AIRPORT LAND USE COMPATIBILITY PLAN

Imperial County Airports

Revision date: June, 1996

APPROVAL TRACKING

AMENDED AIRPORT LAND USE COMPATIBILITY PLAN

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Table of Contents

Part II - Supporting Information

4 - BACKGROUND DATA - IMPERIAL COUNTY AIRPORTS

5 - AIRCRAFT ACCIDENT CHARACTERISTICS

6 - SAFETY COMPATIBILITY POLICY ISSUES

7 - NOISE CHARACTERISTICS

8 - NOISE COMPATIBILITY POLICY ISSUES

9 - IMPLEMENTATION STRATEGIES FOR LOCAL JURISDICTIONS

10 - GENERAL PLAN CONSISTENCY REVIEW - IMPERIAL COUNTY JURISDICTIONS

Part III- Appendices

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1

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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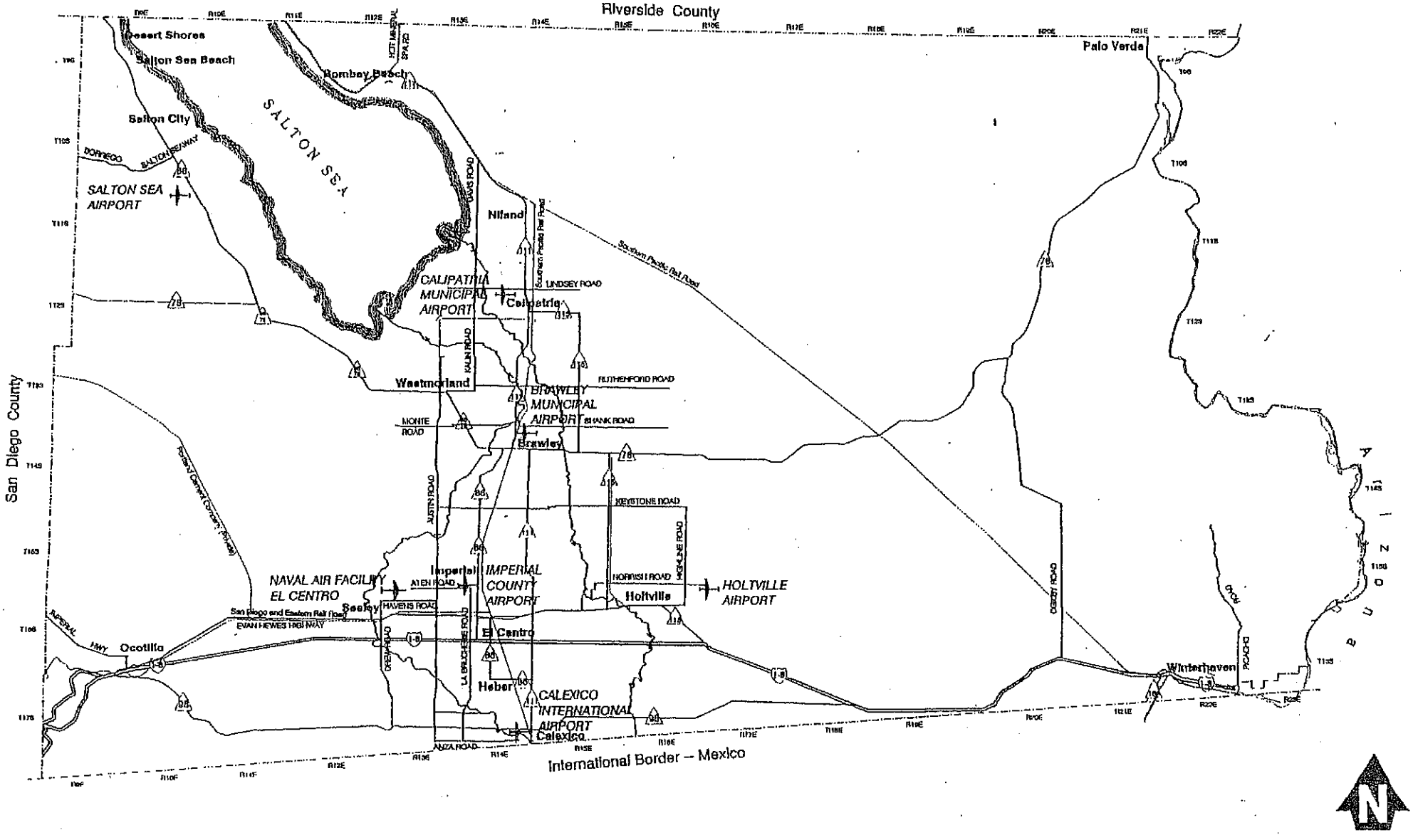

Airport Locations

Imperial County

FIGURE 1A

airport land use compatibility plan

2

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.

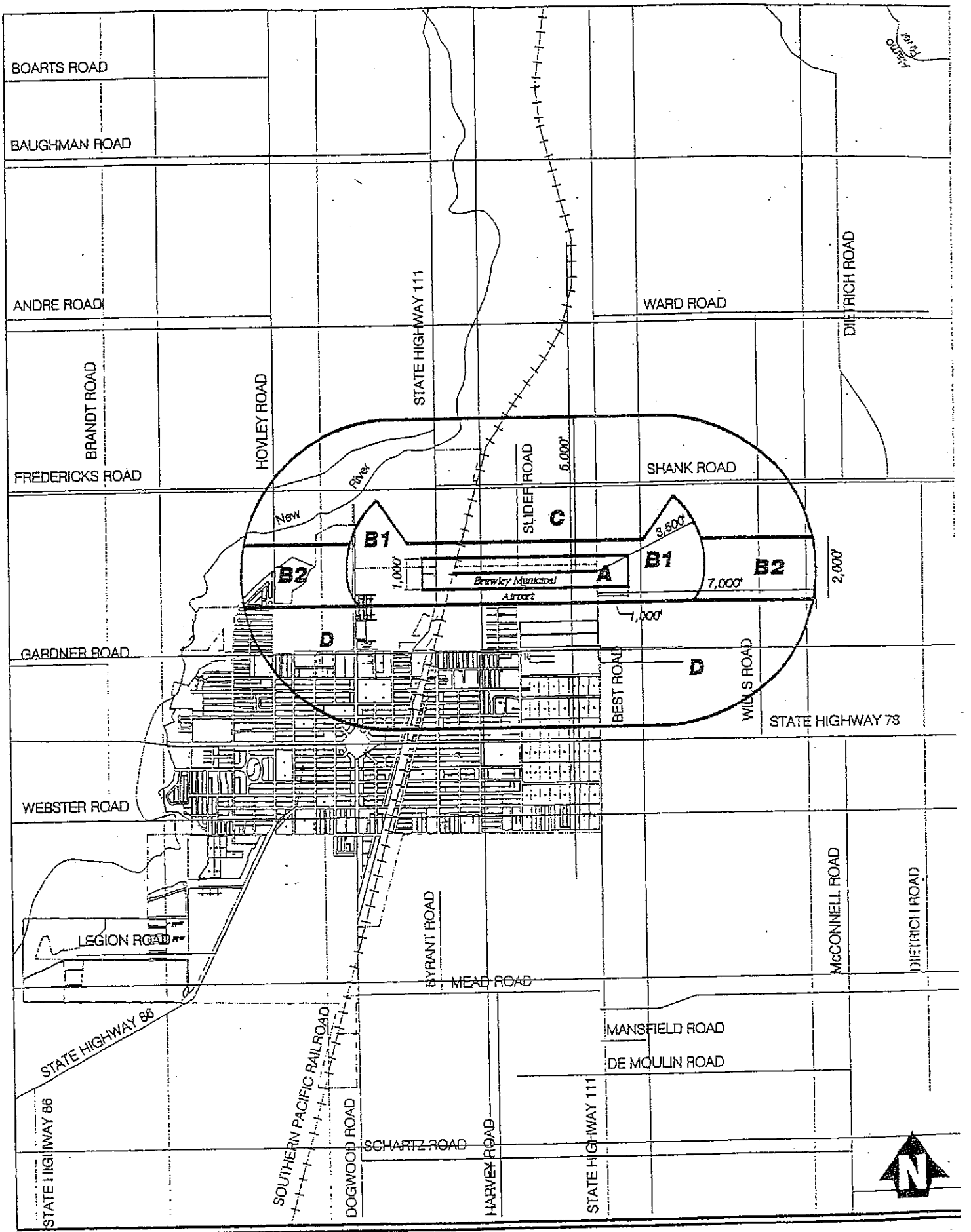
Initially, the impact area for each of these compatibility concerns was delineated for a set of runways having different approach types (visual versus straight-in nonprecision), type of civilian aircraft accommodated (single-engine and light twins versus turboprops, business jets, etc.), and activity 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

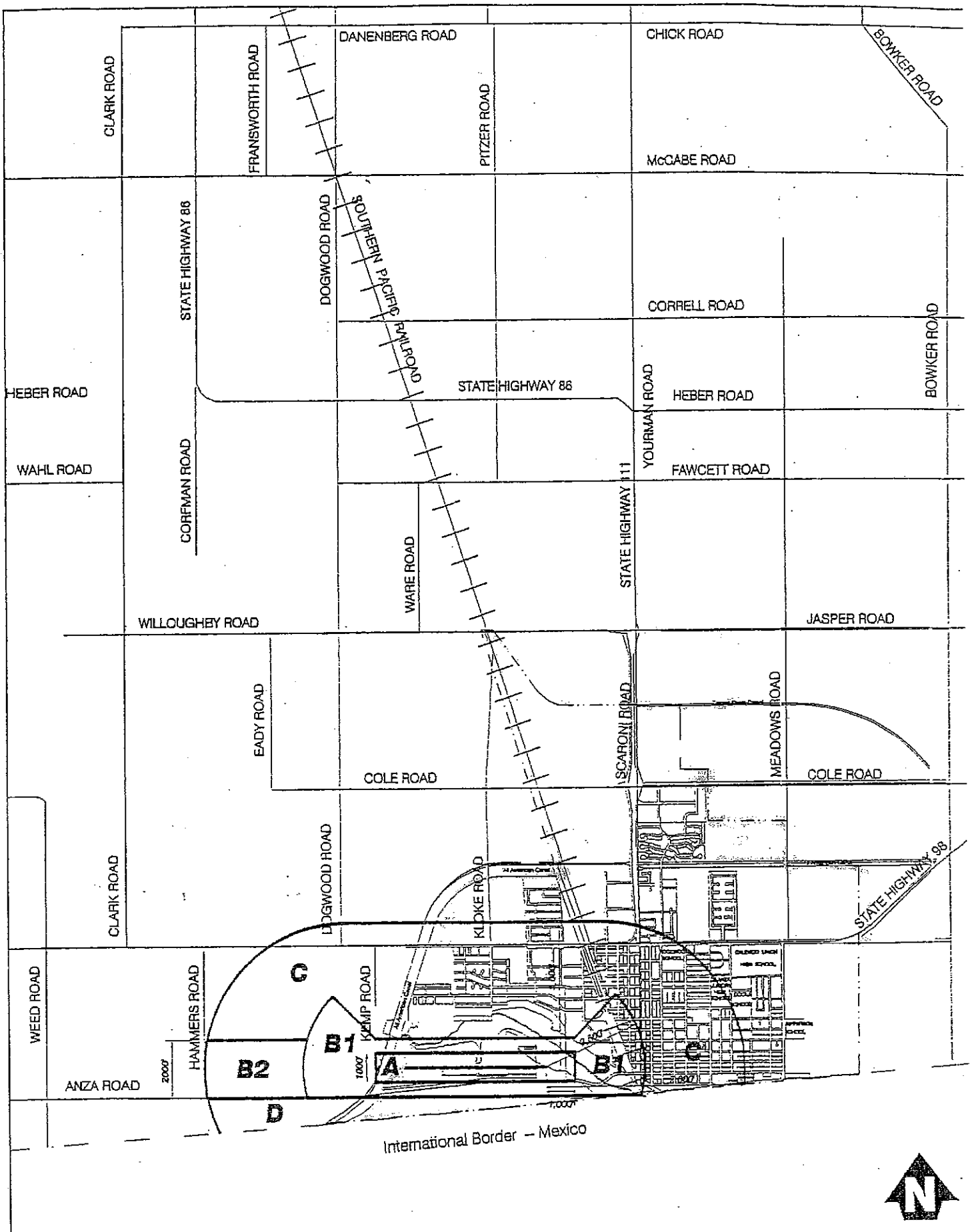
Brawley Municipal Airport

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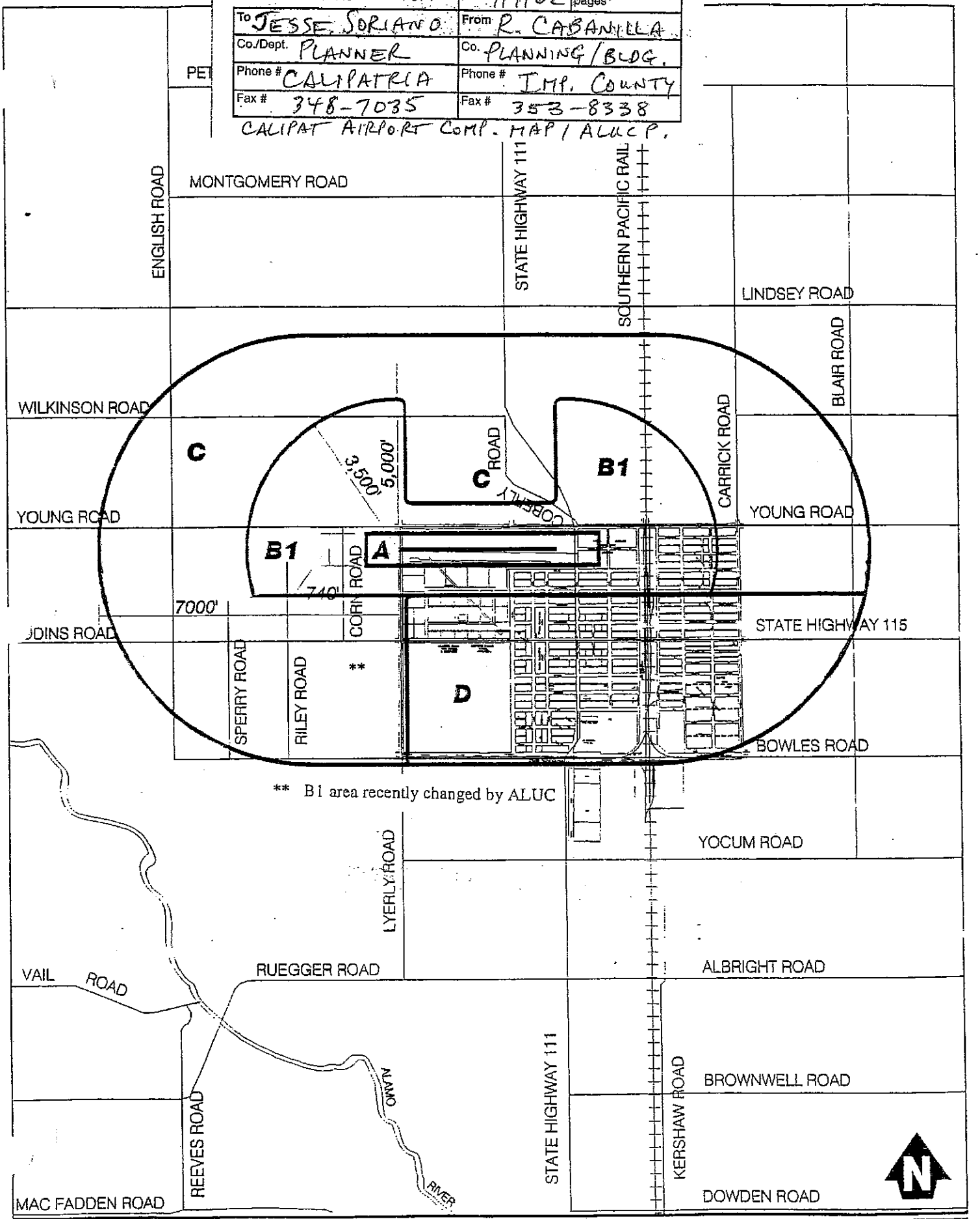
To JESSE SORIANO	From R. CABANILLA
Co./Dept. PLANNER	Co. PLANNING/BLDG.
Phone # CALIPATRIA	Phone # IMP. COUNTY
Fax # 348-7035	Fax # 353-8338

CALIPAT AIRPORT COMP. MAP / ALUCP.



