enactment of compatibility policies. Brief descriptions of selected laws, regulations, and policies having particular significance to noise issues are provided in the paragraphs which follow.

Federal

Laws

Airport Improvement Program Act of 1982, as amended - This act establishes the federal requirements for funding of airport planning and airport development. An Airport and Airway Trust Fund is created to pay for these programs and operation of the federal aviation system. The general types of projects eligible for federal funding are indicated. Additionally, the Act directs the preparation of a National Plan of Integrated Airport Systems (NPIAS) which lists the location of airports in the national system of airports and the recommended development of each.

Among the conditions for Airport Improvement Program funding of an airport project are two requirements involving airport/land use compatibility. The airport sponsor (owner) must assure the Federal Aviation Administration that it will:

> "Adequately clear and protect the aerial approaches to the airport by removing, lowering, relocating, marking, lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards;" and
>
> "Take appropriate action, including the adoption of zoning laws, to the extent reasonable, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft."

U.S. Department of Transportation Noise Abatement Policy - This policy, adopted in 1976, sets forth the noise abatement authorities and responsibilities of the Federal Government, airport proprietors, state and local governments, the air carriers, air travelers and shippers, and airport area residents and prospective residents. The basic thrust of the policy is that the FAA's role is primarily one of regulating noise at its source (the aircraft) plus supporting local efforts to develop airport noise abatement plans. The FAA will give high priority in the allocation of Airport Improvement Program funds to projects designed to ensure compatible use of land near airports; but it is the role of state and local governments and airport proprietors to undertake the land use and operational actions necessary to promote capability.

Federal policy on aviation noise, particularly with regard to airline aircraft and airports, has been a hotly debated topic in recent years. The government is being pushed from many directions to issue a new national noise policy, but, as of late 1990, has not yet done so.

Aviation Safety and Noise Abatement Act of 1979 - Further weight was given to the FAA's supporting role in noise compatibility planning by congressional enactment of this legislation. Among the stated purposes of this act is "to provide assistance to airport operators to prepare and carry out noise compatibility programs." The law establishes funding for noise compatibility planning and sets the requirements by which airport operators can apply for funding. The law does not require any airport to develop a noise compatibility program.

Regulations and Guidelines

- **Federal Aviation Regulations, Part 150** - As a means of implementing the Aviation Safety and Noise Abatement Act, the Federal Aviation Administration adopted these regulations establishing Airport Noise Compatibility Planning Programs. "This part prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs, including the process for evaluating and approving or disapproving these programs." It also prescribes a system for measuring airport noise impacts and presents guidelines for identifying incompatible land uses.

  The noise exposure maps are to be depicted in terms of Yearly Day-Night Average Sound Level (L_{dn}) contours around the airport. All land uses are considered compatible with noise levels of less than 65 L_{dn} unless the local jurisdictions can document the appropriateness of a lower standard. At higher noise exposures, selected land uses are also deemed acceptable, depending upon the nature of the use and the degree of structural noise attenuation provided. In setting the various compatibility guidelines, however, the regulations state that the designations "do not constitute a Federal determination that any use of land covered by the [noise compatibility] program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses remains with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving compatible land uses."

Federal Aviation Regulations, Part 36 - This part of the Federal Aviation Regulations specifies the noise standards that individual types of aircraft are required to meet as part of their airworthiness certification. It includes noise level standards for certification of new types of propeller-driven, small airplanes, as well as for transport category, large airplanes. As originally adopted in 1960, FAR Part 36 only prescribed noise standards for issuance of new aircraft type certificates. Subsequent amendments extended the standards to certain newly produced aircraft of older type designs. Other amendments have at various times extended the required compliance dates.

Although aircraft meeting the latest Part 36 standards are noticeably quieter than many of the older aircraft still flying, the regulations make no determination that the newer aircraft are acceptably quiet for operation at any given airport.

Environmental Protection Agency "Levels Document" - One of the more fundamental set of guidelines on noise impacts was published by the EPA in 1974.

Entitled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, it is better known as the "Levels Document." The document does not constitute EPA regulations or standards. Rather, it is intended to "provide state and local governments as well as the federal government and the private sector with an informational point of departure for the purposes of decision-making". Using the Yearly Day-Night Average Sound Level (L_{dn}) as a measure of noise acceptability, the document states that "undue interference with activity and annoyance" will not occur if outdoor noise levels in residential areas are below 55 L_{dn} and indoor levels are below 45 L_{dn}.

State of California

State Aeronautics Act - Chapter 4, Article 3, Section 21669 of the California Public Utilities Code requires the State Division of Aeronautics to adopt noise standards applicable to all airports operating under a state permit.

California Airport Noise Standards - The standards promulgated in accordance with the State Aeronautics Act are set forth in California Code of Regulations, Title 21, Sections 5000 et seq. The most recent revisions to the regulations became effective on March 22, 1990.

> "The regulations are designed to cause the airport proprietor, aircraft operator, local governments, pilots, and the [Division of Aeronautics] to work cooperatively to diminish noise problems. The regulations accomplish these ends by controlling and reducing the noise impact area in communities in the vicinity of airports."

The regulations state that:

> "The standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels. This standard forms the basis for the following limitation. No airport proprietor of a noise problem airport shall operate an airport with a noise impact area based on the standard of 65 dB CNEL unless the operator has applied for or received a variance as prescribed in ..." the regulations.

The revised regulations define the types of land uses which are deemed *incompatible* with the above standard. The original regulations listed the uses that are considered *compatible*. Four types of land uses are defined by the current regulations as incompatible:

- Residences of all types, except those that are airport owned.

- Public and private schools.

- Hospitals and convalescent homes.

- Churches, synagogues, temples, and other places of worship.

In each case, these land uses are regarded as compatible if: (1) an avigation easement has been obtained; (2) the structure has been acoustically insulated to ensure that the interior CNEL due to aircraft noise is 45 dB or less in all habitable rooms; or (3) with respect to residential land uses, the airport proprietor has made a "genuine effort" to obtain an easement or provide acoustical treatment.

When originally adopted, the State Noise Standards also included single-event noise limits. The single-event standards, however, were challenged in federal court and subsequently struck down in *Air Transportation Association v. Crotti* as being a preemption of federal authority.

California Noise Insulation Standards - These standards, spelled out in the California Code of Regulations, Title 24, Part II, Appendix Chapter 35, are applicable to new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings. They state that "interior community noise equivalent levels (CNEL) with windows closed, attributable to exterior sources shall not exceed an annual CNEL of 45 dBA in any habitable room." Furthermore, "residential structures to be located within an annual CNEL contour of 60 require an acoustical analysis showing that the structure has been designed to limit intruding noise to the prescribed allowable levels. CNEL's shall be as determined by local jurisdiction in accordance with its local general plan."

California Noise Planning in Land Use Act - California Government Code, Division 1, Section 65302, requires that a noise element be included as part of local general plans. Airports are among the noise sources specifically to be analyzed. Noise contours, expressed in terms of either CNEL or L_{dn}, are to be shown down to 60 dB.

POLICY ISSUES

The development of noise compatibility standards and policies can be considered in terms of several individual issues. Some of these issues involve choices which each airport land use commission must make, taking into account the needs of the county's communities.

Basis for Noise Impact Assessment

Aircraft Activity Level

One of the choices to be made in development of noise contours for an airport is what aircraft activity level to use as the basis for the computations.

State statutes regarding comprehensive land use plans for airports specify that the plans should have at least a 20-year outlook. A 20-year activity forecast is usually included in airport master plans; also, forecasts with a similar time frame are available from the California Division of Aeronautics. A 20-year forecast is thus the most commonly used basis for noise contour calculations.

As a reflection of the nationwide decrease in general aviation activity during the 1980's, most forecasts developed during the latter part of the decade have projected very little growth over a 20-year period. Airports, though, presumably have a life span of more than 20 years and it is impossible to anticipate what activity levels might ultimately occur. The danger in using recent 20-year forecasts to determine airport/land use noise compatibility, therefore, is that the forecasts might underestimate the eventual noise impacts.

One alternative is to base an airport's noise impact contours on the operational capacity of the airport runway system. This approach may be reasonable at very busy airports, but at many others it would result in exaggerated noise contours that, in all likelihood, will never be achieved. The option followed in the *Airport/Land Use Policy Plan for Imperial County Airports* represents a compromise between these two choices. It takes available forecasts (from master plans or the state airport system plan) and adds a flat 50% to the total operations. The resulting activity level is for an indefinite point in time that probably will be well beyond 20 years unless a prolonged up-turn in general aviation activity occurs.

Changes in Average Aircraft Noise Levels

As future types of aircraft become operational, the noise impacts of individual aircraft operations may change. Future noise contours consequently may not represent actual noise impacts even if the activity forecasts may happen to be correct. At airline airports, the noise reduction technology of the aircraft recently or soon to be introduced into the airline fleet is such that, even with increased activity, the future contours often are projected to be smaller than the present ones. However, except for business jets, future general aviation aircraft are not expected to become enough quieter to compensate for forecast activity increases. Noise impact areas for general aviation airports consequently will expand over time. For compatibility planning purposes, the worst-case noise impact is normally used regardless of when it would occur.

Acceptable Overall Noise Levels

As suggested by the background discussion in the preceding chapter, there are no absolute measures for establishing which land uses and noise exposures are or are not compatible with each other. The best that can be hoped for is that compatibility criteria will reflect what is "acceptable" to the average person in the communities involved. Moreover, it must be remembered that what may be considered an *acceptable* degree of compatibility probably is not the most *desirable* degree of compatibility.

Residential Areas

Noise compatibility standards typically place primary emphasis on residential areas. Residential development is not only one of the most noise-sensitive land uses, it usually covers the greatest proportion of urban land. Several factors contribute to this sensitivity:

- Normal residential construction usually provides less sound attenuation than typical commercial construction and windows are more likely to be open;
- Outdoor activity is a significant aspect of residential land use; and
- People are particularly sensitive to noise at night when they are trying to sleep.

There are three basic choices as to where to set the limit for acceptable residential noise exposure. The choices and the rationale for each are listed below:

CNEL = 65 dBA

- Established by state law as the maximum acceptable for residential and other incompatible land uses.

CNEL = 60 dBA

- The contour within which California Noise Insulation Standards require an acoustical analysis of proposed residential structures, other than detached single-family dwellings.

- Suggested by the California Department of Health as the maximum "normally acceptable" noise exposure for residential areas.

- Individual noise events will occasionally cause significant interference with residential land use activities, particularly outdoor activities, in quiet suburban/rural communities.

CNEL = 55 dBA

- Identified by the U.S. Environmental Protection Agency as the level below which "undue interference with activity and annoyance" will not occur.

- Individual noise events will seldom significantly interfere with residential land use activities; commonly occurring noise events will not cause disruption under most circumstances.

Other Land Uses

Data on acceptable noise exposure for other noise-sensitive land uses is not as extensive as for residential uses. Some guidelines exist in various U.S. Department of Housing and Urban Development, California Department of Health, and other agency documents. In general, once a criterion has been set for residential uses, the criteria for other land uses can be established by considering their degree of structural sound attenuation, outdoor activity, etc. relative to residential uses.

The extent to which land uses types are grouped or separated into categories for the purpose of compatibility evaluation is a question of ease of use. Three possible means of categorizing are by: (1) Standard Land Use Codes; (2) local zoning districts or land use plan classifications; or (3) uses having similar degrees of noise sensitivity.

Additional Noise Impact Issues

Single-Event Limits

As noted in the previous chapter, there is increasing interest at the national level regarding establishment of some form of single-event noise descriptor to supplement the composite measure provided by the Day-Night Average Sound Level (L_{dn}). In California, the removal of statewide single-event noise standards from the state regulations has not prevented many airport proprietors from successfully implementing single-event standards for aircraft operating at their airports. These single-event standards have been based upon either the noise levels published by the FAA in accordance with FAR Part 36 or actual measured noise levels recorded at the individual airport.

Airport land use commissions cannot set limits for the noise generated by individual aircraft overflights. So doing would be regarded as a direct regulation of airport operations. Nonetheless, airport land use commissions can consider single-event noise levels as a factor in evaluating land use compatibility.

A basic difficulty in development of single-event noise level standards applicable to land use compatibility assessment is the lack of useful data.

- The data resulting from FAR Part 36 is of value only in distinguishing the relative loudness of different types of aircraft. The actual points established by the regulations for measurement of noise levels are too far from the runway to be of much significance in land use planning, especially at general aviation airports.

- Recording of actual aircraft overflight noise levels is mostly done as a routine matter only at airline airports and very busy, urban general aviation facilities. Data for smaller general aviation airports is rarely available unless a specialized study has been conducted for a particular purpose.

- The only other readily available source of data relating aircraft types to the single-event noise levels at various locations on the ground is the data base for the Federal Aviation Administration's Integrated Noise Model. This data base expresses single-event noise in terms of Sound Exposure Level (SEL) which cannot be directly correlated with maximum noise levels.

Until such time as definitive single-event noise level guidelines evolve at the national level, there is little strong grounds on which airport land use commissions can establish single-event noise level compatibility standards.

Interior Noise Level Criteria

The California Noise Insulation Standards, cited previously, set a 45-dBA CNEL as the maximum acceptable interior noise level for residential uses (other than detached single-family dwellings). Although guidelines for other uses exist, there are no other federal, state, or local interior noise level regulations.

Problems arise with developing interior standards for other building uses because some are used only occasionally and others (such as concert halls) are especially sensitive to peak noises. The issue then is whether an average noise exposure measure (e.g., CNEL or L_{dn}) is the most appropriate basis for compatibility standards. Some airport land use commissions have adopted peak noise level criteria for intermittent noises. However, application of these criteria poses questions in defining intermittent noise and in translating projected CNEL values into peak noise levels.

Other Aircraft Noise Sources

Noise contours calculated with the FAA's Integrated Noise Model only take into account airplane takeoffs and landings. Other sources of aircraft noise are not included even though they may be significant in certain circumstances.

- **Engine Run-Up Noise** - Many people perceive the noise from engine run-ups while aircraft are on the ground to be more annoying than the noise from overflights, even if the sounds have equal loudness. Part of the reason for this greater annoyance is that run-up noise is thought to be less necessary and more under the control of the

16.	Nurseries for Children (Day -Care)	50
17.	Offices	100
18.	School Shops and Vocational Rooms	50
19.	Stores - Retail Sales Rooms	
	Basement	20
	Ground Floor	30
	Upper Floors	50
20.	Warehouses	500
21.	All Others	100

Examples:

A. The proposal is for a 60,000-square-foot two-story office building on 4 gross acres (including adjacent roads). The local parking ordinance requires one parking space for every 250 square feet of commercial space. Assuming that the use would generate one person per vehicle, the following calculations would derive the number of people per acre.

Steps:

1) 60,000 sq. ft. ÷ 1 vehicle per 250 sq ft. = 240 vehicles

2) 240 vehicles x 1.0 people per vehicle = 240 people expected at any one time.

3) 240 people ÷ 4 acres = 60 people per acre.

Under this example, the use would be estimated to generate 60 people per acre. In zones with limits of 100 people-per-acre, the use would be considered compatible assuming all other conditions were met.

B. The proposal is for a 12,000-square-foot store on a 63,000-square-foot parcel. Using the maximum occupancy table from the Uniform Building Code (Exhibit C1) and applying the assumption that the building is occupied at 50 percent of maximum nets results in the following calculations:

Steps:

1) 63,000 sq. ft. ÷ 43,560 sq. ft. (in an acre) = 1.45 acre.
2) 12,000 sq. ft. ÷30 sq. ft./occupant = 400 (max. building occupancy).
3) 400 max. bldg. occup. x 50% = 200 people expected at any one time.
4) 200 people ÷ 1.45 acre = 138 people per acre.

Under this example, 138 people per acre would represent a reasonable estimate. In zones with limitations of 100 people-per-acre or less, the use would be considered incompatible.

C. The proposal is for a 3,000-square-foot office on a 16,500-square-foot parcel. Again using the table in Exhibit C1 but assuming the actual occupancy level is 50% of the maximum indicated by the UBC code provides the following result:

Steps:

1) 16,500 sq. ft. ÷ 43,560 sq. ft. (acre) = 0.38 acre.
2) 3,000 sq. ft. ÷ 100 sq. ft./occupant = 30 (max. building occupancy).

3) 30 people maximum building occupancy x 50% (actual occupancy) = 15 people in the building at any one time.
4) 15 people ÷ 0.38 acres = 39 people per acre.

Under this example, the use would be estimated to generate 39 people per acre. In zones with occupancy limits of 100, the use would be considered compatible assuming all other conditions were met.

Appendix D
Compatibility Guidelines for Specific Land Uses

The compatibility evaluations listed below for specific types of land uses can be used by local jurisdictions as guidelines in implementation of the general compatibility criteria listed in Table 2A. These evaluations are not regarded as adopted policies or criteria of the Imperial County Airport Land Use Commission. In case of any conflicts between these evaluations of specific land uses and the policies and criteria in Chapter 2 of this document, the contents of Chapter 2 shall prevail.

