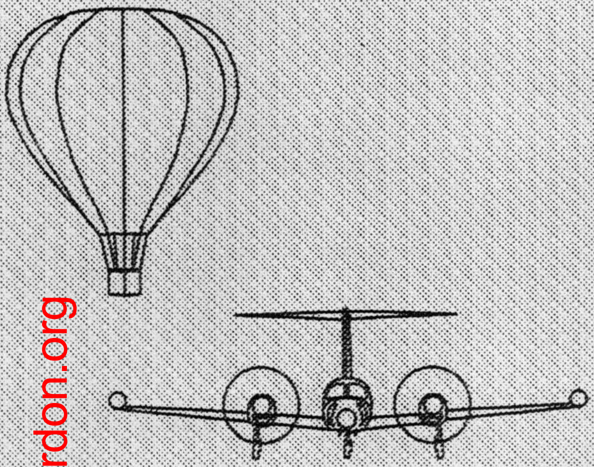


DRAFT

Solberg - Hunterdon Airport

Master Plan

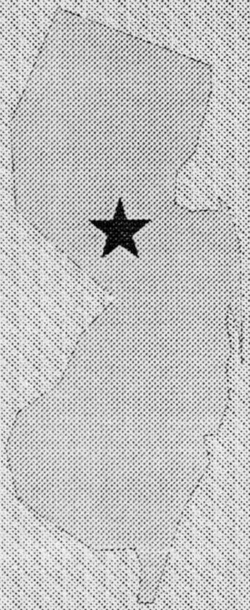
Prepared for :

Solberg Aviation Company

Prepared by :

D&Z TRANSPORTATION SERVICES

A DIVISION OF DAY & ZIMMERMANN INFRASTRUCTURE, INC.



January 1997

Master Plan
Solberg-Hunterdon Airport

Prepared for
Solberg Aviation Company
January 1997

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CHAPTER 1: AIRPORT INVENTORY

CHAPTER 2: FORECASTS OF AVIATION DEMAND

CHAPTER 3: DEMAND/CAPACITY ANALYSIS

CHAPTER 4: FACILITY REQUIREMENTS

5: CONCEPT DEVELOPMENT

CHAPTER 6: ENVIRONMENTAL REVIEW

CHAPTER 7: AIRPORT DEVELOPMENT PLAN

CHAPTER 8: DEVELOPMENT SCHEDULE AND COST ESTIMATES

CHAPTER 9: PROGRAM FUNDING

CHAPTER 1: AIRPORT INVENTORY

TABLES

FIGURES

CHAPTER 1 - AIRPORT INVENTORY

The initial step in the Solberg-Hunterdon Airport Master Plan was to collect data pertinent to the Airport and the area it serves. The inventory was conducted through meetings with Airport management and a review of previous planning efforts.

Section 1-1: History, Location and Role

The following sections discuss the historical development of the Airport, the geographic location, and its operational role in the region's aviation environment.

1.1.1 History

Solberg-Hunterdon Airport was originally opened as a privately owned facility in 1939 by Mr. Solberg. In the late 1940's, a community open-bay hangar was erected. In 1958, the FAA installed a Very High Frequency Omni-Directional Receiver (VOR) on the airfield. During the 1960's, the airport operated an established flight training program. At one time the airport was involved with the export of aircraft and acted as the Scandinavian distributor for Cessna.

Presently, the airport is owned by the Solberg Aviation Company, a New Jersey partnership and operated by Solberg Aviation Co., Inc., a New Jersey corporation.

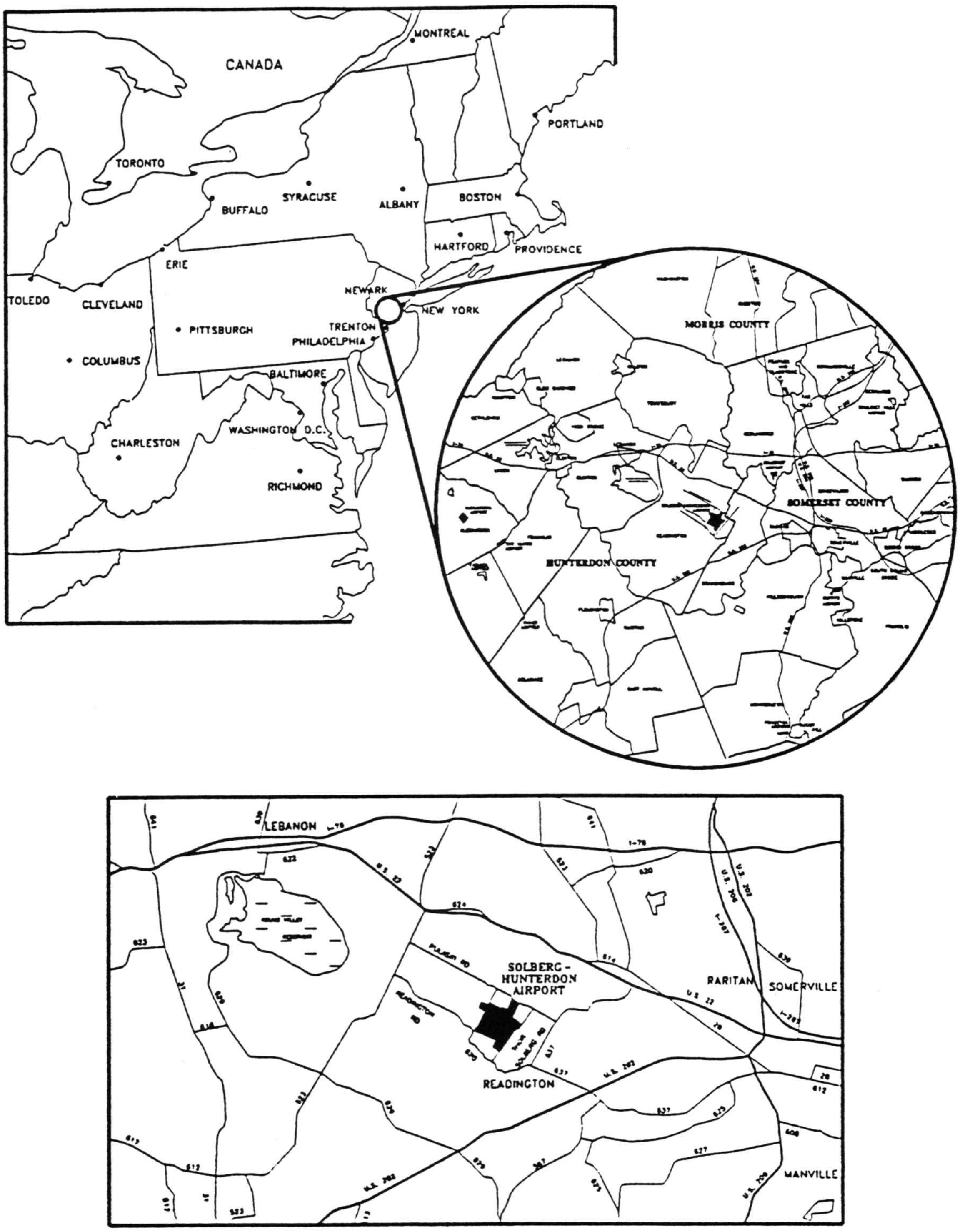
1.1.2 Location

The Solberg-Hunterdon Airport is located in Readington Township, eastern Hunterdon County, in central New Jersey. As shown in Figure 1-1, the airport is located approximately twenty miles north of Trenton, seven miles northeast of Flemington and six miles west of Somerville. The geographic location of the airport reference point (ARP) is 40°35'00" North latitude, 74°44'15" West longitude, at an elevation of 195 feet above mean sea level (MSL).

1.1.3 Airport Role

Solberg-Hunterdon Airport is a privately owned public-use airport serving the general aviation needs of Hunterdon and Somerset Counties and portions of Morris, Union and Middlesex Counties. Designated as one of New Jersey's reliever airport facilities, the airport functions to reduce airport/airspace congestion by prividing an alternate landing site for general aviation, away from Newark International. Solberg has a general aviation role as defined by the National Plan of Integrated Airport Systems, 1993-1997 (NPIAS).

The Airport primarily serves business and recreational users; owners of single and light twin engine, turbo-prop and small turbo-jet aircraft, sailplanes, and hot air balloons.



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 1-1

LOCATION MAP

Section 1-2: Historical Airport Activity

Airport activity statistics were collected from FAA, state and airport management records. As shown in Table 1-1, Solberg-Hunterdon Airport has 100 based aircraft, most of which are small single-engine airplanes. The airport does not have a control tower, therefore, actual activity cannot be accurately accounted for. However, utilizing FAA based aircraft conversion factors, estimates are that these planes together with daily transient traffic account for an estimated 64,000 operations a year.

Local operations are generally referred to as practice take-offs and landings (touch-and-go's), maintenance flights, and aircraft operating within a 25-mile radius of the airport. Itinerant traffic is considered to be all other activity, with the exception of occasional military operations. A breakdown of the activity mix is provided in Table 1-2.

Table 1-1
Based Aircraft

Year	Single Engine	Multi-Engine	Turbo-Prop	Turbo-Jet	Gliders	Total
1988	66	5	-	-	4	75
1989	66	5	-	-	4	75
1990	62	4	-	-	4	70
1991	62	4	-	-	9	75
1992	68	5	1	-	9	83
1993	70	7	3	1	9	90
1994	73	7	2	1	9	92
1995	80	8	2	1	9	100

Airport Records

Table 1-2
Airport Operations

Year	Operations			
	Local	Itinerant	Military	Total
1988	28,800	19,200	1,000	49,000
1989	28,800	19,200	1,000	49,000
1990	24,600	16,400	1,000	42,000
1991	28,200	18,800	1,000	48,000
1992	31,200	20,800	1,000	53,000
1993	33,600	22,400	1,000	57,000
1994	33,600	22,400	1,000	57,000
1995 (Est.)	37,800	25,200	1,000	64,000

Activity estimates using FAA conversion factors.

Section 1-3: Demographic Data

Population, income and employment characteristics of Hunterdon and Somerset Counties, and New Jersey were collected and reviewed for use in this study. These statistics provide a base of information which can be used to determine patterns of economic growth which may relate to air travel in the region.

1.3.1 Population

Historic population data for the two-county service area and the State of New Jersey is presented in Table 1-3.

In the past ten years, both Hunterdon and Somerset Counties have grown at a faster pace, 18% and 14% respectively, than the State of New Jersey which has had an 8% increase in population. State population projections for both Hunterdon and Somerset County depict population growth rates that will continue to exceed those of the State through the planning period.

1.3.2 Income

Effective buying income (EBI) was researched for Hunterdon and Somerset Counties as well as the State of New Jersey. The historic data indicates that the EBI for the service area has nearly tripled in the last ten years while the state has doubled. The federal per capita income estimates which show that incomes in Readington Township exceed the county and state averages, and have risen slightly faster than the county and state over the past four years.

1.3.3 Employment

Information on employment growth provided by the New Jersey Department of Labor for Hunterdon and Somerset Counties indicates that both counties can expect substantial employment growth throughout the year 2005. The growth rates for each county exceed the growth rates of the State in every employment category. Earnings are higher in each county and unemployment rates are lower when compared to the State rates.

Table 1-3
Population Trends

Year	Hunterdon County	Somerset County	New Jersey
Historic[1]			
1970	69,718	198,372	7,171,112
1980	87,361	203,129	7,365,011
1990	107,776	240,279	7,730,188
Forecast[2]			
1995	115,304[3]	252,930	8,154,000
2000	124,450	264,760	8,450,300
2005	134,930	273,326	8,895,700
2010	145,440	284,416	9,179,200

1 Historic Data - U.S. Department of Commerce, Census Bureau
2 Forecast Data - Planning Boards of Hunterdon and Somerset Counties 10/94, New Jersey Department of Labor 6/89
3 Hunterdon County Planning Board Estimate

Section 1-4: Land Use Data

The objective of a land use plan is to guide development in accordance with identified community goals and interests. The zoning of land for specified uses is the primary method applied in achieving land use compatibility.

As shown in Figure 1-3, all of the land surrounding the airport is identified as Rural Residential (RR) in the 1990 Readington Township Master Plan. This designation allows for conventional three acre single family lots, open space cluster development with two acre lots and one-third of the tract devoted to open space and agriculture clusters with smaller lots and a percentage of the tract permanently preserved for agriculture use.

Section 1-5: Airport Access

The Solberg-Hunterdon Airport is easily accessible via an impressive transportation network. Three major interstate highways provide excellent access to various destinations within the state of New Jersey and New York City. These include Interstate 78 which is an east-west link to Newark and metropolitan New York; Interstates 287 and 95 (New Jersey Turnpike) and Route 1 which are north-south highways.

As shown in Figure 1-4, New Jersey Route 202 which runs north and south and Route 22 which runs east and west provide access to the vicinity of the airport. Immediate access to the Airport, shown in Figure 1-4, is provided by Thor Solberg Road which borders the airport to the east and is accessed via County Line Road, Forty Oaks Road, Readington Road and Pulaski Road.

Section 1-6: Existing Airport Facilities

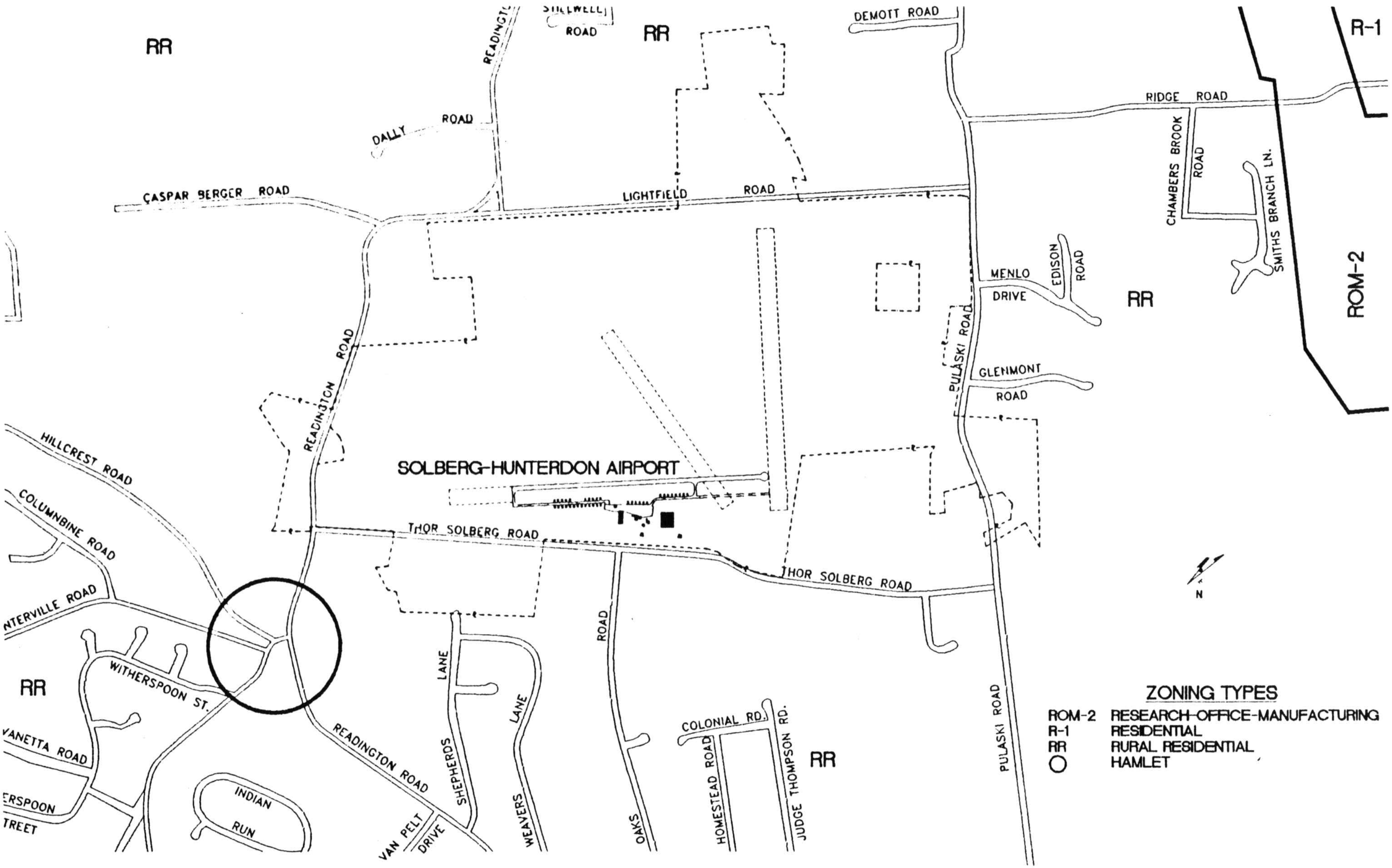
For planning purposes, airport facilities are divided into two categories, airside and landside. Airside facilities are those related to the airfield and include runways, taxiways, and safety related areas. Landside facilities include the hangars, aprons, FBO/terminal buildings, and other support areas. The existing airport facilities are described in the following sections and are depicted in Figure 1-5.

1.6.1 Airport Property

Solberg-Hunterdon Airport consists of approximately 721 acres, the majority of which remains undeveloped. It is bordered by suburban communities, zoned rural residential, which promote the preservation of agricultural uses. Existing land use at Solberg-Hunterdon Airport consists of both airside and landside facilities, and open land.

1.6.2 Airside Facilities

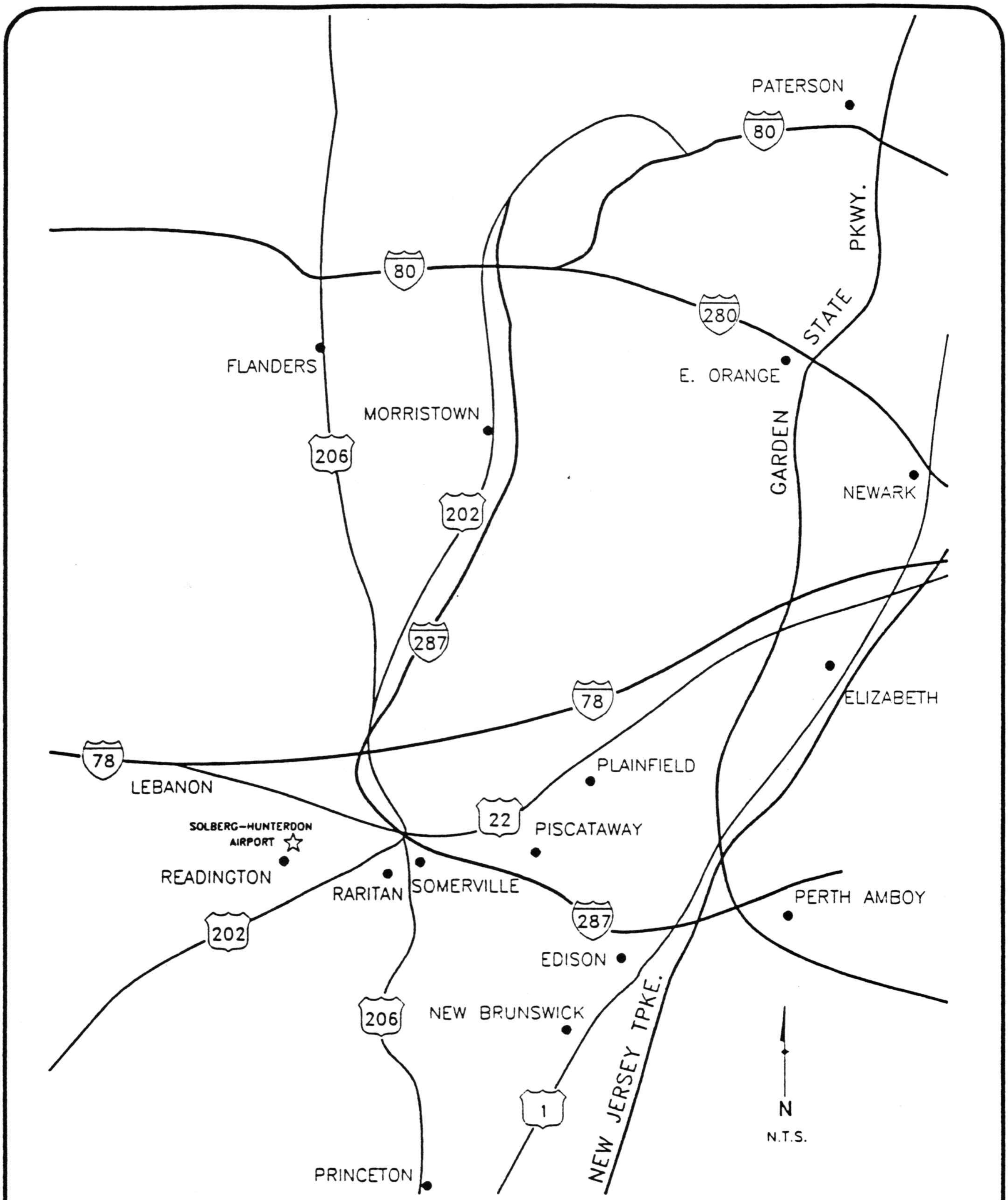
Solberg-Hunterdon Airport has four runways - one paved and three turf. The primary Runway 4-22 has a length of 3,735 feet and a width of 183 feet, of which 3,000' by 50' is paved asphalt. The asphalt is designed for utility aircraft ($\leq$12,500 lbs) with single-wheel landing gear. There are presently two turf crosswind runways and a restricted turf glider runway. The following Table 1-4 lists the runways and pertinent information for each.



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 1–2

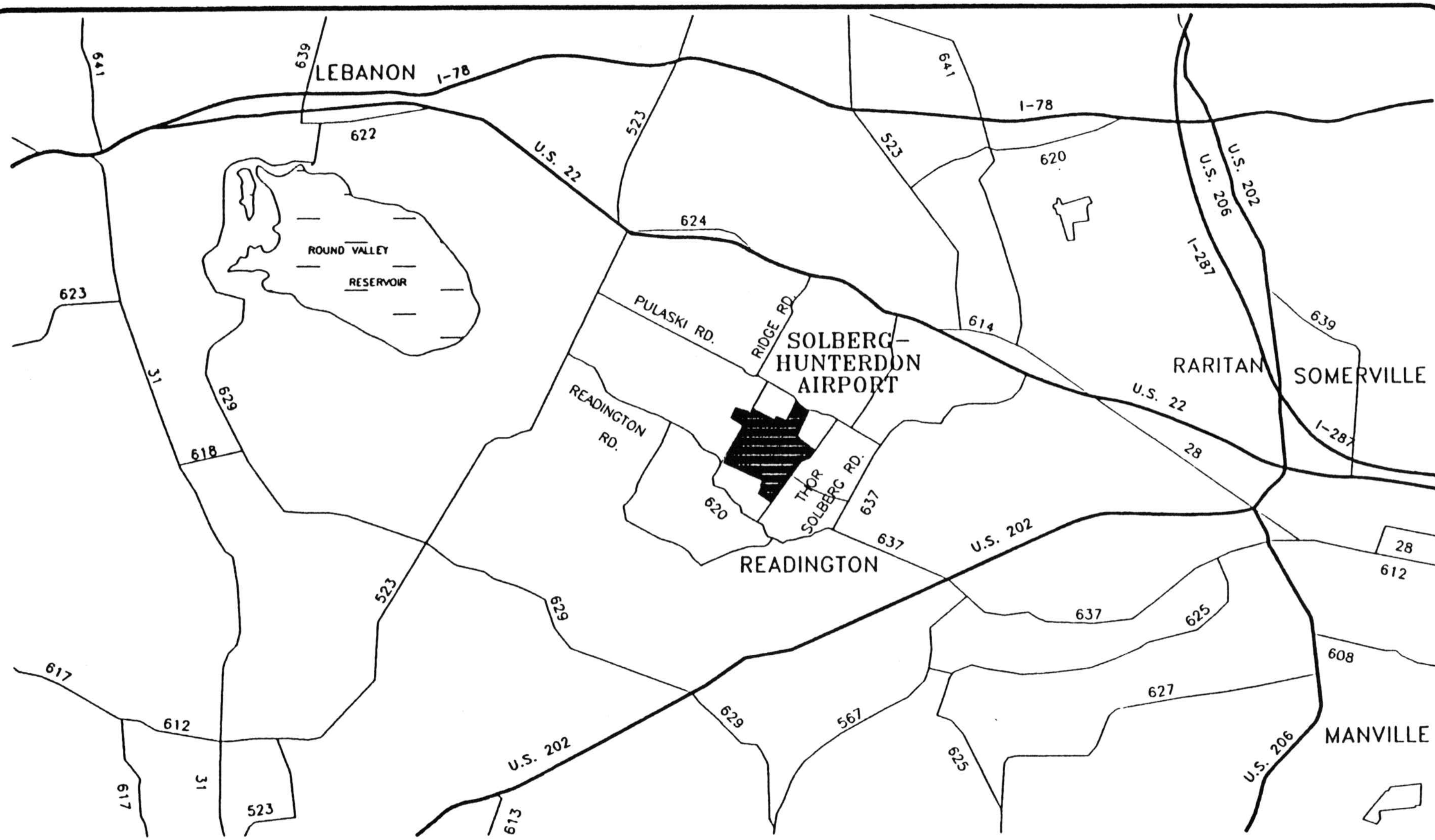
SURROUNDING LAND USE



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 1-3

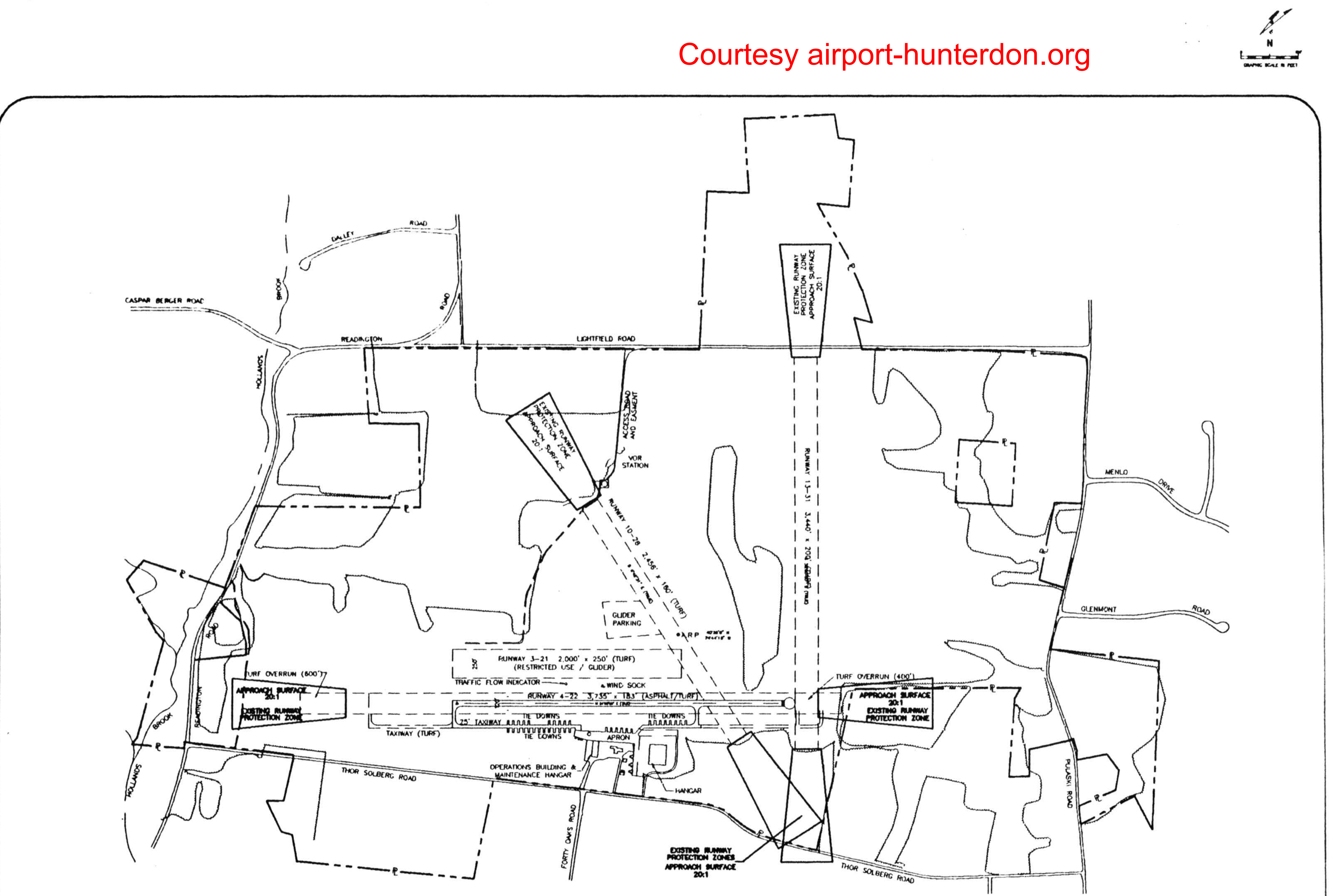
REGIONAL TRANSPORTATION



SOLBERG-HUNTERDON AIRPORT
MASTER PLAN

Figure 1-4

MAJOR ACCESS ROADS



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 1-5

EXISTING FACILITIES

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Table 1-4
Runway Inventory

Runway	Function	Dimension	Surface	Lighting
4-22	Primary	3,735' x 183'	Asphalt/Turf	Medium Intensity
10-28	Crosswind	2,456' x 160'	Turf	None
13-31	Crosswind	3,440' x 200'	Turf	None
3-21	Restricted/Glider	2,000' x 250'	Turf	None

The airport has a single parallel taxiway beginning at the paved end of Runway 4 and extending 1,100 feet north to the terminal area. The paved taxiway continues on the north side of the ramp for about 500 feet where it converts to a turf taxiway that provides access to the Runway 22 threshold and Runway 31. The asphalt portion is designed for utility aircraft with a 200 foot runway/taxiway separation.

The runway protection zone (RPZ) is an area off the end of the runway and is intended to enhance the protection of people and property on the ground during aircraft transitions to and from the runway. The RPZ begins 200 feet beyond each runway end, is trapezoidal in shape and extends outward, away from the runway. Table 1-5 details the RPZ dimensions:

Table 1-5
Runway Protection Zone Dimensions

Inner width	Outer width	Length	Approach Slope
250'	450'	1,000'	20:1

The State of New Jersey created the Airport Safety Zone (ASZ) to establish the minimum standards for the control of airport and aeronautical hazards to people on the ground in the vicinity of airports.

Each ASZ consists of a Runway Subzone, two Runway End Zones, and two Clear Zones. The overall ASZ for an airport is geometrically constructed by defining and locating the Runway Subzone and Runway End Subzones for each public-use runway. The dimensions of each subzone are found in Table 1-6. The following land uses are permitted within the Runway and Runway End Subzones: residential single-family dwellings situated on at least three acres, airpark (minimum of three acres), open space, agricultural, transportation, airport, commercial and industrial. The only land uses permitted in the Clear Zone are residential zoning (as long as the dwellings are physically located outside the Clear Zone), open space agricultural, transportation and airport.

A consideration in the development of primary runway alternatives was the impact on residential dwellings and the permitted land uses created by a relocation of the ASZ, and particularly the Clear Zone.

Table 1-6
Airport Safety Zone Dimensions (in Feet)

Subzone	Inner Width	Outer Width	Length
Runway Subzone	2,350	2,350	Runway Length
Runway End Subzones	2,350	850	3,000
Clear Zones	250	500	1,000

1.6.3 Landside Facilities

All existing aircraft storage and terminal area facilities are currently located between Runway 4-22 and Thor Solberg Road.

The existing terminal building is a two story cinder structure. Each floor has approximately 2,500 square feet of floor space and contains the following: a lobby and lounge area for pilots and passengers, an open reception area which is occupied by Solberg Aviation Co. Inc., a weather briefing area, a pilot briefing room, several administrative offices, a medical office, a flight simulator room, vending machines and restrooms. The terminal is in good condition and the interior recently received cosmetic improvements. There is paved parking in the area of terminal building for approximately 80 vehicles. North of the terminal building is a structure that has been developed for use as a restaurant and lodging facility.

The airport has one open-bay hangar located north of the terminal building. The hangar is constructed of cinder blocks with wood eaves and a wooden roof which was replaced in the late 1980's. This community hangar stores some 20 airplanes and is in very good condition. The airport has a 90 x 50 foot maintenance hangar, constructed of cinder with a wooden roof, adjoining the terminal building. A portion of the hangar has a loft available for storage. The maintenance hangar was built in the 1950's to replace the original that was destroyed by fire. The hangar is in good condition.

In the immediate terminal area the airport has paved apron with 6 available transient aircraft parking spaces and a turf area which accommodates an additional 6 aircraft spaces. The apron serves the fuel farm, operations building, and the hangar facilities. The airport has 50 paved aircraft tie-down spaces, most of which are located along the paved taxiway. There are also 65 grass aircraft parking spaces in various locations in and about the terminal area.

The airport has two 10,000 gallon below ground fuel tanks with 80 low lead and 100 low lead aviation fuel. The tanks are located on the southeast edge of the paved terminal apron and are in good condition.

The airport drainage system is comprised of a series of culverts and drains that have been added to the airport as it was developed. It appears to be functioning satisfactorily.

Primary airport rescue and fire fighting services are provided by the Readington Volunteer Fire Company located approximately one mile from the airport.

The previous figure, Figure 1-5, depicts the existing airport facilities.

1.6.4 Services and Users

Solberg Airport serves both business and recreational general aviation users; owners of single and light twin engine piston, turbo-prop and turbo-jet aircraft, sailplanes, and hot air balloons.

The Airport is served by a fixed based operator (FBO), Solberg Aviation Co., Inc. which handles most airport services including: aircraft storage, fuel sales, major and minor maintenance, aircraft sales, aircraft rentals, aircraft leasebacks, and a flight school. The FBO is also a certified Cessna Pilot and Service Center and a Commander Sales & Service Center.

Solberg-Hunterdon Airport hosts a glider and soaring club as well as the Annual New Jersey Hot Air Balloon Festival. The airport does not maintain a helicopter landing pad, however, there are occasions when helicopters land at the facility. A medical doctor maintains an office at the terminal in order to provide medical examinations for pilot certification.

Section 1-7: Airspace and Navaids

The maneuvering of aircraft both on the ground and in the air is left to the discretion of the pilots using a CTAF radio frequency. The Solberg VOR is located on the airfield. The airport has three published non-precision instrument approach procedures.

Table 1-7 lists eight other airports located with a 25-mile radius of the Solberg-Hunterdon Airport.

Table 1-7
Area Airports

Airport	Location	Longest Runway	Instrument Approach	Air Traffic Control Tower	Nearest Town
Alexandria	15 Miles W	2,112'	VOR/GPS	No	Pittstown
Hackettstown	18 Miles NW	2,200'	None	No	Hackettstown
Kupper	9 Miles SE	3,450'	VOR/GPS	No	Manville
Mercer County	20 Miles SW	6,006'	ILS	Yes	Trenton
Morristown	23 Miles NE	6,000'	ILS	Yes	Morristown
Princeton	14 Miles S	3,105'	VOR/GPS	No	Princeton
Sky Manor	13 Miles W	2,439'	VOR/GPS	No	Pittstown
Somerset	5 Miles NE	2,733'	VOR/GPS	No	Somerville

1.7.1 ATC Jurisdictions

The New York Air Route Traffic Control Center (ARTCC) provides radar services to high altitude aircraft operating on IFR flight plans. The New York Approach Control provides radar services to all IFR aircraft arriving and departing the Solberg-Hunterdon Airport.

The airport does not have an air traffic control tower, therefore, aircraft operating under VFR to and from the airport are visually responsible for their separation from other aircraft. A CTAF (Common Traffic Advisory Frequency 122.8) is provided at the airport and allows pilots to monitor other aircraft positions as well as announce their own position.

To facilitate the coordination of air traffic at Solberg-Hunterdon Airport, a standard left hand traffic pattern has been established. For arriving or departing aircraft, the airport has a standard traffic pattern altitude of 1,000 feet above ground level (AGL) or 1,200 feet mean sea level (MSL). Existing noise abatement procedures require that departing aircraft climb to 1,200 feet MSL over the extended centerline of the runway prior to making any turns .

1.7.2 Navigational Aids

The Solberg VORTAC, located on the airfield, and Global Positioning System (GPS) satellite navigation are both available at the Airport. The next nearest VOR is the Broadway VOR located approximately 16 miles to the north of Solberg-Hunterdon Airport.

Of the three non-precision approaches to the airport, one utilizes GPS as the primary navigational aid (NAVAID) while the remaining two VOR approaches utilize the Solberg

VOR as the primary NAVAID. Table 1-8 summarizes the airport's approach cloud ceiling/visibility minima.

Table 1-8
Instrument Approach Summary

Type of Approach	Aircraft Approach Category			
	A	B	C	D
VOR/GPS-A: Circling	720' - 1		n/a	
VOR/DME or GPS-Runway 4	700'-1		n/a	
GPS-Runway 4	700'-1		n/a	

Example: Minimum descent altitude - visibility in miles

Note: The above minimums are the lowest possible and assume that a local altimeter setting is obtained prior to the initiation of the approach and that DME is installed in the aircraft and available at the time of the approach.

Approach Category A: aircraft with approach speeds of 91 knots or less and weighing less than 30,000 lbs.
Approach Category B: aircraft with approach speeds of 91 to 121 knots and weighing between 30,000 and 60,000 lbs.
Approach Category C: aircraft with approach speeds of 121 to 141 knots and weighing between 60,000 and 150,000 lbs.
Approach Category D: aircraft with approach speeds of 141 to 166 knots and weighing over 150,000 lbs.

Source: U.S. Government, Instrument Approach Procedures, October 10, 1996

Visual aids include medium intensity runway lights (MIRL) on Runway 4-22, a lighted wind sock and an illuminated wind tee.

Section 1-8: Climatological Data

The climatic environment of an airport site influences the operational characteristics as well as airfield facility requirements. For example, cloud ceiling and visibility conditions affect airport capacity because aircraft spacing usually must increase as these conditions deteriorate. Annual temperature information is used to recommend runway specifications. Wind persistency (prevailing wind direction vs. wind speed over time) during various weather conditions dictate runway orientation, as well as the proper location of instrument landing aids.

1.8.1 Temperature

The mean temperatures for the extreme months are as follows:

a.) Mean maximum temperature for the hottest month is 90°F (July)
b.) Mean minimum temperature for the coldest month is 17°F (January)

1.8.2 Wind

Wind coverage is that percent of time that crosswinds are within an acceptable velocity. When a runway configuration provides less then 95 percent all-weather wind coverage, a crosswind runway is recommended. Using Newark International wind data and a 10.5 know crosswind component, Table 1-9 lists the airport's wind coverage.

Table 1-9
Wind Coverage

Condition	Runway Heading					
	4	22	10	28	13	31
All-Weather	85.0		86.1		86.7	
	99.3					
IFR Weather	95.1		84.4		83.1	
	99.3					

Wind tabulations provided by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Climatic Data Center, Ashville, North Carolina. Wind tabulation summary is based upon 14,734 observations at Newark International Airport from 1981 to 1990. Wind coverages are based upon FAA Advisory Circular 150-5300-13, Airport Design.

Section 1-9: Laws and Ordinances

The significant state and federal laws and regulations pertaining to the construction and maintenance of airports and attendant navigational facilities are summarized in the following subsections.

1.9.1 Federal

The Federal Aviation Administration has the major federal role of overseeing and regulating the nation's system of airports. Federal involvement in airport development takes place in four principal areas:

a.) financial support under various capital improvement and property acquisition and planning programs.

b) technical assistance including advisory services on system and master planning and the development of airport design, construction and maintenance standards.

c.) federally sponsored research and development

d.) preparation and publication of the National Plan of Integrated Airport Systems (NPIAS).

Federal funding for airport planning and development projects is provided under the Airport Improvement Program, as authorized by the Airport and Airway Safety and Capacity Expansion Act of 1987. Federal aid for airport development extends only to those airports considered necessary by the FAA to meet the needs of the national airspace system. This system of airports is identified in the National Plan of Integrated Airport Systems (NPIAS), 1990-1999, and includes the Solberg-Hunterdon Airport in Readington Township, New Jersey.

The governing rules affecting aviation activity at the Airport are the Federal Aviation Regulations (FAR's). Procedures and policies for processing airport development projects affecting the environment are contained in FAA Order 5050.4A.

1.9.2 State

The State of New Jersey, in licensing airports, has established some regulations to which the owner operator must conform as a contingency for granting the license. These Licensing Regulations are outlined in the Administrative Code of New Jersey, Title 16, Chapter 54, Subchapter 1.

Under the Air Safety Zoning Act of 1983, the State of New Jersey established minimum standards for the control of airport and aeronautical land uses adjacent to airports. The regulations are outlined Title 16, Chapter 62 of the New Jersey Administrative Code.

The New Jersey Airport Safety Act of 1983, Citation PL 1983 Chapter 26, Co6:1-89ETAL was approved in July of 1983. This indicates that up to five percent funding is available for airports in New Jersey if requirements of the act are met. Failure to abide by these regulations may result in the revocation of the airport license if funding is accepted under this program.

In addition, improvements at Solberg-Hunterdon Airport should comply with the regulations and development patterns set forth in the New Jersey State Aviation System Plan and the New Jersey State Redevelopment Plan.

CHAPTER 2: FORECASTS OF AVIATION DEMAND

TABLES

FIGURES

CHAPTER 2 - FORECASTS OF AVIATION DEMAND

The proper planning of a facility of any type must begin with a definition of the need it can reasonably expect to serve over a specified period of time. At Solberg-Hunterdon Airport, this means developing a set of forecasts that best define the potential of future aviation demand.

At general aviation airports, such as Solberg-Hunterdon Airport, it is generally accepted that aviation activity is a function of the number of based aircraft. For this reason, the forecast of based aircraft is the primary forecast and all other projections result from this forecast.