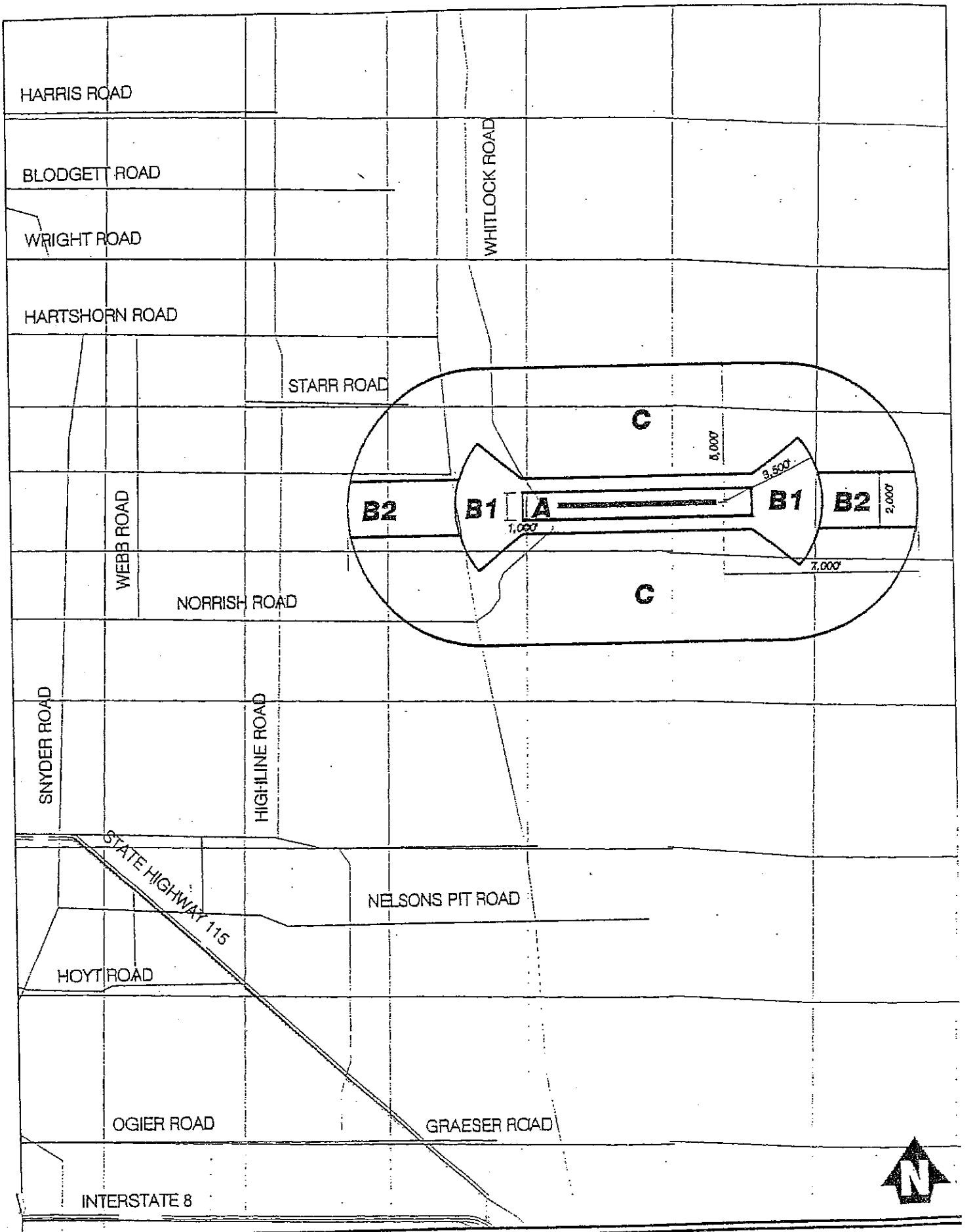
Compatibility Map

Calipatria Municipal Airport

FIGURE 3C

Holtville Airport

- None.



Compatibility Map
Holtville Airport

FIGURE 3D

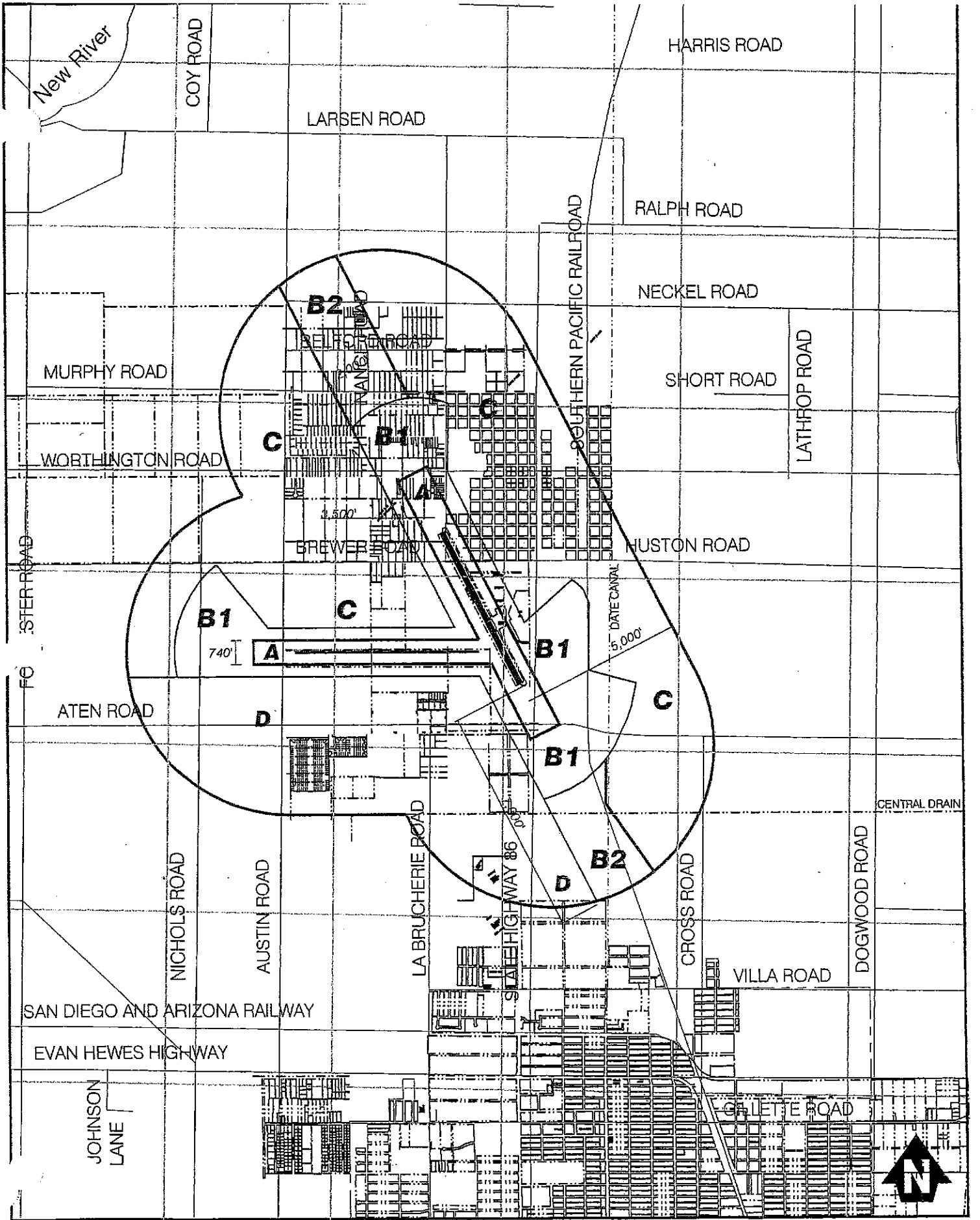
airport land use compatibility plan

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

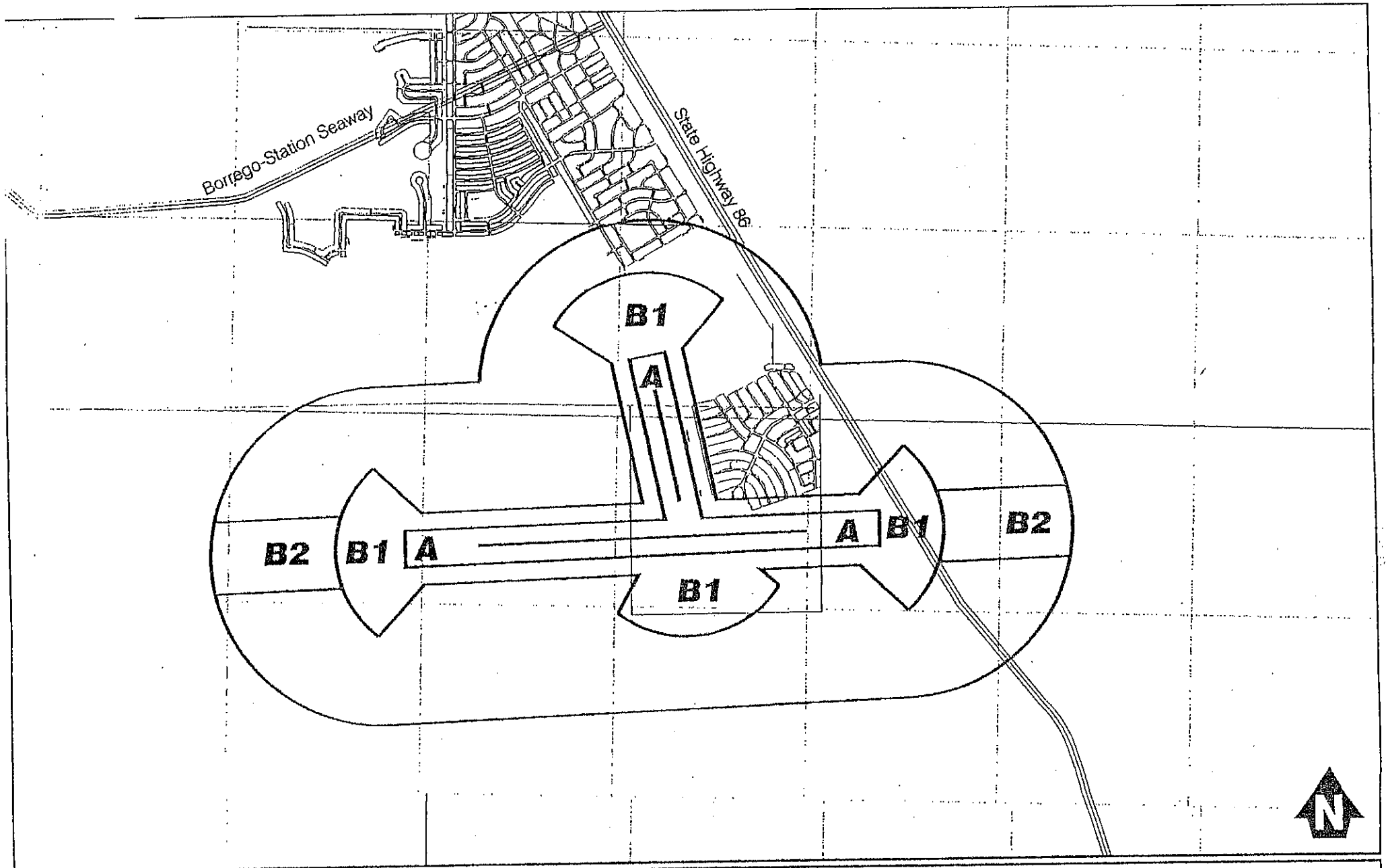
airport land use compatibility plan

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".

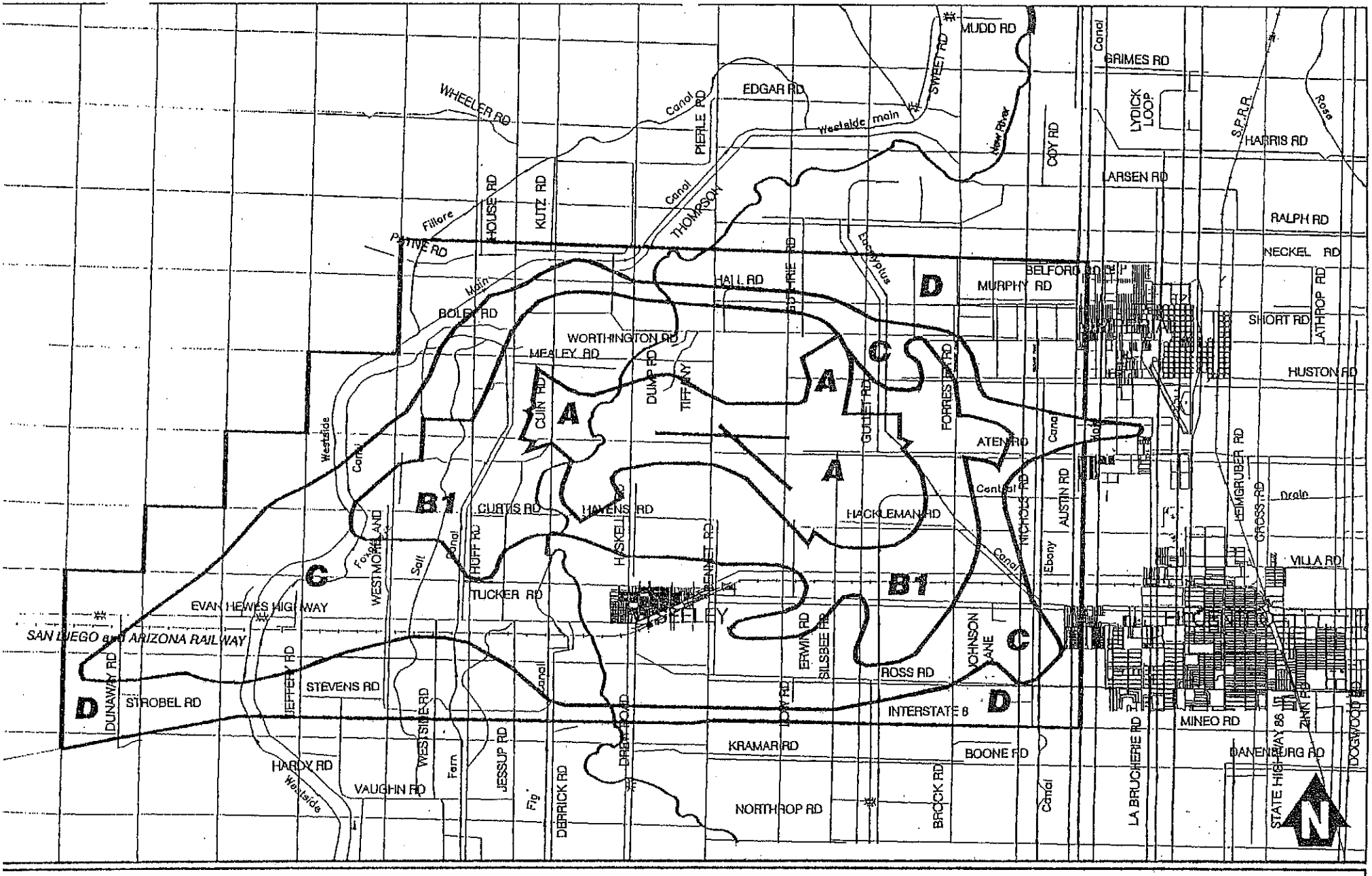
  - The AICUZ Accident Potential Zone II (APZ II) and CNEL 65-75 dBA Area comprise Compatibility Zone "B1".

  - 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

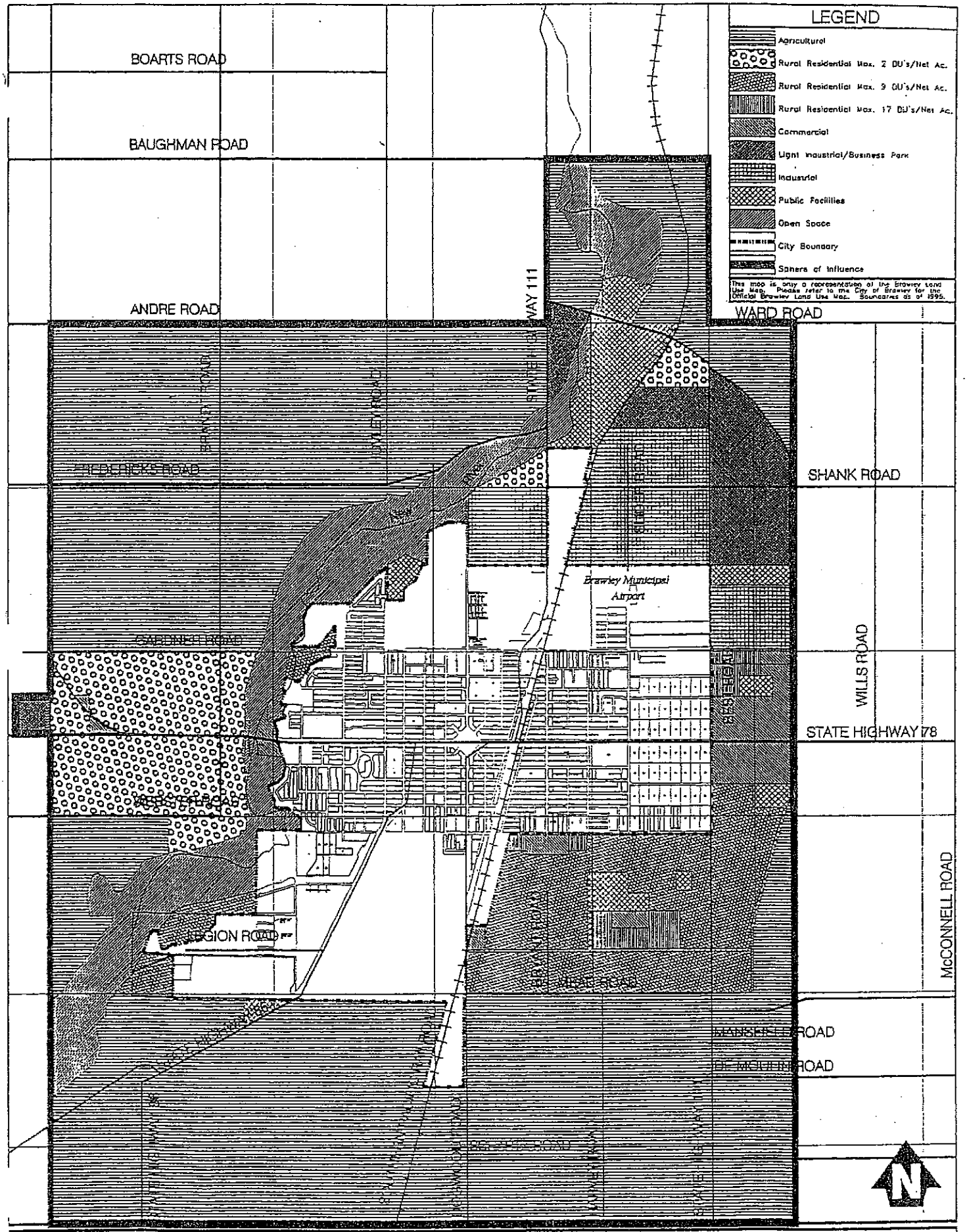
- City sphere of influence extends 0.5 miles north and east of airport.
- *City of Brawley General Plan* adopted April 1995.
  - Industrial uses shown for areas along north and east sides of airport and near western runway protection zone.
  - Open space indicated for eastern runway protection zone; 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.