Land Use Compatibility Zones

	A	B1/B2	C	D
Agricultural Uses				
Truck and Specialty Crops	0	+	+	+
Field Crops	0	+	+	+
Pasture and Rangeland	0	+	+	+
Orchard and Vineyards	-	+	+	+
Dry Farm and Grain	0	+	+	+
Tree Farms, Landscape Nurseries and Greenhouses	-	0	+	+
Fish Farms	-	0	+	+
Feed Lots and Stockyards	-	0	+	+
Poultry Farms	-	0	+	+
Dairy Farms	-	0	+	+
Natural Uses				
Fish and Game Preserves	0	0	0	0
Land Preserves and Open Space	0	+	+	+
Flood and Geological Hazard Areas	0	+	+	+
Waterways: Rivers, Creeks, Canals, Wetlands, Bays, Lakes	0	0	0	+

-	Incompatible
0	Potentially compatible with restrictions
+	Compatible

Land Use Compatibility Zones

	A	B	C	D
Residential and Institutional				
Rural Residential - 10 acres or more	-	0	+	+
Low Density Residential - 2 to 10 acre lots	-	0/+	+	+
Single Family Residential - lots under 2 acres	-	-	0	+
Multi Family Residential	-	-	0	+
Mobile Home Parks	-	-	0	+
Schools, Colleges and Universities	-	-	-	+
Day Care Centers	-	-	0	+
Hospitals and Residential Care Facilities	-	-	-	+
Recreational				
Golf Course	0	+	+	+
Parks - low intensity; no group activities	0	+	+	+
Playgrounds and Picnic Areas	-	0	+	+
Athletic Fields	-	0	+	+
Riding Stables	-	0	+	+
Marinas and Water Recreation	-	0	+	+
Health Clubs and Spas	-	-	0	+
Tennis Courts	-	0	+	+
Swimming Pools	-	0	0	+
Fairgrounds and Race Tracks	-	-	-	+
Resorts and Group Camps-	-	-	0	+
Industrial				
Research and Development Laboratories	-	0	+	+
Warehouses and Distribution Facilities	-	0	+	+
Manufacturing and Assembly	-	0	0	+
Cooperage and Bottling Plants	-	0	+	+
Printing, Publishing and Allied Services	-	0	+	+
Chemical, Rubber and Plastic Products	-	-	0	+
Food Processing	-	-	+	0

-	Incompatible
0	Potentially compatible with restrictions
+	Compatible

Land Use Compatibility Zones

Commercial Uses	A	B1/B2	C	D
Large Shopping Malls (500,000+ sq.ft.)	-	-	0	+
Retail Stores (one story)	-	0	0	+
Retail Stores (two story)	-	-	0	+
Restaurants and Drinking Establishments (no take out)	-	0	0	+
Food Take-Outs	-	-	0	+
Auto and Marine Services	-	0	+	+
Building Materials, Hardware and Heavy Equipment	-	0	+	+
Office Buildings (one story)	-	0	+	+
Multiple-story Retail, Office, and Financial	-	-	0	+
Banks and Financial Institutions	-	0	+	+
Repair Services	-	0	+	+
Gas Stations	-	0	+	+
Government Services/Public Buildings	-	0	+	+
Motels (one story)	-	0	0	+
Hotels and Motels (two story)	-	-	0	+
Theaters, Auditoriums, and Assembly Halls	-	-	0	+
Outdoor Theaters	-	-	0	+
Memorial Parks/Cemeteries	-	+	+	+
Truck Terminals	-	+	+	+
Transportation, Communications, and Utilities				
Automobile Parking	0	+	+	+
Highway & Street Right-of-ways	0	+	+	+
Railroad and Public Transit Facilities	0	+	+	+
Taxi, Bus & Train Terminals	-	0	+	+
Reservoirs	-	0	0	+
Power Lines	-	0	0	+
Water Treatment Facilities	-	0	+	+
Sewage Treatment and Disposal Facilities	-	0	0	+
Electrical Substations	-	0	0	+
Power Plants	-	-	0	+
Sanitary Landfills	-	-	-	0

\- Incompatible

0 Potentially compatible with restrictions

\+ Compatible

Appendix E

Sample Easement and Deed Notice Documents

The Imperial County *Airport Land Use Compatibility Plan* requires the dedication of avigation or overflight easements or use of deed notices in selected areas around each of the airports in the county. The specific applications are as noted in the Compatibility Criteria matrix, Table 2A.

Examples of four types of documents are presented on the following pages.

Exhibit E1 - Avigation Easement

Exhibit E2 - Overflight Easement

Exhibit E3 - Deed Notice

Exhibit E4 - Avigation Easement and Release

Exhibit E1

Typical Avigation Easement

This indenture made this ____ day of _____, 19 __, between _____ _____ hereinafter referred to as Grantor, and the [Insert County or City name], a political subdivision in the State of California, hereinafter referred to as Grantee.

The Grantor, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, does hereby grant to the Grantee, its successors and assigns, a perpetual and assignable easement over the following described parcel of land in which the Grantor holds a fee simple estate. The property which is subject to this easement is depicted as _____ on "Exhibit A" attached and is more particularly described as follows:

[Insert legal description of real property]

The easement applies to the Airspace above an imaginary plane over the real property. The plane is described as follows:

> The imaginary plane above the hereinbefore described real property, as such plane is defined by Part 77 of the Federal Aviation Regulations, and consists of a plane [describe approach, transition, or horizontal surface]; the elevation of said plane being based upon the _____Airport official runway end elevation of _____ feet Above Mean Sea Level (AMSL), as determined by [Insert name and Date of Survey or Airport Layout Plan that determines the elevation] the approximate dimensions of which said plane are described and shown on Exhibit A attached hereto and incorporated herein by reference.

The aforesaid easement and right-of-way includes, but is not limited to:

(1) For the use and benefit of the public, the easement and continuing right to fly, or cause or permit the flight by any and all persons, or any aircraft, of any and all kinds now or hereafter known, in, through, across, or about any portion of the Airspace hereinabove described; and

(2) The easement and right to cause or create, or permit or allow to be caused or created within all space above the existing surface of the hereinabove described real property and any and all Airspace laterally adjacent to said real property, such noise, vibration, currents and other effects of air, illumination and fuel consumption as may be inherent in, or may arise or occur from or during the operation of aircraft of any and all kinds, now or hereafter known or used, for navigation of or flight in air; and

(3) A continuing right to clear and keep clear from the Airspace any portions of buildings, structures, or improvements of any kinds, and of trees or other objects, including the right to remove or demolish those portions of such buildings, structures, improvements, trees, or other things which extend into or above said Airspace, and the right to cut to the ground level and remove, any trees which extend into or above the Airspace; and

(4) The right to mark and light, or cause or require to be marked or lighted, as obstructions to air navigation, any and all buildings, structures, or other improvements, and trees or other objects, which extend into or above the Airspace; and

(5) The right of ingress to, passage within, and egress from the hereinabove described real property, for the purposes described in subparagraphs (3) and (4) above at reasonable times and after reasonable notice.

For and behalf of itself, its successors and assigns, the Grantor hereby covenants with the [Insert County or City name], for the direct benefit of the real property constituting the _____Airport hereinafter described, that neither the Grantor, nor its successors in interest or assigns will construct, install, erect, place or grow in or upon the hereinabove described real property, nor will they permit to allow, any building structure, improvement, tree or other object which extends into or above the Airspace, or which constitutes an obstruction to air navigation, or which obstructs or interferes with the use of the easement and rights-of-way herein granted.

The easements and rights-of-way herein granted shall be deemed both appurtenant to and for the direct benefit of that real property which constitutes the _____ Airport, in the [Insert County or City name], State of California; and shall further be deemed in gross, being conveyed to the Grantee for the benefit of the Grantee and any and all members of the general public who may use said easement or right-of-way, in landing at, taking off from or operating such aircraft in or about the _____ Airport, or in otherwise flying through said Airspace.

This grant of easement shall not operate to deprive the Grantor, its successors or assigns, of any rights which may from time to time have against any air carrier or private operator for negligent or unlawful operation of aircraft.

These covenants and agreements run with the land and are binding upon the heirs, administrators, executors, successors and assigns of the Grantor, and, for the purpose of this instrument, the real property firstly hereinabove described is the servient tenement and said _____ Airport is the dominant tenement.

DATED: _____ _____

_____

STATE OF } ss

COUNTY OF }

On _____, before me, the undersigned, a Notary Public in and for said County and State, personally appeared _____, and _____ known to me to be the persons whose names are subscribed to the within instrument and acknowledged that they executed the same.

WITNESS my hand and official seal.

_____

Notary Public

Exhibit E2

Typical Overflight Easement

GRANTOR hereby grants to the _____ in _____, its successors or assigns, as owners of the [Name of Airport] _____, California, an overflight easement for the following purposes and granting the following rights:

(1) For the use and benefit of the public, and to the extent and in the manner consistent with safe operating procedures as provided under applicable governmental regulations, the right to make flights, and the noise inherent thereto, in airspace over the property described in Exhibit A (attached) in connection with landings, takeoffs, and general operation of the [Name of Airport].

(2) The right to regulate or prohibit the release into the air of any substance which would impair the visibility or otherwise interfere with the operations of aircraft such as, but not limited to, steam, dust, and smoke.

(3) The right to regulate or prohibit light emissions, either direct or indirect (reflective), which might interfere with pilot vision.

(4) The right to prohibit electrical emissions which would interfere with aircraft communication systems or aircraft navigational equipment.

This easement shall be effective from this date and run with the land until such time as the [Name of Airport] is no longer used as an airport.

The real property subject to this overflight easement is described as follows:

See Attachment "A"

DATED: _____ GRANTOR: _____

_____

By: _____

Exhibit E3

Sample Deed Notice

The following statement should be included on the deed for the subject property and recorded in the County. This statement should also be included on any parcel map or final map for subdivision approval.

This property is in the area subject to overflights by aircraft using _____ airport, and as a result, residents may experience inconvenience, annoyance or discomfort arising from the noise of such operations. State law (Public Utilities Code Section 21670 et. seq.) establishes the importance of public use airports to protection of the public interest of the people of the State of California. Residents of property near a public use airport should therefore be prepared to accept such inconvenience, annoyance or discomfort from normal aircraft operations. Any subsequent deed conveying parcels or lots shall contain a statement in substantially this form.

EXHIBIT E4

AVIGATION EASEMENT AND RELEASE

_____, (hereinafter referred to as "Grantor", hereby grants to the County of Imperial, State of California, (hereinafter referred to as "Grantee), a perpetual easement on the following terms:

1. Description: The easement shall be an easement on, over, across, and upon all that certain real property situated in the unincorporated area of the County of Imperial, State of California, described in Exhibit "A" attached hereto and by this reference incorporated herein, and all the air space above said real property.

2. Benefit: The easement shall be appurtenant to and for the benefit of all of the real property comprising the _____, Airport ("Airport") and such other additional property or interest therein as shall be subsequently acquired or designated from time to time by Grantee or its successors as constituting a part of the Airport.

3. Use and Purpose: The easement shall be used for the existence on, over, upon, and within the described easement of all noise, vibration, air currents, natural or artificial illumination, and such matter, emissions, activities, or other events that may occur or result directly or indirectly from the operations of the Airport, now and in the future, including, but in no way limited to, ground and flight operations of aircraft at, over, on, or about the Airport. The easement shall also be used for the passage and flight of aircraft; provided, however, this easement shall not affect such rights for the passage and flight of aircraft as such rights existed prior to the date of easement and as are now or may be provided or permitted by law.

4. Restrictions on Use of Land: Grantor will not use nor permit any use of the land above described in Exhibit "A", or any of the air space above it at any height whatever, for any purpose which will interfere with the use, operation, maintenance, and further development of the airport, and, in addition, will not use nor permit any use of such land and of any structures thereon for purposes which will create or result in a hazard of flight, such as, but not limited to, those which will (a) produce electrical interference with radio or other electronic communications, (b) make it difficult for pilots to distinguish between airport lights and other lights, (c) project glare into the eyes of pilots, (d) impair visibility in the vicinity of the Airport, or (e) otherwise endanger the landing, takeoff, and maneuvering of aircraft, or in any manner whatever adversely affect the accuracy of any devices or apparatus used in the operation of, or to promote, safe landings and takeoffs from the Airport.

Grantee shall, after thirty (30) days written notice to Grantor, have the right to come on the property herein described and correct the proper use, with right of passage over the land described in Exhibit "A" for those purposes.

5. Liability: All of such uses shall be without any liability of Grantee or of any other person or entitled to the benefits of this easement to Grantor, Grantor's heirs, assigns, or successors in interest to all or any part of the property or any interest therein, or to any other person or entity using or located on or in the area subject to the easement for damage to property or physical or emotional injury to persons, animals, or any other living thing the diminution in value of any personal or real property, discomfort or inconvenience of any type or kind to any person or thing, or interference with television, radio, or other types or kinds of electrical reception transmissions, or activities in the easement; and Grantor, for itself and on behalf of the Grantor's heirs, assigns, or successors in interest to all or any part of the property, or any interest therein and each person or entity using or located on or in the area subject to this easement, hereby releases and discharges Grantee and all persons and entities to the benefits of the easement for all claims, demands, actions, and causes of action of all types or kinds, known or unknown, existing or which might be created hereafter by statute or case decision arising out of any of the foregoing described injuries or damages resulting from the use of this easement by Grantee and any person or entity to the benefits of this easement.

6. Covenants Run With the Land: All rights, easements, releases, benefits, and estates granted hereunder shall be covenants running with the land described in Exhibit "A" hereof, of which land Grantor will be the servient tenement, and Grantee and the beneficiaries of such rights, easements, releases, benefits, and estates shall be the dominant tenement.

7. Scope: This agreement and conveyance shall bind the parties hereto, their heirs, administrators, executors, successors, and assigns, and each and every one of them as though specifically named herein, and is joined in by Grantee by the acceptance and recording thereof.

IN WITNESS WHEREOF, Grantor has caused this instrument to be executed this _____ day of _____, 199.

'GRANTOR"

Name of Grantor

By:_____
Its Authorized Agent

sm/ALUCDOCS.

Appendix F
Glossary

ABOVE GROUND LEVEL (AGL): An elevation datum given in feet above ground level.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. (AIM)

AIRCRAFT ACCIDENT: An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, and in which any person suffers death or serious injury as a result of being in or upon the aircraft or by direct contact with the aircraft or anything attached thereto, or in which the aircraft receives substantial damage. (NTSB)

AIRCRAFT OPERATION: The airborne movement of aircraft in controlled or non-controlled airport terminal areas and about given en route fixes or at other points where counts can be made. There are two types of operations- local and itinerant. An operation is counted for each landing and each departure, such that a touch-and-go flight is counted as two operations. (FAA Stats)

AIRCRAFT PARKING LINE LIMIT (APL): A line established by the airport authorities beyond which no part of a parked aircraft should protrude. (Airport Design AC)

AIRPORT: An area of land or water that is used or intended to be used for the landing and taking off of aircraft, and includes its buildings and facilities, if any. (FAR 1)

AIRPORT ELEVATION: The highest point of an airport's usable runways, measured in feet above mean sea level. (AIM)

AIRPORT LAYOUT PLAN (ALP): A scale drawing of existing and proposed airport facilities, their location on the airport, and the pertinent clearance and dimensional information required to demonstrate conformance with applicable standards.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport. (Airport Design AC)

AIRPORT LAND USE COMMISSION (ALUC): A commission established under provisions of California Public Utilities Code, Sections 12670 et seq., in each county within which a public-use airport is located for the purpose of ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive airport noise and safety hazards. (Chapter 4, Article 3.5 of State Aeronautics Act)

AMBIENT NOISE LEVEL: Background noise level, the normal or existing level of environmental noise at a given location.

APPROACH LIGHT SYSTEM (ALS): An airport lighting system which provides visual guidance enabling a pilot to align the aircraft with the extended runway centerline during a final approach to landing. Among the specific types of systems are:

- LDIN - Sequenced Flashing Lead-in Lights.
- ODALS - Omnidirectional Approach Light System, a combination of LDIN and REILS.
- SSALR - Simplified Short Approach Light System with Sequenced Flashing Lights. (AIM)

APPROACH SPEED: The recommended speed contained in aircraft manuals used by pilots when making an approach to landing. This speed will vary for different segments of an approach as well as for aircraft weight and configuration. (AIM)

AVIGATION EASEMENT: A type of easement that includes the following rights or restrictions: (1) the right of overflight above the property at any altitude above a surface specified in the easement. (2) A right to subject the property to noise, vibrations, fumes, dust, emissions associated with airport activities. (3) Prohibits the erection or growth of any object, tree or structure that would penetrate the defined airspace. (4) A right of entry to the property, with proper notice to the owner for the purpose of removing, marking, or lighting any structure or other object that may constitute a hazard or obstruction. (5) Prohibits certain land use characteristics that may create flight hazards, including electrical interference, glare, misleading light sources, smoke, steam, dust or other visual impairments and uses which may attract large flocks of birds.

BASED AIRCRAFT: Aircraft stationed at an airport on a long-term basis.

CEILING: Height above the earth's surface to the lowest layer of clouds or obscuring phenomena. (AIM)

CIRCLING APPROACH/CIRCLE-TO-LAND MANEUVER: A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or not desirable. (AIM)

COMMERCIAL OPERATOR: A person who, for compensation or hire, engages in the carriage by aircraft in air commerce of persons or property, other than as an air carrier. (FAR 1)

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL): The noise measure adopted by the State of California for evaluating airport noise. It represents the composite noise levels of aircraft operations during an average annual 24-hour day. CNEL is measured in A-weighted decibels (dBA) and evening and nighttime operations are weighted to reflect a community's greater sensitivity to noise during these hours and to account for quieter ambient levels.