Section 2-1: Review of Independent Forecasts

It is good planning practice to use existing published forecasts whenever possible. This section reviews three existing forecasts of aviation demand for their possible use in this planning effort. These projections include forecasts developed by the Federal Aviation Administration and the New Jersey Department of Transportation.

2.1.1 National Plan of Integrated Airport Systems (NPIAS) 1993-1997

This NPIAS report is produced by the FAA to identify those airports considered to be necessary to the nation's airport system. For Solberg-Hunterdon Airport, the NPIAS (1993-1997) projected 82 based aircraft for the year 1995 and 83 aircraft for the 1999. This forecast indicates a static condition that does not correspond with the continued economic, demographic and aviation growth experienced in this area. Furthermore, Solberg has already exceeded those numbers. It was determined that this forecast should not be used for master planning purposes.

2.1.2 FAA Eastern Region Forecasts

According to FAA activity forecasts for the Eastern Region, the number of active general aviation aircraft is projected to increase 7.4 percent over the next 11 years, or less than one percent annually. If the Eastern Region growth rate were to be applied to based aircraft at Solberg-Hunterdon Airport, this forecast would project 80 aircraft for the year 2000, and approximately 87 aircraft by the end of the planning period. This forecast is also too low to be used effectively.

The following sections discuss the upward trends in population and aircraft activity in central New Jersey that will justify using an alternate forecasting method.

2.1.3 New Jersey State Aviation System Plan

According to forecasts in the New Jersey State Aviation System Plan (NJSASP), there were 4,670 aircraft based at New Jersey airports in 1988. The system plan estimates that there will be 5,500 New Jersey based aircraft by the year 2010, an increase of 18 percent over the 22 year period.

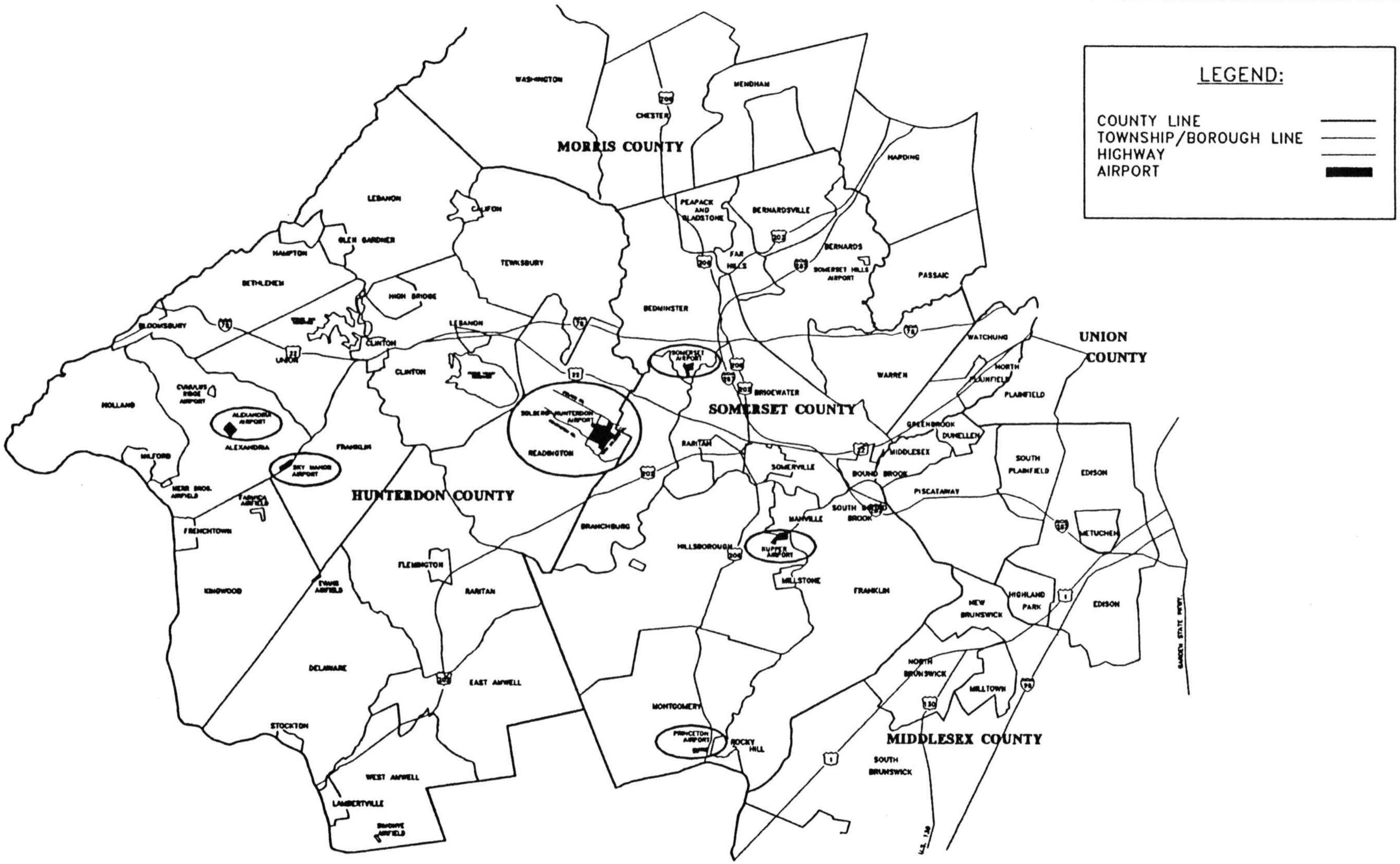
Since the NJSASP is the latest public document representing the aviation needs of New Jersey, it was determined that, unless independent projections deviated substantially, the State's growth rates and projections would be used for baseline forecasting purposes.

Section 2-2: Forecasting Process

The macro/micro forecasting methodology is based on the assumption that individual airport growth can be directly related to the demand in a larger regional area. Macro forecasting uses independent projections (i.e., State System Plan) to determine regional trends and to establish or confirm a rate of growth for an entire airport service area. These macro forecasts were available through the year 2010. Micro forecasting then uses the results of the macro forecast and applies a distribution model to allocate a portion of macro demand to the study airport. The allocation is generally considered to be the airport's market share which can be influenced by independent variables, i.e., runway length, airport services, aircraft storage capacity, etc.. Micro forecasts are airport specific and therefore are provided through the planning year 2015.

A general aviation service area is usually delineated by a.) a 30-minute driving distance, and/or b.) the airport's proximity to other area airports with a similar level of service and comparable facilities. A 30-minute isochronal from the airport will encompass Readington and Branchburg Townships and most of Hunterdon County and Somerset County. For the purpose of this study, this was considered the primary airport service area for Solberg-Hunterdon Airport, and the macro forecast addressed aviation growth in this area, depicted in Figure 2-1.

Within the 30-minute radius are five other general aviation airports of similar size and function. Assuming 30-minutes is an acceptable driving distance for an aircraft owner/pilot to reach the aircraft, the micro forecast will address the distribution of based aircraft in this area.



SOLBERG-HUNTERDON AIRPORT
MASTER PLAN

Figure 2–1

AIRPORT SERVICE AREA

Section 2-3: Service Area Based Aircraft

The NJSASP provides forecasts of based aircraft for Solberg-Hunterdon Airport and the five remaining airports in the service area. Two independent forecasts were then generated for comparison to determine if any changes to the forecast should be recommended. The airports in the service area include Kupper Airport, Alexandria Field, Sky Manor Airport, Princeton Airport, Solberg-Hunterdon Airport and Somerset Airport. The following Table 2-1 lists the forecast for each airport and the resulting macro forecast of based aircraft in the service area. This forecast utilized the growth rates projected in the NJSASP, and the actual numbers have been updated based on current (1995) based aircraft totals.

Table 2-1
Service Area Forecast of Based Aircraft

Airport	Actual 1995	Projected 2000	Projected 2010
Kupper Airport	129	142	164
Alexandria Field	93	102	119
Sky Manor Airport	102	112	129
Princeton Airport	132	146	170
Solberg-Hunterdon Airport	100	110	127
Somerset Airport	170	187	217
Total	726	799	926

Source Based on New Jersey State Airport System Plan growth rates applied to 1995 actual.

2.3.1 NJSASP Forecast

The NJSASP forecast for the service area airports out paced the statewide projection by nearly double. By 2010, service area based aircraft will increase from 726 to 926. This was determined to be an acceptable baseline forecast for planning purposes and was confirmed by two independent forecasts, as presented below.

2.3.2 Independent Forecasts

The following independent forecasting methodologies were developed using registered aircraft information. No source could be found to provide both accurate and complete historical based aircraft information for these airports. In lieu of this, thirteen years of consecutive registered aircraft data was obtained from FAA records. Registered aircraft is a generally accepted forecast variable because this information is readily available and provides an accurate representation of aircraft ownership/activity in a county. However, because the actual number of based aircraft is often substantially different from the number of registered aircraft, a conversion factor must be established.

For example, in 1995, there were 407 registered aircraft and 727 based aircraft in the two-county service area, Hunterdon and Somerset. This translates into factor of 1.79 which has increased in recent years. This factor can be used to convert the forecasts of registered aircraft to a forecast of based aircraft for the same area. The variance might be explained by the fact that there are five airports in the two counties. This tends to attract owners from surrounding New Jersey counties with fewer and/or lessor facilities. Also, aircraft owners tend to register their aircraft outside of New Jersey for tax/business reasons and base the aircraft closer to their main operating areas within the State.

a.) <u>Historical and Projected Trends of Registered Aircraft</u>. A regression analysis was used to establish a forecast based upon past growth trends. From 1977 to 1995, registered aircraft in the Solberg-Hunterdon Service Area increased from 388 to 407. By projecting this growth rate into the future, there will be 508 registered aircraft, or 907 based aircraft by the end of the planning period. The results of this forecast is presented in Table 2-2.

Table 2-2
Service Area Based Aircraft by Past Trends

Year	Registered Aircraft	Based Aircraft Ratio	Service Area Based Aircraft
1995	407	1.79	727
2000	441	1.79	788
2010	508	1.79	907

b.) <u>Historic and Projected Ratio of Registered Aircraft to Service Area Population</u>. Historically, the two-county service area has had approximately 14 registered aircraft per 10,000 residents. Statistically, this ratio has not varied by more than one aircraft over the past ten years, thereby making this an ideal variable to be used. By applying this ratio to independent population forecasts provided by the Planning Boards of Hunterdon and Somerset Counties, there will be 602 registered aircraft, or 1,075 based aircraft by the end of the planning period. The results of this forecast is presented in Table 2-3.

2.3.3 Service Area Based Aircraft Forecast Summary

Neither of the independent forecasts shown above represent a substantial deviation from the projection made in the NJSASP. In fact, due to the high degree of correlation between the estimates, the independent forecasts provide further support to the NJSASP projected growth trend. Therefore, the NJSASP growth trend forecast, Table 2-4, was adopted for further use in this study. The forecast concludes that aviation activity in the central New Jersey region should continue to increase well into the next decade.

Table 2-3
Service Area Based Aircraft Per 10,000 Population

Year	Service Area Population	Aircraft Per 10,000 Res.	Registered Aircraft	Based Aircraft Ratio	Service Area Based Aircraft
1995	368,234	14	516	1.79	922
2000	389,210	14	545	1.79	974
2010	429,856	14	602	1.79	1,075

Sources 1/ U.S. Department of Transportation, Federal Aviation Administration, Census of U.S. Civil Aircraft, 1977 - 1989 and FAA Aviation Forecasts, February, 1991.
2/ Hunterdon and Somerset County Planning Boards, October 1994.

Table 2-4
Service Area Based Aircraft Forecast

Forecast	1995	2000	2005	2010
Service Area Based Aircraft	726	799	863	926

Source: New Jersey State Aviation System Plan growth rate applied to airports in Hunterdon and Somerset Counties

Section 2-4: Based Aircraft Forecast

The micro forecast concentrates on forecasting based aircraft for Solberg-Hunterdon Airport. The forecast process is similar to that of the macro forecast. First, the NJSASP growth rate projection is reviewed for its use as the baseline forecast. Once the baseline demand is established, changes in aircraft distribution can be used to a quantify a future market share.

2.4.1 NJSASP Forecast

The New Jersey State Aviation System Plan provides a published forecast of based aircraft for the airport. As shown in Table 2-5, the system plan is projecting 105 based aircraft by the year 2010. The current level of 100 based aircraft has already exceeded the level forecasted for the year 2000 by the NJSASP. Based on the methodology presented above, the Solberg Airport baseline forecast has been adjusted to account for the current level, while maintaining the growth trend established by the NJSASP. This adjusted forecast is projected out to the year 2015 and presented in Table 2-6.

Table 2-5
NJSASP Forecast of Based Aircraft

Forecast	1988	1995	2000	2010
Solberg Airport	75	83	91	105
Source: New Jersey State Aviation System Plan				

Table 2-6
Adjusted Forecast of Based Aircraft

Forecast	1988	1995	2000	2005	2010	2015
Solberg Airport	75	100	108	116	128	136
Source: New Jersey State Aviation System Plan growth rate applied to Solberg Airport 1995 actual)						

2.4.2 Distribution of Service Area Based Aircraft

The distribution of service area aircraft is considered to be the airport's market share. Historical records indicate that since 1977, Solberg-Hunterdon Airport has consistently held an 11 to 12 percent share of the aircraft based in the airport service area. However, the growth experienced at the airport over the past 6 years has increased the number of based aircraft to its current level of 100, and a market share of over 13 percent of the service area.

The micro forecasts are based upon the airports ability to attract a given percentage of the aircraft in the service area. Three forecast scenarios were generated using variable market share percentages:

a.) assumes the service area continues to grow as projected, and that the airport maintains a constant 13 percent share, which results in the adjusted baseline forecast.

b.) assumes the service area continues to grow as projected, and that the airport will attract an increasing share of the business/corporate aviation market segment, thus allowing the airport to capture a 15 percent share; and, c.) assumes the service area continues to grow as projected, and considers the statistical possibility that a nearby New Jersey airport will close and thus increase the market share of surrounding airports (New Jersey airports have been closing at a rate of 1 per year for the last 30 years). This is represented by the airport capturing an 18 percent share.

The results of these forecasts are presented in Table 2-7. Assuming the service area continues to grow as projected, and the airport maintains a constant 13 percent share, there will be 140 based aircraft by the end of the forecast period. Given that this forecast corresponds directly with the adjusted NJSASP growth rate projection above, this forecast is adopted as the baseline forecast for based aircraft at Solberg-Hunterdon Airport. If no major improvements or outside influence occurs to otherwise increase the airport's market share, facility planning should provide for a minimum of 140 based aircraft.

Table 2-7
Distribution of Service Area Based Aircraft

Based Aircraft	Actual 1995	2000	2005	2010	2015*
Service Area Based Aircraft	726	799	863	926	1,014
Solberg w/ 13 Percent Share	100	110	119	127	140
Solberg w/ 15 Percent Share	100	112	125	139	157
Solberg w/ 18 Percent Share	100	120	138	157	183

* Data extrapolated.

The second forecast is reflective of a continuing growth in business and industrial development throughout the Hunterdon-Somerset County region. A growing demand by the business aviation community for airport facilities in the region could certainly result in a higher range demand profile for the airport. On this basis, the airport not only maintains the current 13 percent share, but will grow to capture over a 15 percent share of the service area based aircraft, or a total of 157 by the year 2015.

The third forecast takes into account that New Jersey Airports have been closing at a rate of 1 per year over the past 30 years and considers the possibility of a nearby airport closing, resulting in a higher market share for nearby airports. Therefore, it is assumed that a demand influence over and above the natural growth trend could result in a market share increase to 18 percent.

2.4.3 Based Aircraft Forecast Summary

The preferred forecast for Solberg-Hunterdon Airport is the median projection, shown in Table 2-8. The forecast is based upon the expectation that the Airport will gain over time a fifteen percent share of the market. This number is supported by an increasing corporate/business market segment demonstrated in both aircraft production and local/regional development and expanding economic conditions. Also, the statewide and service area forecasts indicate that aviation demand will continue to be strong in this region. Furthermore, the available property and development potential of Solberg Airport make it the only facility in the service area with the ability to service the growth in business aviation demand.

Table 2-8
Forecast of Based Aircraft
Median Projection (Selected)

Forecast	1988	1995	2000	2005	2010	2015
Based Aircraft	75	100	112	125	139	157

2.4.4 Based Aircraft Forecast Mix

Nationwide, the current active general aviation aircraft mix consists of 80 percent single-engine, with the remainder consisting of multi-engine and jet aircraft. Historically, the trend of general aviation aircraft indicates a greater shift towards business class aircraft. It is projected on a national basis, that the percentage of single-engine aircraft to total aircraft will decline in the next several years, while increases are forecast in the twin and turbo-prop and turbo-jet categories. This general trend is expected to be experienced at Solberg-Hunterdon Airport as well, particularly as influenced by the business aviation demand.

Factors which will contribute to this change in aircraft mix include: a.) the anticipated increase in purchase, operation, maintenance, and liability costs associated with single-engine aircraft ownership, and b.) demonstrated increase in usage of aircraft by industry and business. Tables 2-9 and 2-10 present the historic and forecast aircraft mix for Solberg-Hunterdon Airport median and high range forecasts.

Table 2-9
Based Aircraft Mix
Median Forecast

Aircraft Type	Historic 1988	Actual 1995	2000	2005	2010	2015
Single Engine	70	89	97	106	116	131
Multi-Engine	5	8	9	10	11	12
Turbo-Prop	-	2	3	5	6	8
Turbo-Jet	-	1	2	2	3	3
Helicopter	-	-	1	2	3	3
Total	75	100	112	125	139	157

Table 2-10
Based Aircraft Mix
High Range Forecast

Aircraft Type	Historic 1988	Actual 1995	2000	2005	2010	2015
Single Engine	70	89	104	114	123	143
Multi-Engine	5	8	8	10	14	15
Turbo-Prop	-	2	5	9	13	15
Turbo-Jet	-	1	2	3	4	6
Helicopter	-	-	1	2	3	4
Total	75	100	120	138	157	183

Section 2-5: Forecasts of Airport Activity

The following activity projections are derivatives of the based aircraft forecast and will be used throughout the remainder of the study. The various activity forecasts correspond to levels of demand which may exceed the capacities of the existing facilities. The following chapter will address any deficiencies and respond with a recommendation for facilities to accommodate excess demand.

2.5.1 Aircraft Operations

The FAA recommends that "airports which do not have an air traffic control tower and therefore do not record aircraft operations, can assume 637 annual operations per based aircraft." This is a constant factor which accounts for all operations, itinerant and local. It is indicative of a healthy, self-sustaining, general aviation facility. Therefore, for planning purposes, this ratio was used to estimate future activity levels at Solberg-Hunterdon Airport.

Table 2-11
Estimated Annual Operations

Forecast	Historic 1988	Estimated 1995	2000	2005	2010	2015
Based Aircraft	75	100	112	125	139	157
Operations Per Based Aircraft	637	637	637	637	637	637
Annual Operations	47,775	63,700	71,344	79,625	88,543	100,000

By definition, local operations may be defined as "operations that are performed by aircraft which (a) operate within the local traffic pattern, or (b) are known to be departing for or arriving from local practice areas within a 25 mile radius of the airport..". Itinerant operations are considered to be all other operations.

Local operations are performed predominantly by single-engine and small multi-engine aircraft, and generally associated with pilot training and maintenance flights. For the purpose of this analysis, approximately 60 percent of the total annual operations are considered to be local. Furthermore, 50 percent of the local operations are considered to be touch and go's, or practice takeoffs and landings.

2.5.2 Passengers Forecast

Pilot/passenger activity is used to estimate FBO terminal usage. Based upon past studies, surveys of general aviation users and the mix of aircraft at Solberg-Hunterdon Airport, the following "passengers per flight" ratios will be used to approximate the total number of annual passengers:

a.) 1.5 pilot/passengers per single-engine/rotor operation
b.) 2.5 pilot/passengers per multi-engine operation
c.) 3.5 pilot/passengers per turbo-prop/jet operation

By applying these ratios to projected operations (less touch and go's), a reasonable passenger forecast is presented in Table 2-12.

Table 2-12
Estimated Annual Passengers

Forecast	Historic 1988	Estimated 1995	2000	2005	2010	2015
Annual Passengers	53,150	65,197	82,802	97,196	111,590	126,700

2.5.3 Ground Trips Forecast

When estimating automobile ground trips, vehicular traffic, like passengers, can be directly related to aircraft activity. The following assumptions were used in forecasting airport related ground trips.

a.) 2 auto trips for every itinerant single, multi-engine, and rotor departure
b.) 3 auto trips for every turbo-prop and jet departure
c.) 1.5 trips for every 5 touch and go operations.

Table 2-13 provides the forecast automobile ground trips used for planning purposes.

Table 2-13
Automobile Ground Trips

Forecast	1988	1995	2000	2005	2010	2015
Estimated Annual Departures	16,888	20,511	28,980	30,019	39,057	44,345
Automobile Ground Trips	33,776	41,022	65,405	72,856	81,736	96,000

2.5.4 Business Aviation

Business Aviation is defined by the FAA as any use of an aircraft, not for compensation or hire, by an individual for transportation required by the business in which the individual is engaged. Business Aviation is a subdivision of General Aviation which the airport serves. Although difficult to predict, General Aviation activities, as a whole, are expected to decrease slightly until about 2005 when they are forecast to level or rise slightly.

In contrast, both the Business and Corporate sectors of aviation are a function of economic activities and business. The FAA predicts that both of these divisions will increase annually as the economy expands. The local economy is expanding and is expected to continue to grow at rates that far exceed those predicted for the State. For this reason, Business Aviation at Solberg-Hunterdon Airport should be expected to increase steadily into the next century.

The National Business Aircraft Association (NBAA) is a nonprofit organization formed to promote the aviation interests of corporations in the United States and its possessions. It concerns itself with companies operating aircraft as an aid to the conduct of their business. The NBAA provides an outstanding source of aircraft information about business aviation. Information obtained from the NBAA documents in Table 2-14 that 77.7% of the NBAA's member aircraft are turbine powered.

Table 2-14
NBAA Turbine Member Aircraft Profiles

Total Member Aircraft	5,000	100.0%
Total Turbo-Jet	2,816	56.3%
Total Turbo-Prop	1,070	21.4%
Total Turbine Powered	3,866	77.7%

Section 2-6: Forecast Summary

Many airport facilities are planned, sized, and designed to accommodate peak activity demands. However, planning for absolute peak demands, i.e., the busiest day of the year, will result in facilities impractically oversized and underutilized. The Average Day / Peak Month (ADPM) is the most common method of converting activity statistics to a daily, and ultimately an hourly demand baseline.

The average busy month accounts for 10 percent of annual operations. The average day is the busiest month divided by 30. The design hour has always been between 10 and 11 percent of daily activities.

Given the peak operations through the period, an estimate of passengers and vehicle trips can also be calculated for peak conditions. A complete listing of peaking characteristics can be found in Table 2-15.

The following Table 2-15 is a summary of the demand forecasts.

Table 2-15
Forecast Summary

Forecast	1988	1995	2000	2005	2010	2015
Based Aircraft	75	100	112	125	139	157
Single Engine	70	89	97	106	116	131
Multi-Engine	5	8	9	10	11	12
Turbo-Prop	-	2	3	5	6	8
Turbo-Jet	-	1	2	2	3	3
Helicopter	-	-	1	2	3	3
Operations	47,800	63,700	71,300	79,600	88,500	100,000
Itinerant	19,100	25,500	28,500	31,800	35,400	40,000
Local	28,700	38,200	42,800	47,800	53,100	60,000
Passengers and Automobiles						
Est. Annual Passengers	53,150	65,197	82,802	97,196	111,590	126,700
Est. Annual Vehicle Trips	33,776	41,022	65,405	72,856	81,736	96,000
Peaking Characteristics						
Operations						
Peak Month	4,770	6,370	7,130	7,960	8,850	10,000
Avg Day Peak Mo.	159	195	227	253	280	325
Design Hour	16	21	24	27	30	33
Passengers						
Peak Month	6,378	8,062	9,936	11,663	13,391	15,204
A.D.P.M.	212	269	331	389	446	507
Design Hour	26	32	40	47	54	61
Vehicle Trips						
Peak Month	4,035	5,000	7,195	8,378	9,800	11,520
A.D.P.M	135	166	240	279	327	384
Design Hour	16	20	29	34	38	44

CHAPTER 3: DEMAND/CAPACITY ANALYSIS

TABLES

CHAPTER 3: DEMAND/CAPACITY ANALYSIS

The preceding section provided a reasonable range of forecast data for Solberg-Hunterdon Airport. To accommodate the demand as determined by the forecasts, a brief demand/capacity and facility requirements analysis follows in this section. The goal of this analysis is to determine a level of magnitude for airport development.

Section 3-1: Airfield Facility Analysis

The analysis of the runway and taxiway system at Solberg-Hunterdon Airport focused primarily on the capacity of the system and its ability to accommodate the forecasted level of aircraft operations over the twenty year planning period.

3.1.1 Existing Airfield Capacity Analysis

The generally accepted airport capacity model is provided in FAA AC 150/5060-5 "Airport Capacity and Delay". The following key terms are relative to the discussion of capacity:

a.) *demand*- the magnitude of aircraft operations to be accommodated in a specified period of time, provided by the forecasts.

b.) *capacity* - a measure of the maximum number of aircraft operations that can be accommodated on an airport in one hour.

c.) *annual service volume* - or ASV, a reasonable estimate of the airports annual capacity.

d.) *delay*- the difference between the actual time it takes an aircraft to operate on the airfield and the time it would take the aircraft if it were operating without interference from other aircraft, usually expressed in minutes.

There are several factors known to influence airport capacity. The VFR and IFR hourly capacities were based upon the following assumptions:

a.) Runway-use Configuration. The appropriate runway use configuration (No. 9) was taken from Figure 2-1 in the Advisory Circular.

b.) Percent Arrivals. Arrivals equal departures.

c.) Percent of Touch and Go's. Thirty percent of the total operations are considered to be touch and go's. This is within the range provided in Table 2-1 of the Advisory Circular.

d.) Taxiways. There is a full-length parallel taxiway, ample runway entrance/exit taxiways, and no taxiway crossing problem.

e.) Airspace Limitations. There is no airspace limitation which would adversely impact flight operations or otherwise restrict aircraft which could operate at the Airport.

f.) Runway Instrumentation. The Airport has VOR & GPS-A approaches that offers limited access during inclement weather conditions.

g.) Mix Index. For all practical purposes, the airport does not serve aircraft in excess of 12,500 lbs. As a result, the airport has a mix index of 0.

Using these assumptions, Solberg-Hunterdon Airport has a VFR hourly capacity of 98 operations. The IFR hourly capacity is approximately 59 operations, however, the Airport does not have the required ILS, therefore, the actual IFR capacity is probably somewhat less. The baseline forecast for average peak hour demand is expected to increase from 21 to 33 operations by the end of the forecast period. Based upon this comparison, the demand is well below the Airport's hourly capacity thresholds.

The annual service volume (ASV) accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time. Two additional assumptions are made:

a.) *Weather.* Meteorological information for the Hunterdon County area confirms that IFR conditions occur roughly 10 percent of the time.

b.) *Runway-use Configuration.* The Airport operates more than 80 percent of the time with a runway-use configuration which produces the greatest hourly capacity.

Using these assumptions, the Airport has an annual service volume of 230,000 operations. The baseline forecast for annual operations is expected to increase from 64,000 to 100,000 operations by the end of the forecast period. Based upon this comparison, the demand is well below the Airport's annual capacity threshold as well.

Under the existing conditions, there is little to no aircraft delay experienced at the Airport. Again, using the aforementioned assumptions and the forecasts presented in Chapter 2, the average delay per aircraft should not exceed 20 seconds during this planning period.

Although changes in the assumptions could affect the capacity calculations, no such change is foreseen at this time. Without an appreciable increase in the number of forecast operations, the margin between demand and capacity is sufficient to conclude that Solberg-Hunterdon Airport should not experience an airfield capacity constraint during this planning period.

Table 3-1
Airfield Capacity

FACILITY	EXISTING CAPACITY		DEMAND				
			1995	2000	2005	2010	2015
RUNWAY	Airfield Operations						
	Annual	230,000	63,700	71,300	79,600	88,500	100,000
	Hourly	98	21	24	27	30	33

3.1.2 Taxiway Requirements

The airport's primary runway is served by a full-length parallel taxiway (paved/turf) which provides direct access to the terminal area. It is recommended, however, that the turf areas at each end be paved and mid-section completed to avoid taxiing through the apron area. Also, additional taxiway exits will be required. Given the existing airfield configuration, no other taxiway changes are required. In the event that a change in the configuration is proposed for other reasons, associated taxiway improvements will be required.

3.1.3 NAVAIDs and Air Traffic Control

The airport has one published instrument approach-a non-precision VOR and GPS circle-to-land procedures. The forecasts suggest there will be an increase in the number of business class aircraft using the Airport resulting in the potential for increased instrument operations. Therefore, the primary runway should include provisions for a straight-in instrument approach which may require additional navigational aids to be located on the Airport.

According to FAA criteria for establishing terminal air navigation facilities, forecast operations are insufficient to make this airport a candidate for an air traffic control tower.

Section 3-2: Landside Facility Analysis

This section will briefly describe the landside requirements needed to accommodate general aviation activity throughout the forecast period. These will include hangars, aprons and tie down areas, FBO/ terminal building, automobile parking and access roadways. Where deficiencies have been identified in **bold**, the following chapter will include the facilities necessary to meet the projected demand.

3.2.1 Hangar Facilities

The airport has acknowledged the existing shortfall in aircraft storage facilities. Presently, there are two conventional storage hangars, one of which is used entirely for maintenance. The one large community hangar is capable of accommodating up to 25 single-engine or an equivalent of 12 business class multi-engine aircraft. There are three t-hangar units.

The forecasts estimate that 157 aircraft could be based at the Airport by the year 2015. For planning purposes, it is assumed that 50 percent of the single engine aircraft owners will request T-hangar space and 50 percent of the multi-engine piston and all of the turbo-prop, turbo-jet and rotorcraft types will require conventional hangar storage. For the purpose of assessing future hangar demand it is assumed that single-engine demand will be accommodated by the existing conventional hangar, as it is today, until such time that the multi-engine demand displaces them; at which time they are accounted for in the T-Hangar demand numbers. Table 3-2 presents the future hangar requirements.

Table 3-2
General Hangar Requirements

FACILITY	EXISTING CAPACITY		DEMAND				
			1995	2000	2005	2010	2015
HANGARS	Aircraft Positions Total-	28	**56**	**64**	**72**	**81**	**91**
	T-Hangars	3	**37**	**54**	**58**	**64**	**71**
	Conventional:						
	-Single-engine	25	12	-	-	-	-
	or						
	-Multi-engine	12	7	10	**14**	**17**	**20**

Also, consideration will have to be given to additional hangar space for aircraft maintenance and equipment storage and maintenance activity.

3.2.2 Apron and Tie-Down Facilities

Facility planning should include paved tie-down area for all aircraft that are not in hangars. The existing terminal area has 50 paved tie-downs. Assuming fifty percent of the single-engine and multi-engine piston based aircraft owners request hangar space, and that there is sufficient hangar capacity for those aircraft, it can be reasoned that the remaining aircraft will require paved apron tie-down space. Based aircraft will require 300 square yards per aircraft, while itinerant aircraft require 360 square yards, according to FAA recommendations for tie-down requirements. Table 3-3 presents apron requirements.

Table 3-3
Tie-down Apron Requirements

FACILITY	EXISTING CAPACITY		DEMAND 1995	2000	2005	2010	2015
TIE-DOWN APRON	Aircraft Positions	56	**57**	**63**	**69**	**76**	**86**
	Transient	6	**12**	**14**	**16**	**18**	**20**
	Based	50	45	49	**53**	**58**	**66**

3.2.3 FBO/Terminal Building Requirements

The existing terminal building is approximately 5,000 square feet in size and provides the necessary pilot/passenger conveniences. Based upon estimated peak hour passengers and assuming a requirement of 100 square feet per peak hour passenger, Table 3-4 presents FBO terminal building requirements.

Table 3-4
FBO/Terminal Building Space Requirements

FACILITY	EXISTING CAPACITY		DEMAND 1995	2000	2005	2010	2015
FBO/ TERMINAL BUILDING	Building Space (sf)	5,000	3,200	4,000	4,700	**5,400**	**6,100**

3.2.4 FBO/General Aviation Parking Requirements

The airport has approximately 80 automobile parking spaces adjacent to the terminal and building area. Parking requirements for general aviation activities are determined to be 1.3 parking spaces per peak hour pilot/passenger, and 35.5 square yards per parking space. Table 3-5 presents general aviation parking requirements.

Table 3-5
FBO/General Aviation Parking Requirements

FACILITY	EXISTING CAPACITY		DEMAND 1995	2000	2005	2010	2015
AUTO PARKING	Vehicle Spaces	80	43	52	61	70	79

3.2.5 Airport Access

Immediate access to the Airport is provided by Thor Solberg Road which enters the airport from the east and is accessed via County Line Road and Forty Oaks Road. The Airport is adequately served by the existing access roadways. Potential impacts of increased airport related traffic on the surrounding communities will be reviewed in Chapter 6 as part of the Environmental Review.

CHAPTER 4: FACILITY REQUIREMENTS

TABLES

CHAPTER 4: FACILITY REQUIREMENTS

This section of the Master Plan outlines what improvements are needed to meet the immediate and short term demand, as well as what additional facilities should be planned for to accommodate the wide range of demand possibilities in the longer term. Once these requirements are clearly identified, various means to accommodate those needs can be reviewed.

Section 4-1: Design Parameters

Design parameters used in concept development are based upon the critical aircraft, airport role and the corresponding airport reference code.

4.1.1 Critical Aircraft

In order to establish airport planning and design standards, a design airplane was first established for this airport. The *critical aircraft* was determined by considering a family of airplanes, having similar performance characteristics, both currently and forecasted to use the airport on a regular basis. A regular basis is considered to be at least 500 operations a year.

Of the 100 aircraft currently based at the airport, there are three multi-engine turbine airplanes. One of these aircraft is a twin engine turboprop, specifically the Piper Cheyenne III-A, which operates on a regular basis. Insofar as the critical aircraft determines the runway length requirements and the airport reference code, and considering there is not presently significant business jet activity, the Piper Cheyenne III-A is determined to be the critical aircraft for immediate action and short term planning.

4.1.2 Airport Role

Solberg-Hunterdon Airport is classified as a general aviation airport, as defined by the National Plan of Integrated Airport Systems, 1993-1997 (NPIAS). Accordingly, airport role separates these airports into commercial and general aviation categories. General Aviation airports are further divided into the following types:

a.) Reliever Airports. General aviation pilots often find it difficult and expensive to gain access to congested airports, particularly large and medium hub airports. In recognition of this, the FAA has encouraged the development of high capacity general aviation airports in major metropolitan areas. These specialized airports, called relievers, provide pilots with an attractive alternative to using congested hub airports. They also provide general aviation access to the surrounding area.

b.) General Aviation Airports. Communities that do not receive scheduled commercial service may be included in the NPIAS as sites for general aviation airports if they account for enough activity (usually at least 10 locally owned aircraft) and are at least 30 minutes from the nearest NPIAS airport. The activity criterion may be relaxed for remote locations or other mitigating circumstances.

c.) Airports Not Included in NPIAS. Over 1,000 publicly owned *public use* landing areas are not included in the NPIAS. Most of these do not meet the minimum entry criteria of 10 based aircraft and 30 minutes ground travel time to the nearest NPIAS airport. However, some which meet these criteria are not included because they are located at inadequate sites and cannot be expanded and improved to provide safe and efficient airport facilities. In these cases, the FAA usually recommends replacement of the inadequate airport. In addition, civil landing areas that are not open to the general public are not included in the NPIAS.

d.) State System Plan. Each state has an airport system plan which identifies the location and scale of development that is considered necessary to satisfy the state's need for air transportation.

Solberg-Hunterdon Airport is a Reliever facility that presently serves all small airplanes commonly used for business and personal needs. On occasion, the airport serves aircraft weighing in excess of 12,500 pounds. Long range planning should be completed based on the defined role as a reliever airport within the State system plan with an expanding business/corporate user segment.

4.1.3 Airport Reference Code

The *airport reference code* (ARC), is an FAA coding system used to relate the airport design criteria to the operational and physical characteristics of the airplanes intended to use the airport on a regular basis.

The airport reference code has two components relating to the design aircraft. The first component, depicted by a letter is the *aircraft approach category* and relates to the aircraft approach speed (operational characteristic). The second component, depicted by a Roman numeral, is the *airplane design group* and relates to airplane wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway related facilities. Airplane wingspan relates to separation criteria involving taxiways, taxilanes, aircraft parking areas, buildings, etc..

On the basis of the critical aircraft selection, the Cheyenne III-A operates within Approach Category B and Design Group I. This aircraft represents the most demanding aircraft for current and short term airport planning at Solberg-Hunterdon Airport. Therefore, all existing and short term planned facilities should meet the requirements for ARC B-I. However, long range planning should use ARC B-II to accommodate the increasing number of aircraft forecast to use the airport as business activity increases. For long range planning purposes, the Cessna Model 550 (Citation) was chosen as the critical aircraft.

4.1.4 Runway Length Requirements

The recommended length for Runway 4-22 is based upon the selection of critical aircraft and the corresponding airport role.

The minimum runway length requirement is based upon several factors including airport elevation, temperature, and type of aircraft expected to utilize the runway on a regular basis. Using this criteria, a baseline, or minimum runway length of 3,710 feet is required to serve the majority of the airplanes in this category. The number does not consider runway gradient (uphill) or pavement condition (wet, snow, etc) or utility considerations.

In order to provide for the specific length required for the critical aircraft and other similar types of business class aircraft, an additional margin should be considered. Given the particular critical operating conditions (i.e. payload, fuel/range, temperature, runway gradient, etc.) these aircraft require additional runway length over the minimum requirement.

Runway length calculations were reviewed using the specific performance data of several of the most prevalent aircraft types in this category. These calculations yielded a primary runway length requirement of between 4,400 and 5,600 feet, as presented in Table 4-2. Also, long term planning must consider the identified increase in business aircraft activity reflected in the selected demand forecast. Given the presence of these aircraft types on a regular basis at Solberg-Hunterdon Airport, additional length over the minimum requirement is recommended in the interest of safety and maximizing the operating utility and level of service at the airport.

Table 4-1
Runway Length Criteria

AIRPORT AND RUNWAY DATA	
Airport elevation	195 feet
Mean daily maximum temperature of the hottest month	90.00 F
Maximum difference in runway centerline elevation	29 feet
Length of haul for airplanes of more than 60,000 pounds	0 miles
MINIMUM RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with approach speeds of less than 30 knots	310 feet
Small airplanes with approach speeds of less than 50 knots	820 feet
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	2570 feet
95 percent of these small airplanes	3120 feet
100 percent of these small airplanes	***3710 feet***
Small airplanes with 10 or more passenger seats	4300 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	5390 feet
75 percent of these large airplanes at 90 percent useful load	7010 feet
100 percent of these large airplanes at 60 percent useful load	5760 feet
100 percent of these large airplanes at 90 percent useful load	8670 feet
Airplanes of more than 60,000 pounds	Approximately 5080 feet

Reference AC 150/5325-4A, Runway Length Requirements for Airport Design.

Table 4-2
Runway Length Parameters

Runway	Existing Dimensions	Runway Length Parameters
Primary Runway 4-22	3,735'	4,400' to 5,600'
Secondary Runway 13-31	3,440'	3,710'
Secondary Runway 10-28	2,546'	Closed

The aircraft performance data in this section was obtained from operating manuals written by the aircraft manufacturers of each aircraft. Aircraft performance data used in the runway length analysis is provided in the appendix.

The distances listed for each aircraft were calculated using the mean critical conditions that a pilot could expect at Solberg-Hunterdon Airport. Critical means that the planning is calculated using the maximum design limits of the aircraft in a condition that will require the most distance to perform the required task. Airports are designed using the mean critical conditions to provide the safest operating conditions at all times to all user aircraft.

Table 4-3 is provided listing several aircraft and the associated runway length requirements. At issue are the Accelerate/Stop and Accelerate/Go distances that a pilot must calculate before a flight. Each of these assumes the total loss of power in one engine at the most critical point in the takeoff role.

Listed below are the definitions of the two limiting distances that a pilot of a multi-engine airplane must calculate in addition to the all engine takeoff distance before a departure can be made. The required runway length is the longer of these distances. The aircraft performance chart used to determine the distance is listed as the critical length.

- Accelerate/Stop Distance- The distance required to accelerate with both engines to the critical engine failure speed, loose power in one engine, and come to a complete stop on the runway.

- Accelerate/Go Distance- The distance required to accelerate to the critical engine failure speed with both engines and then continue the takeoff with one engine and climb to a height of 35 feet within the confines of the runway length.

In some cases the manufacturer only provides a takeoff field length. In these instances the manufacturer has calculated the minimum runway length to be the greater of the accelerate/stop distance, the accelerate/go distance, or a distance equal to 115% of the all-engine takeoff distance to a height of 35 feet above the runway. "Takeoff F/L" is shown in Table 4-3 when a manufacturer derived field length was used.

In cases where performance charts were used in the runway length calculations, the data was derived using temperatures of 90 degrees Fahrenheit (the mean temperature of the hottest month), pressure altitude of 500 feet, aircraft loaded to maximum takeoff weight, zero wind conditions and a minimum uphill runway gradient of 0.6%. Additionally, the runway was considered to be dry and in all aircraft air conditioning, anti-ice, and anti-skid controls in the off position to allow the maximum amount of takeoff and braking power. These parameters yield the runway length requirements found in Table 4-3. It should be noted that these distances provided by the manufacturer, are based on a new aircraft in peak condition, operated by experienced test pilots that are trained in the required emergency procedures for critical engine failure on takeoff.

