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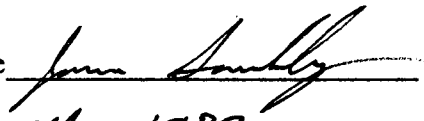
Signature 

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LAND USE COMPATIBILITY PLANNING FOR AIRFIELD ENVIRONS: INTERGOVERNMENTAL COOPERATION TO PROTECT LAND USERS FROM THE EFFECTS OF AIRCRAFT OPERATIONS

A Thesis

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ABSTRACT

In the past, airfield environs land use compatibility planning has suffered from a lack of cooperation between local, state and federal governments. Each has a role to play in terms of land use regulations, legislation, and policies, so it is important that there be intergovernmental cooperation in planning for the protection of residents around airports and military air bases. In an effort to promote such cooperation, the federal government has developed two programs, the Federal Aviation Administration Part 150 Airport Noise Compatibility Planning Program and the Department of Defense Air Installation Compatible Use Zone Program.

This thesis examines these federal programs as they have been applied at two case study sites: Tucson International Airport and Davis-Monthan Air Force Base in Tucson, Pima County, Arizona. The examination includes an analysis of the literature concerning each program and the results of personal interviews with planners who implement the programs. The State of Arizona's airport/air base planning enabling legislation is also evaluated in terms of whether it has strengthened the local governments' abilities to plan for airfield environs and promoted intergovernmental cooperation to that end.

The case studies illustrate the success of the Part 150 and AICUZ Programs in facilitating intergovernmental cooperation in airfield environs planning in Tucson and Pima County. In addition, the case studies emphasize the fact that Arizona's enabling legislation has been sufficient for some local governments in the past, but should be updated to mandate more specific powers for local jurisdictions.

The thesis concludes that land use planning and regulation is an effective means of promoting airfield environs land use compatibility, but that success depends on the establishment of a comprehensive, ongoing planning process that includes the participation of airport proprietors and private citizens as well as governmental agencies. Further, the thesis recommends possible means of establishing such a process through legislation, participation, cooperation, and implementation.

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INTRODUCTION

The dilemma of providing air transportation facilities while protecting land users from the potentially harmful impacts of aircraft noise and accidents is a problem facing many local governments. One reason for this has been the lack of cooperation between local, state and federal governments in airport and air base land use compatibility planning. Although local jurisdictions are primarily responsible for land use plans and ordinances, each level of government has an important role in protecting airfield environs residents. This thesis examines those roles and suggests ways in which the local, state and federal governments can cooperate through land use planning and regulation to promote airport/air base land use compatibility.

Background

The aviation industry has expanded dramatically in the United States since the early 1960's, due to society's increased reliance upon air transportation. This growth has not occurred without some problems. One is the noise level generated at airports with the advent of the jet aircraft. The U.S. Department of Housing and Urban Development and the U.S. Environmental Protection Agency are among the groups which have determined that a Day-Night Average Sound Level (Ldn) of 65 or greater is unacceptable for residential purposes. Used in this thesis as Ldn, the Day-Night Average Sound Level is the

> 24-hour average sound level, in decibels, for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for

> the periods between midnight and 7 a.m., and between 10 p.m., and midnight, local time. (14 Code of Federal Regulations 150.7)

Ldn is a useful measure because it determines the "cumulative exposure of individuals to noise." (Hixson and Tedrick, p. 10) In August, 1974, Ldn was adopted as the noise descriptor to be used by all U.S. federal agencies. By 1986, it was estimated that approximately five million residents in the vicinity of civilian airports in the U.S. were exposed to aircraft noise levels of Ldn 65 or greater. (Bragdon, p.37) In addition, thousands more reside in U.S. military air base environs where the noise level exceeds Ldn 65, with some residents exposed to noise levels greater than Ldn 75. (USEPA, p. 1) In all, "airport related noise effects some six to ten million people in the United States" at varying Ldn levels. (Hixson and Tedrick, p. 5)

Along with aircraft noise, the potential for aircraft accidents is a very real threat to the safety of those who reside in the vicinity of airports and air bases. In 1983, for instance, approximately 58% of the 1,049 general aviation accidents, and over 60% of the 184 commercial air carrier accidents in the U.S. occurred within five miles of the airport of departure or arrival. (NTSB, February 13, 1987, pp. 20-45) Similar hazards exist around U.S. military air bases. The U.S. Air Force, in a study conducted from 1968 to 1980, examined Air Force accidents which occurred within 11.5 miles of air bases. Of those 1,027 accidents, over 70% occurred within an area 15,000 feet long and 3,000 feet wide extending in a straight line from the runway. (Sacramento Airport Land Use Commission, pp. 28-32) In addition, the study revealed that 75% of all the accidents had a definable debris impact area, and that the average size of this area was 5.06 acres. (Sacramento Airport Land Use Commission, p. 32)

Although noise and accident considerations are important in any attempt to protect the public welfare through planning, they are especially critical in the vicinity of airports and air bases for a number of reasons. The most obvious is that of "the intensity and regularity of activity and the duration of exposure" to noise and accident potential around air facilities. (NATO, May, 1987, p. 16) Also, noise and accident impacts around airports are "particularly problematic in that impact areas are huge and airports, located near urban centers, tend to encourage subdivision." (Blitch, p. 683) This is true, as well, for military air bases, which "attract development to the surrounding area in response to the need for services." (Fittipaldi and Hottman, p. 278) The result of this attraction, for both airports and air bases, is that even those facilities "located in undeveloped areas when sited and constructed are now surrounded by urban development or lie in the path of advancing urban growth." (Fittipaldi and Hottman, p. 278) As this trend continues, more residents are exposed to the noise and accident potential from aircraft operations.

With this concentration of aircraft noise, accident potential, and urban growth, it is necessary to protect the health and safety of airport users and residents in the vicinity of air facilities. To be effective, this protection should be the result of cooperation between airport proprietors, local, state and federal governments, and private citizens. Such cooperation, however, is not always a simple matter. Sometimes, individuals' interests are in conflict with the public interest. Also, airport environs often cover parts of many jurisdictions, and cooperation between municipalities is not a given. Similarly, airport proprietors and local, state and federal governments have sometimes been at odds as to who should provide the protection, as well as how it might best be

accomplished. Because of such difficulties, the protection afforded airport users and those who reside in the vicinity of airports is often inadequate.

Research Question

The goal of this thesis is to promote the health and safety of airport and air base environs land users. Specifically, it does this by suggesting ways in which local, state and federal governments can work together to minimize the effects of aircraft operations through land use planning and controls. The thesis examines measures designed to alleviate aircraft noise and accident impacts, as well as local and federal programs for implementing these measures. Intergovernmental coordination for the protection of land users in the vicinity of airfields is the basis of these programs, and the focus of this thesis. The central research question is:

> How can local, state and federal governments cooperate through land use planning and controls to minimize the effects of aircraft operations upon land users in airport and air base environs?

In answering this question, the thesis suggests land use control policies, and details how they might be implemented through the coordinated efforts of all levels of government.

Organization

In terms of organization, the thesis looks at the issue of protecting land users around airfields from two perspectives: measures employed to promote the public's welfare in the vicinity of civilian airports and in the vicinity of military air bases. The thesis examines the roles of each level of government in dealing with the problems of

aircraft noise and accident impacts around both types of air facility. This examination is divided into four chapters.

Chapter I looks at a variety of measures used to alleviate the impacts of noise and accidents on areas surrounding both airports and air bases. Each alternative is dealt with in terms of strengths, weaknesses, and possible applications. Emphasis is on land use planning and regulation as a means of protecting airfield environs land users, and the legality of such regulation.

Chapter II deals with the state governments' roles in protecting land users in the vicinity of airports and air bases through land use planning and controls. Specifically, it includes an examination of the importance of state enabling legislation granting local governments the authority to enact and enforce land use policies and regulations on the basis of noise and accident potential. Enabling legislation from the State of Arizona, as it has been applied in Tucson and Pima County, serves as a case study in determining whether such legislation improves local governments' abilities to protect residents around airports and air bases. Since this case study is limited to the local application of legislation from a single state, it cannot serve as a model for enabling legislation nationwide. But it can offer insights into the types of issues that must be considered in connection with local governments' powers to plan for and regulate land use in airfield environs. In this, the case study can reveal potential problems which may be avoided in other states' enabling acts.

Chapter III examines the roles of local governments and the federal government in civilian airport compatibility planning. The focus is on the interaction between the levels of government in terms of land use planning and regulation. Chapter III looks at

the Federal Aviation Administration's Part 150 Airport Noise Compatibility Planning Program, which is designed to minimize the impacts of aircraft noise around civilian airports. The Chapter deals with how airport officials, using the Part 150 Program, identify and plan for the areas in which aircraft operations might be harmful to the public, and which land use controls and compatible uses the Program suggests. In addition, Chapter III outlines key legal questions concerning the Part 150 Program, with emphasis on the "taking issue." Lastly, Chapter III looks at how airport planners, local governments, and the federal government work together under this Program. These topics are addressed through an examination of literature on the Part 150 Program, as well as a case study of Tucson International Airport, where Part 150 has been implemented. Through the case study, which includes local government plans, airport plans, and interviews with officials from the airport and local and federal governments, the thesis reveals how an airport develops its Part 150 Program. This case study cannot provide a formula by which local governments may plan for airport environs land use in other localities, as it only examines the implementation of a specific program at a single airport. But it can illustrate the type of cooperative effort needed to implement a successful program of airport land use compatibility policies and controls.

Chapter IV is much like Chapter III, but it deals with local and federal governments' roles in protecting land users in the vicinity of military air bases. Again, the focus is on the interaction between the levels of government in terms of land use planning and regulation. Chapter IV examines the U.S. Air Force's Air Installation Compatible Use Zone (AICUZ) Program, which is intended to protect civilian land users from both noise and accident impacts. The Chapter focuses on how air base officials,

using the AICUZ Program, identify and plan for the areas in which aircraft operations might be harmful to the public, and which land use controls and compatible uses the Program recommends. Also, Chapter IV raises legal questions concerning the AICUZ Program, again with emphasis on the "taking issue." Finally, Chapter IV examines how air base planners, local governments, and the federal government work together under this Program. These issues are dealt with through an examination of literature on the AICUZ Program, as well as a case study of Davis-Monthan Air Force Base in Tucson, Arizona, where the AICUZ Program has been implemented. Through the case study, which includes local government plans, air base plans, and interviews with officials form the air base and local and federal governments, the thesis examines how an Air Force base develops its AICUZ Program. The case study is not intended to serve as a rigid model for planning around military airfields, as it examines the unique situation involving only one Air Force Base. Other bases will have different relationships with their surrounding communities. But the case study can serve as an example of how a cooperative planning effort helps to promote land use compatibility around military airfields.

Chapter V combines the information found in the previous chapters to answer the thesis' central question. First, it suggests land use policies and controls for airport and air base environs, based on literature reviews and interviews conducted throughout the research. More importantly, Chapter V outlines the ways in which local, state and federal governments can cooperate to enact these policies and regulations for the public's benefit. These suggestions are the focus and the culmination of the thesis.

This thesis will be a source of information for local governments dealing with the issue of land use planning for the areas surrounding airports and air bases. As our reliance upon air travel continues to increase, and as air facilities continue to attract development, land use planning and regulation will become more important in preventing incompatible uses which might conflict with the public health and safety. Through intergovernmental coordination, compatible uses can be found for the land in airfield environs.

CHAPTER I

ALLEVIATING THE IMPACTS OF AIRCRAFT OPERATIONS ON AIRFIELD ENVIRONS LAND USERS

As the impact of aircraft noise and accident potential has grown with the aviation industry in the United States, so has the list of measures intended to combat these problems. Many of these procedures, designed as noise abatement techniques, also serve to lessen the hazards of aircraft accidents. Generally, these measures fall into two categories. The first set is designed to reduce noise and accident potential at the source, with technological advancements in aircraft design, changes in aircraft operations, and improved airport layout. The second set is intended to reduce the impact of aircraft noise and accident potential around airports through land use planning and the land use controls available to local governments. Since any program to protect airport environs should contain elements of both categories, it is important to understand the strengths and weaknesses of some of these techniques.

Reducing Aircraft Noise and Accident Potential at the Source

There are many techniques which have been employed to reduce aircraft noise and accident potential at the source. They vary in complexity and effectiveness, but may be divided into three broad categories: aircraft design, aircraft operations, and airport layout. A brief description of some of the techniques in each category follows.

Aircraft Design: Aircraft safety, in terms of aircraft design, has taken great strides since the early days of aviation in the U.S. However, with the introduction of the jet aircraft, noise reduction has become a major problem. With the growth of commercial and military aircraft operations in the U.S., "noise abatement technology has always been available at a price, but efficiency and economic tradeoffs have often dictated the amount of that technology that aircraft manufacturers were willing to incorporate into their production." (Tedrick, p. 27) Despite this economic reality, noise abatement plays a major role in aircraft design, due largely to Part 36 of the Federal Aviation Regulations. This Part "established noise standards for new and amended type designs after December 1, 1969," and an amendment in 1973, "extended the same standards to all newly produced aircraft of older designs." (Hixson and Tedrick, p. 6) These standards are used to categorize aircraft into "Stages," with Stage 2 aircraft being noisier than Stage 3 aircraft, etc. Later amendments to Part 36 provided for the phasing out of certain aircraft not meeting Stage 2 or Stage 3 standards by January, 1985.

FAR Part 36 is important because it has generated technological advancements designed to produce aircraft which meet stringent noise emission standards. The military has worked with civilian industries in this respect, in order to develop quieter aircraft to replace older, noisier models. Technical discussions of such things as "hush kits" and retrofitting older aircraft are beyond the scope of this work, but the overall effect can only be helpful as a means of combating the noise problem. Part 36 and similar military noise abatement efforts might also reduce the potential for aircraft accidents around airports and air bases, as older aircraft are removed from active duty because of noise emission standards.

Aircraft Operations: The second broad category of techniques used to lessen noise and accident impacts at the source is the modification of aircraft flight procedures. Here emphasis is on the operation of the aircraft, not its design or production. Again, many of the measures are intended to alleviate the noise problem, but may also reduce the hazards of aircraft accidents in the vicinity of airfields.

One of these measures is a ban which prevents certain classes of aircraft from operating at a particular airport. This may range from "restrictions among types or categories of aircraft during certain times or areas of the airport" to a total prohibition of a type of aircraft. (Bragdon, p. 38) Usually, such bans are based upon FAR Part 36 noise certification standards for categories of aircraft. Although not directly applicable to military air bases, this type of ban may be beneficial for civilian airports. Eventually, it can help combat the noise impacts associated with airports, and might also reduce aircraft accident hazards by removing older models from operation.

This type of aircraft ban has been controversial. In 1986, for example, the San Francisco Airports Commission refused to allow Burlington Northern Air Freight to operate a Boeing 707 at San Francisco International Airport, even though the 707 was equipped with hush kits and met FAR Part 36 Stage 2 noise standards. (Aviation Week and Space Technology, July 21, 1986, p. 36) The FAA charged that the Commission was unjustly discriminatory, and threatened to cut off federal aid to the airport. The Commission claimed that FAA noise standards were flawed and that San Francisco's unique geography called for more stringent noise guidelines. (Aviation Week and Space Technology, July 21, 1986, p. 36)

A similar technique, curfews placed upon aircraft operations, has also been implemented at some civilian airports. Again, this may range from prohibiting certain types or categories of aircraft from operating during certain time periods, to a total ban on all aircraft operations during the curfew. Because of training requirements, such a curfew is not always practical for military air bases. It can, however, reduce the impacts of aircraft noise around civilian airports, especially during sensitive hours.

Operational curfews have also generated controversy. The legality of such curfews depends upon who owns the airport. According to the U.S. Supreme Court in Burbank v. Lockheed Air Terminal, Burbank, "no state or subdivision thereof may constitutionally use its police power to impose a curfew limiting the hours of operation of certain aircraft for the purposes of protecting its citizens against noise." (Blitch, p. 692) If a municipality owns an airport, it may impose a curfew upon that airport, but not upon airports operated by private concerns. The FAA warns that curfews "should be reserved as a strategy of last resort . . . because of their drastic negative impacts upon both aviation and the community's benefit from aviation." (FAA, August, 1983, p. 32)

A third technique designed to minimize noise impacts in airport environs by modifying operations is that of ground run-up restrictions. Ground run-up testing is necessary to ensure aircraft engine performance, but the procedure generates extreme noise levels. In a ground run-up, the "test may last several minutes up to more than an hour with a jet engine operating some of the time at full afterburner power and some of the time in lower power settings ranging from intermediate power to idle power." (NATO, May, 1987, pp. 4-5) Many airports and air bases have placed restrictions on

these tests, including "a time of day restriction, noise emission and duration limit." (Bragdon, p. 38) In addition, the restrictions often specify that aircraft engines be shut down and the aircraft towed to the site of ground run-up testing. Other measures used to lessen the effects of ground run-up tests are included in the discussion of airport layout and noise reduction.

The use of preferential runways is another operational modification intended to alleviate aircraft noise impacts around airports and air bases. This method diverts aircraft from noise sensitive areas, and is frequently used for nighttime operations. (Bragdon, p. 38) By employing a system of preferential runways to avoid noise sensitive residential areas, airport proprietors might also decrease the chances of damage on the ground as a result of an aircraft accident.

Some airports have instituted "noise budgets" as a means of reducing noise from aircraft operations. With a noise budget, commercial air carriers are, in effect, allotted a certain amount of noise which they may generate within a given period. Budgets might entail "single event or integrated noise levels applied to an individual aircraft operation, or the total number of operations over a specified time period." (Bragdon, p. 42) Although this technique has been employed at civilian airports, it would not be practical for military air bases.

Noise budgets of this type are not without criticism. The FAA is concerned that noise budgets might have an adverse effect on interstate and foreign commerce and on competition among air carriers. For these reasons, the FAA continually monitors these programs in an effort to ensure their consistency with fair trade practices.

Noise abatement flight profiles and displaced landings are other means of alleviating airport noise problems through operational adjustments. Often, these procedures result because "in the vicinity of airfields, the public demand steeper angles of approach and departure to reduce exposure to noise." (NATO, May, 1987, p. 5) Both noise abatement profiles and displaced landings modify the altitude and the angle of approach/departure as an aircraft arrives at or leaves an airport or air base. With a noise abatement profile, "this may involve a three-segment departure procedure or a higher than minimum altitude until glide slope intercept occurs on arrival." (Bragdon, p. 38) Using displaced landings, "aircraft are required to use a point on the runway displaced from the physical end so that the approach trajectory will place aircraft higher above noise sensitive land uses." (Bragdon, p. 42) Noise abatement flight profiles and displaced landings have been used at both airports and air bases as a means of reducing noise propagation in surrounding areas.

Noise abatement flight profiles and displaced landings, and municipal ordinances requiring their use, have frequently been upheld in the courts "where there was no conflict with federal regulation." (Blitch, p. 693) Criticism of these techniques does arise, however, in terms of aircraft safety. In this regard,

> flight and public safety must take precedence over any other requirement of flight operations. Therefore, when restrictions are imposed on power settings or flight profiles for noise abatement, it might be necessary for them to be infringed if the safety of an aircraft is threatened . . . Similarly, arrival and departure procedures at airfields can involve increased rates of climb and descent but these, again, must be secondary to safety and well within the performance envelope for a particular type aircraft. (NATO, May, 1987, p. 17)

In addition, noise abatement profiles and displaced landings have been criticized because they offer "little scope for improvement because any variation of flight is limited by

individual aircraft performance, weight, power-setting, and approach and climb speeds." (NATO, May, 1987, p. 5)

Noise abatement flight tracks, another operational modification, are doubly beneficial in that they protect airport environs land users from both aircraft noise and accidents. The practice of using noise abatement flight tracks, the most commonly used of all the operational changes, "involves the use of arrival and departure patterns over the least sensitive land use areas where feasible." (Bragdon, p. 38) With this operational adjustment, "approach and departure procedures over water bodies and agricultural or open space corridors are usually designated." (Bragdon, p. 38) Noise abatement flight tracks are commonly used at both civilian airports and military air bases.

Civilian airport proprietors, in trying to lessen noise impacts on surrounding areas, have also instituted two relatively new operational modifications: operational fees and systems of slots/capacities. With an operational fee, a monetary charge is applied to an aircraft, based upon its noise emission and time of operation, when it uses an airport. (Bragdon, p. 42) The airport proprietor collects these fees, and uses them for other noise abatement expenses. In addition, airport operators can "reward air carriers who go to extra lengths to reduce noise generated by their aircraft by providing a discount or reduction" in fees. (FAA, August, 1983, p. 31) With a system of slots/capacity, the proprietor sets a "limitation on the number of aircraft operations that can be allowed within a specified time period, passenger limit, or other airport services" using aircraft noise emission levels. (Bragdon, p. 42) Slots/capacity restrictions may be based on the cumulative impact of airport operations, the FAA certificated noise levels for particular aircraft, or estimated single event noise levels for certain aircraft. (FAA, August, 1983,

pp. 27-30) These newer measures, though not applicable to military airfields, have already been implemented at some civilian airports with severe noise problems.

Operational fees and systems of slots/capacities also pose difficulties. Unless based upon single event noise ratings for an aircraft, operational fees might be judged discriminatory. (FAA, August, 1983, p. 31) A system of slots/capacity is also likely to have "uneven economic consequences and should be employed only after careful consideration of other alternatives." (FAA, August, 1983, p. 27)

A last operational modification, and one which protects airport and air base environs land users from both noise and accidents, is the imposition of aircraft training restrictions. These restrictions usually apply to practice takeoffs and approaches, and range from allowing training during certain time periods to a total ban. (Bragdon, p. 38) Training restrictions are not applicable to civilian airports, but have been used at military air bases.

Airport Layout: The third general category of techniques, airport layout, is used primarily for noise abatement (layout measures intended for accident prevention will be discussed with land use controls). As urban development follows the construction of an airport, it is not enough to locate airports and air bases in remote areas. Remote locations may even be undesirable for civilian airports, as they are intended to serve urban areas. No matter the location of the airport or air base, then, certain design and layout techniques must be employed to protect land users from aircraft noise.

The simplest of these measures is to locate ground run-up pads in remote parts of the airfield, as far from developed areas as possible. (U.S. Dept. of the Air Force,

July, 1984, pp. 24-25) This is common practice in the layout of civilian airports and military air bases.

A second method is the construction of suppressed test cells or "hush houses" in which aircraft engines can be tested. Again, these engine test cells are located in remote parts of the airfield, and "have led to satisfactory noise reduction (50 dB or more) for the residents in the vicinity of military airfields." (NATO, May, 1987, p. 8) A third measure employed as a means of reducing noise impacts through airport layout is the use of such things as barriers, acoustical shielding, and blast fences. Vegetation has been used as a physical sound barrier at airports, but is generally ineffective unless both trees and underbrush can be planted in bands several hundred feet wide. (FAA, August, 1983, p.31) Other, more effective physical barriers work with suppressed test cells to reduce aircraft noise on the ground, and are in place at many civilian airports and military air bases.

A combination of changes in aircraft design, modifications in aircraft operations, and effective airport layout can help reduce the impact of aircraft noise around airfields. Some of these techniques can also help decrease the hazards of aircraft accidents in airport and air base environs. But the techniques are not foolproof, and some have been questioned on the grounds that they might be illegal or might impair aviation safety. Generally, the only techniques which may be used to reduce aircraft noise at civilian airports are those which do not "unjustly discriminate against any user, impede the Federal interest in safety and management of the air navigation system, or unreasonably interfere with interstate or foreign commerce." (Hixson and Tedrick, p. 4) Similarly, military air installations will not use some of these noise abatement strategies,

as they might jeopardize flight safety or prove incompatible with mission requirements. Even when the most effective measures designed to reduce aircraft noise and accidents at the source are used, large areas in airport environs are still impacted by noise and accident potential. Therefore, they must be accompanied by a second broad category: techniques intended to reduce exposure to noise and accident potential through land use planning and controls which prevent incompatible development around airfields.

Reducing the Impacts of Aircraft Noise and Accidents Through Land Use Planning and Regulation

As the techniques for reducing aircraft noise and accidents at the source have not been completely successful, it is necessary to plan for the land use around airfields, and implement land use controls which prevent incompatible development. This is especially true where urban growth follows the construction of an airport or air base.

Land use planning and regulation is part of local governments' police power to protect the public welfare. Local municipalities derive this power from state enabling legislation. Increasingly, local governments are using this police power to deal with questions concerning land use in airport environs.

Around airports, land use controls generally fall into two categories. The first protects aircraft from hazardous land uses. The second category protects airport environs land users from aircraft noise and accidents. The categories are not mutually exclusive. Preventing incompatible uses which might interfere with aircraft operations, for instance, also helps protect land users. The main difference between the two categories is that the controls for the protection of land users prevent uses which are

incompatible with airport noise, while those designed for the protection of aircraft operations do not. Both categories reduce the potential for aircraft accidents, as well as the impact of accidents on land users, by preventing incompatible uses. A discussion of some of the land use measures employed in the vicinity of airfields follows.

One of the most basic land use controls, zoning plays an integral role in preventing incompatible uses and in lessening the impacts of noise and accidents around airports and air bases. Again, in terms of airport environs land use, there are two general types of zoning ordinances:

> Ordinances limiting the height to which structures may be erected or natural objects permitted to grow, so that airport approaches will be free of obstructions (airport hazard zoning), and ordinances designed to alleviate noise disturbances caused by aircraft landing and departing from airports (airport noise zoning). (Blitch, p. 698)

These zoning ordinances are not mutually exclusive, and usually work together as one airport zoning ordinance. Often, these airport zoning ordinances take one of three forms:

> One may be an arrangement of a jurisdiction's normal zoning districts in such a way that only those districts excluding noise sensitive uses are located within an airport's noise impact areas. Another form may be one or more special zoning districts which specifically exclude uses which would be in conflict with the airport and its noise. The third form is that of an overlay district, superimposed upon the overall zoning pattern, which excludes noise sensitive uses and uses conflicting with the airport's operation without changing the base zoning. (Hixson and Tedrick, p. 12)

This third form of zoning is becoming the most widely used form of airport zoning in the U.S. (Hixson and Tedrick, p. 12) It has been proven as an effective technique for protecting aircraft operations and land users around airfields.