COMMUTER AIR CARRIER: An air taxi operator which performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week and places between which such flights are performed. (FAA Census)

CONTROL ZONE: Controlled airspace surrounding one or more airports, normally a circular area. Having a radius of five statute miles plus extensions to include instrument arrival and departure paths. Most control zones surround airports with air traffic control towers and are in effect only for the hours the tower is operational.

CONTROLLED AIRSPACE: Any of several types of airspace within which some or all aircraft may be subject to air traffic control. (FAR 1)

DAY-NIGHT AVERAGE SOUND LEVEL (Ldn): The noise descriptor adopted by the U.S. Environmental Protection Agency for measurement of environmental noise. It represents the average daytime noise level during a 24-hour day, measured in decibels and adjusted to account for the lower tolerance of people to noise during nighttime periods.

DECIBELS, A-WEIGHTED (dBA): A measure of sound level, adjusted to account for the perception range of the human ear.

DEED NOTICE: A deed notice is a formal statement which is added to the legal description of the deed for a property and on any subdivision map which states that the property is subject to aircraft overflights. Deed notices are used as a form of buyer notification as a means of ensuring that those who are particularly sensitive to aircraft overflights can avoid moving to the affected areas. (Refer to overflight easement.)

DISPLACED THRESHOLD: A landing threshold that is located at a point on the runway other than the designated beginning of the runway. (See Threshold) (AIM)

FEDERAL AVIATION REGULATIONS (FAR): Regulations issued by the FAA to regulate air commerce; issued as separate "Parts", e.g., Part 77.

FAR PART 77: The part of the Federal Aviation Regulations which deals with objects affecting navigable airspace.

FAR PART 77 SURFACES: Imaginary surfaces established with relation to each runway of an airport. There are five types of surfaces: (1) primary; (2) approach; (3) transitional; (4) horizontal; and (5) conical.

FEDERAL AVIATION ADMINISTRATION (FAA): The United States government agency which is responsible for insuring the safe and efficient use of the nation's airspace.

FIXED BASE OPERATOR (FBO): A business operating at an airport that provides aircraft services to the general public, including but not limited to sale of fuel and oil; aircraft sales, rental, maintenance, and repair; parking and tiedown or storage of aircraft; flight training; air taxi/charter operations; and specialty services, such as instrument and avionics maintenance, painting, overhaul, aerial application, aerial photography, aerial hoists, or pipeline patrol.

GENERAL AVIATION: That portion of civil aviation which encompasses all facets of aviation except air carriers. (FAA Stats)

GLIDE SLOPE: An electronic signal radiated by a component of an ILS to provide descent path guidance to approaching aircraft.

HELIPAD: A small, designated area, usually with a prepared surface, on a heliport, airport, landing/takeoff area, apron/ramp, or movement area used for takeoff, landing, or parking of helicopters. (AIM)

INSTRUMENT APPROACH PROCEDURE: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually. It is prescribed and approved for a specific airport by competent authority. Refer to nonprecision and precision approach procedures. (AIM)

INSTRUMENT FLIGHT RULES (IFR): Rules governing the procedures for conducting instrument flight. Generally, IFR applies when meteorological conditions with a ceiling below 1,000 feet and visibility less than 3 miles prevail. (AIM)

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids: (1) Localizer; (2) Glide Slope; (3) Outer Marker; (4) Middle Marker; (5) Approach Lights. (AIM)

INSTRUMENT OPERATION: An aircraft operation in accordance with an IFR flight plan or an operation where IFR separation between aircraft is provided by a terminal control facility. (FAA ATA)

INSTRUMENT RUNWAY: A runway equipped with electronic and visual navigation aids for which a precision or nonprecision approach procedure having straight-in landing minimums has been approved. (AIM)

ITINERANT OPERATION: An arrival or departure performed by an aircraft from or to a point beyond the local airport area.

LARGE AIRCRAFT: An aircraft of more than 12,500 pounds maximum certificated takeoff weight. (FAR 1)

LOCALIZER (LOC): The component of an ILS which provides course guidance to the runway. (AIM)

LOCALIZER TYPE DIRECTIONAL AID (LDA): A NAVAID used for nonprecision instrument approaches with utility and accuracy comparable to a localizer but which is no a part of a complete ILS and is not aligned with the runway. (AIM)

LOCAL OPERATION: An arrival or departure performed by an aircraft: (1) operating in the traffic pattern, (2) known to be departing or arriving from flight in local practice areas, or (3) executing practice instrument approaches at the airport. (FAA ATA)

MEAN SEA LEVEL (MSL): An elevation datum given in feet above mean sea level.

MICROWAVE LANDING SYSTEM (MLS): A precision instrument approach system providing a function similar to an ILS, but operating in the microwave spectrum. It normally consists of three components: azimuth station, elevation station, and precision distance measuring equipment.

MINIMUM DESCENT ALTITUDE (MDA): The lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure where no electronic glide slope is provided. (FAR 1)

MISSED APPROACH: A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. (AIM)

NAVIGATIONAL AID/NAVAID: Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight. (AIM)

NOISE CONTOURS: Lines drawn about a noise source indicating constant energy levels of noise exposure. CNEL and Ldn are the measures used to describe community exposure to noise.

NONPRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which no electronic glide slope is provided. (FAR 1)

NONPRECISION INSTRUMENT RUNWAY: A runway with an instrument approach procedure utilizing air navigation facilities, with only horizontal guidance, or area-type navigation equipment for which a straight-in nonprecision instrument approach procedure has been approved or planned, and no precision approach facility or procedure is planned. (Airport Design AC)

OBJECT FREE AREA (OFA): A two-dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects except for objects whose location is fixed by function. (Airport Design AC)

OBSTRUCTION: Any object of natural growth, terrain, or permanent or temporary construction or alteration, including equipment or materials used therein the height of which exceeds the obstruction standards of subpart C of FAR Part 77 "Objects Affecting Navigable Airspace".

OBSTACLE FREE ZONE (OFZ): The airspace defined by the runway OFZ and, as appropriate, the inner-approach OFZ and the inner-transitional OFZ, which is clear of object penetrations other than frangible NAVAIDs.

OBSTRUCTION: An object, including a mobile object, which penetrates an imaginary surface described in FAR Part 77.

OUTER MARKER: A marker beacon at or near the glide slope intercept position of an ILS approach. (AIM)

OVERFLIGHT EASEMENT: An easement which describes the right to overfly the property above a specified surface and includes the right to subject the property to noise, vibrations, fumes and emissions. An overflight easement is used primarily as a form of buyer notification.

OVERFLIGHT ZONE: The area(s) where aircraft are maneuvering to enter or leave the traffic pattern, typically defined by the FAR Part 77 horizontal surface.

OVERLAY ZONING: Establishes development standards in areas of special concern over an above the standards applicable to basic underlying zoning districts.

PLANNING BOUNDARY: The area designated by the ALUC surrounding each airport pursuant to Section 21675 (c) of the Public Utilities Code in which the ALUC plan applies.

PRECISION APPROACH PATH INDICATOR (PAPI): An airport landing aid similar to a VASI, but which has light units installed in a single row rather than two rows.

PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which an electronic glide slope is provided. (FAR 1)

PRECISION INSTRUMENT RUNWAY: A runway with an instrument approach procedure utilizing an instrument landing system (ILS), microwave landing system (MLS), or precision approach radar (PAR). (Airport Design AC)

PUBLIC USE AIRPORT: Publicly or privately owned airport that offers the use of its facilities to the public without prior notice or special invitation or clearance, and that has been issued a California Airport Permit by the Division of Aeronautics of the California Department of Transportation. For purposes of the ALUC plan, the

State Division of Aeronautics has interpreted "public use" to include special-use airports in which commercial operators offer service to the public.

REFERRAL AREA: The area around an airport defined by the planning boundary adopted by the ALUC within which certain land use proposals are to be referred to the ALUC for review.

RUNWAY EDGE LIGHTS: Lights used to define the lateral limits of a runway. Specific types include:

- HIRL - High-Intensity Runway Lights.
- MIRL - Medium-Intensity Runway Lights.

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

RUNWAY PROTECTION ZONE (RPZ): An area (formerly the clear zone) used to enhance the safety of aircraft operations. It is at ground level beyond the runway end. (Airport Design AC)

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

SAFETY ZONE(S): For the purposes of this Plan, a safety zone is an area near an airport in which land use restrictions are established to protect the safety of the public from potential aircraft accidents.

SINGLE-EVENT NOISE: As used in this report, it refers to the noise from an individual aircraft operation or overflight.

SINGLE EVENT NOISE EXPOSURE LEVEL (SENEL) OR (SEL): The A-weighted sound level of a single noise event, such as an aircraft overflight, measured over the time interval for which the sound exceeds a threshold level and normalized to a reference duration of one second. SENEL and SEL values are identical: SENEL is used in California, SEL is adopted by the EPA and FAA.

The SENEL or SEL expresses the level of a continuous one-second signal that contains the same amount of energy as the entire noise event. This value is not equal to the maximum A-level occurring during the noise event. Aircraft noise events last more than one second. SENEL/SEL values will be higher than the maximum A-level for the same events.

SMALL AIRCRAFT: An aircraft of 12,500 pounds or less maximum certificated takeoff weight.
(FAR 1)

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned instrument flight rules (IFR) air traffic control departure procedure printed for pilot use in graphic and/or textual form. SID's provide transition from the terminal to the appropriate en route structure. (AIM)

STANDARD TERMINAL ARRIVAL ROUTE (STAR): A preplanned instrument flight rule (IFR) air traffic control arrival route published for pilot use in graphic and/or textual form. STARs provide transition from the en route structure to an outer fix or an instrument approach fix/arrival waypoint in the terminal area. (AIM)

STOPWAY: An area beyond the takeoff runway, no less wide than the runway and centered upon the extended centerline of the runway, able to support the airplane during an aborted takeoff, without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating the airplane during an aborted takeoff. (FAR 1)

STRAIGHT-IN INSTRUMENT APPROACH: An instrument approach wherein final approach is begun without first having executed a procedure turn; it is not necessarily completed with a straight-in landing or made to straight-in landing weather minimums. (AIM)

TAXILANE: The portion of the aircraft parking area used for access between taxiways, aircraft parking positions, hangars, storage facilities, etc. (Airport Design AC)

TAXIWAY: A defined path, from one part of an airport to another, selected or prepared for the taxiing of aircraft. (Airport Design AC)

TERMINAL INSTRUMENT PROCEDURES (TERPS): Procedures for instrument approach and departure of aircraft to and from civil and military airports. There are four types of terminal instrument procedures: precision approach, nonprecision approach, circling, and departure.

TERMINAL RADAR SERVICE AREA (TRSA): Airspace surrounding designated airports wherein ATC provides radar vectoring, sequencing, and separation on a full-time basis for all IFR and participating VFR aircraft. (AIM)

THRESHOLD: The beginning of that portion of the runway usable for landing. (AIM) (Also see Displaced Threshold)

TOUCH-AND-GO: A practice maneuver consisting of a landing and a takeoff performed in one continuous movement. A touch-and-go is defined as two operations.

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

TRANSIENT AIRCRAFT: Aircraft not based at the airport.

UNICOM (Aeronautical Advisory Station): A nongovernment air/ground radio communication facility which may provide airport information at certain airports. (AIM)

UTILITY AIRPORT: An airport designed, constructed, and maintained to serve airplanes having approach speeds less than 121 knots. (Airport Design AC)

VISUAL APPROACH: An approach where the pilot must use visual reference to the runway for landing under VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport landing aid which provides a pilot with visual descent (approach slope) guidance while on approach to landing. Also see PAPI.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. VFR applies when meteorological conditions are equal to or greater than the specified minimum- generally, a 1,000-foot ceiling and 3-mile visibility.

VISUAL GLIDE SLOPE INDICATOR (VGSI): A generic term for the group of airport visual landing aids which includes Visual Approach Slope Indicators (VASI), Precision Approach Path Indicators (PAPI), and Pulsed Light Approach Slope Indicators (PLASI). When FAA funding pays for this equipment, whichever type received the lowest bid price will be installed unless the airport owner wishes to pay the difference for a more expensive unit.

VISUAL RUNWAY: A runway intended solely for the operation of aircraft using visual approach procedures, with no straight-in instrument approach procedure

and no instrument designation indicated on an FAA-approved airport layout plan. (Airport Design AC)

WIND SHEER: A condition typified by rapid changes in wind velocity and duration with altitude.

REFERENCES

FAR 1: Federal Aviation Regulations Part 1, Definitions and Abbreviations. (1974)

AIM: Airman's Information Manual, Pilot/Controller Glossary. (1988)

Airport Design AC: Federal Aviation Administration. Airport Design. Advisory Circular 150/5300-13. (1989)

FAA ATA: Federal Aviation Administration. Air Traffic Activity. (1986)

FAA Census: Federal Aviation Administration. Census of U.S. Civil Aircraft. (1986)

FAA Stats: Federal Aviation Administration. Statistical Handbook of Aviation. (1984)

NTSB: National Transportation Safety Board.

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DISTRIBUTION LISTING:

- Air Resources Board
- Brawley Elementary School District
- Brawley Municipal Airport (Airport Manager)
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- Calexico Public Library
- Brawley Public Library
- Imperial Public Library
- Jimmy Doyle
- Phil Haas

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aircraft operator. For land uses near the end of a runway, run-up noise can be louder and more prolonged than overflight noise. This is especially true when a runway is used predominantly in one direction. The runway end which is used for landings, when aircraft are typically the quietest, is also the end at which pre-flight engine run-ups are normally conducted.

In terms of potential airport land use commission policies, run-up noise is similar to single-event noise. ALUC's do not have the authority to regulate the noise at its source, but can consider it in land use compatibility evaluation.

- **Helicopter Noise** - Because of their separate flight tracks, different operating characteristics, and typically low activity volumes, helicopter operations are usually not included in noise contour calculations. A simulation of helicopter noise can be included in Integrated Noise Model calculations. More accurate modelling of helicopter noise impacts requires use of the separate FAA Helicopter Noise Model (HNM) with the impacts then being manually added to the airplane impacts calculated with INM.

- **Agricultural Aircraft Noise** - In agricultural locations, such as Imperial County, a significant portion of aircraft noise impacts is often produced by agricultural aircraft. This noise differs from that of other aircraft and is difficult to accurately portray in airport noise contours.

  - For one, specialized agricultural aircraft are not included in the INM data base and thus must be represented by other aircraft.

  - A more important distinction is that these aircraft seldom climb to normal traffic pattern altitudes and they often make turns at low altitudes close to the runway. Unless humerous flight tracks are modelled, the calculated noise contours tend to maintain a constant width along the flight tracks and never reach a closure point.

  - Thirdly, because of the low flight altitudes and typically loud noise emissions of agricultural aircraft, noise impacts may be greater in the vicinity of fields that require frequent spraying than they are around low-activity airports. Although these impacts cannot be modelled, they can be considered in land use planning for agricultural areas.

9
Implementation Strategies for Local Jurisdictions

INTRODUCTION

The Airport Land Use Commission policies set forth in this *Airport Land Use Compatibility Plan* contain performance-type standards intended to prevent occurrence of future new conflicts between airport operations and surrounding land uses. Implementation of these criteria requires action by the local jurisdictions that have control over the airport-vicinity land use. This process is comparable to that established by the California Environmental Quality Act, the state has adopted a set of guidelines that must then be implemented by the specific procedures and other actions adopted by each local government.

The following strategies are divided into two categories: (1) those that can or must be taken by the local land use jurisdictions; and (2) actions that are available to a local jurisdiction when it is also the owner of the airport creating the impacts.

LOCAL JURISDICTION ACTIONS

Land Use Designations

The most fundamental means of assuring compatibility between an airport and surrounding land uses is by the designation of appropriate land uses in local general plans, specific plans, and zoning ordinances. California state aeronautics law requires local jurisdictions to make their general plans and specific plans consistent with the county airport land use commission plan or otherwise to override the commission.

Although long-term maintenance of airport/land use compatibility is difficult and often impossible without designation of compatible land uses, this form of land use control also has significant limitations. To overcome these limitations, other forms of land use

controls are normally essential as part of a complete airport/land use compatibility implementation strategy.

- **Ease of Change** - Nothing permanently locks in a land use designation. When pressured by landowners to allow less restricted development, future local legislative bodies can change the established designations, by overriding the ALUC, if necessary. Such changes especially can occur if the land changes jurisdiction (e.g., as a result of annexation).

- **Restrictiveness** - Land use designations are limited in the degree of restrictiveness that they can contain. If they are deemed to eliminate all reasonable economic use of private property, they can be considered an unfair taking and result in inverse condemnation. (For additional discussion of inverse condemnation, see Chapter 7). Especially in areas near ends of runways, the restrictions may need to be more severe than can be accomplished by this means alone.

- **Lack of Retroactiveness** - Designating an area for a different use than the one already existing may encourage change over the long run, but it does not directly eliminate existing incompatible uses. Other devices, such as fee simple acquisition, may be necessary to bring about the changes.

- **Nonaviation Orientation** - Standard land use plan and zoning designations are developed for community-wide planning purposes. Seldom do they have an aviation orientation or address the specific issues of compatibility with aviation activities (i.e., noise and safety).

Airport Combining Zones

One way of overcoming the lack of aviation orientation of basic land use designations is adoption of an overlay or combining zone. A combining zone supplements local land use designations by adding specific noise and, often more importantly, safety criteria (e.g., maximum number of people on the site, site design and open space criteria, height restrictions, etc.) applicable to future development in the airport vicinity. Geographically, the combining zone should extend at least a mile from the runway ends and encompass lands regularly overflown by aircraft at or below traffic pattern altitudes.