Runway length requirements for the airport are based on common aircraft types operated for business purposes. The aircraft performance table includes the two most prevalent types of business aircraft, the Cessna Citation series and the Beechcraft KingAir series. These two aircraft, when combined, represent more than half of the business family of aircraft in operation today. These aircraft, as well as the remaining aircraft types included in this analysis, have used the Solberg-Hunterdon Airport, at limited utility, in the past and are anticipated to use the airport on an increasing frequency in the future based on national trends and forecasted growth in area businesses that will result in increased demand for an aviation facility that can accommodate these aircraft. The following Table 4-3 depicts the runway length requirements of specific business aircraft types that were evaluated for this analysis.

Table 4-3
Aircraft Performance Data of Typical Business Aircraft

Manufacturer	Aircraft Type	Aircraft Category	Airport Use	Critical Distance	Runway Length Requirement
Beechcraft	Beechjet 400A[1]	B-I	Forecast	Takeoff F/L	5,200
Beechcraft	King Air C-90A[2]	B-I	Current	Accel/Stop	4,400
Beechcraft	King Air B100[3]	B-I	Current	Accel/Stop	4,500
Beechcraft	B200/B200C[4]	B-II	Current	Accel/Go	5,600
Beechcraft	B300/B300C[5]	B-II	Current	Takeoff F/L	4,400
Cessna	Model 525[6]	B-I	Current	Takeoff F/L	5,600
Cessna	Model 550[7]	B-II	Current	Takeoff F/L	5,600
Cessna	Model 560[8]	B-II	Forecast	Takeoff F/L	4,400
Piper	Cheyenne IIIA[9]	B-I	Current	Accel/Go	5,000

Source 1/ Beechjet 400A Operators Manual, Raytheon Aircraft Company, 7/94
2/ King Air C90-A Operators Manual, Raytheon Aircraft Company, 1/94
3/ King Air B100 Operators Manual, Raytheon Aircraft Company, 10/84
4/ Model B200 Operators Manual, Raytheon Aircraft Company, 10/93
5/ Model B300 Operators Manual, Raytheon Aircraft Company, 9/93
6/ Model 525 Operators Manual, Cessna Aircraft Company, 10/95
7/ Model 550 Operators Manual, Cessna Aircraft Company, 10/95
8/ Model 560 Operators Manual, Cessna Aircraft Company, 10/95
9/ Cheyenne IIIA Operators Manual, Piper Aircraft Corporation, 5/89

The analysis concludes that a runway length of 5,600 feet would allow these aircraft types to operate at their full utility during most conditions. Current aircraft owners, operators, and student pilots that use the Solberg facility on a regular basis would also benefit from the increased safety margin the longer runway length would provide.

The length of a secondary crosswind runway should accommodate 95 percent of the aircraft intended to use the airport. However, existing roadways constrain the crosswind runway to a maximum length of 3,700 feet. It is also recommended that the secondary runway be paved and be provided with the standard full-length, paved parallel taxiway system (includes entrance and exit taxiways).

4.1.5 Runway Width and Separation Standards

Based upon FAA airport design standards as they relate to the critical aircraft and short-term planning, the minimum recommended runway width is 60 feet. It is also recommended that the entire width be paved to provide a uniform runway surface.

In order to ensure the operational safety of airports, the FAA has developed guidelines for lateral spacing between runways, taxiways, aprons and objects in those areas. Guidelines, as they apply to Solberg-Hunterdon Airport, are based upon the design aircraft and are presented Table 4-4 for both short and long term planning.

Table 4-4
Primary Runway Width and Separation Standards

Item	Short Term	Long Term
Runway pavement width	60 feet	100 feet
Runway centerline to parallel runway centerline	700 feet	700 feet
Runway centerline to holdline	125 feet	250 feet
Runway centerline to parallel taxiway/taxilane centerline	150 feet	300 feet
Runway centerline to edge of aircraft parking	125 feet	400 feet
Taxiway centerline to fixed or movable object	44.5 feet	65.5 feet
Taxilane centerline to fixed or movable object	39.5 feet	57.5 feet

Reference: AC 150/5300-13, Airport Design

It should be noted that the above dimensions apply to the primary runway. Secondary runway requirements are somewhat less.

4.1.6 Runway Protection Zones

The runway protection zone (RPZ) is an area off the end of the runway and is intended to enhance the protection of people and property on the ground during aircraft transitions to and from the runway. At airports such as Solberg-Hunterdon Airport, the FAA recommends that the airport owner have an adequate interest in the property located within the RPZ in order to insure against future encroachment. Land uses which might create glare and misleading lights or lead to the construction of residences, fuel handling and storage facilities, smoke generating activities and places of public assembly such as churches, schools, office buildings, shopping centers and stadiums should be avoided.

Based upon the design aircraft and the presence of a non-precision VOR-DME approach, the RPZ dimensions will be increased from those currently identified. Long term planning was also completed assuming the implementation of a precision approach to Runway 3. The proposed RPZ will begin 200 feet beyond each threshold and continue outward with the following measurements:

Table 4-5
Runway Protection Zones

	Short Term	Long Term
Runway protection zones primary runway:		
Runway 3 or 4		
Length	1000 feet	2500 feet
Width 200 feet from runway end	250 feet	1000 feet
Outer Width	450 feet	1750 feet
Runway 21 or 22		
Length	1000 feet	1000 feet
Width 200 feet from runway end	250 feet	500 feet
Outer Width	450 feet	700 feet
Visual Runways		
Runway protection zones secondary runways:		
Length		1000 feet
Width 200 feet from runway end		250 feet
Width 1200 feet from runway end		450 feet

4.1.7 Wind Coverage

Wind coverage is that percent of time that crosswinds are within an acceptable velocity. When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the runway on a regular basis, a crosswind runway is recommended. Based upon the selection of critical aircraft and the corresponding airport reference code (ARC B-I), a maximum allowable crosswind component of 10.5 knots was used for this analysis.

The primary Runway 4-22 is aligned with the prevailing IFR winds. This is the standard IFR orientation for most New Jersey airports. The combination of a primary runway and two crosswind runways yield a wind coverage which exceeds the FAA minimum requirements. Based upon 36-point wind data taken from Newark International, the airport has 99.3 percent wind coverage under IFR and all-weather wind conditions.

4.1.8 Current and Short Term Facility Requirements Summary

The development and evaluation of current and short term improvements at Solberg-Hunterdon Airport should be based on the following facility requirements:

Airside

1. Paving of existing turf areas to achieve additional paved runway length and providing paved taxiway extensions to each runway end.
2. A paved connector taxiway located adjacent to the terminal apron area to reduce congestion and improve safety.

3. Primary runway improvements to achieve the 5,600 foot runway length requirement. (Will involve several interim steps).

Landside

1. Reconstruction and enhancement of the existing transient apron to provide access to all existing and future ramp areas and taxiway access points to accommodate increased transient aircraft demands.
2. Development of T-hangars to accommodate based aircraft demand.
3. Development of paved aircraft tie-downs to accommodate based aircraft demand.

4.1.9 Long Term Facility Requirements

Airside

1. Pave and improve existing Runway 13-31 and construct a full-length parallel taxiway system.
2. Closure of Runway 10-28

Landside

1. Development of aircraft storage facilities to accommodate based aircraft storage demands.
2. Future Maintenance Storage Facility
3. Additional FBO/Terminal Building Capacity

5: CONCEPT DEVELOPMENT

TABLES

FIGURES

CHAPTER 5: CONCEPT DEVELOPMENT

Section 5-1: Development Parameters and Constraints

On the basis of the previous chapter, a number of facility requirements were identified which involve either the enhancement of existing airport facilities, or potentially the development of new facilities. To meet these needs, various methods of accommodating future improvements that will allow the airport to develop and effectively operate through the twenty year planning period, were reviewed through an evaluation of alternative development concepts.

The airport system has been divided into two components for analysis:

- Airfield - which includes the runway and taxiway system; and
- Landside - which includes the building area and general aviation facilities.

5.1.1 Development Parameters

The physical layout of airside and landside facilities at Solberg-Hunterdon Airport will be dictated in part by those parameters which are associated with the airport role and Airport Reference Code (ARC). As presented in Chapter 4, Solberg-Hunterdon Airport is currently operating as a Reliever airport serving those aircraft with physical and operating characteristics which classify them with Airport Reference Code B-I. However, the requirement for longer term facility improvements at the airport are related to the demand associated with business aviation. A number of those aircraft, as discussed in the previous chapter, will require facilities which are designed to ARC B-II standards. Thus, for the purpose of properly evaluating ultimate development alternatives which can serve the long term demand for airport facilities, each of the alternatives have been established using ARC B-II design standards with a precision approach to the instrument runway.

5.1.2 Constraints and Influences

Prior to actually developing airside and landside alternatives, the characteristics of both the on-airport and off-airport environs were reviewed. A number of factors were identified which were seen as potentially having an impact or influence on airport development. These factors include the following:

A. On-Airport Features

Various on-airport features were identified as illustrated in Figure 5-1:

1. Property and Roadways

The Solberg-Hunterdon Airport encompasses 721 acres of land. For the most part, this should provide adequate property on which to develop future facilities, however, the following areas could offer some constraint;

- The existing building area, which is currently located between the main runway and Thor Solberg Road, is relatively narrow and may restrict building area development, particularly with the adoption of greater runway set-back criteria associated with ARC B-II and precision instrumentation design criteria.

- Readington Road and Pulaski Road establish physical limitations on runway development to south and north respectively. Although the airport controls property south of Readington Road and north of Pulaski, the Runway Protection Zones associated with longer runway development may extend beyond airport property. In addition, the area of property off the north end of the existing Runway 4-22, is not controlled by the airport, which places a constraint on the existing runway layout as well as future development.

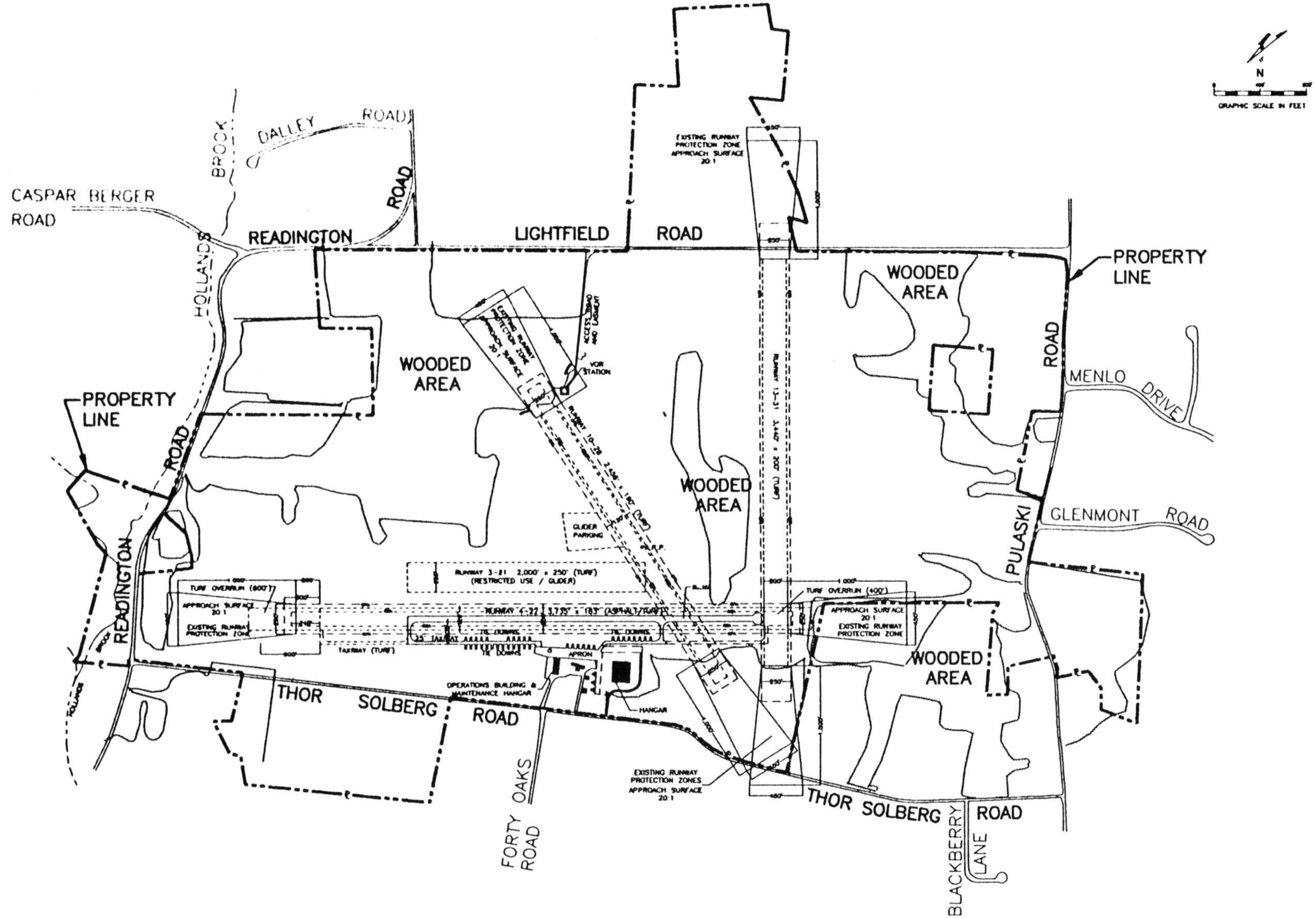
- Lightfield Road and Thor Solberg Road play a role in the future development and orientation of the secondary crosswind runway.

2. Wetlands

The potential for wetland areas which may conflict with proposed development was researched using the New Jersey Department of Environmental Protection, Freshwater Wetlands Maps, in addition to field visits. The location of these wetlands and the ability to avoid or effectively manage any wetland impact was certainly a consideration in the evaluation.

3. Topography and Drainage Features

Due to the somewhat rolling terrain of the airport property and the presence of wooded areas, consideration was given to the amount of earthwork and clearing that may be required for both construction and storm water drainage.



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 5-1

ON AIRPORT FEATURES

4. Existing Facilities

The facilities already in place at the airport, and the ability to maintain the use of these facilities was an important consideration. These include the buildings, paved aircraft ramps, support facilities such as auto parking and fuel storage, and the existing paved runway and taxiways.

B. Off-Airport Features

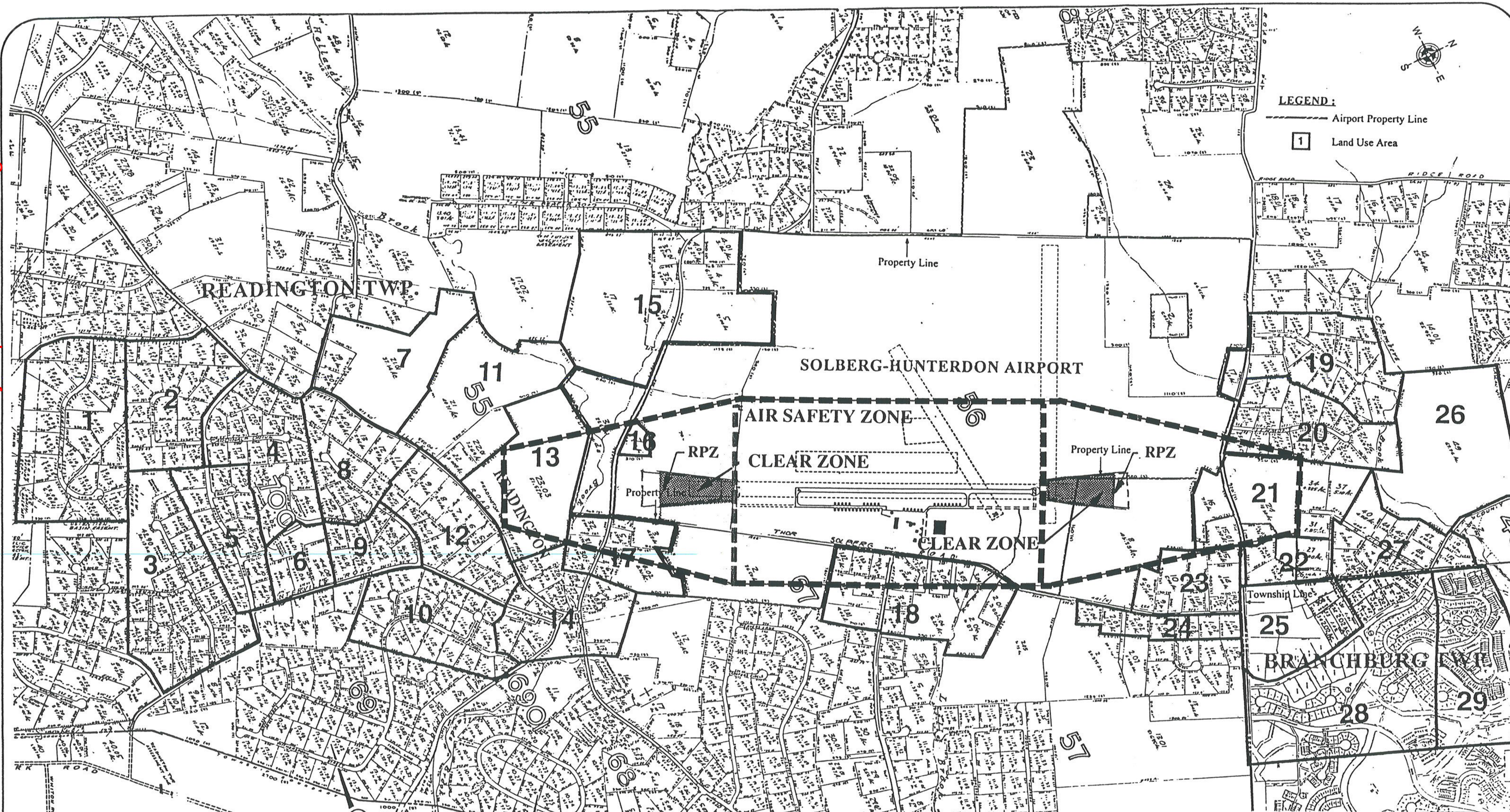
A number of features within the immediate airport environs were considered important to the alternatives evaluation from the perspective of aircraft sound exposure and the influence on land use. Through the use of the latest available tax maps for the Townships of Readington and Branchburg, various residential areas were identified in proximity to the airport. These include the homes and residential parcels off both ends of the primary runway to the north of the airport in Readington and Branchburg Townships and to the south of the airport in Readington. Other areas considered were the residential areas adjacent to the airport along Thor Solberg Road and the recreational baseball and soccer fields south of the airport. These off-airport features are presented in Figure 5-2 and discussed below:

1. Land Use Controls

The Runway Protection Zone is an area associated with each runway end within which the Federal Aviation Administration provides recommended land use parameters. The Air Safety Zone is a regulation established by the State of New Jersey for the purpose of land use and zoning control in areas adjacent to the airport.

- Runway Protection Zone

The Runway Protection Zone (RPZ) defines a trapezoidal portion of the runway approach surface which extends beyond a runway end for varying distances depending on runway classification and the instrument approach procedure in place. It is recommended that special consideration be given to the type of proposed land use, within the RPZ as it relates to compatibility with aircraft operations. For this reason the location of proposed RPZ's relative to the airport property were considered during the development of alternatives. Land uses which might create glare and misleading lights or lead to the construction of new residences, fuel handling and storage facilities, smoke generating activities and places of public assembly such as churches, schools, office buildings, shopping centers, etc. should be discouraged.



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 5-2

OFF AIRPORT FEATURES

The development alternatives established RPZ dimensions for the primary runway as follows:

Table 5-1
Primary Runway
Required Runway Protection Zone Dimensions

RUNWAY	INNER WIDTH	OUTER WIDTH	LENGTH	APPROACH SLOPE
Runway 4	1,000'	1,750'	2,500'	50:1
Runway 22	500'	700'	1,000'	34:1

- Airport Safety Zone

The State of New Jersey created the Airport Safety Zone (ASZ) to establish the minimum standards for the control of airport and aeronautical hazards to people on the ground in the vicinity of airports.

Each ASZ consists of a Runway Subzone, two Runway End Zones, and two Clear Zones. The overall ASZ for an airport is geometrically constructed by defining and locating the Runway Subzone and Runway End Subzones for each public-use runway. The dimensions of each subzone are found in Table 5-2 and illustrated relative to the existing Solberg-Hunterdon Airport primary runway in Figure 5-2. The following land uses are permitted within the Runway and Runway End Subzones: residential single-family dwellings situated on at least three acres, airpark (minimum of three acres), open space, agricultural, transportation, airport, commercial and industrial. The only land uses permitted in the Clear Zone are residential zoning (as long as the dwellings are physically located outside the Clear Zone), open space agricultural, transportation and airport.

A consideration in the development of primary runway alternatives was the impact on residential dwellings and the permitted land uses created by a relocation of the ASZ, and particularly the Clear Zone.

Table 5-2
Airport Safety Zone Dimensions (in Feet)

Subzone	Inner Width	Outer Width	Length
Runway Subzone	2,350	2,350	Runway Length
Runway End Subzones	2,350	850	3,000
Clear Zones	250	450	1,000

2. Aircraft Sound Exposure

The impact of aircraft and the associated *sound levels* on the surrounding communities was a primary consideration in the alternatives evaluation. A detailed explanation of sound and noise analysis will be included in Chapter 6 as part of the environmental review. This chapter presents the results of a noise analysis completed in order to evaluate the potential impacts associated with the primary runway development alternatives.

Aircraft sound exposure contour lines were generated for each of the primary runway alternatives using the FAA's *Integrated Noise Model (INM)*, a computer program that uses existing and forecast operational data to simulate actual sound measurements. The INM is also capable of grid point analysis, i.e., estimating the Ldn level at any defined point within a contour. For the purpose of comparatively evaluating alternatives and the potential for adverse sound exposure on the surrounding communities, both the sound exposure contour and grid point analysis method were utilized.

It should be noted that there are other off-airport considerations which will require review such as roadway traffic and other land uses (schools, churches, etc.). However, these factors are consistent with each alternative and do not influence the runway analysis. These factors will be evaluated in the Environmental Review chapter.

Section 5-2: Airside Development

5.2.1 Runway Requirements Review

Runway length calculations were reviewed in Chapter 4 using specific performance data of several of the most prevalent aircraft types that are currently using, or would be expected to use Solberg-Hunterdon Airport. These calculations determined that the critical runway length required for these aircraft is 5,600 feet, and design criteria for long term planning should be established in accordance with Airport Reference Code B-II and the allowance for precision instrumentation. Thus, the primary runway alternatives have been developed and evaluated based on these requirements.

5.2.2 Vertical and Lateral Clearances

Any planned runway improvements will have to consider the placement and restrictions associated with both the vertical and lateral clearance criteria. The lateral clearances and set-backs from the runway, set forth by FAA Airport Design criteria, have been established for each alternative based on Airport Reference Code B-II. The roadway set back criteria of 75 feet as established by Readington Township zoning regulations has been used, as well as the vertical clearances necessary to meet the requirements designated in Federal Aviation Administration Regulation Part 77.

5.2.3 Primary Runway Alternatives

Three alternative concepts were developed for the primary runway, including a Base Case or No Action alternative and two alternative concepts which provide the required 5,600' x 100' paved runway. The alternatives are described below and illustrated in Figures 5-3, 5-4 and 5-5 respectively.

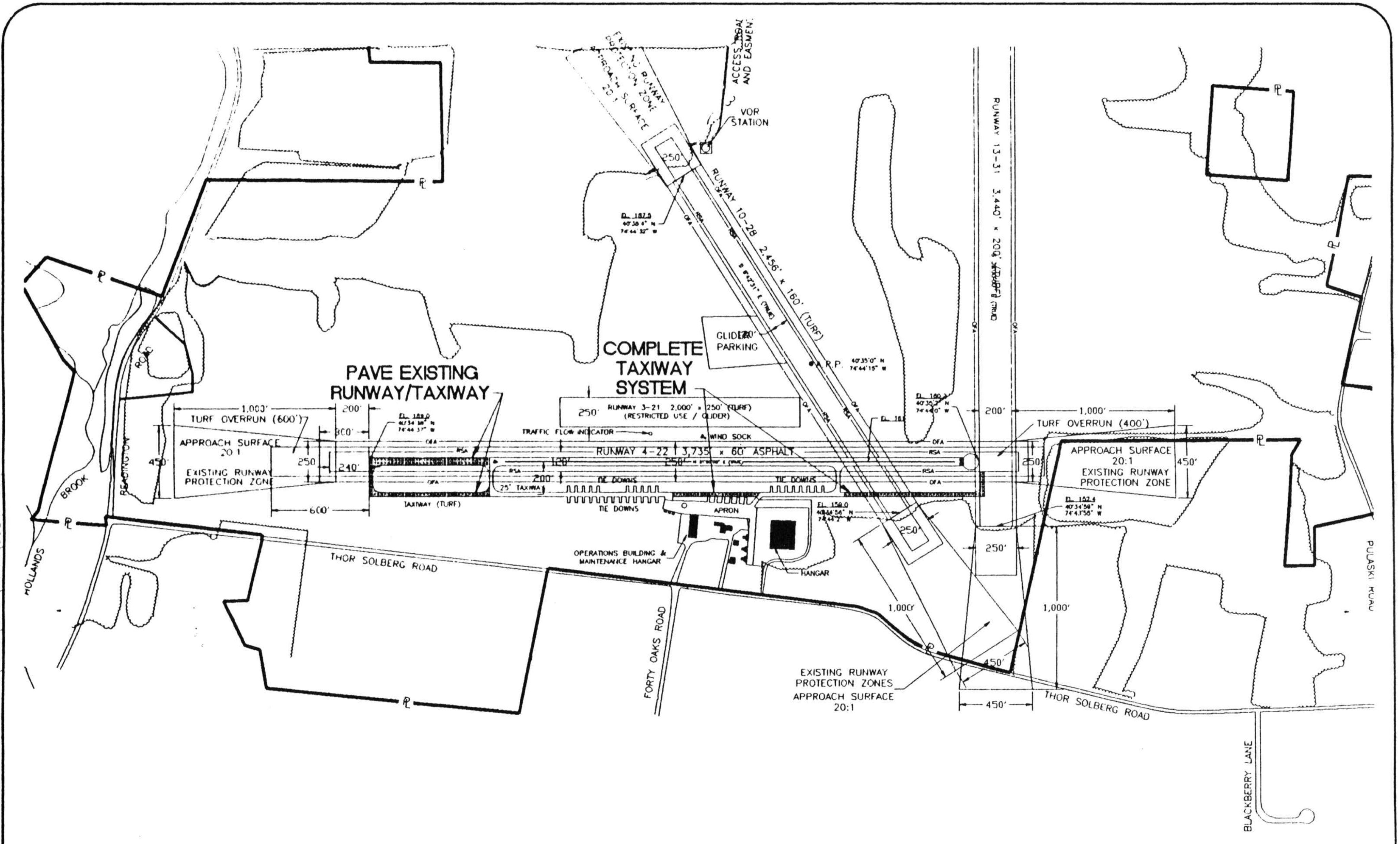
- Alternative 1: Complete Existing Runway 4-22
- Alternative 2: Improve and Extend Existing Runway 4-22
- Alternative 3: Improve and Extend Existing Runway 3-21

Alternative 1, as depicted in Figure 5-3, is effectively a "Do-Nothing" or "No-Action" alternative which involves minimal development to complete the existing runway/taxiway system. These minor enhancements would include the paving of the existing 735 feet of turf runway, the extension and completion of the current parallel taxiway, and widening the existing paved runway to 60 feet. This alternative will also require property acquisition for the Runway 22 RPZ and Clear Zone.

The runway safety area (RSA) and obstacle free area (OFA) would remain unchanged. It is understood that this alternative will not meet the objectives established for the primary runway, but is included as a baseline from which to comparatively measure the effect of changes imposed by the two development alternatives.

Alternative 2, as shown in Figure 5-4, involves improvements to the existing runway as required to meet the primary runway objectives. This would include widening the existing paved runway to 100 feet, extending the existing runway to the northeast and to the southwest to a the required 5,600 feet. Furthermore, substantial taxiway development will be required potentially on both sides of the runway. This concept will require the acquisition of property to accommodate the extensions and the associated OFA and RPZ's for each runway end.

Alternative 3, as shown in Figure 5-5, involves the paving and extension of the current glider Runway 3-21 which is west of and parallel to existing Runway 4-22. The proposed runway will be 5,600' x 100', and will involve a 2,600 foot extension of the existing Runway 4-22 and convert it for use as a full length parallel taxiway to serve Runway 3-21. A portion of land will have to be acquired to accommodate taxiway development, the OFA's for each runway end, and the New Jersey Clear Zones.



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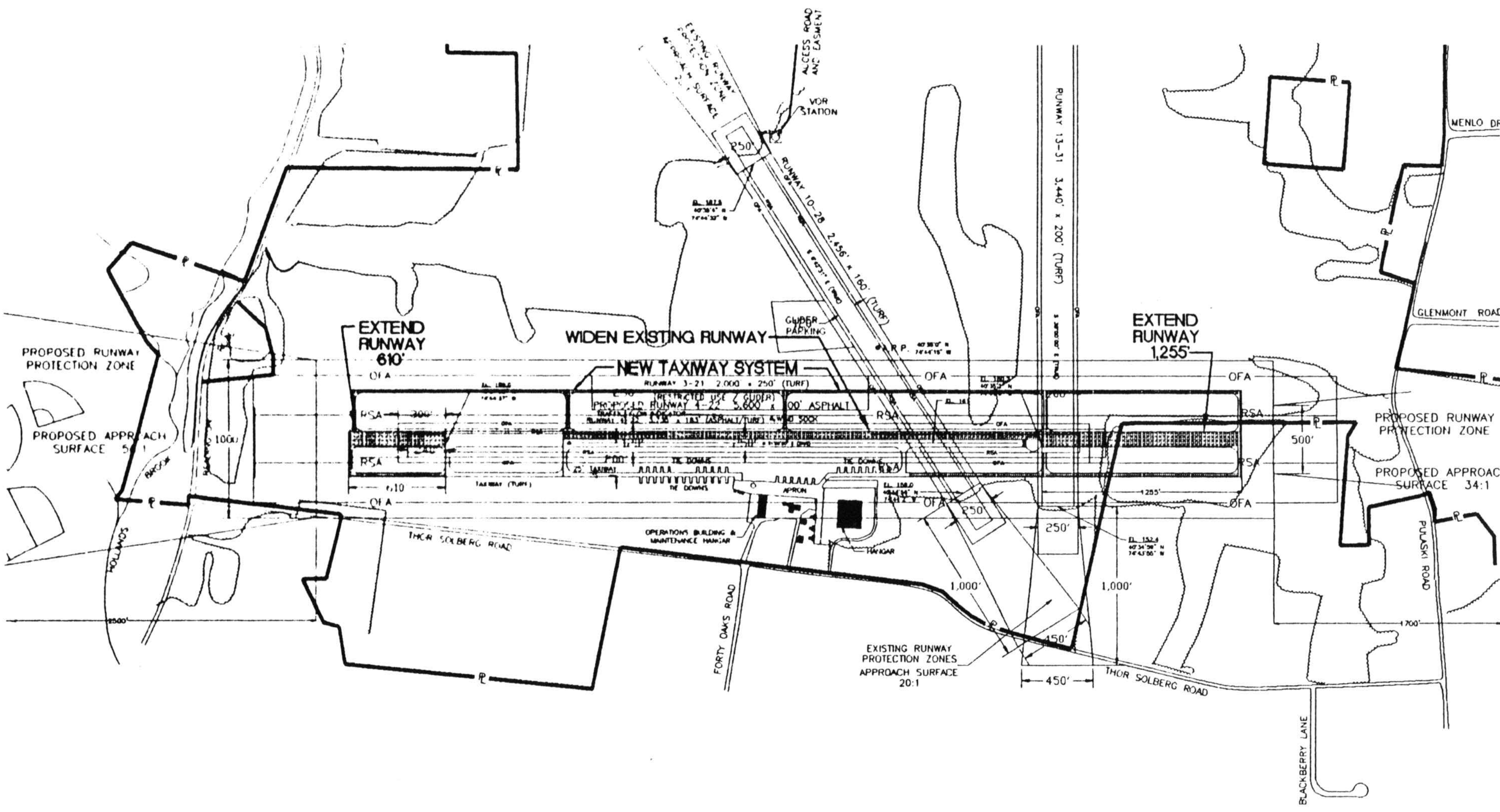
SOLBERG-HUNTERDON AIRPORT
MASTER PLAN

Figure 5-3
RUNWAY ALTERNATIVE 1
COMPLETE EXISTING RUNWAY 4-22



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 5-4

RUNWAY ALTERNATIVE 2 IMPROVE AND EXTEND RUNWAY 4-22

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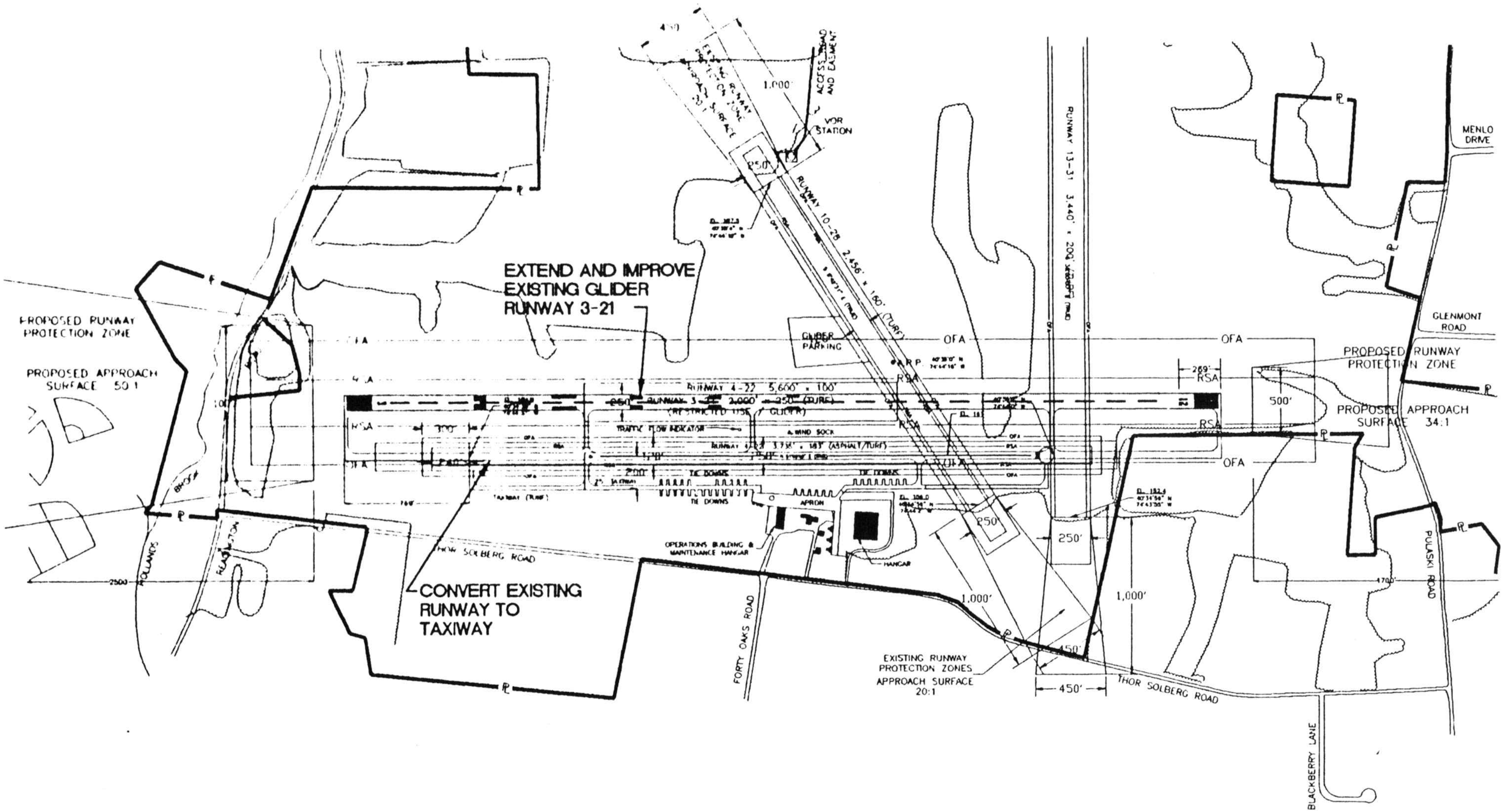


SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 5-5

RUNWAY ALTERNATIVE 3 IMPROVE AND EXTEND RUNWAY 3-21

5.2.4 Runway Alternatives Evaluation

A. Evaluation Criteria

The following list of criteria were used for comparative analysis of the primary runway alternatives:

- Aeronautical and Operational Utility

The ability of the airport to accommodate the forecast activity level and aircraft mix is the primary objective under this criteria. Areas reviewed included the ability to meet the requirements of runway length and the taxiway system, precision instrumentation, the Runway Safety Area and Obstacle Free Area, and compatibility with required landside development. Also considered was the ability to maintain and maximize the use of existing facilities including buildings, paved areas and support facilities.

- Topography and Drainage

The differing terrain over the airport property presents the need to evaluate each alternative with respect to stormwater drainage and the quantity of earthwork that may be required for construction. A general evaluation of cut and fill required for each alternative has been conducted in order to assess the magnitude of such earthwork and associated cost implications.

- Wetlands

According to the Freshwater Wetlands Maps of Flemington and Raritan prepared by the New Jersey Department of Environmental Protection and Energy (NJDEPE), and general field review, it has been determined that there are potentially three wetland areas that may be encountered in some respect by each of the alternatives. The potential for impact to these wetlands was considered under this criteria.

- Property Acquisition

A preliminary review of additional property which may be required to accommodate each alternative has been conducted. Issues considered under this criteria in comparing each alternative include the amount of property required, the need for the property (whether it be for physical runway placement as opposed to a clearance requirement or land use protection), and whether fee simple acquisition or easement is required.

- Aircraft Sound Exposure

The INM computer program was used to generate sound exposure contours and a sound level grid point analysis. A comparative analysis of each of the primary runway alternatives was conducted to assess the potential for sound exposure to the surrounding community, as well as determine any increase or decrease in sound levels which may be attributed to each alternative.

- Land Use

Off-airport land use was analyzed for each alternative relative to the various criteria which are established by runway location. Regulations dictate that the Runway Safety Area (RSA) and Obstacle Free Area (OFA) associated with the runway be contained on airport property. The land uses off airport property that fall within the Runway Protection Zone as defined by FAA criteria, and the Airport Safety Zone (ASZ) as defined by the State of New Jersey have been reviewed to assess the change in off-airport location and residential areas affected by each alternative.

- Compatibility with the Readington Township Master Plan

Each alternative was reviewed in its relation to the 9 stated goals of the Readington Township Master Plan (1990). These goals are as follows: 1) Agricultural Preservation; 2) Environmental Protection; 3) Residential Development; 4) Economic Development; 5) Circulation; 6) Community Facilities and Recreation; 7) Utilities; 8) Historic Preservation; and 9) Recycling.

Many of the stated goals of the Readington Township Master Plan will be quantified by one of the other criteria or have no relevance to the airport projects being proposed. Each alternative will be analyzed in those categories stated above for comparison with the Readington Township Master Plan.

- Capital Costs

The alternatives were evaluated based on capital cost estimates and the relation to benefits derived from these costs.

B. Alternatives Evaluation By Criteria

Each of the primary runway alternatives were comparatively evaluated on the basis of the on-airport criteria discussed below and illustrated in Figures 5-6, 5-7 and 5-8.

- Aeronautical and Operational Utility

Alternative 1-Baseline or No-Action, obviously does not meet the existing or future aeronautical and operational requirements of the airport. The runway length of 3,735 feet would remain inadequate and the runway would not meet the standards for a precision instrument approach. Overall, the more restrictive lateral clearance and separation standards for an ARC B-II facility could not be accommodated without seriously hindering the use of existing facilities and the development potential of the existing landside and building area.

Alternative 2-Improve and Extend Runway 4-22, provides for the required runway length of 5,600 feet. However, the vertical and lateral separation criteria associated with ARC B-II and precision instrumentation create difficulty in a number of areas. Firstly, the minimum required runway to taxiway separation of 300 feet cannot be met without relocating the taxiway closer to the building area, where there is insufficient area to place a full length taxiway, given the current buildings and aircraft parking areas. Secondly, the runway and roadway set-backs, which would be imposed on the building area under this alternative, would not only place the current facilities in violation of the standards, but would leave essentially no property for the development or improvement of the landside facilities. In summary, from an aeronautical and operational perspective, Alternative 2 would require the development of new landside facilities on the west side of the runway, a new entrance and access road, most likely off of Readington Road, and a new taxiway system would be required to properly serve the relocated landside area. The impact of these restrictions is depicted in Figure 5-7. These actions would also create other potential impacts which are discussed under the appropriate criteria.

Alternative 3-Improve and Extend Runway 3-21 would meet all of the aeronautical and operational utility requirements and separation standards associated with the runway and taxiway system. The need for additional taxiway development would be limited to just that necessary to serve the full length of the runway that is not presently available. Furthermore, the shifting of the runway centerline by 350 feet to the west will relieve the existing landside area of the vertical and lateral clearance restrictions to the point where the landside facilities could remain in use in the present location and develop to the extent necessary to meet current and future demand.

- Topography and Drainage Features

Alternative 1 uses the current runway location and would require very little in the way of earthwork or drainage modifications.