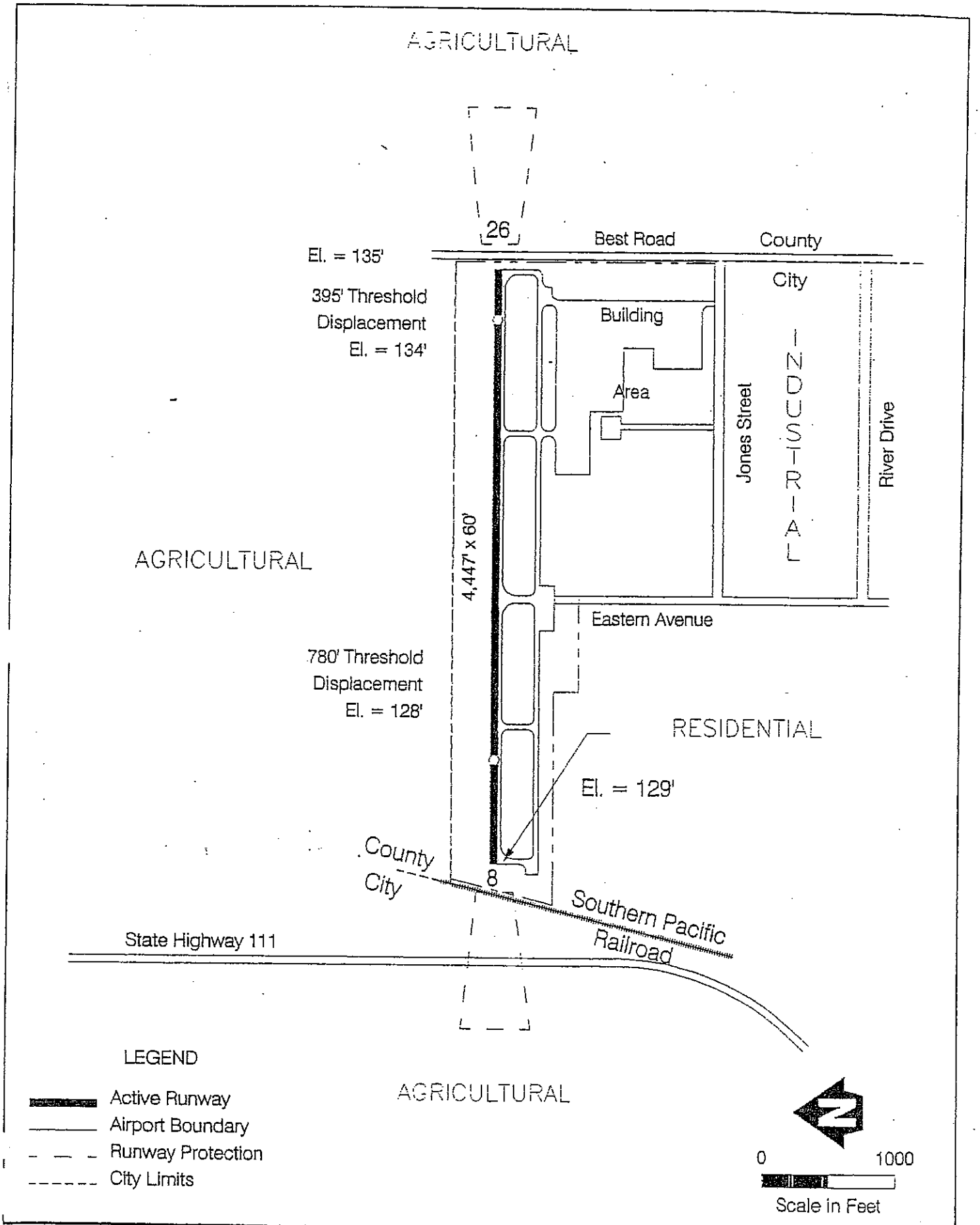
RUNWAY APPROACHES

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

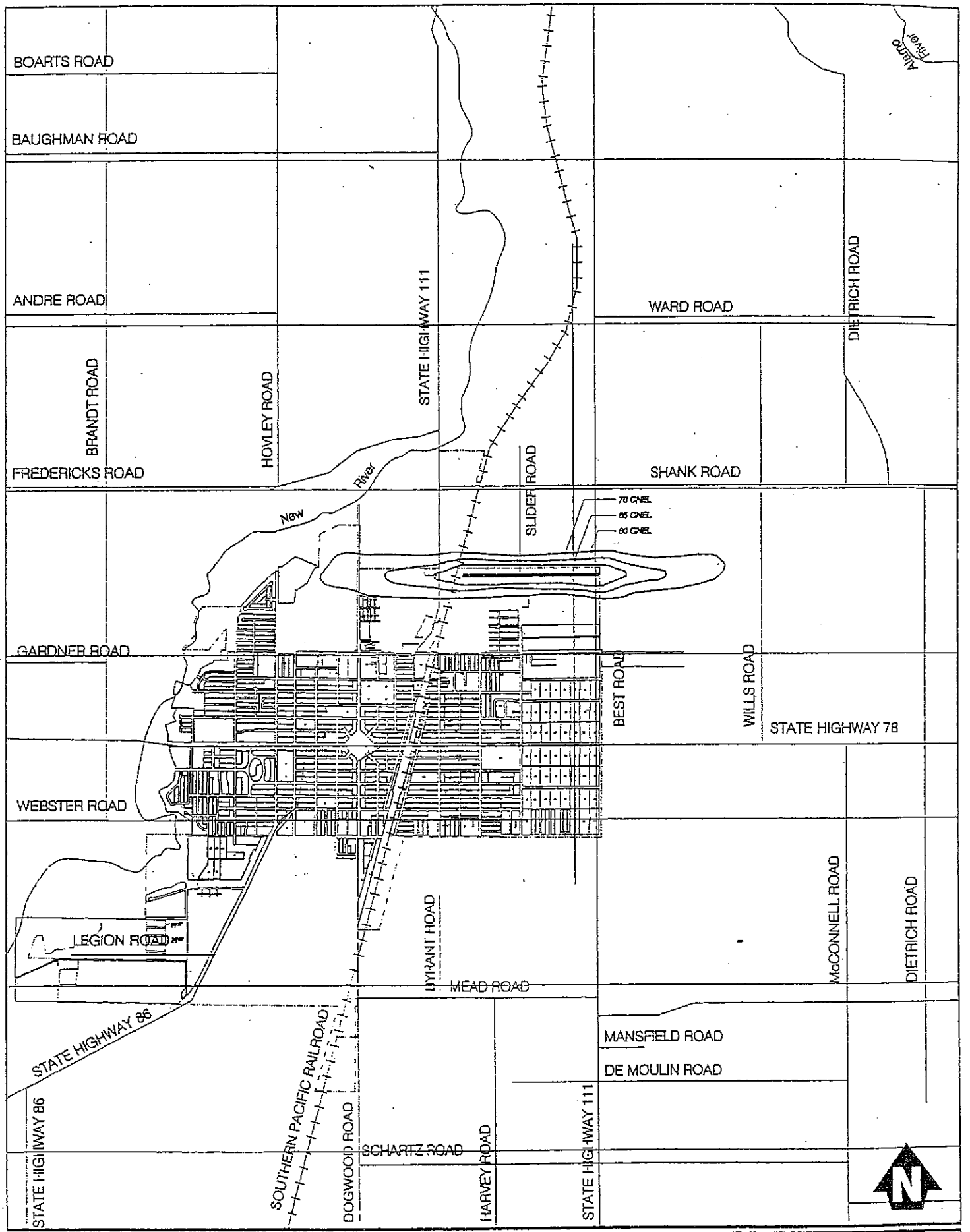
[a] Source: Airport Manager and 1988 *Airport Master Plan.*

[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.

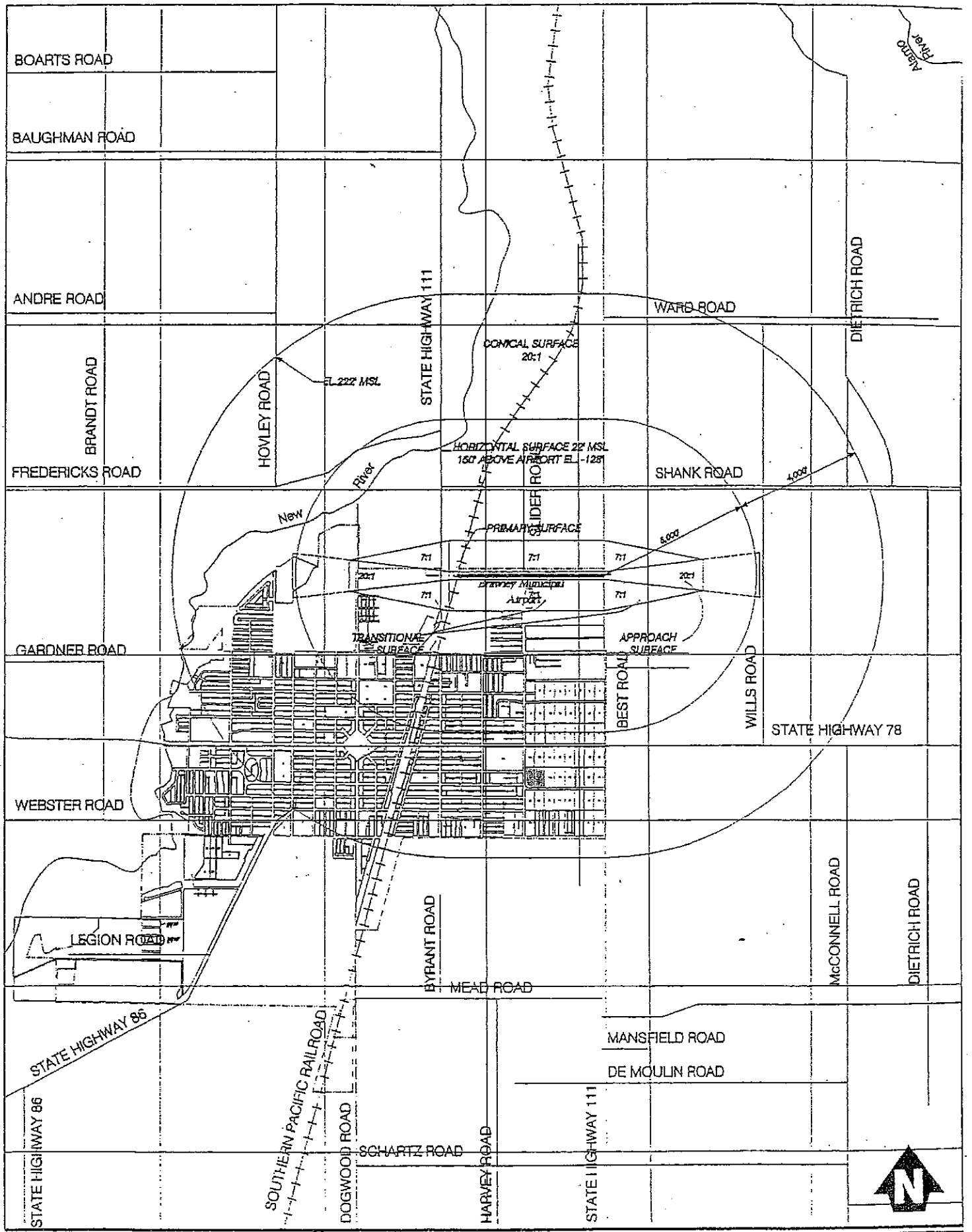


Background Data

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

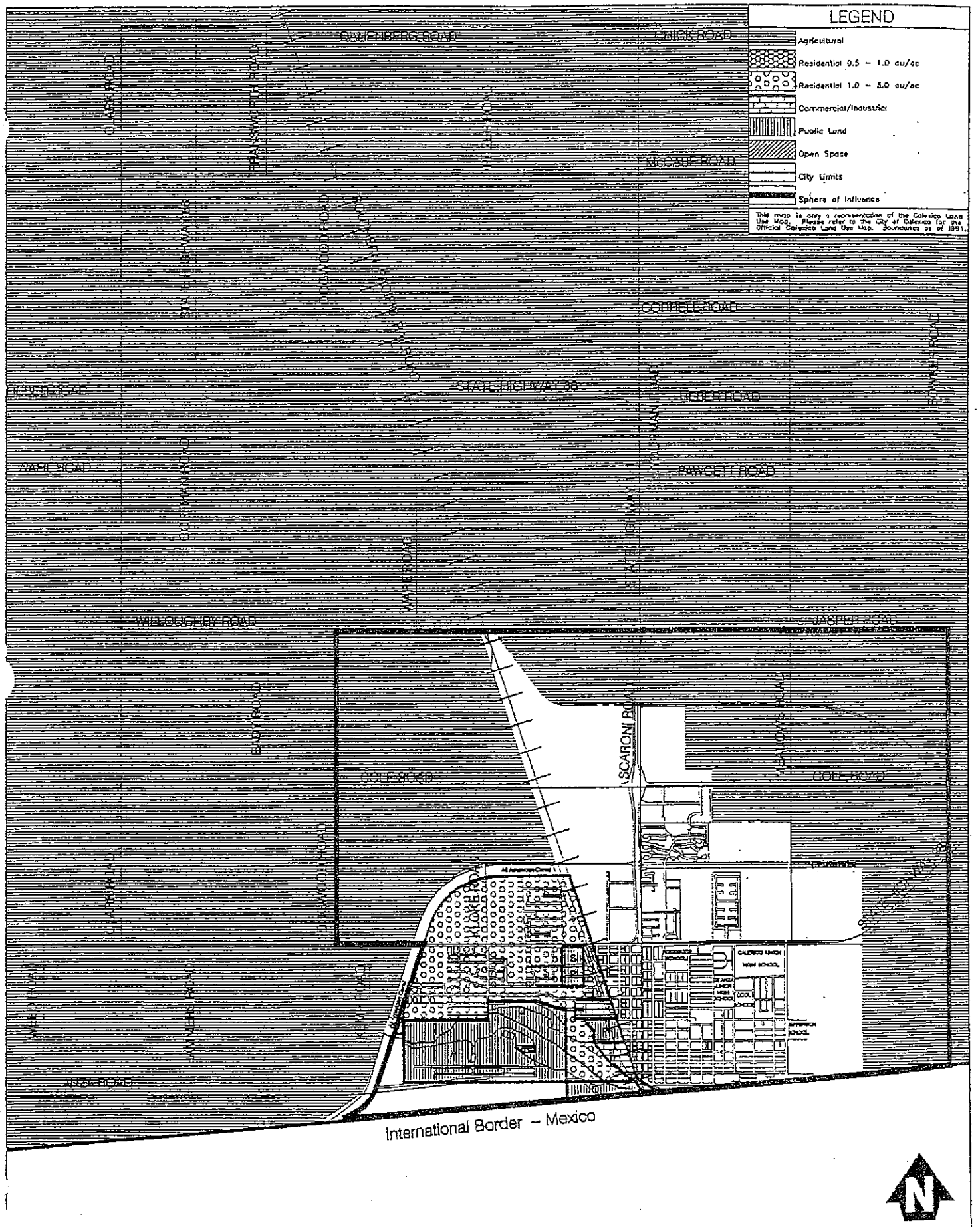
- Sphere of influence coincides with city limits in airport vicinity.
- *City of Calexico General Plan*, dating from 1975, in the process of being updated as of 1992.
  - Noise Element of 1975 plan says new residential development not permitted where existing transportation noise levels exceed normal 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

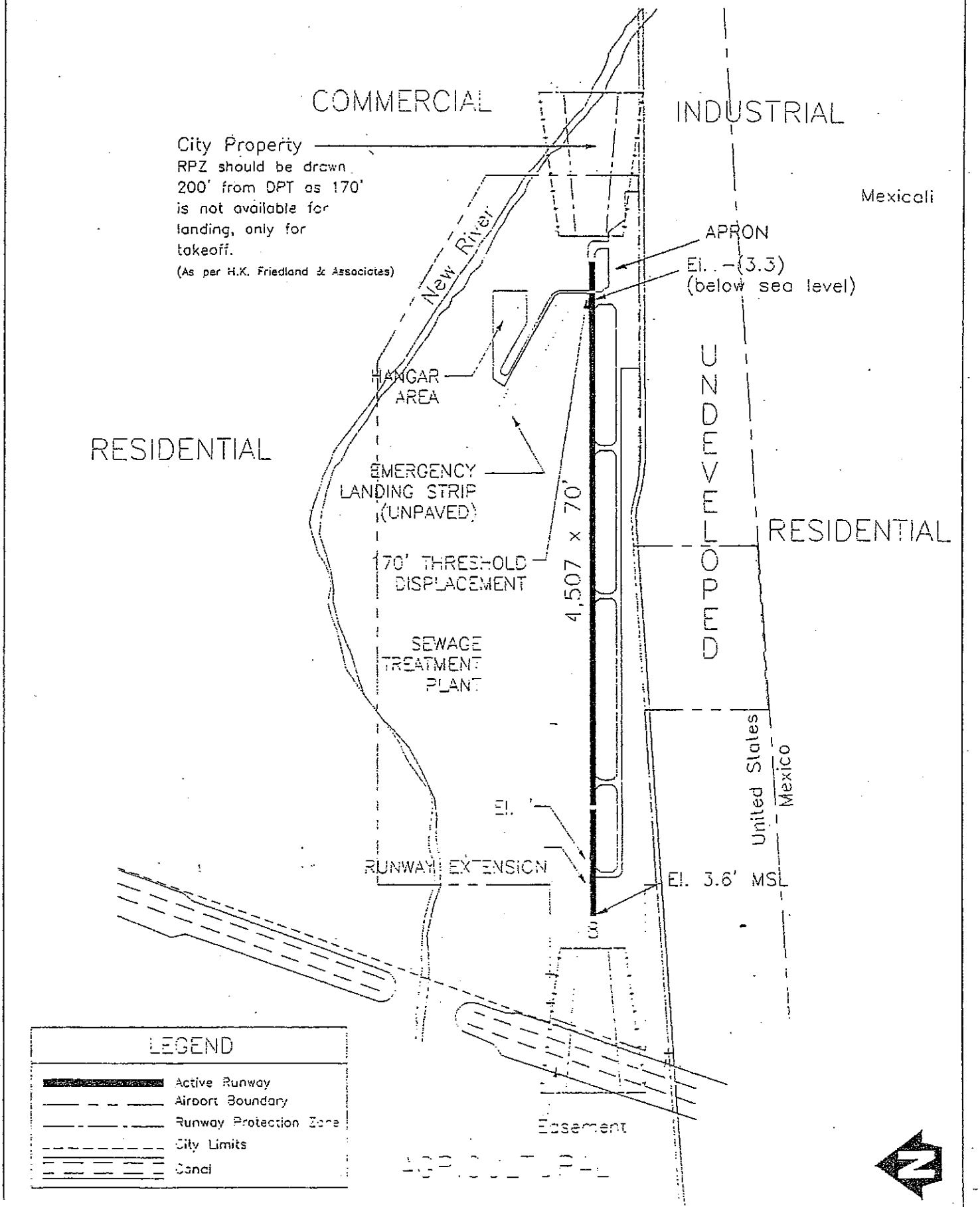
- *Approach Type* –; **Current approaches are visual but land and easements acquired for future non-precision.**
- *Runway Protection Zone*