A second land use control which helps protect aircraft operations and, consequently, land users, in the vicinity of airports is the acquisition of easements. An easement may be defined as:

> The right to use the land of another for a specified purpose. Usually, the owners of the land continue in possession and may use it as long as such use does not interfere with the purpose for which the easement was granted. An easement may be acquired for a specific term or in perpetuity. (U.S. Dept. of the Air Force, December 27, 1985, p. 29)

These easements are leased or purchased by the airport proprietor, whether it is a private body or a municipality, at civilian airports. They are also leased and purchased for military air bases. For airport and air base environs, specific types of easements help protect aircraft operations and land users. The first type is a "clearance easement." It grants the proprietor the right to "remove or prevent obstructions rising into the airspace." (U.S. Dept. of the Air Force, December 27, 1985, p. 29) The second type is an "expanded clear zone easement." It grants the proprietor the right to prohibit all incompatible uses within a specified distance of the runway, minimizing interference with aircraft operations. (U.S. Dept. of the Air Force, December 27, 1985, p. 30) A combination of these easements can help reduce the potential impacts of aircraft accidents around air facilities.

The surest way to prevent incompatible uses around airports and protect aircraft operations and land users is the acquisition of large tracts of land by the airport proprietor or local government. This goes beyond the purchase of easements, as the proprietor now owns the land in the air field environs. Often, this property acquisition becomes a form of "land banking," where the proprietor purchases the property

intending to sell it in the future when compatible development proposals come along. (Bragdon, pp. 42-44)

Development incentives, such as special tax incentives, are another land use tool implemented to prevent incompatible uses in airport environs. (Bragdon, p. 44) A municipality can use such incentives in a number of ways. The local government might offer residential developers and homebuyers tax incentives (such as lower assessments) to purchase property away from airport environs. Conversely, those who would develop compatible uses around airports could receive similar tax incentives. Other possible incentives include free or low cost sewer and water hookups and higher densities for those who develop away from the airport or air base. Generally, a system of incentives for compatible uses and disincentives for incompatible uses helps ensure the safety of the aircraft as well as the land user.

By examining each development proposal on a case-by-case basis through a system of site/proposal review, local governments can further prevent incompatible uses around airfields. In the site/proposal review process, "environmental factors, including noise, are considered and solutions are integrated into the plat or land plan." (Bragdon, p. 44) Every development proposal is evaluated in great detail, and judged upon its own merits rather than "a recipe which is supposed to meet all situations." (U.S. Department of the Air Force, July, 1984, pp. 4-5) This works as a type of performance measure in determining whether a proposed development is acceptable in the vicinity of an airport.

Municipalities often use capital improvement funds to guide development, and can use them to prevent incompatible land uses around airports. (Bragdon, p. 42) By providing the necessary infrastructure, such as sewer and water lines and roads, in areas

deemed suitable for development, local governments can draw incompatible uses away from airports. At the same time, the municipality can provide the infrastructure for the airport, and limit the availability of these services to those land uses which are compatible with the operation of an airfield.

Some local governments have discouraged incompatible uses around airports by disclosing noise levels and accident potential to prospective developers, homebuyers, and lending institutions. (Bragdon, p. 42) Such a policy can even take the form of "truth-in-sales" ordinances which require disclosure by law. This is especially useful when the proposed development relies on federally assisted and insured financing. Both the Department of Housing and Urban Development (HUD) and the Veterans Administration (VA) have policies against lending for new construction in areas with unacceptable noise levels. Similarly, private lenders are not likely to provide loans for projects in areas where noise levels and accident potential might decrease property values.

Another measure employed by local governments to prevent incompatible land uses and to lessen the impacts on existing incompatible uses around airports is the enforcement of stringent building codes containing "noise performance requirements . . . including minimum sound transmission requirements." (Bragdon, p. 42) These building codes often call for sound insulation or soundproofing, the "application of sound control materials to a structure, including the building envelope, to reduce the transmission of sound." (Bragdon, p. 42) This helps prevent incompatible uses by increasing developers' costs, and can help protect the health of land users in existing incompatible residences.

As is the case with the measures designed to reduce aircraft noise and accident potential at the source, land use planning and controls have not been wholly successful in protecting airport environs land users. Part of this failure is due to the multi-jurisdictional nature of airport environs. Different local governments have different ways of dealing with the issue. Part of the failure might be because of weaknesses in the land use control measures themselves. Some are very costly, while others are simply ineffective. Part of the failure also has to do with philosophical and legal questions concerning the role of land use planning and regulation in society.

Property acquisition, for example, is the most complete form of land use control, and local governments have used their powers of eminent domain and condemnation to protect residents in airport environs. In terms of using eminent domain, "there is no serious disagreement with the proposition that airport purposes constitute a public use" and that "the exercise of eminent domain is thus allowed in the furtherance of airport development." (Blitch, p. 697) But the use of eminent domain as a means of protecting airport environs land users has raised some questions. Critics see "problems in governmental jurisdiction" and of "stretching the interpretation of 'eminent domain' to include areas at a distance from the airport." (Baron, p. 168) Thus, property acquisition might not be the most practical alternative for protecting land users around airports.

The acquisition of easements can also pose problems. For one thing, drafting an easement in terms of aircraft type, frequency, altitude and duration of flights, or noise levels could "present insurmountable difficulties . . . and be viewed as an attempt to create a right to inflict injury upon the inhabitants of the property." (Lorenz, Determination, pp. 46-47) Yet some courts have held that increases in the frequency

and loudness of aircraft operations beyond the terms of an easement constitutes a taking. (Lorenz, Determination, pp. 46-47) The problem is how to draft an easement which can account for the possibility of increased aircraft operations and noise in the future. A second problem with easements is that they must be very specific in terms of including the right to operate aircraft at certain altitudes over private property as well as the right to regulate the land use on that property. (Lorenz, Determination, p. 45) Again, it's difficult to predict cases in which aircraft might need to violate such altitude restrictions for the sake of aviation safety. Generally, easements must be straightforward as to what the airport or air base proprietor and the property owner may each do with regard to the property in question. Such specificity is not easily achieved when dealing with future events.

The use of building codes requiring soundproofing as a means of protecting airport environs land users has also been criticized. Usually, critics argue that such building codes are "either too costly, ineffective, or both." (Blitch, p. 698) The legality of such codes as a part of local governments' police power has also been questioned.

However, no land use control for the protection of airport environs has received so much criticism as zoning. This entails philosophical and legal questions about land use regulation itself. Critics of airport zoning ordinances point to a number of shortcomings:

1. Zoning is the domain of state and local governments, so the federal government has no power to enact and enforce zoning around airports or even federal air bases. (Hixson and Tedrick, p. 13)

2. Zoning is not retroactive, so it has "limited influence on existing development." (Hixson and Tedrick, p. 13) This limited influence often leaves a number of existing nonconforming uses. In these situations, local governments must take remedial actions, the degree

of which "will be dependent upon the degree of urbanization around the airport." (FAA, August, 1983, p. 36)

3. Zoning controls are "normally applicable to those areas within the boundaries of the zoning jurisdiction," despite the fact that "airport noise impacts often span several zoning jurisdictions." (FAA, August, 1983, p. 34, and Hixson and Tedrick, p. 13) It can be difficult for these municipalities to cooperate in formulating effective zoning ordinances for the whole airport impact area.

4. Zoning is not permanent, and may change at any time, allowing incompatible development after the airport is completed. (FAA, August, 1983, p. 33)

5. Zoning, which is often cumulative, can permit incompatible development by allowing "higher" uses (such as residential) in lower use districts such as those around airports. (FAA, August, 1983, p. 34)

6. Zoning is not equitable, as it forces jet noise victims to move instead of pressuring the aviation industry to reduce noise at the source. (Baron, pp. 167-168)

These are legitimate criticisms of zoning, and are especially relevant in terms of zoning around airports and air bases. But the same limitations could be offered as an argument against zoning in many land use contexts. It must be remembered that zoning is not a panacea for the protection of airport environs land users. But it is one of the many methods which should be used in any plan to reduce aircraft noise and accident impacts, and it is a valid exercise of local governments' police power:

> Although it has been argued that the most equitable adjustment of the rights and interests of the landowners and municipalities is to hold that all airport zoning ordinances are an unconstitutional taking, it is equally plausible to argue that any municipal regulation, including building setbacks and density limitations, is also a taking. Every instance of zoning affects property values, yet zoning has long been recognized as a constitutional and effective mechanism for guiding the direction and character of urban growth. Single family homes should be separated from many objectionable urban uses, including airports, and there is no reason for considering airports any different from the factories and rendering plants now routinely separated from residential areas through zoning." (Blitch, pp. 700-701)

Not only is zoning valid for airport environs, it can be effective as well. The primary advantage of zoning is that it "may be used to promote land use compatibility while leaving the land in private ownership, on the tax rolls, and economically productive." (FAA, August, 1983, p. 33) Another advantage is that zoning does not require local jurisdictions to provide compensation. Zoning's practical basis is that "within its limitations and legal constraints" it is an "effective tool for compatible land use when it is used constructively in conjunction with source noise reduction and a comprehensive planning process." (Hixson and Tedrick, p. 13) The same may be said for land use planning and regulation in general, as each land use control has individual strengths to contribute to an overall airport environs land use plan. For example, easements also promote land use compatibility while keeping private property on the tax rolls, and, unlike zoning, can be permanent. (FAA, August, 1983, p. 33) In addition, easements are practical for airport land use planning because they "may be acquired for a fraction of the total value of the land and thus be less expensive than outright purchase." (FAA, August, 1983, p. 33) Additional benefits of land use control measures will be dealt with later in the thesis, for they are "perhaps the most fruitful countermeasure against aircraft noise" in airport environs." (Ashford and Wright, p. 414) The key is that this land use planning and regulation must work together with efforts to reduce noise and accidents at the source.

For land use planning and regulation to be successful in airport and air base environs, it must be the result of intergovernmental cooperation at the local, state and federal levels. The remainder of this thesis examines this cooperative relationship to find ways of making it easier to establish and more effective in meeting its goals.

CHAPTER II

THE IMPORTANCE OF STATE ENABLING LEGISLATION IN AIRFIELD LAND USE COMPATIBILITY PLANNING

Background

With the primary authority to enact and enforce land use control regulations, local governments have the major role in planning for the protection of residents in the vicinity of airfields. But state governments also play an important part. States are involved in the intergovernmental effort to protect airfield environs land users through special state land use control regulations and through their authority to create enabling legislation.

Because of the multi-jurisdictional impacts of aircraft noise and accidents in the vicinity of airfields, many states have enacted special statewide land use control laws to help alleviate the problem. As of 1986, 26 states had adopted special noise control regulations for airport environs. (Bragdon, p. 37) This trend results as "the recognition grows that some types of land . . . must be controlled in their entirety, regardless of local boundaries," and so "some land use control authority (i.e. zoning) has been taken back by the state." (U.S. Dept. of the Air Force, July, 1984, p. 8) Proponents argue that the "intent of these changes has not been to strip local governments of their power, but to provide mechanisms for addressing problems which are beyond the local governments' capability." (U.S. Dept. of the Air Force, July, 1984, p. 8) Some planners feel that the growing role of state governments in airport environs planning "promises to complement

and strengthen planning at the local level by providing additional means for achieving local goals, particularly where the achievement of those goals is dependent upon the actions of other jurisdictions." (U.S. Dept. of the Air Force, July, 1984, p. 8)

The states have their greatest influence on airport and air base environs land use, however, through their ability to create enabling legislation. States use enabling legislation to delegate powers to local governments. Among these are local governments' regulatory powers, which usually include the right to engage in land use planning and regulation for the public welfare. Each state's enabling legislation concerning land use regulation varies, but,

> Most states enable local governments (municipalities, counties, parishes, etc.) to enact comprehensive ordinances to protect and promote the public health, safety and welfare. These acts, for the most part, do not cover the question of airport environs land use as it is affected by flying activities (i.e., noise or aircraft accident hazards to the land user). (U.S. Dept. of the Air Force, July, 1984, p. 27)

Generally, state enabling legislation has dealt with land use control powers which prevent hazards to aviation, not specifically with powers to protect land users from the effects of aircraft operations. As a result, "arguments against ordinances regulating land use on the basis of such noise or aircraft accident hazard criteria have been successful when the enabling act language omitted such criteria as a basis for regulatory ordinances." (U.S. Dept. of the Air Force, July, 1984, p. 27) This makes regulating land uses on the basis of both noise and accident potential difficult in states with inadequate legislation.

There are, however, some states which have adopted enabling acts granting local governments the specific authority to regulate land use around airports and air bases on the basis of noise as well as accident potential. The States of California, Arizona, Minnesota and Ohio have led the way in this type of legislation. Arizona has enacted

special enabling legislation for those jurisdictions with military air bases. It allows local governments to regulate land use for the protection of residents who are exposed to high levels of aircraft noise and accident potential. But the Arizona enabling legislation concerning land use regulation for civilian airport environs contains no such provision. Because of this juxtaposition, Arizona's legislation serves as a good case study. This chapter examines the State of Arizona's enabling legislation, as it has been applied in Tucson and Pima County, to determine if the provisions which specifically mandate land use controls on the basis of noise and accident potential improve local governments' abilities to protect residents around air facilities. Is such special legislation necessary, or is the State's general planning and zoning enabling legislation sufficient to protect airport environs land users from the impacts of noise and accidents?

Arizona's Airport/Air Base Zoning Enabling Legislation

As is the case with many states, Arizona has enacted legislation which enables local governments to regulate the use of land around airfields. In terms of local governments' actual powers, though, the legislation makes a distinction between civilian airports and military air bases. Both types of airfields are included in "Airport Zoning and Zoning Regulations," Section 2, Chapter 3, Article 2, of the Arizona Revised Statutes.

The Arizona act defines an airport as "any area of land or water designed and set aside for the landing and taking-off of aircraft and utilized or to be utilized in the interest of the public for those purposes" (Section 2-321). Further, the act defines an airport hazard as "any structure, tree or use of land which obstructs the air space

required for flight of aircraft in taking off or landing at an airport, or is otherwise hazardous to aircraft taking off or landing" (Section 2-321). The regulations also declare:

1. That creation or establishment of an airport hazard is a public nuisance and a public injury to the community served by the airport.

2. That it is in the interest of the public health, public safety, and general welfare that the creation or establishment of airport hazards be prevented.

3. That prevention of these hazards should be accomplished to the extent legally possible by exercise of the police power without compensation. (Section 2-322)

To prevent and/or eliminate airport hazards, the legislation states that "political subdivisions may raise and expend public funds and acquire land or interests in land" (Section 2-322). The act also provides that "every political subdivision having an airport hazard area within its territorial limits may adopt, administer, and enforce . . . airport zoning regulations for the airport hazard area" (Section 2-334). Thus, in Sections 2-321 through 2-333, the Arizona legislation grants local governments the authority to regulate land use on the basis of hazards to the operation of an airport.

However, only the legislation specifically dealing with military air bases grants local governments the power to regulate land use on the basis of aircraft noise. Some civilian airports, such as Tucson International Airport and Phoenix's Sky Harbor International Airport, might be included in the act because of Air National Guard flight activities. But the legislation is not clear on this point, and seems to exclude all civilian airports not used for military aircraft operations. Section 2-335 of the Arizona act states that

> Any political subdivision having territory in the vicinity of a military airport shall adopt land use plans and adopt and enforce zoning

> regulations to assure compatible development with the high noise and accident potential generated by military airport operations which have or may have an adverse effect upon public health and safety.

In addition, the legislation allows local governments to "acquire by exchange, purchase, lease, donation, devise or condemnation land or interests therein for the continued operation of a military airport" (Section 2-334). As an extra measure of protection, the legislation concerning military air bases mandates noise and accident potential disclosure:

> Each political subdivision shall notify any property owner who would be impacted by a high noise and accident potential zone identified by the land use plan or zoning regulations," and such property owner "shall notify potential purchasers of the property and potential lessees or renters of such impact (Section 2-335).

Thus, the Arizona enabling legislation mandates land use regulation on the basis of noise as well as accident potential around military airfields. It empowers local governments to engage in noise zoning, the acquisition of easements, and noise and accident potential disclosure in the vicinity of military air bases. But the legislation dealing with civilian airports specifically authorizes the regulation of land use on the basis of airport hazards only. One clause in the legislation mentions the impacts of noise around civilian airports, and that clause is found in the section pertaining to military airfields:

> Nothing in this section shall affect the existing authority of a political subdivision to plan and zone on the basis of noise or accident potential in the vicinity of any airport owned or controlled by the political subdivision (Section 2-335).

But this clause, and Arizona's enabling legislation concerning airport/air base compatibility planning, poses some potential problems.

The mention of "the existing authority of a political subdivision," for example, is ambiguous, as the authority to regulate land use on the basis of noise around civilian airports is not specifically covered elsewhere in the legislation. The clause also does not

apply to all civilian airports, only those owned or controlled by a political subdivision. So the authority to regulate land use on the basis of noise around civilian airports not owned or controlled by a local government, such as Tucson International Airport, is never clearly spelled out in the enabling legislation. In addition, the Arizona legislation concerning civilian airports could pose legal problems by mandating airport hazard zoning. For example, in neighboring California "airport hazard zoning . . . remains questionable as a valid exercise of the police power." (Blitch, pp. 698-699) But airport noise zoning has been upheld in California, "for the purpose of preventing damage claims that might be brought by future residents of property adjoining the airport." (Blitch, pp. 698-699)

The central issue for Arizona's enabling legislation is whether it improves local governments' abilities to regulate land use on the basis of noise as well as accident potential for the protection of land users. Do local governments in Arizona have sufficient authority to control land use around civilian airports on the basis of noise through general planning and zoning enabling legislation, or is there a need for more specific authority as contained in the legislation concerning military airfields?

Despite possible ambiguity in the Arizona enabling legislation, local governments do engage in noise zoning around civilian airports as well as military air bases. The legislation was amended in 1986 to authorize noise zoning around military airfields, but it has never been amended to include such specific powers for zoning in civilian airport environs. Yet some Arizona jurisdictions concluded that the state's general planning and zoning enabling legislation was sufficient to authorize zoning on the basis of noise around military air bases, and even civilian airports, before the 1986 amendment.

Although it required revision and was finally adopted in 1986, Pima County originally enacted a noise zoning ordinance around Tucson International Airport, Ryan Field, Pinal Airpark, and Davis-Monthan Air Force Base in 1985. Bob Johnson, Director of Planning and Development Services for Pima County, says that the ambiguity of the legislation concerning civilian airports "could be a legal problem." (Johnson, 1988) But, Johnson explains, "the position of Pima County is that they adopted the ordinance, they felt it was in the best interest of the public, and if someone doesn't like it then they can challenge it." (Johnson, 1988) Johnson also states that the County felt it had the statutory authority to enact a noise zoning ordinance, and that "the general enabling legislation was justification enough to say that the ordinance was appropriate." (Johnson, 1988)

Since Pima County originally adopted its noise zoning ordinance in 1985, the Arizona enabling legislation concerning military airfields did not affect the ordinance and its regulation of land use around Davis-Monthan AFB either. Geno Patriarca, Director of the Community Planning Department at Davis-Monthan, says that the state legislation served to legitimize the County ordinance after the fact, but that it did not serve as an impetus for the ordinance. (Patriarca, 1988) Bob Johnson agrees, saying that the County "went ahead and adopted the ordinance without the legislation." (Johnson, 1988) Johnson adds that "the legislation came along, so now we have the statutory authority to do what we did" around Davis-Monthan, and that "the lack of legislation didn't keep us from adopting the ordinance." (Johnson, 1988)

Similarly, the City of Tucson intends to adopt a noise zoning ordinance in the near future for the area around Tucson International and Davis-Monthan AFB. Roger

Howlett, Principal Planner in the City of Tucson Department of Planning, says that the Arizona enabling legislation concerning airports and air bases "has had no impact" on the City's airport compatibility planning efforts thus far. (Howlett, 1988) Howlett feels that stronger enabling legislation "probably would make some sense," but adds that the City views the State's general planning and zoning enabling legislation as sufficient authority to enact an airport noise zoning ordinance. (Howlett, 1988) Referring to studies which indicate that noise levels above Ldn 65 have harmful impacts on humans, Howlett adds that Tucson "can justify the zoning on safety and health issues." (Howlett, 1988)

The attitudes of planners in Tucson and Pima County suggest that some local governments in Arizona feel they have the sufficient authority to zone on the basis of noise around civilian airports, whether such authority is specifically spelled out in the State's enabling legislation or not. The local governments are confident that airport noise zoning is a legitimate exercise of the police power mandated under general planning and zoning legislation. In that respect, the Arizona enabling legislation dealing with land use regulation around airports and air bases does little to improve local governments' abilities to protect land users in airfield environs. At best, the airport/air base legislation helps legitimize noise zoning around military air bases, but the lack of such legislation does not deter some local governments in Arizona from adopting noise zoning ordinances for civilian airports. But there is a need to amend the Arizona legislation with respect to airport noise zoning, if only to make existing regulations more legally defensible. There are also some weaknesses in the legislation which prevent other types of land use controls for the protection of airport/air base environs land users.

One such land use control is ordinances requiring the disclosure of noise levels and accident potential around airports and air bases. This often takes the form of "truth-in-sales" ordinances which require property owners and developers to notify potential buyers and renters of the high noise levels and accident potential associated with a particular piece of property. Arizona's enabling legislation concerning military airfields mandates noise and accident potential disclosure, but the legislation dealing with civilian airports does not. This hampers local governments' abilities to protect land users in civilian airport environs. Roger Howlett argues that the City of Tucson has not adopted a truth-in-sales ordinance specifically because of the lack of state enabling legislation. (Howlett, 1988) The City does not feel as confident relying upon general planning and zoning legislation for a truth-in-sales ordinance as it does for an airport noise ordinance. Howlett feels that noise and accident potential disclosure is "a larger political issue because it requires truth-in-sales for this one specialized situation, high noise from aircraft activity, but that it gets into the consumer protection area." (Howlett, 1988) He adds that disclosure is required for things such as floodplains and landfills, and that the real estate community has discouraged truth-in-sales on the basis of aircraft noise and accident potential because "they would be liable, and it creates a bigger responsibility than they want to deal with." (Howlett, 1988) Mona McGuire De Leon, Airport Planner with the Tucson Airport Authority, says the fact that neither Pima County nor the City of Tucson has enacted a truth-in-sales ordinance has been a disappointment. (De Leon, December 7, 1988) De Leon says the Tucson Airport Authority must improvise because of the lack of a truth-in-sales ordinance:

> Every time a rezoning comes up, we say there is this truth-in-sales policy, and even though we haven't done an ordinance, we think it should be a condition for the rezoning. Sometimes it works, sometimes it doesn't. It

> would be better if we had an ordinance that applied across the board to everybody. (De Leon, December 7, 1988)

Roger Howlett says that the City of Tucson must also improvise because of the lack of state enabling legislation authorizing truth-in-sales ordinances around civilian airports:

> What we're doing in response is, if a subdivision comes in, and they're going to do the acoustical treatment because we have the building codes in place, we put notes on the subdivision maps saying this is in a high noise area. So at least if people are buying the lots we try to make it a condition that they're telling people. Its not 100% successful, but its all we have to work with right now. (Howlett, 1988)

Bob Johnson also sees the need for enabling legislation authorizing the adoption of truth-in-sales ordinances, but does not think it is a critical issue:

> We felt it was more important to have a strong zoning ordinance and not go with the truth-in-sales type situation. We thought, well maybe it ought to be in there, but we need a lot more than that. Realtors generally promote that type of thing, its easy for them. They'd rather have truth-in-sales in the contract than have the land use restrictions. Our feeling was that we'd rather have the land use restrictions. (Johnson, 1988)

But truth-in-sales ordinances should be designed to work with strong zoning ordinances to protect airport and air base environs land users. The addition of state enabling legislation allowing local governments in Arizona to adopt truth-in-sales ordinances can help promote civilian airport compatibility.

There is also a potential problem in Arizona's legislation in terms of the acquisition of avigation easements to lessen aircraft accident potential around airports and air bases. Arizona's current legislation empowers local governments to purchase easements around both civilian and military airfields. But some planners see the need for legislation enabling local governments to require the donation of easements as a condition for rezoning in airfield environs. Roger Howlett feels that this issue is even more important than the debate over truth-in-sales ordinances. (Howlett, 1988) Howlett

says that the City of Tucson had hoped to acquire easements around Tucson International and Davis-Monthan as a condition for rezoning, but that it could only be done under state enabling legislation. (Howlett, 1988) The City is not confident that such statutory authority exists in general planning and zoning enabling legislation.

Mona McGuire De Leon adds that the Tucson Airport Authority supports such conditional rezonings, but that "the lack of state statutes resulted in insufficient legal basis for requiring avigation easements through the rezoning and development process." (De Leon, December 30, 1988) Although the increased use of avigation easements as a condition for rezoning in other states may "substitute a legally defensible argument in support of avigation easements in Tucson," De Leon feels that "the current enabling legislation is not sufficient." (De Leon, December 30, 1988)

Although local governments in Arizona do regulate land use on the basis of noise and accident potential around civilian and military airfields, the State's enabling legislation could be improved to include specific authority to adopt noise zoning ordinances, truth-in-sales ordinances, and ordinances requiring the donation of avigation easements as a condition for rezoning. These improvements would help local governments protect airport/air base environs land users from both aircraft noise and accident impacts in a more legally defensible manner. Currently, some local governments in Arizona operate under the assumption that the State's general planning and zoning enabling legislation permits airport noise zoning, but the question has never been decided in court. The same jurisdictions cannot adopt truth-in-sales ordinances or require the donation of easements as a condition of rezoning for the lack of statutory authority.

In terms of planning for the protection of land users around airports and air bases, state governments play their most important part through enabling legislation. And, although the examination of the Arizona legislation dealt with only two local governments, it does point out the importance of adequate state enabling legislation. If a state feels that local jurisdictions should regulate the land use activities around airfields, then the state should give those local governments sufficient authority to carry out the task. For local and federal airport/air base compatibility planning programs to be effective, the state must provide local governments with a variety of land use control options. If the state does its share by adopting strong, effective enabling legislation, it becomes easier for local jurisdictions and the federal government to protect land users in the vicinity of airports and air bases.