An airport combining zone has several important benefits. Most importantly, it permits the continued utilization of the majority of the design and use guidelines contained in the existing zones. At the same time, it provides a mechanism for implementation of restrictions and conditions that may apply to only a few types of land uses within a given land use category or zoning district. This avoids the need for a large number of discrete zoning districts. It also enables local jurisdictions to use the performance standards provided in the *Airport Land Use Compatibility Plan* directly, rather than through redefinition of existing zoning district descriptions.

Combining Zone Components

Requirements defined in a combining zone ordinance could include:

- **Noise Insulation Standards** - In highly noise-impacted areas, the ordinance could be used to assure compliance with state statutes regarding interior noise levels. The ordinance could specify the construction techniques necessary to meet the requirements.

- **Height Limitations** - Restrictions on the height of buildings, antennas, trees, and other objects near airports, as defined by Federal Aviation Regulations (FAR) Part 77, Subpart C, and regulated by California aeronautics law, can be implemented as part of a combining zone. Although Part 77 surfaces are complex, three-dimensional shapes even at airports with only one runway, the general flatness of the land around airports in Imperial County limits the significance. Except within Compatibility Zone A, and to a minor extent Zone B, only objects exceeding 35 feet in height would have a potential to penetrate the Part 77 surfaces.

- **FAA Notification Requirements** - Combining zones also can be used to assure that project developers are informed about the need for compliance with the notification requirements of FAR Part 77. Subpart B of the regulations require that the proponent of any project which exceeds a specified set of height criteria submit a "Notice of Proposed Construction or Alteration" (Form 7460-1) to the Federal Aviation Administration prior to commencement of construction. The height criteria associated with this notification requirement are lower than those spelled out in Part 77, Subpart C, which define airspace obstructions. The purpose of the notification is to determine if the proposed construction would constitute a potential hazard or obstruction to flight. Notification is not required for proposed structures that would be shielded by existing structures or by natural terrain of equal or greater height, where it is obvious that the proposal would not adversely affect air safety.

- **Maximum Densities** - The principal noise and safety compatibility standards in the *Airport Land Use Compatibility Plan* are expressed in terms of dwelling units per acre for residential uses and people per acre for other land uses. These standards can either be included as is in a compatibility zone or used to modify the underlying land use designations. For residential land uses, the correlation between the compatibility criteria and land use designations is direct. For other land uses, the implications of the density limitations are not as clear. One step that can be taken by local governments is establish a matrix indicating whether specific types of land uses are or are not compatible with each of the four compatibility zones. To be useful, the land use categories will need to be more detailed than typically provided by general plan or zoning ordinance land use designations. Appendix D herein provides a sample compatibility matrix for over 70 types of land uses.

- **Open Space Requirements** - *Airport Land Use Compatibility Plan* criteria regarding airport-vicinity open space suitable for emergency aircraft landings can be implemented by a combining zone. These criteria are most effectively carried out by planning at the general or specific plan level, but may also need to be addressed in terms of the development restrictions on large parcels.

Avigation Easements

Avigation easements are another type of land use control measure available to local jurisdictions. These easements have historically been used to establish height limitations, prevent other flight hazards, and permit noise impacts. More recently, they have been employed as a form of buyer awareness, the recording of an easement with the title to a property ensures that prospective buyers of the property are informed about the airport impacts.

Methods of Acquisition

As with all easements, an avigation easement applies only to the specific property to which it is attached and it is binding on all subsequent owners of the property. Avigation easements can be obtained either by purchase or by required dedication.

- **Purchase** - Acquisition of avigation easements for some monetary amount is usually done by the airport proprietor, which may or may not be the same as the local land use jurisdiction. In most instances, the purchase of avigation easements is limited to property within runway protection zones (previously called clear zones) or elsewhere very close to the airport boundaries where some significant degree of restriction or impact is involved.

- **Dedication** - Required dedication of avigation easements is sometimes set as a condition for local jurisdiction approval of a proposed land use development, especially a residential development, in the vicinity of an airport. Generally, when avigation easements are obtained in this manner, they are primarily intended to serve as a comprehensive and stringent form of buyer awareness measure, the rights conveyed by the easement dedication are seldom more restrictive than the conditions and rights established in other legal forms (e.g., airport-vicinity height-limit zoning ordinances, Federal Aviation Regulations, etc.).

- Approved authorization for the Planning Director, acting as Secretary to the Airport Land Use Commission, to accept aviation easements, overflight easement and such other easements of records of (sic) instrument needing to be accepted by County on behalf of the Airport, owned by the County, if and when so directed by the Airport Land Use Commission. (Board Minute Order, #21, 5/11/93).

Property Rights Conveyed

A standard avigation easement conveys the following property rights from the owner of the property to the holder of the easement:

- **Overflight** - A right-of-way for free and unobstructed passage of aircraft through the airspace over the property at any altitude above a surface specified in the easement (set in accordance with Federal Aviation Regulations Part 77 and/or criteria for terminal instrument approaches).

- **Impacts** - A right to subject the property to noise, vibration, fumes, dust, and fuel particle emissions associated with normal airport activity.

- **Height Limits** - A right to prohibit the construction or growth of any structure, tree, or other object that would enter the acquired airspace.

- **Access and Abatement** - A right-of-entry onto the property, with appropriate advance notice, for the purpose of removing, marking, or lighting any structure or other object that enters the acquired airspace.

- Other Restrictions - A right to prohibit electrical interference, glare, misleading light sources, visual impairments, and other hazards to aircraft from being created on the property.

Easements which convey only certain ones of these rights are common. An easement containing only the first two rights is usually referred to as an *overflight* or *noise*

easement. The latter three rights are often collectively called a *height-limit* or *airspace* easement. Overflight easements are useful in locations sufficiently distant from an airport that height limits and other restrictions are not a concern. Height-limit easements have most frequently been obtained by purchase on properties close to an airport where restrictions on the height of objects are necessary. Because height-limit easements do not include the overflight easement rights, there is little apparent advantage to obtaining them rather than a complete avigation easement.

Buyer Awareness Measures

Buyer awareness is an umbrella category for types of airport/land use compatibility measures whose objective is to ensure that prospective buyers of property in the vicinity of an airport are made aware of the airport's existence and the impacts that the airport activity has on surrounding land uses. Avigation easements are the most definitive form of buyer awareness measure. Buyer awareness, though, can also be successfully implemented through other types of programs. Two primary methods are deed notices and real estate disclosure statements.

Deed Notices

Deed notices are statements, attached to the deed to a property, disclosing that the property is subject to routine overflights and associated noise and other impacts by aircraft operating at a nearby airport. An ideal application of deed notices is as a condition of approval for development of residential land uses in airport-vicinity locations where neither noise nor safety are significant factors, but frequent aircraft overflights may be annoying to some people. In addition to being recorded with the deed to a property, the notices shall be included "on its face" and on parcel maps and final maps.

Deed notices are similar to avigation or other aviation-related easements in that they become part of the title to a property and thus are a permanent form of buyer awareness. The distinguishing difference between deed notices and avigation easements is that deed notices only serve as a disclosure of potential overflights, whereas avigation easements convey an identified set of property rights. In locations where height limitations or other land use restrictions are unnecessary, deed notices have the advantage of being less cumbersome to define. Also, they give less appearance of having an negative affect on the value of the property.

A example of a deed notice is included in Appendix E.

Real Estate Disclosure Statements

A more comprehensive form of buyer awareness program is to require that information about an airport's influence area be disclosed to prospective buyers of all airport-vicinity properties prior to the transfer of title. The advantage of this type of program is that it applies to previously existing land uses as well as to new development.

This type of buyer awareness program can be implemented through adoption of a local ordinance requiring real estate disclosure upon the transfer of title or it can be established in conjunction with the adoption of an airport combining zone. Notification describing the zone and discussing its significance could be formally sent to all local real estate brokers and title companies. Having received this information, the brokers would be obligated by state law to pass it along to prospective buyers.

At a minimum, the area covered by a real estate disclosure program should include the airport influence area as established in the *Airport Land Use Compatibility Plan.* The boundary also could be defined to coincide with the boundaries of an airport combining zone.

AIRPORT PROPRIETOR ACTIONS

By law, an airport land use commission cannot establish policies governing the operation of any airport. Nonetheless, in developing its policies, the commission must take into account adopted airport master plans and thus, by extension, should consider actions taken by the airport proprietor to limit the airport's impacts. When a local land use jurisdiction is also the owner of the airport creating the impacts, the jurisdiction gains significant additional capabilities with regard to assuring airport/land use compatibility. Sometimes, the jurisdiction can use airport/land use compatibility actions such as those described below in addition to or in lieu of restrictions on land use development.

Acquisition of Fee Simple Title

Outright airport-owner purchase of fee simple title to a property is the most direct means of land use control. It provides positive assurance of long-term land use compatibility and is the only type of action that enables existing incompatible uses to be removed.

Federal Aviation Administration Funding

Acquisition of property for approach protection purposes is eligible for federal grants under the Federal Aviation Administration Airport Improvement Program. FAA guidelines state that:

> "...land interest is eligible which is necessary to restrict the use of land in the approach and the transitional zones (the dimensions as cited in the applicable Advisory Circulars) to activities and purposes compatible with normal airport operations as well as to meet current and anticipated development at the airport." (FAA Order 5100.38A)

Airport sponsors are encouraged "to acquire the minimum property interest necessary to ensure safe aeronautical use." Except when required for noise compatibility, normally only the portion of approach zone property within 5,000 feet of the runway end is grant eligible.

Limitations

Weighing against the benefits of fee simple acquisition are several important drawbacks:

- **Cost** - Fee simple acquisition is usually the most expensive land use compatibility measure. Also, although some 90% of acquisition costs are eligible for FAA grants under current legislation, the FAA participates in acquisition of parcels only within the limited area indicated above. Most airport operators cannot afford to purchase property without assistance from the FAA.

- **Disruptiveness** - The need to relocate residents and businesses occupying the property to be acquired is disruptive both to the individuals directly involved and to the neighborhood as a whole. Compliance with state and federal relocation laws is required (assistance in finding replacement property must be provided and moving costs must be paid).

- **Tax Implications** - Government acquisition of real property removes it from the tax rolls unless it is leased out for compatible development.

- **Owner Opposition** - Landowners may be unwilling to sell their property voluntarily. Although the property can still be acquired by eminent domain, the condemnation process can be time consuming and costly (both financially and socially).

Acquisition of Approach Protection Easements

As with easements in general, approach protection easements are a form of less-than-fee interest in real property. The key distinction between approach protection easements and the standard avigation easements discussed earlier is that approach protection easements establish specific controls on the underlying use of the land; avigation easements do not. Certain development rights that normally are associated with land ownership would be acquired (e.g., rights to develop high-density residential facilities). The landowner would have all other rights associated with land ownership including the right to sell the property. The easement would, however, be attached to the property title and therefore be binding on subsequent owners. In concept, approach protection easements are very similar to conservation easements which have been employed in several states as a means of agricultural land preservation.

There are two means by which approach protection easements can be acquired. One is through direct purchase. This method is suitable where the existing land uses are compatible with airport activities, but where prevention of future incompatible uses is of such importance that other, less absolute control measures (e.g., zoning) are deemed inadequate. The second method is by retention of the easement when reselling property previously acquired in fee. This approach is necessary when the existing land uses are not compatible with airport activities. In either case, several specific issues must be addressed in the acquisition process:

- **Lack of Precedence** - A difficulty associated with use of approach protection easements as an airport/land use compatibility measure is that there is little previous experience with them. More experience exists with the conservation easements employed as a means of agricultural land preservation, but these most often are obtained through donation rather than purchase. Several airports, however, are currently in the process of obtaining approach protection easements. Their experience will be invaluable elsewhere.

- **Determining Cost of Acquisition** - One of the problems with acquisition of approach protection easements is determining their fair cost, especially when they are purchased directly. In theory, the cost of an approach protection easement should be the difference between a property's market value without the easement and its remaining value with the easement restrictions attached. The market values would be based upon the concept of "highest and best use" and would be determined by appraisal. The problem that arises, however, is the lack of comparable transactions upon which to base appraisals of the easement-restricted property. Some negotiation undoubtedly would come into play regarding what uses

reasonably could still occur on the property and what the property's "fair" value for such purposes should be.

- **Maximum Acceptable Cost** - If the cost of acquiring an approach protection easement is determined to represent a significant percentage of the fee simple value (30-50% as a maximum), it becomes preferable to purchase the property in fee and resell it with the easement attached. The value of the easement would be easier to determine under such circumstances. Although appraisals would still need to be obtained, the actual sale price of the property would be established by the open market.

- **Description of Restrictions** - An approach protection easement is a negative easement in that it restricts the underlying rights to use of the land. However, the easement agreement can be written either to prohibit specified uses or to permit only those uses listed. The latter is more certain to prevent development of incompatible uses, although it may also eliminate unanticipated uses that would be compatible. Regardless of the approach, the agreement must be carefully worded to prevent future disputes.

- **Transfer of Development Rights** - An extension of the approach protection easement concept is to allow the development rights acquired and removed from one parcel to be sold or transferred to another parcel where development would be acceptable. The latter parcel would then be allowed to be developed to a higher degree than would otherwise be permitted by the underlying zoning. Implementation of development rights transfer would require approval by the local jurisdiction and coordination with other community land use planning criteria.

Airport Operational Restrictions and Facility Modifications

All of the airport/land use compatibility implementation strategies discussed previously in this chapter involve some form of control on land use. The other approach to minimizing compatibility conflicts is to reduce the impacts created by aircraft operating at an airport. This can be done by adoption of restrictions on the way aircraft are permitted to operate at the airport and/or by construction of physical facilities to mitigate operational impacts.

At most airports where operational restrictions or facility modifications have been implemented, the objective has been to reduce the airport's noise impacts. Enhancement of safety can, however, also be an important goal. The following list represents only a few of the numerous actions that can be beneficial at general aviation airports. The choice of which ones to implement depends upon the nature and extent of the impacts and the characteristics of the land uses being affected.

- **Preferential Runway** - When winds are blowing at more than about 5 knots, the wind direction dictates which runway is used at an airport. During calm or near calm conditions any runway can be used. The purpose of a preferential runway policy is to establish which runway should be used under these circumstances. Since aircraft takeoffs typically create more noise than do landings, overall noise impacts can sometimes be reduced by directing these operations over lands whose uses are the least affected by noise.

- **Traffic Pattern Location and Altitudes** - As described in Chapter 5, standard left-hand traffic pattern turns result in a pattern on each side of a runway. Often, high terrain or airspace conflicts necessitate limitation of the pattern to a single side of the runway. The length or width of the pattern sometimes is limited for similar reasons. Such restrictions also can be established for noise abatement purposes Ä for example, to place the pattern over open land and avoid overflight of urban areas. Increasing the altitude of the traffic pattern is another change that can have noise reduction benefits. Implementation of these actions, it must be noted, requires coordination with the Federal Aviation Administration.

- **Single-Event Noise Level Limits** - Overall airport noise levels can potentially be reduced by restricting or prohibiting operation of the noisiest aircraft. This technique is most effective when a few specific types of aircraft are far noisier than others operating at the airport. Maximum noise level criteria can be based upon published data, such as Federal Aviation Regulations Part 36, or, at severely impacted airports, upon actual monitoring of individual events.

- **Aircraft Weight Limit** -Most airports have an operational weight limit set to reflect the pavement strength or other physical limitations of the airport. Aircraft weight limit restrictions also can be established as a means of reducing the potential severity of off-airport accidents. Additionally, because heavier aircraft tend to be louder than lighter ones, an aircraft weight limit can serve as a form of single-even noise level limit.

- **Nighttime Restrictions** - Any of the above restrictions can be fixed to be more stringent during nighttime hours than during the daytime. The concept is that airport impacts, particularly from noise, are more disturbing during the night than in the daytime.

- **Run-up Locations** - Normal practice is for aircraft to conduct run-ups at a designated location adjacent to the point they taxi onto the runway. If such a location produces excessive noise impacts upon adjacent property, it is often reasonable to move the run-up area to another convenient spot. Alternatively, a

sound barrier (such as an earthen berm) can sometimes be constructed between the run-up area and the impacted land uses.

- **Other Facility Modifications** - At some airports, other physical changes to the runway configuration can hold prospects for reducing noise and/or safety impacts. Such facility modifications might include displacing or relocating a runway landing threshold or construction of a new runway to take traffic off a runway that produces more significant impacts.

- **Override Process** - Various sections of the Airport Land Use Commission statutes provide for local agencies to override ALUC decisions on land use matters and airport master plans. The override process involves three mandatory steps:

  (1) The holding of a public hearing;

  (2) The making of specific findings that the action proposed is consistent with the purposes of the ALUC statute; and,

  (3) The City or County may override the Commission's determination of inconsistency by a 2/3 vote of its governing body.

The necessity for adequate findings to accompany a local agency's overriding of an ALUC was affirmed in a 1992 court case, California Aviation Council v. City of Ceres. In this case the court found that the Ceres city council had merely referred to the ALUC statutes and then concluded that the proposed land uses minimized public exposure to excessive noise and safety hazards in the airport area. The findings did not document the critical links between the proposal, the finding, and the facts. (Chapter 5, 5-15, State ALUC Handbook, December 1993).