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

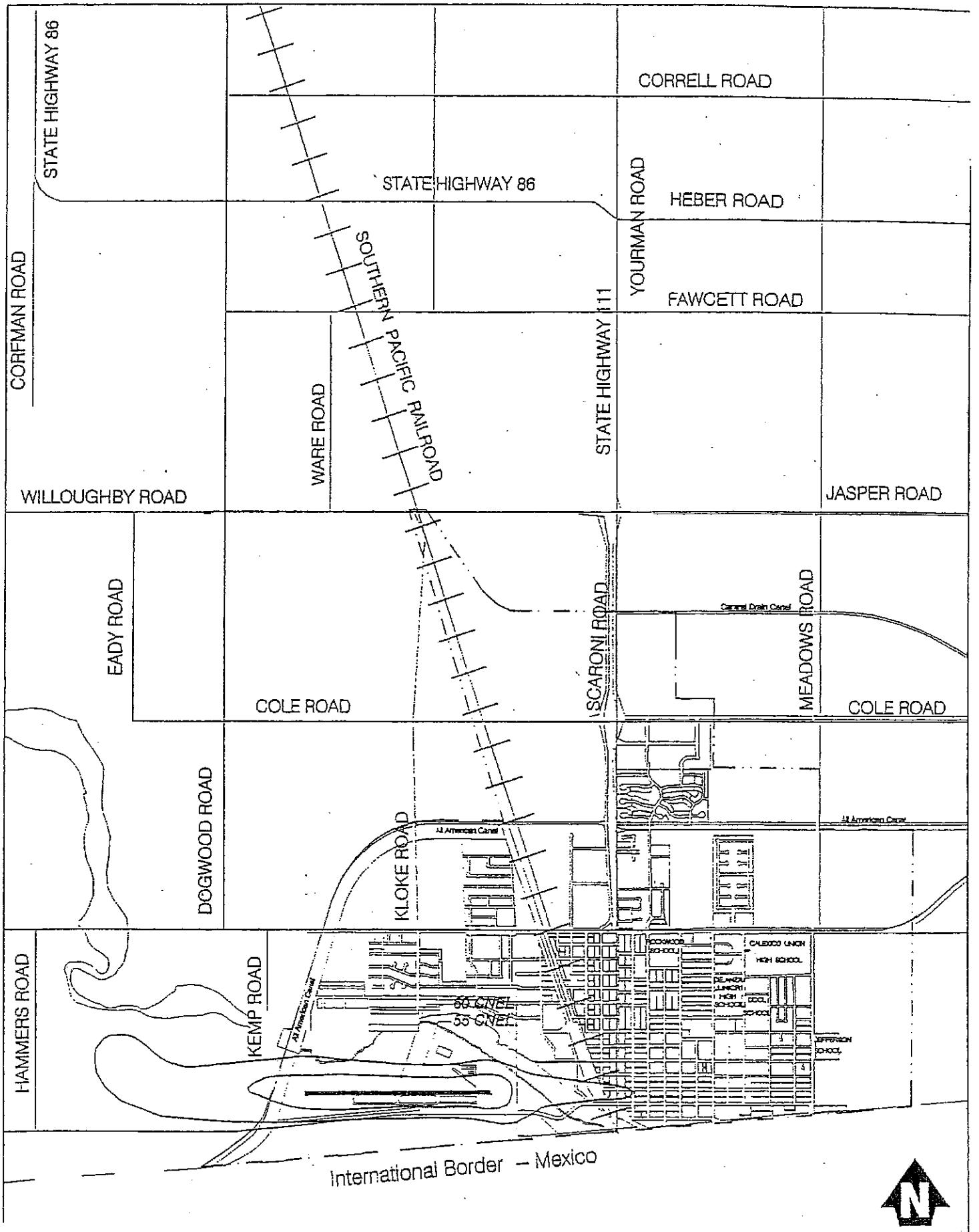
- Pattern Altitude – 800 feet AGL.
- Right traffic on Runway 26 (no south side pattern).
- No straight-in approach to Runway 26.

NOTES

[a] Estimated 1995 activity levels.

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

RC/sm/ClxAllTb.

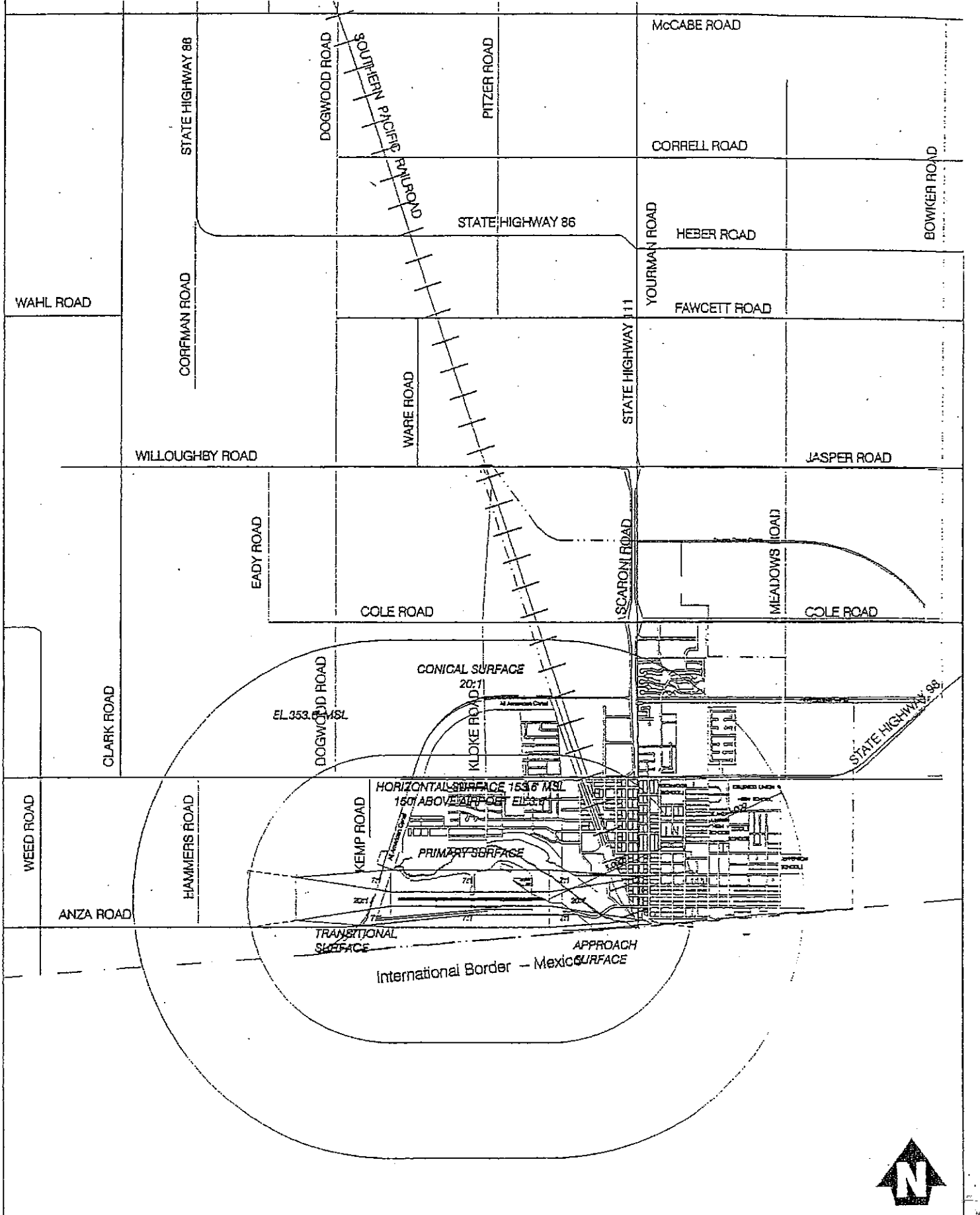


Background Data

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

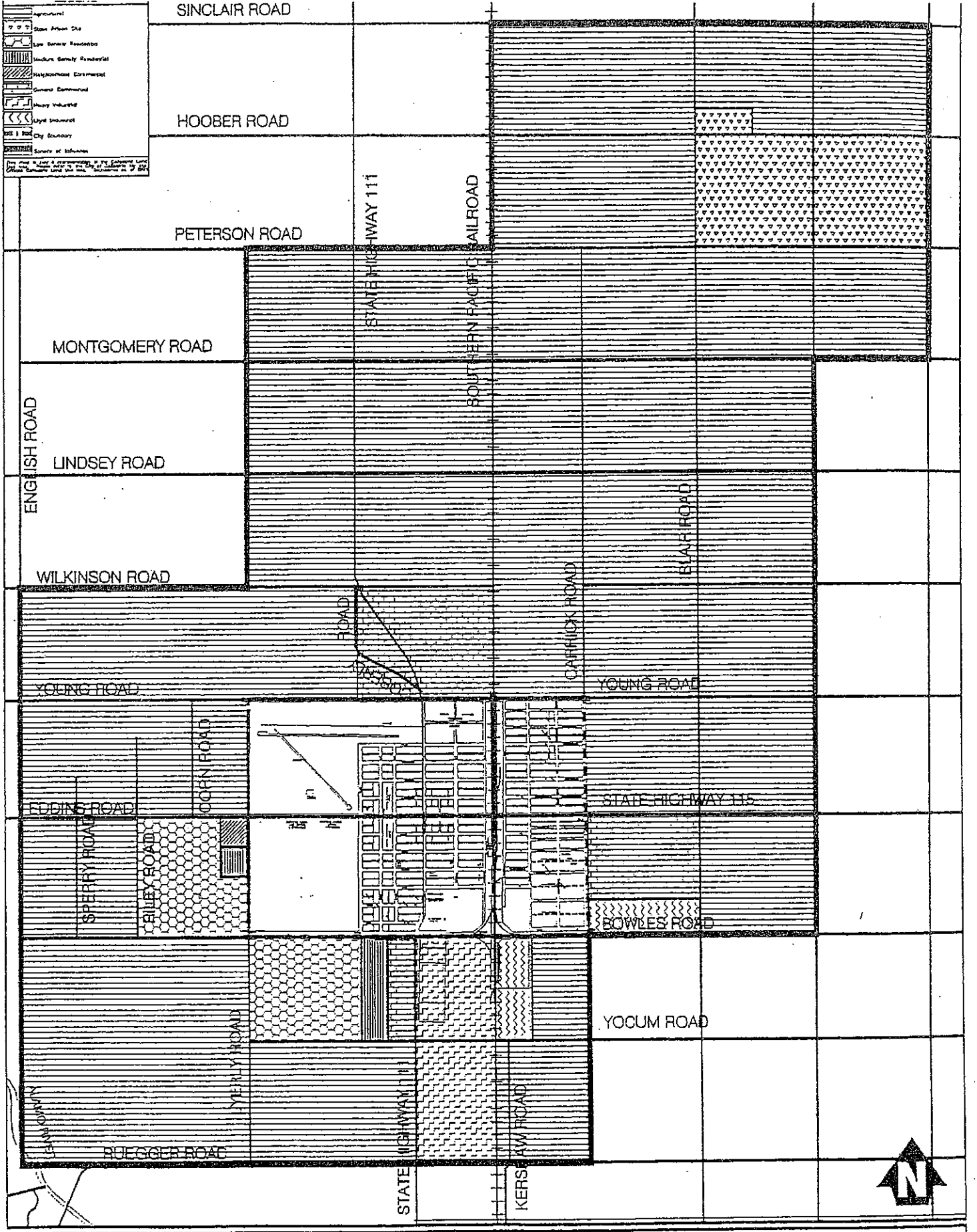
- East approach and land to south in city limits; city sphere of influence extends north of airport; to west, sphere of influence ends at airport boundary.
- *City of Calipatria General Plan* adopted 1992.
- County zoning for area west of airport is A-1 (Light Agriculture); designation permits residential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

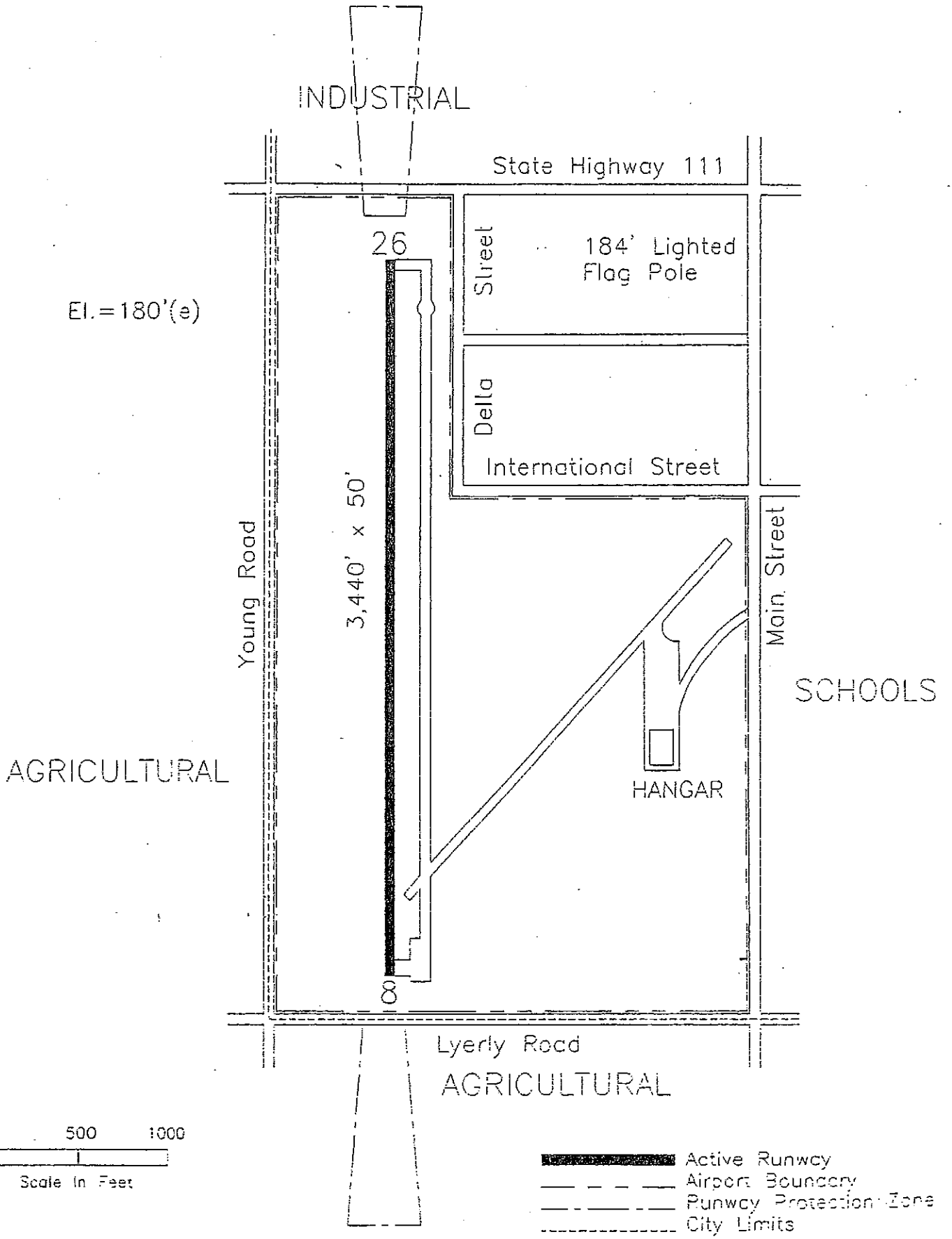
RUNWAY APPROACHES

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.