CHAPTER III

THE ROLES OF THE FEDERAL GOVERNMENT AND LOCAL GOVERNMENTS IN AIRPORT ENVIRONS LAND USE COMPATIBILITY PLANNING: FAA'S PART 150 PROGRAM

The federal government, working in conjunction with local governments and airport operators, plays an active part in protecting land users around civilian airports. This is due to the federal government's management of the nation's airspace, as well as to the fact that federal agencies provide funding for a variety of airport projects. This federal interest has resulted in programs designed to alleviate the impacts of noise and accidents through land use planning and regulation. One such program, the Federal Aviation Administration's Part 150 Airport Noise Compatibility Planning Program, is aimed at lessening the effects of noise around civilian airports. The Part 150 Program encourages airport proprietors, local governments, and federal agencies to cooperate in planning for compatible land use in airport environs. It represents the latest federal effort to achieve airport land use compatibility nationwide.

Background

In 1979, the federal government strengthened its agenda for protecting airport environs land users with "the first U.S. Federal legislation specifically addressing airport noise problems"-- the Aviation Safety and Noise Abatement Act. (Hixson and Tedrick, p. 5) The ASNA Act requires "the identification of land uses normally compatible with

various exposures of individuals to noise, and the establishment of a standard airport noise compatibility planning program" for civilian airports receiving federal noise abatement funding. (Hixson and Tedrick, p. 5)

Pursuant to the ASNA Act, the Federal Aviation Administration adopted Federal Aviation Regulation Part 150, Airport Noise Compatibility Planning, as an interim rule in 1981. "After eleven months of comment period and four years of practical experience under the interim rule," the FAA adopted the final rule in January, 1985. (Hixson and Tedrick, p. 6) This established a national program for alleviating the noise impacts around civilian airports, with funding for fiscal years 1983 through 1987 totaling $347.3 million provided by the ASNA Act and the Airport and Airway Improvement Act of 1982. The Airport and Airway Safety and Capacity Expansion Act of 1987 continued this funding through fiscal year 1992, with a budget of $870 million.

FAA'S Part 150 Airport Noise Compatibility Planning Program

Generally, the Part 150 Program "identifies the land uses that are normally compatible or noncompatible with various levels of airport noise, and provides for voluntary development of Noise Exposure Maps and Noise Compatibility Programs by airport operators and their submission to the FAA for approval." (Hixson and Tedrick, p. 5) The program is voluntary, but airports must have a Part 150 Program to receive FAA funding for noise mitigation projects. An airport's Part 150 Program begins with the preparation of Noise Exposure Maps and culminates in the implementation of a Noise Compatibility Program which includes recommendations concerning local land use control policies and regulations.

Part 150 Noise Exposure Maps: The Code of Federal Regulations defines a Noise Exposure Map as

> a scaled, geographic depiction of an airport, its noise contours, and surrounding area . . . including the accompanying documentation setting forth the required description of forecast aircraft operations at that airport . . . together with the ways, if any, those operations will affect the map (including noise contours and the forecast land uses) (14 CFR 150.7).

The Part 150 Noise Exposure Map forecasts the noise impacts of an airport "based on reasonable assumptions concerning future type and frequency of aircraft operations, number of nighttime operations, flight patterns, airport layout including any planned development, planned land use changes and demographic changes in the surrounding areas" (14 CFR 150.21).

The most important function of the Noise Exposure Map is to help planners identify existing areas and land uses which are incompatible with airport noise. Under Part 150, airport operators identify these areas and uses with Ldn contours plotted on the maps. For each Noise Exposure Map, continuous contours are developed for annual Ldn levels of 65, 70, and 75. Additional contours may be developed depending on the situation. These contours are based upon calculations involving the airport's location and layout, airport activity levels and operational data, information on flight characteristics, and data concerning the noise emission levels of the aircraft in question. These calculations are usually performed by airport engineering consultants or by the airport proprietor using FAA's Integrated Noise Model computer program.

Based on the Noise Exposure Maps, airport proprietors identify the land uses in areas where the annual Ldn level exceeds 65, and determines if those uses are compatible with such noise exposure levels. The FAA defines a compatible land use as

one which is "normally compatible with the outdoor noise environment (or an adequately attenuated noise level reduction for any indoor activities involved) at the location because the yearly day-night average sound level is at or below that identified for that or similar use" (14 CFR 150.7). This identification refers to the land use compatibility table prepared by the FAA in conjunction with other federal agencies (See Appendix 1). The table has 24 land use categories, and indicates whether a particular use is usually compatible with noise exposure levels of 65, 70, 75, 80, and 85 Ldn. In addition, the table "provides Noise Level Reduction factors of 25, 30, and 35dB to adjust levels for noise attenuation incorporated into buildings." (Hixson and Tedrick, p. 11) The table reflects the "statistical variability for the responses of large groups of people to noise" and "might not, therefore, accurately assess an individual's perception of an actual noise environment" (14 CFR 150.101). Because of this, adjustments are usually made so that the table better reflects the conditions around a particular airport. The compatibility table is designed to serve as a guide for assessing the compatibility of airport environs land uses, not as a rigid prescription for all situations.

Part 150 Noise Compatibility Program: When an airport's Part 150 Noise Exposure Map has been approved by the FAA, the airport operator begins to prepare the airport's Noise Compatibility Program. In its final form, the Program will serve as the airport's overall noise reduction plan.

The actual Part 150 Program document submitted to the FAA must contain a number of things, including:

1. A description and analysis of the alternative measures considered by the airport operator in developing the Program, together with a discussion of why each rejected measure was not included in the Program.

2. Program measures proposed to reduce or eliminate present and future noncompatible land uses and a description of the relative contributions of each of the proposed measures to the overall effectiveness of the Program.

3. A description of public participation and consultation with officials of public agencies and planning agencies in areas surrounding the airport, FAA regional officials and other Federal officials having local responsibility for land uses depicted on the Map, and air carriers and other users of the airport.

4. The actual and anticipated effect of the Program on reducing noise exposure to individuals and noncompatible land users and preventing the introduction of additional noncompatible uses within the area covered by the Noise Exposure Map.

5. A summary of the comments at any public hearing on the Program and a copy of all written material submitted to the operator . . . together with the operator's response and disposition of those comments and materials to demonstrate the Program is feasible and reasonably consistent with obtaining the objectives of airport noise compatibility planning.

6. The period covered by the Program, the schedule for implementation of the Program, the persons responsible for implementation of each measure, documentation suggesting the feasibility of such implementation, including any essential governmental actions, costs and anticipated sources of funding, that will demonstrate that the Program is reasonably consistent with achieving the goals of airport noise compatibility planning. (14 CFR 150.23)

The Noise Compatibility Program itself is made up of a number of methods designed to alleviate the impact of airport noise on surrounding land users. Each of these measures must be evaluated for its applicability to a given situation. The FAA mandates that the airport operator consider, at a minimum, the following alternatives:

1. Acquisition of land and interests therein, including, but not limited to air rights, easements, and development rights.

2. The construction of barriers and acoustical shielding, including the soundproofing of public buildings.

3. The implementation of a preferential runway system.

4. The use of flight procedures (including the modification of flight tracks) to control the operations of aircraft to reduce exposure of individuals (or specific noise sensitive areas) to noise in the area around the airport.

5. The implementation of any restriction on the use of the airport by any type or class of aircraft based on the noise characteristics of those aircraft.

6. Other actions or combinations of actions which would have a beneficial noise control or abatement impact on the public.

7. Other actions recommended for analysis by the FAA for the specific airport. (14 CFR 150.7)

After an airport's Noise Compatibility Program has been prepared, it is submitted to the FAA for approval. If the proposed Program is approved, it may be implemented and the airport is eligible for FAA noise mitigation funding. But the entire process relies on cooperation between the federal government, local governments, airport proprietors, and the general public for its success.

Without this type of cooperative effort, a Part 150 Program will not be approved by the FAA. Each interested party has a major role in the Part 150 planning and implementation process:

-- The federal government, through the FAA, has the authority and the responsibility to "control aircraft noise by the regulation of source emissions, by flight operational procedures, and by management of the air traffic control system and navigable airspace . . . The federal government also provides financial and technical assistance to airport proprietors for noise reduction and abatement activities."

-- Airport operators are responsible for "planning and implementing actions designed to reduce the effects of noise on residents of the surrounding area."

-- Private citizens in areas surrounding the airport "should seek to understand the noise problem and what steps can be taken to minimize its effects on people" and participate in the process of planning and implementing such measures. (Hixson and Tedrick, pp. 4-5)

The Part 150 Program provides for such a cooperative undertaking, especially in terms of land use planning and regulation. Under Part 150, two purposes of the Noise Compatibility Program are:

> 1. To promote a planning process through which the airport operator can examine and analyze the noise impact created by the operation of an airport, as well as the costs and benefits associated with various alternative noise reduction techniques, and the responsible impacted land use control jurisdictions can examine existing and forecast areas of noncompatibility and consider actions to reduce noncompatible uses.
>
> 2. To bring together through public participation, agency coordination, and overall cooperation, all interested parties with their respective authorities and obligations, thereby facilitating the creation of an agreed upon noise abatement plan especially suited to the individual airport location while at the same time not unduly effecting the national air transportation system. (14 CFR B150.1)

These purposes are furthered by a number of Part 150 regulations requiring coordinated efforts by the parties involved.

In creating the Noise Exposure Map, for example, the airport operator must "identify each public agency and planning agency whose jurisdiction or responsibility is either wholly or partially within the Ldn 65dB boundary" (14 CFR 150.105). In addition, the Noise Exposure Map's documentation must identify the "geographic areas of jurisdiction" for those agencies" (14 CFR 150.105). To ensure that the development of the Noise Exposure Map is a cooperative effort, Part 150 specifies that each map must be prepared,

> in consultation with states, and public agencies and planning agencies whose area, or any portion of whose area, of jurisdiction is within the Ldn 65dB boundary" and so that the mapping process "has afforded interested persons adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft Exposure Map and description of forecast aircraft operations. (14 CFR 150.21)

Many of the same regulations apply for a Part 150 Noise Compatibility Program submitted to the FAA. Each program must be,

> developed and prepared in consultation with FAA regional officials, the officials of the state and of any public agencies or planning agencies whose area, or any portion of whose area, of jurisdiction within the Ldn 65dB noise contour is depicted on the Noise Exposure Map, and other Federal officials having local responsibility of land uses depicted on the map. (14 CFR 150.23)

In addition, the airport operator must "afford adequate opportunity for...the general public to submit their views, data and comments on the formulation and adequacy" of the Part 150 Program." (14 CFR 150.23)

To further improve the level of intergovernmental coordination involved, the Part 150 Noisc Compatibility Program must define and evaluate noise control alternatives in terms of the governmental agency responsible for their implementation. This evaluation must consider those measures to be implemented by the airport proprietor, and the local, state, and federal governments. For each noise reduction alternative selected, the Program must identify "the agency or agencies responsible for such implementation, whether those agencies have agreed to the implementation, and the approximate schedule agreed upon." (14 CFR 150.7) Identification of those agencies must also include documentation of "any essential governmental actions, costs and anticipated sources of funding." (14 CFR 150.23)

The Part 150 Program and the "Taking Issue"

In terms of a cooperative effort, the national Part 150 Program mandates that all levels of government, the airport operator, and the public participate. With so much

governmental involvement in private land use, questions of legality are common. The key issue concerning intergovernmental coordination and the Part 150 Program is the "taking issue."

The taking issue, in terms of land use planning, centers around the argument of whether a governmental regulation can go so far as to amount to a physical taking of private property without just compensation. The courts have held that, in some instances, regulation can result in a taking for which compensation is required.

With local, state and federal governments all playing an important part, it is not surprising that the taking issue is of great importance in connection with the Part 150 Program. This is due to the fact that one of the bases of the Program is the regulation of private property for the public benefit. But with the Part 150 Program, the taking issue goes beyond the regulatory question. Other governmental actions taken in conjunction with the Part 150 Program might be construed as an illegal taking.

With the Program's emphasis on the acquisition of easements, for example, a violation of the terms agreed to by an airport owned and operated by a local government might be deemed a taking. It could also be argued that the FAA, by using noise mitigation funds and lobbying efforts as a means of persuading local governments to adopt land use controls, has abused its influence to such an extent that it amounts to a taking. Lastly, as airport operators, the FAA, or local governments disclose the results of a Part 150 Noise Exposure Map to government and private lenders, inaccuracies in the map can be a problem. Inaccurate Noise Exposure Maps, and the resulting denial of loans for the areas indicated as being above Ldn 65, might be construed as an attempt to take private property without just compensation. (Lorenz, Liability, p. 19)

As originally conceived, the Part 150 Program is dependent upon intergovernmental coordination for its success. Realizing this, the FAA attempted to design the Program so as to avoid potential legal conflicts involving the taking issue. But has the FAA been successful? Is there really public and intergovernmental cooperation in the development and implementation of an actual Part 150 program? Does the taking issue arise and, if so, how is it dealt with? To answer some of these questions, it is important to examine a case study, the Part 150 Program at Tucson International Airport in Tucson, Arizona. A single case study will not provide definitive answers, but it helps raise some of the more pertinent issues involved in the Part 150 Program in general.

Tucson International Airport and the Part 150 Program

Tucson International Airport covers approximately 3,775 acres in southwest Tucson in Pima County, Arizona (See Figure 1). The Airport is owned and operated by an independent, non-governmental agency, the Tucson Airport Authority. In 1985, there were a total of 237,025 air carrier, air taxi, general aviation, and military aircraft operations (takeoffs and landings) at Tucson International, and that number is expected to increase to around 386,000 by the year 2005. (Tucson Airport Authority, January, 1987, pp. 2-3)

Land use around Tucson International is mixed. To the north and northwest, the land use pattern is made up of a variety of commercial, residential, and industrial activities. This area, from Valencia Road north to Interstate 10, is an older, established part of Tucson, with some neighborhoods dating back to the 1920's and 30's. The land

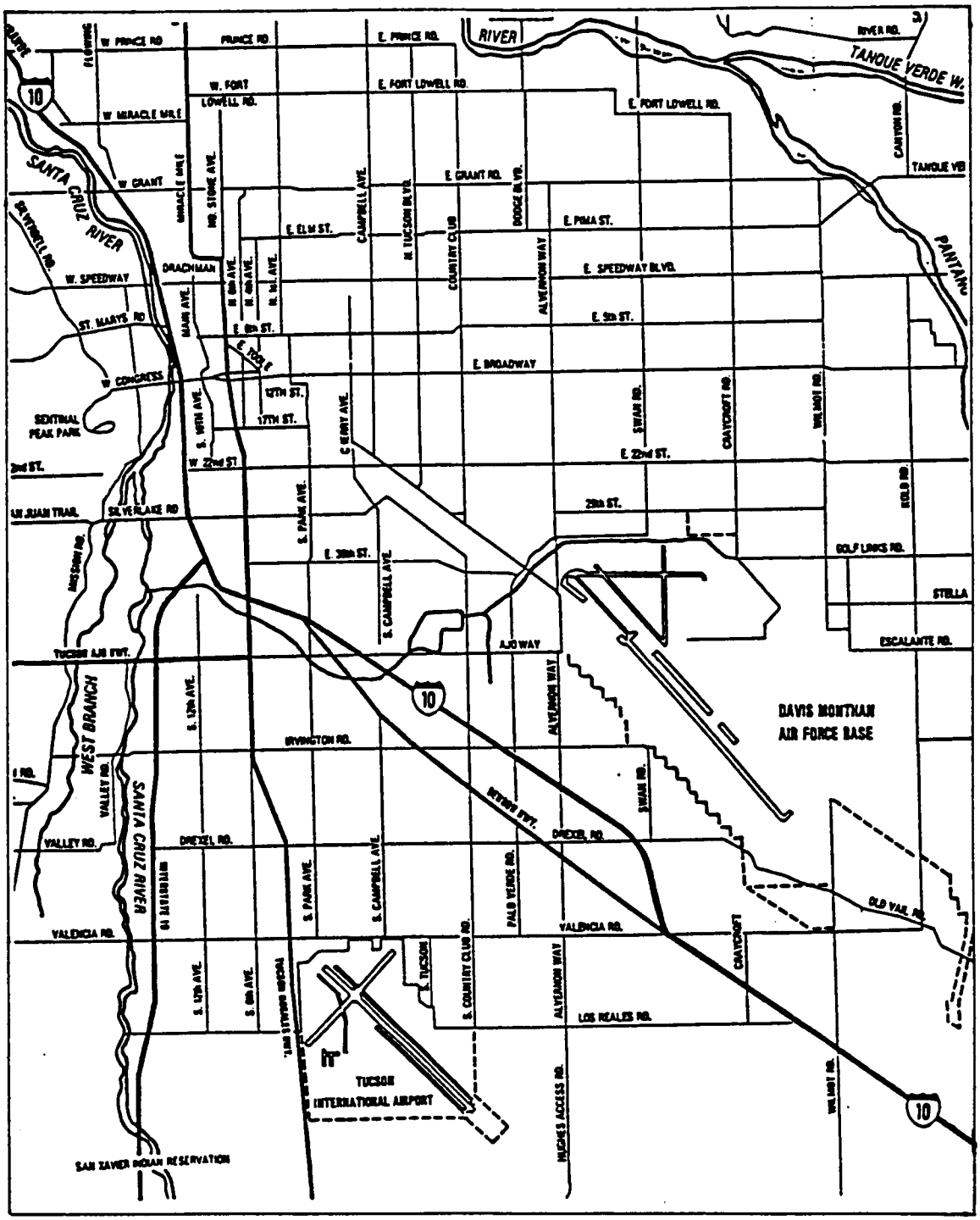


Figure 1. Map of Tucson, Arizona.

use pattern is similar to the east and northeast, between the Airport and Davis-Monthan Air Force Base, but development has been more recent and at a lower density. To the south and southeast, much of the area has been devoid of development. Land to the southwest of the Airport, west of the Tucson-Nogales Highway, is also primarily vacant, and much of it is owned by the Tohono O'odham tribe on the San Xavier Reservation.

This land use pattern presents two distinct challenges for Tucson International. To the north and east the land use pattern is well established, as development has occurred over the years with the growth of Tucson. In this area, the primary concern is with the effects of aircraft noise and accidents on existing land users. To the south and southwest, the problem is one of impending urban encroachment, as large tracts of vacant land become available for commercial development. Until recently, this area posed few problems in terms of airport compatibility. Now the situation has changed. Much of the property south of the Airport was once owned by aviation pioneer Howard Hughes, but was never developed. After Hughes' death the land became available, and buying was "almost like a land rush" according to Bill Vasko, Director of the City of Tucson Department of Planning. (Vasko, 1988) In addition, there have been some development proposals for vacant land to the southwest of the Airport on the San Xavier Reservation. The development proposals have never come to fruition, but Vasko says "it does focus attention on that area, because people had always just assumed that it would be open." (Vasko, 1988) These commercial and residential development pressures pose a different problem, that of preventing incompatible development in the future, for the areas to the south and southwest of the airport.

These noise and encroachment challenges are the impetus for Tucson International's Part 150 Program. This Program is the result of a process that began before the FAA adopted the national Part 150 Program as an interim rule in 1981. The Tucson Airport Authority prepared a twenty-year comprehensive plan for the Airport in 1974. By 1978, the Authority decided to review and update the plan as needed, since it made recommendations based upon information that was at least five years old and because the region had experienced growth since 1974.

The 1978 review brought two important issues to light:

1. Because of the expected increase in aircraft operations and passenger enplanements, new Airport facilities would be needed to meet the growing demand through the next 20 years and beyond. It would be necessary to accommodate those needs on an Airport site that was being threatened by urban encroachment . . . .

2. The Tucson area was becoming one of the fastest growing metropolitan areas in the country, and much of that growth was taking place in the vicinity of the Airport. The large tracts of vacant but Airport-compatible desert lands to the south and southeast of the Airport were being identified as prime locations to accommodate some of that growth, including residential development which would be potentially incompatible with the Airport. The Authority wanted to prevent the same incompatibility problems that were occurring to the northwest of the Airport from being repeated to the southeast. (Tucson Airport Authority, February, 1982, pp. 1-2)

To deal with these issues, the Authority decided to prepare supplemental master plan studies. This resulted in Tucson International's 1999 Master Plan, completed in 1979.

The 1999 Master Plan contains very specific recommendations concerning runway arrangement and usage and land acquisition in an effort to ensure that all land exposed to Ldn levels of 75 or more are within Airport boundaries. However, "in the environmental assessment prepared as part of the 1999 master plan study, it was clear that the adoption of the 1999 Master Plan and the implementation of on-Airport noise

abatement procedures could not solve the entire aircraft noise problem without other cooperative action by the community." (Tucson Airport Authority, February, 1982, p. 3) This was because residents already lived in areas exposed to high aircraft noise levels, and growth was continuing around the Airport. To compound the problem, "it was beyond the power of the Authority to establish off-Airport controls that would regulate or direct this growth to more compatible locations." (Tucson Airport Authority, February, 1982, p. 3)

As a result, the Tucson Airport Authority, the City of Tucson, and Pima County began preparation of the Airport Noise Control and Land Use Compatibility (ANCLUC) study in September, 1980. The study was intended to "provide guidance to the land use jurisdictions in establishing the necessary controls to achieve land use compatibility in areas exposed to high levels of aircraft noise." (Tucson Airport Authority, February, 1982, p. 3) It was especially important that the ANCLUC study be prepared at this time, for the City of Tucson and Pima County were simultaneously preparing area plans in the vicinity of Tucson International. This enabled the City, the County, and the Airport Authority to work together to create an overall land use compatibility program for the area.

The ANCLUC study for Tucson International was completed in 1982. Prepared by Peat, Marwick, Mitchell & Co., the plan was funded jointly by the FAA, the Airport Authority, the City of Tucson, and Pima County. The ANCLUC study was entitled the Airport Environs Plan and Program.

The FAA accepted Tucson International's ANCLUC study as a Part 150 Program when the national Part 150 rule was adopted in 1985. The Tucson Airport Authority is

in the process of updating its original Part 150 Program, with total costs expected to exceed $300,000. Funds for this update will come from the FAA (91%), the State of Arizona (4.5%), and the Tucson Airport Authority (4.5%).

Tucson International's Part 150 Program: Goals and Objectives

The original Part 150 study prepared by the Tucson Airport Authority consists of two parts:

1. A review of the noise abatement measures already in effect or proposed to be implemented on the Airport, and recommendations for additional measures, if any, and,

2. An off-Airport land use plan with accompanying land use controls and programs. (Tucson Airport Authority, February, 1982, p. 3)

The results of the first part indicated that the recommendations in the 1999 Master Plan and the other measures already in effect or being proposed by the Authority were "the most feasible options available" at the time. (Tucson Airport Authority, February, 1982, p. 6.) Because of this, the emphasis of the study was on the second part--achieving airport compatibility through land use planning and regulation

The first step in Tucson's Airport Environs Plan and Program was to define the study area. The Airport Environs, which consists of the Airport and its vicinity area, is shown in Figure 2. The study area covers about 141 square miles, including urban areas north of the Airport in Tucson, and unincorporated areas south of the Airport in Pima County.

The Tucson Airport Authority outlines two major goals of its Airport Environs Plan and Program. The first is to "ensure the compatibility of land uses in the Environs

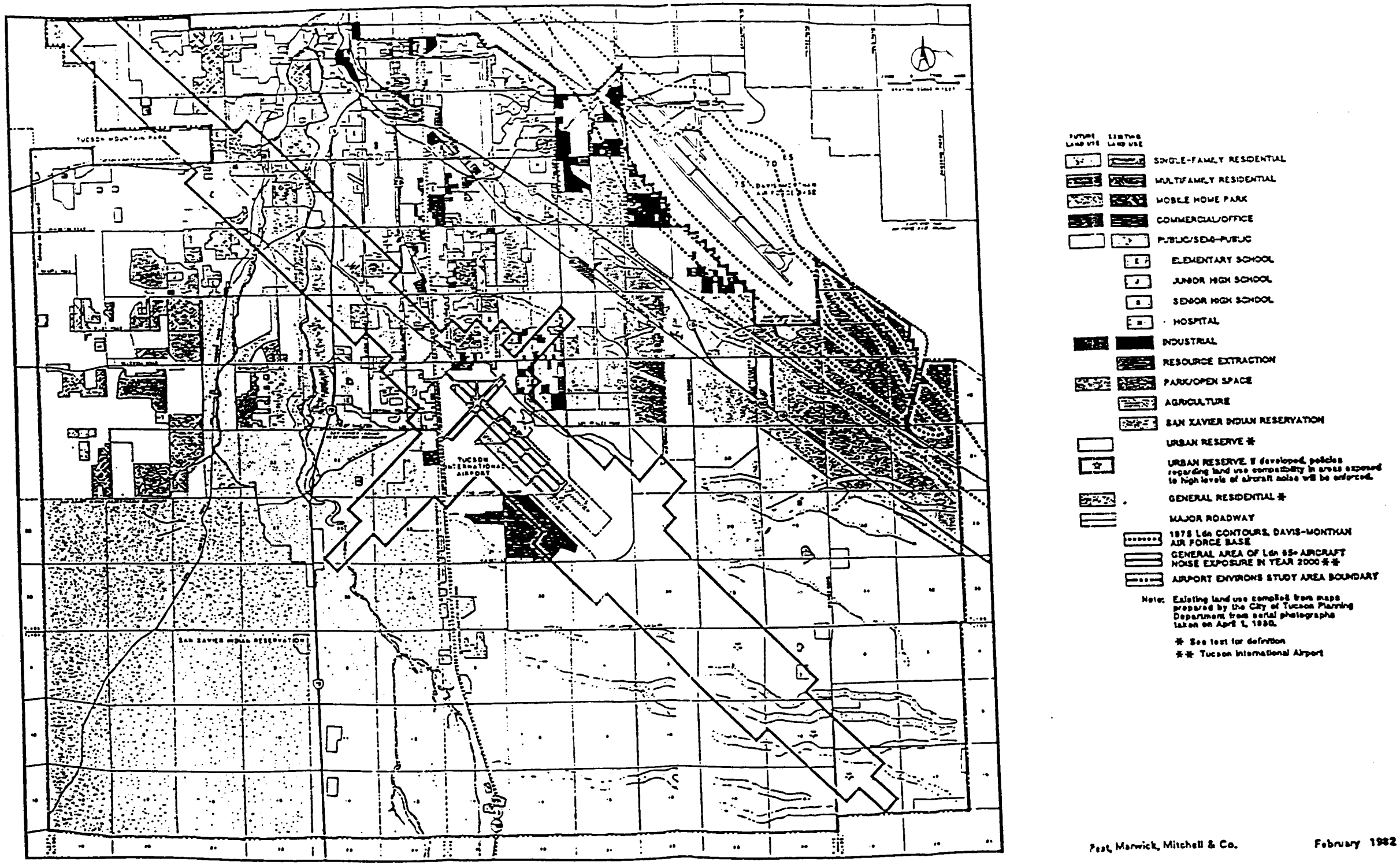


Figure 2. Tucson International Airport ANCLUC Study Recommended Environs Land Use And Circulation Pattern Map

with the Airport and aircraft operations by the year 2000." (Tucson Airport Authority, February, 1982, p. 53) The second is to achieve a balance "between the needs associated with the continued development of Tucson International Airport and growth trends in the Environs." (Tucson Airport Authority, February, 1982, p. 53)

To achieve these goals, the study recommends four specific objectives. The first objective is to "involve all of the local planning agencies and other affected entities in the planning, decision-making, and implementation process." (Tucson Airport Authority, p. 54)

In order to meet this objective, the Tucson Airport Authority sought the cooperation of local governments, the State government, the federal government, and private citizens early in the planning process. From the beginning, these groups were involved in the development of Tucson's Part 150 Program through their participation on three committees.