- Airport Owner's Immunity

With respect to a publicly owned airport that a public agency does not operate, if the public agency pursuant to Section 21676 or 21676.5 overrides a commission's action or recommendation, the operator of the airport shall be immune form liability for damages to property or personal injury caused by or resulting directly or indirectly from the public agency's decision to override the commission's action or recommendation.

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General Plan Consistency Review

Imperial County Jurisdictions

INTRODUCTION

As part of the previous study which revises the 1982 Airport Land Use Plan, the general plans, zoning ordinances, and other applicable plans and policies of the jurisdictions near each of the airports in the county were reviewed. The intent of this review was to identify clear or potential inconsistencies between the Airport Land Use Compatibility Plan policies,especially those listed in the Compatibility Criteria matrix (Table 2A) - and the land uses planned for the airports' environs. The results of this review are outlined below.

The review was based upon the documents indicated. In most cases the documents are adopted by the local jurisdiction. At the time the Airport Land Use Compatibility Plan was being drafted, several communities had general plans or elements thereof under preparation. The County currently is preparing an update of the 1993 General Plan Land Use Ordinance, and the listing includes the latest updates of local city general plans.

COUNTY-WIDE

County of Imperial

Documents Reviewed

- General Plan (November 1993)
- Zoning Ordinance

Inconsistencies Noted

- The General Plan addresses airport compatibility but is not sufficiently detailed to determine land use compatibility.

The Amended Noise Plan allows residential densities of up to 29 dwelling units per acre in CNEL 60-65 dBA range. Noise levels of up to CNEL 70 dBA are allowed for residential uses having densities of up to 2 dwelling units per acre in A-1 Light Agricultural Zone and 7 dwelling units per acre in R-1 Residential Agricultural Zone.

- No open land requirements for "A", "B", and "C" Zones.

- No avigation easement dedication requirements for "A", "B", and "C" Zones.

BRAWLEY MUNICIPAL AIRPORT

City of Brawley

Documents Reviewed

- **General Plan, Land Use and Circulation Map (April 1995)**

- **Public Safety/Noise Element (April 1995).**

- General Plan requires a deed notice in "D" Zone and avigation easements in the "B" Zones.

Inconsistencies Noted

- No intensity restrictions for industrial uses in "A", "B", and "C" Zones.

- No open land requirements for "A", "B" and "C" Zones.

- No indicated restrictions on open space/park use proposed for "A" Zone at east end of runway.

- Up to 9 dwelling units per acre allowed in "B1" and "B2" Zones west of runway. Residential development allowed within CNEL 60-65 dBA range.

- No restrictions on school sites and other critical uses in "B" and "C" Zones.

- Avigation easement dedication not established as adopted policy for "A" and "B" Zones.

- Height limits not adopted.

County of Imperial

Documents Reviewed

- Brawley Area Zoning Map (1995).

Inconsistencies Noted

- Labor camps permitted in "A" and "B" Zones at east end of runway (County Zone A-2).
- No intensity limitations for manufacturing uses in "C" Zone north of airport.
- No open land requirements for "A", "B", and "C" Zones.

CALEXICO INTERNATIONAL AIRPORT

City of Calexico

Documents Reviewed

- General Plan, Land Use Element (1992)

Inconsistencies Noted

- Residential densities greater than 4 dwelling units per acre may be allowable in "C" Zone north of airport.
- No limitations or intensities for commercial and manufacturing uses in "B" and "C" Zones east of airport.
- No open land requirements for "A", "B", and "C" Zones.
- No avigation easement dedication requirements for "A", "B", and "C" Zones.

County of Imperial

Documents Reviewed

- Current Land Use Plan, Calexico Planning Unit (April 1982).
- Calexico Area Zoning Plan, (March 1990).

Inconsistencies Noted

- Labor camps permitted in "A" and "B" Zones at west end of runway (County Zone A-2).

CALIPATRIA MUNICIPAL AIRPORT

City of Calipatria

Documents Reviewed

- Zoning Ordinance, (1992).
- Airport Approaches Zoning Ordinance, (1992).

No Inconsistencies Noted

County of Imperial

Documents Reviewed

- County Zoning Map 6 (1992).

Inconsistencies Noted

- A-1 Light Agricultural Zone allow up to 2 dwelling units per acre in "A" and "B" Zones at west end of runway.

HOLTVILLE AIRPORT

County of Imperial

Documents Reviewed

- County-wide plans.

Inconsistencies Noted

- None.

IMPERIAL COUNTY AIRPORT

City of Imperial

Documents Reviewed

- Amended General Plan, (May 1993)
- Zoning Map

Inconsistencies Noted

- Residential uses permitted in part of "A" Zone at north end of runway.
- Residential densities of up to 1 dwelling unit per acre allowed in "B1" Zone.
- No intensity limitations in city commercial and industrial zoning districts.
- No open land requirements for "A", "B" and "C" Zones.
- No avigation easement dedication requirements for "A", "B" and "C" Zones.

City of El Centro

Documents Reviewed

- General Plan, (June 1988).
- Zoning Ordinance and Map, (April 1989).

Inconsistencies Noted

- Residential densities greater than 0.5 dwelling units per acre allowed in "B2" Zone southeast of airport.
- No avigation easement dedication requirements for "B2" and "C" Zones.
- Airport height limit zoning not established.

County of Imperial

Documents Reviewed

- El Centro Area Zoning Map, (March 1990).
- Imperial Area Zoning Map, (March 1989).

Inconsistencies Noted

- County A-1 zone allows residential density of up to 2 dwelling units in "A", "B" and "C" Zones west and northwest of airport.
- No intensity limitations on manufacturing zone (M-2) encompassed by "B2" Zone southeast of airport.
- No open land requirements for "A", "B", and "C" Zones.

SALTON SEA AIRPORT

Documents Reviewed

- Salton City Area Zoning Map, (March 15, 1989).

Inconsistencies Noted

- Up to 7 dwelling units per acre allowed in residential area encompassed by "B" and "C" Zones adjacent to airport.

NAVAL AIR FACILITY EL CENTRO

Documents Reviewed

- Seeley and Imperial West Area Zoning Maps

Inconsistencies Noted

- Labor camps permitted in "A" and "B" Zones (County Zone A-2).
- Residential densities of up to 2 dwelling units per acre allowed in County A-1 zoning district along Evan Hewes Highway encompassed by "B" Zone.
- "C" Zone encompasses community of Seeley where County R-1 zone allows densities of up to 7 dwelling units per acre.

Appendix A
State Airport Land Use Commission Law

STATE OF CALIFORNIA AERONAUTICS LAW
STATE AERONAUTICS ACT

Public Utilities Code
Chapter 4, Article 3.5

AIRPORT LAND USE COMMISSION

Creation; Membership; Selection

21670. (a) The Legislature hereby finds and declares that:

(1) It is in the public interest to provide for the orderly development of each public use airport in this state and the area surrounding these airports so as to promote the overall goals and objectives of the California airport noise standards adopted pursuant to Section 21669 and to prevent the creation of new noise and safety problems.

(2) It is the purpose of this article to protect public health, safety, and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around public airports to the extent that these areas are not already devoted to incompatible uses.

(b) In order to achieve the purposes of this article, every county in which there is located an airport which is served by a scheduled airline shall establish an airport land use commission. Every county, in which there is located an airport which is not served by a scheduled airline, but is operated for the benefit of the general public, shall establish an airport land use commission, except that the board of supervisors for the county may, after consultation with the appropriate airport operators and affected local entities and after a public hearing, adopt a resolution finding that there are no noise, public safety, or land use issues affecting any airport in the county which require the creation of a commission and declaring the county exempt from that requirement. The board shall, in this event, transmit a copy of the resolution to the Director of Transportation. For purposes of this section, "commission" means an airport land use commission. Each commission shall consist of seven members to be selected as follows:

(1) Two representing the cities in the county, appointed by a city selection committee comprised of the mayors of all the cities within that county, except that if

there are any cities contiguous or adjacent to the qualifying airport, at least one representative shall be appointed therefrom. If there are no cities within a county, the number of representatives provided for by subdivisions (b) and (c) shall each be increased by one.

(2) Two representing the county, appointed by the board of supervisors.

(3) Two having expertise in aviation, appointed by a selection committee comprised of the managers of all the public airports within that county.

(4) One representing the general public, appointed by the other six members of the commission.

(c) Public officers, whether elected or appointed, may be appointed and serve as members of the commission during their terms of public office.

(d) Each member shall promptly appoint a single proxy to represent the member in commission affairs and to vote on all matters when the member is not in attendance. The proxy shall be designated in a signed written instrument which shall be kept on file at the commission offices, and the proxy shall serve at the pleasure of the appointing member. A vacancy in the office of proxy shall be filled promptly by appointment of a new proxy.

(e) A person having an "expertise in aviation": means a person who, by way of education, training, business, experience, vocation, or avocation has acquired and possesses particular knowledge of, and familiarity with, the function, operation, and role of airports, or is an elected official of a local agency which owns or operates an airport.

Action by Designated Body Instead of Commission

21670.1 (a) Notwithstanding any provisions of this article, if the board of supervisors and the city selection committee of mayors in any county each makes a determination by a majority vote that proper land use planning can be accomplished through the actions of an appropriate designated body, then such body shall assume the planning responsibilities of an airport land use commission as provided for in this article, and a commission need not be formed in that county.

(b) A body designated pursuant to subdivision (a) which does not include among its membership at least two members having an expertise in aviation, as defined in subdivision (e) of Section 21670, shall, when acting in the capacity of an airport land use commission, be augmented so that the body, as augmented, will have at least two members having that expertise. The commission shall be constituted pursuant to this section on and after March 1, 1988.

(c)(1) Notwithstanding subdivisions (a) and (b), and subdivision (b) of Section 21670, if the Board of Supervisors of a County and each affected city in that county each makes a determination that proper land use planning pursuant to this article can be accomplished pursuant to this subdivision, then a commission need not be formed in that county.

(2) If the Board of Supervisors of a county and each affected city makes a determination that proper land use planning may be accomplished and a commission is not formed pursuant to paragraph (1) of this subdivision, that county and the appropriate affected cities having jurisdiction over an airport, subject to the review and approval by the Division of Aeronautics of the department, shall do all of the following:

(A) Adopt processes for the preparation, adoption, and amendment of the comprehensive airport land use plan for each airport that is served by a scheduled airline or operated for the benefit of the general public.

(B) Adopt processes for the notification of the general public, landowners, interested groups, and other public agencies regarding the preparation, adoption, and amendment of the comprehensive airport land use plans.

(C) Adopt processes for the mediation of disputes arising from the preparation, adoption, and amendment of the comprehensive airport land use plans.

(D) Adopt processes for the amendment of general and specific plans to be consistent with the comprehensive airport land use plans.

(E) Designate the agency that shall be responsible of the preparation, adoption, and amendment of each comprehensive airport land use plan.

(3) The Division of Aeronautics of the department shall review the processes adopted pursuant to paragraph (2), and shall approve the processes if the division determines that the processes are consistent with the procedure required by this article and will do all of the following:

(A) Result in the preparation, adoption, and implementation of plans within a reasonable amount of time.

(B) Rely on the height, use, noise, safety, and density criteria that are compatible with airport operations, as established by this article, and referred to as the Airport Land Use Planning Handbook, published by the division, and any applicable federal aviation regulations, including, but not limited to Part 77 (commencing with Section 77.1) of Title 14 of the Code of Federal Regulations.

(C) Provide adequate opportunities for notice to, review of, and comment by the general public, landowners, interested groups, and other public agencies.

(4) If the county does not comply with the requirements of paragraph (3) within 120 days, then the plan and amendments shall not be considered adopted pursuant to this article and a commission shall be established within 90 days of the determination of noncompliance by the division and a plan shall be adopted pursuant to this article within 90 days of the establishment of the commission.

(d) A commission need not be formed in a county that has contracted for the preparation of comprehensive airport land use plans with the Division of Aeronautics under the California Aids to Airport Program (Title 21 (commencing with Section 4050) of the California Code of Regulations), Project Ker-VAR 90-1, and that submits all of the following information to the Division of Aeronautics for review and

comment that the county and the cities affected by the airports within the county, as defined by the plans:

(1) Agree to adopt and implement the comprehensive airport plans that have been developed under contract.

(2) Incorporated ~~by~~ the height, use, noise, safety and density criteria that are compatible with airport operations as established by this article, and referred to as the Airport Land Use Planning Handbook, published by the division, and any applicable federal aviation regulations, including, but not limited to, Part 77 (commencing with Section 77.1) of Title 14 of the Code of Federal Regulations as part of the general and specific plans for the county and for each affected city.

(3) If the county does not comply with this subdivision on or before May 1, 1995, then a commission shall be established in accordance with this article.

(e) (1) A commission need not be formed in a county if all of the following conditions are met:

(A) The county has only one public use airport that is owned by a city.

(B)(i) The county and the affected city adopt the elements in paragraph (2) of subdivision (d), as part of their general and specific plans for the county and the affected city.

(ii) The general and specific plans shall be submitted, upon adoption, to the Division of Aeronautics. If the county and the affected city do not submit the elements specified in paragraph (2) of subdivision (d), on or before May 1, 1996, then a commission shall be established in accordance with this article.

Applicability to Counties Having Over 4 Million Population

21670.2. (a) Sections 21670 and 21670.1 do not apply to counties of more than 4 million population. In such counties, the county regional planning commission has the responsibility of coordinating the airport planning of public agencies within the county. In instances where impasses result relative to this planning, an appeal may be made to the county regional planning commission by any public agency involved. The action taken by the county regional planning commission on such an appeal may be overruled by a four-fifths vote of the governing body of a public agency whose planning led to the appeal.

(b) By January 1, 1992, the county regional planning commission shall adopt the comprehensive land use plans required pursuant to Section 21675.

Airports Owned by a City, District, or County; Appointment of Certain Members by Cities and Counties

21671. In any county where there is an airport operated for the general public which is owned by a city or district in another county or by another county, one of the representatives provided by paragraph (1) of subdivision (a) of Section 21670 shall be appointed by the city selection committee of mayors of the cities of the county in which the owner of that airport is located, and one of the representatives provided by paragraph (2) subdivision (a) of Section 21670 shall be appointed by the board of supervisors of the county in which the owner of that airport is located.

Term of Office; Removal of Members; Vacancies; Compensation; Staff Assistance; Meetings

21671.5 (a) Except for the terms of office of the members of the first commission, the term of office for each member shall be four years and until the appointment and qualification of his or her successor. The members of the first commission shall classify themselves by lot so that the term of office of one member is one year, of two members is two years, of two members is three years, and of two members if four years. The body which originally appointed a member whose term has expired shall appoint his or her successor for a full term of four years. Any member may be removed at any time and without cause by the body appointing him or her. The expiration date of the term of office of each member shall be the first Monday in May in the year in which his or her term is to expire. Any vacancy in the membership of the commission shall be filled for the unexpired term by appointment by the body which originally appointed the member whose office has become vacant. The chairperson of the commission shall be selected by the members thereof.

(b) Compensation, if any, shall be determined by the board of supervisors.

(c) Staff assistance, including the mailing of notices and the keeping of minutes, and necessary quarters, equipment, and supplies shall be provided by the county. The usual and necessary expenses of the commission shall be a county charge.

(d) Notwithstanding any other provisions of this article, the commission shall not employ any personnel either as employees or independent contractors without the prior approval of the board of supervisors.

(e) The commission shall meet at the call of the commission chairperson or at the request of the majority of the commission members. A majority of the commission members shall constitute a quorum for the transaction of business. No

action shall be taken by the commission except by the recorded vote of a majority of the full membership.

(f) The commission may establish a schedule of fees for reviewing and processing proposals and for providing copies of land use plans, as required by subdivision (d) of Section 21675. Those fees shall be charged to the proponents of actions, regulations, or permits, shall not exceed the estimated reasonable cost of providing the service, and shall be imposed pursuant to Chapter 13 (commencing with Section 54990) of Part 1 of Division 2 of Title 5 of the Government Code. After June 30, 1991, a commission which has not adopted the comprehensive land use plan required by Section 21675 shall not charge fees pursuant to this subdivision until the commission adopts the plan.

Rules and Regulations

21672. Each commission shall adopt rules and regulations with respect to the temporary disqualification of its members from participating in the review or adoption of a proposal because of conflict of interest and with respect to appointment of substitute members in such cases.

Initiation of Proceedings for Creation by Owner of Airport

21673. In any county not having a commission or a body designated to carry out the responsibilities of a commission, any owner of a public airport may initiate proceedings for the creation of a commission by presenting a request to the board of supervisors that a commission be created and showing the need therefor to the satisfaction of the board of supervisors.

Powers and Duties

21674. The commission has the following powers and duties, subject to the limitations upon its jurisdiction set forth in Section 21676:

(a) To assist local agencies in ensuring compatible land uses in the vicinity of all new airports and in the vicinity of existing airports to the extent that the land in the vicinity of those airports is not already devoted to incompatible uses.

(b) To coordinate planning at the state, regional, and local levels so as to provide for the orderly development of air transportation, while at the same time protecting the public health, safety, and welfare.

(c) To prepare and adopt an airport land use plan pursuant to Section 21675.

(d) To review the plans, regulations, and other actions of local agencies and airport operators pursuant to Section 21676.

(e) The powers of the commission shall in no way be construed to give the commission jurisdiction over the operation of any airport.

(f) In order to carry out its responsibilities, the commission may adopt rules and regulations consistent with this article.