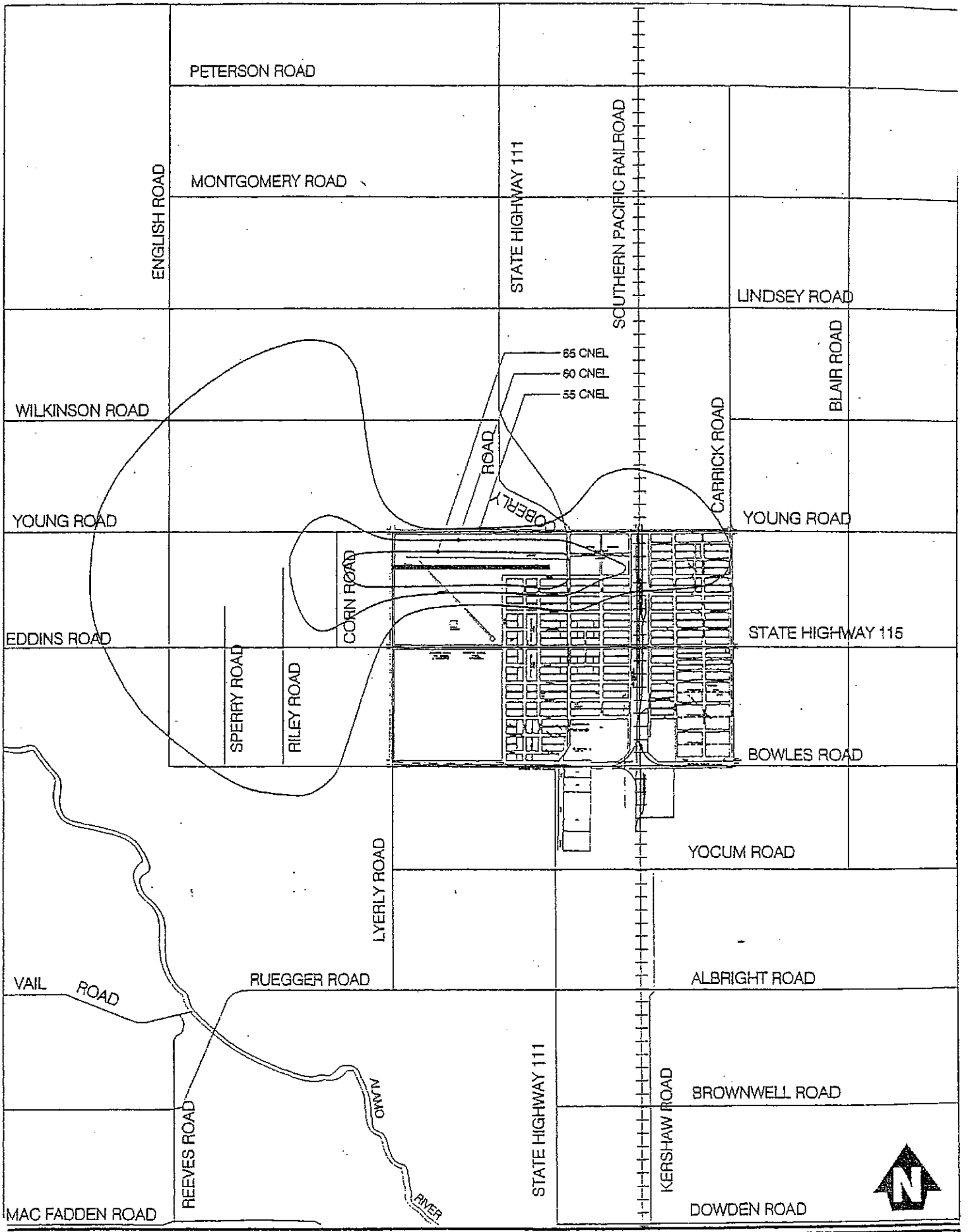
NOTES

[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

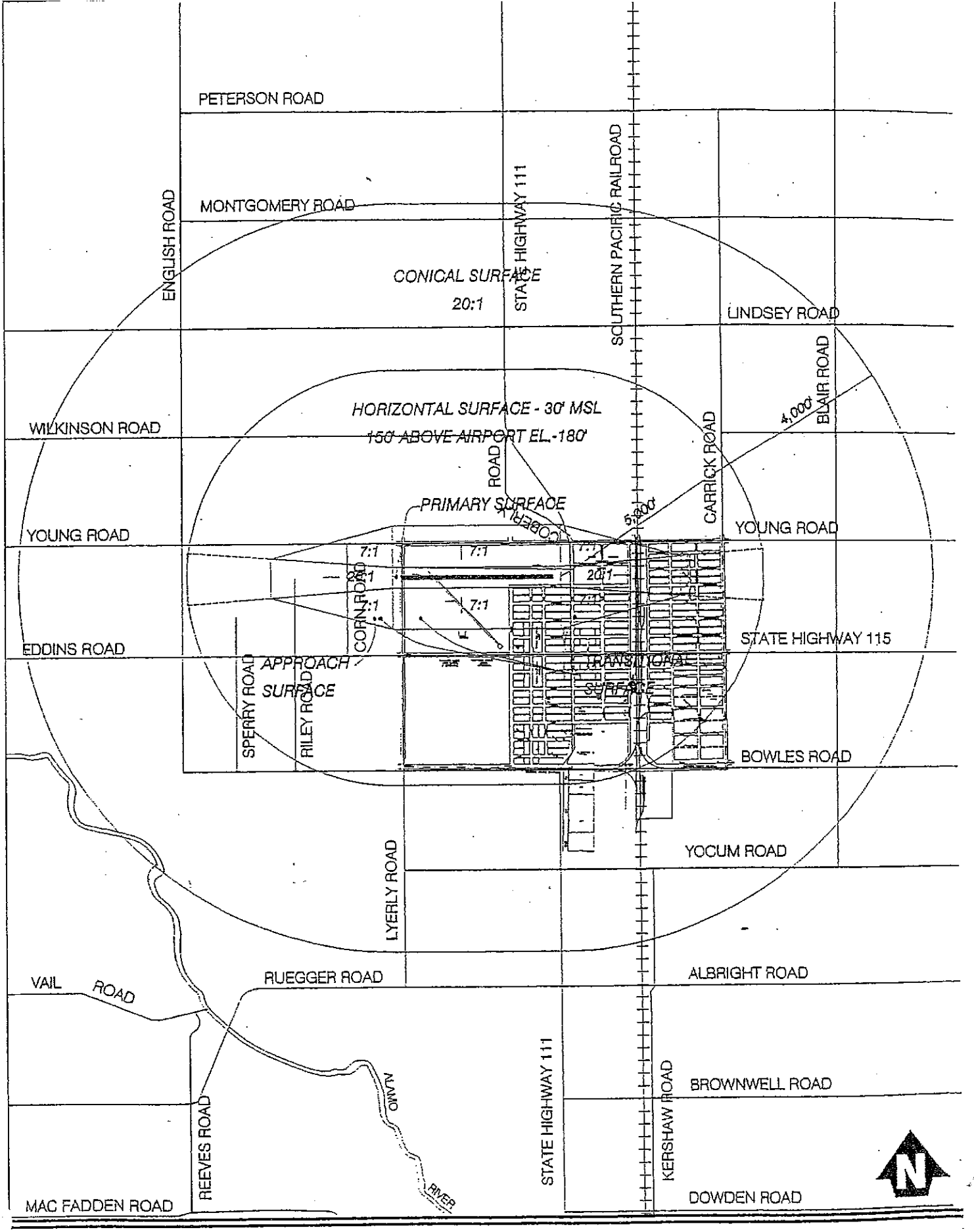


Background Data

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

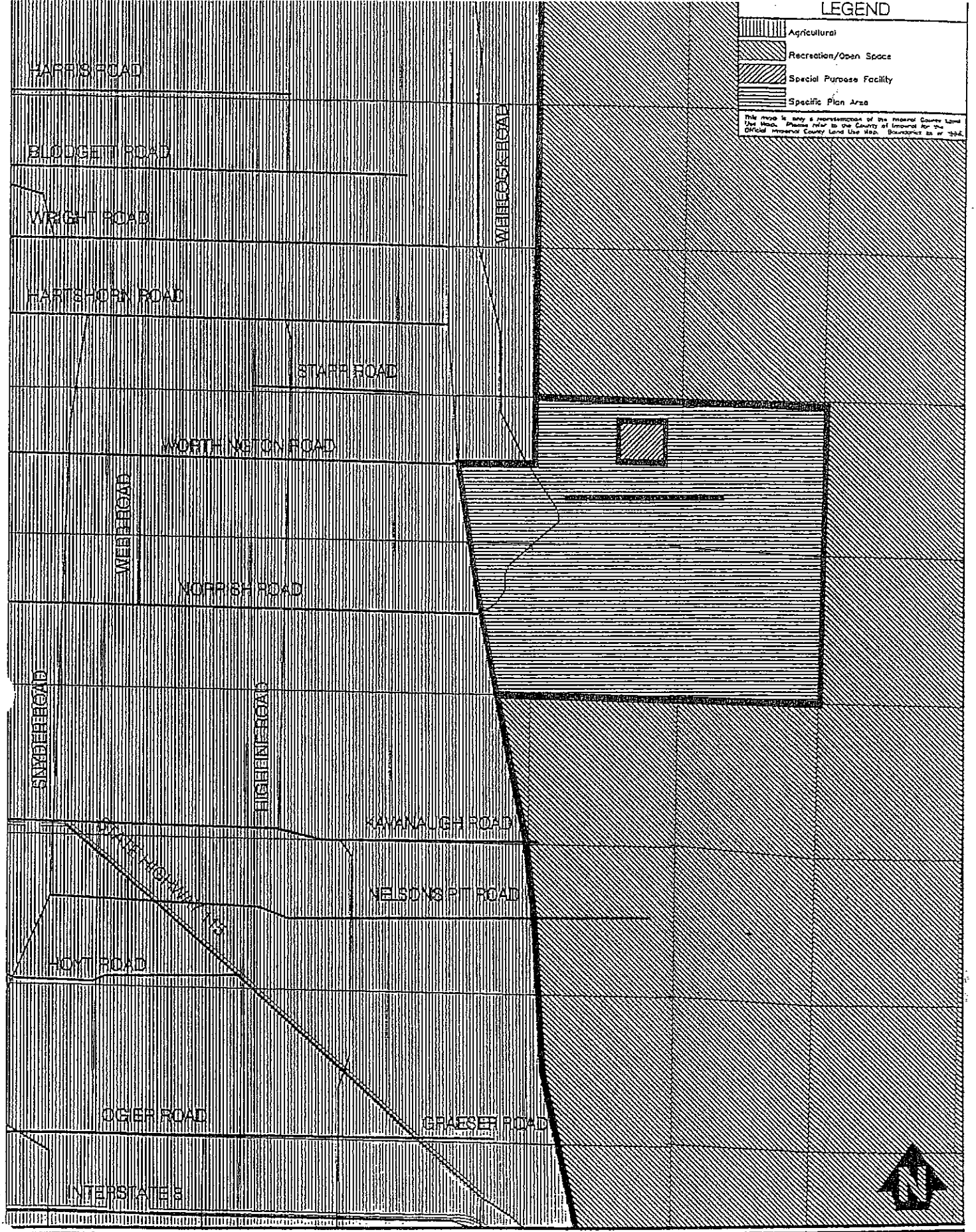
- Airport property shown as special purpose facility on County's Land Use Element Map.
- Located beyond City of Holtville sphere of influence.

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.

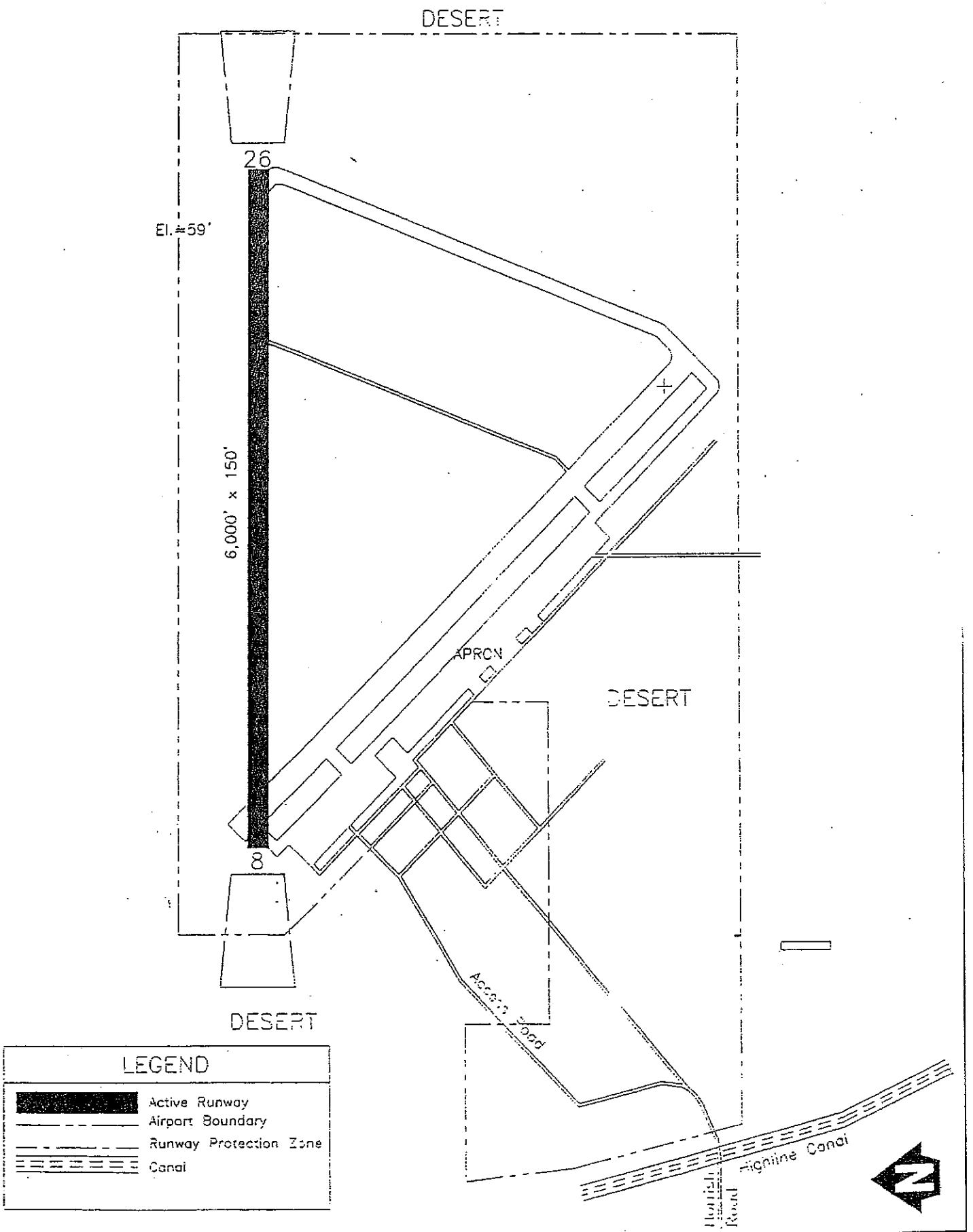
RUNWAY APPROACHES

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.

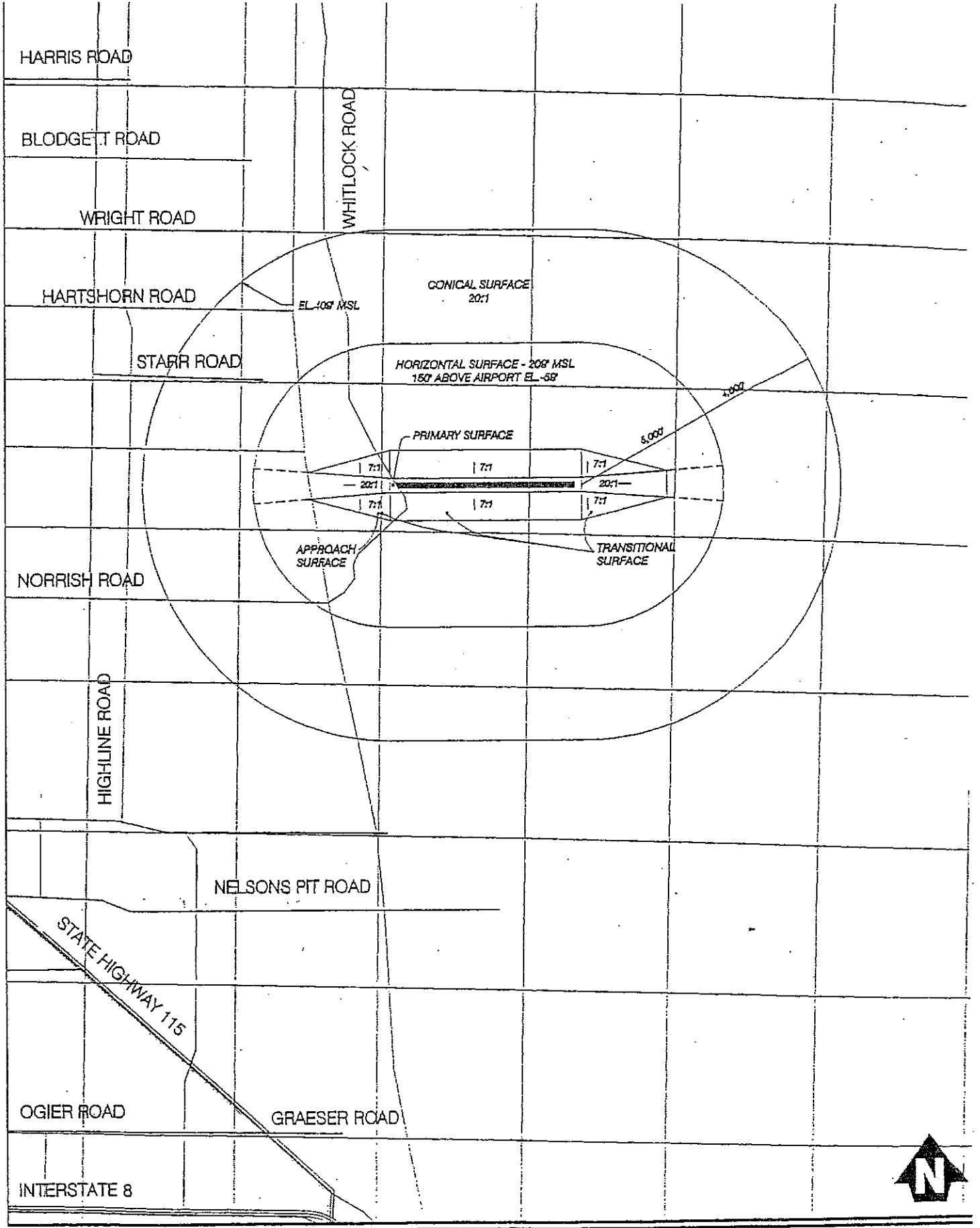
Future usage uncertain

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

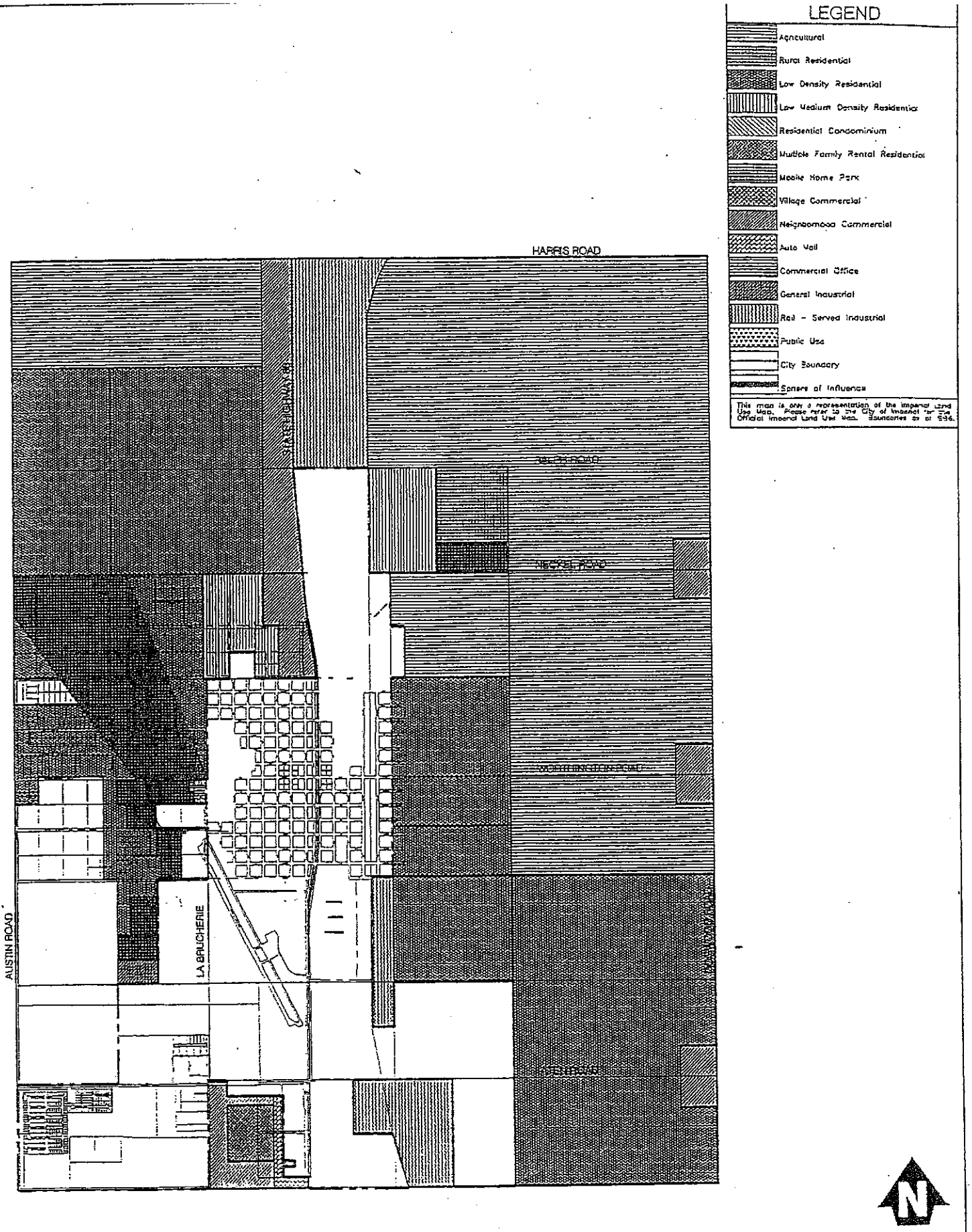
- *City of Imperial General Plan* adopted April 1989.
  - Mostly rural residential land uses (0.5-1.0 dwelling units per acre) planned between runways and northwest of airport.
  - Plan refers to 1991 *Airport Land Use Plan* and the need to limit development in critical areas near the airport. Existing 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