The first of these, the Project Policy Committee, was responsible for general policy decisions. It was composed of a representative from the FAA, the Tucson City Council, the Pima County Board of Supervisors, the San Xavier District Council, and the Tucson Airport Authority Board. Participation by this committee was crucial, because the elected officials were "ultimately responsible for adopting and implementing the recommendations that would result from the study." (Tucson Airport Authority, February, 1982, p. 4) For the current Tucson International Part 150 update, this committee has been renamed the Policy Advisory Committee, and will consist of a member of Tucson's City Council, a member of Pima County's Board of Supervisors, and a member of the Airport Authority Board. The City and County involvement in the

early planning stages is extremely important, according to Mona McGuire De Leon of the Tucson Airport Authority. She says that when the Authority's plan goes to public hearings before either the City Council or the County Board, "we need to have someone up there who can say, 'I monitored this process, I was involved, they took our considerations under advisement and incorporated them into the plan.'" (De Leon, December 7, 1988) De Leon adds that this Council or Board member "becomes an advocate in terms of the decision-makers" on the Airport Authority's behalf. (De Leon, Decmber 7, 1988)

The second committee, the Project Steering Committee, included representatives of the following organizations:

Tucson Airport Authority
City of South Tucson
Arizona State Land Department
Pima County Planning and Zoning Commission
Tucson Department of Planning
Arizona Air National Guard
Federal Aviation Administration
Arizona Department of Transportation
San Xavier District Council
Davis-Monthan Air Force Base
Tucson Citizens Advisory Planning Committee

For Tucson's Part 150 update, the committee has been renamed the Technical Advisory Committee, and its membership has been expanded. The new Committee also includes representatives of the Air Transport Association of America, the Airline Pilots Association, general aviation users, the Sunnyside School District, and the Pima County Association of Governments. De Leon says the Technical Advisory Committee is important because it involves so many different groups:

> Its an opportunity for us to educate them, so when they go back to their departments they can tell people that this is what the plan is and why its

> important. And its an opportunity for us to get input from them, too. (De Leon, December 7, 1988)

The third committee, the Project Advisory Forum, was composed of "representatives of groups or agencies that were also affected by the study or that could provide special information to the consultants and staff members." (Tucson Airport Authority, February, 1982, p. 4) One of the purposes of this Forum was to "obtain input to the study from people representing a wide diversity of community interests as well as permit the community-at-large to be well informed on the progress of the study." (Tucson Airport Authority, February, 1982, pp. 4-6) The Project Advisory Forum was to be a chance for active citizen participation in the original Part 150 Program. But, according to Mona McGuire De Leon, this approach was not wholly successful. For the Part 150 update, the Airport Authority will use a different method to generate public interest and participation. The Authority has identified at least eight neighborhood associations directly impacted by aircraft noise from Tucson International. De Leon stresses that it is "imperative that we give all of the neighborhood associations an equal opportunity to participate" in the Part 150 update. (De Leon, December 7, 1988) To achieve this, the Authority has prepared a questionnaire which will be mailed to the neighborhood associations (See Appendix 2). De Leon says the questionnaire will give each association "an opportunity to tell us how they want to participate." (De Leon, December 7, 1988) She adds that the Authority has also compiled a mailing list from the Airport's noise complaint file, and that individuals and groups on the list will be asked to participate in the update. Citizens will also participate through more traditional means, such as public meetings and public hearings before the City Council and the County Board.

The purpose of these committees and the public participation is to meet the other objectives outlined in Tucson International's original Part 150 Program:

2. Identify existing and potential land uses in the Environs that are incompatible with the Airport and aircraft operations.

3. Evaluate alternative ways to mitigate the effects of aircraft noise on existing noise-sensitive land uses and to prevent additional noise-sensitive development from locating in areas exposed to high levels of aircraft noise.

4. Develop recommendations for ways to accommodate the projected increase in population and employment in the Environs without a subsequent increase in the number of people exposed to high levels of aircraft noise. (Tucson Airport Authority, February, 1982, p. 54)

Tucson International's Part 150 Program: Land Use Policies and Controls

The final Airport Environs Plan and Program consists of two parts intended to attain these objectives:

1. A land use and circulation pattern.

2. An Action Program which includes associated land use controls and programs to achieve compatibility with Airport operations, and special overall policies to assist in carrying out the land use pattern. (Tucson Airport Authority, February, 1982, p. 7)

These two parts include the details of the Authority's plan to alleviate the noise compatibility problem around Tucson International.

Land Use and Circulation Pattern: The land use and circulation pattern recommended in the Airport Environs Plan and Program is shown in Figure 3, along with the boundary of the Ldn 65 noise exposure area for 1999. These recommendations are intended to accomplish three general objectives:

1. Prohibit future noise-sensitive development in areas with aircraft noise exposure levels of Ldn 70+,

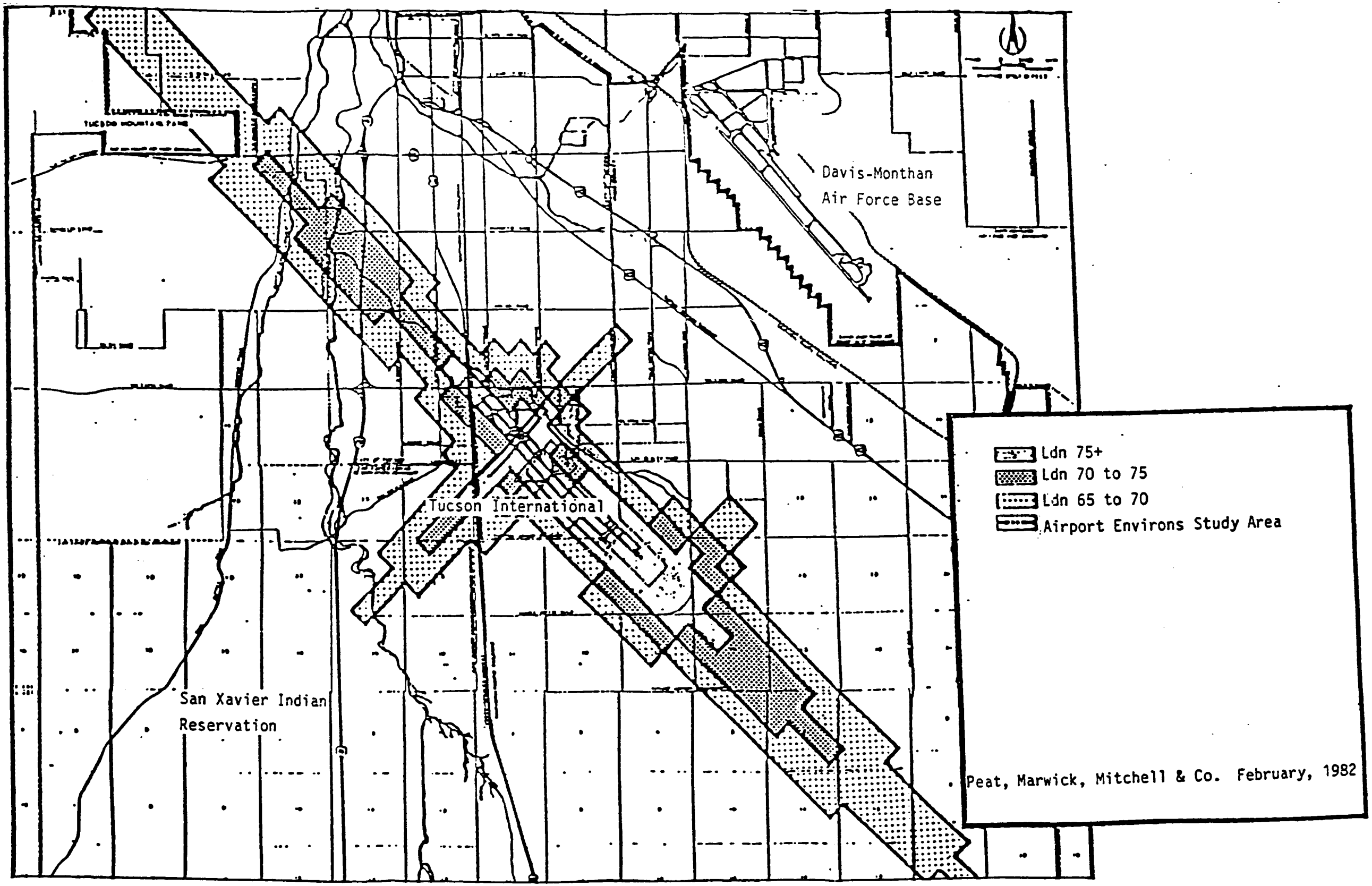


Figure 3. Tucson International Airport ANCLUC Study 1999 Aircraft Noise Exposure Areas Map

2. Restrict new noise sensitive development to multifamily residential areas with aircraft noise exposure levels of Ldn 65 to 70, and

3. Encourage compact growth, as opposed to "leapfrog growth." (Tucson Airport Authority, February, 1982, p. 7)

To achieve the recommended land use pattern and airport compatible development, the Airport Authority must cooperate with the City of Tucson and Pima County. The Authority makes recommendations concerning specific land use policies and controls in the Action Program of the Airport Environs Plan and Program.

Action Program: To establish a compatible land use pattern around Tucson International, the Tucson Part 150 study recommends a number of land use controls and programs. This Action Program is the key to the success of the Tucson International Program. These recommendations require participation by the City of Tucson and Pima County, for they are responsible for implementing land use regulations.

According to the Airport Environs Plan and Program, land use controls for the area around Tucson International "relate to the location of future noise-sensitive land uses or to specific restrictions and conditions for such land uses." (Tucson Airport Authority, February, 1982, p. 71) These land use controls are "preventive actions to be taken by the City of Tucson and Pima County to ensure that future noise-sensitive land uses will be compatible with the Airport." (Tucson Airport Authority, February, 1982, p. 71) The study lists seven land use control policies necessary for airport land use compatibility:

1. Ldn 70+ area: Prohibit any new or redeveloped noise-sensitive land uses by amending the zoning ordinances.

2. Ldn 65 to 70 area: Prohibit any new or redeveloped noise-sensitive land uses except multifamily residential by amending the zoning ordinances and modifying the building codes. Multifamily may be permitted only if construction or acoustical treatment techniques are

adequate "to maintain a maximum noise level of Ldn 45 in all habitable rooms."

3. Ldn 65+ area: Require acoustical treatment for all new structures in infill areas or redeveloped structures of noise-sensitive land uses by modifying the building codes.

4. Ldn 65+ area: Require acoustical treatment, if necessary, for all new or redeveloped structures that would contain noise-sensitive activities by modifying the building codes.

5. Ldn 65+ area: Require the dedication of avigation easements to the Tucson Airport Authority for all new or redeveloped noise-sensitive land uses by amending local subdivision regulations.

6. Ldn 65+ area: Revise the Airport Approach zoning district overlay to include height, noise and density considerations.

7. Ldn 65+ area: Enact a truth-in-sales ordinance. "All persons moving into an area exposed to noise levels of Ldn 65 or greater would be informed, in writing (as required by ordinance), of the anticipated noise condition and whether there is an avigation easement on the property." (Tucson Airport Authority, February, 1982, pp. 72-81)

The Airport Environs Plan and Program argues that these land use control policies and regulations are a must if land use compatibility is to be achieved around Tucson International. And the City of Tucson and Pima County have been, for the most part, cooperative in adopting such policies and regulations.

Mona McGuire De Leon says that partly because of the original Part 150 study, the County created "a whole new ordinance," adopting the "Airport Environs and Facilities" section of the Pima County Zoning Code in 1985. (De Leon, December 7, 1988) This new ordinance implemented some of the changes requested in the Tucson International Part 150 Program in terms of prohibiting certain land uses in areas exposed to high levels of aircraft noise. But the ordinance did meet some public resistance over provisions intended to protect land users from aircraft accidents around Davis-Monthan

Air Force Base. This resistance, discussed fully in Chapter IV, forced the County to modify its original ordinance. After certain revisions, the ordinance was adopted by the Pima County Board of Supervisors in December, 1986. De Leon says that the Airport Authority worked along with the County and Davis-Monthan Air Force Base to get the ordinance adopted. She says that the ordinance "is not perfect, or exactly what we want, but its in place and it reflects noise and safety considerations." (De Leon, December 7, 1988) The County also revised its building codes to require the acoustical treatment provisions included in the Tucson International Part 150 study. In addition, the County updated all its area plans to reflect airport noise and safety compatibility issues.

The City of Tucson has been slower in enacting the land use controls suggested in the Airport Environs Plan and Program. Unlike Pima County, the City has not amended its zoning ordinance to deal specifically with airport noise compatibility. However, the City is currently working on a new airport noise zoning ordinance, the Runway Approach Compatible Use Zone (RACUZ) ordinance. Mona McGuire De Leon says that the Airport Authority is disappointed that the City has not "moved a little faster, but it is in the process and hopefully it will be adopted within the next year." (De Leon, December 7, 1988) Roger Howlett says that the City will include airport noise considerations in the new ordinance, but adds that "its going to be a very incremental process because the areas are pretty much built out." (Howlett, 1988) For the time being, the City is trying to cooperate in promoting airport land use compatibility through land use planning updates and building codes. In June, 1982, the City Council adopted the Airport Environs Plan, in which the City agreed to the land use policies and controls recommended in the Tucson International Part 150 study. But

the City has never adopted the ordinances required to put these policies and controls into effect. Howlett says that the City,

> changed the Comprehensive Plan to add a policy dealing with human activity hazards. And as we've done other plans, we've addressed that issue. All of the area plans have been updated or changed to reflect the concerns about high noise areas. (Howlett, 1988)

In addition, the City of Tucson has enacted building codes which include acoustical treatment for high noise areas. Howlett says that these building codes allow the City to "catch people at the building permit level even if they have their zoning in place, so they're still going to have to do the acoustical treatment." (Howlett, 1988)

Pima County, then, has an airport noise zoning ordinance in place, and uses its area plans and building codes to promote airport noise compatibility. The City of Tucson also updated its area plans and building codes to reflect noise considerations, and is currently preparing an airport noise zoning ordinance. In this, the Tucson Airport Authority has been successful in getting the local governments to cooperate in the implementation of many of the land use controls suggested in the original Part 150 study. But neither the City of Tucson nor Pima County have enacted truth-in-sales ordinances or ordinances requiring the dedication of avigation easements as a condition of rezoning in the Airport Environs.

Land use programs, in Tucson's Airport Environs Plan and Program, are "measures that relate to the rehabilitation, conversion, or other action to transform an existing incompatible land use to a compatible land use." (Tucson Airport Authority, February, 1982, p. 71) These land use programs are "remedial actions to be taken by the Tucson Airport Authority to mitigate the effects of existing and future aircraft noise on existing noise-sensitive land uses." (Tucson Airport Authority, February, 1982, p. 8)

The study lists two programs necessary for airport land use compatibility around Tucson International:

1. Ldn 70+ area: Establish a purchase assurance program for all existing single-family dwellings. The Tucson Airport Authority would agree to "purchase any home in the specified area if the owner has difficulty in selling the home at fair market value after it is listed for a period of 90 days (or some other agreed-upon time period) with a real estate multiple listing service." After such purchase, the Authority would provide acoustical insulation, and the home would be sold with an avigation easement at fair market value. This program would be available on a one-time basis, and the homeowner must demonstrate that the primary reason for difficulty in selling the home is aircraft noise.

2. Ldn 65 to 70 area: Establish a cost-sharing acoustical treatment program, in which a homeowner would agree to have his or her home insulated and be eligible to receive 50% (or some other agreed-upon percentage) of the cost from the Authority. In return, the Authority would obtain an avigation easement on the property. (Tucson Airport Authority, February, 1982, pp. 82-83)

These land use programs are the Airport Authority's responsibility, and part of its role in promoting airport environs land use compatibility. But the Tucson Airport Authority has not implemented the purchase assurance program or the cost-sharing acoustical treatment program. Mona McGuire De Leon says the Authority has been unable to find the funding necessary for such programs. She adds that,

> these two things, cost-sharing and purchase assurance, will be the two top priorities that we'll be investigating in the Part 150 update. And a lot of it will depend on citizen participation. If people say, 'No, I don't want you messing with my house' or they don't want any changes, then that's fine, too. We just have to see what the people are interested in. If they're afraid that the neighborhood might break up, we need to be sensitive to things like that. We see these two things, though, as something we could be doing more of. (De Leon, December 7, 1988)

Coupled with the land use controls already adopted by the City and the County, these two land use programs will help protect residents around Tucson International. But the

Airport Authority must acquire the funding and implement these programs as part of its responsibilities. The Authority can hardly expect the City and the County to adopt stringent and sometimes controversial land use controls if it is unable to carry out its portion of the overall program to promote airport compatibility.

The Success of Tucson International's Part 150 Program

To help judge the success of FAA's national Part 150 Program, it is important to examine the success of that Program's application at Tucson International. For the purposes of this thesis, success is determined by three criteria. The first is whether Tucson's Part 150 Program, and the land use controls implemented by Tucson and Pima County partly as a result of it, have met strong resistance, or even legal challenges, from the public. The second criterion is whether the Program has provided for genuine, active citizen participation. The third, and most important, criterion is whether the Program has fostered cooperation between the levels of government, the airport proprietor, and the general public, in promoting airport land use compatibility in Tucson.

In terms of public resistance and legal challenges, Tucson International's Part 150 Program and the land use controls suggested in it have been successful. Even where state enabling legislation is lacking, such as the case in requiring the dedication of avigation easements as a condition of rezoning in high noise areas, the City, the County, and the Airport Authority have been successful in attaining such conditions without serious legal repercussions. Bob Johnson, Director of Planning and Development Services for Pima County, says that the County has "had virtually no negative reaction in our relationship with Tucson International." (Johnson, 1988) There was some public

resistance early in the implementation process, and although it had more to do with land use regulations relating to Davis-Monthan, this resistance affected the County and the Airport Authority's abilities to control development around Tucson International. Mona McGuire De Leon says that when the County enacted the Airport Environs and Facilities Zone ordinance "there was so much protest, and I mean out of control protest, that they went in and reopened the whole process." (De Leon, December 7, 1988) So the County changed some provisions in the ordinance (such as allowing 50 employees in land uses which had originally been restricted to one employee per 5,000 square feet of net lot area, and 50 employees and 50 non-employees in land uses which had originally been restricted to one employee per 3,500 square feet of net lot area) and has not met serious resistance since. By revising the ordinance, the County avoided potential legal action.

The City of Tucson has faced no legal challenges to the land use controls it has adopted thus far, but its new airport zoning ordinance has yet to be enacted. Roger Howlett cannot foresee any potential legal challenges, primarily because of the City's flexibility in land use regulation. (Howlett, 1988) Howlett says that the City encourages development around Tucson International, so long as the development is compatible. He adds that the city usually considers some commercial and industrial uses compatible with the Airport, and that developers "love that, because most of the developers in this part of town are thinking industrial and they know that we're probably going to support their request for a rezoning." (Howlett, 1988) Howlett explains that developers are usually not too opposed to many of the airport compatibility land use controls, so long as they are applied equally to everyone:

> The builders have had to go out there and use acoustical treatment and they may not be too happy. The way we argue for it is that any acoustical treatment you do is also energy efficient, so that's been a pretty successful argument with the builders. If the people understand the ground rules, they may not like it but they'll be willing to deal with it if we're consistent. (Howlett, 1988)

The Tucson Airport Authority was involved in the resistance faced by the County, but there have been no legal challenges to the Authority's Part 150 Program itself. Mona McGuire De Leon says that the

> fact that the City and the County are involved in the whole process and adopt these plans at the end, means its not really our plan. It becomes the City's or the County's plan. In that regard its pretty well respected. A developer may battle us about a particular condition of a rezoning, but overall, as a plan that's in place, it hasn't been challenged. (De Leon, December 7, 1988)

So, Tucson International's Part 150 Program, and the City and County land use regulations which followed that program, has been a success in dealing with public resistance and avoiding potential legal confrontations.

The Program at Tucson International has not been so successful in promoting active citizen participation. Although the original Part 150 process established the Project Advisory Forum to offer citizens a chance to participate, the effort was not very successful. Neither were efforts to promote public involvement through a series of public meetings and hearings. Mona McGuire De Leon asserts that part of the problem with the County's original zoning ordinance, for instance, was a problem of "not enough citizen participation up front" in the planning efforts of the County, the Airport, and the Air Force Base. (De Leon, December 7, 1988) She adds that developers were not satisfied until more public meetings resulted in a revision of the ordinance, and that this is an example of how the lack of public participation "can backfire, because you end up

going through the same process twice." (De Leon, December 7, 1988) De Leon says that for the original Part 150 study,

> there was no strictly citizen representation on the Committees, no neighborhood association people or anything like that. There were public hearings and we did have public meetings. And it did go through the planning commission and the elected officials for the County and the planning commission and the elected officials for the City. So there was all this series of public hearings that gave people the opportunity to comment. But I think this time (the Part 150 update) that's something we need to strengthen, this time we need more involvement. (De Leon, December 7, 1988)

Thus, the Tucson Airport Authority recognizes one of the weaknesses of its original Part 150 Program. More importantly, the Authority intends to rectify the situation through the methods discussed earlier for the Part 150 update.

Tucson International's Part 150 Program has been successful in fostering cooperation between airport environs residents, the Airport Authority, and the levels of government in promoting airport land use compatibility. Although the citizen participation process could be improved, when individuals such as developers had legitimate concerns, the Program was flexible enough to allow compromise. This flexibility helps avoid legal challenges over the terms of the regulations adopted. The State of Arizona and the federal government have been involved throughout the planning and implementation process. And the state and federal governments' roles will be even more important in the Part 150 update in Tucson. But the greatest success for Tucson International's Part 150 Program is the way in which the City of Tucson and Pima County, and the Airport Authority cooperated to plan and implement land use policies and regulations for the protection of Airport environs land users. Although there has been some public resistance, the City and County have supported the

Authority's plans, and implemented the Authority's land use control recommendations to the extent allowed by the Arizona enabling legislation. In this cooperative effort, Mona McGuire De Leon sees the Tucson Part 150 Program as successful. She asserts that sometimes the local governments are a bit hesitant to adopt potentially controversial policies, and that they sometimes need "coaching, prodding, begging, and pleading," but says that "overall, they're very cooperative." (De Leon, December 7, 1988) De Leon adds that, with the City and the County,

> we've accomplished a lot. As of right now I think all of the 70 to 75 Ldn contour is on our property. And the fact that we're dealing more proactively with new development is good. Now we need to go back and take care of the people who were there already. (De Leon, December, 1988)

This refers to the purchase assurance and cost-sharing acoustical treatment programs to be developed in the part 150 update.

On the other side of this cooperative effort, the Airport Authority has asked the City and the County to play an active role in the Part 150 process, and has listened to the local governments concerns and suggestions. The Airport Authority should make a more determined effort to implement the purchase assurance and cost-sharing programs, but overall the Authority has done a good job of managing the airport compatibility planning process in Tucson. Roger Howlett says that the Tucson Airport Authority "has taken a real strong leadership role in preventing the area from becoming like Phoenix or Los Angeles." (Howlett, 1988) He feels that the cooperative efforts of the City, the County, and the Airport Authority have been a success:

> I think we're proceeding along pretty well. There are some areas where we've not been able to move ahead because there's not state enabling legislation. I think we have a good working relationship with the Airport Authority. If a zoning case comes through, it gets sent to them if its in their area. They give us their comments which we usually include as

> conditions of rezoning. Hopefully, we're going to avoid a situation like in Phoenix, where they had to buy up all those communities. (Howlett, 1988)

Howlett adds that the City intends to maintain its rapport with the Airport Authority:

> They're really cooperative, and we've tried to set up a process so that we keep those links alive. Even if the people that we've dealt with in the past move on, we've established the process so we can keep that up. Having a first class airport in the community is really critical to the economic development of the City. All the things that we can do to ensure that is time well spent. We do feel we have the support of the Council and the Mayor. They've continued to hold strong, even with the different people elected over time. (Howlett, 1988)

Bob Johnson also sees the success of the cooperation between the City, the County, and the Airport Authority. He states that,

> the feeling of the community, at least from my perception, is that Tucson International Airport is acting very responsibly and looking to the future, and that we're in a good situation because they do have the opportunity to move in a direction where there is no development. (Johnson, 1988)

Johnson feels especially strong about the County's implementation of the Part 150 recommendations:

> We feel very good about it, we think its a very good ordinance. Our ordinances are as good as the plans call for, and probably better. We feel that we've done as much as we can right now without actually going out and purchasing property. (Johnson, 1988)

Thus, in terms of cooperation between the interested parties, the Part 150 Program has been a success at Tucson International Airport.