Staff Training and Development

21674.5 (a) The Department of Transportation shall develop and implement a program or programs to assist in the training and development of the staff or airport land use commissions, after consulting with airport land use commissions, cities, counties, and other appropriate public entities.

(b) The training and development program or programs are intended to assist the staff of airport land use commissions in addressing high priority needs, and may include, but need not be limited to, the following:

(1) The establishment of a process for the development and adoption of comprehensive land use plans.

(2) The development of criteria for determining airport land use planning boundaries.

(3) The identification of essential elements which should be included in the comprehensive plans.

(4) Appropriate criteria and procedures for reviewing proposed developments and determining whether proposed developments are compatible with the airport use.

(5) Any other organizational, operational, procedural, or technical responsibilities and functions which the department determines to be appropriate to provide the commission staff and for which it determines there is a need for staff training and development.

(c) The department may provide training and development programs for airport land commission staff pursuant to this section by any means it deems appropriate. Those programs may be presented in any of the following ways:

(1) By offering formal courses or training programs.

(2) By sponsoring or assisting in the organization and sponsorship of conferences, seminars, or other similar events.

(3) By producing and making available written information.

(4) Any other feasible method of providing information and assisting in the training and development of airport land use commission staff.

Comprehensive airport land use plan; adoption or amendment; use of Airport Land Use Planning Handbook

21674.7.. An airport land use commission that formulates, adopts or amends a comprehensive airport land use plan shall be guided by information prepared and updated pursuant to Section 21674.5 and referred to as the Airport Land Use Planning

Handbook published by the Division of Aeronautics of the Department of Transportation.

Land Use Plan

21675. (a) Each commission shall formulate a comprehensive land use plan that 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 and shall be based on a long-range master plan or an airport layout plan, as determined by the Division of Aeronautics of the Department of Transportation, that reflects the anticipated growth of the airport during at least the next 20 years. In formulating a land use plan, the commission may develop height restrictions on buildings, specify use of land, and determine building standards, including soundproofing adjacent to airports, within the planning area. The comprehensive land use plan shall be reviewed as often as necessary in order to accomplish its purposes, but shall not be amended more than once in any calendar year.

(b) The commission may include, within its plan formulated pursuant to subdivision (a), the area within the jurisdiction of the commission surrounding any federal military airport for all the purpose specified in subdivision (a). This subdivision does not give the commission any jurisdiction or authority over the territory or operations of any military airport.

(c) The planning boundaries shall be established by the commission after hearing and consultation with the involved agencies.

(d) The commission shall submit to the Division of Aeronautics of the department one copy of the plan and each amendment to the plan.

(e) If a comprehensive land use plan does not include the matters required to be included pursuant to this article, the Division of Aeronautics of the department shall notify the commission responsible for the plan.

Date of Adoption; Review of Actions; Approval or Disapproval

21675.1 (a) By June 30, 1991, each commission shall adopt the comprehensive land use plan required pursuant to Section 21675.

(b) Until a commission adopts a comprehensive land use plan, a city or county shall first submit all actions, regulations, and permits within the vicinity of a public airport to the commission for review and approval. Before the commission approves or disapproves any actions, regulations, or permits, the commission shall give the public notice in the same manner as the city or county is required to give for those actions, regulations, or permits. As used in this section, "vicinity" means land which will be included or reasonably could be included within the plan. If the commission has not

designated a study area for the plan, then "vicinity" means land within two miles of the boundary of a public airport.

(c) The commission may approve an action, regulation, or permit if it finds, based on substantial evidence in the record, all of the following:

(1) The commission is making substantial progress toward the completion of the plan.

(2) There is a reasonable probability that the action, regulation, or permit will be consistent with the plan being prepared by the commission.

(3) There is little or no probability of substantial detriment to or interference with the future adopted plan if the action, regulation, or permit is ultimately inconsistent with the plan.

(d) If the commission disapproves an action, regulation, or permit, the commission shall notify the city or county. The city or county may overrule the commission, by a two-thirds vote of its governing body, if it makes specific findings that the proposed action, regulation, or permit is consistent with the purposes of this article, as stated in Section 21670.

(e) If a city or county overrules the commission pursuant to subdivision (d), that action shall not relieve the city or county from further compliance with this article after the commission adopts the plan.

(f) If a city or county overrules the commission pursuant to subdivision (d) with respect to a publicly owned airport that the city or county does not operate, the operator of the airport shall be immune from liability for damages to property or personal injury from the city's or county's decision to proceed with the action, regulation, or permit.

(g) A commission may adopt rules and regulations which exempt any ministerial permit for single-family dwellings from the requirements of subdivision (b) if it makes the findings required pursuant to subdivision (c) for the proposed rules and regulations, except that the rules and regulations may not exempt either of the following:

(1) More than two single-family dwellings by the same applicant within a subdivision prior to June 30, 1991.

(2) Single-family dwellings in a subdivision where 25 percent or more of the parcels are undeveloped.

Failure to Approve or Disapprove

21675.2 (a) If a commission fails to act to approve or disapprove any actions, regulations, or permits within 60 days of receiving the request pursuant to Section 21675.1, the applicant or his or her representative may file an action pursuant to Section 1094.5 of the Code of Civil Procedure to compel the commission to act, and the court shall give the proceedings preference over all other actions or proceedings, except previously filed pending matters of the same character.

(b) The action, regulation, or permit shall be deemed approved only if the public notice required by this subdivision has occurred. If the applicant has provided seven days advance notice to the commission of the intent to provide public notice pursuant to this subdivision, then, not earlier than the date of the expiration the time limit established by Section 21675.1, an applicant may provide the required public notice. If the applicant chooses to provide public notice, that notice shall include a description of the proposed action, regulation, or permit substantially similar to the descriptions which are commonly used in public notices by the commission, the name and address of the commission, and a statement that the action, regulation, or permit shall be deemed approved if the commission has not acted within 60 days. If the applicant has provided the public notice specified in this subdivision, the time limit for action by the commission shall be extended to 60 days after the public notice is provided. If the applicant provides notice pursuant to this section, the commission shall refund to the applicant any fees which were collected for providing notice and which were not used for that purpose.

(c) Failure of an applicant to submit complete or adequate information pursuant to Sections 65943 to 65946, inclusive, of the Government Code, may constitute grounds for disapproval of actions, regulations, or permits.

(d) Nothing in this section diminishes the commission's legal responsibility to provide, where applicable, public notice and hearing before acting on an action, regulation, or permit.

Review of Local General Plans

21676. (a) Each local agency whose general plan includes areas covered by an airport land use commission plan shall, by July 1, 1983, submit a copy of its plan or specific plans to the airport land use commission. The commission shall determine by August 31, 1983, whether the plan or plans are consistent or inconsistent with the commission's plan. If the plan or plans are inconsistent with the commission's plan, the local agency shall be notified and that local agency shall have another hearing to reconsider its plans. The local agency may overrule the commission after such a hearing by a two-thirds vote of its governing body if it makes specific findings that the proposed action is consistent with the purposes of this article stated in Section 21670.

(b) Prior to the amendment of a general plan or specific plan, or the addition or approval of a zoning ordinance or building regulation within the planning boundary established by the airport land use commission pursuant to Section 21675, the local agency shall first refer the proposed action to the commission. If the commission determines that the proposed action is inconsistent with the commission's plan, the referring agency shall be notified. The local agency may, after a public hearing, overrule the commission by a two-thirds vote of its governing body if it makes specific findings that the proposed action is consistent with the purposes of this article stated in Section 21670.

(c) Each public agency owning any airport within the boundaries of an airport land use commission plan shall, prior to modification of its airport master plan, refer such proposed change to the airport land use commission. If the commission determines that the proposed action is inconsistent with the commission's plan, the referring agency shall be notified. The public agency may, after a public hearing, overrule the commission by a two-thirds vote of its governing body if it makes specific findings that the proposed action is consistent with the purposes of this article stated in Section 21670.

(d) Each commission determination pursuant to subdivision (b) or (c) shall be made within 60 days from the date of referral of the proposed action. If a commission fails to make the determination within that period, the proposed action shall be deemed consistent with the commission's plan.

Review of Local Plans

21676.5. (a) If the commission finds that a local agency has not revised its general plan or specific plan or overruled the commission by a two-thirds vote of its governing body after making specific findings that the proposed action is consistent with the purposes of this article as stated in Section 21670, the commission may require the local agency submit all subsequent actions, regulations, and permits to the commission for review until its general plan or specific plan is revised or the specific findings are made. If, in the determination of the commission, an action, regulation, or permit of the local agency is inconsistent with the commission plan, the local agency shall be notified and that local agency shall hold a hearing to reconsider its plan. The local agency may overrule the commission after hearing by a two-thirds vote of its governing body if it makes specific findings that the proposed action is consistent with the purposes of this article as stated in Section 21670.

(b) Whenever the local agency has revised its general plan or specific plan or has overruled the commission pursuant to subdivision (a), the proposed action of the local agency shall not be subject to further commission review, unless the commission and the local agency agree that the individual projects shall be reviewed by the commission.

Marin County Override Provisions

21677. Notwithstanding Section 21676, any public agency in the County of Marin may overrule the Marin County Airport Land Use Commission by a majority vote of its governing body.

Airport Owner's Immunity

21678. With respect to a publicly owned airport that a public agency does not operate, if the public agency pursuant to Section 21676 or 21676.5 overrides a commission's action or recommendation, the operator of the airport shall be immune from liability for damages to property or personal injury caused by or resulting directly or indirectly from the public agency's decision to override the commission's action or recommendation.

Court Review

21679. (a) In any county in which there is no airport land use commission or other body designated to assume the responsibilities of an airport land use commission, or in which the commission or other designated body has not adopted an airport land use plan, an interested party may initiate proceedings in a court of competent jurisdiction to postpone the effective date of a zoning change, a zoning variance, the issuance of a permit, or the adoption of a regulation by a local agency, which directly affects the use of land one mile of the boundary of a public airport within the county.

(b) The court may issue an injunction which postpones the effective date of the zoning change, zoning variance, permit, or regulation until the governing body of the local agency which took the action does one of the following:

(1) In the case of an action which is a legislative act, adopts a resolution declaring that the proposed action is consistent with the purposes of this article stated in Section 21670.

(2) In the case of an action which is not a legislative act, adopts a resolution declaring that the proposed action is consistent with the purposes of this article stated in Section 21670.

(3) Rescinds the action.

(4) Amends its action to make it consistent with the purposes of this article stated in Section 21670, and complies with either paragraph (1) or (2) of this subdivision, whichever is applicable.

(c) The court shall not issue an injunction pursuant to subdivision (b) if the local agency which took the action demonstrates that the general plan and any applicable specific plan of the agency accomplishes the purposes of an airport land use plan as provided in Section 21675.

(d) An action brought pursuant to subdivision (a) shall be commenced within 30 days of the decision or within the appropriate time periods set by Section 21167 of the Public Resources Code, whichever is longer.

(e) If the governing body of the local agency adopts a resolution pursuant to subdivision (b) with respect to a publicly owned airport that the local agency does not operate, the operator of the airport shall be immune from liability for damages to property or personal injury from the local agency's decision to proceed with the zoning change, zoning variance, permit, or regulation.

(f) As used in this section, "interested party" means any owner of land within two miles of the boundary of the airport or any organization with a demonstrated interest in airport safety and efficiency.

Action to Postpone Effective Date of Zoning Change, Etc.

21679.5 (a) Until June 30, 1991, no action pursuant to Section 21679 to postpone the effective date of a zoning change, a zoning variance, the issuance of a permit, or the adoption of a regulation by a local agency, directly affecting the use of land within one mile of the boundary or a public airport, shall be commenced in any county in which the commission or other designated body has not adopted an airport land use plan, but is making substantial progress toward the completion of the plan.

(b) If a commission has been prevented from adopting the comprehensive land use plan by June 30, 1991, or if the adopted plan could not become effective, because of a lawsuit involving the adoption of the plan, the June 30, 1991 date in subdivision (a) shall be extended by the period of time during which the lawsuit was pending in a court of competent jurisdiction.

(c) Any action pursuant to Section 21679 commenced prior to January 1, 1990, in a county in which the commission or other designated body has not adopted an airport land use plan, but is making substantial progress toward the completion of the plan, which has not proceeded to final judgment, shall be held in abeyance until June 30, 1991. If the commission or other designated body does not adopt an airport land use plan on or before June 30, 1991, the plaintiff or plaintiffs may proceed with the action.

(d) An action to postpone the effective date of a zoning change, a zoning variance, the issuance of a permit, or the adoption of a regulation by a local agency, directly affecting the use of land within one mile of the boundary of a public airport for which an airport land use plan has not been adopted by June 30, 1991, shall be commenced within 30 days of June 30, 1991, or within 30 days of the decision by the

local agency, or within the appropriate time periods set by Section 21167 of the Public Resources Code, whichever date is later.

Federal Aviation Regulations
Part 77

Subpart A - General

§77.1 Scope.

This Part-
(a) Establishes standards for determining obstructions in navigable airspace;
(b) Sets forth the requirements for notice to the administrator of certain proposed construction or alteration;
(c) Provides for aeronautical studies of obstructions to air navigation, to determine their effect on the safe and efficient use of airspace;
(d) Provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and
(e) Provides for establishing antenna farm areas.

§77.2 Definition of terms.

For the purpose of this Part:
"Airport available for public use" means an airport that is open to the general public with or without a prior request to use the airport.
"A seaplane base" is considered to be an airport only if its sea lanes are outlined by visual markers.
"Non-precision instrument runway" means a runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance, or area type navigation equipment, for which a straight-in non-precision instrument approach procedure has been approved, or planned, and for which no precision approach facilities are planned, or indicated on an FAA planning document or military service military airport planning document.
"Precision instrument runway" means a runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS), or a Precision Approach Radar (PAR). It also means a runway for which a precision approach system is planned and is so indicated by an FAA approved airport layout plan; a military service approved military airport layout plan; any other FAA planning document, or military service military airport planning document.
"Utility runway" means a runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight and less.
"Visual runway" means a runway intended solely for the operation of aircraft using visual approach procedures, with no straight-in instrument approach procedure and no instrument designation indicated on an FAA approved airport layout plan, a military service approved military airport layout plan, or by any planning document submitted to the FAA by competent authority.

§77.3 Standards.

(a) The standards established in this Part for determining obstructions to air navigation are used by the Administrator in-

(1) Administering the Federal-aid Airport Program and the Surplus Airport Program;

(2) Transferring property of the United States under Section 16 of the Federal Airport Act;

(3) Developing technical standards and guidance in the design and construction of airports; and

(4) Imposing requirements for public notice of the construction or alteration of any structure where notice will promote air safety.

(b) The standards used by the Administrator in the establishment of flight procedures and aircraft operational limitations are not set forth in this Part but are contained in other publications of the Administrator.

§77.5 Kinds of objects affected.

This Part applies to-

(a) Any object of natural growth, terrain, or permanent or temporary construction or alteration, including equipment or materials used therein, and apparatus of a permanent or temporary character; and

(b) Alteration of any permanent or temporary existing structure by a change in its height (including appurtenances), or lateral dimensions, including equipment or materials used therein.

Subpart B - Notice of Construction or Alteration

§77.11 Scope.

(a) This subpart requires each person proposing any kind of construction or alteration described in §77.13(a) of this chapter to give adequate notice to the Administrator. It specifies the locations and dimensions of the construction or alteration for which notice is required and prescribes the form and manner of the notice. It also requires supplemental notices 48 hours before the start and upon the completion of certain construction or alteration that was the subject of a notice under §77.13(a).

(b) Notices received under this subpart provide a basis for -

(1) Evaluating the effect of the construction or alteration on operational procedures and proposed operational procedures;

(2) Determinations of the possible hazardous effect of the proposed construction or alteration on air navigation;

(3) Recommendations for identifying the construction or alteration in accordance with the current Federal Aviation Administration Advisory Circular AC 70/7460-1 entitled "Obstruction Marking and Lighting," which is available without charge from the Department of Transportation. Distribution Unit, TAD 484.3, Washington, D.C. 20590;

(4) Determining other appropriate measures to be applied for continued safety of air navigation; and
(5) Charting and other notification to airmen of the construction or alteration.

§77.13 Construction or alteration requiring notice.

(a) Except as provided in §77.15, each sponsor who proposes any of the following construction or alteration shall notify the Administrator in the form and manner prescribed in §77.17:
(1) Any construction or alteration of more than 200 feet in height above the ground level at its site.
(2) Any construction or alteration of greater height than an imaginary surface extending outward and upward at one of the following slopes:
(i) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport specified in subparagraph (5) of this paragraph with at least one runway more than 3,200 feet in actual length, excluding heliports.
(ii) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport specified in subparagraph (5) of this paragraph with its longest runway no more than 3,200 feet in actual length, excluding heliports.
(iii) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport specified in subparagraph (5) of this paragraph.
(3) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (1) or (2) of this section.
(4) When requested by the FAA, any construction or alteration that would be in an instrument approach area (defined in the FAA standards governing instrument approach procedures) and available information indicates it might exceed a standard of Subpart C of this part.
(5) Any construction or alteration on any of the following airports (including heliports):
(i) An airport that is available for public use and is listed in the Airport Directory of the current Airman's Information Manual or in either the Alaska or Pacific Airman's Guide and Chart Supplement.
(ii) An airport under construction, that is the subject of a notice or proposal on file with the Federal Aviation Administration, and, except for

military airports, it is clearly indicated that the airport will be available for public use.