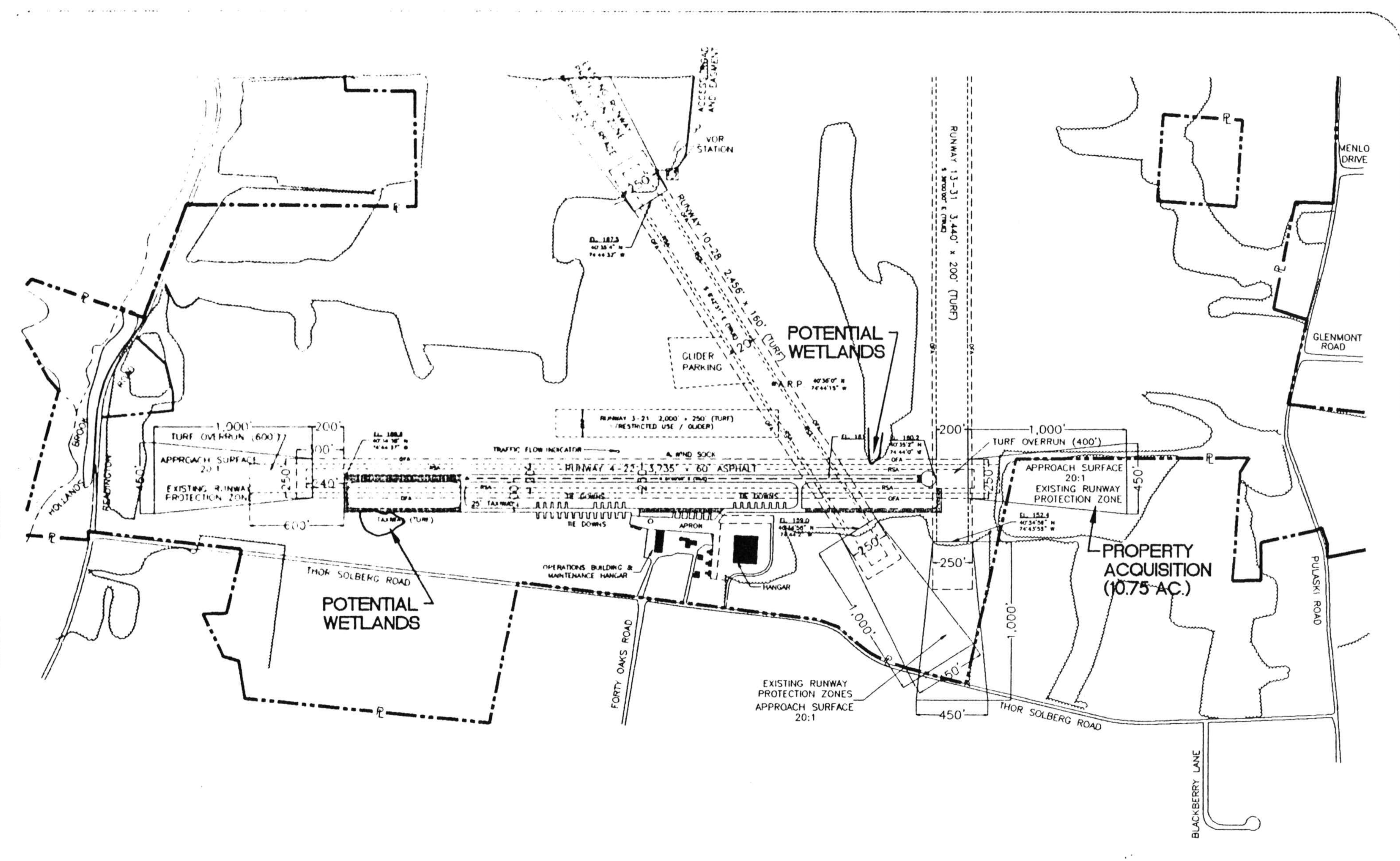
Grading and fill is required to accommodate **Alternative 2** along each runway extension. The amount of earthwork associated with this alternative is the greatest of the three with more fill required over the amount of cut or grading. Thus, there is an imbalanced earthwork ratio with this alternative, and a fill borrow source may have to be identified. Substantial grading and fill will be required for the development of **Alternative 3**. However, the earthwork cut-to-fill ratio is essentially equal, and thus a balanced earthwork project is foreseen under this alternative, with little if any borrow being required.

- Wetlands

Each alternative encounters one or more of three specific areas of potential wetlands. **Alternative 1** could have very minimal impact associated with the extension of the parallel taxiway to the south. The airside development impacts to potentials wetland areas is essentially the same with respect to **Alternative 2** and **Alternative 3**. Although the potential for wetlands impacts is essentially the same between the two primary runway development alternatives, the additional development which would be required under this alternative including a new taxiway on the west side, relocated landside/building area and new access via Readington Road, would in all likelihood encounter substantially more wetlands than the other alternatives.

- Property Acquisition

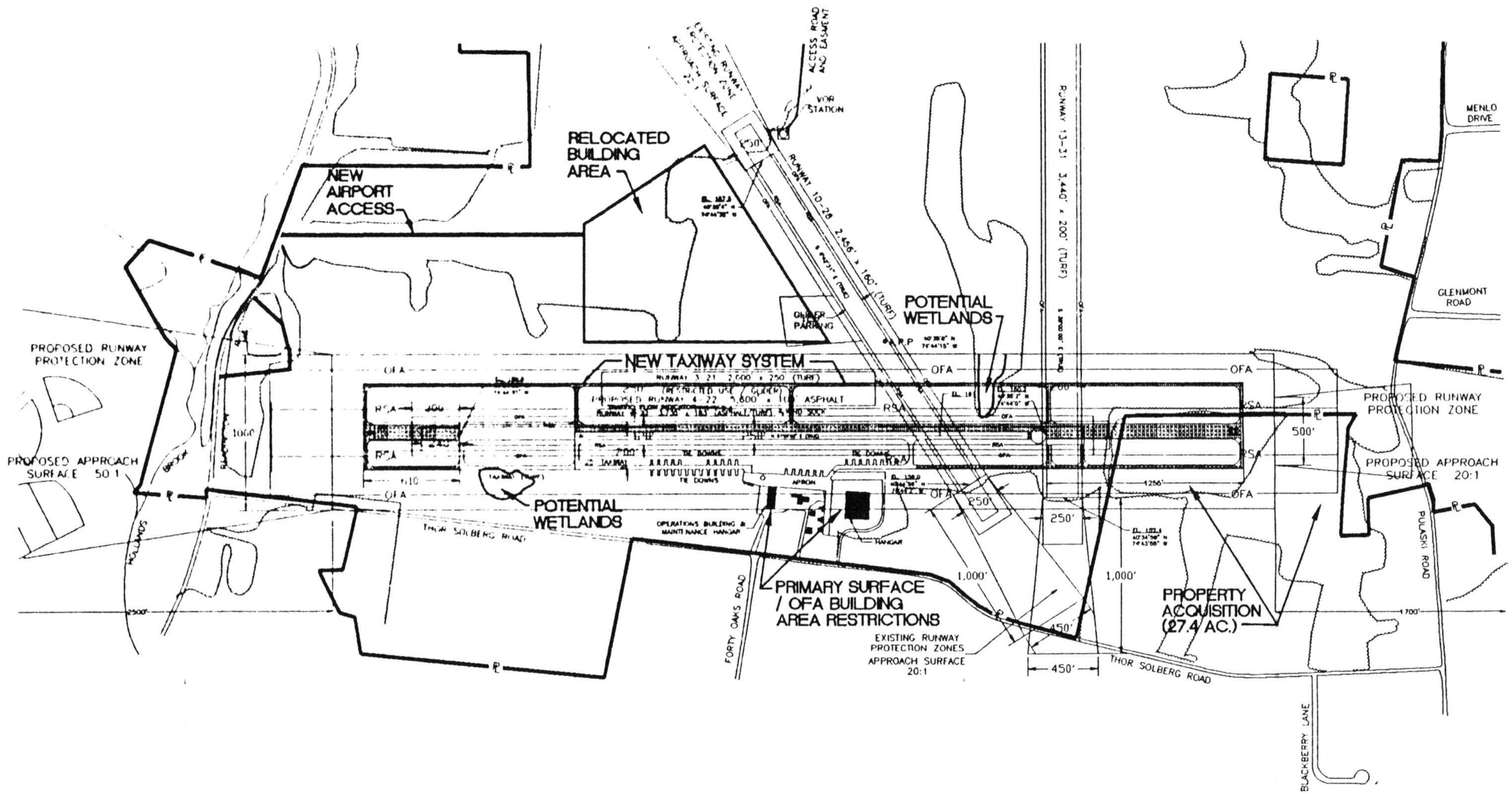
Alternatives 2 and 3 require some property acquisition to physically accommodate the runway improvements. Alternative 2 will require acquisition of 27.4 acres from a private parcel located off the north end of the runway, and Alternative 3 will require acquisition of 13.3 acres from the same north parcel. Additionally, a three acre parcel off the proposed south runway end may have to be acquired for the OFA and RSA. Alternative 1 would involve the acquisition of 10.75 acres of RPZ off the existing north runway end.



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

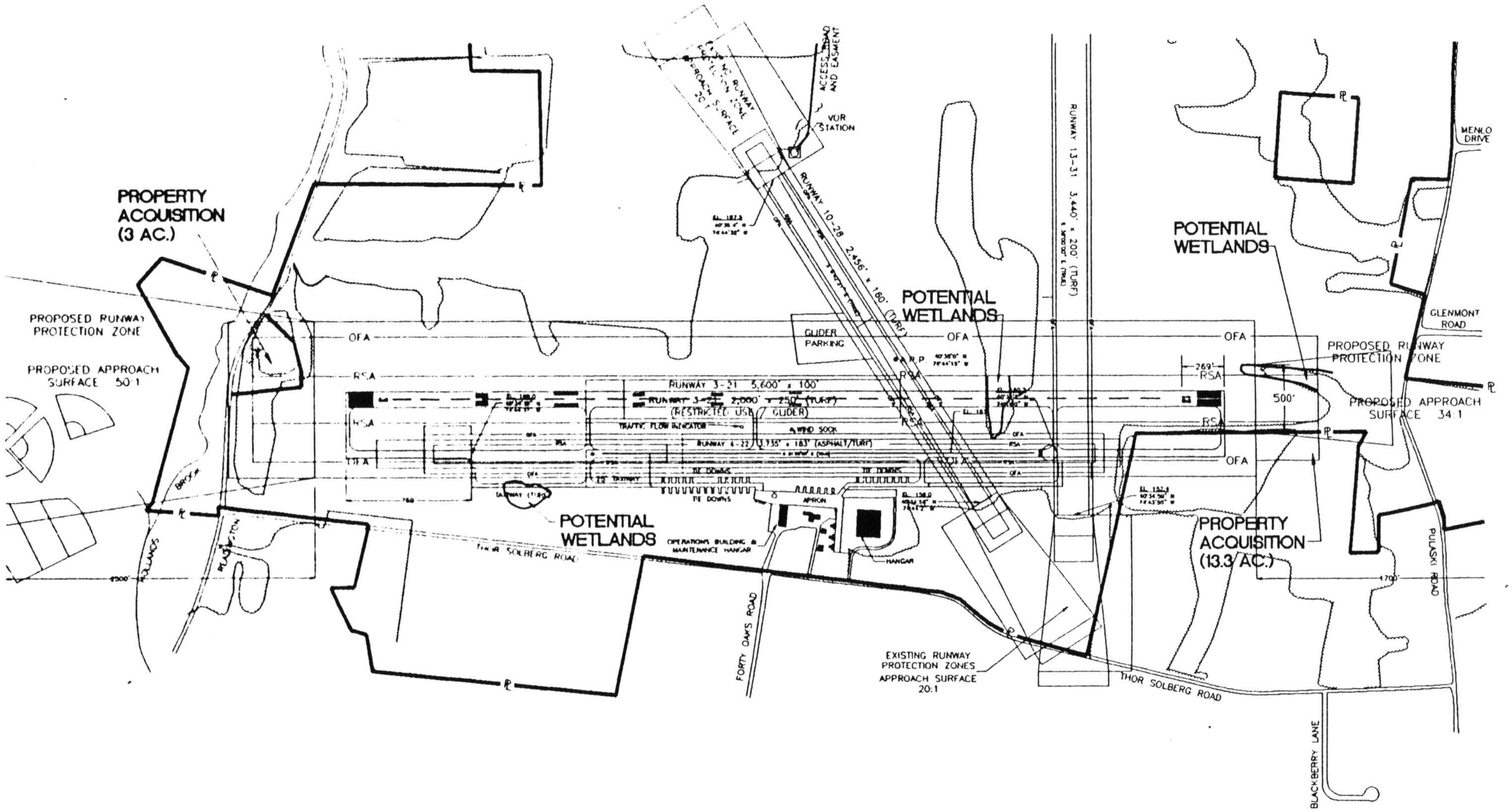
Figure 5-6

RUNWAY ALTERNATIVE 1 ON AIRPORT EVALUATION



SOLBERG-HUNTERDON AIRPORT
MASTER PLAN

Figure 5–7
RUNWAY ALTERNATIVE 2 ON AIRPORT EVALUATION



SOLBERG-HUNTERDON AIRPORT
MASTER PLAN

Figure 5-8
RUNWAY ALTERNATIVE 3 ON AIRPORT EVALUATION

The alternatives were also comparatively evaluated based on the following off-airport criteria.

- Land Use

The off-airport land uses were reviewed with respect to the change in location of Runway Protection Zones and the Air Safety Zone associated with each alternative. The off-airport areas affected under each alternative are presented Table 5-3:

Both development options, Alternatives 2 and 3, increase the off-airport area contained within the Runway 4-22 Air Safety Zone. However, Alternative 3, which develops Runway 3-21, only encompasses an additional 8 residential dwellings while the Alternative 2 ASZ overlies an additional 20 dwellings and more than double the residential land use. It should be noted that the numbers presented above are based only on the primary runway ASZ. It is anticipated that the development of Alternatives 2 or 3 will provide additional runway utility, through increased length and width, that will allow for the closure of Runway 10-28. This would remove 14 homes from the current Runway 10-28 ASZ and, thus; Alternatives 2 or 3 would result in an overall reduction in the number of dwellings located in the full ASZ.

Table 5-3
Airport Safety Zone

Scenario	Residential Dwellings Affected		Residential Land Use Affected (Acres)		Other Land Uses Affected (Acres)	
	Air Safety Zone	Clear Zone	Air Safety Zone	Clear Zone	Air Safety Zone	Clear Zone
Existing Airfield (1995)	20	0	41.3	5.0	29.1	0
Alternative 1	20	0	41.3	5.0	29.1	0
Alternative 2	40	1	90.3	4.1	40.1	0
Alternative 3	28	0	58.3	0.9	38.6	0

Note Dwelling counts based on aerial photography and are subject to field verification.

The most restrictive of the ASZ subzones, the clear zone, only affects one dwelling unit under Alternative 2, and only a minimal area of off-airport property under any alternative. Furthermore, these areas affected by the clear zone are required for acquisition in any event, under other criteria.

The Runway Protection Zones also shift with each alternative and overlie off-airport land uses as follows in Table 5-4. Figures 5-9 through 5-11 depict the above airport zones as part of the off-airport evaluation for each alternative.

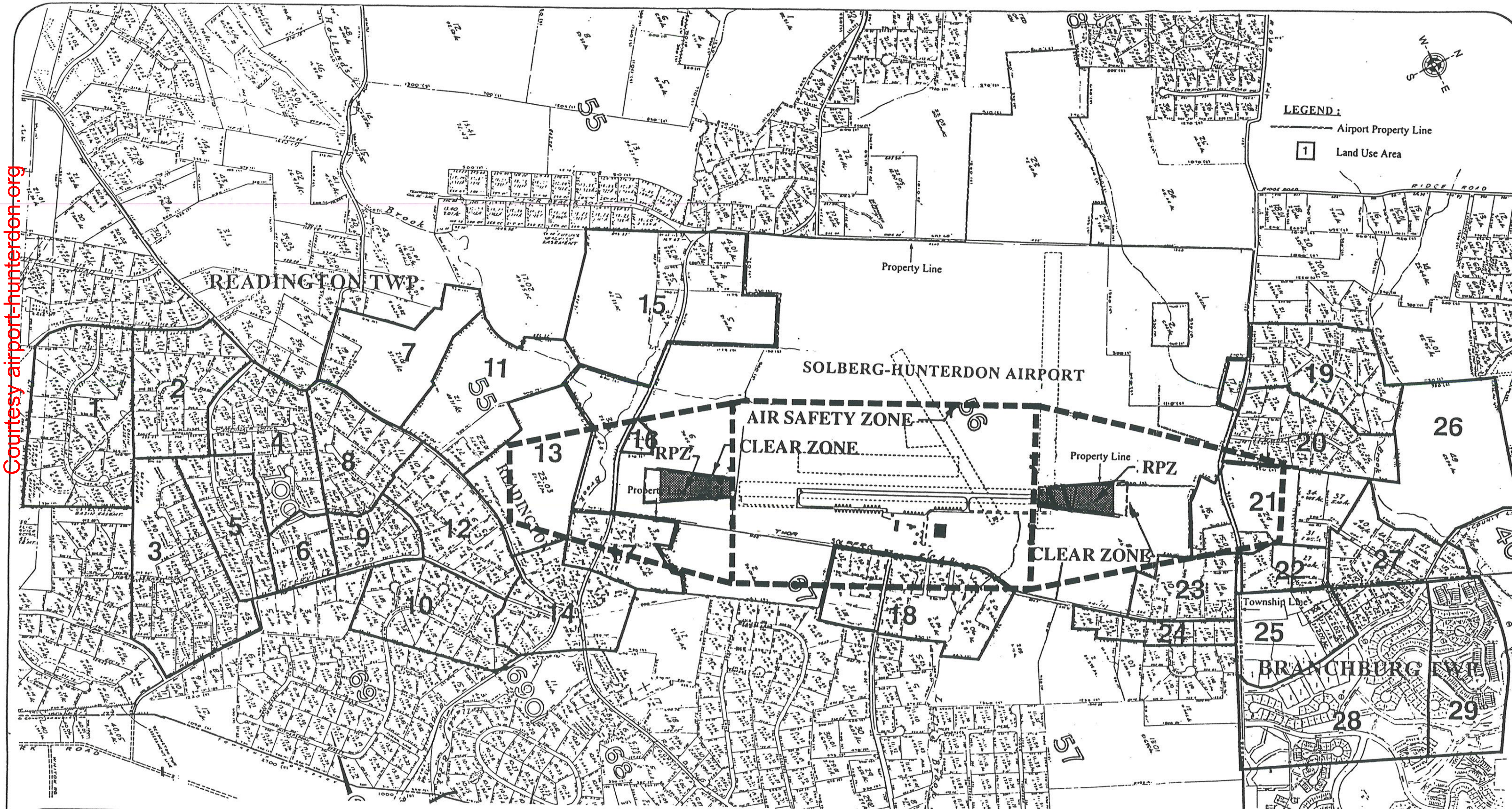
Table 5-4
Runway Protection Zones

Scenario	Residential Parcels Affected	Residential Land Use Affected (Acres)	Other Land Uses Affected (Acres)
Existing Airfield (1995)	0	0	0
Alternative 1	0	0	0
Alternative 2	14	24.8	43.2
Alternative 3	11	22.5	41.5

- Aircraft Sound Exposure

Through the use of the INM, sound exposure contours were developed to determine if incompatible sound levels of 65 Ldn or greater, would be generated in the surrounding communities. The analysis concluded that by 2005 (the year 2005 was selected assuming it to be an appropriate point in time for the fully developed alternative to be in place) aircraft sound levels of 65 Ldn or greater will be entirely contained within airport property under any of the development alternatives. Despite this positive finding, and to further evaluate sound exposure, a grid point analysis was used to comparatively differentiate the effect of each alternative from the standpoint of sound exposure.

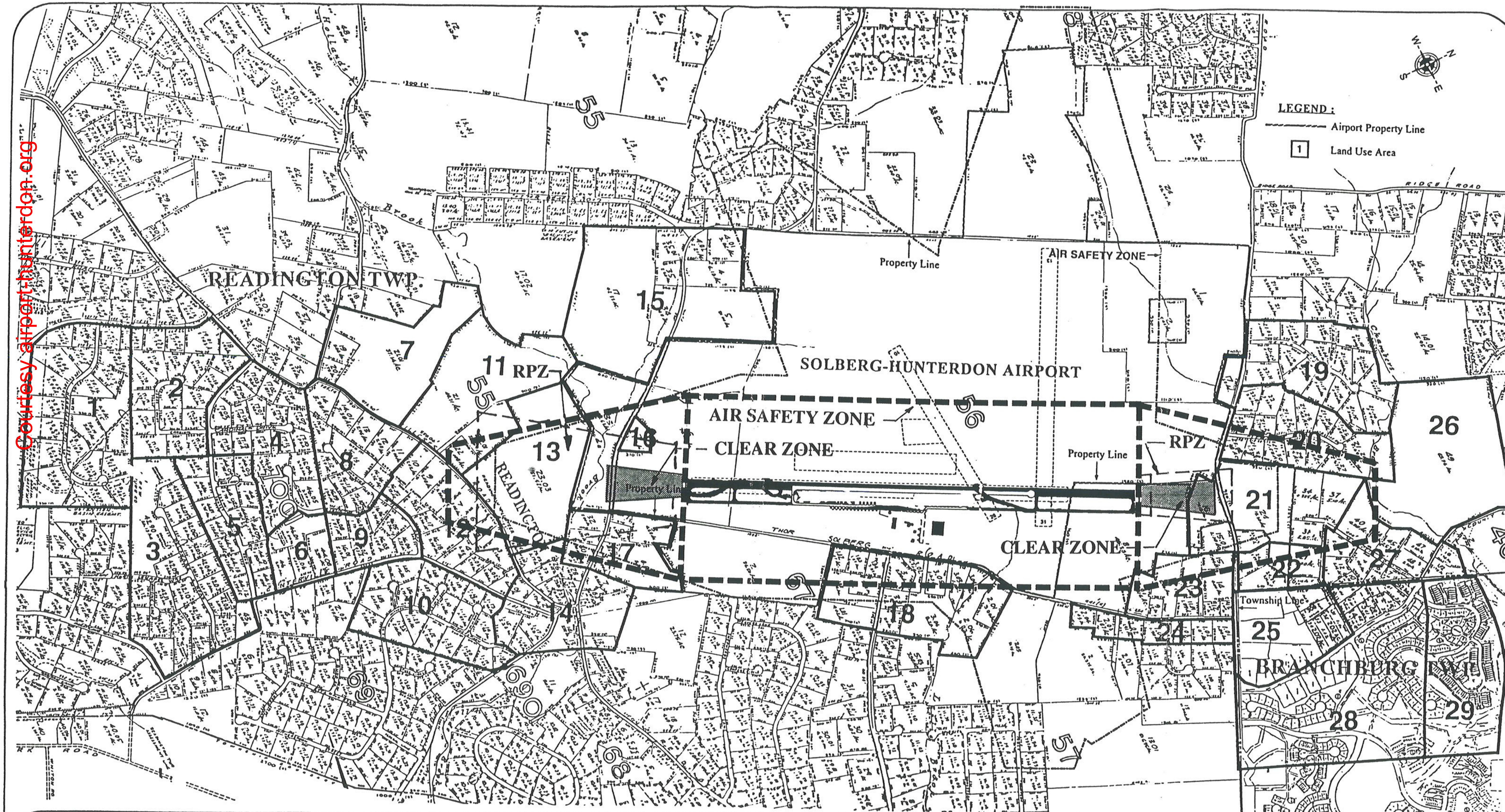
The surrounding environs and a number of areas subject to sound from aircraft overflights were identified and sorted into individual land use areas. The INM was then programmed to simulate individual Ldn levels for each of the areas, by alternative, for both 1995 activity levels as well as the projected 2005 activity. In order to quantify the result, the Ldn readings for each alternative were compared to the 1995 existing sound levels. The net change in Ldn, above or below the existing levels, were then multiplied by the number of dwellings and total acreage in each land use area. This results in a weighted factor which corresponds the Ldn level in each area to the residential density and size of the area. As presented in the Tables 5-5 and 5-6, the results are then averaged to determine the net increase or decrease in the average daily sound level (Ldn) over the area for each alternative, as compared to the existing situation.



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 5-9

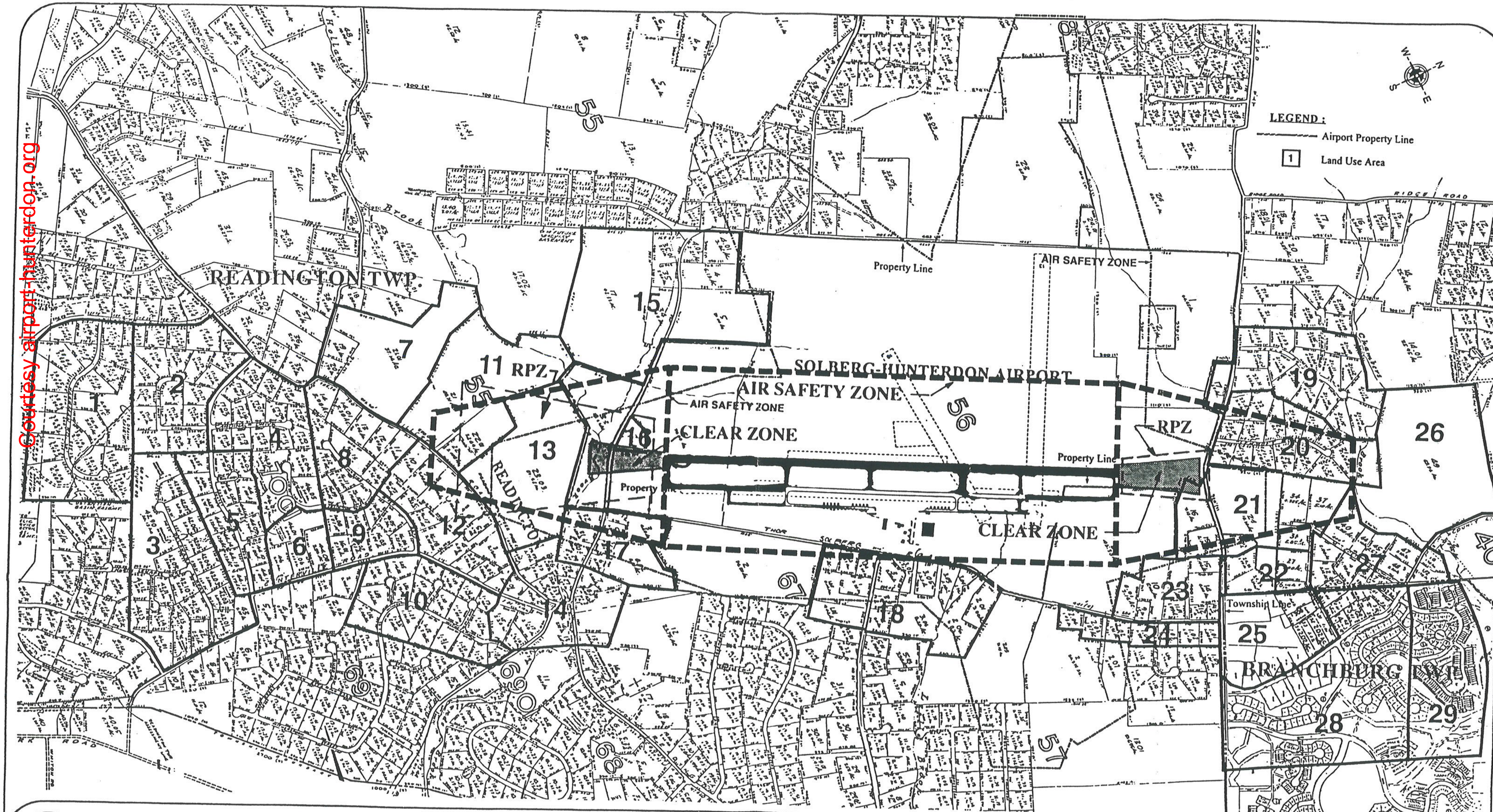
RUNWAY ALTERNATIVE 1
OFF AIRPORT EVALUATION



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 5-10

RUNWAY ALTERNATIVE 2 OFF AIRPORT EVALUATION



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 5-11

RUNWAY ALTERNATIVE 3 OFF AIRPORT EVALUATION

The analysis demonstrates two things; firstly, that the surrounding environs experience current and future 24-hour average sound levels ranging from 41 to 59 Ldn. Secondly, the analysis did provide a comparison of the alternatives to assist in identifying the alternative that would have the least impact on the community, or offer the most benefit, or reduction in sound exposure. Alternatives 1, 2 and 3 were both compared to the 1995 Existing Case, under today's conditions and activity levels; in other words, what the difference would be if each of the alternatives were in place today. The alternatives were also compared to the 1995 Existing Case under year 2005 activity to determine what change can be expected given ten years of projected activity growth.

Under the 1995 scenario, Table 5-5, all three alternatives result in either no change or a decrease in the average sound exposure level per dwelling. The greatest decrease, or benefit, is achieved by Alternative 3 with an average sound level reduction of approximately 2 Ldn per dwelling. A review of the year 2005 scenario, Table 5-6, indicates that Alternative 1, the No-Action alternative, would result in a net increase in average sound level of approximately 1 Ldn per dwelling, while Alternatives 2 and 3 would continue to offer a reduction in sound exposure over those levels currently being experienced today. This is due to a number factors, the primary of which is the shifting of the Runway 22 end to a point further north, which allows aircraft departing to the south to begin their take-off further back and achieve greater altitude over the community. By comparison, Alternative 3 would offer the greatest benefit with a reduction in sound level twice that of Alternative 2.

In summary, the sound levels and changes that would be experienced under any of the primary runway alternatives is very nominal, and in truth would be hardly noticeable. Furthermore, despite a projected increase in activity over the next ten years, there will be no substantial change in the average sound exposure levels as perceived in the community; they will still be essentially the same, if not somewhat lower, than they are today.

Table 5-5

Sound Exposure Level (SEL)

Alternatives Grid Point Analysis

Year 1995 Scenario

1995 EXISTING				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
Area No.	Number of Dwellings	Residential Acres	Existing SEL (Ldn)	SEL (Ldn)	Ldn Change	Dwelling Factor	Acreage Factor	SEL (Ldn)	Ldn Change	Dwelling Factor	Acreage Factor	SEL (Ldn)	Ldn Change	Dwelling Factor	Acreage Factor
1	21	99	50.5	50.3	-0.2	-4.2	-19.8	48.4	-2.1	-44.1	-207.9	48.9	-1.6	-33.6	-158.4
2	20	40	49.3	49.1	-0.2	-4.0	-8.0	49.0	-0.3	-6.0	-12.0	50.3	1.0	20.0	40.0
3	20	64	49.7	49.3	-0.4	-8.0	-25.6	48.9	-0.8	-16.0	-51.2	47.5	-2.2	-44.0	-140.8
4	18	41	54.4	53.9	-0.5	-9.0	-20.5	52.7	-1.7	-30.6	-69.7	53.0	-1.4	-25.2	-57.4
5	15	28	53.2	52.6	-0.6	-9.0	-16.8	51.7	-1.5	-22.5	-42.0	50.5	-2.7	-40.5	-75.6
6	4	16	51.8	51.2	-0.6	-2.4	-9.6	50.1	-1.7	-6.8	-27.2	48.4	-3.4	-13.6	-54.4
7	2	4	48.8	48.3	-0.5	-1.0	-2.0	47.2	-1.6	-3.2	-6.4	48.9	0.1	0.2	0.4
8	12	30	55.8	55.5	-0.3	-3.6	-9.0	53.7	-2.1	-25.2	-63.0	54.1	-1.7	-20.4	-51.0
9	8	15	53.9	53.6	-0.3	-2.4	-4.5	52.2	-1.7	-13.6	-25.5	50.4	-3.5	-28.0	-52.5
10	20	40	48.9	49.0	0.1	2.0	4.0	48.7	-0.2	-4.0	-8.0	47.1	-1.8	-36.0	-72.0
11	1	3	54.3	54.1	-0.2	-0.2	-0.6	53.5	-0.8	-0.8	-2.4	54.7	0.4	0.4	1.2
12	15	38	55.6	55.3	-0.3	-4.5	-11.4	54.4	-1.2	-18.0	-45.6	52.9	-2.7	-40.5	-102.6
13	0	0	57.0	56.7	-0.3	0.0	0.0	55.9	-1.1	0.0	0.0	56.5	-0.5	0.0	0.0
14	17	29	48.2	48.6	0.4	6.8	11.6	49.2	1.0	17.0	29.0	47.5	-0.7	-11.9	-20.3
15	6	24	41.9	42.7	0.8	4.8	19.2	43.8	1.9	11.4	45.6	45.3	3.4	20.4	81.6
16	1	3	56.8	56.8	0.0	0.0	0.0	58.7	1.9	1.9	5.7	58.8	2.0	2.0	6.0
17	10	24	56.1	55.9	-0.2	-2.0	-4.8	56.0	-0.1	-1.0	-2.4	54.0	-2.1	-21.0	-50.4
18	16	51	56.8	55.4	-1.4	-22.4	-71.4	53.2	-3.6	-57.6	-183.6	49.9	-6.9	-110.4	-351.9
19	17	41	42.9	43.3	0.4	6.8	16.4	44.4	1.5	25.5	61.5	45.7	2.8	47.6	114.8
20	15	36	48.6	48.6	0.0	0.0	0.0	48.9	0.3	4.5	10.8	50.6	2.0	30.0	72.0
21	2	5	56.1	55.7	-0.4	-0.8	-2.0	56.5	0.4	0.8	2.0	53.5	-2.6	-5.2	-13.0
22	4	11	49.5	49.4	-0.1	-0.4	-1.1	49.4	-0.1	-0.4	-1.1	47.8	-1.7	-6.8	-18.7
23	9	22	47.7	48.3	0.6	5.4	13.2	50.9	3.2	28.8	70.4	49.1	1.4	12.6	30.8
24	7	13	45.5	47.4	1.9	13.3	24.7	50.3	4.8	33.6	62.4	48.1	2.6	18.2	33.8
25	18	28	44.0	44.5	0.5	9.0	14.0	45.7	1.7	30.6	47.6	44.4	0.4	7.2	11.2
26	1	70	50.7	50.0	-0.7	-0.7	-49.0	50.7	0.0	0.0	0.0	50.9	0.2	0.2	14.0
27	11	22	50.3	50.0	-0.3	-3.3	-6.6	48.6	-1.7	-18.7	-37.4	46.7	-3.6	-39.6	-79.2
28	123	84	42.3	42.6	0.3	36.9	25.2	41.9	-0.4	-49.2	-33.6	41.2	-1.1	-135.3	-92.4
29	158	44	47.8	47.7	-0.1	-15.8	-4.4	42.9	-4.9	-774.2	-215.6	42.9	-4.9	-774.2	-215.6
Total	571	925				-9	-139			-938	-700			-1227	-1200
Average Sound Level Change (per Dwelling/Acre)						-0.02	-0.15			-1.64	-0.76			-2.15	-1.30

Notes: Ldn Change is alternative Ldn less existing Ldn.
Dwelling Factor is Change x Number of Residential Dwellings.
Acreage Factor is Change x Number of Residential Acres.
Average Sound Level Change is Acreage or Dwelling Factor divided by the total Acres or Residential Dwellings or Acres respectively.

Table 5-6
Sound Exposure Level (Ldn)
Alternatives Grid Point Analysis
Year 2005 Scenario

1995 EXISTING				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
Area No.	Number of Dwellings	Residential Acres	Existing Ldn	Ldn	Ldn Change	Dwelling Factor	Acreage Factor	Ldn	Ldn Change	Dwelling Factor	Acreage Factor	Ldn	Ldn Change	Dwelling Factor	Acreage Factor
1	21	99	50.5	51.4	0.9	18.9	89.1	49.5	-1.0	-21.0	-99.0	50.0	-0.5	-10.5	-49.5
2	20	40	49.3	50.2	0.9	18.0	36.0	50.1	0.8	16.0	32.0	51.4	2.1	42.0	84.0
3	20	64	49.7	50.4	0.7	14.0	44.8	50.0	0.3	6.0	19.2	48.6	-1.1	-22.0	-70.4
4	18	41	54.4	55.0	0.6	10.8	24.6	53.8	-0.6	-10.8	-24.6	54.0	-0.4	-7.2	-16.4
5	15	28	53.2	53.7	0.5	7.5	14.0	52.8	-0.4	-6.0	-11.2	51.6	-1.6	-24.0	-44.8
6	4	16	51.8	52.3	0.5	2.0	8.0	51.2	-0.6	-2.4	-9.6	49.5	-2.3	-9.2	-36.8
7	2	4	48.8	49.4	0.6	1.2	2.4	48.3	-0.5	-1.0	-2.0	50.0	1.2	2.4	4.8
8	12	30	55.8	56.5	0.7	8.4	21.0	54.8	-1.0	-12.0	-30.0	55.2	-0.6	-7.2	-18.0
9	8	15	53.9	54.7	0.8	6.4	12.0	53.3	-0.6	-4.8	-9.0	51.5	-2.4	-19.2	-36.0
10	20	40	48.9	50.0	1.1	22.0	44.0	49.8	0.9	18.0	36.0	48.2	-0.7	-14.0	-28.0
11	1	3	54.3	55.2	0.9	0.9	2.7	54.6	0.3	0.3	0.9	55.8	1.5	1.5	4.5
12	15	38	55.6	56.4	0.8	12.0	30.4	55.4	-0.2	-3.0	-7.6	54.0	-1.6	-24.0	-60.8
13	0	0	57.0	57.8	0.8	0.0	0.0	57.0	0.0	0.0	0.0	57.5	0.5	0.0	0.0
14	17	29	48.2	49.6	1.4	23.8	40.6	50.2	2.0	34.0	58.0	48.5	0.3	5.1	8.7
15	6	24	41.9	43.6	1.7	10.2	40.8	44.8	2.9	17.4	69.6	46.3	4.4	26.4	105.6
16	1	3	56.8	57.9	1.1	1.1	3.3	59.7	2.9	2.9	8.7	59.8	3.0	3.0	9.0
17	10	24	56.1	57.0	0.9	9.0	21.6	57.1	1.0	10.0	24.0	55.0	-1.1	-11.0	-26.4
18	16	51	56.8	56.4	-0.4	-6.4	-20.4	54.2	-2.6	-41.6	-132.6	50.9	-5.9	-94.4	-300.9
19	17	41	42.9	44.4	1.5	25.5	61.5	45.4	2.5	42.5	102.5	46.7	3.8	64.6	155.8
20	15	36	48.6	49.6	1.0	15.0	36.0	49.9	1.3	19.5	46.8	51.6	3.0	45.0	108.0
21	2	5	56.1	56.8	0.7	1.4	3.5	57.5	1.4	2.8	7.0	54.6	-1.5	-3.0	-7.5
22	4	11	49.5	50.4	0.9	3.6	9.9	50.4	0.9	3.6	9.9	48.9	-0.6	-2.4	-6.6
23	9	22	47.7	49.3	1.6	14.4	35.2	51.9	4.2	37.8	92.4	50.1	2.4	21.6	52.8
24	7	13	45.5	48.4	2.9	20.3	37.7	51.3	5.8	40.6	75.4	49.1	3.6	25.2	46.8
25	18	28	44.0	45.5	1.5	27.0	42.0	46.7	2.7	48.6	75.6	45.4	1.4	25.2	39.2
26	1	70	50.7	51.1	0.4	0.4	28.0	51.8	1.1	1.1	77.0	52.0	1.3	1.3	91.0
27	11	22	50.3	51.1	0.8	8.8	17.6	49.6	-0.7	-7.7	-15.4	47.8	-2.5	-27.5	-55.0
28	123	84	42.3	43.6	1.3	159.9	109.2	42.9	0.6	73.8	50.4	42.2	-0.1	-12.3	-8.4
29	158	44	47.8	48.8	1.0	158.0	44.0	44.0	-3.8	-600.4	-167.2	43.9	-3.9	-616.2	-171.6
Total	571	925				594	840			-336	277			-641	-227
Average Sound Level Change (per Dwelling/Acre)						1.04	0.91			-0.59	0.30			-1.12	-0.25

Notes: Negative (-) number indicates reduction in sound level.
Ldn Change is alternative Ldn less existing Ldn.
Dwelling Factor is Change x Number of Residential Dwellings.
Acreage Factor is Change x Number of Residential Acres.
Average Sound Level Change is Acreage or Dwelling Factor divided by the total Acres or Residential Dwellings respectively.

- Compatibility with the Readington Township Master Plan

The No-Action Alternative, or **Alternative 1**, essentially maintains the airport in its present condition. There would be no significant change in relation to the present airport and the Readington Township Master Plan and that of Alternative 1. It should be noted that the town's goals of economic development and circulation would not be encouraged under this alternative. Although this alternative concept will not maximize the goals presented in the Readington Township Master Plan, this alternative will neither enhance nor diminish the plan's stated goals as they exist today and is thus compatible.

Alternatives 2 and **3** will not affect the town's agricultural preservation or recycling goals.

- Environmental protection will be ensured through the adherence to the environmental assessment process and are quantified within the other evaluation criteria for each alternative. The airport will continue to preserve large portions of undisturbed land from unwanted development.

- Many of the existing properties located within the N.J. Air Safety Zone, do not meet the minimum lot requirement of three acres specified in the N.J. Air Safety and Zoning Act. Because these parcels are preexisting, such "nonconforming" or "conditional" land uses are permitted provided that there are no major changes that would be contrary to the purpose of the act. It is further noted that there is limited land available for development within the existing and proposed N.J. Air Safety Zone. The Readington Township Master Plan does not indicate incompatible development or land use within either the existing or proposed ASZ. Finally, the minimum lot size for future residential development is 3 acres and should therefore be compatible.

- The town's economic development goal is achieved under these alternatives.

- By granting the public access to the airway system and providing local business an access point to a larger business market at reduced transportation costs, these alternatives will improve circulation. No monetary outlay of the community will be required to achieve this benefit.

- The airport is a public facility and is used for educational, recreational, and personal use as well as business. Additionally, no adverse impacts are anticipated with respect to other community centers and the surrounding compatible land uses. Again, the community receives a benefit with no monetary outlay.