Conclusions

With the success of Tucson's Part 150 Program, there are a number of lessons to be learned by local governments dealing with the airport land use compatibility dilemma. The first lesson is that the Part 150 Program should not be viewed as an isolated land use planning exercise. It should be viewed as an integral part of the local governments' overall land use planning and regulation efforts. This allows the airport and the local governments to share information and resources in working towards goals that are mutually beneficial. As the local governments work on comprehensive plans or area plans, issues brought forth should be reflected in the Part 150 Program, and vice versa.

The second lesson is that this view of the Part 150 Program in a larger context should be accompanied by active participation by all interested parties. The airport proprietor and local, state, and federal governments should establish contacts and processes that foster a coordinated planning effort. The airport proprietor should take an active role of leadership in coordinating the work of these entities. This cooperation is especially important at the local level, where airport proprietors and local governments must plan and implement land use policies and regulations. But coordination between the airport proprietor, the local governments, and the state and federal governments is also crucial, especially in terms of legislation and funding. This cooperation should be viewed as a standard process, not as something dependent upon the personalities of particular agencies, departments, or administrations.

The idea of cooperation between all parties interested in the airport land use compatibility problem brings about a third important lesson--that active citizen participation should be a top priority. Airport proprietors and local governments should

not assume that the public is aware of the Part 150 planning process, or that residents and developers will not challenge land use regulations which result from that process. Genuine citizen participation should go beyond the usual public meetings and hearings, to an active education process that elicits citizen input through whatever channels necessary. The public will feel, rightfully so, that the airport's land use compatibility program is their program, because they have had a productive role in its development.

These lessons are apparent throughout the examination of the Tucson International Airport case study, and are important for any local government faced with airport land use compatibility problems. Their applicability to the FAA's national Part 150 Program is discussed in greater detail in Chapter V.

CHAPTER IV

THE ROLES OF THE FEDERAL GOVERNMENT AND LOCAL GOVERNMENTS IN MILITARY AIR BASE ENVIRONS LAND USE COMPATIBILITY PLANNING: THE AIR FORCE'S AIR INSTALLATION COMPATIBLE USE ZONE PROGRAM

As in planning for civilian airport environs, the federal government and local governments have important roles in protecting land users in the vicinity of military airfields. This is because the federal government owns and operates military airfields, and must rely on local governments to adopt land use regulations to control incompatible development around air bases. As a result, the federal government, through the Department of Defense, created the Air Installation Compatible Use Zone (AICUZ) Program. The AICUZ Program is intended to lessen the impacts of military aircraft noise and accidents on land users in the vicinity of DOD airfields. To avoid problems with aircraft noise and accidents which have occurred in the past, and to prevent further urban encroachment around air bases, the AICUZ Program mandates strong citizen participation and cooperation between air bases and all levels of government.

Background

By the early 1970's, it was apparent that the potential impacts of noise and accidents around military air bases were as bad, if not worse, than those in the vicinity of civilian airports. Although once located in remote areas, "many airfields became

encroached upon by residential (and other) development" that was incompatible with the noise exposure levels and accident potential around the bases. (USEPA, p. 3) This encroachment was particularly troublesome around military air installations because "the nature of the DOD aircraft mission requires constant activity and change" and because many military aircraft are "heavy (and noisy), multi-engine types, such as the B52." (USEPA, p. 3) With development around air bases, the DOD could no longer gain public acceptance of the noise and accident potential "by relying on the recognition that it served the national defense and was "good" for the country." (USEPA, p. 3)

Incompatible development, which comes with encroaching urban growth, represents a threat to the health and safety of those who live in the vicinity of military airfields. But it also represents a threat to the Department of Defense. The threat is not to be taken lightly because "due in part to actions of irate homeowners in military airport environs . . . installations in the past have been forced to modify or cease their flying operations or to close entirely." (USEPA, p. 1) Chanute and Lowry Air Force Bases, for example, ceased flying operations as a result of urban encroachment. Hamilton and Loredo Air Force Bases were closed entirely.

To combat threats to the health and safety of air base environs land users, and to the bases themselves, the Department of Defense developed its Air Installation Compatible Use Zone Program. Formally announced by DOD Instruction 4165.57 of July 30, 1970, the AICUZ Program was fully operational by 1973.

The Air Force constitutes the largest sector of DOD's AICUZ Program, as each branch of the service designs its own AICUZ format and agenda within DOD guidelines. The Air Force operates over 80 Air Force Bases and a number of joint-use civilian

airfields which must participate in the AICUZ planning process. Each Air Force AICUZ program tries to

> minimize the effects of flying operations on land areas adjacent to installations, to prevent incompatible development in high noise exposure and accident potential areas, and to maintain operational capability through compatible land use planning and control. (USEPA, p. 1)

Unlike the Part 150 Program, which deals only with aircraft noise, the AICUZ Program deals with both noise and accident potential.

The Air Force is in a unique position in terms of alleviating the impacts of noise and accidents around airfields. On one hand, the Air Force "exercises direct control over its aircraft, its airfields, and its pilot and maintenance personnel." (USEPA, p. 3) This allows the Air Force to implement strategies intended to reduce noise and accidents through aircraft design and operation as well as the layout of air bases. On the other hand, many of these strategies are not applicable to Air Force operations because of the need for constant training in loud, high-powered aircraft. So, to an even greater extent than civilian airport operators, the Air Force must rely on land use planning and controls to mitigate the impacts of noise and accidents around installations.

In working to implement land use controls through local governments, the Air Force has a certain advantage. This is because "many communities are heavily dependant upon military bases for their economic prosperity, and since DOD represents a consolidated political power, it can readily influence communities to take actions to control land development." (USEPA, p. 3) For better or worse, this makes the Air Force's AICUZ Program an interesting study of intergovernmental cooperation in planning for airport and air base environs.

The Air Force's Air Installation Compatible Use Zone Program

Air Force policy, in terms of the AICUZ Program, is to "promote land use compatibility between air installations and neighboring civilian communities through participation in local, regional, state, and federal land use planning, control and coordination processes." (U.S. Dept. of the Air Force, July, 1984, p. 2) To achieve this goal, each installation must:

1. Prepare and publicly release AICUZ studies and amendments.
2. Take formal positions in accordance with the published AICUZ study/amendment on all public and private proposals...affecting land use within the AICUZ area.
3. Keep all appropriate governmental bodies and citizens fully informed of AICUZ guidelines, recommendations and changes. (U.S. Dept. of the Air Force, July, 1984, p. 3)

In doing these things, the AICUZ Program is adapted to local conditions and is not "an end in itself, but one of many factors considered in the Base Comprehensive planning process." (U.S. Dept. of the Air Force, July, 1984, p. 1)

For the Air Force Bases and joint-use airfields which must prepare an AICUZ program (some are excluded if they are not active flying bases or if the Ldn 65 noise contour is within base property), the AICUZ consists of "land areas upon which certain uses may obstruct the airspace or otherwise be hazardous to aircraft operations and land areas exposed to the health, safety, and welfare hazards of aircraft operations." (U.S. Dept. of the Air Force, July, 1984, p. 1) The end result of the AICUZ Program for these areas is an AICUZ study which "projects, defines and maps aircraft noise and accident potential" in an effort to achieve compatible land use. (U.S. Dept. of the Air Force, July, 1984, p. 4) In addition, study amendments are prepared in the event of

operational or maintenance modifications, mission changes, or mission beddowns. These studies and amendments contain "specific land use compatibility recommendations based on an analysis of the relationship between aircraft operational effects and existing land use, existing and proposed zoning, and planned or anticipated land use." (U.S. Dept. of the Air Force, July, 1984, p. 4) As is the case with the Part 150 Program, the first step in the AICUZ process is the development of maps.

AICUZ Mapping: The AICUZ mapping process is more detailed than that of the Part 150 Program, as it identifies areas of accident potential as well as high noise exposure levels. In developing the AICUZ maps for a specific base, Air Force officials must first gather detailed flight data, the end product of which is "the knowledge of how many and what type aircraft are using which flight paths for how long and at what altitudes, airspeeds, and power settings." (U.S. Dept. of the Air Force, July, 1984, pp. 1-2) With this input, noise maps are created with contours of equal noise exposure using the Air Force's NOISEMAP computer program. These maps outline noise exposure contours of Ldn 65, 70, 75, and 80 (California law also requires an Ldn 60 contour).

Accident potential maps are prepared using "specific aircraft operational characteristics and accident histories" which are adapted to local runway configuration and utilization." (U.S. Dept. of the Air Force, July, 1984, p. 1) The result is an accident potential map which identifies a Clear Zone (CZ) and two Accident Potential Zones (APZ). The Clear Zone encompasses the area of highest aircraft accident potential, followed in descending order by APZ I and APZ II.

Once accident and noise maps have been prepared for an air installation, the two are combined in an overlay process to develop Compatible Use Districts (CUDs). There

are 13 of these CUDs, ranging from an area outside APZ II with a noise level of Ldn 65, to an area within the Clear Zone with a noise level of Ldn 85.

The purpose of creating these Compatible Use Districts is to provide "reasonable differentiation of land areas and allow the maximum possible number of land use alternatives." (U.S. Department of the Air Force, July, 1984, p. 1) This is achieved by combining the CUDs with land use categories in a table which indicates whether a certain land use is compatible with a particular CUD. The table, which is part of each AICUZ study, lists 68 land uses within eight broad land use categories (See Appendix 3). For an AICUZ program at any base, the table serves as a general guide, as "adaptation to fit local conditions and more precise land use category designations are required." (U.S. Dept. of the Air Force, July, 1984, p. 5) The table helps base officials use the CUD map to develop an AICUZ study.

The AICUZ Study: With the CUD map for a particular base, Air Force officials prepare an AICUZ study which identifies compatible land uses for the area and suggests means of achieving such uses. The first step in the process is to recognize potential encroachment threats to the base. This is done through an analysis of existing land use, zoning, property values and property ownership, as well as proposed land use, around the base.

Once the AICUZ study process has determined patterns which might lead to urban encroachment and incompatible development, the study suggests alternative methods for achieving compatible land use and preventing encroachment. AICUZ policy requires that

> a thorough evaluation and analysis be performed to determine if the amount and impact of noise can be minimized. This evaluation must

> include an identification of all alternatives regardless of cost or other problems. (U.S. Dept. of the Air Force, July, 1984, p. 24)

In terms of land use planning, some of these methods include the use of zoning, planned unit development ordinances, site plan review processes, building codes, bonus and incentive plans, and the acquisition of property and/or easements. The AICUZ Program relies heavily upon all these measures, with the exception of property acquisition. The Air Force purchases the Clear Zone, and, in some cases, will purchase property in Accident Potential Zones. But it will not purchase property within the noise contours outside these Zones unless "all possibilities of achieving compatible land use zoning, or similar protection, have been exhausted and the operational integrity of the air installation is manifestly threatened." (U.S. Department of Defense, p. 5) In short, the Air Force will not purchase land "solely on the basis of noise impacts." (USEPA, p. 5) It prefers to reduce the impacts of noise, and accidents, using the land use controls implemented through intergovernmental cooperation.

Intergovernmental Cooperation and the AICUZ Program

As a branch of the federal government dealing in local land use issues, the Air Force does not wish to appear as if it is abusing its power to force land use regulations upon private citizens. And, at least theoretically, it cannot force such controls because state and local governments have legal prerogative in land use regulation. Because of this, intergovernmental cooperation and public participation are vital to the AICUZ Program.

The Air Force's planning philosophy stresses that the environment is an "integrated system in which every action or element generates and receives a series of impacts." (U.S. Dept. of the Air Force, July, 1984, p. 2) With this framework, the AICUZ Program defines "the geographical scope of planning by a region of influence rather than by political or artificial geographical designations." (U.S. Dept. of the Air Force, July, 1984, p. 2) Thus, the AICUZ Program must respond to the needs of all parties affected by the operation of an air installation:

> The Air Force base does not exist as an isolated activity. It is an integral part of the systems (ecological, economic, social, political, etc.) of the geographical area in which it is located. The air base generates various effects on the community. The community affects the base. These effects cover the spectrum of human and natural relationships. Where such relationships are ignored, the resulting impacts can get out of control. (U.S. Dept. of the Air Force, July, 1984, p. 2)

To operate effectively within this system, the AICUZ Program helps base planners work with local, state and federal governments and the general public.

Local governments are important to the AICUZ Program because they are authorized by state legislation to enact and enforce land use controls and are responsible for local land use planning. However, the Air Force "does not intend for its AICUZ studies to be incorporated directly into local ordinances . . . It regards these studies only as one very important input element to the local planning process." (USEPA, p. 2) In fact, the Air Force "cannot guarantee that AICUZ maps will not be altered and cautions communities in attempting to incorporate Compatible Use Districts directly into community zoning codes." (USEPA, p. 4) Some local governments have incorporated AICUZ studies directly into their zoning ordinances, however, using their police powers to enact and enforce strategies outlined in those studies. But AICUZ studies are only

"intended to present the community with the noise and accident situation around the base and to show community officials what types of development are compatible near the base." (USEPA, p. 1)

Closely related to the interaction between the AICUZ Program and local governments is the public participation necessary for successful implementation of local land use planning and regulation. Within the AICUZ format, there is a mandate to

> inform local governments, citizens groups, and the general public of the requirements of flying activities, the reasons therefore, the efforts which may have been made or may be taken to reduce noise exposure, and similar matters which will promote and develop a public awareness of the complexities of air installation operations, the problems associated therewith, and the willingness of the Department of Defense to take all measures possible to alleviate undesirable external effects. (U.S. Dept. of Defense, p. 9)

The AICUZ Program is designed to keep the public informed and gather input through public participation in local land use issues. In addition, the Air Force assists civilian airports in developing noise abatement programs by providing the information and guidance documents upon which AICUZ studies are based. (USEPA, p. 12)

State governments and agencies are also important to the AICUZ process, for they deal with regional issues beyond the scope of local governments. In addition, the state authorizes local land use planning and regulation through enabling legislation.

The success of the AICUZ Program at any Air Force base also depends upon the coordination of many federal agencies. The Air Force works closely with the FAA in terms of noise compatibility and accident prevention, especially around civilian airports used jointly by the Air Force. Also, the Department of Housing and Urban Development and the Veterans Administration are important to the AICUZ process because their policies of not financing development in areas of high noise exposure

levels can prevent further incompatible residential development around air bases. AICUZ studies help HUD and the VA determine areas in which financing will not be provided. In addition, the Environmental Protection Agency can assist in the AICUZ process at a particular base by "ensuring that its "208" areawide Waste Treatment Management Program is being carried out so as not to spur incompatible development within the AICUZ." (USEPA, p. 13)

The AICUZ Program, then, is heavily dependant upon intergovernmental cooperation as well as public participation for its success. But, as is often the case when governmental programs affect private land use, certain issues and potential problems arise.

The AICUZ Program and the "Taking Issue"

One reason the Air Force does not encourage local governments to incorporate AICUZ studies directly into zoning ordinances and other land use regulations is the legal liabilities involved. The Air Force is responsible "for the technical adequacy of findings and recommendations" in each study, and if local ordinances enacting a study are "declared unconstitutional or illegal, the Air Force as well as the community suffers. (U.S. Dept. of the Air Force, July, 1984, p. 28)

As is the case with the FAA Part 150 Program, the AICUZ Program must deal with the taking issue as a result of its influence on the local regulation of private property. With the AICUZ Program, the taking issue centers on claims of illegal takings through the abuse of Air Force influence on local governments and the disclosure of noise and accident data to federal agencies.

The AICUZ Program has been involved in suits which allege an illegal taking through the abuse of Air Force influence on local land use regulation decisions. In the case De Tom Enterprises, Inc. v. United States (213 Ct. Cl. 362, 552 F.2d 337, 1977), plaintiff claimed that certain lobbying activities on the part of the Air Force amounted to an illegal taking of private property. The plaintiff, who owned property around March AFB in California, "made no claim that the aircraft noise was unduly disturbing, and in fact sought to develop his property for high density residential purposes." (Lorenz, Liability, p. 20) The application for a zoning change to allow such development was opposed by the base Staff Judge Advocate at the zoning board meeting, and the plaintiff's application was denied. The Court held that such a claim was beyond its jurisdiction, but opined that the Air Force had not acted improperly in influencing the County to "adopt a proper and regulatory stance." (Lorenz, Liability, pp. 20-21)

In Nalder v. United States (217 Ct. Cl. 686, 1978) the court rejected plaintiffs' claims that "the Air Force improperly established a greenbelt around Hill Air Force Base amounting to a taking of their property." (Lorenz, Liability, p. 21) The court also held that when the Air Force "uses only publicity, persuasion, approaches to local zoning bodies or to federal financing agencies" it has not abused its influence so much as to amount to a taking. (Lorenz, Liability, p. 21)

The case Gilliland v. United States (U.S. Ct. Cl. 546-76, 1980) presents a more complex view of the claim that the Air Force might be guilty of a taking through the abuse of its power and the results of an AICUZ study. Gilliland owned property about 1 1/2 miles form the centerline of a runway at Air Force Plant 42 near Palmdale,

California. A 1976 AICUZ study for Plant 42 placed plaintiff's property within Accident Potential Zone II and the Ldn 65 noise contour. (Lorenz, Liability, p. 27) In 1973, Gilliland had applied to the City of Palmdale and Los Angeles County for a rezoning from agricultural to commercial. Even at this time, "the Air Force actively opposed the zoning change before both local bodies and engaged in intensive lobbying efforts that included meetings with local officials as well as obtaining the support of defense contractors at Plant 42." (Lorenz, Liability, pp. 27-28) Both the City and the County denied the application.

In 1978, an amendment to the Plant 42 AICUZ study placed Gilliland's property outside the noise and accident potential zones entirely. Plaintiff brought suit alleging that the combination of frequent overflights, Air Force influence, and the AICUZ study itself constituted a taking. The court found that "the Air Force had committed no impropriety in the course of its participation as an affected, nearby landowner in its opposition to rezoning." (Lorenz, Liability, pp. 27-28) In addition, the court held that the AICUZ study effected "no direct immediate or substantial interference with the use and enjoyment of plaintiff's property." (Lorenz, Liability, pp. 27-28) The petition was dismissed June 12, 1981.

Gilliland sought a Writ of Certiorari in the U.S. Supreme Court in December, 1981 (No. 81-1242). He claimed that

> the trial judge had improperly segregated the evidence in the "overflight" case from the evidence in the "zoning" case, refusing to consider Air Force representations about the impact of overflights as evidence of a taking by overflights. Plaintiff claimed that when the Air Force officially represents that a certain property is subject to a large number of overflights, a high noise level and a serious hazard of jet crash, the Air Force has "taken" the property. Plaintiff further claimed that the Air Force, once making such claims, should be estopped from denying the claims in a later suit for just compensation. (Lorenz, Liability, p. 28)

The Writ of Certiorari was denied in March, 1982, but it raises some questions about the legality of the Air Force's position in terms of the AICUZ Program.

The second form of taking for which the AICUZ Program has been questioned is the "effect of an AICUZ study upon other federal agencies involved in approval of federally insured or financed loans." (Lorenz, Liability, p. 23) Both the Department of Housing and Urban Development and the Veterans Administration have policies against providing or insuring loans in areas with high noise levels. In an effort to prevent incompatible development around its bases, the Air Force releases AICUZ studies to HUD and VA officials. As a result, the AICUZ Program and its studies "can have an indirect adverse effect upon a developer seeking to secure Federal approval for HUD and VA housing programs." (Lorenz, Liability, p. 24) No legal case has found this impact alone to constitute an illegal taking. However, the release of such information has caused controversy. At Castle AFB in California, for example, operational changes necessitated the revision of existing noise contours. These new contours were more extensive and utilized the Ldn noise descriptor rather than older standards used by HUD at the time. This caused problems because "to some developers, it appeared that the new contours arbitrarily covered chunks of land not heretofore covered and were expressed in a language that seemed incompatible with HUD standards." (USEPA, p. 11)

Although there have been no legal cases regarding the appropriateness of noise and accident disclosure in the AICUZ Program, one court found such disclosure to be a taking when the information was incorrect. In Rossmoor Corporation v. United States (Ct. Cl. 396-67, 1972) the United States was held liable for a taking in the implementation of an AICUZ study containing misleading information. In the Rossmoor

case, officials at El Toro Marine Corps Air Station in California had taken a number of actions to limit development around the base. Some of these actions included informing "the FHA and VA of sound studies deemed to make certain portions of the area unsuitable for residential use; the public was informed of the governments' views through a letter writing campaign; and there was personal contact with the local planning commission and County Supervisors." (Lorenz, Liability, p. 24) It was later revealed that some of the information released was incorrect, "such as a 50% overstatement of aircraft accidents at the base." (Lorenz, Liability, p. 24) In addition, the Marine Corps "allegedly sought a delay of a local decision on the matter awaiting the taking of office of Supervisors more favorable to the Government's position." (Lorenz, Liability, pp. 24-25) The trial judge found in favor of the plaintiff, stating that he had been "clubbed, coerced, forced, and even sandbagged into submission." (Lorenz, Liability, pp. 24-25)

These cases are rather unusual, and they do further the argument that, when properly conducted, the AICUZ Program itself does not constitute a taking. But local land use regulations based upon the results of an AICUZ study might still face public resistance or even legal challenges. Realizing this, the Air Force tries to oversee the AICUZ Program at each base in an attempt to avoid potential legal challenges and public resistance. But has the Air Force been successful? Is there really public participation and intergovernmental cooperation in the development and implementation of actual AICUZ Program studies? Does the taking issue arise and, if so, how is it handled? To answer some of these questions, this thesis examines a case study, the AICUZ Program at Davis-Monthan Air Force Base in Tucson, Arizona. A single case

study will not provide definitive answers, but it helps raise some of the pertinent issues involved in the AICUZ Program nationwide.

Davis-Monthan Air Force Base and the AICUZ Program

Davis-Monthan Air Force Base covers approximately 11,000 acres in southeast Tucson in the eastern portion of Pima County, Arizona (See Figure 4). The base is situated about three miles northeast of Tucson International Airport. Home of the 836th Air Division, Davis-Monthan is an active flying base, with most of its flights made by the A10 aircraft.

The land use pattern around Davis-Monthan is similar to that around Tucson International. Because of this, Davis-Monthan faces many of the same types of land use compatibility challenges. Geno Patriarca, Director of the Community Planning Department at Davis-Monthan, says that the AICUZ Program at the base is "the tale of two runway ends." (Patriarca, 1988) The base, like Tucson International, is faced with the problems of minimizing the impacts of aircraft noise and accident potential to the north, in more developed areas. Roger Howlett, Principal Planner with the City of Tucson Department of Planning, says that "there's always been a lot of complaints about the jet fighter overflights north of the base, near the University and around Tucson." (Howlett, 1988) According to Geno Patriarca, the noise and accident potential problems are greatest to the north and northwest of the base because,

> the development is there and has been mostly residential for the past 30 years, even before AICUZ was conceived. So that end of the runway was lost. (Patriarca, 1988)

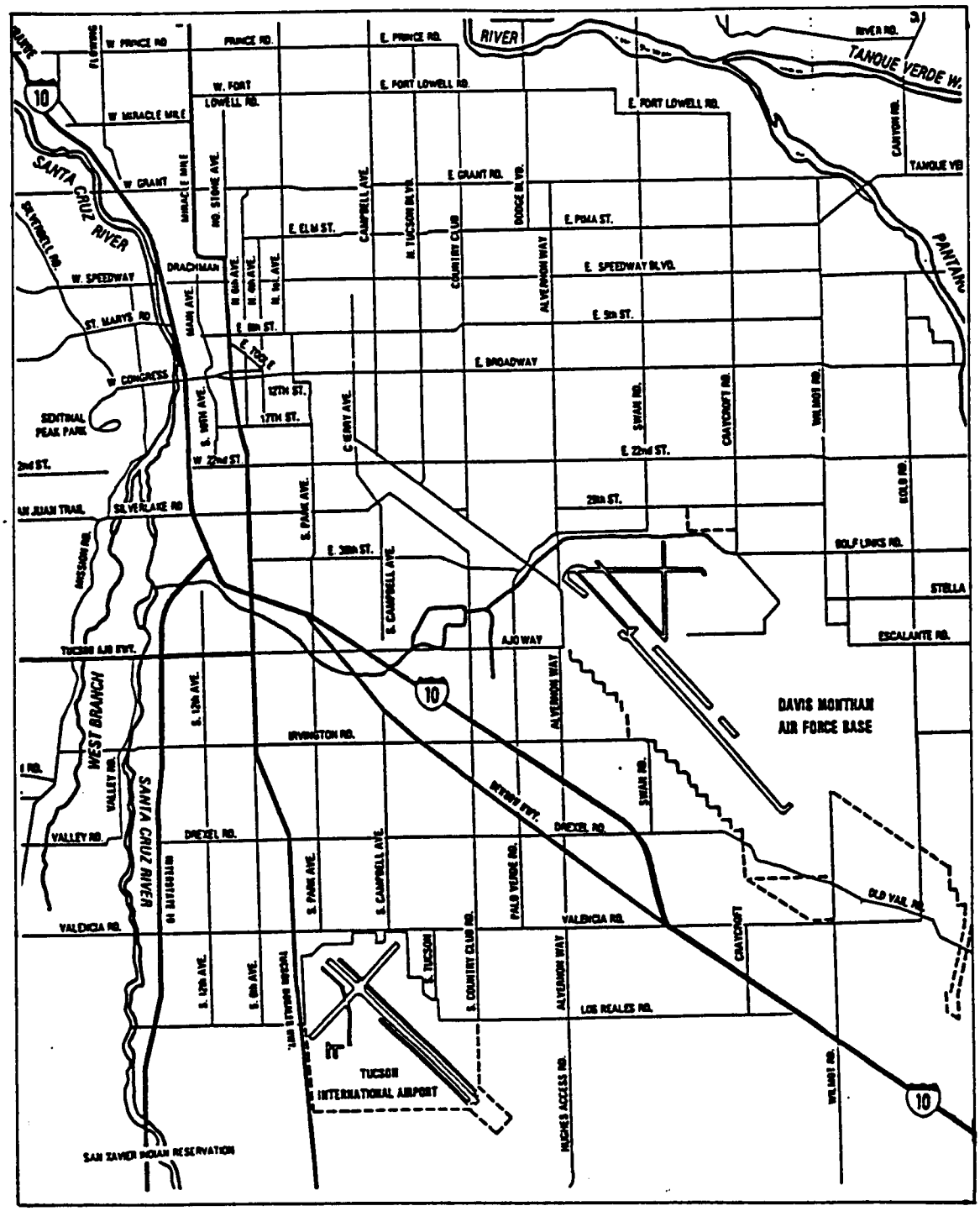


Figure 4. Map of Tucson, Arizona.