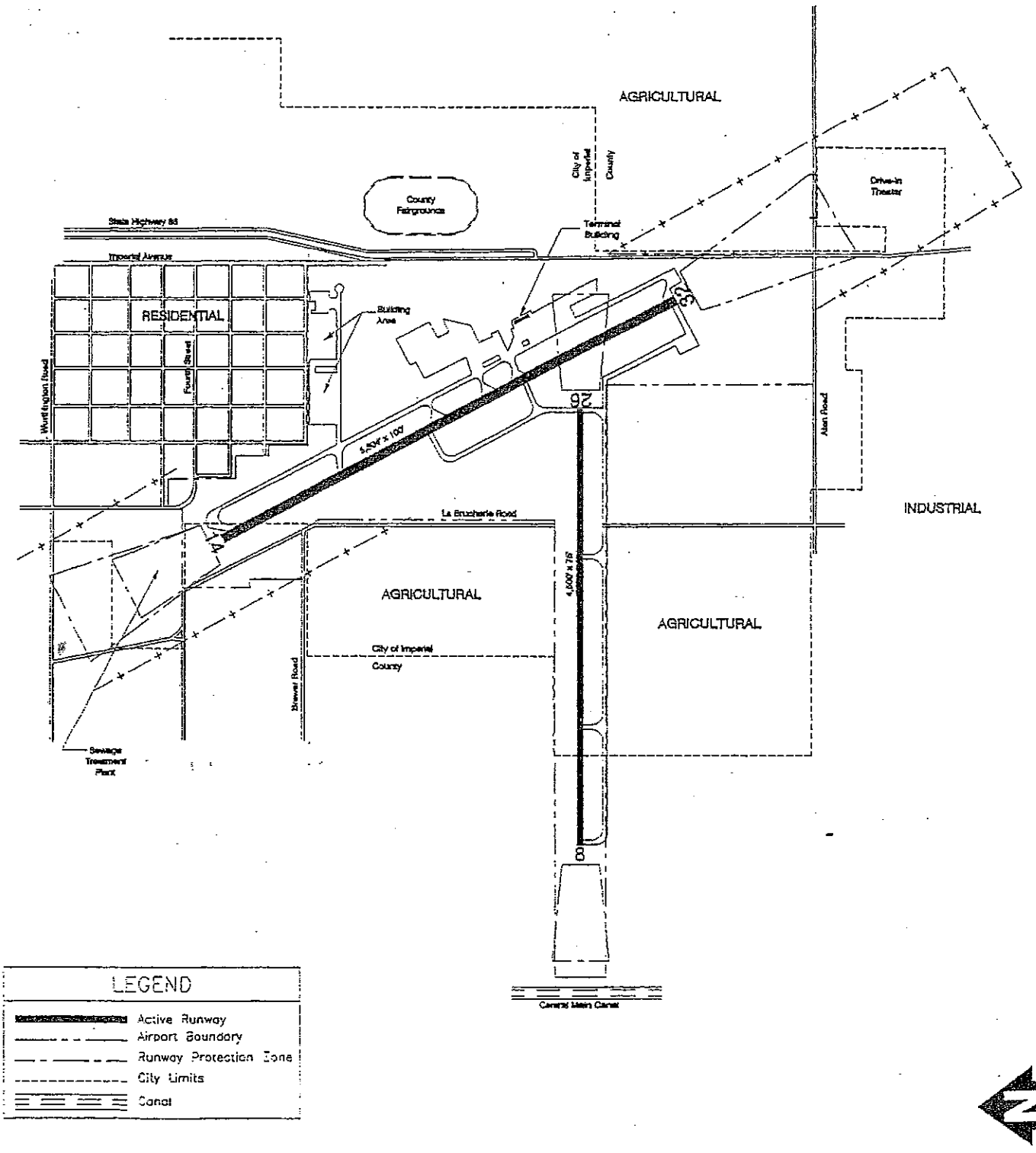
- ***Approach Type*** – Visual; also circling VOR approach.
- ***Runway Protection Zone*** – Mostly on airport property or protected by easement.
- ***Approach Obstacles*** – Road (900 feet from runway end, on centerline).

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

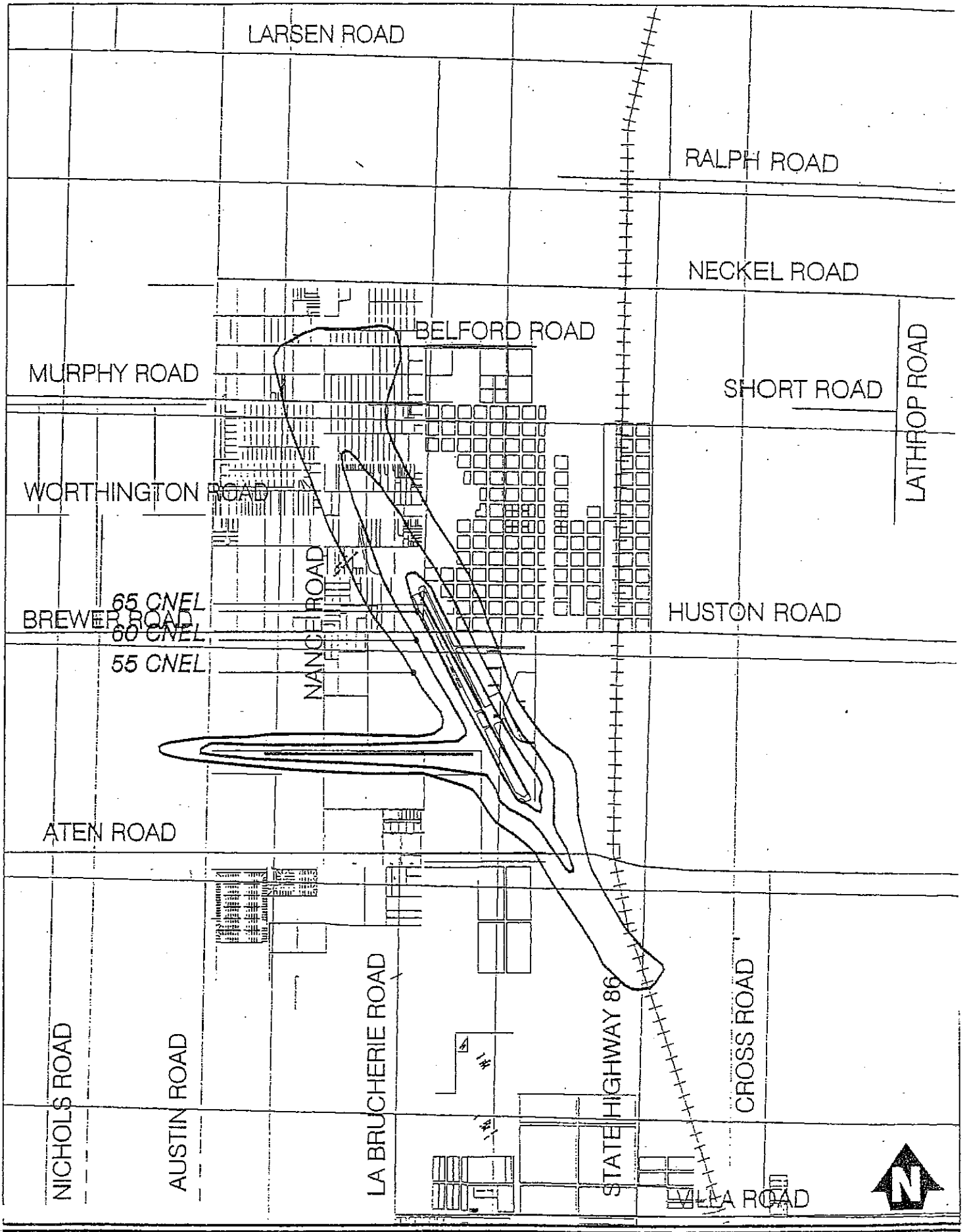
[a] Airport Manager's estimated 1989 aircraft operations, 1990 based aircraft.

[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.

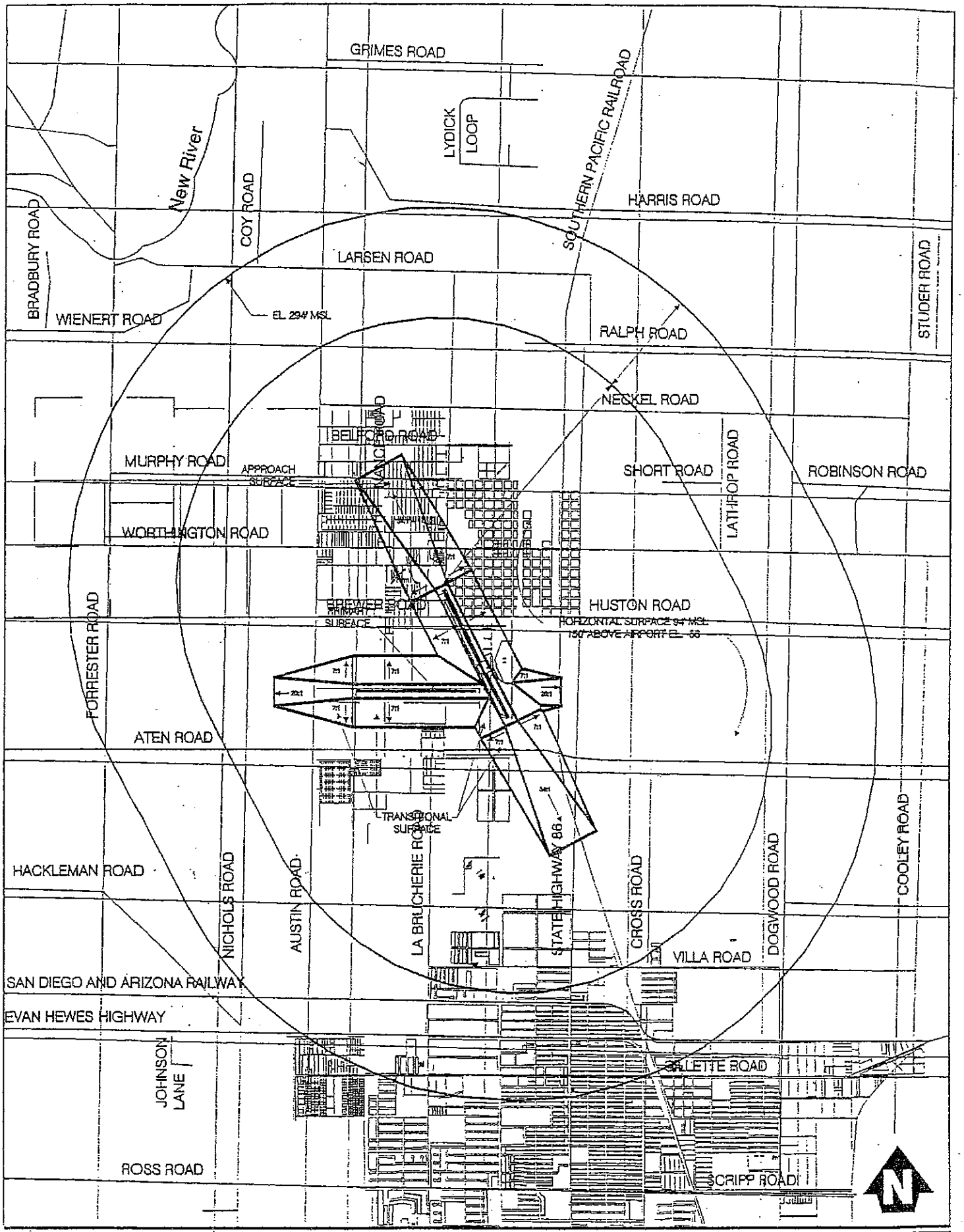


Background Data

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

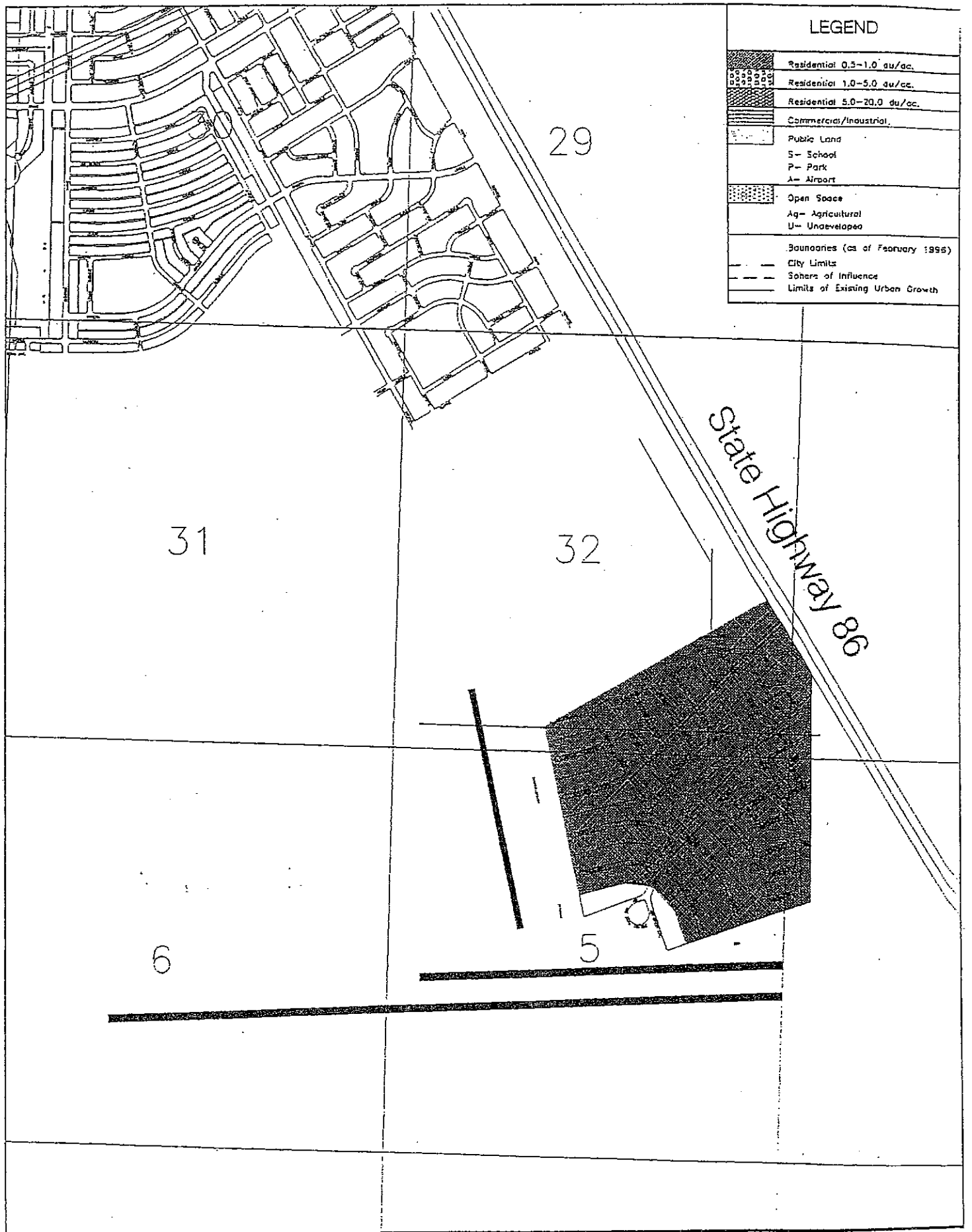
- *Imperial County General Plan*, adopted in 1993, is current land use plan for area.
- *Salton City Area Zoning Map*, last updated 1984, illustrates extensive proposed development of Salton City community.