- Utility demands will remain essentially unchanged under these alternatives as they are in the No-Action Alternative. Tax revenue is saved by deferring the need for utility (esp. sewer) improvements.

- Adverse impacts to historical preservation areas are not anticipated. Finally, an additional access route to such sites that is not currently available will become an option.

In conclusion, each of the primary runway alternatives are compatible with the Readington Township Master Plan. Alternatives 2 and 3 serve to better achieve the stated goals of the town.

- Capital Costs

Each alternative was compared on the basis of capital cost outlays to determine a cost and benefit relationship between the two alternatives.

Alternative 1: Some development is required, primarily for immediate safety and capacity concerns, under this alternative. It should be noted that the completion of this alternative is also the first airside development phase of the remaining alternatives and therefore, any costs associated with this phase will be equally included in the other two alternatives.

Costs to complete this alternative would be minimal. Cut and fill costs would be non-existent since the pavement areas are already graded. Pavement would be needed to complete the center terminal taxiway bypass, the paving of the 750 foot turf runway end, and the associated 750 foot taxiway extension and entrance taxiway. There are also grubbing and turfing costs associated with all proposed pavement areas. Finally, a portion of land would be acquired to ensure ownership control with the Runway 22 RPZ and Clear Zone.

This alternative will provide instant benefits that more than justify the costs. The safety level for arriving and departing aircraft will be greatly improved. Although it is possible for existing aircraft to takeoff and land on the existing pavement, the proposed pavement surface would provide a needed safety buffer to existing small aircraft. The completion of the terminal taxiway is necessary to improve safety in the terminal area and would allow aircraft to bypass the terminal. The proposed entrance taxiways to each runway end would eliminate the need for aircraft to taxi on the active runway and thus increase safety and operational capacity.

The cost benefit of this alternative is very high. These improvements are considered to be necessary and should be initiated as soon as practical. As described earlier, this is also a prerequisite step in the development of both the remaining alternatives. However, this alternative would not be enough to meet the requirements associated with aircraft of ARC B-II that use the airport and demand additional operational utility. Nor will this alternative provide the services that a reliever facility is expected to provide.

Alternative 2: Additional pavement will be required in this alternative over the previous. In addition to the costs associated with Alternative 1, Runway 4-22 will be widened to 100 feet and extended in both directions to a total length of 5,600 feet. The taxiway would also need to be extended in each direction and entrance taxiways provided for each proposed runway end. Two exit taxiways would also be provided under this alternative. Cut and fill costs would be significant and a fill source might be necessary to meet runway gradient and line-of-sight requirements. Proposed pavement areas would need to be grubbed and turfed.

Airside costs include pavement, cut and fill, grubbing, and turfing. Airside capital expenditures would be comparable to those airside costs associated with Alternative 3. The benefit would be that the additional operational utility would be obtained with the exception of non-standard runway to taxiway distance. The terminal area would be constrained and would ultimately require its relocation to accommodate natural aviation demand. New auto access and parking would need to be constructed as well as terminal buildings, aircraft storage buildings, paved apron and tie-down areas, new fueling facilities, taxiway access, and the completion of a west parallel taxiway to Runway 4-22.

Although airside costs would be comparable to those associated with Alternative 3, terminal development costs would far exceed those of Alternative 3. Finally, the relocated terminal area would incur additional environmental evaluation and mitigation costs. Alternative 2 will result in the highest total capital costs of the three alternatives.

Alternative 3: Airside costs will be comparable to the costs that would be realized in Alternative 2. Paved entrance and exit taxiways would also be provided. All pavement areas would need to be grubbed and turfed. Cut and fill costs would be significantly less than Alternative 2 because the amount of terrain that would require to be cut is approximately the same as would need to be filled.

Airside utility would be achieved and the terminal area would be able to remain in its present location with the capability of meeting long term airside demands through the planning period.

Of the two development alternatives, Alternative 3 requires less capital outlay and meets the utility requirements and planning standards required of a facility of ARC B-II. Therefore, the cost benefit is maximized utilizing this alternative.

5.2.5 Primary Runway Alternatives Conclusion

The results of the foregoing primary runway alternatives evaluation for Solberg-Hunterdon Airport favors Alternative 3-Extend and Improve Runway 3-21.

5.2.6 Crosswind Runway Concept

The determination and evaluation of the secondary runways are independent of the primary runway analysis. The complete airport runway configuration should provide for a minimum of 95% wind coverage. In addition, the secondary runway should accommodate 95% of the aircraft intended to use the airport during the planning period. It is further recommended that the secondary runway be of a paved surface and have taxiway access.

Based on a wind analysis and a review of potential impacts, it was determined that the location of the existing turf Runway 13-31 had the least impact. Therefore, the secondary runway would be a paved improvement of the existing turf Runway 13-31 with the standard full length parallel taxiway. Lightfield and Thor Solberg Road are the primary constraints to Runway 13-31.

The additional utility that would be gained from the recommended primary and secondary runway system would allow for the closure of the existing turf Runway 10-28. Closing Runway 10-28 would release several dwellings that currently exist within this runway's Air Safety Zone. Residential areas to the west of the airport along Lightfield Road, Readington Road and Dalley Street would experience a decrease in both the number of aircraft overflights and a corresponding decrease in the associated sound levels generated by those aircraft. The closure of Runway 10-28 would also release airport property for airside development in areas that are now reserved for the runway. The potential for development is most prominent along the approach end of Runway 28 where based aircraft could be stored.

In summary, the improved runway configuration would provide a primary Runway 3-21 and a secondary paved crosswind Runway 13-31. Both runways should have sufficient taxiway access to facilitate ground maneuvering and safety. It is important to stress that the closure of Runway 10-28 and future airside development on land made available by this runway closure is contingent on the required development of the primary and secondary runway system.

Section 5-3: Conceptual Landside Layout

The analysis of airside development focused on meeting both the immediate needs of the terminal area as well as long term expansion capabilities. Data contained in the demand/capacity section along with the constraints of the airport and proposed development of airside facilities established the parameters within which airside concepts were evaluated.

5.3.1 Review of Landside Requirements

The demand/capacity analysis highlighted deficiencies in the existing terminal area. This section reviews and identifies the new facilities needed to accommodate immediate and forecast demand.

A.) Hangars - There is an immediate demand for 37 T-hangar spaces, which is expected to grow to 71 T-hangar spaces by the end of the planning period. Presently, only 3 T-hangars exist at the airport, all of which are in poor condition. Additional conventional hangars are required for 20 multi-engine aircraft by the end of the planning period.

An expanded terminal area would need sufficient area to provide a combined total of 91 hangar spaces by year 2015.

B.) Tie-down Apron - Airside facility planning should include paved tie-down aprons for both transient and based aircraft. There is a short-term need for 12 transient aircraft tie-down spaces and a long-term need for 20 such spaces. By the end of the planning period, there will be a demand for up to 86 total tie-down spaces (66 based and 20 transient), or approximately 27,000 square yards of apron. This is in addition to the hangar requirements.

C.) FBO/Terminal Building - There is sufficient terminal building/office space to meet the current demand. A total of 6,100 square feet of space will be needed by the end of the planning period. Therefore, at a point future point within the planning period, there may be a need to evaluate FBO/Terminal building requirements to provide adequate indoor space for all airport business related activities. Renovation to existing facilities and/or the development of new building structures may be required.

D.) Auto Parking - There is sufficient auto parking to meet the current demand. A total of 79 spaces will be needed by the end of the planning period.

5.3.2 Immediate Landside Development

The following is a description of the immediate airside development plans that should be initiated as soon as possible and in the order presented below. These are immediate needs because the airport has an expressed demand and is not presently meeting its demand responsibilities. The immediate development plan does not depend on airside development and has a higher priority than the ultimate airside development.

A. Taxiway Improvements- The existing parallel taxiway should be completed in the middle of the existing apron to avoid congestion and to minimize conflicts in the apron area.

B. Terminal Apron Reconstruction- The terminal area pavement is in poor condition and needs to be replaced. Apron reconstruction will provide appropriate grading to allow aircraft to travel to the north hangar and apron area directly from the transient ramp and fueling area. The transient apron would also be improved to accommodate transient aircraft demand.

C. T-hangar and Tie-down Development- The short term development emphasizes T-hangar development where there is a current demand and an obvious shortfall. The proposed plan would extend the existing apron to the southwest between Thor Solberg Road and the existing parallel taxiway. The apron would be of a paved surface and should provide sufficient hangar space and based tie-down positions to accommodate immediate and short-term based aircraft demand.

5.3.3 Ultimate Airside Development

This plan expands upon short-term improvements following the implementation of the recommended primary and secondary runway configurations and assumes the closure of Runway 10-28. Closure of Runway 10-28 would allow needed airside development to continue into the areas presently occupied by that runway and its associated imaginary surfaces and building setback requirements. This plan represents the ultimate development and should be completed in a series of phases over the course of the planning period.

A. Expanded Transient Aircraft Tie-Down- Following the implementation of the recommended primary runway configuration, the transient parking apron will require continued development over that which is accomplished in the short-term development phase to provide sufficient long-term transient aircraft parking positions.

B. T-Hanger Development- To accommodate the forecast demand for T-hangars, a paved area would be created within the area released by the closure of Runway 10-28. This area would accommodate two, 12 unit buildings for a total of 24 T-hangars. Sufficient access routes to taxiways and the fueling apron should also be planned. If future demand warrants, the area could be further expanded upon to provide additional T-hangars or tie-down locations.

C. Expansion of Tie-Down Area- Upon the completion of improved Runway 3-21, the Southside tie-down area, completed to accommodate immediate storage demand, would be expanded to include the existing parallel taxiway. The improvement would provide additional tie-down locations to serve the airport's long-term storage needs. These long-term capacity enhancements would likely be completed in a similar manner and at approximately the same time as the long-term transient apron improvements.

D. Conventional Hangar Development- Current forecasts indicate a future need for additional conventional hangars. Eight conventional hangars will be located in the areas on both sides of the existing North Hangar. The area would be paved and given appropriate access to the airside. Additionally, access would be provided to all sides of the existing north Hangar and would allow for the full utility and ease of aircraft storage in that facility. Depending on future conditions, this area could be expanded for the development of additional conventional hangars.

Table 5-7 compares the forecast demand with current and improved capacities.

Table 5-7
Airside Improvement Comparison

	Capacity		Demand				
	Current	Improved	1995	2000	2005	2010	2015
T-hangars	3	72	37	54	58	64	71
Conventional Hangar, Aircraft Hangar Positions	12	20	19	10	14	17	20
Total Tie-Down Positions (Paved)	55	86	56	62	69	76	86
Auto Parking	-	120	43	52	61	70	79
Total Aircraft Positions	70	178	112	126	141	157	177

CHAPTER 6: ENVIRONMENTAL REVIEW

TABLES

FIGURES

Section 6-1: Introduction

This environmental review is intended to provide the Solberg Aviation Company with an understanding of the potential environmental impacts related to the proposed development plan at the Solberg-Hunterdon Airport. The purpose of this inventory is to identify areas which could potentially be impacted by the proposed development, outline the measures to minimize impacts, and identify any permits and approvals necessary to implement the proposed development plan.

The following are environmental categories which were investigated:

- Noise Exposure and Compatible Land Use
- Social Impacts
- Induced Socio-economic Impacts
- Air Quality
- Water Resources
- Department of Transportation Act, Section 4(f)
- Historic, Architectural, Archaeological and Cultural Resources
- Endangered and Threatened Species of Flora and Fauna
- Wetlands
- Floodplains
- Coastal Zone Management Program/ Coastal Barriers
- Prime and Unique Farmlands
- Wild and Scenic Rivers
- Energy Supply and Natural Resources
- Light Emissions
- Solid Waste Impacts
- Construction Impacts

This chapter does not constitute an Environmental Assessment Report (EAR). However, the information presented herein is similarly prepared to facilitate the preparation of such a report, if necessary. Guidelines for preparing an Environmental Assessment Report are provided in FAA Order 5050.4A, Airport Environmental Handbook.

Section 6-2: Specific Impact Categories

6.2.1 Noise Exposure and Compatible Land Use

Compatibility of land use in the vicinity of an airport is greatly associated with aircraft sound levels. The FAA, in Federal Aviation Regulations Part 150, has published Guidelines for land use compatibility with airport sound levels. Of importance to this analysis is the 65 DNL (average day/night decibel level) noise contour, which establishes the threshold of incompatibility between aircraft and sensitive land uses, such as churches, schools and hospitals.

The characteristic most commonly used to describe sound is its loudness, measured in decibels (dB). The full audible range of the human ear is from 0 dB (the threshold of hearing) to 120 dB (the threshold of pain). But since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependant rating scale is used to relate the sound more closely to the sensitivity of the human ear. This is the A-weighted decibel (dBa) scale, which is the most frequently used rating in environmental analysis.

Typical A-weighted levels of some common sounds are indicated in Figure 6-1. These sound levels are encountered in the average environment on a daily basis. As shown, ambient neighborhood sound levels range from 50 to 90 dBa. Ambient home and other interior sound levels are lower due to the attenuation of exterior sounds by the building envelope. Ambient interior sound levels range from 15 to 40 dBa.

Sound exposure contours are a series of lines geographically related and placed on maps to estimate the average sound exposure at certain locations. They are the principle tool for analyzing land use compatibility in the vicinity of airports and heliports. The contours are used to identify existing and projected areas potentially affected by aircraft sound exposure. The unit used in defining sound exposure contours is the average day-night sound level, abbreviated as DNL and symbolized mathematically as Ldn. (The Ldn annotation is used hereafter). Specifically, Ldn is the 24-hour average sound level, in A-weighted decibels, for the period midnight to midnight, obtained after an addition of 10 decibels to sound levels occurring in the night between 10 p.m. to 7 a.m.

The analysis used the FAA's Integrated Noise Model (INM), Version 5.0, to generate contour lines and consequently determine potential incompatible land use impacts. The INM is the only FAA approved computer model for simulating aircraft related noise. INM data obtained and entered into the model for analysis includes:

- Runway data
- Approach, departure, and touch and go flight tracks
- Current and forecast aircraft activity and mix levels
- Runway and track use percentage splits
- Day/Night operations splits

Figures 6-2 through 6-4 depict the aircraft sound exposure contours under the existing (1995), 2015 No-Action, and 2015 Proposed conditions, respectively. Tables 6-1 through 6-3 provide the daily operations input that was entered into the model for current, 2015 No-Action and the 2015 Proposed Action, respectively.

Sound Level Comparisons

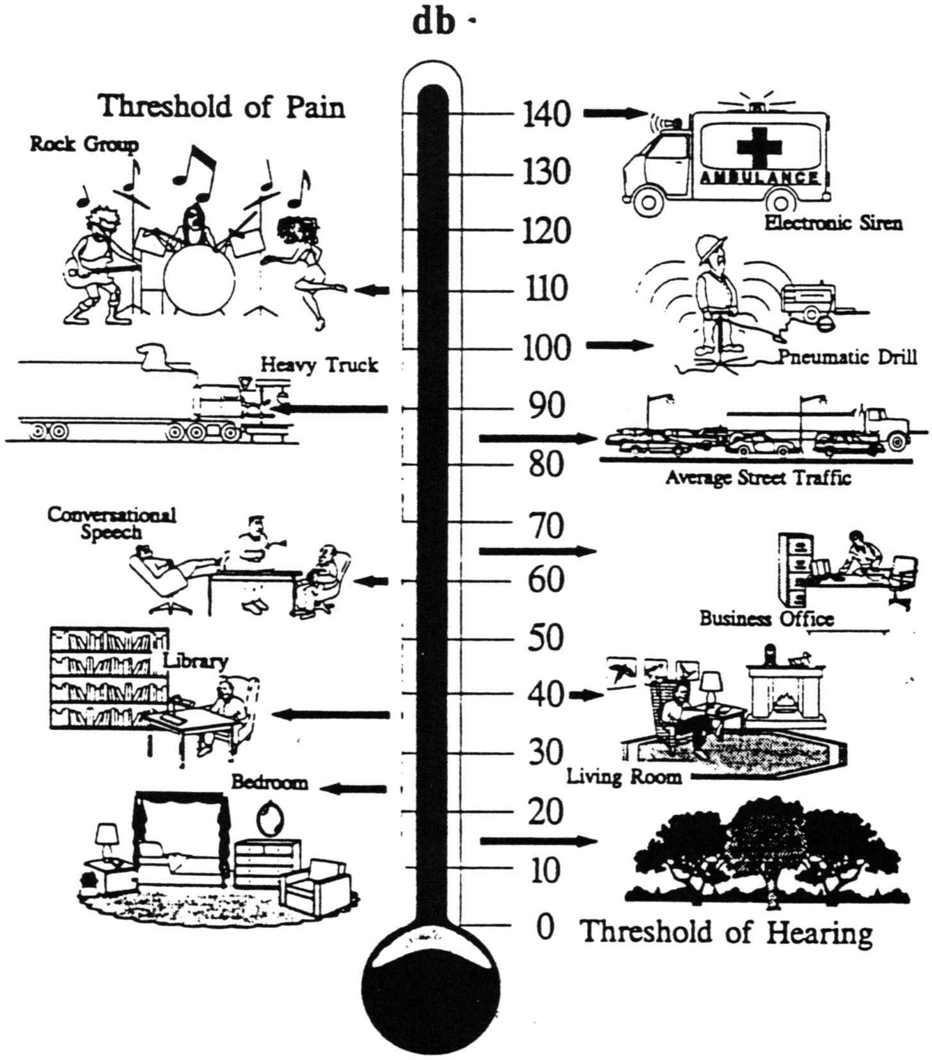
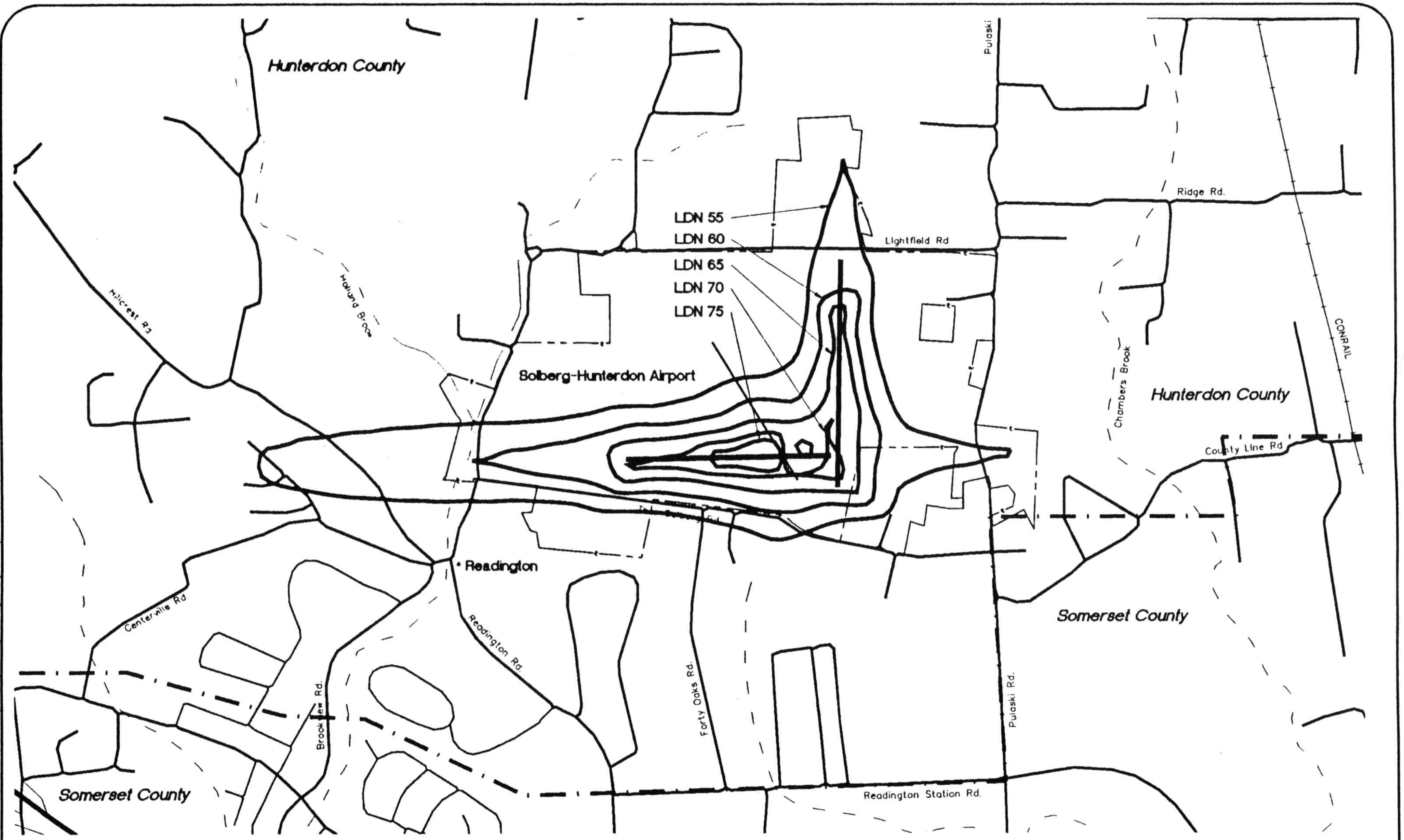


Figure 6-1



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 6–2

EXISTING SOUND CONTOURS

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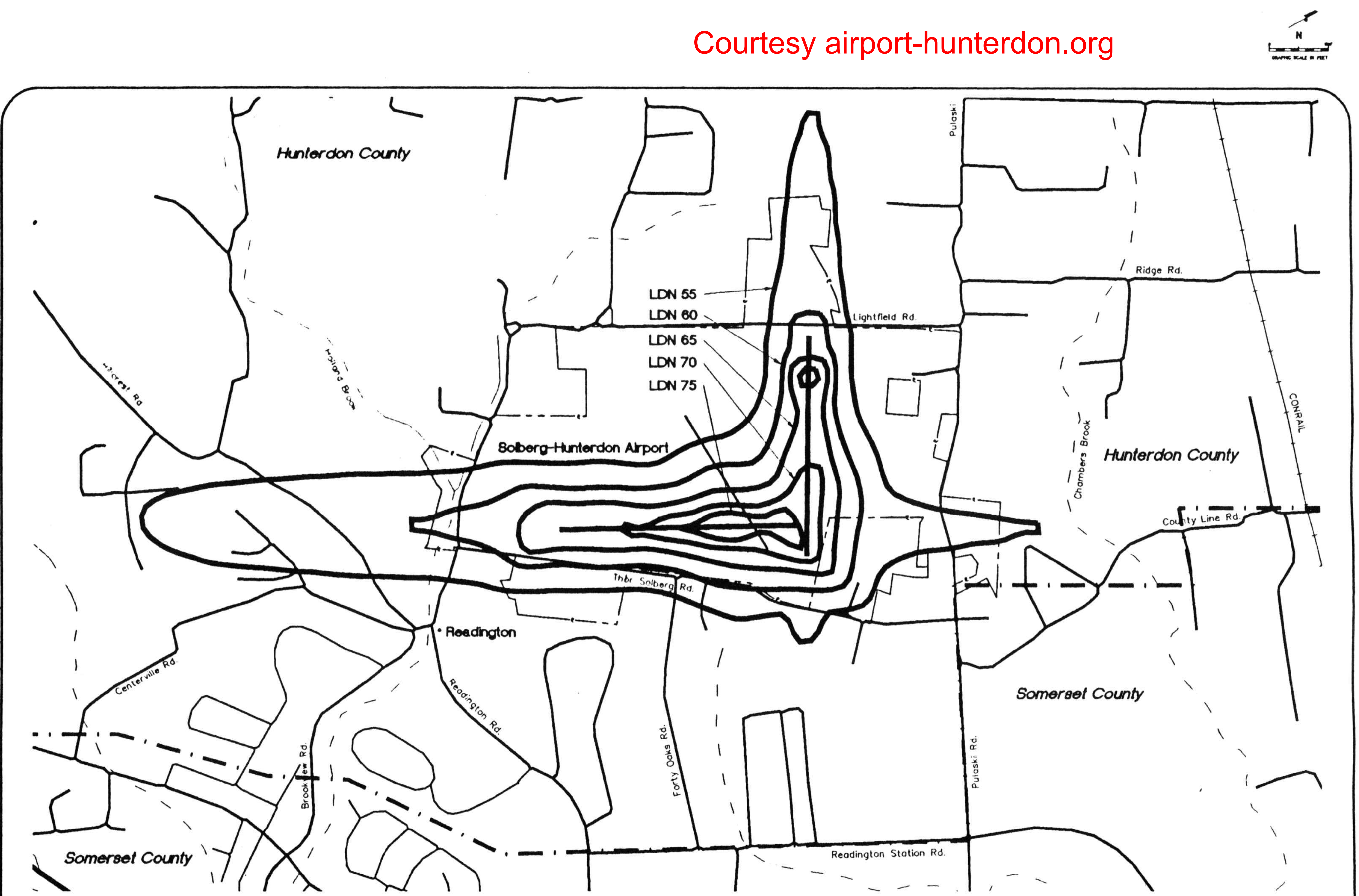

SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 6–3

2015 NO-ACTION SOUND CONTOURS

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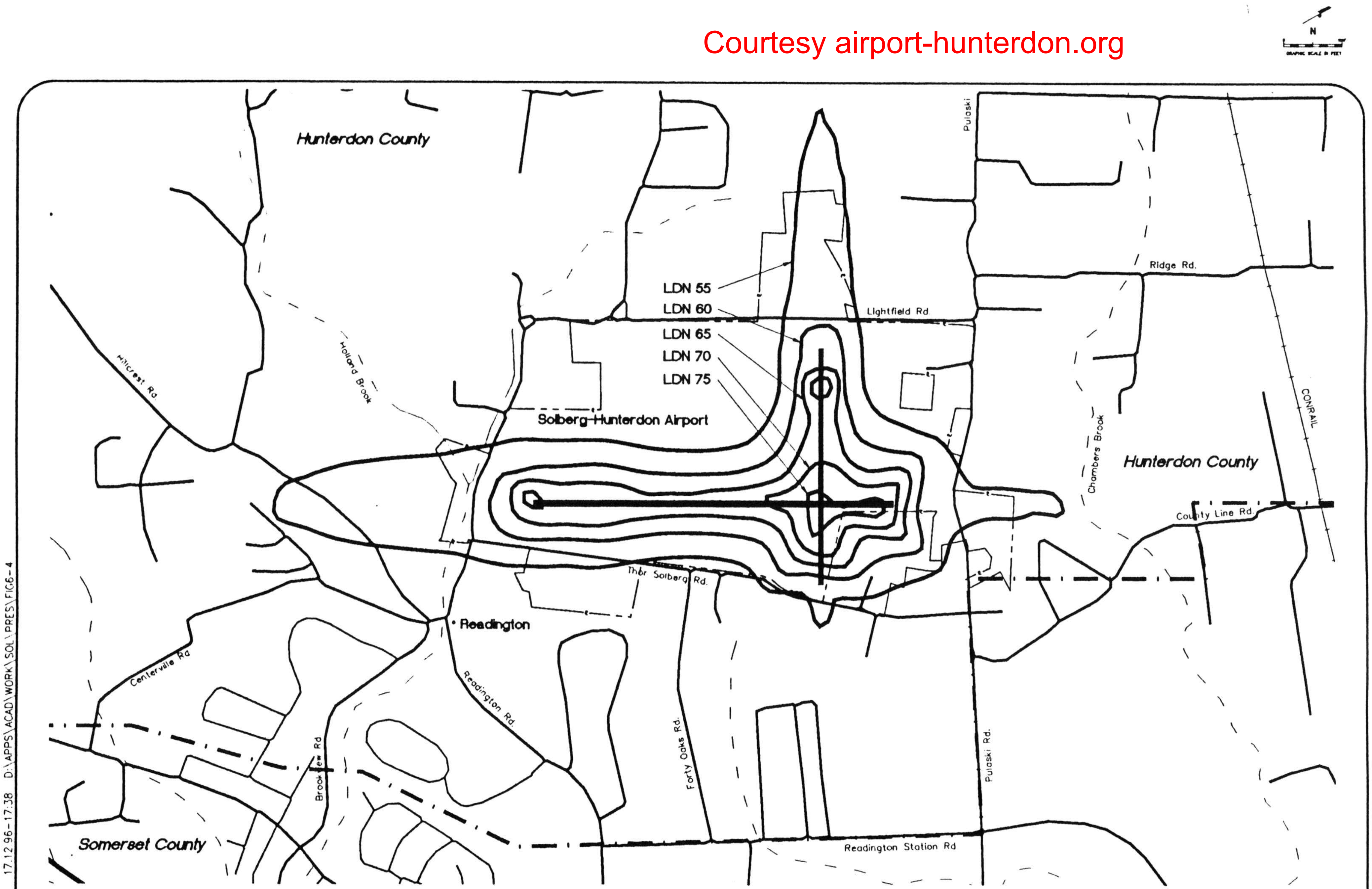


SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 6–4

IMPROVED 2015 SOUND CONTOURS

TABLE 6-1
CURRENT (1995) DAILY OPERATIONS BREAKDOWN MODEL INPUT

SEFP= Single-Engine, Fixed Pitch Prop
SEVP= Single-Engine, Variable Pitch Prop
MEP= Multi-Engine, Prop
METP= Multi-Engine, Turbo-Prop
METJ= Multi-Engine, Turbo-Jet

Total Annual Operations 63,700
Total Daily Operations 174 5205

Local Operations Breakdown

Aircraft Category	Percent of Operations	Annual Operations	Daily Ops (ANN OPS/365)	Daytime Ops (Daily Ops x 0.9)	Evening Ops (Daily Ops x .08)	Night Ops (Daily Ops x .02)
SEFP	75%	14,333	39.2671	35.3404	3.1414	0.7853
SEVP	25%	4,778	13.0890	11.7801	1.0471	0.2618
Totals	100%	19,110	52.3562	47.1205	4.1885	1.0471

Itinerant Operations Breakdown

Aircraft Category	Percent of Operations	Annual Operations	Daily Ops (ANN OPS/365)	Daytime Ops (Daily Ops x 0.9)	Evening Ops (Daily Ops x .08)	Night Ops (Daily Ops x .02)
SEFP	65 25%	29,095	79.7123	71.7410	6.3770	1.5942
SEVP	21 75%	9,698	26.5708	23.9137	2.1257	0.5314
MEP	7.00%	3,121	8.5515	7.6964	0.6841	0.1710
METP	4.00%	1,784	4.8866	4.3979	0.3909	0.0977
METJ	2.00%	892	2.4433	2.1990	0.1955	0.0489
Totals	100.00%	44,590	122.1644	109.9479	9.7732	2.4433

Total Operations

	100.00%	63,700	174.5205	157.0685	13.9616	3.4904

TABLE 6-2
NO-ACTION (2015) DAILY OPERATIONS MODEL INPUT

SEFP= Single-Engine, Fixed Pitch Prop
SEVP= Single-Engine, Variable Pitch Prop
MEP= Multi-Engine, Prop
METP= Multi-Engine, Turbo-Prop
METJ= Multi-Engine, Turbo-Jet

Total Annual Operations	89,180
Total Daily Operations	244.3288

Local Operations Breakdown

Aircraft Category	Percent of Operations	Annual Operations	Daily Ops (ANN OPS/365)	Daytime Ops (Daily Ops x 0.9)	Evening Ops (Daily Ops x .08)	Night Ops (Daily Ops x .02)
SEFP	75%	20,066	54.9740	49.4766	4.3979	1.0995
SEVP	25%	6,689	18.3247	16.4922	1.4660	0.3665
Totals	100%	26,754	73.2986	65.9688	5.8639	1.4660

Itinerant Operations Breakdown

Aircraft Category	Percent of Operations	Annual Operations	Daily Ops (ANN OPS/365)	Daytime Ops (Daily Ops x 0.9)	Evening Ops (Daily Ops x .08)	Night Ops (Daily Ops x .02)
SEFP	65.25%	40,733	111.5972	100.4374	8.9278	2.2319
SEVP	21.75%	13,578	37.1991	33.4791	2.9759	0.7440
MEP	7.00%	4,370	11.9721	10.7749	0.9578	0.2394
METP	4.00%	2,497	6.8412	6.1571	0.5473	0.1368
METJ	2.00%	1,249	3.4206	3.0785	0.2736	0.0684
Totals	100.00%	62,426	171.0301	153.9271	13.6824	3.4206

Total Operations	100.00%	89,180	244.3288	219.8959	19.5463	4.8866

TABLE 6-3
Improved (2015) DAILY OPERATIONS MODEL INPUT

SEFP= Single-Engine, Fixed Pitch Prop
SEVP= Single-Engine, Variable Pitch Prop
MEP= Multi-Engine, Prop
METP= Multi-Engine, Turbo-Prop
METJ= Multi-Engine, Turbo-Jet

Total Annual Operations	100,000
Total Daily Operations	273.9726

Local Operations Breakdown

Aircraft Category	Percent of Operations	Annual Operations	Daily Ops (ANN OPS/365)	Daytime Ops (Daily Ops x 0.9)	Evening Ops (Daily Ops x .08)	Night Ops (Daily Ops x .02)
SEFP	75%	22,500	61.6438	55.4795	4.9315	1.2329
SEVP	25%	7,500	20.5479	18.4932	1.6438	0.4110
Totals	100%	30,000	82.1918	73.9726	6.5753	1.6438

Itinerant Operations Breakdown

Aircraft Category	Percent of Operations	Annual Operations	Daily Ops (ANN OPS/365)	Daytime Ops (Daily Ops x 0.9)	Evening Ops (Daily Ops x .08)	Night Ops (Daily Ops x .02)
SEFP	59.36%	41,550	113.8356	102.4521	9.1068	2.2767
SEVP	19.79%	13,850	37.9452	34.1507	3.0356	0.7589
MEP	10.86%	7,600	20.8219	18.7397	1.6658	0.4164
METP	7.29%	5,100	13.9726	12.5753	1.1178	0.2795
METJ	2.71%	1,900	5.2055	4.6849	0.4164	0.1041
Totals	100.00%	70,000	191.7808	172.6027	15.3425	3.8356

Total Operations	100.00%	100,000	273.9726	246.5753	21.9178	5.4795

The entire area around the airport is zoned Rural Residential (RR). The 65 Ldn contour will remain entirely within airport property or within property that will be acquired by the sponsor. The results of the study are tabulated below in Table 6-4, *Sound Exposure Impact.*

Table 6-4
Sound Exposure Impact

Off Airport Sound Exposure	Current 1995				No-Action 2015				Improved 2015			
Ldn	55-60	60-65	65-70	70+	55-60	60-65	65-70	70+	55-60	60-65	65-70	70+
Dwellings	22	0	0	0	55	0	0	0	14	0	0	0
Acres	85	0	0	0	137	3	0	0	114	0	0	0

The means for measuring this impact of sound exposure on persons and guidelines for land use compatibility are found in the appropriate federal guidelines. Table 6-5, adapted from these guidelines, identifies a set of sound exposure zones based upon Ldn levels. The sound exposure zones are identified in order of increasing sound level by the letters A through D. It is apparent from the table that a 65 Ldn and higher reading means that The U.S. Department of Housing and Urban Development (HUD) and the Environmental Protection Agency (EPA) considers these "unacceptable" levels of sound exposure for residential areas.

Table 6-5
Sound Exposure Compatibility Guidelines

Sound Exposure Zone	Ldn	Sound Exposure Class	HUD/EPA Residential Standards
A	Less than 55	Minimal	Acceptable
B	55 to 65	Moderate	Acceptable
C-1	65 to 70	Significant	Normally Unacceptable Unacceptable
C-2	70 to 75	Significant	Unacceptable
D-1	75 to 80	Severe	Unacceptable
D-2	80 to 85	Severe	Unacceptable
D-3	Above 85	Severe	

Source Guidelines for Considering Noise in Land Use Planning and Control, Federal Interagency Committee on Urban Noise, Washington, D.C., 1980.

Community perceived sound levels generated by airport activity are within Sound Exposure Zones A and B for the existing (1995) and the proposed development concept utilizing 2015 activity and mix levels. These zone classifications are considered acceptable residential standards derived by HUD and the EPA and thereby compatible with the surrounding land use. Potential impacts to nearby schools, including a proposed school, were also examined in the noise analysis. These schools will remain well below noise impact thresholds through the period. No adverse impacts are anticipated with respect to this category.

6.2.2 Land Use

The Solberg-Hunterdon Airport and all of the surrounding areas are currently zoned as Rural Residential (RR). Single family lots, open space cluster development, open space and agricultural clusters, with a small percent of the tract permanently dedicated for agricultural use are allowed under this designation, however, much of the land surrounding the airport remains farmland. According to the Readington Township Master Plan, this is mostly due to the lack of public utilities and possibly geologic and topographical constraints.

The Readington Hamlet is located at the intersection of Readington, Hillcrest and Columbine Roads. A hamlet has an established historic development pattern which is intended to be preserved. The State Development and Redevelopment Plan describes a hamlet as "a small cluster of homes with a distinct identity in a rural area". These hamlets are typically located at crossroads and have a compact nucleus which permits infill development. No adverse impacts to the hamlet are anticipated as a result of the airport's proposed development plan.

The State of New Jersey created the Air Safety Zone (ASZ), N.J.S.A. 16:62, to establish minimum standards for the control of airport safety and aeronautical standards for land use adjacent to airports. Compliance with the Act improves airport safety by ensuring that structures "which will interfere with, diminish, change or obstruct the airspace or landing and take-off area available for the landing and take-off of aircraft at public use airports" be avoided. The following land uses are permitted within the Runway and Runway End Subzones of the ASZ: residential single-family dwellings situated on at least three acres, airpark (minimum of three acres), open space, agricultural, transportation, airport, commercial and industrial. The only land uses permitted in the Clear Zone are residential zoning (as long as the dwellings are physically located outside the Clear Zone), open space agricultural, transportation and airport. The following Table 6-6, *ASZ Dwelling Comparison*, summarizes the residential dwelling units that are within the Existing, Do Nothing, and Proposed ASZ.

Table 6-6
ASZ Dwelling Comparison

Residential Dwelling Units	Current 1995	No-Action 2015	Improved 2015
Runway and Runway End subzones	43	43	43
Clear Zones	0	0	0

Many of the existing properties, located within the existing ASZ, do not meet the minimum lot requirements of 3 acres as specified in the Act. Because these parcels are preexisting, such "nonconforming" or "conditional" land uses are permitted provided that there are no major changes that would be contrary to the purpose of the Act. The Readington Township Master Plan does not indicate development in the immediate airport vicinity, however, the minimum lot size of future residential parcels is 3 acres and would thus conform to the provisions of the Act. There are no dwellings located within any of the existing or proposed Runway Clear Zones associated with the ASZ.

Hillcrest Park, built by the township southwest of the airport along Hillcrest Road, encompasses approximately 55 acres and contains three soccer and four baseball fields. This park is located within the New Jersey ASZ and the proposed Runway 3 RPZ of the recommended development plan. The park is located outside of the Runway OFA, will not attract wildlife, will not interfere with navigational aids, and is not a specifically prohibited land use. It is further noted in the noise analysis that the 65 Ldn contour will not extend over the park or any of the associated playing fields in the foreseeable future. Therefore, the park will not be adversely impacted by the proposed development plan.

No adverse impacts to land use are anticipated as a result of the proposed development.

6.2.3 Social Impacts

A proposed development requires analysis of social impacts if it involves: the relocation of any residence, farm operation or business: the alteration of surface transportation patterns: the division or disruption of orderly and planned development: or, an appreciable change in employment.

The proposed development plan at Solberg-Hunterdon Airport will not involve the relocation of any farm operations, businesses, or residences. Two residential parcels with a combined total area of approximately 48 acres are planned to be acquired. Approximately 12 acres of a large parcel is planned for acquisition in order to obtain ownership control of the existing Runway 22 RPZ as well as proposed taxiway development and runway OFA and RSA areas to accommodate the proposed primary runway. An additional parcel of 3 acres and the associated dwelling would also be acquired for the proposed Runway 3 OFA and RSA. The additional land will provide additional protection for off airport sound exposure impacts and incompatible land use encroachment. It is anticipated that these acquisitions will be fee-simple transactions that will be settled in an amicable manner between the airport and the respective property owners and would therefore not constitute a relocation.

The development plan will not require the alteration of any existing surface transportation patterns, nor will it divide or disrupt any established community. Therefore, it can be assumed that the plan will not disrupt orderly or planned development.

There is potential for an appreciable short-term increase in local construction type employment as a result of the proposed project.

An analysis was conducted in order to determine what affect the increasing airport auto-traffic would have on the local road system. Recent traffic counts were obtained from both Hunterdon and Somerset counties for several counter locations located near the airport. For the purpose of this analysis, It was assumed that every airport user would need to use either Readington or County Line Road in order to access the airport, and thus, the study focused on counter locations on these roads.

The results of the road study are presented in Table 6-7, *Auto Traffic and Road Analysis*. The resulting conclusions were made:

1. From 1990 to 1994, airport auto traffic increased at a lower rate (35.7%) than the corresponding community traffic growth (69.7%).

2. From 1990 to 1994, airport related traffic averaged 1.14 percent of the total traffic using these roads.

3. Airport related auto traffic is forecast to grow by 125 percent (about 146 trips a day) between 1995 and 2015.

4. There is not a significant difference between the No-Action and Proposed Action auto traffic. The difference is only 35 daily trips by the year 2015.