David Sumner, Community Planner at Davis-Monthan, agrees:

> To the north end of the runway, most of the development has been in place for some time. There has been, since 1975, a continual infilling, but most of it was already there. Its basically the heart of Tucson, with the University campus area and a lot of residential. (Sumner, 1988)

So, planners for the City and the base must deal with the potentially hazardous effects of aircraft noise and accidents to the north of Davis-Monthan, where the development pattern is well established.

To the south and southeast of Davis-Monthan the situation is different. As is the case south of Tucson International, much of the land south of Davis-Monthan is vacant. Because of this, about 85% of the flights to and from Davis-Monthan are routed to the southeast, over less densely populated areas. (Davis-Monthan AICUZ, p. 3) But the situation is beginning to change, and Davis-Monthan now faces the problems of incompatible development and urban encroachment from the south. David Sumner says that in 1975, "there wasn't much of anything at all to the southeast of the base, so most of what's there now has been built since then." (Sumner, 1988) Geno Patriarca adds that the area off the southeast end of the runway is of the most concern to Davis-Monthan now,

> because that end has the most available vacant land for development and changes at that end have been because the area is in the employment corridor of the region. All that area is open to industrial development. (Patriarca, 1988)

Bill Vasko, Director of the City of Tucson Department of Planning, says that this area is "much more susceptible to development pressures because of the Kolb Road extension and the entrance to Valencia Road." (Vasko, 1988) Bob Johnson, Director of Planning

and Development Services for Pima County, agrees that the area to the southeast will present challenges to the land use compatibility program at Davis-Monthan in the future:

> I think the fact that Valencia Road is such a major connector corridor with Kolb Road and the Alvernon area, and as you go south with the interstate, that there's going to be a lot of industrial development. And when you talk about industrial development that has a clear shot into the City of Tucson, all you have to do is cut across Davis-Monthan, it makes that industrial area very attractive. (Johnson, 1988)

But planners with the County and Davis-Monthan are not overly concerned about industrial development in this area, because industrial land uses are often compatible with aircraft noise and accident potential. The planners are more concerned with uses which might follow industrial development to the southeast. Bob Johnson explains that,

> because of the industrial development that's going on in there, there is a tendency to think that putting hotels and other kinds of uses like that in would be appropriate, and I think that's the type of thing we're going to face in the future. I don't think we need to worry so much about residential, I think even the elected officials understand that putting residential in those areas is in no one's best interest. So its primarily watching over and standing guard against some uses which may be permitted but really aren't appropriate. (Johnson, 1988)

So, to the south and southeast, Davis-Monthan and Pima County face the challenges of preventing future incompatible uses and urban encroachment in an area ripe for development.

From the beginning, the Air Force has recognized the importance of the AICUZ Program at Davis-Monthan:

> Though originally sited some distance from its supporting communities, Davis-Monthan AFB is feeling the effects of land development. Experience has shown that when unguided development impinges upon a facility's accident potential areas and/or high noise zones, the impacted groups soon seek relief . . . Conversely, it must be recognized that the public must be protected from the noise and danger inherent in airbase operations. Therefore, it is in the best public interest to protect the

> taxpayers' multi-million dollar investment in Davis-Monthan AFB, and also give the citizens a plan for the rational development of lands impacted by aircraft operations that is fully attentive to their health, safety, and welfare. (Davis-Monthan AICUZ, pp. 1-2)

With the development pressures to the southeast, the AICUZ Program at Davis-Monthan has become even more important. William Cox, the Air Force's AICUZ Program Manager at the Pentagon, recently cited Davis-Monthan as a base "where unchecked growth could present problems for the Air Force if compatible land use planning is allowed to slip." (Glines, p. 78)

Davis-Monthan's AICUZ Program: Land Use Policies and Controls

The AICUZ report and program for Davis-Monthan were originally prepared in 1975, before the A10 aircraft was stationed there, but the program has been updated over the years. In meeting the goal of land use compatibility around Davis-Monthan, the Air Force sees its responsibilities as being two-fold. The first is to "insure that all possible steps have been taken to reduce the noise impacts generated by aircraft operations." (Davis-Monthan AICUZ, p. 1) This is the noise abatement portion of the program, and it includes modified flight tracks and flight profiles to avoid densely populated areas, curfews on engine runup testing (which is conducted away from populated areas), and the introduction of a quieter aircraft, the A10. The Air Force sees its second responsibility as being "an active and willing participant in an ongoing cooperative planning process through which compatible development plans are generated by the local community." (Davis-Monthan AICUZ, p. 1) It is the second responsibility which makes the Davis-Monthan AICUZ Program important to this thesis.

As is the case with all Air Force AICUZ studies, the Davis-Monthan study divides the air base environs into areas based on noise exposure and accident potential. The Davis-Monthan AICUZ consists of noise contours of Ldn 65, 70, 75 and 80 (See Figure 5). These contours are based on the noise emission characteristics of the A7 aircraft.

The study also outlines the Davis-Monthan Clear Zone and Accident Potential Zones I and II (Figure 5) based upon Air Force accident statistics and the characteristics of the planes stationed at the base. The Clear Zone at Davis-Monthan, which is owned by the Air Force and lies entirely within the boundaries of the base, represents the area where "the overall risk is so high that the necessary land use restrictions would prohibit reasonable economic use of land." (Davis-Monthan AICUZ, p. 6) Accident Potential Zone I is "less critical than the Clear Zone but still possesses a significant risk factor." (Davis-Monthan AICUZ, p. 6) APZ I at Davis-Monthan covers an area 5,000' long and 3,000' wide extending from either end of the runway. Accident Potential Zone II is "less critical than APZ I but still possesses some risk." (Davis-Monthan AICUZ, p. 8) APZ II at Davis-Monthan covers an area 7,000' long and 3,000' wide extending from the APZ I at either end of the runway. To the northwest of Davis-Monthan, a portion of APZ I and all of APZ II cover developed areas in Tucson. To the southeast, both APZ I and APZ II cover Air Force property. Thus the desire to route flights to and from Davis-Monthan to the southeast, and the need to restrict incompatible development in the vicinity of Valencia and Kolb Roads.

For Accident Potential Zones I and II, land use guidelines have been developed. These guidelines seek to prevent uses which:

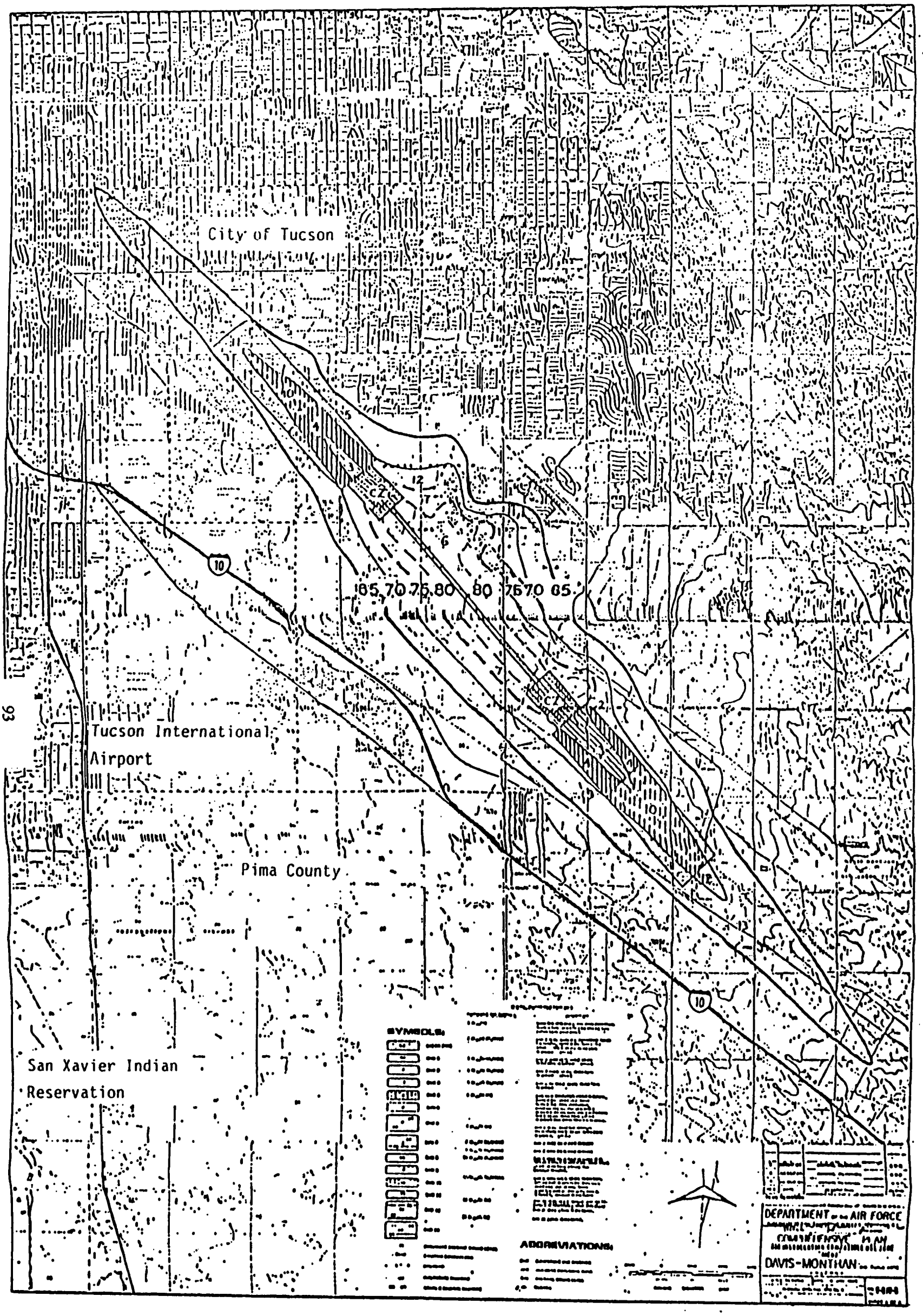


Figure 5. Davis-Monthan Air Force Base AICUZ Map

1. Have high residential density characteristics.

2. Have high labor intensity.

3. Involve explosives, fire, toxic, corrosive or other hazardous characteristics.

4. Promote population concentration.

5. Involve utilities and services required for area-wide population, where disruption would have an adverse impact.

6. Concentrate people who are unable to respond to emergency situations such as children, elderly, handicapped, etc.

7. Promote extended duration of population concentration.

8. Pose hazards to aircraft operations. (Davis-Monthan AICUZ, pp. 11-12)

The Air Force stresses that these are guidelines, and that the implementation of land use restrictions required to meet such guidelines is the responsibility of local governments.

When combined with the noise contours, the Accident Potential Zones create thirteen possible Compatible Use Districts, eleven of which are used for the Davis-Monthan AICUZ. The Air Force AICUZ Program has established land use guidelines for each CUD, based upon studies prepared by the Department of Housing and Urban Development, the Environmental Protection Agency, the Air Force, and other state and federal agencies (See Appendix 3). These guidelines were used in preparing the Davis-Monthan AICUZ study and the land use recommendations which make up the program itself.

Currently, the main focus of the AICUZ Program at Davis-Monthan is in trying to prevent urban encroachment and incompatible development to the southeast. This

land is outside the City of Tucson, and falls under the jurisdiction of Pima County. But the Davis-Monthan AICUZ is also trying to lessen the impacts of noise and accidents on residents north of the base, in the City of Tucson. Because of this, the Air Force must rely on the governments of Tucson and Pima County to enact land use policies and regulations to establish an air base-compatible land use pattern. Based upon certain conclusions concerning the existing land use pattern, the Air Force makes a number of recommendations for achieving the desired land use pattern around Davis-Monthan. Some of the conclusions upon which these recommendations are based are:

1. That the primary concern is with existing land uses off to the northwest end of the runway and the future land uses surrounding the other boundaries of the base, primarily to the southeast.

2. That, in terms of existing and potential land use conflicts around the base, residential and dense commercial uses pose the greatest problem.

3. That with a greater emphasis on compatible land uses, and with noise attenuation measures for new construction, future compatibility problems may be avoided.

4. That the existing flight patterns for the assigned mission represent an optimum situation, and that further modification could result in safety hazards or mission degradation.

5. That the encroachment of Davis-Monthan AFB is nearing a critical stage, and that in order to insure the public health, safety, peace, comfort, convenience and general welfare and to prevent impairment of the airfield, it is necessary to guide, control, and regulate future growth and development. (Davis-Monthan AICUZ, pp. 3-4)

With these conclusions, the Air Force makes several specific recommendations for the land use pattern around Davis-Monthan.

To achieve land use compatibility around the base, the Davis-Monthan AICUZ study recommends the following:

1. Data from the study should be incorporated into existing land use plans and ordinances of the local communities to serve as a basis for approval or disapproval of future development requests.

2. Local jurisdictions in the Davis-Monthan AFB environs should review their building codes and, where necessary, incorporate sound attenuation requirements.

3. Land use proposals within the Davis-Monthan AICUZ should be fully evaluated on a case-by-case basis.

4. Residential uses are totally incompatible in Compatible Use Districts 1 through 9, strongly discouraged in Compatible Use Districts 10 and 12, and discouraged in Compatible Use Districts 11 and 13. Such uses should only be permitted in Compatible Use Districts 10 through 13 following a full evaluation requiring that Noise Level Reduction Standards be incorporated into building design and criteria.

5. There is a wide range of compatible land uses within the AICUZ. Efforts should be made to plan for and promote such uses in lieu of permitting those uses which are incompatible. (Davis-Monthan AICUZ, pp. 3-4)

To go with these recommendations, the Air Force also suggests certain policies be considered for incorporation into comprehensive plans and area plans prepared by the City of Tucson and Pima County. These general policies include the following admonitions:

1. Incorporate the Air Installation Compatible Use Zone concept into existing land use plans, modifying them where necessary.

2. Adopt appropriate ordinances to implement airfield environs land use plans. (Davis-Monthan AICUZ, p. 3)

There are a number of other very specific policy recommendations, but it is basically with these two and the land use recommendations that the Air Force hopes to achieve land use compatibility around Davis-Monthan. It is , therefore, imperative that there be intergovernmental cooperation between the Air Force and the City of Tucson and Pima County.

As with the recommendations made in Tucson International's Part 150 Program, the City of Tucson and Pima County have been cooperative in implementing many of the land use policies and regulations called for in the Davis-Monthan AICUZ study. Geno Patriarca emphasizes the importance of this cooperation:

> City and county governments play the biggest role. You can't do AICUZ without implementation, and the only way to implement it right now is through zoning ordinances. The bottom line on that is that the County has done it, and the City is doing it right now. (Patriarca, 1988)

Pima County's "Airport Environs and Facilities" section of the Pima County Zoning Code is the major thrust in implementing the Davis-Monthan AICUZ Program. The County ordinances apply to both Tucson International and Davis-Monthan, but Bob Johnson says the code is "a little more restrictive in the Davis-Monthan ordinance than the Tucson International Ordinance both in terms of noise and clear zones." (Johnson, 1988) Johnson explains that this is due to the nature of military aircraft operations and flight tracks around Davis-Monthan. In fact, these tougher restrictions were the basis for the public resistance to the original County ordinances. Johnson says that the main problem was the allowance for public assembly in commercial and industrial areas:

> The numbers of people in industrial areas was very restrictive and it didn't allow the property owners to take advantage of the land. The issue was that it allowed a certain floor area ratio, a certain amount of the land to be covered with structures, but we would only allow a few people within the structures themselves and so there was a contradiction there. They didn't want too many people out there, but they did want to take advantage of the structures, and so it was a matter of adjusting the numbers of people and taking a look at some of the uses. (Johnson, 1988)

Johnson adds that, in this instance, "the property owners banded together after the ordinance was adopted and claimed that they were not properly notified, that it was a taking, and all that." (johnson, 1988) To solve the dilemma, Johnson says the County

Board of Supervisors "instructed us to re-meet with the property owners and we spent about six months with their attorney redoing the ordinance." (Johnson, 1988) The revised ordinance, which increased the number of employees and non-employees allowed in certain types of land uses, was adopted by the County in December, 1986.

Pima County's zoning ordinance represents Davis-Monthan's best defense against encroachment, as development pressures to the southeast are in the County's jurisdiction. The County also updated its building codes to require acoustical treatment, and revised its area plans to reflect recommendations contained in the Davis-Monthan AICUZ study.

As discussed in Chapter III, the City of Tucson has been slow to enact the recommendations of the Part 150 Program. The same is true in terms of the City's implementation of the AICUZ Program, but with some excuse. Geno Patriarca says that Davis-Monthan was annexed by the City in the early 1980's, and that before the annexation the AICUZ Program was not as relevant to the City as to Pima County. (Patriarca, 1988) Patriarca adds that before annexation,

> there was something in Tucson's zoning ordinance about height limitations, but really not anything as far as noise or safety zones go. Even though the City adopted the AICUZ in its plans, as far as being enforceable, it wasn't. (Patriarca, 1988)

But annexation changed the situation. Patriarca explains that "part of the annexation agreement, we got it written right in the agreement, is that the City would adopt a zoning ordinance." (Patriarca, 1988) So, as discussed in Chapter III, the City of Tucson is currently working on its Runway Approach Compatible Use Zone (RACUZ) ordinance. Patriarca is sympathetic with the City's efforts to revise its ordinances:

> It's tougher in the City because that area is redeveloping and that redevelopment issue is really a sticky one. I feel for the City in trying to

> work this one out. We've been working with them and they've been involved with us. (Patriarca, 1988)

He adds that the City's new ordinance will be similar to Pima County's, but with the emphasis on preventing incompatible redevelopment rather than new urban encroachment.

Roger Howlett says the City has been able to control incompatible redevelopment fairly well without the ordinance. (Howlett, 1988) He explains that "on zoning cases that have come in, we've limited the impacts from Davis-Monthan through the building codes." (Howlett, 1988) In addition, the City has tried to promote compatibility around Davis-Monthan by updating area plans and the comprehensive plan to reflect accident and noise considerations.

Currently, Pima County's zoning ordinance, area plans, and building codes are helping prevent incompatible development in the area of high growth potential south of Davis-Monthan. And the City of Tucson, by agreeing to update its zoning ordinance, areas plans, and building codes, is trying to prevent incompatible redevelopment north of the base. Thus, the Davis-Monthan AICUZ Program, along with the Tucson International Part 150 Program, has been successful in getting local governments to cooperate in the implementation of land use regulations promoting airport and air base compatibility.

The Success of the Davis-Monthan AICUZ Program

In order to assess the Air Force's AICUZ program nationwide, it is important to examine the success of the Program's application at Davis-Monthan Air Force Base.

The criteria for success are the same as those used to judge Tucson International's Part 150 Program. The first is whether Davis-Monthan's AICUZ Program, and the land use controls implemented by Tucson and Pima County partly as a result of it, have met strong resistance, or even legal challenges, from the public. The second criterion is whether the Program has provided for genuine, active citizen participation. This is especially important for the AICUZ Program, for the Air Force does not wish to appear "heavy-handed" on local land use issues. The third, and most important, criterion is whether the Program has fostered cooperation between the levels of government in promoting air base land use compatibility in Tucson and Pima County.

In terms of public resistance and legal challenges, Davis-Monthan's AICUZ Program and the land use controls resulting from it have been, for the most part, successful. But problems have occurred because of the need to adopt very restrictive zoning controls for the area south of the base. The Air Force cooperated with the County and the Tucson Airport Authority in satisfying land owners' complaints, however, and probably avoided legal action.

Geno Patriarca says that the process of revising the County ordinance

> was essentially a compromise. It was less than what we had originally started out with, but I think we did the best we could with what we had. There was an awful lot of compromise and we focused on the safety aspect. That was the best alternative and we kept it out of the legal arena. (Pariarca, 1988)

Bob Johnson says that since the County revised the ordinance, he does not expect legal challenges in the future because

> the major property owners that were impacted by the ordinance worked with us on it and were part of the process. And our attorneys feel that its a valid ordinance. They really believe that if we're challenged sometime in the future that we're okay. (Johnson, 1988)

Geno Patriarca also feels that the County ordinance will be successful against possible legal challenges in the future because

> it affects not only Davis-Monthan, but also Tucson International Airport and Ryan Field, and we approached it not as an AICUZ ordinance, but as a regional airport ordinance. AICUZ was used as some of the basis for it, but other things were too, like models from California. (Patriarca, 1988)

The City of Tucson has faced no legal challenges to the land use controls it has adopted for the Davis-Monthan area, but its airport zoning ordinance has not been enacted. Roger Howlett thinks that, even if the ordinance is very restrictive to deal with the nature of aircraft operations at Davis-Monthan, the City and the base will not face serious legal challenges:

> There's been the perception that Davis-Monthan has attempted to be a good neighbor. The bottom line at Davis-Monthan is that its a pretty stable employer, and does pump a lot of money into the economy. (Howlett, 1988)

In fact, the Air Force's importance to the Tucson area may preclude any future legal challenges concerning the AICUZ Program or the City and County's ordinances stemming from it. In the case of rezonings, for instance, David Sumner says that

> the developers think that they're up against a formidable opponent. If the Air Force even shows up, that probably diminishes their chances quite a bit. The Air Force carries a considerable amount of weight, especially in Arizona, because of the legacy that we have here. (Sumner, 1988)

Such influence can be used positively, or it can cause citizens to feel as if the Air Force is abusing its power. When used properly, this influence helps protect air base environs land users from the hazards of aircraft operations. If abused, such influence can bring about legal action. Whether the Air Force successfully defends its actions or not, negative public exposure can never further the goals of the AICUZ Program.

One example of this for the Davis-Monthan AICUZ Program is the potential for legal action concerning the Davis-Monthan noise exposure contours. When the AICUZ study for Davis-Monthan was originally prepared in 1975, the noise exposure contours were based upon the A7 aircraft's noise emission characteristics. But in the early 1980's, the A10 aircraft replaced the A7 at Davis-Monthan. The A10 is a much quieter aircraft, and Geno Patriarca says that "when we did our AICUZ noise contours again, we found that they had shrunk." (Patriarca, 1988) These smaller noise contours could present problems for Davis-Monthan. Geno Patriarca explains:

> We went from the A7's to the A10's and the noise contours were reduced. We looked at that and said 'wait a minute, what are we doing to ourselves?' We had a talk with our legal people, too. If we were to re-release that and have a completely new study, the local jurisdictions would think it would be okay to allow more development. So what we did then is say 'alright, City, County, we'd like to keep the A7 contours, since they are of the furthest extent. Knowing that our current contours are not like that, but considering that the forecast. And in all your planning consider those our forecasts.' And they looked at it and agreed. So in all their neighborhood plans, and all their regional plans, the A7 contours are there for forecasts. (Patriarca, 1988)

This could be a potential problem for Davis-Monthan, as it was for the Air Force in Gilliland v. United States and for the Marine Corps in Rossmoor Corporation v. United States. Geno Patriarca does feel that using the A7 noise contours could be a legal problem, and that if Davis-Monthan had not "done enough ground work with the jurisdictions and developers, there could be a challenge." (Patriarca, 1988)

But by not using the A7 contours, Patriarca says that Davis-Monthan faces a bigger problem--that of constantly adjusting noise contours and land use regulations to fit changing missions at the base. Patriarca sees this as a basic flaw in the national AICUZ Program:

> Bases do change. We get new missions, we get new aircraft. And that's the situation here at Davis-Monthan. What could happen, with a lot of bases being closed in the next five years, is that Davis-Monthan could get more missions. We may get more aircraft, or louder aircraft, and if that happens, then we're back to having a real problem. One of the biggest faults, I feel, in the AICUZ Program is that it doesn't allow for planning, and I don't know one planner out there that not only says 'this is the way it is, but this is the way its going to be.' But we need some forecasts for that. AICUZ does not allow for forecasts, and that's a flaw. I've been preaching that since 1982. It's difficult to go in the Air Force from any six month period and say 'this is the way it's going to be six months from now,' because of the way things change. So that's why, in our case, we've already briefed the City of Tucson and Pima County that we're using the noise contours from the A7 and that's going to be our planning base. (Patriarca, 1988)

So far, the use of the A7 noise contours at Davis-Monthan has not been challenged. But if the noise contours are challenged, it might appear as if the Air Force is attempting to provide misleading information and abuse its power in preventing development near the base. Because of these problems with contracting noise contours, Geno Patriarca feels that the AICUZ Program's emphasis should be on accident potential:

> The noise has not impressed me as being very solid because there are engineering ways to take care of noise and developers seem to be willing to attenuate. It's the safety issue that's still the main focus of the AICUZ. Let's take a longer look at safety and I think we can justify trying to achieve compatible land use better through safety than we can through noise. (Patriarca, 1988)

Overall, the AICUZ Program at Davis-Monthan, and the City and County land use regulations based partly upon that program, have been successful in dealing with public resistance and avoiding legal challenges. The Air Force and the local jurisdictions have remained flexible and open to compromise. But the Davis-Monthan Program, and AICUZ programs nationwide, must be ready to deal with changing mission requirements in an effective manner, or they may face legal confrontations in the future.