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.

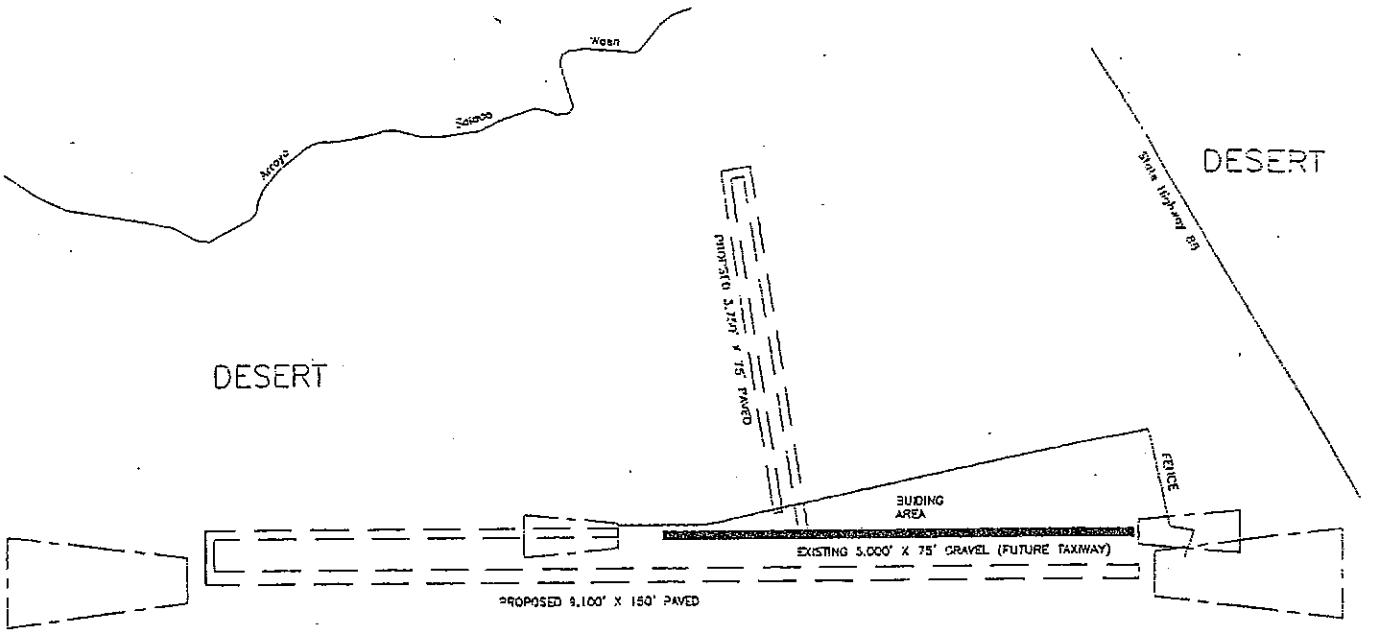
RUNWAY APPROACHES

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

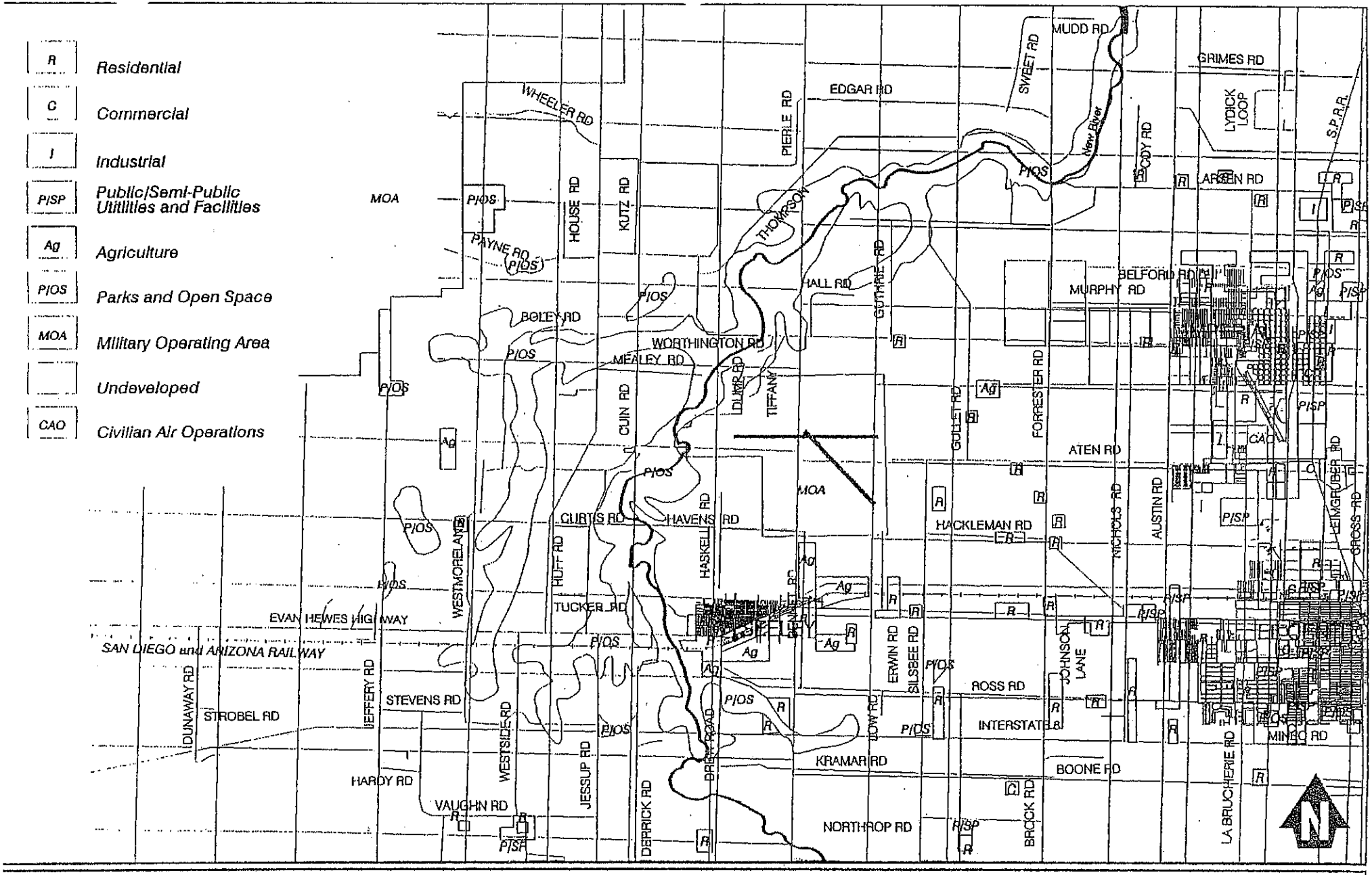
- *Imperial County General Plan*, dating from 1993 is current land use plan for area.
  - Air base shown as heavy industrial land use, surrounding area general agricultural, and river channel as preservation.
- County zoning designates most of surrounding areas as general or heavy agriculture; other 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

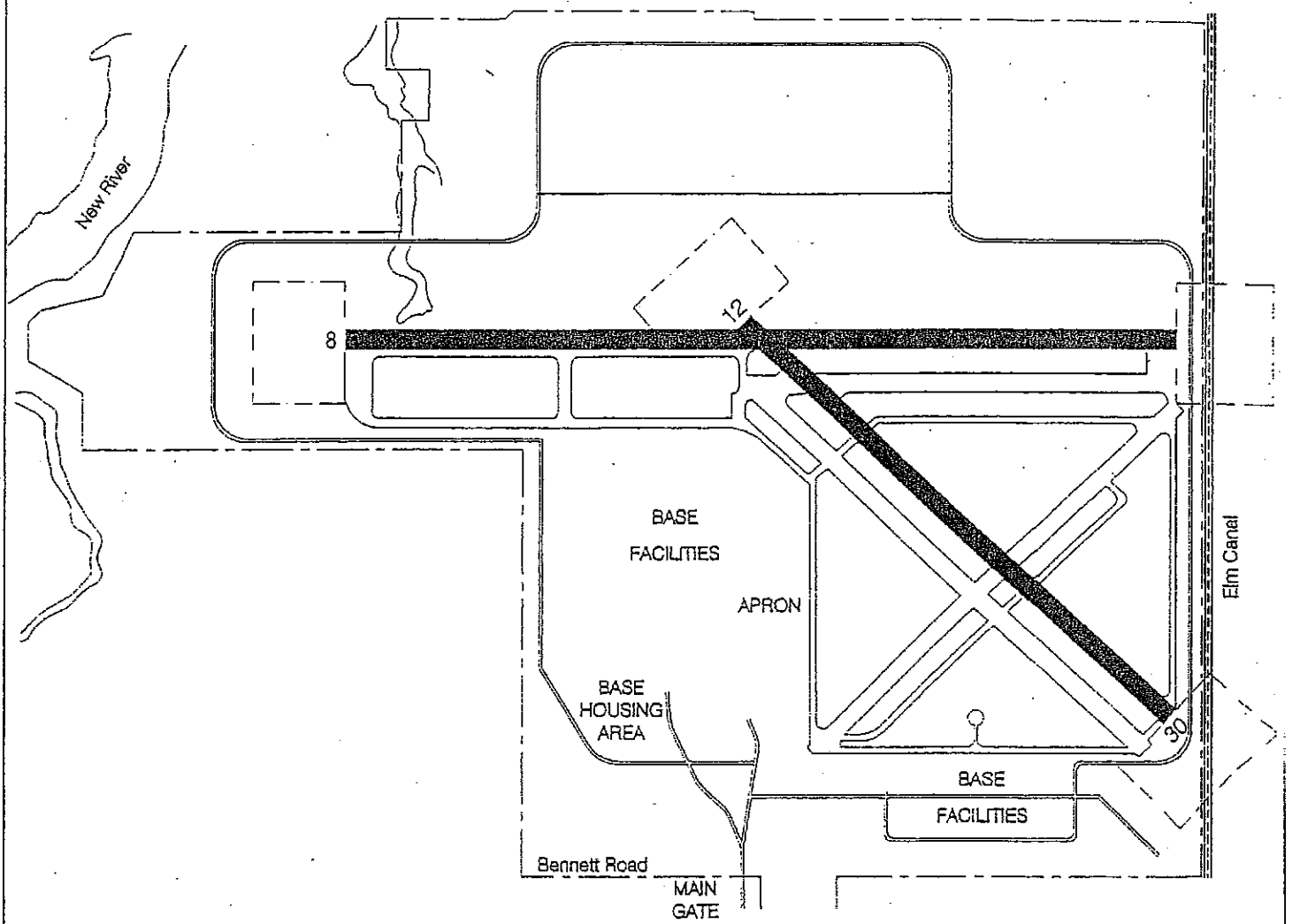
- ***Approach Type*** – TACAN, non-precision circle-to-land.
- ***Clear Zone*** – Mostly off base property; acquisition planned.
- ***Approach Obstacles*** – None.

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%	

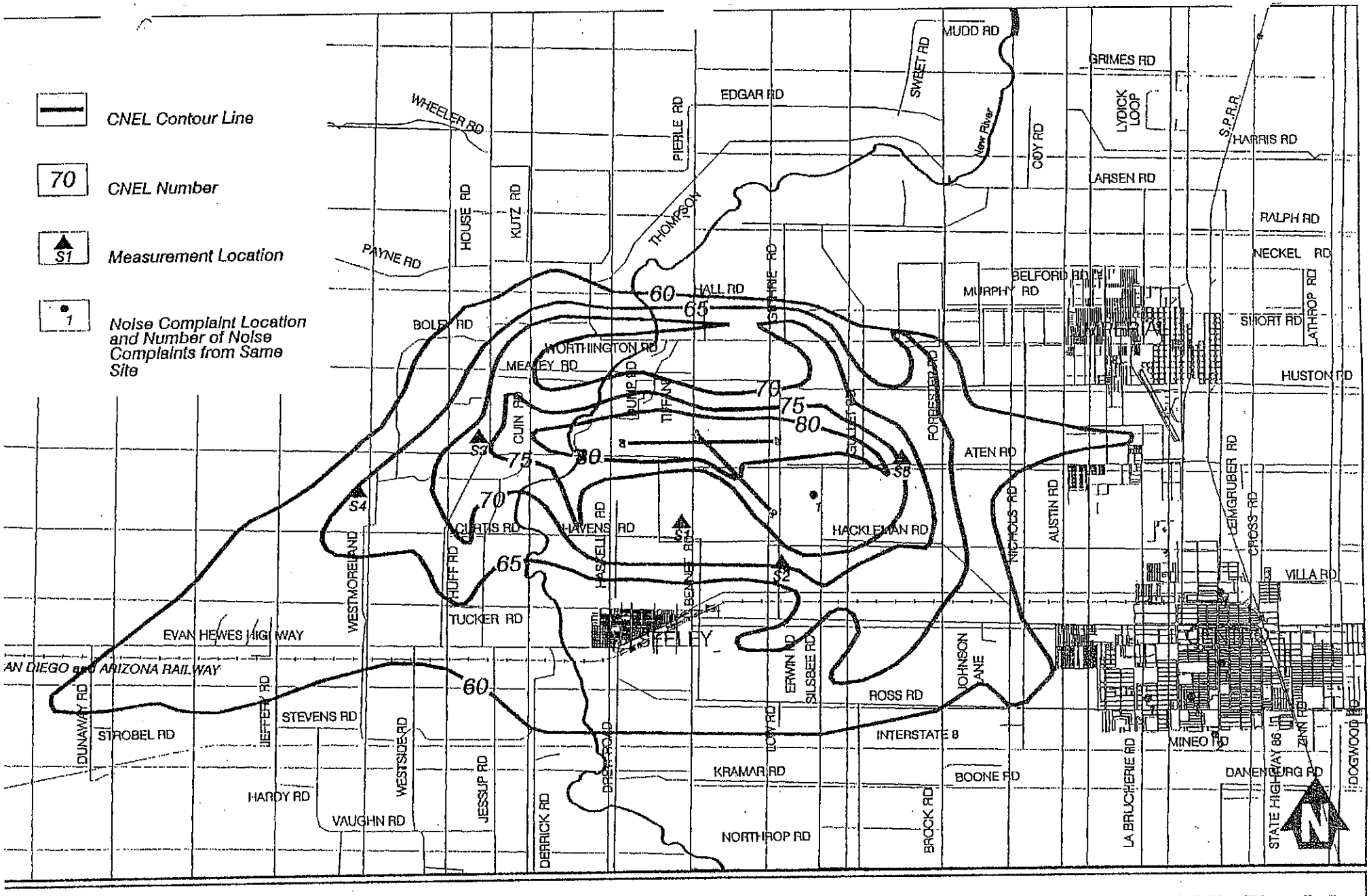
FLIGHT TRACK DATA

- 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.

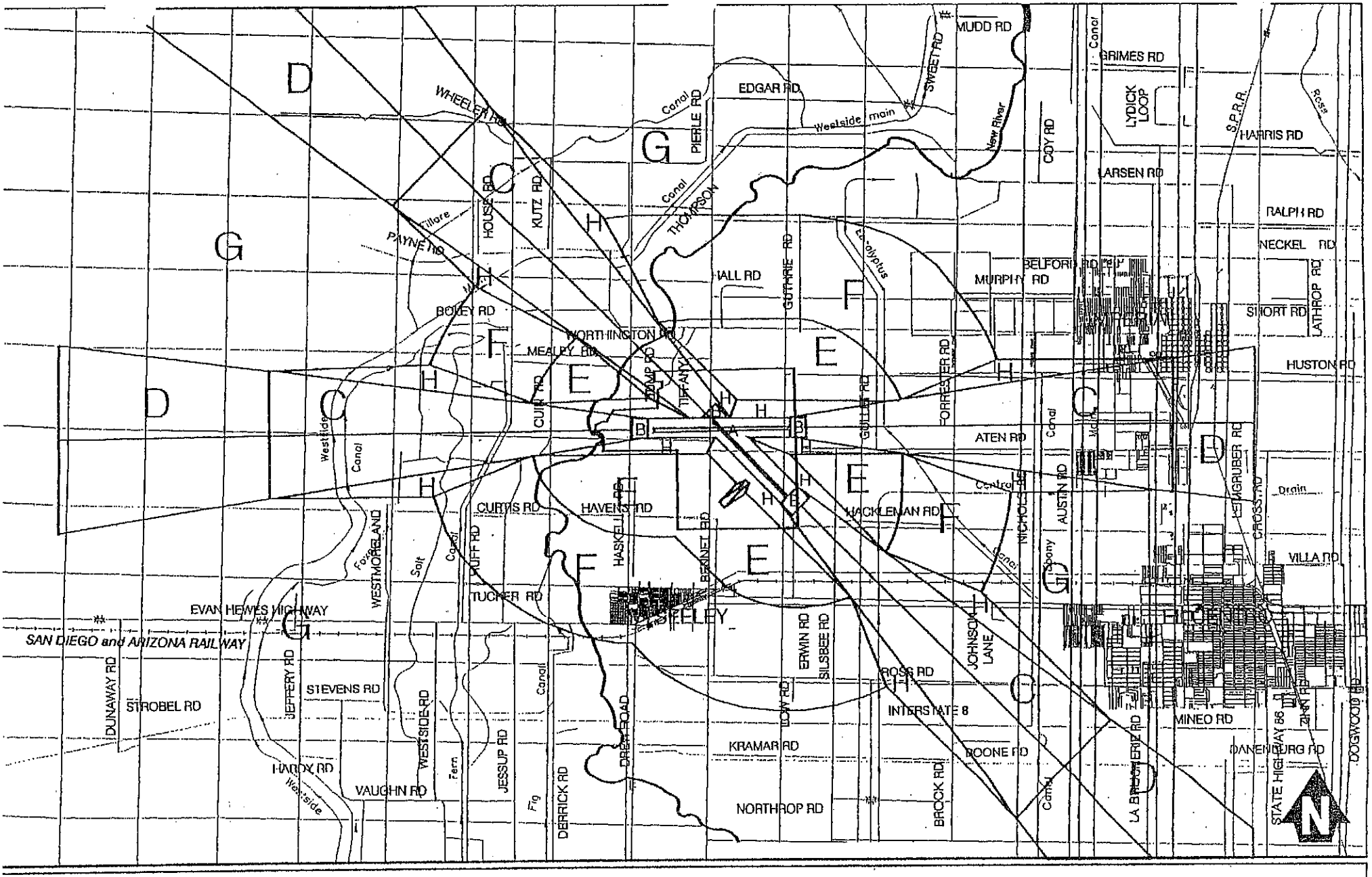


Background Data

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

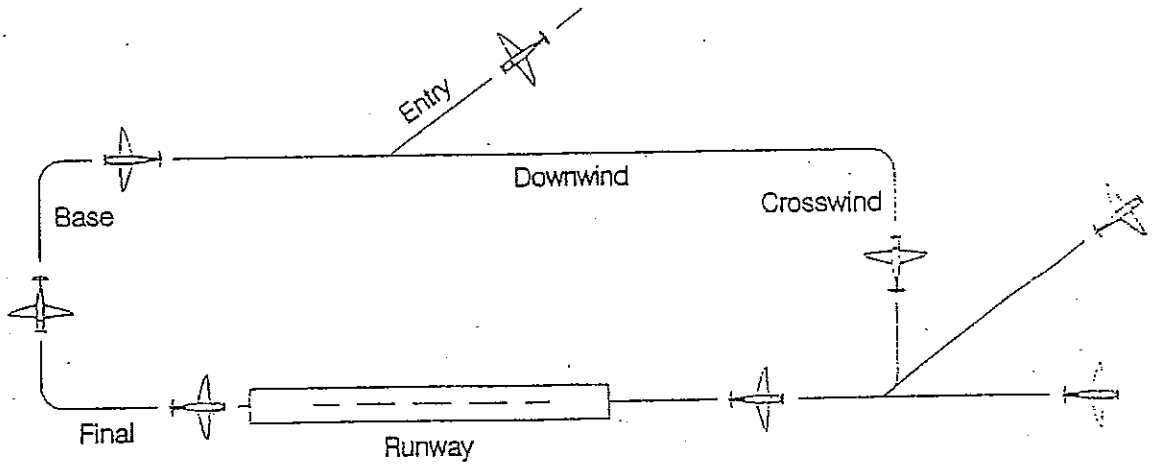
To facilitate the orderly, efficient, and safe operation of aircraft to and from airports, the Federal Aviation Administration has established standard aircraft traffic patterns. An airport traffic pattern is typically defined in terms of an altitude (or height above the airport) and a generalized routing. 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