Table 6-7
Auto Traffic and Road Analysis

Historic Traffic Growth in Average Daily Traffic (ADT)

Year	CR 620 Readington Road Counter: J-071	CR 620 Percent Total Traffic	CR 637 County Line Road Counter: J-116	CR 637 Percent Total Traffic	Total Traffic	Airport Related Traffic	Airport Percent Total Traffic
1990	2534	32.38	5291	67.62	**7825**	85.51	1.093
1991	2595	30.76	5841	69.24	**8436**	97.73	1.158
1992	2423	30.12	5622	69.88	**8045**	107.91	1.341
1993	2929	31.33	6421	68.67	**9350**	116.05	1.241
1994	3673	27.65	9613	72.35	**13286**	116.05	0.8735
						av	1.141
Percent Growth	44.95		81.69		**69.79**	**35.71**	

Forecast Airport Related Traffic

No-Action

Year	Annual Airport Related Traffic	Airport Related Traffic (ADT)
1995	41,022	117.0
2000	69,005	189.1
2005	71,242	195.2
2010	77,179	211.4
2015	83,116	227.7
Percent Growth		94.63

Improved

Year	Annual Airport Related Traffic	Airport Related Traffic (ADT)
1995	41,022	117.0
2000	65,405	179.2
2005	72,856	199.6
2010	81,736	223.9
2015	96,000	263.0
Percent Growth		124.80

Peak hour traffic is generated primarily by individual residents commuting to and from work. The proposed airport improvements will not involve new residential development. Peak airport related traffic does not conform to the regular business day, i.e. the cycle is more evenly distributed with peak hours not corresponding to employment related travel peaks.

It is noted that the existing roadways are likely experiencing moderate delay during peak commuting hours. Assuming auto traffic continues to increase at its present rate, peak hour delay will likely reach unacceptable levels in the near term. The small amount of airport generated traffic will not be the limiting factor that will create unacceptable levels of delay on its surrounding roadways during peak travel periods.

It is concluded that airport related automobile traffic does not currently, nor is it expected to in the foreseeable future, create a significant impact on the local road system surrounding the airport.

There are no significant social impacts anticipated.

6.2.4 Induced Socio-economic Impacts

Socio-economic impacts that are induced or secondary in nature, will normally not be significant except where there are significant impacts in other categories, especially noise, land use or direct social impacts.

Potential impacts to Trends of Population Movement and Growth; Public Service Demands; and Business and Economic Activity have been examined.

The Solberg-Hunterdon Airport is currently located in a suburban/semi-rural portion of the county. Many established communities currently exist around major portions of the airport. These communities will realize no significant impacts associated with the proposed improvements.

Public Service Demand will remain virtually unchanged. The proposed development plan will result in a beneficial economic (primary as well as induced) impact relating to the creation of temporary jobs during the construction of facility requirements and increased business/corporate commerce.

6.2.5 Air Quality

The *Clean Air Act (CAA) Amendments of 1990* expand the scope and content of the CAA's conformity provision by defining conformity to an implementation plan. Conformity is defined in Section 176[c] of the CAA as conformity to the State Implementation Plan's (SIP) purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards. The CAA further states that no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable state implementation plan. This regulation will set forth policy, criteria, and procedures for demonstrating and assuring conformity of such actions to the applicable implementation plan.

According to the State's emissions inventory[1], northern New Jersey is in severe non-attainment for ozone. Therefore, pursuant to the Clean Air Act[2] and regulations under 40 CFR(51)(w) with respect to the conformity of general Federal Actions to the applicable state implementation plan (SIP), the extent to which the proposed development would contribute to the existing condition must be considered.

Potential airport emissions that can potentially impact air quality include: carbon monoxide, hydrocarbons, nitrates, sulfur dioxide, aldehydes, and particulate matter. There are six major pollution sources associated with the operational phase of any airport: aircraft engine exhausts (producing CO, HC, NOx and particulates); gasoline fueled ground service equipment (emitting CO, NOx, HC, SO_2 and particulates); access traffic entering and exiting the airport (emitting CO, NOx, HC, SO_2 and particulates); aircraft engine exhaust emissions occurring during maintenance (emitting CO, HC, NOx and particulates); heating and air conditioning plants (emitting CO, NOx, SO_2 and aldehydes); and fuel handling storage systems (producing emissions of HC). Emissions from these activities can extend several miles from the airport. The potential for impacts to air quality should therefore be examined on a regional basis as well as a local basis. For this reason existing regional air quality must be considered along with that of the immediate airport vicinity. Since the airport is in a non-attainment area for Ozone, diminimis calculations for VOC and NOx (Ozone precursors) have been developed based on aircraft operations.

[1]NJDEP, Air Quality Regulation Program

[2]§176 [c] of the Clean Air Act (CAA), as amended (42 U.S,C 7401 et seq.)

The EPA's General Conformity Rule was consulted to determine conformity rates for severe ozone non-attainment areas. Individual development projects that will increase annual ozone production by 25 tons are considered to be in conformity with current air quality regulations. Although this plan forecasts that operations will increase steadily throughout the planning period regardless of individual development projects, anticipated aircraft emissions were calculated. Table 6-8, *Aircraft Emissions Inventory*, depicts annual aircraft pollutant emissions for the existing, 2015 No-Action forecast, and 2015 improved forecast. Diminimus calculations compare the two 2015 forecast emissions to document air quality impacts in the event that the airport improvements induce the additional aircraft activity. The calculation provides that ozone production generated as a result of induced aircraft activity is clearly well below the established diminimus levels and is thereby in conformity with air quality requirements. Significant impacts to air quality are not anticipated as a result of the proposed airport improvements.

6.2.6 Water Resources

The construction and operation of airport facilities can affect the quality and quantity of a region's water resources, both surface and subsurface (ground water). The *Federal Water Control Act*, as amended by the *Clean Water Act of 1977*, provides the authority to establish water quality standards, control discharges into surface and subsurface waters, develop waste treatment management plans and practices, and issue permits for discharges (Section 402) and for dredged or fill material (Section 404). In New Jersey, this authority has been delegated to the NJ Department of Environmental Protection (NJDEP). Discharges to surface water and groundwater are regulated under the NJ Pollutant Discharge Elimination System (NJDES) Program. Discharges of dredged or fill material to wetlands and open waters is regulated under the NJ Freshwater Wetlands Protection Act (NJFWPA).

Surface Water Hydrology. The entire study area is located within the Raritan River Drainage Basin. The northern portion of the site drains into Chambers Brook or a tributary of Chambers Brook to the North Branch of the Raritan River, and the southern portion of the site drains into Hollands Brook to the South Branch of the Raritan River. According to the New Jersey 1992 State Water Quality Inventory Report, both the northern and southern branches of the Raritan River Watersheds contain generally good to fair quality waters.

Table 6-8
Aircraft Emissions Inventory

Solberg-Hunterdon Airport Existing Activity -1995				
		Emission Inventory Pollutant (lbs)		
Type	**Annual**			
GA Piston (EPA Class P1)	**LTO's**	**NOx**	**HC**	**SOx**
Single Engine	28,944	578.88	7,525.44	0.00
Multi-Engine	1,570	31.40	2,763.20	0.00
Business Turbo-Prop(EPA Class P2)	876	773.51	7,358.40	140.16
Business Jets	438	876.00	2,943.36	175.20
TOTAL EXISTING 1995 (Pounds)	31,828	2,259.79	20,590.40	315.36

Solberg-Hunterdon Airport 2015 No-Action Activity				
		Emission Inventory Pollutant (lbs)		
Type	**Annual**			
GA Piston (EPA Class P1)	**LTO's**	**NOx**	**HC**	**SOx**
Single Engine	40,533	810.65	10,538.45	0.00
Multi-Engine	2,185	43.70	3,845.60	0.00
Business Turbo-Prop(EPA Class P2)	1,249	1,102.43	10,487.40	199.76
Business Jets	625	1,249.00	4,196.64	249.80
Total Projected 2015 (Pounds)	44,591	3,205.78	29,068.09	449.56

Solberg-Hunterdon Airport Improved 2015 Activity				
		Emission Inventory Pollutant (lbs)		
Type	**Annual**			
GA Piston (EPA Class P1)	**LTO's**	**NOx**	**HC**	**SOx**
Single Engine	42,700	854.00	11,102.00	0.00
Multi-Engine	3,800	76.00	6,688.00	0.00
Business Turbo-Prop(EPA Class P2)	2,550	2,251.65	21,420.00	408.00
Business Jets	950	1,900.00	6,384.00	380.00
Total Projected 2015 (Pounds)	50,000	5,081.65	45,594.00	788.00

SUMMARY		**Pollutant Emissions (Tons)**		
	Annual LTO's	**NOx**	**HC**	**SOx**
Total Projected, Improved	50,000	2.5408	22.7970	0.3940
Total Projected, No-Action	44,591	1.6029	14.5340	0.2248
Projected Increase	5,410	0.9379373	8.262955	0.16922
EPA Allowable Emission Rate		25	100	100
Percent of Diminimus		3.75%	8.26%	0.17%

Note: Annual LTOs are Annual Landing Takeoff Cycles or Annual Operations / 2.

Ground Water Hydrology. The site is within the Brunswick Aquifer System and consists of the Passaic Formation. Aquifers are groundwater-bearing geological units. According to a Hydrologic data point located at the nearby Readington School, the Geologic Survey has determined water elevations in this part of the county to be approximately 30 feet. This appears to be a representative elevation within the Peidmont Area given similar topography. Because of the bedrock formation in the area of the airport, the site is believed to contain a seasonal perched water table, occurring in the spring. This brings the water table much closer to the surface during this time of year. The depth to bedrock on the majority of the site ranges from 0 to 3.5 feet, with pockets of 3.5 to 6 feet and 6 to 10 feet on some areas along the perimeter of the site. The depth to the seasonal high water table ranges from 0 to 5 feet.

Potable Water Supply. New Jersey is currently in the process of identifying Water Resource Protection Areas, but has not yet identified these resources within Hunterdon County, therefore, no Recharge or Wellhead Protection Areas are known to exist on site.

There are three well defined ways in which airport development can affect water resources. The first issue relates to water quantity and the ability of the site to provide ground water recharge. The proposed runway and taxiway facilities and expanded terminal will increase the pavement area at the airport. The added impermeable surface will increase storm water runoff by reducing the area available for infiltration, thereby reducing recharge potential.

The second potential impact to water resources is the potential to increase downstream flooding of surface water due to an increase in the rate and quantity of storm water runoff. The airport has an abundance of property in which to handle drainage and storm water runoff. Storm water detention basins are included as part of the airfield improvements. These basins will be designed to retard storm water runoff and allow settling and filtration. Storm water management facilities will be designed in accordance with NJDEP and Readington Township Requirements.

The third potential project impact deals with water quality and the potential water hazards resulting from additional airport activity and increased storm water runoff. By increasing the runway length and providing additional hangars and apron, the airport will be accessible and capable of accommodating a greater number of airplanes. Every day airport activity involves the use of potential contaminants, including: paints, petroleum, automobile and aircraft fuel, detergents, and deicing chemicals. Without the proper water quality controls in place, these potential pollutants can accumulate and be collected by storm water runoff and spread to receiving waters and could result in a contaminated water

Additionally, there is also the potential for short term impacts to water quality from vegetation clearing during construction. These impacts will be mitigated through construction controls described in a following impact category entitled *Construction Impacts.* A soil erosion and sediment control plan will be developed and submitted to the Hunterdon County Soil Conservation District for certification.

Based on the aforementioned controls and mitigation measures, it is anticipated that potential impacts to water resources can be adequately mitigated to the point of non-significance.

6.2.7 Department of Transportation Act, Section 4(f)

Section 4(f) of the Department of Transportation (DOT) Act, 49 U.S.C. 303 (c), requires that the proposed use of land from a publicly owned park, recreation area, or wildlife or waterfowl refuge, or any historic site be given particular attention. Final action requiring the taking of such land must document that there are "no feasible or prudent alternatives" to the use of such land, and that the proposed action includes "all possible planning to minimize harm" from such use.

No such sites are within or in close proximity to the boundaries of the Solberg-Hunterdon Airport property, therefore, there will be no impact on this resource.

6.2.8 Architectural, Archaeological and Cultural Resources

A preliminary investigation of archaeological and historic resources was conducted within the study area pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended and the Archaeological and Historic Preservation Act of 1974.

The National Historic Preservation Act of 1966, Section 106-80 Stat. 915, 16 U.S.C. 470 et seq, 36 CFR Part 800, as amended, applies to Federal actions affecting properties included in or eligible for the National Register of Historic Places. The Historic Preservation Office has concluded that there are no known sites which are listed or eligible for listing in the National Register on airport property. However, there may be more properties which are currently eligible for listing in the National Register within the three mile boundary which have not yet been identified and included on the list by the Historic Preservation Office.

The Archaeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistorical, archaeological, or paleontological data when such data may be destroyed or irreparably lost to a federally funded project.

Currently, New Jersey has no surveys available pertaining to archaeological resources. This information is being evaluated on a site specific bases. The State Historic Preservation Office will determine if an archaeological investigation must be performed. This determination will depend on the disturbed nature of the site, soils information and site topography.

6.2.9 Endangered and Threatened Species of Flora and Fauna

Federally endangered and threatened wildlife and plant species are listed and protected in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.). The program to list and protect is administered by the US Fish and Wildlife Services. In New Jersey, endangered and threatened animal species are identified and protected in accordance with the Nongame Species Conservation Act (N.J.S.A 23:2A-1 et seq.). The program for listing and protection of these species is administered by the NJDEP Division of Fish Game and Wildlife Endangered and Nongame Species Program. State endangered plant species have been identified in the NJ Endangered Plant Species List Act (N.J.S.A. 13:1B-15.151 et seq.).

No Federally listed endangered or threatened plant or animal species or State endangered plant species are recorded for the site and immediate vicinity. The Natural Heritage Data Base revealed records of occurrences of the State threatened grasshopper sparrow, *Ammodramus savannarum*, the State threatened bobolink, *Dolichonyx oryzivorus*, the State threatened savannah sparrow, *Passerculus sandwichensis*, and the State endangered vesper sparrow, *Pooecetes gramineus*, which may be on site. There is also a record for an occurrence of the State threatened wood turtle, Clemmys insulpta, in the immediate vicinity of the site. The airport and surrounding open space is designated as having a Biodiversity Significance of B5. This means that the site is of a general Biodiversity interest or open space, because it contains one State endangered and three State threatened bird species.

The Office of Natural Lands Management has identified Solberg-Hunterdon Airport as a Natural Heritage Priority Site (Sitecode S.USNJHPL*503). Priority sites are areas noted for their biological diversity due to the presence of endangered or threatened species or ecosystems. The Solberg-Hunterdon Airport site was identified as a priority site due to the recorded sightings of one State endangered and three State threatened grassland bird species. The Office of Natural Lands Management classifies sites as either "standard sites" or "macrosites" based on size. Sites are also assigned a biodiversity significance rating of B1-B5, where B1 is the most significant. The Solberg site is classified as a "standard site" (smaller than 3,200 acres) and is ranked as"B5 - of general biodiversity interest or open space."

Preliminary investigation of the project area did not identify any potentially suitable habitat for the wood turtle. The airport property has large areas of grassland that may be potentially suitable habitat for the bird species listed above. A literature review and in-depth field survey of the project area and the airport property will be performed as part of the Environmental Assessment to characterize vegetation communities and assess their suitability for utilization by rare grassland birds. Any potential impacts on critical rare bird habitat will be assessed. If the potential for significant impacts is identified, a habitat restoration, enhancement, replacement and management plan will be developed to mitigate any adverse impacts.

The airport will maintain much of the existing undisturbed habitat in its natural condition. It is therefore believed that the airport will continue to provide ample habitat for the existing species. A more in-depth field survey will need to be conducted as part of the environmental assessment to determine if suitable habitat is available for the described species and to deny or confirm their presence on site.

6.2.10 Wetlands

Wetlands are important biological resources which function as habitat for aquatic and terrestrial biota, storm water treatment and retention and aquifer recharge areas, and physical buffers to erosion and storm damage.

In compliance with Federal Executive Order 11990, the study area was evaluated through the use of the Soil Survey of Hunterdon County, New Jersey, a general field review, and the State of New Jersey Freshwater Wetland Maps.

The NJ Freshwater Wetlands Protection Act of 1987 (N.J.S.A. 13:9B) defines a wetland as "an area that is inundated or saturated by surface water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence or vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation." The Act also requires that a wetland be designated using the three parameter approach (vegetation, soils and hydrology) enumerated in the "Wetland Identification and Delineation Manual."

The Freshwater Wetlands Protection Act requires appropriate permits from NJDEP, Land Use Regulation Program for regulated activities conducted in freshwater wetlands, or for the discharge of dredge and fill material into State open waters. The act also requires a transition area waiver be obtained for prohibited activities being conducted in the transition areas surrounding wetlands classified as either exceptional value or intermediate resource value.

A transition area is an ecological zone adjacent to a freshwater wetland, extending from the freshwater wetland boundary into the uplands for either 150 feet for an exceptional value wetland, 50 feet for an intermediate resource value wetland, and no transition area for ordinary resource value wetlands. These transition areas serve as a buffer to minimize the adverse impacts of human activity on freshwater wetland ecosystems.

According to the Hunterdon County Soil Survey, the airport is composed of many different soil types. On-airport soil types include the following:

RfA- Reaville silt loam, wet variant, 0 to 2 percent slopes (Hydric Soil)
RcB- Readington silt loam, 2 to 6 percent slopes (Hydric Soil)
PeB- Penn shaly silt loam, 2 to 6 percent slopes
NoB- Norton loam, 2 to 6 percent slopes
PfC2- Penn-Bucks Complex, 6 to 12 percent slopes, eroded
ReB- Reaville silt loam, 2 to 6 percent slopes
PfB- Penn-Bucks Complex, 2 to 6 percent slopes
BuB- Bucks silt loam, 2 to 6 percent slopes
Ma- Made land
AbB- Abbottstown silt loam, 2 to 6 percent slopes
LbB- Lansdown silt loam, 0 to 6 percent slopes (Hydric Soil)
PeC2- Penn shaly silt loam 6 to 12 percent slopes, eroded

The airport has potentially 58 acres of wetlands broken into approximately 12 independent potential wetland systems dispersed throughout the 721 acre property. Figure 6-5 graphically depicts these areas. Of these potential wetland areas, the following might be impacted by the proposed improvements.

Wetland 1 is a large wetland complex consisting of many different types of wetland classifications. This complex is located on the south central portion of the project site and covers a total of approximately 14 acres. This complex consists of approximately 2¼ acres of R4SB2, Riverine- Intermittent- Streambed, Rubble Bottom, approximately 5¼ acres of PF01B, Palustrine; Forested Broad- Leaved Deciduous-Saturated Wetland, approximately ¾ acres is classified as PSS1B, Palustrine, Scrub/Shrub- Broad- Leaved Deciduous-Saturated and approximately 5 acres classified as MODAg, Modified Regiem- Probably Agricultural Drainage (the largest portion of this wetland complex). A small portion (less than 1 acre) of Wetland 1 could potentially be impacted by the proposed Runway 3-21 OFA requirements.

Wetland 2 is located in the center of the site. It is composed of approximately 14¾ acres and consists of two different types of wetland classifications. The northwestern portion of the wetland is composed of approximately 4½ acres of MODAq, Modified Regiem-Probably Agricultural Drainage. The southern portion of the complex consists of 10¼ acres of PSS1B/PEM1B, Palustrine; Scrub/Shrub- Broad Leaved Deciduous/Palustrine; Emergent- Broad- Leaved Deciduous- Saturated wetland. The southeastern portion of this wetland may be impacted by the paving and extending of primary Runway 3-21 and OFA and RSA grading requirements. Trees will also be removed to provide adequate line-of-sight visibility within the runway visibility zone (RVZ).

Wetland 3 is a small isolated wetland located south of the taxiway extension to Runway 4. It consists of approximately 1 acre of Palustrine Emergent Wetland. This wetland could potentially be impacted by the immediate safety improvements involving the paving of the turf portion of the parallel taxiway.

Wetland 4 is a small wetland ditch. Approximately ¾ acres of the wetland is located within the airport property. This wetland is classified as PEM1B, Palustrine; Emergent- Broad Leaved Deciduous- Saturated. A portion of the ditch could potentially be impacted by proposed apron facilities.

Wetland 5 is approximately 3¼ acres. It may currently be hydrologically connected via piping underneath Thor Solberg Road. This wetland is classified as PF01B, Palustrine; Forested Broad- Leaved Deciduous- Saturated. This system could potentially be impacted by the paving and extending of Runway 13-31 and the associated parallel taxiway.

Wetland 6 is located on the northeastern portion of the site. It may currently be hydrologically connected to offsite wetlands via a pipe underneath Pulaski Road. The complex consists of approximately 1¼ acres of MODAg, Modified Regiem- Probably Agricultural Drainage and 4½ acres of PF01B, Palustrine; Forested Broad- Leaved Deciduous- Saturated wetland. The southwestern most portion (MODAg) may be disturbed to accommodate RSA grading at the Runway 3 end.

In addition to the above, the airport also includes the following potential wetland systems within the airport boundary where there are no anticipated impacts associated with the proposed improvements.

Wetland 7 is located north of Pulaski Road. To the north the wetland becomes hydrologically connected to Wetland 6. It is also the same classification as Wetland 6 and is composed of approximately 2½ acres.

Wetland 8 is located northwest of Wetland 6 and is hydrologically connected to the same large wetland complex. It is also connected via a pipe under Pulaski Road. This wetland complex is comprised of two different wetland classifications. Approximately 7 acres are PF01B, Palustrine; Forested Broad- Leaved Deciduous- Saturated and approximately 1 acre is PF01B/PEM1B, Palustrine; Forested Broad- Leaved Deciduous/Palustrine; Emergent- Broad Leaved Deciduous- Saturated. This wetland is also hydrologically connected via piping under Lightfield Road.

Wetland 9 is approximately 1½ acres. This wetland extends to the east and is connected under Lightfield Road to Wetland 8. This wetland is classified as PSS1B, Palustrine; Scrub/Shrub- Broad Leaved Deciduous- Saturated.

Wetland 10 is located northwest of Wetland 9 and is hydrologically connected to Wetlands 8 and 9 to the east. This complex is comprised of two different classifications. Approximately 2¼ acres of PF01B, Palustrine; Forested Broad- leaved Deciduous- Saturated and ¼ acre of R4SB2, Riverine- Intermittent- Streambed with Rubble Bottom.

Wetland 11 is a wetland approximately 1½ acres which may be connected via piping under Lightfield Road to Wetland 2. It is classified as MODAq, Modified Regium- Probably Agricultural Drainage.

Wetland 12 is located on the south side of Readington Road on airport property and is a portion of a larger wetland complex. This area is comprised of two different wetland classifications. Approximately 4¼ acres are classified as R30W, Riverine- Upper Perennial- Open Water- Unknown Bottom Type. The remaining 6¼ acres are PSS1B, Palustrine; Scrub/Shrub- Broad Leaved Deciduous- Saturated wetland. This complex extends to the north, south, and west of the described area.

It is possible that some of the wetlands located on the western portion of the site will be classified as exceptional Resource Value Wetlands. This is due to the suitable habitat this area contains for threatened and endangered grassland bird species on site. Wetlands of this classification require a transition area of 150 feet adjacent to the entire wetland. Development of any kind is usually not permitted in this type of wetland. The development plan shows no plans to develop in this wetland. Other areas of Exceptional Resource Value may exist, however, a NJDEP wetland biologist will need to make this determination during future analysis of the site.

Most of the remaining wetlands on the airport property will probably be classified as Intermediate Resource Value Wetlands. These wetlands require a 50 foot transition area. Wetland ditches and swales will be classified as Ordinary Resource Value, requiring no transition area.

In order to verify the locations and classifications of these wetlands, and any other wetlands which may have not been identified, it is recommended that a professional field survey and delineation be conducted as part of the environmental assessment.

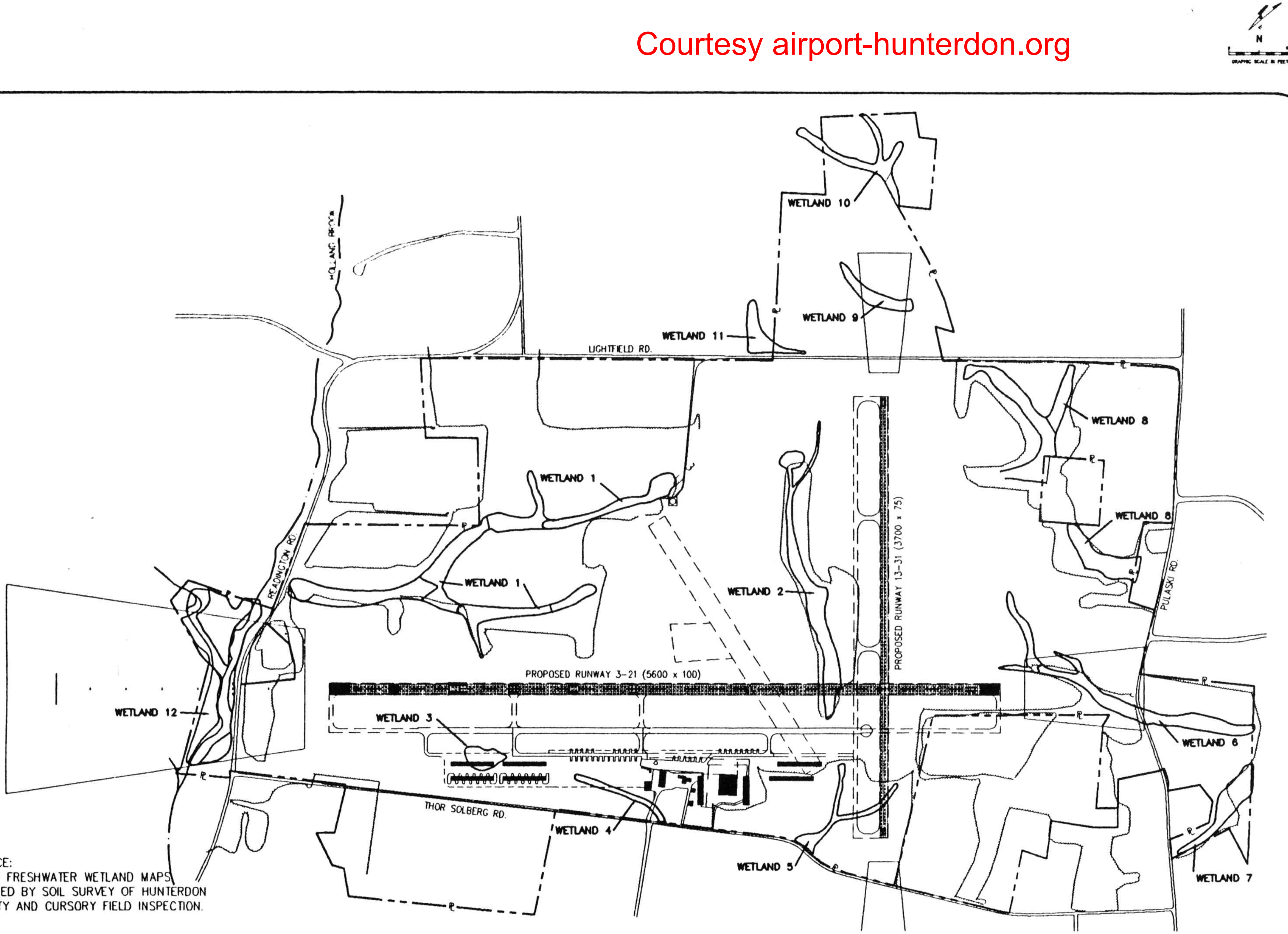
Most of the airport property is non-wetland. Of the airport's 58 acres of potential wetlands, most will not be impacted by the proposed improvements. Additional piping will maintain necessary hydrologic connections where applicable. Replacement of wetlands within airport property at the appropriate replacement ratio is recommended to mitigate potential impacts.

A field survey and delineation will be necessary as part of the environmental assessment to determine the actual wetland locations and boundaries and the specific impacts that the proposed development plan might have. Any proposed activities in wetlands or wetland transition areas would have to be authorized by obtaining a freshwater wetlands permit and transition area waiver from the NJDEP in accordance with the NJ Freshwater Wetlands Protection Act (N.J.S.A 13:9-BI). It is anticipated that potential wetland impacts can be adequately mitigated by the design and construction of proper drainage features and replacement of impacted wetlands.

6.2.11 Floodplains

Executive Order 11988 defines a floodplain as "...the lowland area and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at minimum, the area subject to a one percent or greater chance of flooding in a given year."

Floodplains are areas along a natural water course which are periodically inundated by the waters of the base flood, 100 year flood, including the floodway, flood fringe, and general



SOURCE:
NJDEP FRESHWATER WETLAND MAPS
MODIFIED BY SOIL SURVEY OF HUNTERDON
COUNTY AND CURSORY FIELD INSPECTION.

SOLBERG-HUNTERDON AIRPORT
MASTER PLAN

Figure 6–5

WETLAND LOCATIONS

floodplain area, as defined in Article XVIII. The NJDEP regulates activities in Flood Hazard Areas under the NJ Flood Hazard Areas Control Act (N.J.S.A. 58:F16A-50 et seq.), the NJ Water Pollution Control Act (N.J.S.A. 58:10-1 et seq.) And the NJ Department of Environmental Protection Act (N.J.S.A. 13:1D-1 et seq.). A Stream Encroachment Permit is required for any activities in the flood hazard area. A delineation of any flood hazard areas within the project area will be performed as part of the Environmental Assessment. Preliminary analysis indicates that the crossing of an existing drainage way in the northern portion of Runway 3-21 may require a Stream Encroachment Permit. Any proposed stormwater discharges to Flood Hazard Areas will also require a Stream Encroachment Permit.

According to the Flood Insurance Rate Map (FIRM) of Hunterdon County, New Jersey, no floodplains are mapped within the project areas. No impacts to delineated floodplains are projected.

6.2.12 <u>Coastal Zone Management Program/ Coastal Barriers</u>

The airport and the surrounding areas are not located within the coastal zone as defined by the Coastal Area Facility Review Act N.J.S.A. 13:19-1 et seq.

6.2.13 <u>Prime and Unique Farmland</u>

The Farmland Protection Policy Act (FPPA), P.L. 97-98, authorized the Department of Agriculture (USDA) to develop criteria for identifying the effects of Federal programs on the conversion of farmland to nonagricultural uses. These guidelines became effective as of August 6, 1984, and apply to Federal activities or responsibilities that involve undertaking, financing or assisting construction or improvement projects or acquiring, managing or disposing of Federal lands and facilities.

Four types of farmlands are protected under this act. They include Prime, Unique, Farmland of Statewide Importance, and Additional Farmland of Local Importance.

Prime Farmland is land best suited for producing food, feed, forage, fiber and oilseed crops, and also available for these uses (the land that could be cropland, pasture land, rangeland, forest land, or other land but not build-up land or water). It has the soil quality, growing season and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

Prime Farmland is one of the most important resources of the Nation. This exceptional land can be farmed continuously or nearly continuously without degrading the environment. It will produce the most food, feed, etc., with the least amount of energy used.

Unique Farmland is land other than Prime Farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season and moisture supply needed to produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are citrus, olives, cranberries, fruit and vegetables.

Additional Farmland of Statewide Importance is land, in addition to Prime and Unique Farmlands, that is of statewide importance for the production of food, feed, fiber, forage and oilseed crops.

Additional Farmland of Local Importance are local areas in which there is concern for certain additional farmlands for the production of food, feed, fiber, forage, and oilseed crops, even though these lands are not identified as having national or statewide importance.

The Hunterdon County Soil Survey has identified twelve different soil types which exist within the airport study area. They include the following:

1. RfA- Reaville Silt Loam, wet variant, 0 to 2 percent slopes
2. RcB- Readington silt loam, 2 to 6 percent slopes (Prime Farmlands)
3. PeB- Penn Shaly silt loam, 2 to 6 percent slopes (Prime Farmlands)
4. NoB- Norton loam, 2 to 6 percent slopes (Prime Farmlands)
5. PfC2- Penn-Bucks complex, 2 to 6 percent slopes, eroded (Statewide Importance)
6. ReB- Reaville silt loam, 2 to 6 percent slopes (Statewide Importance)
7. PfB- Penn-Bucks complex, 2 to 6 percent slopes (Prime Farmlands)
8. BuB- Bucks silt loam, 2 to 6 percent slopes (Prime Farmlands)
9. Ma- Made Land
10. AbB- Abbottstown silt loam, 2 to 6 percent slopes (Statewide Importance)
11. LbB- Lansdowne silt loam, 0 to 6 percent slopes (Statewide Importance)
12. PeC2- Penn shaly silt loam, 6 to 12 percent slopes, eroded (Statewide Importance)

Of the above mentioned soils RcB, PeB, NoB, PfB, and BuB are designated as “Prime Farmland Soils”. The PfC2, ReB, AbB, LbB, and PeC2 soils are designated as “Statewide Important” soils. No Unique or Farmlands of Local Importance exist within the airport study area.

The development plan for the Solberg-Hunterdon Airport involves the use of land designated as Prime Farmlands and of Farmlands of Statewide Importance. Some of this land has been disturbed therefore, this soil is no longer considered Prime or Statewide Important Farmland. However, a large portion of the area remains undisturbed.

FAA Order 5050.4A(47)(d)(16) states in part "... the Farmland Protection Policy Act is not applicable and no formal coordination with the SCS in necessary if (a) the land was purchased prior to August 6, 1984 for the purpose of being converted; and (b) acquisition does not directly or indirectly convert farmland (e.g., land acquired for clear zones or noise compatibility)...".

Much of the proposed development will take place on existing airport property that was purchased through a number of acquisitions between 1939 and 1949. However, a 45 acre parcel designated prime farmland, located off the existing approach end to Runway 22, is planned to be acquired for ownership control of the existing RPZ and for planned taxiway development. A portion of this property acquisition (approximately 12 acres) constitutes a conversion due to the proposed taxiway construction. Having determined that the proposed airport development program will involve the conversion of prime farmland, it is recommended that a Farmland Conversion Impact Rating, Form AD-1006, be scored during the environmental assessment process. Although the results cannot be predetermined, given the relatively small amount of acreage to be converted as opposed to the total amount of agricultural land in the county, it is unlikely that the proposed development plan represents a threat to agricultural activity in the county.

6.2.14 Wild and Scenic Rivers and Trout Production and Maintenance Streams

There are no Wild and Scenic Rivers designated in or adjacent to the project area. The two streams adjacent to the project area, Holland Brook and Chambers Brook are not designated Trout Production or Trout Maintenance streams (NJ Water Quality Standards N.J.A.C. 7:94-4). Therefore, there are no impacts associated with airport development.

6.2.15 Energy Supply and Natural Resources

Minor changes to energy supply and natural resources will result from the proposed development but should not create a substantial demand on local energy supplies. Significant impacts to this category are not anticipated.

6.2.16 Light Emissions

The FAA requires the airport sponsor to consider the extent to which any lighting associated with an airport action will create an annoyance among people in the vicinity of the installation. The more visible lighting facilities often include rotating beacons and the high intensity sequenced flashers associated with approach lighting systems.

Several of the facilities, such as the improved primary and secondary runways and taxiways will be lighted. These lights should have no significant impact on residential or other sensitive areas (hospitals, schools, etc.). Approach lighting could potentially create an annoyance to people in the vicinity of an installation if this lighting were installed. It is anticipated that impacts to this category would not be significant, but a finding to this affect should be placed in an environmental assessment upon review of light source locations and types.

6.2.17 Solid Waste Impacts

Development at the airport should not greatly increase solid waste collection. Some short-term increases in solid waste generation may occur during the construction of new facilities, however, significant impacts are not anticipated.

6.2.18 Construction Impacts

Specific effects during construction which may create adverse environmental impacts include noise of construction equipment on the site, noise and dust from the delivery of materials, creation of borrow pits and the disposal of spoil, air pollution from burning debris, and water pollution from erosion. The extent to which any of these effects are subject to state or local ordinances or regulations should be addressed with measures to conform with such requirements.

Construction of airside and landside projects will be confined to existing and future airport property. Temporary pollution controls shall include but not be limited to items such as limiting work activities to normal business hours; no open burning; wetting of active work areas; covering of all trucks hauling loose materials; seeding inactive work areas with fast growing grasses; placement of hay bales and silt fences in sloped work areas; and disposal of all construction debris in properly licensed landfills. In all instances possible, application procedures outlined in FAA Advisory Circular 150/5370-10, Standards for Specifying Construction of Airports should adequately mitigate most construction related impacts which would be considered significant to both the environment and nearby communities.

All environmental construction controls required by the FAA, the State of New Jersey, and the Readington Township shall be incorporated by reference into the construction plans, specifications, and permits that will be obtained prior to implementation. Application procedures outlined in FAA Advisory Circular 150/5370-10, *Standards for Specifying Construction of Airports* should adequately mitigate most construction related impacts which would be considered significant to both the environments and nearby communities.

CHAPTER 7: AIRPORT DEVELOPMENT PLAN

FIGURES

Section 7-1: Airport Drawings Introduction

This chapter presents the airport development program and identifies the airside, landside, and support facilities to be included on the Airport Layout Plan (ALP). The ALP is a scaled graphic presentation of the existing and ultimate airport facilities, their location on the airport and the pertinent clearance and dimensional information required to show relationships with standard separations. The ALP drawing set is submitted to the FAA and is kept on file with the Airport Master Plan. This drawing set was prepared during the master planning process as an independent document. Included within the ALP are the following sheets:

Sheet 1	Cover Sheet
Sheet 2	Existing Airport Layout Plan
Sheet 3	Proposed Airport Layout Plan
Sheet 4	Building Area Plan, Phase I
Sheet 5	Building Area Plan, Phase II
Sheet 7	Runway 10-28 Approach Plan and Centerline Profile
Sheet 8	Existing and Proposed Runway 13-31 Approach Plan and Centerline Profile
Sheet 9	Proposed Runway 3-21 Approach Plan and Centerline Profile
Sheet 10	Existing Airport Surfaces - Part 77
Sheet 11	Proposed Airport Surfaces - Part 77
Sheet 12	2015 Noise Contours and N.J Air Safety Zone
Sheet 13	Airport Property Map - Exhibit "A"

The following section describes the proposed facilities that make up the airport layout plan. Specific projects will be identified and cost estimates developed in the following chapter along with project scheduling. The development plan was broken into airside, landside, and miscellaneous projects and was further broken into immediate and planned development. Each project, when completed, will include all necessary ancillary projects such as OFA and RSA obstruction removal and grading, runway line-of-sight grading requirements, drainage, lighting, signage and pavement markings.

Section 7-2: Airside Facilities

The proposed Airport Layout Plan, Figure 7-1, depicts the following airside projects:

7.2.1 Short-Term Development Pan

The short-term development plan places emphasis on immediate safety improvements and primary runway rehabilitation. Specifically the immediate safety improvements involve paving the 735 feet of turf runway and the existing turf overruns and providing paved taxiway extensions and entrances to each runway end. This would result in a total runway length of 3,735 feet of paved runway that would provide current users an additional safety margin. The taxiway extensions and entrances are needed to provide access to each runway end, thereby minimizing backtaxi maneuvers and minimizing aircraft runway occupancy time while allowing aircraft to use the full runway length.

A taxiway link or bypass taxiway is also planned to complete the parallel taxiway system and increase safety levels within the apron/terminal building area. This link will allow aircraft taxiing to a runway end to bypass the apron area. Although taxiway improvements are, by definition, airside projects, this project will be completed during the terminal area reconstruction due to its proximity and dependence on the terminal ramp area.

The ALP depicts the paving and extending of the current glider Runway 3-21 which is west of and parallel to the existing Runway 4-22. Proposed Runway 3-21 will become the primary runway and the existing Runway 4-22 will be converted to a full-length parallel taxiway. The completed runway will be a total length of 5,600 feet, 100 feet wide and pavement strength capable of accommodating design group 2 aircraft. A precision approach is planned at the Runway 3 end. Sufficient runway entrance/exit ramps will also be provided at various distances throughout the runway length. All new taxiways will be constructed with a minimum width of 35 feet.

Although there is an existing demand for the proposed 5,600 foot primary runway, realistically it will take several years to complete the project. Development of the primary runway will begin with the initiation of a formal Environmental Analysis, which will document all environmental impacts and mitigation measures. Preliminary engineering and design will follow the preparation of environmental reports. Construction will be the final phase of the project. Because it is difficult to predetermine the amount of time required from the initiation of the environmental process to the completion of construction, the following chapter presents an optimistic development schedule (4 years from initiation to completion) for planning and funding purposes.

7.2.2 Long Term Development Plan

Long-term airside improvements focuses on the secondary runway. Improvements to this runway are planned during the second development phase.

In order to achieve adequate wind coverage during all seasons, the existing turf Runway 13-31 will be paved and extended to the southeast for a total crosswind runway length of 3,700 feet. The runway will be a minimum of 75 feet wide and pavement strength constructed to meet design group 2 aircraft standards. A full-length parallel taxiway is to be constructed with a minimum width of 35 feet and include entrance and exit taxiway segments.

Assuming the primary and crosswind runways are developed as described above, the airport would obtain the necessary wind coverage required during all seasons to warrant the closing of Runway 10-28. Therefore, this runway is planned to be closed, releasing off-airport property from the New Jersey Airport Safety Zone. All setback requirements and imaginary surfaces associated with this runway would also be eliminated, allowing landside development to exist within areas formerly reserved for this runway.

Section 7-3: Landside Facilities

The current and forecast demand determined both an immediate and long term need for landside development.

7.3.1 Short-Term Development Plan

Figure 7-2 depicts the short-term landside development plan. Terrain features and pavement condition require the complete renovation of the existing terminal apron. This project involves the demolishing of existing pavement, including the removal of existing tie-down locations, excavation and reconstruction of the existing apron. Also included would be a 520 foot center taxiway segment that would complete that parallel taxiway system for Runway 4-22 and taxilane access to the rear door of the North Hangar to provide efficient aircraft handling of those aircraft stored within the large hangar. The existing fueling facilities will be removed and a new relocated fueling facility will be provided in its place.

The development will provide a regraded paved apron surface that will allow aircraft to taxi to each of the various existing and planned airport components. The paved apron area will also be expanded to meet immediate transient apron requirements. The end result of this project will be a revitalized apron with an expanded transient aircraft tie-down area that will allow aircraft to taxi freely to the different apron segments.