The AICUZ Program at Davis-Monthan got off to a slow start in terms of promoting active citizen participation, but it is doing a better job as useful procedures are established. Roger Howlett says that when Davis-Monthan updated its AICUZ Program in 1982, for instance, the Air Force may have been less than candid:

> They hired an outside consultant whose major role was to go out and try to make people aware of what was happening. I didn't really get the sense of a lot of public participation, though. I think they might have been concerned that they would get a lot of questions about military overflights. (Howlett, 1988)

This view of public involvement backfired on the County and Davis-Monthan when the County originally tried to adopt its airport zoning ordinance in 1985, because major landowners felt they had been left out of the planning process. When the County and the base revised the ordinance in 1986 with open public participation, "both the realtors and the developers were involved in the process, and they were satisfied with the results," according to Bob Johnson. (Johnson, 1988) The County and Davis-Monthan learned a valuable lesson: that citizen participation must be part of any successful land use regulatory process. Johnson adds that the developers did not want special treatment, but that they wished to be involved in decisions concerning land use in the County:

> They all agreed that they didn't want to see Davis-Monthan leave the community. Just about everyone I've talked to, with the exception of some people at the University of Arizona, feels very strongly about Davis-Monthan. They feel that Davis-Monthan is an important asset to the community, and they don't want to jeopardize that asset. So they were willing to work with us, and they felt very strongly that they wanted to keep Davis-Monthan here. So they did work with us in a very positive way to resolve the differences of opinion. (Johnson, 1988)

Geno Patriarca agrees that, over the years, the Davis-Monthan AICUZ Program has helped the Air Force generate active citizen involvement. Patriarca says that, since the early 1980's,

> our AICUZ Program has gone through local planning processes for area plans and neighborhood plans where there is active citizen participation. If there's a group working on a neighborhood plan that Davis-Monthan might affect, we sit on that group as a member. And I make a presentation saying 'this is what we do at Davis-Monthan, this is where we fly, these are the things we're concerned about, and these are the things you need to be concerned about.' So now most of the citizen participation is through the neighborhood plans, area plans, the zoning process, and working with developers. (Patriarca, 1988)

In establishing a process of working with developers as a form of citizen participation, the AICUZ Program at Davis-Monthan has been particularly successful. Patriarca feels that this working relationship stems from a willingness, on both sides, to compromise:

> I think we've been successful in saying 'hey, listen, nobody's right and nobody's wrong. Davis-Monthan has been here since 1929, but the region progresses and marches forward, and if it doesn't then it stagnates and dies. What we want to do is make sure that compatible land use goes in.' And that's the approach we've taken, that's our philosophy. And that's how we've been dealing with developers. We feel that if we go with the developers and work with them, then when we both go before the Planning and Zoning Commission and the Board of Supervisors then we'll be better off coming up with a compromise that we both can live with. (Patriarca, 1988)

The Davis-Monthan AICUZ Program has also helped the Air Force establish a positive working relationship with realtors and lending institutions. Patriarca explains that the base has

> an ongoing dialogue with the realtors. I get about two calls a month saying 'we're looking at a property in this area, looking to sell it or buy it, does Davis-Monthan affect it at all?' This happens a lot with local realtors, I think, because the local jurisdictions refer them to us. The banks call us, too. And we get calls from Phoenix, San Diego, and Los Angeles saying 'we're representing a client who's thinking of either buying

> or selling a property, tell us a little bit about your flying activities. (Patriarca, 1988)

Thus, the AICUZ Program at Davis-Monthan has improved its record on citizen participation since the early 1980's. As long as the base remains flexible and open to compromise, active citizen participation should not threaten Davis-Monthan's existence, but promote land use compatibility around the base. In the long run, this will help maintain Davis-Monthan's operational capability as a flying base.

As with the Part 150 Program at Tucson International, the greatest success for Davis-Monthan's AICUZ Program has been in fostering intergovernmental cooperation to promote land use compatibility. Overall, the Air Force has succeeded in avoiding claims that it has abused its power and influence to control private land use around Davis-Monthan. When the potential for such claims has been greatest, the Air Force has handled the problem through increased citizen participation and effective community relations.

Much of this success has to do with the cooperation between the City of Tucson, Pima County, and Davis-Monthan itself. Roger Howlett says that since the City has been more closely involved with the base, the two have had a good working relationship, and have established the mutual contacts necessary to keep the cooperation going. (Howlett, 1988) Howlett adds that Davis-Monthan has helped the City develop its new zoning ordinance, and that the City has helped the base by promoting compatible redevelopment north of the base. (Howlett, 1988)

Bob Johnson thinks that Pima County's relationship with Davis-Monthan has also been very cooperative and productive. He says that he feels good about the County's role, "because we've followed the studies and the plans that have gone on out there."

Johnson adds that the County's ordinance is "one of the best in the country, that's what we've been told by Davis-Monthan." (Johnson, 1988)

The planners at Davis-Monthan also recognize the importance of the City of Tucson and Pima County in planning efforts to establish a compatible land use pattern around Davis-Monthan. David Sumner says that the base always tries to maintain

> several key contacts with the City and the County. They let us know if there's any sort of development that's coming in. They let us know ahead of time, and we go through the proper channels and decide how we want to approach it. Then we go back down and talk to the City or the County. Those contacts help a lot. (Sumner, 1988)

Geno Patriarca says that the City of Tucson and Pima County have been very willing to work implementing the AICUZ Program around Davis-Monthan:

> It was completely accepted by the City and the County. They realized that Davis-Monthan is a vital employment force. We're the second largest employer in Tucson, and we're a stable economic force, while other ones go through the business cycles. So I think they're willing to work with us on any problems we have. I'm happy with the way things go. I'd sometimes like to see a little stronger stance but, overall, looking at the situation in the Tucson area, knowing the growth potential and the developers, I think we're making out fine. (Patriarca, 1988)

This success has been the result of seeking the City and County's participation in planning for the base. The planners at Davis-Monthan have established valuable contacts in the process, as Geno Patriarca realizes:

> 50% of my time is spent downtown. It's going downtown to see people from the City or the County. It's going to meetings and talking to people. A planner has to be active. He can't just sit behind a desk and do base planning. (Patriarca, 1988)

It is through the combination of citizen participation and cooperation between the levels of government, especially the City of Tucson and Pima County, that Davis-Monthan has achieved success with its AICUZ Program. An example of this is how the

Air Force is currently working to prevent urban encroachment and incompatible development south of Davis-Monthan. It requires compromises on the part of the Air Force, Pima County, and private citizens. Geno Patriarca explains:

> I have found that Davis-Monthan's importance to the region is significant enough that developers pay attention to us and come to talk with us. And that's due, in part, to the work we do here, as far as our willingness to work with developers, but also to the support from the City and County. They say 'hey, listen, look at the Davis-Monthan AICUZ first.' And once they say that the developers come over to us and say 'why don't you sit down with us and let's take a look at it.' And I think those two things are critical. The perception of our willingness to work with the developers in not saying 'hey, this is a flying area, we don't want anything to go in there.' And also, the local jurisdictions saying 'go talk to Davis-Monthan first and then come back to us with some kind of a development plan.' When they come here we say 'there's no black, there's no white, it's gray.' Then we say 'it'd really be nice if we could both go to the local jurisdictions set on a development plan that we both agree on.' We say 'it'd be nice if we could give you a letter from the general saying we support the development.' Then it's a lot easier to get it through the local jurisdictions. (Patriarca, 1988)

This approach has been successful at Davis-Monthan. One recent example concerns the South Kolb Road Specific Plan, a 348-acre proposed development about two miles southeast of Davis-Monthan's runway. Early in 1988, the developer, Jerry Jones and Associates, proposed a mixed land use project, with 20% of the development to be set aside for a civic arena and a hotel/motel complex. The remainder was to be mixed commercial and industrial. The area was zoned for industrial, and the developers sought a rezoning to allow high density commercial uses.

Because the property is located in Davis-Monthan's Compatible Use District 4, the Air Force was concerned about allowing a civic arena and a hotel/motel complex. Bob Johnson says that, originally, the County Board of Supervisors supported the proposed development. (Johnson, 1988) Realizing this, the Air Force contested the

rezoning by writing letters to the Pima County Department of Planning and Development Services and by attending public meetings before the County Planning and Zoning Commission.

To solve the disagreement, the Air Force, the County, and the developers reached a compromise. Geno Patriarca says

> we were concerned, and we got together with the developers and talked about it. They knew our concerns, and nothing was illegal in the whole thing, it was just that they wanted a certain type of land use in there that the zoning codes might have allowed and might not have allowed. We wanted another type, a more compatible land use in there. We worked with them and went to the Planning and Zoning Commission and the Board of Supervisors and worked out a compromise. They took out the hotel/motel and the civic arena, and were allowed to put commercial in there instead of industrial, and it worked out fine. (Patriarca, 1988)

Bob Johnson adds that the developer "did get commercial, but there's a limitation in the ordinance in terms of the number of people that can be in a facility at any one time." (Johnson, 1988)

So, through compromise and a willingness to negotiate, the Air Force was able to prevent incompatible land uses in the Kolb Road Specific Plan development, and the developers were able to proceed with commercial land uses, albeit at a lower density. It is this type of cooperative effort between the public, the local governments, and the Air Force that has made Davis-Monthan's AICUZ Program successful.

Conclusions

There are a number of lessons to be learned by local governments and the Air Force in Davis-Monthan's success with the AICUZ Program. The first lesson is that the AICUZ Program should be viewed as part of the region's overall land use planning and

regulatory program. Local plans and regulations should reflect concerns brought for in the AICUZ Program, and the Air Force should recognize and deal with local land use concerns. This strengthens ties between the base and the local governments, and helps the base function as a part of the larger community. It also allows the base and the community to share information and resources in working towards a land use pattern that will allow the base to carry out its mission. Thus the Air Force and the local community receive benefits from the base's continued operation.

The second lesson is that the active participation of local governments is essential to an AICUZ program's success. The Air Force cannot pass regulations to control civilian land use around bases; that is the responsibility of local governments. But the relationship goes beyond the need for regulations. A positive relationship between the base and the community can be fostered if it is clear that the Air Force wants the local governments' views on land use issues, and tries to incorporate those views into its planning efforts. It prevents the Air Force from being perceived as "heavy-handed" by citizens. Local governments also benefit, as they can help protect private citizens from the effects of aircraft operations and can show the base that it is recognized as an important, welcome part of the community, and one which local governments' wish to help in remaining operational.

A third lesson for AICUZ programs nationwide is that the AICUZ process should involve open, active citizen participation. Again, this will strengthen ties between the base and the community, and can help the Air Force avoid public resistance and charges that it is abusing its influence. AICUZ planners should be willing to work with citizens' groups, developers, realtors, and other interested parties in explaining the need

for the AICUZ Program. They also must gather input from these groups, and be willing to compromise for the good of the base and the community. Genuine citizen participation should go beyond the usual formal public meetings, to a process in which the AICUZ planners interact with the citizens affected by the AICUZ Program. The public should feel that its concerns and viewpoints will not be overlooked.

These are a few of the lessons readily apparent from an examination of Davis-Monthan's AICUZ Program. As is the case with the lessons learned from the Tucson International Part 150 Program, they are important for local governments dealing with airport or air base land use compatibility problems, and for AICUZ planners who work with these communities. Their applicability to the national AICUZ Program is discussed in greater detail in Chapter V.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Although the case studies of the Part 150 Program at Tucson International and the AICUZ Program at Davis-Monthan cannot serve as models for airport/air base land use compatibility planning nationwide, they do offer a number of conclusions that are relevant to airfield environs planning in general. Some of the more pertinent conclusions are:

1. That land use planning and regulation is an effective means of promoting land use compatibility around airfields. The City of Tucson and Pima County have used area plans, zoning, development proposal review, and building codes to prevent incompatible development and to promote the public's safety and welfare around Tucson International and Davis-Monthan.

2. That strong state enabling legislation is necessary if local governments are to plan for and regulate the land use around airports and air bases. Planners with the City of Tucson, Pima County, the Tucson Airport Authority, and Davis-Monthan AFB feel that they could improve airfield land use compatibility with stronger legislation including the authority to require easements as a condition of rezonings around airfields and the authority to enact truth-in-sales ordinances mandating aircraft accident potential and noise level disclosures.

3. That airfield environs land use compatibility programs should be viewed as a part of an area's overall planning process. In Tucson and Pima County, the Part 150 and AICUZ Programs are reflected in the comprehensive and area plans, and are considered in development decisions affecting the entire region.

4. That any program for airport/air base land use compatibility must be a result of cooperation between the airport proprietor, local, state, and federal governments. In Tucson and Pima County, the Tucson Airport Authority and Davis-Monthan's Community Planning

Department have taken the leadership role in airfield environs land use planning. But their programs could not be successful without the coordination and cooperation of all levels of government.

5. That citizen participation is necessary for the successful implementation of land use control policies and regulations designed to promote airport/air base compatibility. In the case of Pima County, the lack of citizen involvement resulted in the long process of revising the zoning ordinance to avoid potential legal challenges.

6. That the process of land use compatibility planning for airfield environs relies on the activity of certain key actors or leaders. In Tucson and Pima County, this is evident in the strong contacts between the planners for the City, the County, the Airport Authority, and the Air Force Base. They have taken a proactive stance in promoting airport/air base land use compatibility, and have established the ongoing links that keep that process intact regardles of changes in municipal administrations.

From these general conclusions, it is possible to make a number of recommendations concerning airfield environs land use planning in other localities.

Recommendations

Airport/air base environs land use compatibility planning has benefitted from the efforts of the Part 150 and AICUZ Programs in Tucson and Pima County. But there is no foolproof solution to the problem of protecting residents in the vicinity of airfields while providing the air transportation society demands. Incompatible development still occurs around airports and air bases, and land users are still exposed to high noise levels and accident potential.

Despite these realities, there are certain measures for alleviating the potential impacts of airfield operations on land users in the vicinity. The Part 150 and AICUZ Programs currently represent the best means of implementing these actions, for they

combine on-site noise abatement with land use controls to lessen the impacts of noise and accidents. Establishing such a program involves private citizens, airport proprietors, and local, state and federal governments. Basically, these groups should work to achieve airport/air base environs land use compatibility through four interrelated and continuous sets of actions: legislation, participation, cooperation, and implementation.

Legislation: The legislative process for airport/air base environs land use compatibility centers on state enabling legislation. Without adequate enabling legislation, local governments are hampered in their efforts to plan for the protection of land users in the vicinity of airfields. But all too often state enabling legislation is inadequate, and local jurisdictions and airport operators face legal challenges. This further impedes the planning and regulatory process, as "the judiciary is not a repository of planning expertise and should not be forced to correct the unfortunate results of legislative inaction." (Blitch, p. 704) Fortunately, this situation can be changed. But the change must be a result of the combined efforts of airport operators and the local, state governments, and federal governments.

Airport operators (whether local governments, private agencies, or branches of the military) and local governments must constantly review state enabling legislation, and suggest additions and amendments as warranted. This legislative monitoring process should involve enabling acts dealing with land use planning, zoning, building codes, subdivision regulations, environmental protection and related topics. Such examination is important at the local level, where the day to day application of state enabling legislation occurs. As a result, airport proprietors and local jurisdictions must remain active, for "only through obtaining, reviewing and analyzing the enabling acts will suggestions for

amendments to enabling acts be forthcoming." (U.S. Dept. of the Air Force, July, 1984, p. 25)

But suggested additions and amendments are not enough to help ensure airport/air base environs land users' safety. State legislatures must act upon local suggestions. State governments should stay abreast of changes in land use planning and regulation practices, and create legislation which reflects those changes. If the states expect local governments to plan for and regulate land use in the vicinity of airfields, then state enabling legislation should be strong enough to make local implementation more legally defensible. Local jurisdictions can protect land users around airports and air bases, but they need state legislation mandating effective land use controls such as noise zoning and noise and accident potential disclosure ordinances, to do so.

The federal government can also promote effective state legislation with the development of a model enabling act for airport/air base land use planning. A number of federal agencies, including FAA, HUD, and EPA, could lend their expertise in creating model legislation illustrating the types of powers local governments need to plan and regulate for land use around air facilities. Such model legislation would be valuable in helping states develop their own enabling acts, and would further promote airfield environs land use compatibility.

The combined efforts of airport operators and the local, state and federal governments can help rectify past failures in the legislative process concerning airport compatibility planning. But the establishment of a proper legislative framework is only part of the overall scheme in working towards airport/air bases environs land use compatibility.

Participation: The participatory process for airport/air base environs land use compatibility centers on active public involvement. Without citizen participation, any program to regulate land use in the vicinity of airports and air bases can expect public resistance or even legal challenges. Genuine public involvement should go beyond the obligatory public meetings and hearings held during the implementation stage. Neighborhood groups, developers, realtors, and other interested parties should be encouraged to participate throughout the planning process. Both the local jurisdictions and the airport operator are responsible for assuring active citizen participation.

A recent article on the Army's version of the AICUZ Program offers several useful insights as to how airport proprietors and local governments can benefit from public involvement:

1. When people feel a genuine sense of participation in the decision making process, they are far more committed to implementing that decision. By getting the local community emotionally invested in solving the problem, a political climate of cooperation can be developed which facilitates implementation. Once participation in a decision has occurred, self-esteem rides on making it work.

2. The entire process must be open and visible. People trust what they see and understand. When decisions are made internally, without an opportunity for people to see and understand the factors considered, suspicions build which reduce credibility. Visibility breeds credibility.

3. Solutions to problems which satisfy the needs of all interests have the best chances of being implemented. The different values and competing interests among parties can produce conflict and hinder the development of implementable solutions to problems. In order to reduce conflict, the values and interests of all parties concerned must be identified and addressed in the planning process. Community involvement can help to identify and eliminate some of the sources of conflict which are based on poor communication and misunderstanding, and ultimately, can lay the groundwork for implementing decisions. (Dunning, et al, pp. 10-11)

Clearly, citizen participation benefits the airport operator and local jurisdictions as well as the general public.

The study of the Army ICUZ Program also offers suggestions for making such productive citizen participation a reality. The focus of these suggestions is a "thought process" which helps local planners and airport operators "identify the scope and intensity of their interaction with the public." (Dunning, et al, p. 11) Basically, this thought process encourages local planners and airport proprietors to ask themselves a number of questions. One question asks what information needs to be exchanged with the public at various stages of the planning process. It stresses that

> the exchange of information must be an exchange. Planners must identify the information they need <u>from</u> the public as well as the information they need to provide <u>to</u> the public. (Dunning, et al, p. 11)

Another question asks what groups in the community need to be contacted at various stages of the planning process. This question reminds planners "that there are a variety of groups or elements of the community which need to be involved, each needing and providing different kinds of information." (Dunning, et al, p. 12) Two final questions ask "which techniques for interacting with the community are appropriate" and "what special circumstances exist which could affect the choice of techniques." (Dunning, et al, p. 11) These questions emphasize the need for going beyond the typical public meeting/hearing form of participation.

Through a system of open, active public involvement, then, local governments and airport operators can expect a stronger, more effective program for alleviating the impacts of airfield operations on land users. This program will be easier to implement and will face less public resistance than one not involving citizen input. The article on

the Army's ICUZ Program stresses that "the foremost lesson learned concerns the value of communication between an installation and the surrounding communities" and that "the very act of approaching communities and asking them to participate creates a positive climate for problem solving." (Dunning, et al, p. 13)

Cooperation: The cooperative process for airport/air base environs land use compatibility planning involves elements of citizen participation, but it centers on cooperation between the airport proprietor and local, state, and federal governments. Without such cooperation, no airport compatibility planning program can be successful. Airport operators (including branches of the military) must take the lead in this cooperative effort, and seek the involvement of all levels of government. Local governments are important, because they will eventually adopt and implement any land use regulatory controls for the areas around airfields. State governments are important, for they create enabling legislation and can help coordinate regional planning efforts to alleviate the effects of aircraft operations. The federal government is important, because it provides funding and guidelines for noise and accident potential abatement at the source, and operates a number of airfields which have established effective land use control programs with the help of local governments. Generally, when airport proprietors and the separate levels of government coordinate on airport compatibility programs, the chances of successful implementation are greatly improved.

There are some ways to improve this cooperative process. The first is the establishment of a system through which intergovernmental cooperation and coordination are constants, regardless of changes in administration or agency personnel. This should involve "links" between the airport operator and the agencies and departments at each

level of government. These links or contacts are established through open communication and the active exchange of information and resources. Cooperation of this type is especially important in terms of the governmental regulation of private land use because "there is always the risk that certain actions will be found to be excessive or 'unfair'." (Lorenz, Liability, p. 25) But such risks should not prevent interested agencies from "working in close cooperation with local officials in land use matters, particularly when such activity is done openly and with full availability of all material relating to the program." (Lorenz, Liability, p. 25)

A second way to improve this cooperative process is to view airport and air base planning programs as a part of the local, regional, state, and federal effort to improve airport/air base land use compatibility. Airports and air bases are not isolated entities, they interact both positively and negatively with entire regions. The cooperative process should emphasize this. Airport operators and air base officials should invite governmental officials to visit their facilities, so that local, state, and federal agencies and departments have a better understanding of the daily interaction between airfields and their environs. Governmental departments and agencies should keep airport proprietors and air base officials informed as to the needs and viewpoints of the local communities and the region as a whole, as well as how they are impacted by aircraft operations. This is important because the local communities need air facilities for their economic prosperity, and the airports and air bases need the support services provided by the local communities.

Through the cooperation of airport operators and the separate levels of government, land use compatibility around air facilities can be greatly improved. This

cooperation works with citizen participation and effective enabling legislation to bring about the most important step in airport/air base environs land use compatibility planning--implementation.

Implementation: The process of implementation for airport/air base environs land use compatibility consists of establishing a program of land use policies and controls and seeing that they are adopted and monitored in a consistent, effective manner. This includes the establishment of mechanisms to ensure that the process of land use planning and regulation is a continuous, ongoing process, regardless of changes in administrations or agency personnel. Without question, this is the key to protecting land users around air facilities.

There is no established list of land use controls which should be adopted in airport/air base compatibility planning. Local jurisdictions must evaluate each alternative measure, and determine its applicability to a given situation. Usually, a combination of different land use controls is most effective in alleviating the effects of aircraft operations on land users. Such combinations can be created from a number of land use control techniques.

Zoning is probably the most important land use control in terms of preventing incompatible development around air facilities. It can also prevent incompatible redevelopment in areas of high noise levels and accident potential where the existing land use pattern is well established. In addition, zoning keeps private property on the tax rolls and allows for the development of land, so long as that use is compatible with airfield operations. In Pima County, the zoning ordinance has been the primary tool in

controlling growth in the development-ripe areas south of Tucson International and Davis-Monthan.

The acquisition of easements is also important in airport/air base compatibility planning, as they can help prevent land uses which may pose a threat to the safe operation of aircraft. In this, they protect residents around airfields. Easements also leave land in a productive state and on the tax rolls and, unlike zoning, can be permanent. Local governments might require the donation of easements as a condition of rezoning around air facilities, if the state enabling legislation allows.

A program of development proposal review is also an effective land use tool for airfield environs, for it allows local governments to evaluate proposals on a case-by-case basis rather than on a rigid prescription of land use classifications. This type of "performance" evaluation allows for greater flexibility and compromise, and may help local governments avoid the legal challenges involved in overly restrictive zoning codes.

Building codes which require acoustical treatment for new and redeveloped land uses in airport/air base environs are one of the most widely used controls. They help prevent incompatible development and can protect residents of existing incompatible land uses. Acoustical treatment has the added benefit of energy efficiency. Stringent building codes have been used effectively in the City of Tucson in the absence of an airport noise zoning ordinance.

Accident potential and noise exposure level disclosure is another effective land use control which local governments may wish to consider for airfield environs. Again, such disclosure can be mandated by local truth-in-sales ordinances if the state enabling legislation allows. If not, local jurisdictions can take it upon themselves to inform

potential buyers and renters through the building code and subdivision regulation process. Local governments can also disclose such information to private and federal lenders, further discouraging incompatible development.

These are but a few of the land use control measures available to local governments facing the airport/air base land use compatibility dilemma. The important thing for local governments to recognize is that these controls are most effective when used in combination with each other and in conjunction with a comprehensive, ongoing planning and land use control process. The implementation of such a comprehensive land use control program cannot be successful, however, without the other processes--legislative, participatory, and cooperative.

As shown in the examples of the Part 150 Program at Tucson International and the AICUZ Program at Davis-Monthan, strong state enabling legislation is important for the implementation of land use policies and regulations which may be viewed as controversial or overly restrictive. Citizen participation is also crucial for implementation, if the recommended land use controls are to avoid public resistance and legal challenges. In Tucson and Pima County, effective public involvement helped local governments adopt and implement regulations that are flexible enough to allow compromise, yet rigid enough to protect airfield environs land users. Intergovernmental cooperation is also a must in the implementation process, as local jurisdictions are ultimately responsible for enacting any regulatory program for airport/air base environs land use. The governments of Tucson and Pima County have been cooperative in implementing the policies and controls recommended in the Part 150 and AICUZ Programs, and the region has benefitted as a result.

The case studies presented in this thesis are intended to offer local jurisdictions an example of how the airport/air base land use compatibility problem has been addressed in Tucson and Pima County, Arizona. Other localities might face different problems and may find alternative solutions more useful. In addition, the case study of Davis-Monthan AFB does not cover every facet of the relationship between the base and its supporting communities. Although not directly related to the AICUZ Program, research on such issues as contingency plans for evacuations in the event of an accident involving aircraft carrying hazardous materials at Davis-Monthan would be useful.

In the future, as air transportation becomes increasingly important to society, the dilemma of promoting land use compatibility around air facilities will become a greater problem. Because of this, it is important to adopt programs for airport and air base land use compatibility now. The key to such programs will be successful implementation, which can only result from strong state enabling legislation, citizen participation, and intergovernmental cooperation. To avoid the problems of the past and to prevent greater problems in the future, such a comprehensive airport/air base land use compatibility program is essential nationwide. Through the Part 150 and AICUZ Programs, the United States is closer to the goal of airport land use compatibility for the protection of land users. Hopefully, such Programs will continue, and the day will come when discussions of the potentially hazardous impacts of aircraft operations on airfield environs land users are a thing of the past.

BIBLIOGRAPHY

BIBLIOGRAPHY

Airport Environs Plan. Adopted by the Mayor and Council of the City of Tucson, Arizona. Resolution 11915, June 21, 1982.

Arizona Revised Statutes. "Airport Zoning and Zoning Regulations." Section 2, Chapter 3, Article 2.

Ashford, Norman and Paul H. Wright. Airport Engineering. New York: John Wiley and Sons, Second Edition, 1984.

Baron, Robert Alex. The Tyranny of Noise. New York: Harper and Row, 1970.

Blitch, Stephen G. "Airport Noise and Intergovernmental Conflict: A Case Study in Land-Use Parochialism." Ecology Law Quarterly. Volume 5, 1976, pp. 669-705.

Bragdon, Clifford R. "Airport/Aircraft-Related Noise Control in the United States." Aircraft Noise In A Modern Society. North Atlantic Treaty Organization, September, 1986, Section H, pp. 37-44.

Code of Federal Regulations. Department of Housing and Urban Development. Subchapter B, Part 51, July, 1979.