(iii) An airport that is operated by an armed force of the United States.

(b) Each sponsor who proposes construction or alteration that is the subject of a notice under paragraph (a) of this section and is advised by an FAA regional office that a supplemental notice is required shall submit that notice on a prescribed form to be received by the FAA regional office at least 48 hours before the start of the construction or alteration.

(c) Each sponsor who undertakes construction or alteration that is the subject of a notice under paragraph (a) of this section shall, within 5 days after that construction or alteration reaches its greatest height, submit a supplemental notice on a prescribed form to the FAA regional office having jurisdiction over the region involved, if-

(1) The construction or alteration is more than 200 feet above the surface level of its site; or

(2) The FAA regional office advises him that submission of the form is required.

§77.15 Construction or alteration not requiring notice.

No person is required to notify the Administrator for any of the following construction or alteration:

(a) Any object that would be shielded by existing structures of a permanent and substantial character or by natural terrain or topographic features of equal or greater height, and would be located in the congested area of a city, town, or settlement where it is evident beyond all reasonable doubt that the structure so shielded will not adversely affect safety in air navigation.

(b) Any antenna structure of 20 feet or less in height except one that would increase the height of another antenna structure.

(c) Any air navigation facility, airport visual approach or landing aid, aircraft arresting device, or meteorological device, of a type approved by the Administrator, or an appropriate military service on military airports, the location and height of which is fixed by its functional purpose.

(d) Any construction or alteration for which notice is required by any other FAA regulation.

§77.17 Form and time of notice.

(a) Each person who is required to notify the Administrator under §77.13(a) shall send one executed form set (four copies) of FAA Form 7460-1, Notice of Proposed Construction or Alteration, to the [Manager], Air Traffic Division, FAA Regional Office having jurisdiction over the area within which the construction or alteration will be located. Copies of FAA Form 7460-1 may be obtained from the headquarters of the Federal Aviation Administration and the regional offices.

(b) The notice required under §77.13(a)(1) through (4) must be submitted at least 30 days before the earlier of the following dates-

(1) The date the proposed construction or alteration is to begin.

(2) The date an application for a construction permit is to be filed.

However, a notice relating to proposed construction or alteration that is subject to the licensing requirements of the Federal Communications Act may be sent to the FAA at the same time the application for construction is filed with the Federal Communications Commission, or at any time before that filing.

(c) A proposed structure or an alteration to an existing structure that exceeds 2,000 feet in height above the ground will be presumed to be a hazard to air navigation and to result in an inefficient utilization or airspace and the applicant has the burden of overcoming that presumption. Each notice submitted under the pertinent provisions of this Part 77 proposing a structure in excess of 2,000 feet above ground, or an alteration that will make an existing structure exceed that height must contain a detailed showing, directed to meeting this burden. Only in exceptional cases, where the FAA concludes that a clear and compelling showing has been made that it would not result in an inefficient utilization of the airspace and would not result in a hazard to air navigation, will a determination of no hazard be issued.

(d) In the case of an emergency involving essential public services, public health, or public safety that requires immediate construction or alteration, the 30-day requirement in paragraph (b) of this section does not apply and the notice may be sent by telephone, telegraph, or other expeditious means, with an executed FAA Form 7460-1 submitted within five days thereafter. Outside normal business hours, emergency notices by telephone or telegraph may be submitted to the nearest FAA Flight Service Station.

(e) Each person who is required to notify the Administrator by paragraph (b) or (c) of §77.13, or both, shall send an executed copy of FAA Form 117-1, Notice of Progress of Construction or Alteration, to the [Manager], Air Traffic Division, FAA Regional Office having jurisdiction over the area involved.

§77.19 Acknowledgment of notice.

(a) The FAA acknowledges in writing the receipt of each notice submitted under §77.13 (a).

(b) If the construction or alteration proposed in a notice is one for which lighting or marking standards are prescribed in the FAA Advisory Circular AC 70/7460-1 entitled "Obstruction Marking and Lighting", the acknowledgment contains a statement to that effect and information on how the structure should be marked and lighted in accordance with the manual.

(c) The acknowledgment states that an aeronautical study of the proposed construction or alteration has resulted in a determination that the construction or alteration-

(1) Would not exceed any standard of Subpart C and would not be a hazard to air navigation;

(2) Would exceed a standard of Subpart C but would not be a hazard to air navigation; or

(3) Would exceed a standard of Subpart C and further aeronautical study is necessary to determine whether it would be hazard to air navigation, that the sponsor may request within 30 days that further study, and that,

pending completion of any further study, it is presumed the construction or alteration would be a hazard to air navigation.

Subpart C - Obstruction Standards

§77.21 Scope

(a) This subpart establishes standards for determining obstructions to air navigation. It applies to existing and proposed manmade objects, objects of natural growth, and terrain. The standards apply to the use of navigable airspace by aircraft and to existing air navigation facilities, such as an air navigation aid, airport, Federal airway, instrument approach or departure procedure, or approved off-airway route. Additionally, they apply to a planned facility of use, if a proposal therefor is on file with the Federal Aviation Administration or an appropriate military service on the date the notice required by §77.13(a) is filed.

(b) At those airports having defined runways with specially prepared hard surfaces, the primary surface for each such runway extends 200 feet beyond each end of the runway. At those airports having defined strips or pathways that are used regularly for the taking off and landing of aircraft and have been designated by appropriate authority as runways, but do not have specially prepared hard surfaces, each end of the primary surface for each such runway shall coincide with the corresponding end of the runway. At those airports, excluding seaplane bases, having a defined landing and takeoff area with no defined pathways for the landing and taking off of aircraft, a determination shall be made as to which portions of the landing and takeoff pathways. Those pathways so determined shall be considered runways and an appropriate primary surface as defined in §77.25(c) will be considered as being longitudinally centered on each runway so determined, and each end of that primary surface shall coincide with the corresponding end of that runway.

(c) The standards in this subpart apply to the effect of construction or alteration proposals upon an airport if, at the time of filing of the notice is required by §77.13(a), that airport is-

(1) Available for public use and is listed in the Airport Directory of the current Airman's Information Manual or in either the Alaska or Pacific Airman's Guide and Chart Supplement; or,

(2) A planned or proposed airport or an airport under construction, that is the subject of a notice or proposal on file with the Federal Aviation Administration, and, except for military airports, it is clearly indicated that that airport will be available for public use; or,

(3) An airport that is operated by an armed force of the United States.

(d) [Deleted]

§77.23 Standards for determining obstructions.

(a) An existing object, including a mobile object, is, and a future object would be, an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:

(1) A height of 500 feet above ground level at the site of the object.

(2) A height that is 200 feet above ground level or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length, and that height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 500 feet.

(3) A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.

(4) A height within an en route obstacle clearance area, including turn and termination areas, of a Federal airway or approved off-airway route, that would increase the minimum obstacle clearance altitude.

(5) The surface of a takeoff and landing area of an airport or any imaginary surface established under §§77.25, 77.28, or 77.29. However, no part of the takeoff or landing area itself will be considered an obstruction.

(b) Except for traverse ways on or near an airport with an operative ground traffic control service, furnished by an air traffic control tower or by the airport management and coordinated with the air traffic control service, the standards of paragraph (a) of this section apply to traverse ways used or to be used for the passage of mobile objects only after the heights of these traverse ways are increased by:

(1) Seventeen feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance.

(2) Fifteen feet for any other public roadway.

(3) Ten feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.

(4) Twenty-three feet for a railroad.

(5) For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it.

§77.25 Civil airport imaginary surfaces.

The following civil airport imaginary surfaces are established with relation to the airport and to each runway. The size of each such imaginary surface is based on the category of each runway according to the type of approach available or planned for that runway. The slope and dimensions of the approach surface applied to each end of a runway are determined by the most precise approach existing or planned for that runway end.

(a) Horizontal surface - a horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway of each

airport and connecting the adjacent arcs by lines tangent to those arcs. The radius of each arc is:

(1) 5,000 feet for all runways designated as utility or visual;

(2) 10,000 feet for all other runways.

The radius of the arc specified for each end of a runway will have the same arithmetical value. That value will be the highest determined for either end of the runway. When a 5,000 foot arc is encompassed by tangents connecting two adjacent 10,000 foot arcs, the 5,000 foot arc shall be disregarded on the construction the perimeter of the horizontal surface.

(b) Conical surface - a surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

(c) Primary surface - a surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway: but when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of a primary surface is:

(1) 250 feet for utility runways having only visual approaches.

(2) 500 feet for utility runways having non-precision instrument approaches.

(3) For other than utility runways the width is:

(i) 500 feet for visual runways having only visual approaches.

(ii) 500 feet for non-precision instrument runways having visibility minimums greater than three-fourths statute mile.

(iii) 1,000 feet for a non-precision instrument runway having a non-precision instrument approach with visibility minimums as low as three fourths of a statute mile, and for precision instrument runways.

The width of the primary surface of a runway will be that width prescribed in this section for the most precise approach existing or planned for either end of that runway.

(d) Approach surface- a surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end.

(1) The inner edge of the approach surface is the same width as the primary surface and it expands uniformly to a width of:

(i) 1,250 feet for that end of a utility runway with only visual approaches;

(ii) 1,500 feet for that end of a runway other than a utility runaway with only visual approaches;

(iii) 2,000 feet for that end of a utility runway with a non-precision instrument approach;

(iv) 3,500 feet for that end of a non-precision instrument runway other than utility, having visibility minimums greater than three-fourths of a statute mile;

(v) 4,000 feet for that end of a non-precision instrument runway, other than utility, have a non-precision instrument approach with visibility minimums as low as three-fourths statute mile; and

(vi) 16,000 feet for precision instrument runways.

(2)The approach surface extends for a horizontal distance of:

(I) 5,000 feet at a slope of 20 to 1 for all utility and visual runways;

(ii) 10,000 feet at a slope of 34 to 1 for all non-precision instrument runways other than utility; and,

(iii)10,000 feet at a slope of 50 to 1 with an additional 40,000 feet at a slope of 40 to 1 for all precision instrument runways.

(3) The outer width of an approach surface to an end of a runway will be that width prescribed in this subsection for the most precise approach existing or a planned for that runway end.

(e) *Transitional surface-* These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces for those portions of the precision approach surface which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

§77.27 [Revoked]

§77.28 Military airport imaginary surfaces.

(a) *Related to airport reference points.* These surfaces apply to all military airports. For the purposes of this section a military airport is any airport operated by an armed force of the United States.

(1) *Inner horizontal surface-* A plane is oval in shape at a height of 150 feet above the established airfield elevation. The plane is constructed by scribing an arc with a radius of 7,500 feet about the centerline at the end of each runway and interconnecting these arcs with tangents.

(2) *Conical surface-* A surface extending from the periphery of the inner horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation.

(3) *Outer horizontal surface-* A plane, located 500 feet above the established airfield elevation, extending outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.

(b) *Related to runways.* These surfaces apply to all military airports.

(1) Primary surface- A surface located on the ground or water longitudinally centered on each runway with the same length as the runway. The width of the primary surface for runways is 2,000 feet. However, at established bases where substantial construction has taken

place in accordance with a previous lateral clearance criteria, the 2,000 foot width may be reduced to the former criteria.

(2) *Clear zone surface-* A surface located on the ground or water at each end of the primary surface, with a length of 1,000 feet and the same width as the primary surface.

(3) *Approach clearance surface-* An inclined plane, symmetrical about the runway centerline extended, beginning 200 feet beyond each end of the primary surface at the centerline elevation of the runway end and extending for 50,000 feet. The slope of the approach clearance surface is 50 to 1 along the runway centerline extended until it reaches an elevation of 500 feet above the established airport elevation. It then continues horizontally at this elevation to a point 50,000 feet from the point of beginning. The width of this surface as the runway end is the same as the primary surface, it flares uniformly, and the width at 50,000 is 16,000 feet.

(4) Transitional surfaces- These surfaces connect the primary surfaces, the first 200 feet of the clear zone surfaces, and the approach clearance surfaces to the inner horizontal surface, conical surface, outer horizontal surface or other transitional surfaces. The slope of the transitional surface is 7 to 1 outward and upward at right angles to the runway centerline.

§77.29 Airport imaginary surfaces for heliports.

(a) *Heliport primary surface.* The area of the primary surface coincides in size and shape with the designated takeoff and landing area of a heliport. This surface is a horizontal plane at the elevation of the established heliport elevation.

(b) *Heliport approach surface.* The approach surface begins at each end of the heliport primary surface with the same width as the primary surface, and extends outward and upward for a horizontal distance of 4,000 feet where its width is 500 feet. The slope of the approach surface is 8 to 1 for civil heliports and 10 to 1 for military heliports.

(c) *Heliport transitional surfaces.* These surfaces extend outward and upward from the lateral boundaries of the heliport primary surface and from the approach surfaces at a slope of 2 to 1 for a distance of 250 feet measured horizontally from the centerline of the primary and approach surfaces.

(December 1993, Airport Land Use Planning Hand Book).

Airport Design Standards
FAA Advisory Circular No. 150/5300-13

Table 2-4. Approach surface dimensions

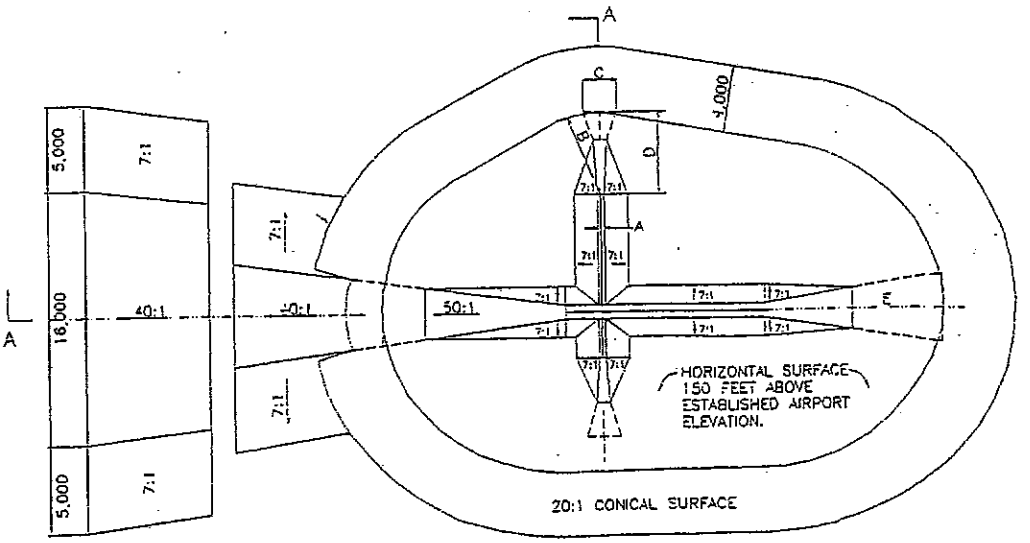
Facilities Expected To Serve	Runway End: Approach End	Runway End: Opposite End	Approach Surface Dimensions: Length feet (meters)	Inner Width feet (meters)	Outer Width feet (meters)	Slope run/rise
	V	V	5,000	250	1,250	20:1
Only		NP	5,000 (1,500)	500 (150)	1,250 (375)	20:1
Small		NP 3/4	5,000 (1,500)	1,000 (300)	(1,250) (375)	20:1
	NP	V NP	5,000 (1,500)	500 (150)	2,000 (600)	20:1
Airplanes		NP 3/4 P	5,000 (1,500)	1,000 300	2,000 (600)	20:1
	V	V NP	5,000 (1,500)	500 (150)	1,500 450	20:1
Large		NP 3/4 P	5,000 (1,500)	1,000 (300)	1,500 (450)	20:1
Airplanes	NP	V NP	10,000 (3,000)	500 (150)	3,500 (1,050)	34:1
		NP 3/4 P	10,000 (3,000)	1,000 (300)	3,500 (1,050)	34:1
Large or Only	NP 3/4	V NP NP 3/4 P	10,000 (3,000)	1,000 (300	4,000 (1,200)	34:1
Small Airplanes	P	V NP NP 3/4 P	10,000 (3,000) PLUS 40,000 (12,000)	1,000 (300) 4,000 (1,200)	4,000 (1,200) 16,000 (4,800)	50:1 40:1

V- Visual approach
NP- Non-precision instrument approach with visibility minimums more than 3/4 statute mile
NP 3/4- Non-precision instrument approach with visibility minimums as low as 3/4 statute mile
P - Precision instrument approach