Development of a tie-down ramp and T-hangar storage facilities is planned south of the existing terminal apron area. A tie-down ramp will be provided between the transient aircraft parking apron and the proposed southside T-hangar building area to accommodate 32 paved tie-down positions.

T-hangar storage facilities are planned south of the proposed tie-down area to accommodate existing demand. There is a current demand for 37 T-hangar units. The airport only has 3 T-hangar units that are in poor condition. Phase I construction will provide 4 buildings of 12 units each for a total of 48 T-hangar units. Each unit will be provided with a paved apron for maneuvering the aircraft into and out of the unit.

7.3.2 Long-Term Development Plan

Long-term landside improvements are dictated by future storage facility demands and are thus capacity improvements. The long-term building area development plan assumes the relocation of the primary runway to Runway 3-21 and the closure of Runway 10-28. A precision approach to Runway 3 is also planned and all building and parking restriction setbacks are planned accordingly. The proposed shifting of the primary runway 350 feet to the west allows for the transient apron area to be further expanded to accommodate additional transient and based aircraft tie-down locations.

Airport property adjacent to and north of the existing North Hangar also will become available upon the closure of Runway 10-28 and the proposed conversion of existing Runway 4-22 to a parallel taxiway. Eight conventional hangars will be placed adjacent to the existing North Hangar with 4 hangars located on each side.

A new T-hangar storage area is planned north of the proposed conventional hangar development and will contain two rows of 12 units for a total of 24 additional t-hangar units for long-term T-hangar storage requirements through year 2015.

An expansion to the south tie-down ramp is also planned to resolve long-term capacity issues. The apron will be expanded to the parallel taxiway (existing Runway 4-22) and additional tie-down locations provided to allow for 52 tie-down positions.

Finally, the parking facilities will be improved to allow for several parking locations and on-airport access to these locations. The objective is to allow adequate parking facilities and auto access into and around the terminal building, restaurant, and North hangar areas. Unnecessary congestion in the existing parking facilities and long walking distances to individual user facilities will be minimized. The result will be a safer apron area. An assessment of terminal building space requirements should also be made during this time. Figure 7-3 depicts the long term development plan of the building area (Building Area Phase II).

Section 7-4: Miscellaneous Projects

In addition to the projects included in the proposed development plan, three ancillary projects have been recognized as necessary and are included as part of the airport improvements.

a.) Airfield Fencing. To improve the level of safety, a standard 6 foot chain-link fence should be constructed around all active airfield movement areas to deter deer entry and to prevent accidental incursions by pedestrians into the airfield's movement areas.

b.) Obstruction Survey and Removal. In the interest of safety, the identification, disposition and, if necessary, removal of known airport obstructions should be carried forward. Included in this project will be the removal of objects located within the runway visibility zone.

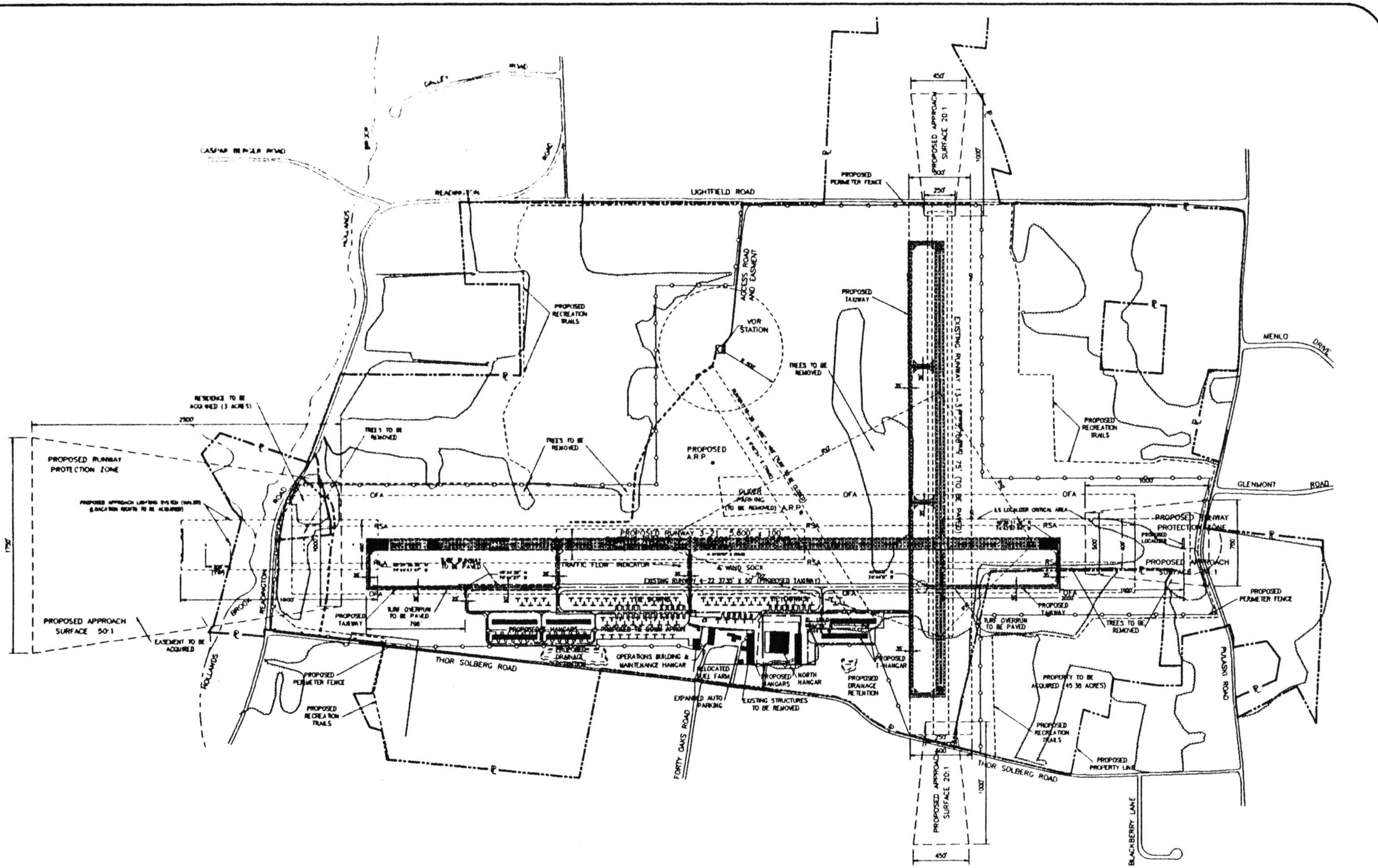
c.) Automated Surface Weather Observation Transmitter Station Installation. An automated weather reporting station will be installed to aid pilots in obtaining accurate local weather conditions on the airfield while in flight and while on the ground prior to departure.

Section 7-5: Property Acquisition and Easements

The Airport Layout Plan, Figure 7-1, clearly depicts all existing and proposed airport property boundaries.

The airport sponsor will need to acquire approximately 13 acres from a private parcel located off the north end of Runway 4-22 for immediate RPZ requirements. The sponsor is committed to ensuring compatible land use within noise sensitive areas and has proposed the acquisition of the entire 46 acre parcel for immediate RPZ requirements and long-term community compatibility with aircraft sound exposure. Additionally, a three acre parcel off the proposed south end of the runway will have to be acquired for OFA and RSA before Runway 3-21 can be expanded to the South. The land area to be acquired would total approximately 49 acres.

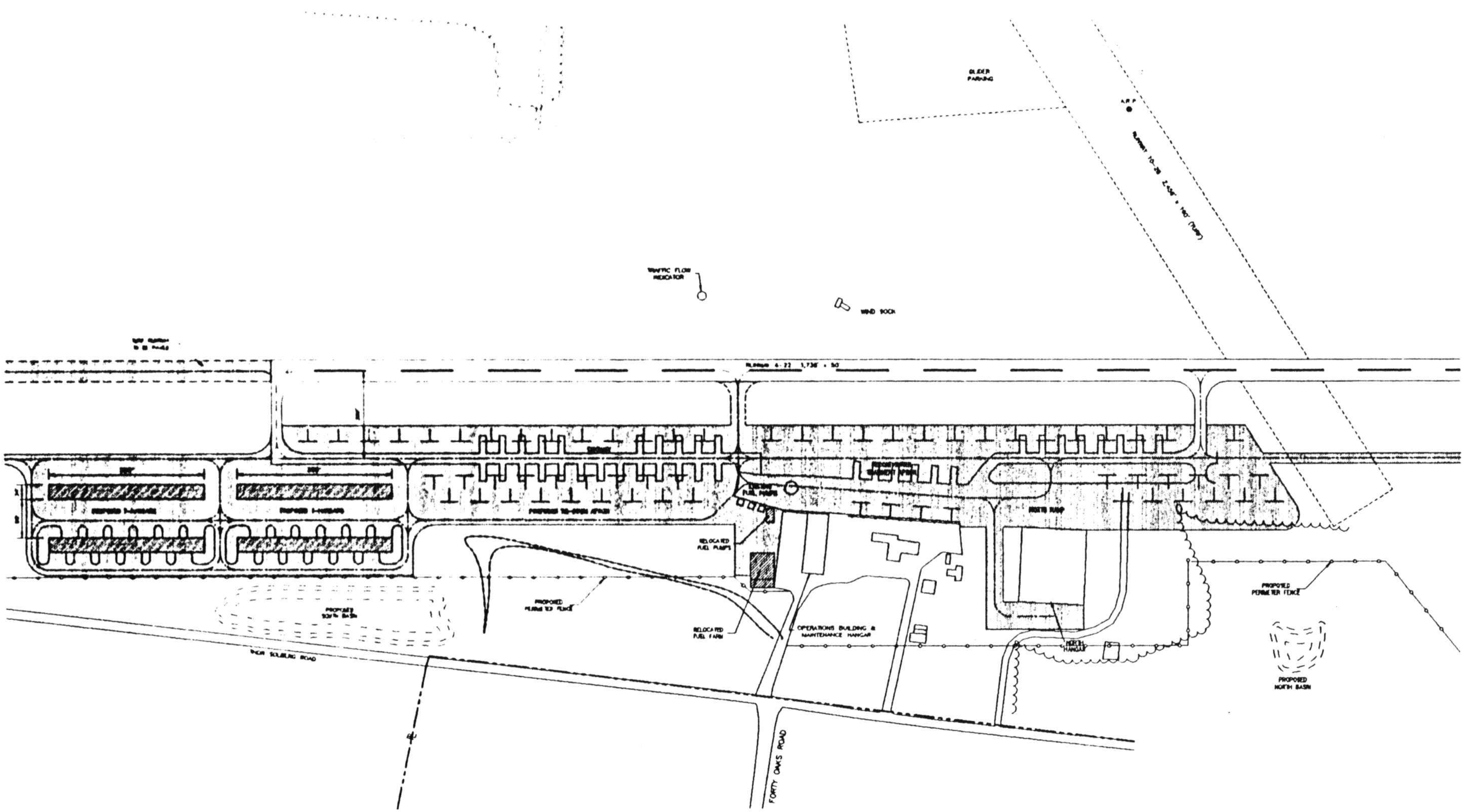
Avigation easements are recommended for any areas located within the RPZ's in order to ensure compatible land use development within these areas. Location rights may also need to be acquired for any navigational facilities that are required to be located off airport.



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 7-1

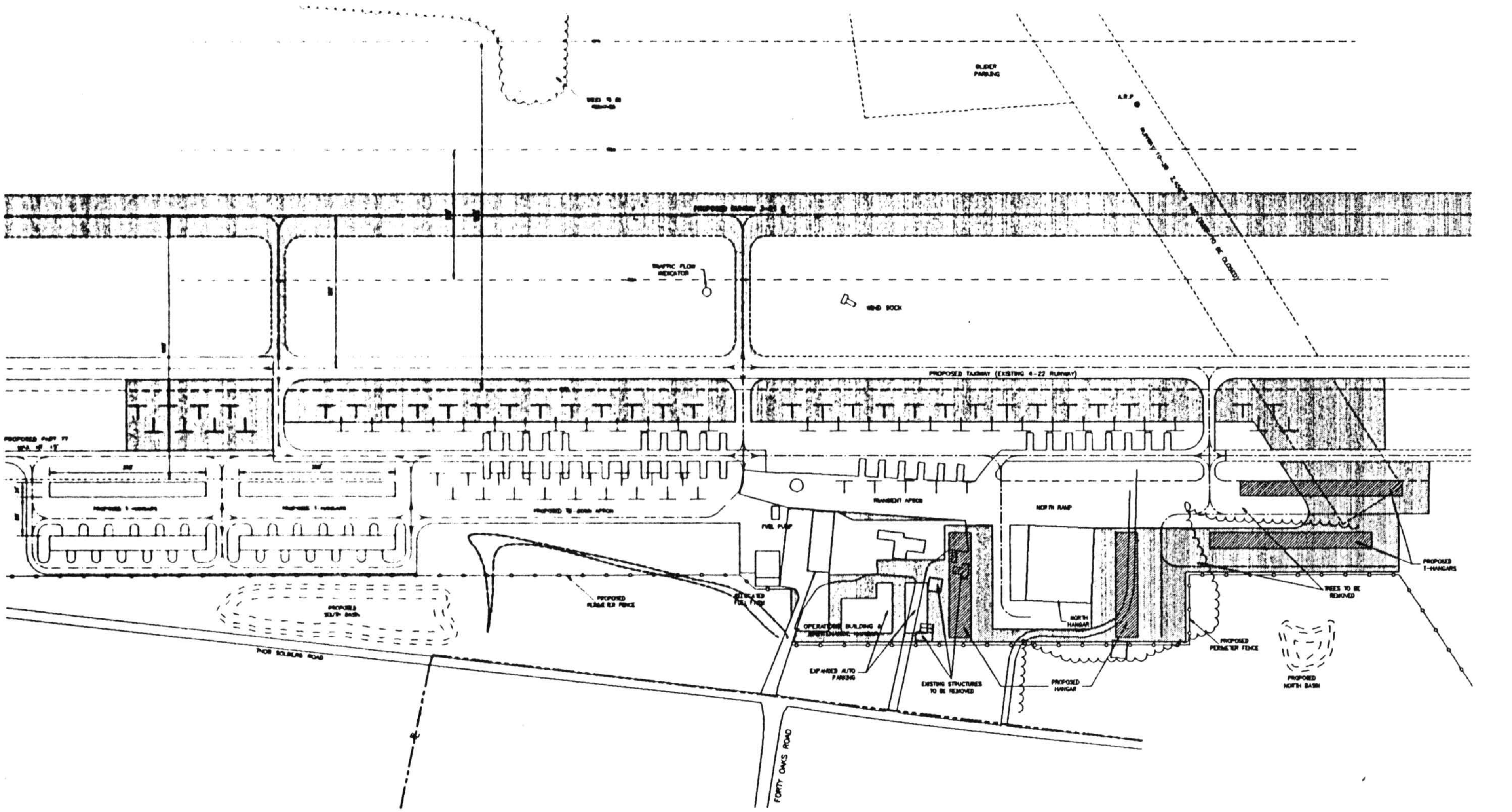
PROPOSED AIRPORT LAYOUT PLAN



SOLBERG-HUNTERDON AIRPORT
MASTER PLAN

Figure 7–2

BUILDING AREA PLAN PHASE 1



SOLBERG-HUNTERDON AIRPORT MASTER PLAN

Figure 7–3

BUILDING AREA PLAN PHASE 2

CHAPTER 8: DEVELOPMENT SCHEDULE AND COST ESTIMATES

TABLES

Section 8-1: Introduction

The schedule is based on short (1-5 years), intermediate (5-10 years) and long term (up to 20 years) development requirements. Each project is specifically sequenced and reflects the Sponsor's goals and objectives for Solberg-Hunterdon Airport. On this basis, airport development projects have been prioritized to:

a.) Enhance the safety of operations;

b.) Provide the aeronautical facilities and services required to meet the aviation demand and to do so in a fiscally responsible manner; and

c.) Achieve the maximum degree of compatibility between the airport, its environment, and the surrounding communities.

A series of preliminary cost estimates were developed to assist in preparing a more feasible schedule and to identify funding requirements. Lump sum estimates are shown by phase and individual project. The estimates reflect recent construction costs taken from similar projects at other northeast region general aviation airports. All costs include engineering and design, construction, and contingencies. All monetary values are 1996 constant dollars; future inflation not included.

Section 8-2: Project Identification and Description

This section describes the proposed facilities that make up the airport layout plan. Individual projects are described in the order that they will occur and the scope that each development project will entail. Project names will be referenced in preceding sections and documents.

1.) Runway 22 RPZ Property Acquisition

Approximately 13 acres of a large vacant private parcel located off the north end of Runway 4-22 is required for immediate RPZ requirements. The sponsor is committed to ensuring compatible land use within noise sensitive areas and has proposed the acquisition of the entire 46 acre parcel for immediate RPZ requirements and long-term community compatibility with aircraft sound exposure. Cost estimates are based on the purchase of the entire parcel.

2.) Terminal Apron and Taxiway Reconstruction

Terrain features and pavement condition requires the complete renovation and expansion of the existing terminal apron. This project involves the demolishing of existing pavement to include existing tie-down positions, excavation and reconstruction of the existing apron. Also included would be a 520 foot taxiway segment that would complete the parallel taxiway system for Runway 4-22 and taxiway access to the rear of the North Hangar.

The existing fueling facilities would need to be removed as a result of the apron regrading and reconstruction. A new fueling facility is planned to replace the existing at a relocated position adjacent to the existing auto parking area.

The reconfigured apron will provide space for 31 tie-down positions with access to all movement areas.

3.) Runway 4-22 Paving and Taxiway Construction

This project involves paving the 735 feet of turf runway that exists at the southwest end and construction of an associated paved taxiway extension. Also included in this project is the paving of the existing turf overruns. The taxiway will also be extended at the Runway 22 end with an entrance taxiway to both runway ends. This would result in a total runway length of 3,735 feet of paved runway with runway end access to minimize backtaxi maneuvers and runway occupancy time. The completion of the parallel taxiway would serve to improve the level of safety by reducing the amount of time an aircraft remains on an active runway taxiing to a runway end and to reduce congestion levels at the terminal apron.

The runway and taxiway should be constructed of comparable pavements, and include appropriate safety area, edge lighting, signage and marking.

4.) Automated Surface Report Transmitter Station Installation

Currently, the nearest 24-hour weather reporting station is Newark International. An automated surface observation report station will be installed to provide pilots with accurate local weather information. A computer system records transmits, and continually updates weather conditions to include: cloud ceiling, visibility, atmospheric pressure, wind direction and velocity, temperature and dew point. Pilots use this information while in flight and while on the ground during pre-flight and taxiing procedures.

5.) Pave and Extend Runway 3-21 and Parallel Taxiway

The ALP depicts the paving and extending of the current glider Runway 3-21 which is west of and parallel to the existing Runway 4-22. The project will occur over a period of several years and will include environmental studies, preliminary engineering, and construction.

The runway will be paved to a total length of 5,600 feet, 100 feet wide and pavement strength capable of accommodating design group 2 aircraft. The existing Runway 4-22 will be converted to a parallel taxiway and extended to include the full runway extension. Sufficient runway entrance/exit ramps are also to be provided at various points throughout the runway length. All new taxiways will be constructed with a minimum width of 35 feet.

The project will also include appropriate runway and taxiway safety area, edge lighting, signage and markings. One 3 acre parcel containing a residential dwelling will be acquired for RSA and OFA requirements. Tree removal for OFA, RSA and the runway visibility zone (RVZ) will be completed as part of this project.

6.) Obstruction Survey and Removal

A field survey will be conducted to determine obstructions that penetrate the planned departure and arrival surfaces for existing and proposed runway ends. Once obstructions are identified, they are removed (if possible) or are identified and published. The only obstructions will be trees that can be removed (preferable) or topped.

7.) Southside Tie-Down Apron Construction, Phase I

In order to meet tie-down location demands in the near term, a tie-down apron will be provided and will accommodate 32 paved tie-down positions. Existing paved tie-down positions will be removed as part of the apron construction.

8.) Southside T-Hangar Construction

The airport's existing 3 t-hangar units are clearly insufficient to handle current demand. A southside t-hangar facility will be located to the south of the new tie-down apron that will be constructed in the previous project. Four building rows consisting of 12 units each will provide a total of 48 units to meet short-term demand. This project will be divided into site preparation and hangar construction.

9.) Airfield Perimeter Fence Installation

To improve the level of safety, a 6 foot high, chain-link fence will be constructed to deter deer entry and to prevent incursions by pedestrians into the airfield's airside environment.

10.) Runway 3 Precision Instrument Approach

A precision approach to Runway 3 is planned for installation. Such an approach will allow continued operation during low visibility conditions that a reliever airport is entitled to provide. The type of approach facility to be installed has not been decided, however the instrumentation will likely consist of a localizer and glideslope for horizontal and vertical navigation and an approach lighting system. Furthermore, lighting and surface markings will be appropriate to the type of approach that is ultimately approved. The ALP depicts critical areas for an ILS precision approach system.

11.) Auto-Parking and Terminal Access Modification

The objective of this project is to allow adequate parking facilities and auto access into and around the terminal building, restaurant, and North Hangar areas. In order to reduce future congestion and minimize pedestrian activity on the aircraft apron, a series of small parking lots connected by an on-airport access road has been planned. The result will be a safer apron with convenient access to each of the user areas.

12.) North Conventional Hangar Construction, Phase I

To meet forecast conventional hangar storage space demands, areas on both the north and south side of the existing North Hangar are planned for development. The actual development of the area will be such as to allow for future development of additional hangar storage units beyond the planning period. Phase I development is the construction of 4 conventional units south of the large hangar. This project will be divided into site preparation and hangar construction.

13.) Pave Runway 13-31 and Parallel Taxiway Construction

As shown on the ALP, the existing turf Runway 13-31 will be paved and extended to the southeast for a total crosswind runway length of 3,700 feet. The runway will be a minimum of 75 feet wide and pavement strength constructed to meet design group 2 aircraft standards. A full-length parallel taxiway will also be provided with a minimum width of 35 feet. The parallel taxiway will also include the depicted entrance and exit taxiway segments.

14.) Transient and Southside Tie-down Apron Construction, Phase II

The new transient and southside tie-down aprons will be expanded over that which was completed in Phase I construction following the relocation of the primary runway. The existing parallel taxiway (to Runway 4-22) will no longer be required and will be utilized as part of an expanded tie-down apron. Apron pavement will be expanded to the proposed parallel taxiway (existing Runway 4-22) along the extended southside and transient ramp aprons to provide a total of 86 paved tie-down positions for the airport.

15.) North Conventional Hangar Construction, Phase II

Four additional conventional hangars with adequate taxiway access and paved apron are planned to resolve long-term conventional hangar demand. These hangars will be placed north of the existing North Hangar and will mirror those constructed in Phase I and total conventional hangars will increase from 4 to 8. This project will be divided into site -preparation and hangar construction.

If future demand beyond the planning period warrants, the southern hangars (Phase I) can be expanded towards Thor Solberg Road to include 7 conventional hangars for a total of eleven conventional hangars.

16.) North T-hangar Construction, Phase I

The North T-hangars are proposed to handle long-term T-hangar demand which is forecast to climb to 71 units by 2015. This development assumes Runway 10-28 is closed as proposed. Phase I improvements call for the development of 1 building of 12 T-hangars. These units will be located on the existing departure end of Runway 28. The entire area will be paved and provide taxiway access to the terminal apron. Site-preparation will occur first followed by hangar construction upon sufficient demand.

17.) North T-Hangar Construction, Phase II

The north T-hangar area will be expanded upon once sufficient demand exists. An additional area is shown to be paved and construction of a second 12 unit T-hangar building will be erected. The project will include site-preparation and hangar construction.

Section 8-3: Project Scheduling and Cost Estimates

8.3.1 Project Costs

For planning purposes, short-term projects are the most important and are the most realistic because the project need is based upon the most current information. The goal of the first five year period is to develop those areas which have the highest priority need and those which will result in direct benefit to the airport in terms of improved safety and meeting short-term demand. The short-term plan is recognized by the FAA as the airport's current 5-year plan. It is an immediate action program for implementing the highest priority projects, and serves as the basis for the Sponsor's capital improvement program (CIP). Using this criteria, Table 8-1 lists the short-term projects (Phase I) and cost estimates.

Table 8-1
Short-Term (Phase I) Project Cost Estimates

Project Title	Cost (1996 $)
Property Acquisition (Runway 22 RPZ- 45 acres)	$350,000
Terminal Apron and Taxiway Reconstruction	1,760,000
Runway 4-22 Paving and Taxiway Construction	1,050,000
Runway 3-21 Environmental Studies	200,000
Southside Tie-down Apron Construction, Phase I	620,000
Southside T-hangar Construction	2,190,000
Airport Perimeter Fence Installation	410,000
Automated Surface Report Transmitter Station Installation (NEXWOS)	75,000
Pave and Extend Runway 3-21 and Parallel Taxiway	6,700,000
Obstruction Survey and Removal	80,000
Runway 3 Precision Approach Installation	1,500,000
Total Short-Term Project Costs	$14,935,000

The remaining projects will be completed during the remainder of the planning period as demand necessitates. The goal for development within the five to ten year planning period is to implement those projects which will continue to build on the short-term improvements. Intermediate projects also include those which will increase the airport's operational utility (airside) in order to meet its defined airport role. Projects needed to implement the initial stages of the long-term plan would also be included in the intermediate phase (Phase II).

The long-term development goal is to complete those areas which continue to build on the intermediate term improvements and to implement the remaining projects necessary for the airport to meet its long-term demands (Phase III). The following Table 8-2 provides cost estimates associated with the remaining two phases.

Table 8-2
Intermediate and Long-Term (Phase II and III) Project Cost Estimates

Project Title	Cost (1996 $)
Auto Parking and Terminal Access Modification	$190,000
North Conventional Hangar Construction, Phase I	530,000
Pave Runway 13-31 and Parallel Taxiway Construction	3,420,000
Transient and Southside Tie-down Apron Construction, Phase II	530,000
North Conventional Hangar Construction, Phase II	880,000
North T-hangar Construction, Phase I	610,000
North T-Hangar Construction, Phase II	650,000
Total Long Term Improvement Costs	$6,810,000

Implementation of projects should occur when demand warrants. Since a master plan is conceptual in nature, it is further recommended that capital improvements be subject to more detailed engineering and environmental analysis prior to implementation. Capital costs should be viewed as estimates, subject to subsequent refinement.

8.3.2 Project Phasing

The purpose of this section is to provide a reasonable project development schedule and an estimated capital outlay phased over the planning period. The result is a capital budget plan that may be used to determine future costs and to identify needed funding sources to complete the projects. Table 8-3, *Phase I (1997-2001) Projects and Costs*, constitutes the airport's *capital improvement program (CIP)* and is broken into individual years. The *Phase II* and *Phase III Project Costs* (Tables 8-4 and 8-5, respectively), are more general in nature and provide phase estimates only, not by year.

Table 8-3
Phase I (1997-2001) Projects and Costs

Project Year	Project Description	Project Cost
1997	- Property Acquisition (Runway 22 RPZ and noise compatibility 45 acres). - Terminal Apron and Taxiway Reconstruction - Runway 4-22 Paving and Taxiway Construction - Runway 3-21 Environmental Studies Total 1997 Improvement Costs	$350,000 1,760,000 1,050,000 200,000 3,360,000
1998	- Southside Tie-down Apron Construction, Phase I - Southside T-hangar Site Prep/Taxilanes - Airport Perimeter Fence Installation - Runway 3-21 Preliminary Engineering Total 1998 Improvement Costs	620,000 890,000 410,000 880,000 2,800,000
1999	- Automated Surface Report Transmitter Station Installation (NEXWOS) - Southside T-hangar Construction (24 units) - Runway 3-21 Construction - Obstruction Survey and Removal Total 1999 Improvement Costs	75,000 650,000 2,910,000 80,000 3,715,000
2000	- Runway 3-21 Construction (Cont'd) Total 2000 Improvement Costs	 2,910,000
2001	- Southside T-hangar Construction - Runway 3 Precision Approach Installation Total 2001 Improvement Costs	650,000 1,500,000 2,150,000
Total Phase I Improvement Costs (Estimated)		$14,935,000

Table 8-4
Phase II (2002-2006) Projects and Costs

Project Year	Project Description	Project Cost
2002 to 2006	Auto Parking and Terminal Access Modification	$190,000
	North Conventional Hangar Construction, Phase I	530,000
	Pave Runway 13-31 and Parallel Taxiway Construction	3,420,000
	Total Phase II Improvement Costs	$4,140,000

Table 8-5
Phase III (2007-2015) Projects and Costs

Project Year	Project Description	Project Cost
2007 to 2015	Transient and Southside Tie-down Apron Construction, Phase II	$530,000
	North Conventional Hangar Construction, Phase II	880,000
	North T-hangar Construction, Phase I	610,000
	North T-hangar Construction, Phase II	650,000
	Total Phase III Improvement Costs	$2,670,000
Total Program Costs (Phases I, II & III)		$21,745,000

CHAPTER 9: PROGRAM FUNDING

TABLES

Section 9-1: Introduction

The potential financing of Solberg-Hunterdon Airport's future expenses was evaluated according to the various sources of airport revenues and other financial tools available.

It should be noted that while federal and state funding programs will contribute significantly to the development of "eligible" items, the primary responsibility for financing the airport's development plans remain with the airport sponsor.

Section 9-2: Source of Funds

Capital improvement program funding sources for Solberg-Hunterdon Airport are presented in Table 9-1. The funding sources indicated are the maximum FAA eligible discretionary monies, maximum state eligible matching share grants, and minimum sponsor funding. Ineligible items (those projects which will be 100 percent tenant/sponsor funded) are shown as "private" and may or may not result in additional costs to the sponsor. The funding eligibility levels represent the most optimistic scenario for outside funding assistance for the airport.

Airfield improvement projects such as pavement construction, lighting, obstruction removal, and public roadways are eligible for 90 percent federal funding and 5 percent state matching-share grants. Facilities and equipment projects such as airport navaids are 100 percent FAA funded and will not effect the financing plan. Ineligible items include private and/or revenue producing facilities such as hangars and tenant office space.

9.2.1 Federal Grants

The primary source of capital improvement funds is the FAA's Airport Improvement Program (AIP). Referred to as "discretionary monies", FAA grants are distributed annually on a case-by-case basis, and awarded on a priority level established in the National Plan of Integrated Airport Systems (NPIAS). These funds can be used to finance up to 90 percent of the construction cost of eligible items, such as land acquisition, airfield pavements, access roads and other public facilities.

In 1993, the Federal Aviation Administration and the New Jersey Department of Transportation, Division of Aeronautics, entered into a State Block Grant Program. Under the new agreement, the FAA has transferred the administrative responsibility for appropriating federal grant monies to a number of New Jersey airports. The FAA offers lump sum grants to the Division of Aeronautics, which in turn, allocates the funds to several approved general aviation airports, including Solberg-Hunterdon Airport.

Table 9-1
Airport Development Program
Source of Funds

Year	Project Description	Project Cost	Federal %	Federal $	State %	State $	Sponsor %	Sponsor $
			Participation					
Phase I								
1997	Property Acquisition (Runway 22 RPZ- 45 acres)	$350,000	90%	$315,000	5%	$17,500	5%	$17,500
1997	Terminal Apron and Taxiway Reconstruction	$1,760,000	90%	$1,584,000	5%	$88,000	5%	$88,000
1997	Runway 4-22 Paving and Taxiway Construction	$1,050,000	90%	$945,000	5%	$52,500	5%	$52,500
1997	Runway 3-21 Environmental Studies	$200,000	90%	$180,000	5%	$10,000	5%	$10,000
	1997 Project Costs	$3,360,000		$3,024,000		$168,000		$168,000
1998	Southside Tie-Down Apron Construction, Phase I	$620,000	90%	$558,000	5%	$31,000	5%	$31,000
1998	Southside T-hangar Site Prep/Taxilanes	$890,000	90%	$801,000	5%	$44,500	5%	$44,500
1998	Airport Perimeter Fence Installation	$410,000	90%	$369,000	5%	$20,500	5%	$20,500
1998	Rumway 3-21 Preliminary Engineering	$880,000	90%	$792,000	5%	$44,000	5%	$44,000
	1998 Project Costs	$2,800,000		$2,520,000		$140,000		$140,000
1999	Automated Surface Report Transmitter Station Installation (NE:	$75,000	90%	$67,500	5%	$3,750	5%	$3,750
1999	Southside T-hangar Contruction (24 units)	$650,000	0%	$0	0%	$0	100%	$650,000
1999	Runway 3-21 Construction	$2,910,000	90%	$2,619,000	5%	$145,500	5%	$145,500
1999	Obstruction Survey and Removal	$80,000	90%	$72,000	5%	$4,000	5%	$4,000
	1999 Project Costs	$3,715,000		$2,758,500		$153,250		$803,250
2000	Runway 3-21 Construction	$2,910,000	90%	$2,619,000	5%	$145,500	5%	$145,500
	2000 Project Costs	$2,910,000		$2,619,000		$145,500		$145,500
2001	Southside T-hangar Contruction (24 units)	$650,000	0%	$0	0%	$0	100%	$650,000
2001	Runway 3 Precision Approach Installation	$1,500,000	90%	$1,350,000	5%	$75,000	5%	$75,000
	2001 Project Costs	$2,150,000		$1,350,000		$75,000		$725,000
	Total Phase I	**$14,935,000**		**$12,271,500**		**$681,750**		**$1,981,750**

Table 9-1 (Cont'd)
Airport Development Program
Source of Funds (Con't)

Project Description		Project Cost	Participation					
			Federal		State		Sponsor	
Phase II	Auto Parking and Terminal Access Modification	$190,000	90%	$171,000	5%	$9,500	5%	$9,500
	North Conventional Hangar Construction, Phase I	$530,000	75%	$397,500	4%	$21,200	21%	$111,300
2002 to 2006	Pave Runway 13-31 and Parallel Taxiway Construction	$3,420,000	90%	$3,078,000	5%	$171,000	5%	$171,000
	Total Phase II	$4,140,000		$3,646,500		$201,700		$291,800
Phase III	Transient and Southside Tie-down Apron Construction,	$530,000	90%	$477,000	5%	$26,500	5%	$26,500
	North Conventional Hangar Construction, Phase II	$880,000	75%	$660,000	4%	$35,200	21%	$184,800
2007 to 2015	North T-hangar Construction, Phase I	$610,000	75%	$457,500	4%	$24,400	21%	$128,100
	North T-hangar Construction, Phase II	$650,000	75%	$487,500	4%	$26,000	21%	$136,500
	Total Phase III	$2,670,000		$2,082,000		$112,100		$475,900
	TOTAL PROGRAM	$21,745,000		$18,000,000		$995,550		$2,749,450

9.2.2 State Grants

In support of the state system plan, the New Jersey Department of Transportation also participates in the development of airports through the Division of Aeronautics. Presently, the State will contribute five percent to the cost of an AIP eligible and funded project, thus matching the local share of the project.

9.2.3 Sponsor Share

After 90 percent Federal AIP contribution, and the five percent state matching share contribution, the Solberg Aviation Company is obligated for the remaining five percent sponsor share.

9.2.4 Private

Private financing will be required for those projects not eligible for AIP funding (i.e., hangars). These are shown as "private" and may or may not result in additional costs to the sponsor.

Aircraft Performance Charts
For Runway Length Calculations

January 1997

Beechcraft Beechjet 400A

Conditions:

Takeoff Field Length	
Outside Air Temperature:	32°C
Takeoff Weight:	16,100 pounds
Pressure Altitude:	500 feet
Runway Gradient:	0.6% uphill
Runway Length Requirement	5,200 feet, see Figures A-1 through Figure A-3.

Beechcraft King Air C-90A

Conditions:

Accelerate/Stop Distance	
Outside Air Temperature:	32°C
Weight:	10,100 pounds
Pressure Altitude:	500 feet
Runway Length Requirement:	4,400 feet, see Figure A-4.

Beechcraft King Air B100

Conditions:

Accelerate/Stop Distance	
Outside Air Temperature:	32°C
Pressure Altitude:	500 feet
Weight:	11,800 pounds
Wind:	Zero
Runway Length Requirement:	4,500 feet, see Figure A-5.

Beechcraft B200/B200C

Conditions:

Accelerate/Go Distance	
Outside Air Temperature:	32°C
Pressure Altitude:	500feet
Weight:	12,500 pounds
Wind:	Zero
Runway Length Requirement:	5,600 feet, see Figure A-6.

Beechcraft B300/300C

Conditions:

Takeoff Field Length	
Takeoff Weight:	15,000 pounds
Outside Air Temperature:	32°C
Runway Gradient:	0.6% Uphill
Runway Length Requirement:	4,400 feet, see Figures A-7 and A-8.

Cessna Model 525

Conditions:	
Takeoff Field Length	
Weight:	10,400 pounds
Temperature:	32°C
Wind:	Zero
Runway gradient:	0.6% Uphill
Runway Length Requirement:	5,600 feet, see Figures A-9 and A-10.

Cessna Model 550

Conditions:	
Takeoff Field Length	
Weight:	14,100 pounds
Temperature:	32°C
Wind:	Zero
Pressure Altitude:	500 feet
Runway gradient:	1.0% Uphill
Runway Length Requirement:	5,600 feet, see Figures A-11 and A-12.

Cessna Model 560

Conditions:	
Takeoff Field Length	
Weight:	16,300
Temperature:	32°C
Wind:	Zero
Pressure Altitude:	500 feet
Runway gradient:	1.0% Uphill
Runway Length Requirement:	4,500 feet, see Figures A-13 and A-14.

Piper Cheyenne IIIA

Conditions:	
Accelerate/Go Distance	
Outside Air Temperature:	32°C
Pressure Altitude:	500 feet
Aircraft Weight:	11,200 pounds
Wind Component:	Zero
Runway Length Requirement:	5,000 feet, see Figure A-15.

Figure A-1

Beechcraft, Beechjet 400A

TAKE-OFF SPEEDS AND FIELD LENGTH
NO WIND – LEVEL RUNWAY

FLAPS 10°
SEA LEVEL

T.O. WGT. - LBS (KG)	ITEM	OUTSIDE AIR TEMPERATURE -°C									
		-40	-20	-10	0	10	15	20	30	40	50
	FAN RPM-%N_1	87.8	91.4	93.2	95.0	96.9	97.8	* 98.7	* 98.2	97.2	96.0
16,100 (7303)	V_1 ~ KIAS	109	109	109	108	108	108	109	110	112	116
	V_R ~ KIAS	114	114	114	114	114	114	115	115	116	117
	V_2 ~ KIAS	122	122	122	122	122	122	122	122	122	122
	TOFL ~ FT	3470	3711	3852	3963	4066	4169	4302	4731	5328	6113
15,500 (7031)	V_1 ~ KIAS	106	106	106	106	106	106	106	107	109	
	V_R ~ KIAS	112	112	112	112	112	112	112	113	113	
	V_2 ~ KIAS	120	120	120	120	120	120	120	120	120	
	TOFL ~ FT	3218	3443	3572	3694	3790	3867	3967	4379	4914	
15,000 (6804)	V_1 ~ KIAS	103	103	103	103	102	102	103	104	106	
	V_R ~ KIAS	109	109	109	109	109	109	110	110	111	
	V_2 ~ KIAS	118	118	118	118	118	118	118	118	118	
	TOFL ~ FT	3019	3230	3351	3466	3556	3627	3739	4102	4596	5222
14,500 (6577)	V_1 ~ KIAS	100	100	100	100	100	100	100	102	104	106
	V_R ~ KIAS	107	107	107	107	107	107	107	108	109	110
	V_2 ~ KIAS	116	116	116	116	116	116	116	116	116	116
	TOFL ~ FT	2826	3023	3136	3242	3327	3394	3497	3833	4288	4851
14,000 (6350)	V_1 ~ KIAS	97	97	97	97	97	97	97	99	101	103
	V_R ~ KIAS	105	105	105	105	105	105	105	106	106	107
	V_2 ~ KIAS	114	114	114	114	114	114	114	114	114	114
	TOFL ~ FT	2640	2824	2930	3030	3109	3172	3267	3578	3997	4512
13,500 (6123)	V_1 ~ KIAS	95	94	94	94	94	94	95	96	98	100
	V_R ~ KIAS	102	102	102	102	102	102	102	103	104	105
	V_2 ~ KIAS	112	112	112	112	112	112	112	112	112	112
	TOFL ~ FT	2469	2633	2730	2824	2898	2966	3044	3332	3717	4188
13,000 (5897)	V_1 ~ KIAS	93	93	92	92	92	92	92	93	95	97
	V_R ~ KIAS	100	100	100	100	100	100	100	101	102	102
	V_2 ~ KIAS	110	110	110	110	110	110	110	110	110	110
	TOFL ~ FT	2338	2506	2590	2676	2758	2804	2854	3097	3453	3883
12,500 (5670)	V_1 ~ KIAS	93	93	93	93	93	92	92	92	92	94
	V_R ~ KIAS	97	97	97	97	97	97	97	98	99	100
	V_2 ~ KIAS	108	108	108	108	108	108	108	108	108	108
	TOFL ~ FT	2317	2482	2565	2649	2730	2776	2824	2965	3197	3591
12,000 (5443) AND UNDER	V_1 ~ KIAS	93	93	93	93	93	93	93	92	92	91
	V_R ~ KIAS	96	96	96	95	94	96	96	96	96	97
	V_2 ~ KIAS	106	106	106	106	106	106	106	106	106	106
	TOFL ~ FT	2297	2469	2541	2626	2706	2748	2796	2932	3104	3316

* INTERPOLATION BETWEEN THESE FAN RPMS IS NOT ALLOWED. REFER TO TAKEOFF THRUST SETTING GRAPH.

BT04722

Interpolation

30	32	40
4731	4850	5328

Use this distance in Figure A-2 to interpolate for 500 foot Pres Alt.