Code of Federal Regulations. Federal Aviation Administration. Subchapter I, Part 150, January, 1985.

Davis-Monthan Air Force Base. Air Installation Compatible Use Zone (AICUZ) Report. August, 1975.

De Leon, Mona McGuire. Airport Planner with the Tucson Airport Authority. Memorandum to Suzanne McLean, Manager of Planning and Development with the Tucson Airport Authority. November 29, 1988.

De Leon, Mona McGuire. Airport Planner with the Tucson Airport Authority. Personal correspondence with James Saulsbury. December 30, 1988.

De Leon, Mona McGuire. Airport Planner with the Tucson Airport Authority. Personal interview with James Saulsbury. December 7, 1988.

Dunning, C. Mark, J. Phillip Huber and Darrell G. Nolton. "Developing A Collaborative Planning Approach For Managing Noise and Land Use Issues Around U.S. Army Installations." Aircraft Noise In A Modern Society. North Atlantic Treaty Organization, September, 1986, Section H, pp. 9-14.

"FAA Assessing Impact of Regulation Setting Airline Noise Budget at Denver's Stapleton Airport." Aviation Week and Space Technology. March 30, 1987, p. 33.

Federal Register. Part II, Department of Transportation, Federal Aviation Administration. "14 C.F.R. Part 150, Airport Noise Compatibility Planning; Request For Public Comment." Volume 53, Number 213, November 3, 1988.

Fittipaldi, John J. and Steven D. Hottman. "Installation Compatible Use Zone (ICUZ)." Environmental Impact Assessment Review. Volume 7, 1987.

Glines, C.V. "Closing In On The Airfields." Air Force Magazine. Volume 72, Number 1, January, 1989, pp. 74-78.

Hixson, Robert B. "Airport Noise Compatibility Planning: A Program That Works." Noise/News. Volume 14, Number 5, September-October, 1985.

Hixson, Robert B. and Richard N. Tedrick. "Reducing The Noise Impacts of Civil Aircraft in the United States; Part I: The Problems and Approaches To Solutions," and "Part II: Details of Our Solutions." Aircraft Noise In A Modern Society. North Atlantic Treaty Organization, September, 1986, Section F, pp. 3-17.

Howlett, Roger. Principal Planner with the City of Tucson Department of Planning. Personal interview with James Saulsbury, December 9, 1988.

Johnson, Bob. Director of Planning and Development Services for Pima County, Arizona. Personal interview with James Saulsbury, December 8, 1988.

Lorenz, Frederick M., Maj., USMC. "Determination of Just Compensation In Cases of Inverse Condemnation Based Upon Aircraft Overflights." Unpublished paper, May, 1982.

Lorenz, Frederick M., Maj., USMC. "Liability of the United States Arising Out of Military Airfield Operations." Unpublished paper, May, 1982.

McLean, Suzanne. Manager of Planning and Development with the Tucson Airport Authority. Memorandum to I.H. Bud Carr, Chairman AOCI Planning and Environmental Affairs Committee. August 17, 1988.

National Transportation Safety Board. Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations Calendar Year 1983. NTSB/ARC-87/01, Washington D.C., February 13, 1987.

National Transportation Safety Board. Annual Review of Aircraft Accident Data: U.S. General Aviation Calendar Year 1983. NTSB/ARC-87/01. Washington, D.C., January 8, 1987.

Newman, J. Steven and Kristy Beattie. Aviation Noise Effects. United States Federal Aviation Administration, Report Number FAA-EE-85-2, March, 1985.

North Atlantic Treaty Organization. Aircraft Noise In A Modern Society: Interim Report of the Pilot Study. Number 163, May, 1987.

North Atlantic Treaty Organization. Aircraft Noise In A Modern Society: Proceedings of a Conference Held at Mittenwald (Germany). September 22-24, 1986.

Patriarca, Geno. Director, Community Planning Office at Davis-Monthan Air Force Base. Personal interview with James Saulsbury, December 6, 1988.

Pima County, Arizona, Zoning Code. Ordinance #1985-82, Chapter 18.7, "Airport Environs and Facilities," as amended December 2, 1986.

Sacramento Airport Land Use Commission. Mather Air Force Base Comprehensive Land Use Plan. Sacramento, California, 1987.

"San Francisco Commission Challenging FAA's Role in Airport Noise Abatement." Aviation Week-Space Technology, July 21, 1986, p. 36.

Sumner, David M. Community Planner at Davis-Monthan Air Force Base. Personal interview with James Saulsbury, December 6, 1988.

Tedrick, Richard N. "Technology and the Regulation of Noise From Civil Aircraft." Aircraft Noise In A Modern Society. North Atlantic Treaty Organization, September, 1986, Section B, pp. 27-34.

Tucson Airport Authority. Tucson International Airport: An Economic Report. 1988.

Tucson Airport Authority. Tucson International Airport Master Plan Update Summary. San Francisco: Peat, Marwick, Main and Company, January, 1987.

Tucson Airport Authority. Tucson International Airport Noise Control and Land Use Compatibility (ANCLUC) Study: Airport Environs Plan and Program. San Francisco: Peat, Marwick, Mitchell and Company, February, 1982.

United States Department of Defense. "Air Installations Compatible Use Zones." Department of Defense Instruction Number 4165.57. November 8, 1977.

United States Department of the Air Force. Air Force Regulations Section 19-9: Environmental Planning; Interagency and Intergovernmental Coordination of Land, Facility, and Environmental Plans, Programs, and Projects. Washington, D.C., February 14, 1986.

United States Department of the Air Force. Air Force Regulations Section 87-1: Real Property Management; Acquisition of Real Property. Washington, D.C., December 27, 1985.

United States Department of the Air Force. Air Installation Compatible Use Zone Handbook: Base Comprehensive Planning. Washington, D.C., July, 1984.

United States Environmental Protection Agency. Federal Noise Program Report Series, Volume I: Department of Defense; Air Installations Compatible Use Zones (AICUZ) Program. Washington, D.C., April, 1977.

United States Federal Aviation Administration. Citizen Participation in Airport Planning. Advisory Circular 150/5050-4, September, 1975.

United States Federal Aviation Administration. Noise Control and Compatibility Planning for Airports. Advisory Circular 150/5020-1, August, 1983.

Vasko, Bill. Director, City of Tucson Department of Planning. Personal interview with James Saulsbury, December 9, 1988.

APPENDIX 1

PART 150 LAND USE COMPATIBILITY TABLE

Land use	Yearly day-night average sound level (L_{dn}) in decibels					
	Below 65	65–70	70–75	75–80	80–85	Over 85
Residential						
Residential other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches auditoriums and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

*The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

KEY TO TABLE 1

SLUCM = Standard Land Use Coding Manual.

Y (Yes) = Land Use and related structures compatible without restrictions.

N (No) = Land Use and related structures are not compatible and should be prohibited.

NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

NOTES FOR TABLE 1

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

APPENDIX 2

TUCSON INTERNATIONAL AIRPORT NOISE STUDY

NEIGHBORHOOD ASSOCIATION SURVEY

Tucson International Airport
Noise Study
Neighborhood Association Survey

Name _____
Neighborhood Association _____
Address _____
_____

Designated Part 150 Study Representative (if different from above) _____
Address _____
_____

Phone _____

I wish to participate in the study through: (you may check more than one).

_____ Serving on a committee which meets 4 to 6 times throughout the process.

_____ Receiving study updates through the mail (instead of serving on a committee).

_____ Inviting members of the Study Team to make one or more presentations to the neighborhood group.

_____ Being listed on the mailing list for public meetings and hearings.

_____ Other (please specify) _____
_____
_____

Please provide additional information about your association, if available:

The Neighborhood Association was formed in 19___, and registered with the City of Tucson Citizen Participation Office in 19___.

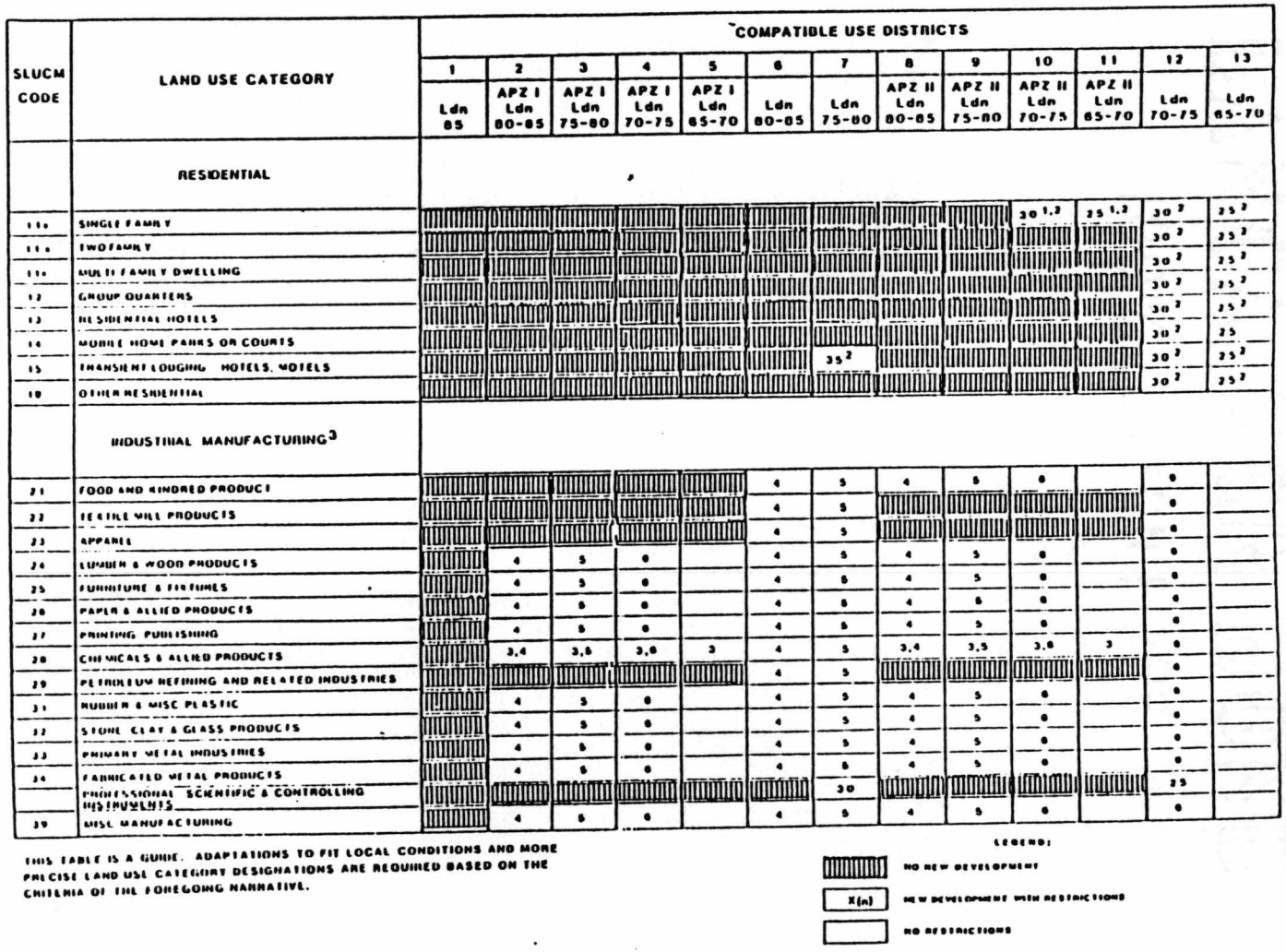
The Neighborhood Association represents _____ households or approximately _____ people.

Other information about your association:

_____
_____
_____
_____
_____
_____

APPENDIX 3

AICUZ LAND USE COMPATIBILITY MATRIX

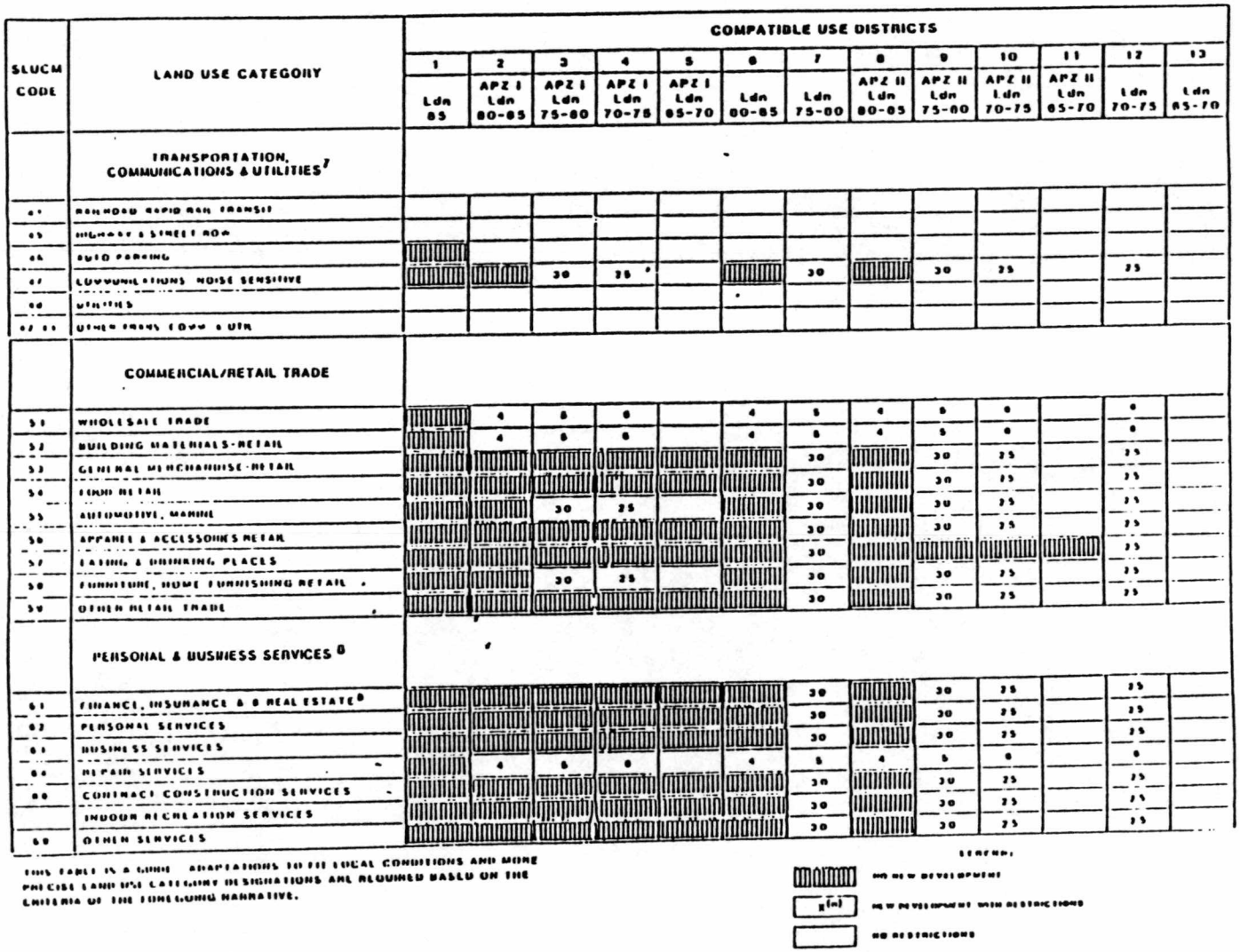


SLUCM CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		Ldn 85	APZ I Ldn 80-85	APZ I Ldn 75-80	APZ I Ldn 70-75	APZ I Ldn 65-70	Ldn 80-85	Ldn 75-80	APZ II Ldn 80-85	APZ II Ldn 75-80	APZ II Ldn 70-75	APZ II Ldn 65-70	Ldn 70-75	Ldn 65-70
	RESIDENTIAL													
11a	SINGLE FAMILY										30[1,2]	25[1,2]	30[2]	25[2]
11b	TWO FAMILY												30[2]	25[2]
11c	MULTI FAMILY DWELLING												30[2]	25[2]
12	GROUP QUARTERS												30[2]	25[2]
13	RESIDENTIAL HOTELS												30[2]	25[2]
14	MOBILE HOME PARKS OR COURTS												30[2]	25
15	TRANSIENT LODGING HOTELS, MOTELS							35[2]					30[2]	25[2]
19	OTHER RESIDENTIAL												30[2]	25[2]
	INDUSTRIAL MANUFACTURING[3]													
21	FOOD AND KINDRED PRODUCT						4	5	4	5	0		0	
22	TEXTILE MILL PRODUCTS						4	5					0	
23	APPAREL						4	5					0	
24	LUMBER & WOOD PRODUCTS		4	5	0		4	5	4	5	0		0	
25	FURNITURE & FIXTURES		4	5	0		4	5	4	5	0		0	
26	PAPER & ALLIED PRODUCTS		4	5	0		4	5	4	5	0		0	
27	PRINTING PUBLISHING		4	5	0		4	5	4	5	0		0	
28	CHEMICALS & ALLIED PRODUCTS		3,4	3,5	3,5	3	4	5	3,4	3,5	3,5	3	0	
29	PETROLEUM REFINING AND RELATED INDUSTRIES						4	5					0	
31	RUBBER & MISC PLASTIC		4	5	0		4	5	4	5	0		0	
32	STONE CLAY & GLASS PRODUCTS		4	5	0		4	5	4	5	0		0	
33	PRIMARY METAL INDUSTRIES		4	5	0		4	5	4	5	0		0	
34	FABRICATED METAL PRODUCTS		4	5	0		4	5	4	5	0		0	
	PROFESSIONAL SCIENTIFIC & CONTROLLING INSTRUMENTS							30					25	
39	MISC MANUFACTURING		4	5	0		4	5	4	5	0		0	

THIS TABLE IS A GUIDE. ADAPTATIONS TO FIT LOCAL CONDITIONS AND MORE PRECISE LAND USE CATEGORY DESIGNATIONS ARE REQUIRED BASED ON THE CRITERIA OF THE FOREGOING NARRATIVE.

LEGEND:

- NO NEW DEVELOPMENT
- X(n) NEW DEVELOPMENT WITH RESTRICTIONS
- NO RESTRICTIONS



SLUCM CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		Ldn 85	APZ I Ldn 80-85	APZ I Ldn 75-80	APZ I Ldn 70-75	APZ I Ldn 65-70	Ldn 80-85	Ldn 75-80	APZ II Ldn 80-85	APZ II Ldn 75-80	APZ II Ldn 70-75	APZ II Ldn 65-70	Ldn 70-75	Ldn 65-70
	TRANSPORTATION, COMMUNICATIONS & UTILITIES[7]													
41	RAILROAD RAPID MASS TRANSIT													
42	HIGHWAY & STREET ROW													
43	AUTO PARKING													
47	COMMUNICATIONS NOISE SENSITIVE			30	25			30		30	25		25	
48	UTILITIES													
45 46	OTHER TRANS COMM & UTIL													
	COMMERCIAL/RETAIL TRADE													
51	WHOLESALE TRADE		4	5	6		4	5	4	5	6		6	
52	BUILDING MATERIALS-RETAIL		4	5	6		4	5	4	5	6		6	
53	GENERAL MERCHANDISE-RETAIL							30		30	25		25	
54	FOOD RETAIL							30		30	25		25	
55	AUTOMOTIVE, MARINE			30	25			30		30	25		25	
56	APPAREL & ACCESSORIES RETAIL							30		30	25		25	
57	EATING & DRINKING PLACES							30					25	
58	FURNITURE, HOME FURNISHING RETAIL			30	25			30		30	25		25	
59	OTHER RETAIL TRADE							30		30	25		25	
	PERSONAL & BUSINESS SERVICES[8]													
61	FINANCE, INSURANCE & R REAL ESTATE[8]							30		30	25		25	
62	PERSONAL SERVICES							30		30	25		25	
63	BUSINESS SERVICES							30		30	25		25	
64	REPAIR SERVICES		4	5	6		4	5	4	5	6		6	
65	CONTRACT CONSTRUCTION SERVICES							30		30	25		25	
	INDOOR RECREATION SERVICES							30		30	25		25	
69	OTHER SERVICES							30		30	25		25	

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LEGEND:

NO NEW DEVELOPMENT

x[n] NEW DEVELOPMENT WITH RESTRICTIONS

NO RESTRICTIONS

SLUCM CODE	LAND USE CATEGORY	COMPATIBLE USE DISTRICTS												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		Ldn 85	APZ I Ldn 80-85	APZ I Ldn 75-80	APZ I Ldn 70-75	APZ I Ldn 65-70	Ldn 80-85	Ldn 75-80	APZ II Ldn 80-85	APZ II Ldn 75-80	APZ II Ldn 70-75	APZ II Ldn 65-70	Ldn 70-75	Ldn 65-70
	PUBLIC & QUASI PUBLIC SERVICES													
67	GOVERNMENT SERVICES							30		30[8]	25[8]	8	25	
68	EDUCATIONAL SERVICES												30	25
711	CULTURAL ACTIVITIES INCL CHURCHES												30	25
651	MEDICAL & OTHER HEALTH SERVICES[8]												30	25
824	CEMETERIES		4,10	5,10	6,10	10	4	5	4,10	5,10	6,10	10	6	
69x	NON PROFIT ORGANIZATION												30	25
	OTHER PUBLIC AND QUASI-PUBLIC SERVICES										30	25	30	25
	OUTDOOR RECREATION													
761x	PLAYGROUNDS, NEIGHBORHOOD PARKS													
762x	COMMUNITY & REGIONAL				11	11						11	11	
712	NATURE EXHIBITS													
722	SPECTATOR SPORTS INCL ARENAS													
741x	GOLF COURSE[12], RIDING STABLES[13]			14	15			14		14	15		15	
743/744	WATER BASED RECREATIONAL AREAS			14	15			14		14	15		15	
75	RESORT & GROUP CAMPS													
721x	AUDITORIUMS, CONCERT HALLS													
723x	OUTDOOR AMPHITHEATERS, MUSIC SHELLS													
	OTHER OUTDOOR RECREATION				11	11								
	RESOURCE PRODUCTION, EXTRACTION, & OPEN SPACE													
81	AGRICULTURE (EXCEPT LIVE-STOCK)	17	17	17	18	19	17	17	17	17	18	19	19	19
8157 817	LIVESTOCK FARMING, ANIMAL BREEDING			17	18	19		17		17	18	19	19	19
83	FORESTRY ACTIVITIES	17	17	17	18	19	17	17	17	17	18	19	19	19
84	FISHING ACTIVITIES & RELATED SERVICES		11	11	11	11								
85	MINING ACTIVITIES													
91	PERMANENT OPEN SPACE													
93	WATER AREAS		11	11	11	11			11	11	11	11		

THIS TABLE IS A GUIDE. ADAPTATIONS TO FIT LOCAL CONDITIONS AND MORE PRECISE LAND USE CATEGORY DESIGNATIONS ARE REQUIRED BASED ON THE CRITERIA OF THE FOREGOING NARRATIVE.

LEGEND:

- NO NEW DEVELOPMENT
- x[n] NEW DEVELOPMENT WITH RESTRICTIONS
- NO RESTRICTIONS

NOTES

35, 30 or 25

The land use is generally compatible; however, a Noise Level Reduction of 35, 30, or 25 must be incorporated into the design and construction of the structure.

35x, 30x or 25x

The land use is generally compatible with NLR; however, such NLR does not necessarily solve noise difficulties and additional evaluation is warranted.

1 - Because of accident hazard potential, the residential density in these CUDs should be limited to the maximum extent possible. It is recommended that residential density not exceed one dwelling unit per acre. Such use should be permitted only following a demonstration of need to utilize this area for residential purposes.

2 - Although it is recognized that local conditions may require residential uses in these CUDs, this use is strongly discouraged in CUDs 10 and 12 and discouraged in CUDs 11 and 13. The absence of viable alternative development options should be determined and an evaluation should be conducted which indicates that a demonstrated community need for residential use would not be met if development were prohibited in these CUDs. Where the community determines that residential uses must be allowed, Noise Level Reductions (NLR) of at least 30 (CUDs 10 and 12) and 25 (CUDs 11 and 13) should be incorporated into building codes and/or individual approvals. Additional consideration should be given to modify the NLR levels based on peak noise levels. Such criteria will not eliminate outdoor environmental noise problems and, as a result, site planning and design should include measures to minimize this impact, particularly where the noise is from ground level sources.

3 - Because these uses vary considerably by locality and within a general category, particular care should be taken to evaluate and modify guidelines to fit local conditions. Among factors to be considered: labor intensity, structural coverage, explosive/inflammable characteristics, size of establishment, people density, peak period (including shopper/visitor concentrations).

4 - A NLR of 35 must be incorporated into the design and construction of portions of these buldings where the public is received, office areas, or where the normal noise level is low.

5 - A NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, or where the normal noise level is low.

6 - A NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas or where the normal noise level is low.

7 - No structures in Clear Zone, no passenger terminals, and no major ground transmission lines in Clear Zones or APZ I.

8 - Low intensity office uses only (limited scale of concentration of such uses). Meeting places, auditoriums, etc are not recommended.

9 - Excludes hospitals.

10 - Excludes chapels.

11 - Facilities must be low intensity.

12 - Clubhouse not recommended.

13 - Concentrated rings with large classes not recommended.

14 - A NLR of 30 must be incorporated into buildings for this use.

15 - A NLR of 25 must be incorporated into buildings for this use.

16 - No structures in Clear Zone.

17 - Residential structures not permitted.

18 - Residential buildings require a NLR of 30.

19 - Residential buildings require a NLR of 25.

* SLUCM: STANDARD LAND USE CLASSIFICATION MANUAL: A standard system for identifying and coding land use activities. Department of Commerce, 1965.

VITA

James William Saulsbury was born in Morristown, Tennessee, on November 9, 1963. He was graduated from Morristown-Hamblen High School West in June, 1982, and enrolled in the University of Tennessee, Knoxville, in September, 1982. In June, 1986, he received a Bachelor of Arts degree in History, with minors in English and Business. In the fall of 1986, he was awarded a Hilton A. Smith Fellowship by the Graduate School of the University of Tennessee, Knoxville, and began study toward a Master of Science degree in Planning. Mr. Saulsbury will be employed as a private planning and environmental assessment consultant after graduation, with clients including Martin Marietta Energy Systems, Inc. and the University of Tennessee.