Table 2-5. Runway protection zone (RPZ) dimensions

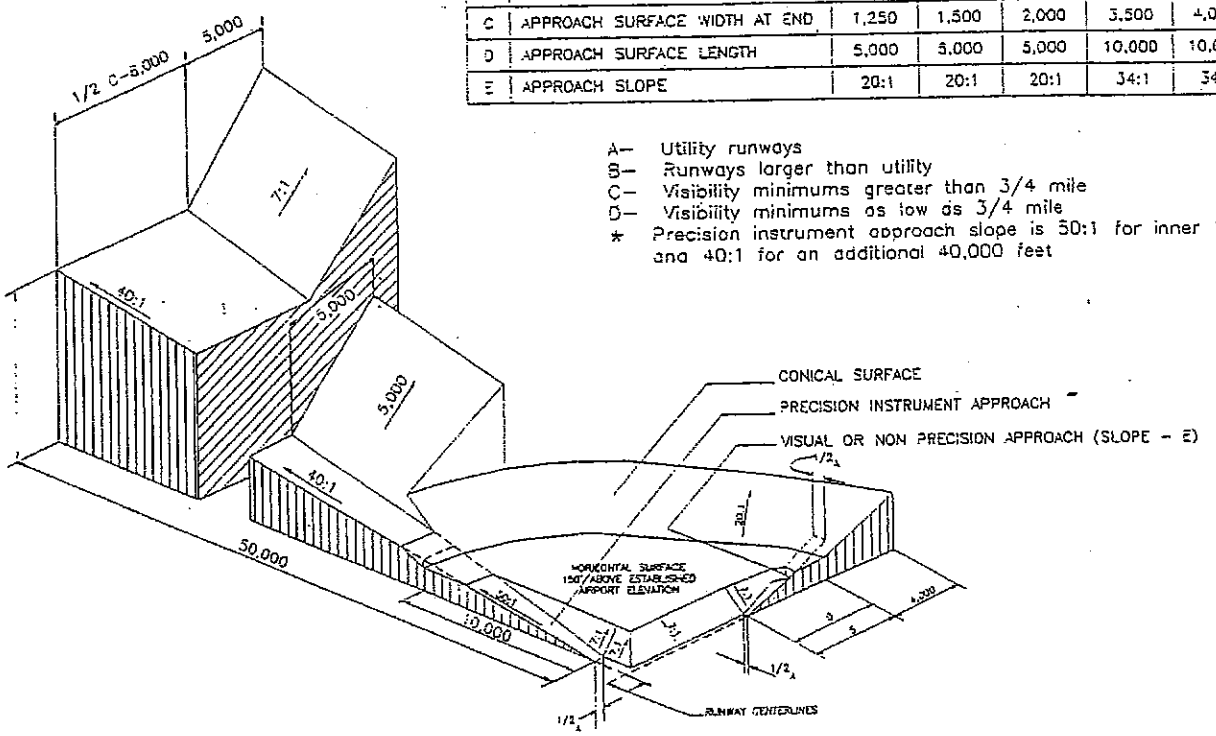
Facilities Expected To Serve	Runway End: Approach End	Runway End: Opposite End	Runway End: Length L feet (meters	Dimensions for Approach End: Inner Width W1 feet (meters)	Dimensions for Approach End: Outer Width W2 feet (meters)	Dimensions for Approach End: RPZ acres
Only Small Airplanes	V	V	1,000 (300)	250 (75)	450 (135)	8.035
		NP	1,000 (300)	500 (150)	650 (195)	13,200
		NP 3/4 P	1,000 (300)	1,000 (300)	1,050 (315)	23.542
	NP	V NP	1,000 (300)	500 (150)	800 (240)	14,922
		NP 3/4 P	1,000 (300)	1,000 (300)	1,200 (360)	25.252
Large Airplanes	V	V NP	1,000 (300)	500 (150)	700 (210)	13,770
		NP 3/4	1,000 (300)	1,000 (300)	1,100 (330)	24.105
	NP	V NP	1,700 (510)	500 (150)	1,010 (303)	29.465
		NP 3/4 P	1,700 (510)	1,000 (300)	1,425 (427.5)	47,320
Large or Only Small Airplanes	NP 3/4	V NP NP 3/4 P	1,700 (510)	1,000 (300)	1,510 (453)	48.978
	P	V NP NP 3/4 P	2,500 (750)	1,000 (300)	1,750 (525)	78,914

V- Visual Approach
NP- Non-precision instrument approach with visibility minimums more than 3/4 statute mile.
NP 3/4- Non-precision instrument approach with visibility minimums as low as 3/4 statute mile.
P- Precision instrument approach



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT RUNWAY
					B		
		A	B	A	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	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

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
* 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

§ 77.25 CIVIL AIRPORT IMAGINARY SURFACES

Appendix B

FAA Runway Approach Protection Standards

Objects Affecting Navigable Airspace

FIGURE B-1

airport land use compatibility plan

Notice of Proposed Construction or Alteration

FAA Form 7460

US Department of Transportation
Federal Aviation Administration

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

Aeronautical Study Number

1. Nature of Proposal

A Type
☐ New Construction
☐ Alteration

B Class
☐ Permanent
☐ Temporary (Duration_____months)

C Work Schedule Dates
Beginning _____
End _____

2. Complete Description of Structure

A Include effective radiated power and assigned frequency of all existing proposed or modified AM FM or TV broadcast stations utilizing this structure.

B Include size and configuration of power transmission ??? and their supporting towers in the vicinity of FAA facilities and public airports.

C Include information showing site orientation dimensions and construction materials of the proposed structure.

(If more space is required continue on a separate sheet)

3A. Name and address of individual, company, corporation, etc. proposing the construction or alteration. *(Number Street City State and Zip Code)*

( )_____
area code Telephone Number

B Name address and telephone number of proponent's representative if different than 3 above

4. Location of Structure

A Coordinates To nearest second
Latitude
Longitude

B Nearest City or Town and State
(1) Distance to 48 Miles
(2) Direction to 48

C Name of nearest airport heliport flightport or seaplane base
(1) Distance from structure to nearest point of nearest runway
(2) Direction from structure to airport

5. Height and Elevation (Complete to the nearest foot))

A Elevation of site above mean sea level
B Height of Structure including all appurtenances and lighting (if any) above ground or water if so situated
C Overall height above mean sea level (A B)

C Description of location of site with respect to highways streets airports prominent terrain features existing structures etc. Attach a U.S. Geological Survey quadrangle map or equivalent showing the relationship of construction site to nearest airport(s) *(If more space is required continue on a separate sheet of paper and attach to this notice)*

Notice is required by Part 77 of the Federal Aviation Regulations 14 C F R Part 77 pursuant to Section 1101 of the Federal Aviation Act of 1958 as amended 749 U S C 1107 Persons who knowingly and willfully violate the Notice requirements of Part 77 are subject to a fine (criminal penalty) of not more than $500 for the first offence and not more than $2,000 for subsequent offenses pursuant to Section 902(a) of the Federal Aviation Act of 1958 as amended 149 U S C 1472(a))

I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge. In addition, I agree to obstruction mark and/or light the structure in accordance with established marking & lighting standards if necessary.

Date	Typed Name/Title of Person Filing Notice	Signature

FOR FAA USE ONLY — FAA will either return this form or issue a separate acknowledgement.

The Proposal:

☐ Does not require a notice to FAA.

☐ Is not identified as an obstruction under any standard of FAR, Part 77, Subpart C, and would not be a hazard to air navigation.

☐ Is identified as an obstruction under the standards of FAR, Part 77, Subpart C, but would not be a hazard to air navigation.

☐ Should be obstruction ☐ marked. ☐ lighted per FAA Advisory Circular 70/7460-1, Chapter (s) _____

☐ Obstruction marking and lighting are not necessary.

Remarks:

Supplemental Notice of Construction FAA Form 7460-2 is required any time the project is abandoned, or

☐ At least 48 hours before the start of construction.

☐ Within five days after the construction reaches its greatest height.

This determination expires on _____unless:

(a) the construction is subject to the licensing authority of the Federal Communications Commission and an application for a construction permit is made to the FCC on or before the above expiration date. In such case the determination expires on the date prescribed by the FCC for completion of construction, or on the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be postmarked or delivered to the issuing office at least 15 days prior to the expiration date.

If the structure is subject to the licensing authority of the FCC, a copy of this determination will be sent to that Agency.

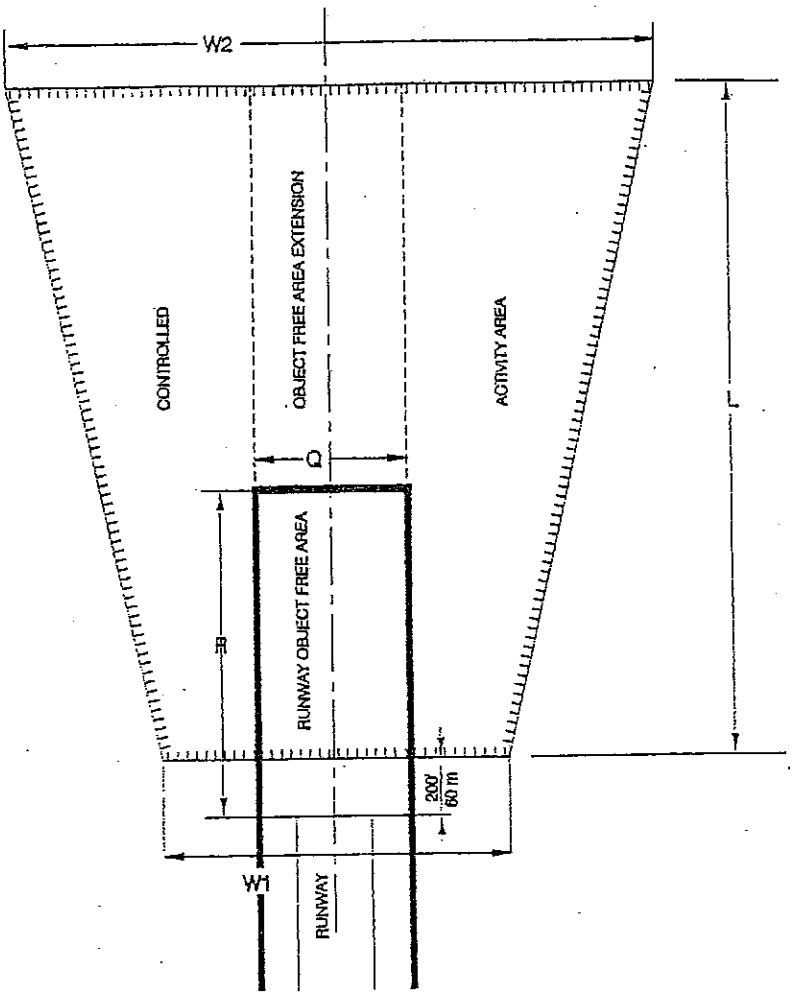
Issued In	Signature	Date

FAA Form

FAA Runway Approach Protection Standards

Notice of Proposed Construction or Alteration

Appendix B
FIGURE B-2
airport land use compatibility plan



NOTE: See Table 2-5 for dimensions W1, W2, L
See Tables 3-1 through 3-3 for dimensions R, Q

Appendix C
Methods for Determining Concentrations of People

One criterion used in the *Airport Land Use Compatibility Plan* is the maximum number of people per acre that can be present in a given area at any one time. If a proposed use exceeds the maximum density, it will be considered inconsistent with ALUC policies. This appendix provides some guidance on how to make the people-per-acre determination.

The most difficult part of making a people-per-acre determination is estimating the number of people likely to use a particular facility. There are several methods that can be utilized, depending upon the nature of the proposed use:

- **Parking Ordinance** - The number of people present in a given area can be calculated based upon the number of parking spaces provided. Some assumption regarding the number of people per vehicle needs to be developed to calculate the number of people on-site. The number of people per acre can then be calculated by dividing the number of people on-site by the size of the parcel in acres. This approach is appropriate where the use is expected to be dependent upon access by vehicles.

- **Maximum Occupancy** - The Uniform Building Code can be used as a standard for determining the maximum occupancy of certain uses. The chart provided as Exhibit C-1 is taken from the 1976 edition of the UBC (Table 33-A) and indicates the required number of square feet per occupant with changes from 1991 UBC shown. The number of people on the site can be calculated by dividing the total floor area of a proposed use by the minimum square feet per occupant requirement listed in the table. The maximum occupancy can then be divided by the size of the parcel in acres to determine the people per acre.

  Surveys of actual occupancy levels conducted by the City of Sacramento have indicated that many retail and office uses are generally occupied at 50% of their maximum occupancy levels, even at the busiest times of day. Therefore, the number of people calculated for office and retail uses should be adjusted (50%) to reflect the actual occupancy levels before making the final people-per-acre determination.

- **Survey of Similar Uses** - Certain uses may require an estimate based upon a survey of similar uses. This approach is more difficult, but is appropriate for uses which, because of the nature of the use, cannot be reasonably estimated based upon parking or square footage.

Exhibit C1

Occupancy Levels

Uniform Building Code

	Use	Minimum Square Feet per Occupant
1.	Aircraft Hangars (no repair)	500
2.	Auction Room	7
3.	Assembly Areas, Concentrated Use (without fixed seats) Auditoriums Bowling Alleys (assembly areas) Churches and Chapels Dance Floors Lodge Rooms Reviewing Stands Stadiums	7
4.	Assembly Areas, Less Concentrated Use Conference Rooms Dining Rooms Drinking Establishments Exhibit Rooms Gymnasiums Lounges Skating Rinks Stages	15
5.	Children's Homes Homes for the Aged	80
6.	Classrooms	20
7.	Dormitories	50
8.	Dwellings	300
9.	Garage, Parking	200
10.	Hospitals and Sanitariums Nursing Homes	80
11.	Hotels and Apartments	200
12.	Kitchen - Commercial	200
13.	Library Reading Room	50
14.	Locker Rooms	50
15.	Mechanical Equipment Room	300

Appendix D
Compatibility Guidelines for Specific Land Uses

The compatibility evaluations listed below for specific types of land uses can be used by local jurisdictions as guidelines in implementation of the general compatibility criteria listed in Table 2A. These evaluations are not regarded as adopted policies or criteria of the Imperial County Airport Land Use Commission. In case of any conflicts between these evaluations of specific land uses and the policies and criteria in Chapter 2 of this document, the contents of Chapter 2 shall prevail.

Land Use Compatibility Zones

	A	B1/B2	C	D
Agricultural Uses				
Truck and Specialty Crops	0	+	+	+
Field Crops	0	+	+	+
Pasture and Rangeland	0	+	+	+
Orchard and Vineyards	-	+	+	+
Dry Farm and Grain	0	+	+	+
Tree Farms, Landscape Nurseries and Greenhouses	-	0	+	+
Fish Farms	-	0	+	+
Feed Lots and Stockyards	-	0	+	+
Poultry Farms	-	0	+	+
Dairy Farms	-	0	+	+
Natural Uses				
Fish and Game Preserves	0	0	0	0
Land Preserves and Open Space	0	+	+	+
Flood and Geological Hazard Areas	0	+	+	+
Waterways: Rivers, Creeks, Canals, Wetlands, Bays, Lakes	0	0	0	+

\- Incompatible

0 Potentially compatible with restrictions

\+ Compatible

Land Use Compatibility Zones

Residential and Institutional	A	B1/B2	C	D
Rural Residential - 10 acres or more	-	0	+	+
Low Density Residential - 2 to 10 acre lots	-	0/+	+	+
Single Family Residential - lots under 2 acres	-	-	0	+
Multi Family Residential	-	-	0	+
Mobile Home Parks	-	-	0	+
Schools, Colleges and Universities	-	-	-	+
Day Care Centers	-	-	0	+
Hospitals and Residential Care Facilities	-	-	-	+
Recreational				
Golf Course	0	+	+	+
Parks - low intensity; no group activities	0	+	+	+
Playgrounds and Picnic Areas	-	0	+	+
Athletic Fields	-	0	+	+
Riding Stables	-	0	+	+
Marinas and Water Recreation	-	0	+	+
Health Clubs and Spas	-	-	0	+
Tennis Courts	-	0	+	+
Swimming Pools	-	0	0	+
Fairgrounds and Race Tracks	-	-	-	+
Resorts and Group Camps-	-	-	0	+
Industrial				
Research and Development Laboratories	-	0	+	+
Warehouses and Distribution Facilities	-	0	+	+
Manufacturing and Assembly	-	0	0	+
Cooperage and Bottling Plants	-	0	+	+
Printing, Publishing and Allied Services	-	0	+	+
Chemical, Rubber and Plastic Products	-	-	0	+
Food Processing	-	-	+	0

\- Incompatible

0 Potentially compatible with restrictions

\+ Compatible

Land Use Compatibility Zones

Commercial Uses	A	B1/B2	C	D
Large Shopping Malls (500,000+ sq.ft.)	-	-	0	+
Retail Stores (one story)	-	0	0	+
Retail Stores (two story)	-	-	0	+
Restaurants and Drinking Establishments (no take out)	-	0	0	+
Food Take-Outs	-	-	0	+
Auto and Marine Services	-	0	+	+
Building Materials, Hardware and Heavy Equipment	-	0	+	+
Office Buildings (one story)	-	0	+	+
Multiple-story Retail, Office, and Financial	-	-	0	+
Banks and Financial Institutions	-	0	+	+
Repair Services	-	0	+	+
Gas Stations	-	0	+	+
Government Services/Public Buildings	-	0	+	+
Motels (one story)	-	0	0	+
Hotels and Motels (two story)	-	-	0	+
Theaters, Auditoriums, and Assembly Halls	-	-	0	+
Outdoor Theaters	-	-	0	+
Memorial Parks/Cemeteries	-	+	+	+
Truck Terminals	-	+	+	+
Transportation, Communications, and Utilities				
Automobile Parking	0	+	+	+
Highway & Street Right-of-ways	0	+	+	+
Railroad and Public Transit Facilities	0	+	+	+
Taxi, Bus & Train Terminals	-	0	+	+
Reservoirs	-	0	0	+
Power Lines	-	0	0	+
Water Treatment Facilities	-	0	+	+
Sewage Treatment and Disposal Facilities	-	0	0	+
Electrical Substations	-	0	0	+
Power Plants	-	-	0	+
Sanitary Landfills	-	-	-	0

\- Incompatible

0 Potentially compatible with restrictions

\+ Compatible