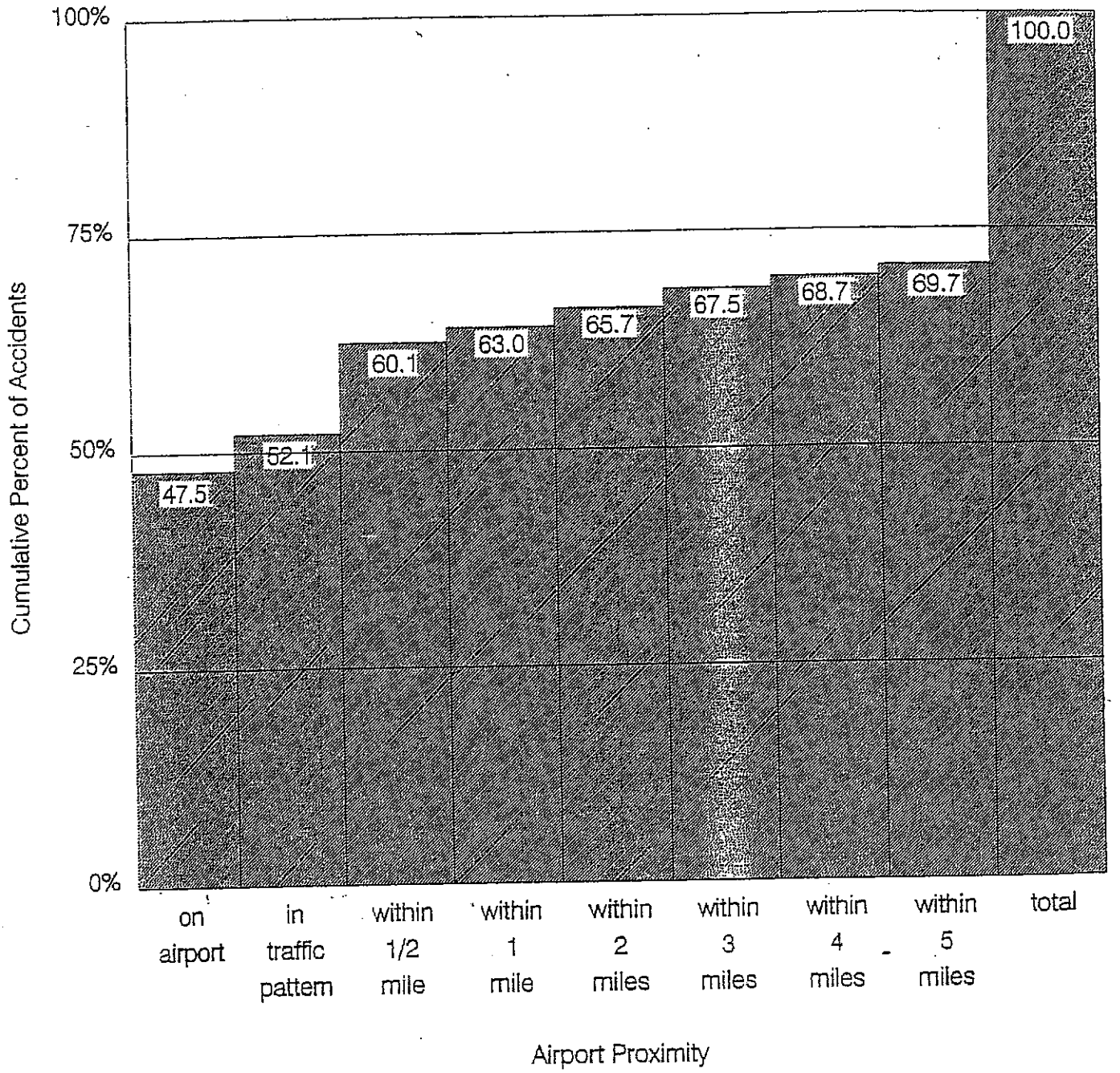
Buchanan Field	Concord, California
Chino Airport	Chino, California
Fullerton Municipal Airport	Fullerton, California
Hayward Air Terminal	Hayward, California
John Wayne Airport	Santa Ana, California
Palo Alto Airport	Palo Alto, California
Reid-Hillview Airport	San Jose, California
South County Airport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

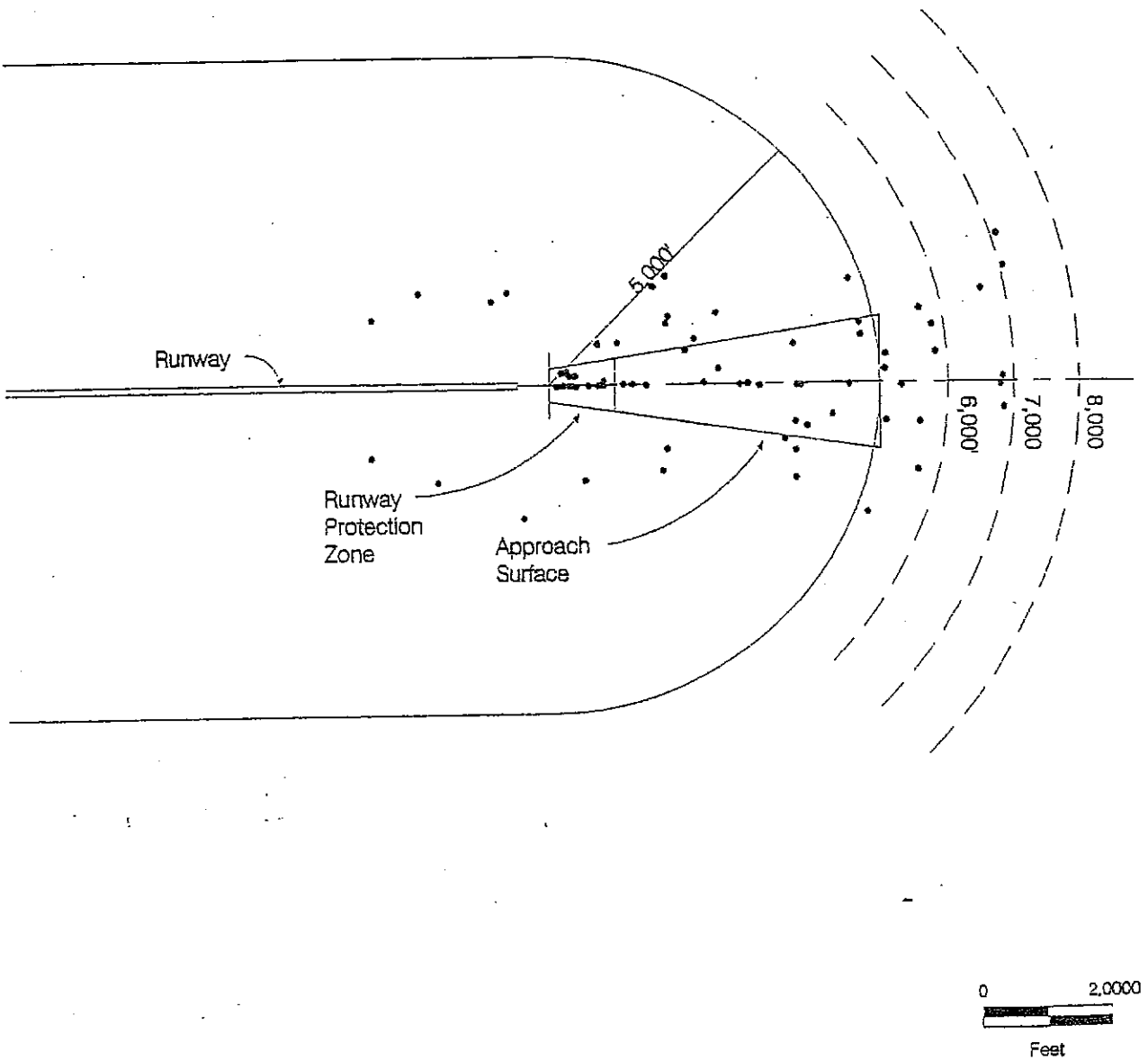


Source: N.T.S.B. Annual Review of Aircraft Data
U.S. General Aviation Calendar Years 1974-1978
Data is not published in this format for later years

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

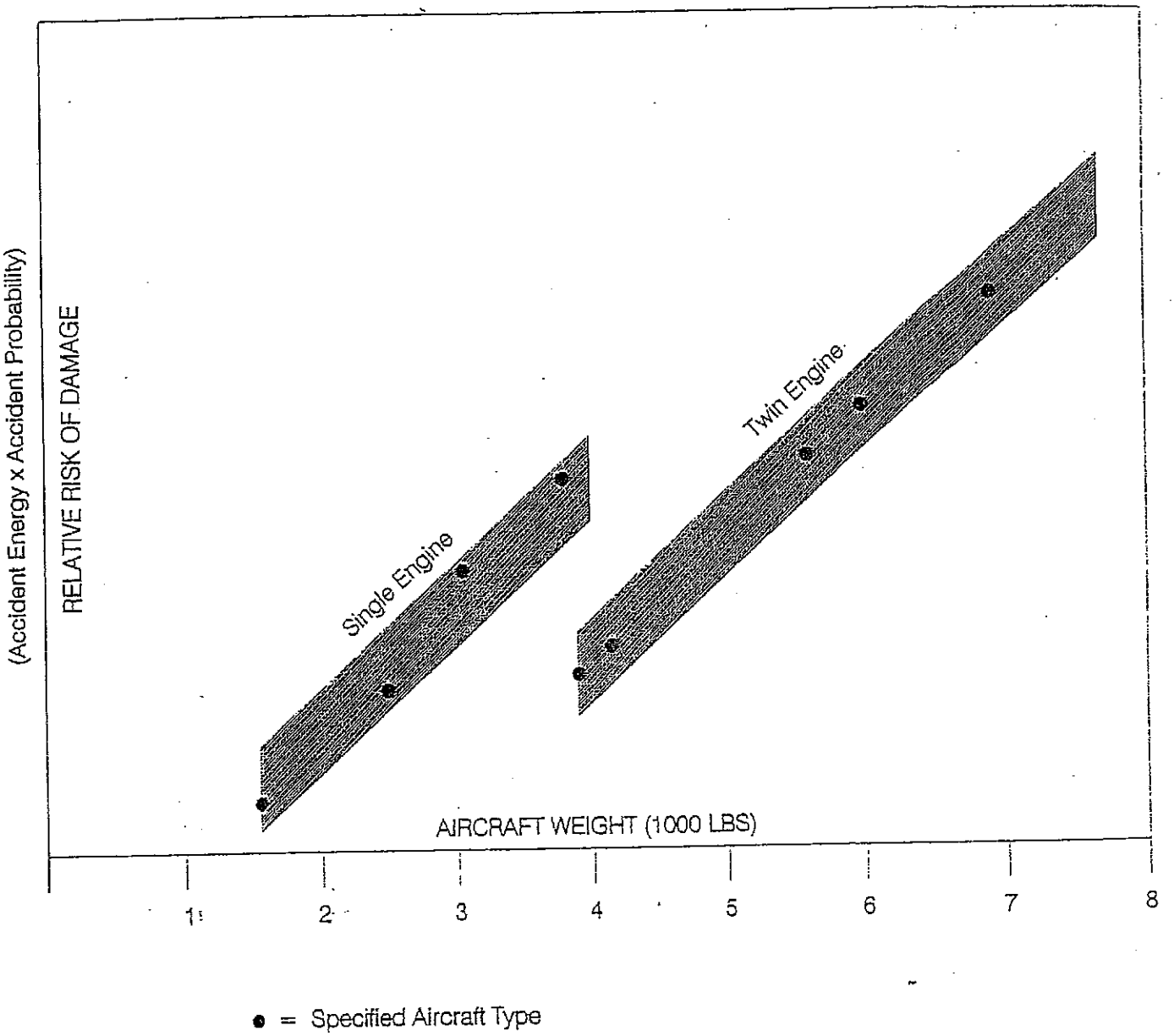
United States 1964-1982

	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

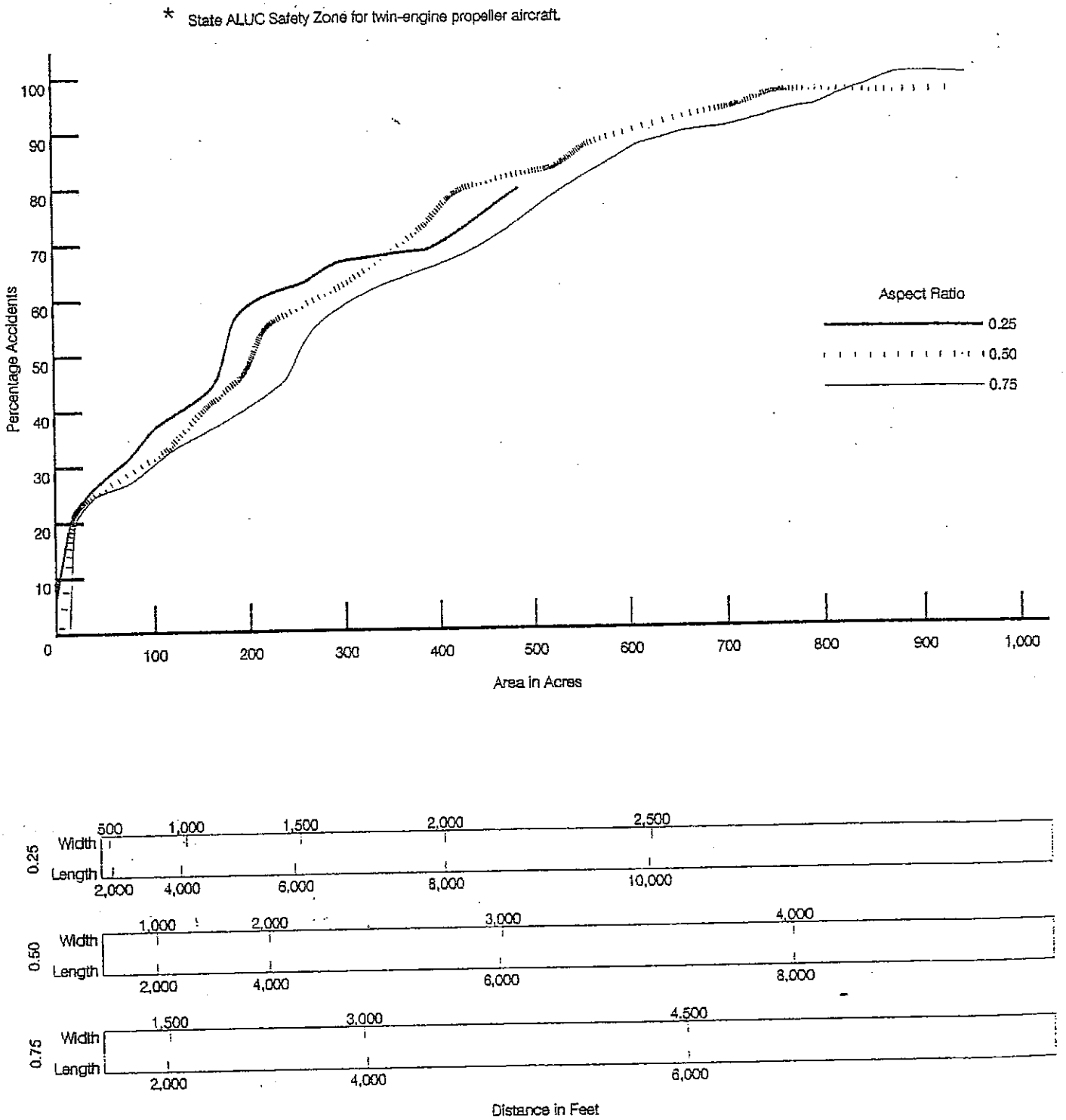
As discussed previously, the pilot of a disabled aircraft will, if possible, tend to aim the aircraft toward some form of open space when an off-airport emergency landing is inevitable. This tendency raises two questions:

- 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