Figure A-2

Beechcraft, Beechjet 400A

TAKE-OFF SPEEDS AND FIELD LENGTH
NO WIND – LEVEL RUNWAY

FLAPS 10°
1000 FT

T.O. WGT. - LBS (KG)	ITEM	OUTSIDE AIR TEMPERATURE -°C								
		-40	-20	-10	0	10	20	30	40	50
	FAN RPM-%N₁	89.0	92.7	94.5	96.3	96.2*	96.2*	96.2	97.2	96.0
16,100 (7303)	V_1 ~ KIAS	108	108	108	108	108	109	111	113	116
	V_R ~ KIAS	114	114	114	114	114	115	116	116	[illegible]
	V_2 ~ KIAS	122	122	122	122	122	122	122	122	[illegible]
	TOFL ~ FT	3622	3777	3916	4038	4139	4623	5053	5706	6590
15,500 (7031)	V_1 ~ KIAS	106	105	105	106	106	108	108	110	118
	V_R ~ KIAS	112	112	112	112	111	112	113	114	[illegible]
	V_2 ~ KIAS	120	120	120	120	120	120	120	120	120
	TOFL ~ FT	3288	3504	3633	3748	3849	4190	4872	5258	[illegible]
15,000 (6804)	V_1 ~ KIAS	103	102	102	102	102	104	106	107	[illegible]
	V_R ~ KIAS	109	109	109	109	109	110	111	111	[illegible]
	V_2 ~ KIAS	118	118	118	118	118	118	118	118	[illegible]
	TOFL ~ FT	3066	3286	3408	3514	3604	3926	4372	4905	[illegible]
14,500 (6577)	V_1 ~ KIAS	100	100	100	100	99	101	103	105	107
	V_R ~ KIAS	107	107	107	107	107	108	108	109	[illegible]
	V_2 ~ KIAS	116	116	116	116	116	116	116	116	[illegible]
	TOFL ~ FT	2889	3076	3190	3290	3373	3671	4063	4573	[illegible]
14,000 (6350)	V_1 ~ KIAS	97	97	97	97	97	98	100	102	104
	V_R ~ KIAS	106	105	106	105	104	106	106	107	[illegible]
	V_2 ~ KIAS	114	114	114	114	114	114	114	114	[illegible]
	TOFL ~ FT	2882	2976	2981	3075	3152	3428	3808	4269	4821
13,500 (6123)	V_1 ~ KIAS	94	94	94	94	94	96	97	99	[illegible]
	V_R ~ KIAS	102	102	102	102	102	103	104	104	[illegible]
	V_2 ~ KIAS	112	112	112	112	112	112	112	112	[illegible]
	TOFL ~ FT	2601	2661	2779	2886	2939	3192	3545	3968	[illegible]
13,000 (5897)	V_1 ~ KIAS	93	93	92	92	92	92	94	98	[illegible]
	V_R ~ KIAS	100	100	100	100	98	100	101	102	[illegible]
	V_2 ~ KIAS	110	110	110	110	110	110	110	110	[illegible]
	TOFL ~ FT	2391	2563	2649	2735	2817	2988	3294	3673	[illegible]
12,500 (5670)	V_1 ~ KIAS	93	93	93	93	93	92	92	93	95
	V_R ~ KIAS	97	97	97	97	97	98	99	99	[illegible]
	V_2 ~ KIAS	108	108	108	108	108	108	108	108	[illegible]
	TOFL ~ FT	2369	2539	2622	2708	2789	2910	3074	3400	[illegible]
12,000 (5443) AND UNDER	V_1 ~ KIAS	93	93	93	93	93	92	92	91	[illegible]
	V_R ~ KIAS	94	94	94	94	94	96	98	97	[illegible]
	V_2 ~ KIAS	108	108	108	108	108	108	108	108	[illegible]
	TOFL ~ FT	2348	2515	2598	2682	2763	2879	3037	3222	[illegible]

* INTERPOLATION BETWEEN THESE FAN RPMS IS NOT ALLOWED. REFER TO TAKEOFF THRUST SETTING GRAPH.

Interpolation

30	32	40
5053	5066	5706

↓ Apply this distance to calculation at bottom of this page to interpolate for 500 ft. PA.

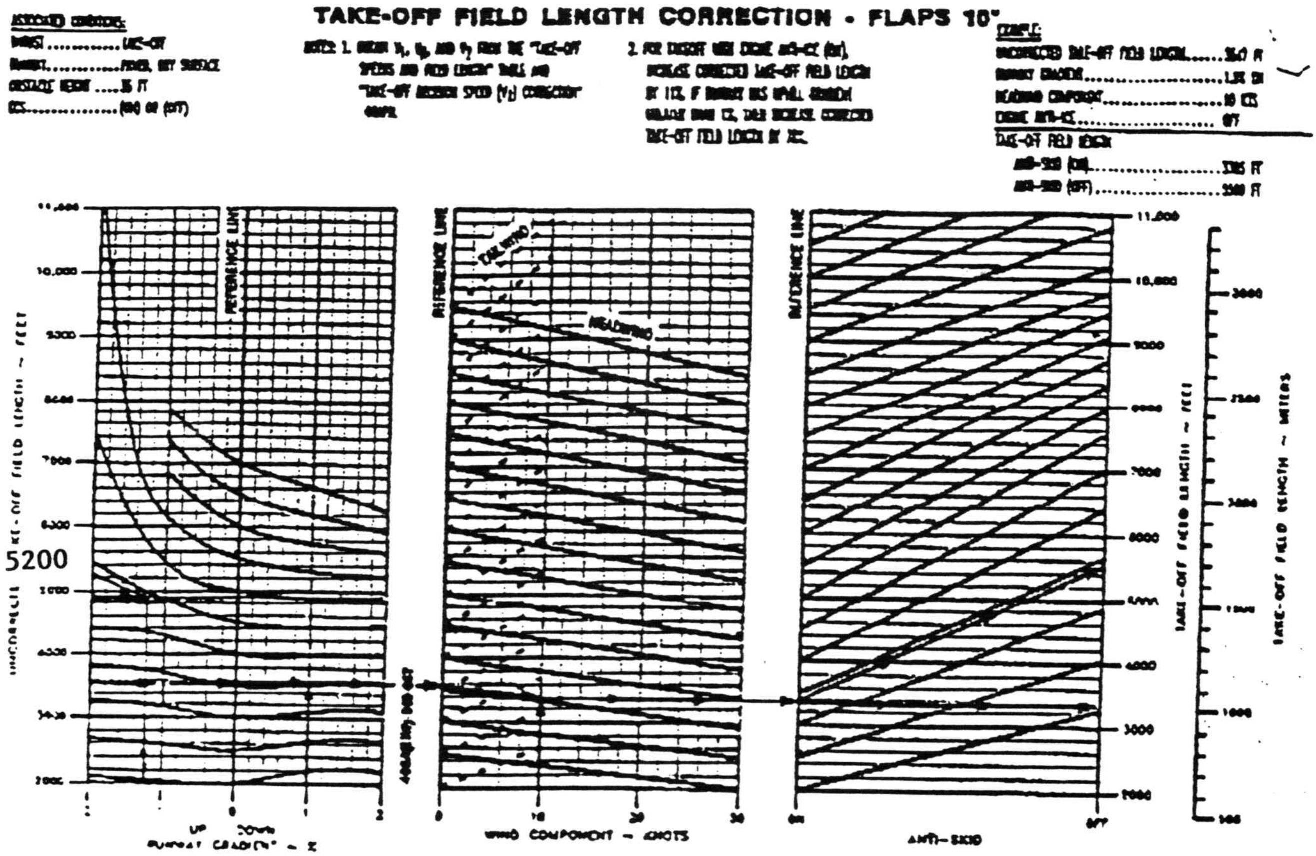
PA Interpolation:

SL	500 ft PA	1000 ft PA.
4850	4958	5706

↓ Enter Figure A-3 with this distance to correct for runway gradient.

Figure A-3

Beechcraft, Beechjet 400A



ACCELERATE-STOP DISTANCE

ASSOCIATED CONDITIONS:
POWER ..... 1. TAKE-OFF POWER SET BEFORE BRAKE RELEASE
2. BOTH ENGINES TO GROUND FINE AT DECISION SPEED
FLAPS ..... UP
BRAKING ... MAXIMUM WITHOUT SLIDING TIRES
RUNWAY ... PAVED, LEVEL, DRY SURFACE

WEIGHT ~ POUNDS	DECISION SPEED ~ KTS
10,100	97
9000	87
7850	80
7000	80

NOTE: DISTANCES INCLUDE A TIME DELAY EQUIVALENT TO 3 SECONDS AT ENGINE FAILURE SPEED.

EXAMPLE:
OAT .... 25°C
FIELD PRESSURE ALTITUDE .... 3966 FT
TAKE-OFF WEIGHT .... 9650 LBS
HEADWIND COMPONENT .... 10 KTS
ACCELERATE-STOP DISTANCE ..... 4074 FT
DECISION SPEED .... 93 KTS

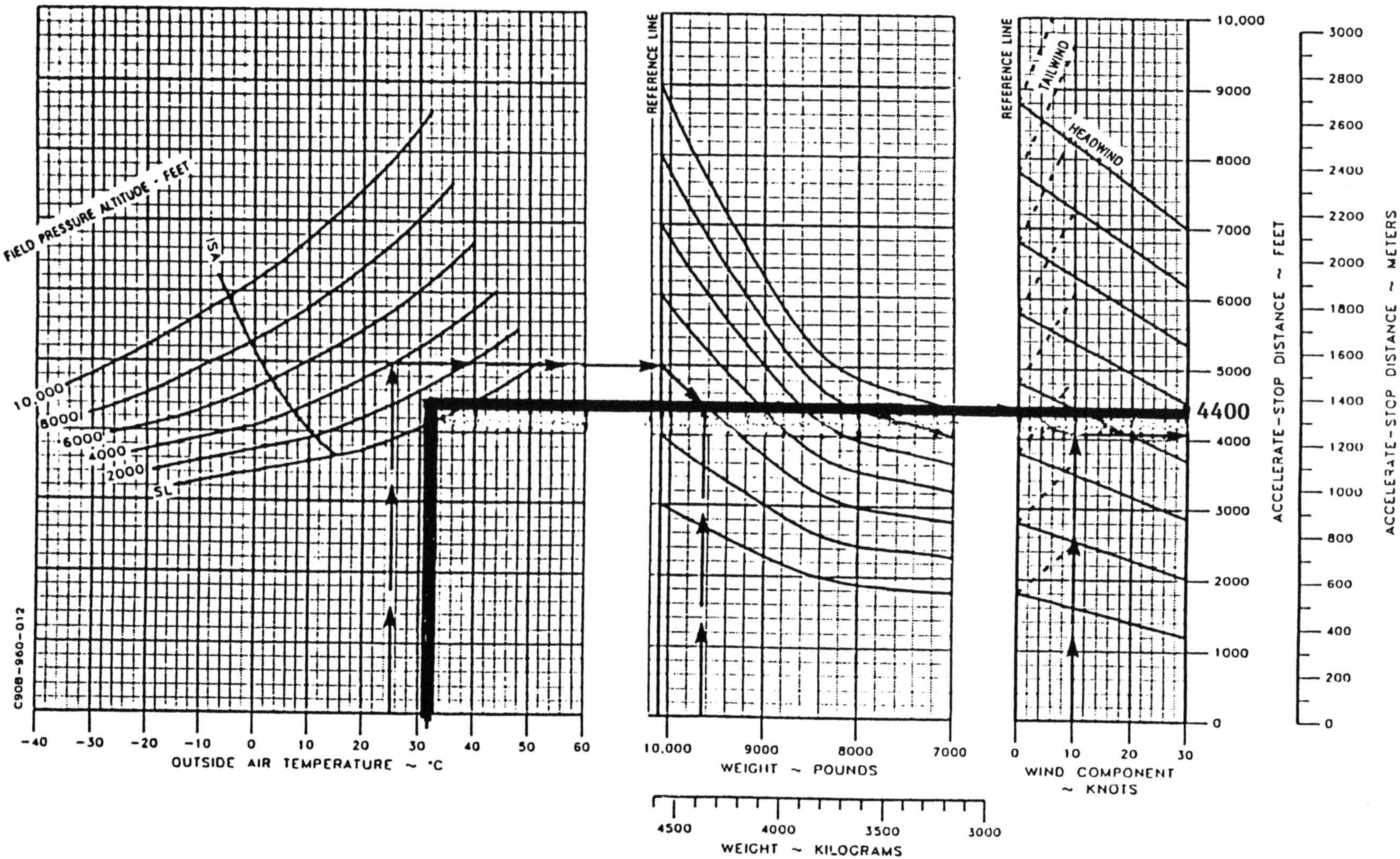


Figure A-5

ACCELERATE — STOP DISTANCE — FLAPS 0%

ASSOCIATED CONDITIONS

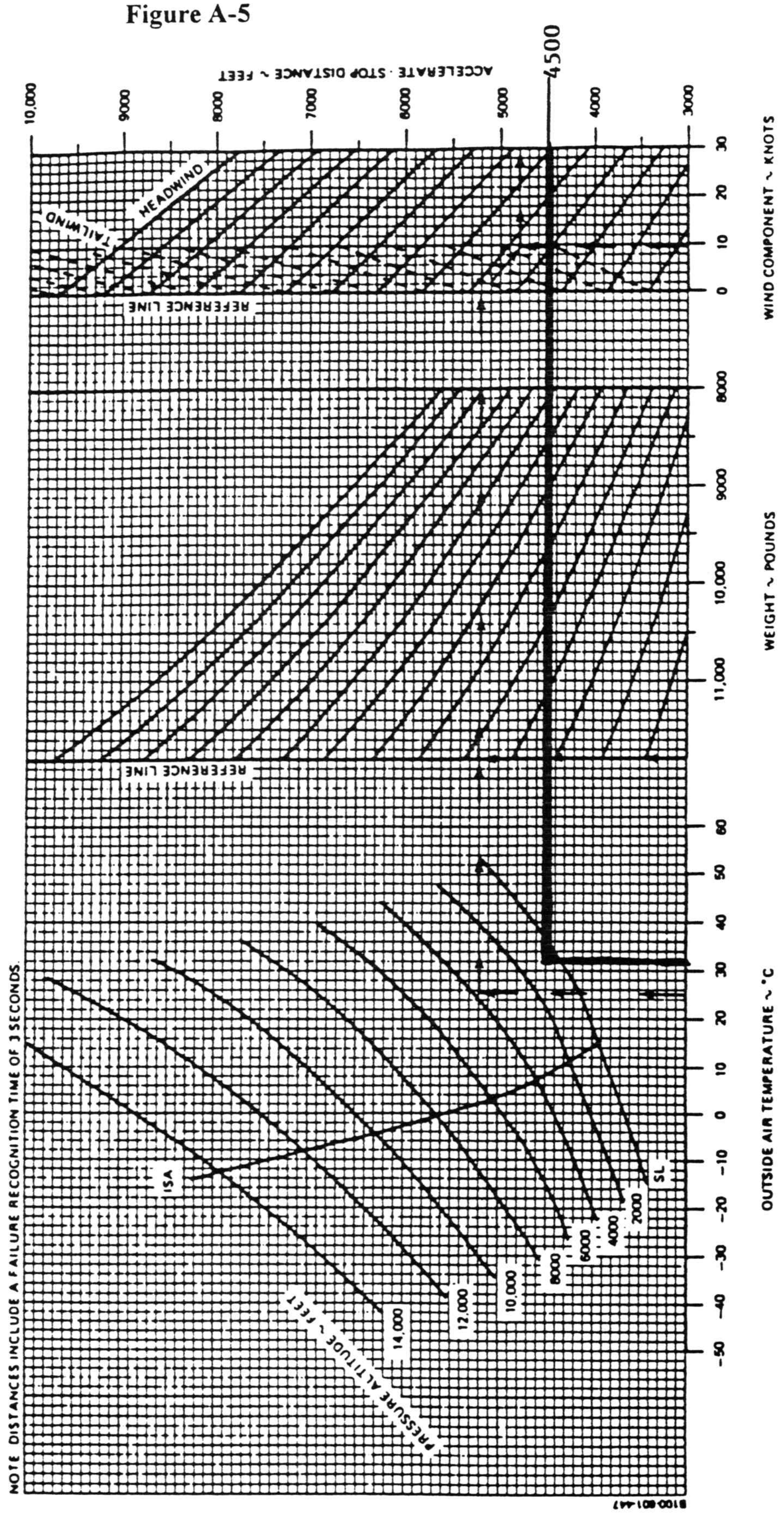
POWER	1. TAKE OFF POWER SET BEFORE BRAKE RELEASE 2. BOTH ENGINES IDLE AT ENGINE FAILURE SPEED AND REVERSE OPERATING ENGINE
FLAPS	0%
BRAKING	MAXIMUM
RUNWAY	PAVED, LEVEL, DRY SURFACE

WEIGHT ~ POUNDS	ENGINE FAILURE SPEED ~ KNOTS
11 800	97
11 500	96
11 000	95
10 000	92
9 000	89

EXAMPLE

OAT	25°C
PRESSURE ALTITUDE	3966 FT
WEIGHT	11,800 LBS
HEADWIND COMPONENT	9.5 KTS
ENGINE FAILURE SPEED	97 KTS IAS
ACCELERATE - STOP DISTANCE	4800 FT

NOTE: DISTANCES INCLUDE A FAILURE RECOGNITION TIME OF 3 SECONDS.



ACCELERATE - GO - FLAPS APPROACH

ASSOCIATED CONDITIONS:

POWER . . . . . TAKE-OFF POWER SET BEFORE BRAKE RELEASE
FLAPS . . . . . APPROACH
AUTOFEATHER . ARMED
LANDING GEAR . RETRACT AFTER LIFT-OFF
RUNWAY . . . PAVED, LEVEL, DRY SURFACE
OBSTACLE HEIGHT . . 35 FEET

WEIGHT ~ POUNDS	SPEED ~ KNOTS V_R	V_2
12,500	94	106
12,000	94	105
11,000	94	103
10,000	94	101
9000	94	99

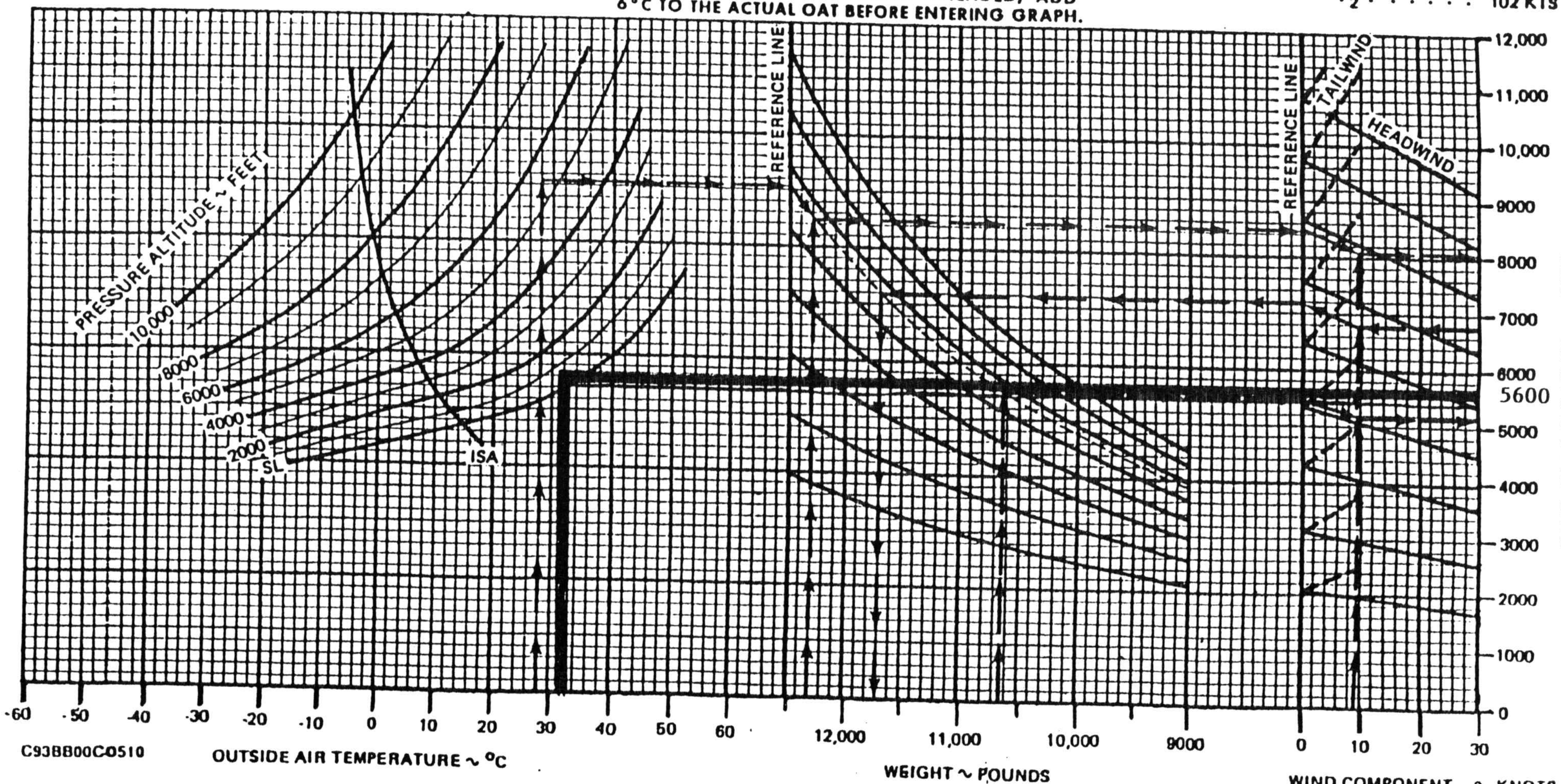
NOTE:
1. AIR DISTANCE IS 50% OF TAKE-OFF FIELD LENGTH.
2. V_1 (ENGINE FAILURE SPEED) EQUALS V_R (ROTATION SPEED).
3. USABLE CLEARWAY CANNOT EXCEED 25% OF THE RUNWAY LENGTH.
4. FOR OPERATION WITH ICE VANES EXTENDED, ADD 6°C TO THE ACTUAL OAT BEFORE ENTERING GRAPH.

EXAMPLE:

OAT . . . . 28°C
PRESSURE ALTITUDE . . . . . . 5430 FT
HEADWIND COMPONENT . . . . . . 9.5 KTS

TAKE-OFF WEIGHT ~ POUNDS	TAKE-OFF FIELD LENGTH ~ FEET
12,300	8080
11,700	6786
10,625	5150

SPEEDS (10,625 POUNDS) V_R . . . . 94 KTS
V_2 . . . . 102 KTS



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TAKE-OFF SPEEDS AND FIELD LENGTHS - FLAPS APPROACH (A/C AND BLEED AIR ON) PRESSURE ALTITUDE: SEA LEVEL

T.O. WEIGHT	ITEM	OUTSIDE AIR TEMPERATURE - °C								
		-35	-15	-5	5	15	25	35	45	52
15,000 LBS	V_1 - KIAS	100	99	99	99	99	99	101	103	104
	V_R - KIAS	103	103	103	103	104	104	104	104	105
6804 KG	V_2 - KIAS	109	109	109	109	109	109	109	109	109
	TOFL - FT	2387	2733	2916	3103	3300	3612	4154	4746	5199
14,500 LBS	V_1 - KIAS	98	97	97	97	97	97	99	101	102
	V_R - KIAS	102	102	102	102	102	102	103	103	103
6577 KG	V_2 - KIAS	107	107	107	107	107	107	107	107	107
	TOFL - FT	2260	2541	2712	2889	3068	3354	3862	4407	4826
14,000 LBS	V_1 - KIAS	98	97	97	96	96	96	98	99	100
	V_R - KIAS	102	102	102	102	102	102	102	102	102
6350 KG	V_2 - KIAS	107	107	107	107	107	106	106	106	105
	TOFL - FT	2179	2450	2607	2774	2939	3181	3629	4114	4476
13,500 LBS	V_1 - KIAS	97	96	96	96	95	96	97	99	99
	V_R - KIAS	102	102	102	102	102	102	102	102	102
6123 KG	V_2 - KIAS	107	107	107	107	107	107	106	106	106
	TOFL - FT	2099	2365	2515	2675	2836	3066	3482	3968	4314
13,000 LBS	V_1 - KIAS	97	96	96	95	95	95	96	98	99
	V_R - KIAS	102	102	102	102	102	102	102	102	102
5897 KG	V_2 - KIAS	108	107	107	107	107	107	106	106	106
	TOFL - FT	2020	2282	2425	2578	2736	2955	3346	3828	4169
12,500 LBS	V_1 - KIAS	96	95	95	95	94	94	96	97	98
	V_R - KIAS	102	102	102	102	102	102	102	102	102
5670 KG	V_2 - KIAS	108	108	107	107	107	107	106	106	106
	TOFL - FT	1947	2201	2338	2484	2638	2847	3216	3662	4007
12,000 LBS	V_1 - KIAS	96	95	94	94	94	94	95	96	98
	V_R - KIAS	102	102	102	102	102	102	102	102	102
5443 KG	V_2 - KIAS	108	108	108	107	107	107	107	106	106
	TOFL - FT	1879	2122	2253	2392	2539	2742	3091	3505	3850
11,500 LBS	V_1 - KIAS	95	94	94	94	93	93	94	96	97
	V_R - KIAS	102	102	102	102	102	102	102	102	102
5216 KG	V_2 - KIAS	108	108	108	108	108	107	107	106	106
	TOFL - FT	1812	2044	2169	2301	2441	2637	2968	3362	3675
11,000 LBS	V_1 - KIAS	94	94	93	93	93	93	94	95	96
	V_R - KIAS	102	102	102	102	102	102	102	102	102
4989 KG	V_2 - KIAS	108	108	108	108	108	107	107	106	106
	TOFL - FT	1744	1966	2085	2211	2344	2534	2847	3223	3513
10,500 LBS	V_1 - KIAS	94	93	93	92	92	92	93	94	95
4763 KG	V_R - KIAS	102	102	102	102	102	102	102	102	102
AND	V_2 - KIAS	108	108	108	108	108	107	107	107	106
UNDER	TOFL - FT	1678	1889	2002	2122	2248	2428	2729	3085	3360

NOTE INTERSECTION IN SHADED AREAS EXCEED OPERATING LIMITATIONS AND ARE PRESENTED AS INTERPOLATION AIDS ONLY.

fmmtab7

Interpolation—

25	32	35
3612	3991	4154

↓

Enter Figure A-8 using thi
distance to corrct for
runway gradient.

TAKE-OFF FIELD LENGTH - FLAPS APPROACH

CORRECTED FOR RUNWAY GRADIENT AND WIND COMPONENT
AIR CONDITIONING AND BLEED AIR ON

NOTES: 1. OBTAIN THE TAKE-OFF FIELD LENGTH FROM THE APPROPRIATE "TAKE-OFF SPEEDS AND FIELD LENGTHS" TABLE. ENTER THE GRAPH BELOW WITH THAT VALUE, AND DETERMINE THE FIELD LENGTH CORRECTED FOR RUNWAY GRADIENT AND WIND COMPONENT.

2. THE WIND GRIDS INCLUDE FACTORS OF 50% FOR HEADWINDS AND 150% FOR TAILWINDS. THEREFORE, COMPONENTS OF REPORTED WINDS MAY BE USED DIRECTLY IN THE GRAPH.

EXAMPLE:
UNCORRECTED TAKE-OFF FIELD LENGTH ...... [illegible] FT
RUNWAY GRADIENT ...... [illegible] DN
HEADWIND COMPONENT ...... 10 KTS
CORRECTED TAKE-OFF FIELD LENGTH ...... [illegible] FT

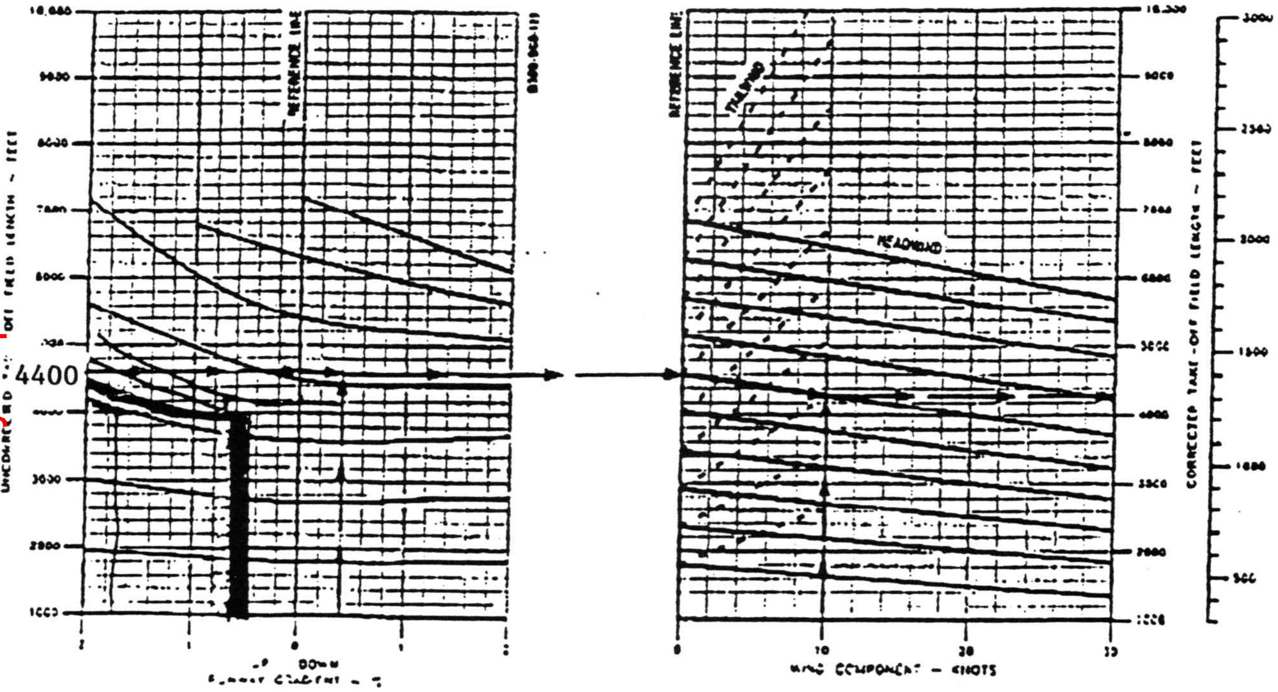


Figure A-9

Cessna, Model 525

TAKEOFF PERFORMANCE

TAKEOFF FIELD LENGTH - 15° FLAPS

(Distance to 35 Feet Above the Runway)
Anti-Ice Off, Zero Wind

Interp.
32 4218

Elevation = Sea Level

Ambient Temp. °C / °F	Takeoff Weight (lbs) 10,400	10,200	10,000	9,600	9,000	8,500	8,000	7,000
0 / 32	2940	2750	2610	2440	2210	2150	2080	1970
10 / 50	3030	2860	2690	2520	2280	2210	2140	2040
15 / 59	3080	2910	2740	2560	2320	2250	2180	2070
20 / 68	3320	3120	2930	2650	2390	2260	2190	2060
25 / 77	3570	3370	3160	2770	2470	2280	2210	2050
30 / 86	4010	3800	3590	3170	2610	2380	2210	2050
35 / 95	4530	4320	4100	3660	3010	2530	2300	2050
40 / 104	5090	4870	4640	4190	3510	2950	2440	2040
45 / 113	—	—	—	4750	4050	3470	2900	2100
50 / 122	—	—	—	—	4610	4010	3420	2250
Climb Wght Temp Limits °C/°F	41/106	42/108	44/111	47/117	52/126	54/129	54/129	54/129
Field Length at Temp Limits (ft)	5210	5090	5100	4990	4830	4440	3830	2590

500 ft. PA Interp.
4427

Elevation = 1,000 Feet

Ambient Temp. °C / °F	Takeoff Weight (lbs) 10,400	10,200	10,000	9,600	9,000	8,500	8,000	7,000
0 / 32	3030	2860	2700	2520	2280	2210	2140	2040
10 / 50	3150	2970	2800	2610	2350	2280	2210	2110
15 / 59	3280	3100	2920	2670	2410	2310	2240	2120
20 / 68	3580	3370	3160	2790	2500	2320	2250	2100
25 / 77	3920	3710	3490	3060	2610	2380	2260	2100
30 / 86	4420	4200	3980	3540	2880	2530	2300	2100
35 / 95	4960	4730	4510	4050	3370	2810	2440	2090
40 / 104	—	5300	5070	4600	3890	3310	2730	2090
45 / 113	—	—	—	—	4450	3850	3250	2230
50 / 122	—	—	—	—	—	4400	3780	2510
Climb Wght Temp Limits °C/°F	38/100	40/104	41/106	44/111	49/120	52/126	52/126	52/126
Field Length at Temp Limits (ft)	5300	5300	5180	5060	4900	4620	3990	2720

Interp.
32 4636

Figure A-10

Cessna, Model 525

TAKEOFF FIELD LENGTH - FEET, WITH FLAPS 15°

Determine takeoff field length, V_1, V_R, V_2 and V_{ENR} from Figure 4-21 and correct for runway gradient and anti-icing requirements using figure 4-20.

If the required distance is greater than the available distance, the airplane weight must be reduced until distance required is less than or equal to distance available.

NOTE

All anti-ice on performance presented in this FAA Airplane Flight Manual is based on Anti-Ice Systems On - All (engine, wing and windshield).

TAKEOFF CORRECTION FACTORS - FLAPS 15°

CORRECTION FACTORS - RUNWAY GRADIENT		
RUNWAY GRADIENT	SHADED AREA V1	NONSHADED AREA V1
2% UPHILL	USE V_R	USE V_R
1% UPHILL	USE V_R	USE V_R
1% DOWNHILL	SUBTRACT 3 KNOTS	NO CORRECTION
2% DOWNHILL	SUBTRACT 5 KNOTS	NO CORRECTION
ANTI-ICE ON	NO CORRECTION	NO CORRECTION

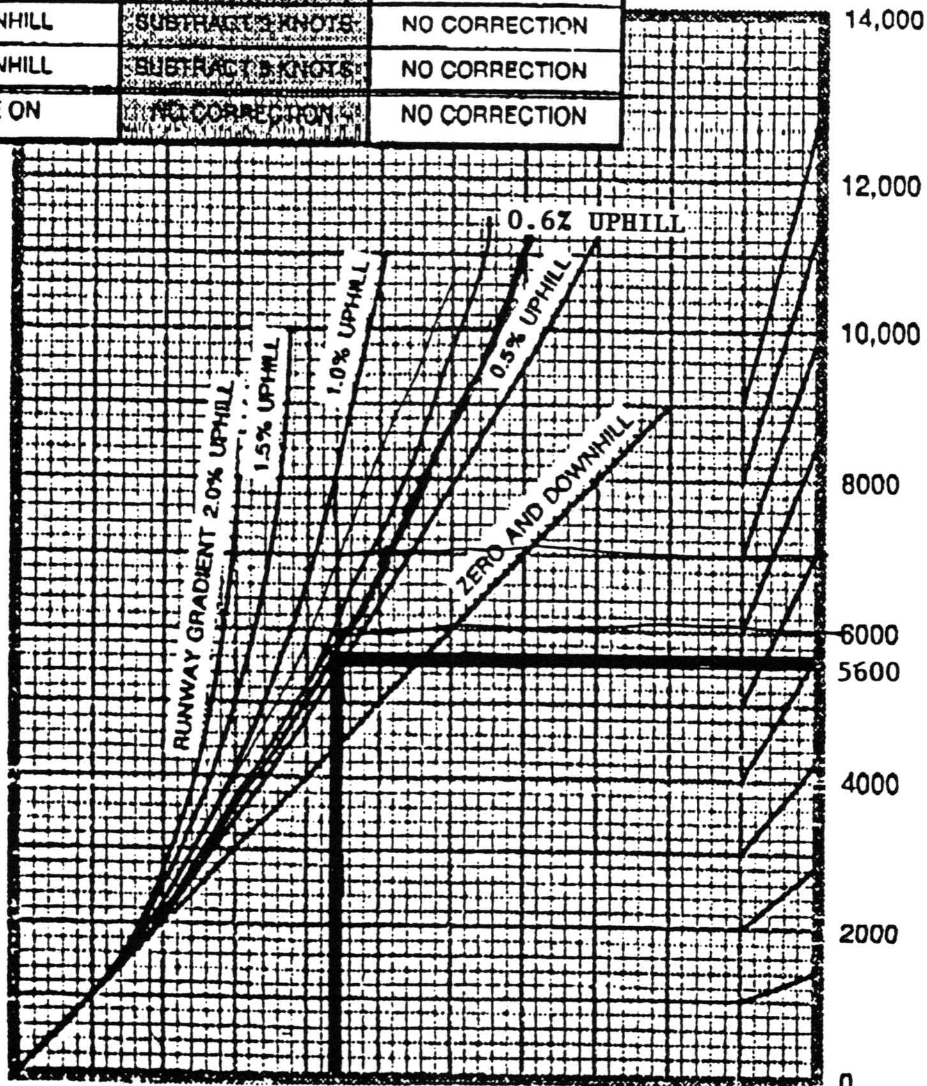


Figure A-11

Cessna, Model 550

TAKEOFF FIELD LENGTH - FEET

FLAPS - 15°
SEA LEVEL

Figure A-11

Cessna, Model 550

CONDITIONS: RUNWAY GRADIENT - ZERO; LANDING GEAR - DOWN; ANTI-ICE SYSTEMS - OFF; SPEEDBRAKES - RETRACT; INOPERATIVE ENGINE - WINDMILLING AFTER V_1; OPERATIVE ENGINE - TAKEOFF THRUST

SOME CONDITIONS DO NOT MEET CLIMB REQUIREMENTS. OBTAIN ALLOWABLE WEIGHT FROM MAXIMUM TAKEOFF WEIGHT TABLES.

Interp

30
4580

32
4800

35
5130

WEIGHT = 14100 LBS VENR = 153 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	10 KTS DIST FT	20 KTS V1 KIAS	20 KTS DIST FT	30 KTS V1 KIAS	30 KTS DIST FT	VR KIAS	V2 KIAS
-25	109	3830	109	2880	109	2610	108	2370	108	2150	109	117
[illegible]	109	3890	109	2930	109	2660	108	2420	108	2200	109	117
[illegible]	[illegible]	3970	109	2980	109	2710	108	2470	107	2240	109	117
[illegible]	[illegible]	4050	109	3030	109	2760	108	2520	107	2290	109	117
[illegible]	[illegible]	4130	109	3080	109	2810	108	2560	107	2330	109	117
[illegible]	[illegible]	4210	109	3130	109	2860	108	2610	107	2380	109	117
5	108	4310	109	3200	109	2920	108	2670	107	2430	109	117
10	108	4470	109	3330	109	3010	108	2760	108	2510	109	117
15	108	4640	109	3450	109	3120	109	2850	108	2600	109	117
20	108	5020	109	3760	109	3400	109	3070	109	2780	109	117
25	109	5460	110	4130	110	3740	110	3370	110	3020	110	117
30	110	6030	110	4580	110	4140	110	3730	110	3340	110	117
35	110	6780	110	5130	110	4640	110	4170	110	3730	110	118
40	110	7630	110	5760	110	5200	110	4660	110	4160	110	118
45	110	8610	110	6480	110	5830	110	5230	110	4650	110	118
46	110	8840	110	6650	110	5980	110	5360	110	4770	110	118
50	110	9910	110	7420	110	6670	110	5960	110	5290	110	118
51	110	10230	110	7640	110	6870	110	6130	110	5440	110	118

WEIGHT = 13500 LBS VENR = 152 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	10 KTS DIST FT	20 KTS V1 KIAS	20 KTS DIST FT	30 KTS V1 KIAS	30 KTS DIST FT	VR KIAS	V2 KIAS
-25	107	3480	106	2630	106	2390	105	2180	104	1970	107	115
-20	107	3530	106	2680	106	2440	105	2220	104	2010	107	115
-15	107	3580	106	2720	106	2490	105	2260	104	2050	107	115
-10	107	3650	106	2770	106	2530	105	2310	104	2090	107	115
-5	106	3720	106	2820	105	2580	105	2350	104	2140	107	115
0	106	3790	106	2870	105	2620	105	2390	104	2180	107	115
5	106	3870	106	2920	105	2680	105	2450	104	2230	107	115
10	106	4010	106	3020	106	2760	105	2530	104	2300	107	115
15	106	4150	107	3110	106	2880	105	2610	105	2380	107	115
20	107	4480	107	3380	107	3060	106	2790	106	2540	107	115
25	107	4890	107	3710	107	3360	107	3020	107	2730	107	115
30	107	5410	107	4100	107	3700	107	3330	107	2980	107	115
35	107	6040	107	4570	107	4130	107	3710	107	3310	107	115
40	107	6750	107	5090	107	4600	107	4130	107	3680	107	115
45	107	7550	107	5680	107	5120	107	4590	107	4090	107	115
50	108	8590	108	6440	108	5790	108	5130	108	4600	108	115
51	108	8830	108	6610	108	5950	108	5320	108	4720	108	115
54	108	9670	108	7220	108	6480	108	5760	108	5120	108	115

500 ft. PA Interp.
5051
Enter Fig. A-12 to correct for RW gradient.

MODEL 550

TAKEOFF FIELD LENGTH - FEET

FLAPS - 15°
1000 FEET

CONDITIONS: RUNWAY GRADIENT - ZERO; LANDING GEAR - DOWN; ANTI-ICE SYSTEMS - OFF; SPEEDBRAKES - RETRACT; INOPERATIVE ENGINE - WINDMILLING AFTER V_1; OPERATIVE ENGINE - TAKEOFF THRUST

SOME CONDITIONS DO NOT MEET CLIMB REQUIREMENTS. OBTAIN ALLOWABLE WEIGHT FROM MAXIMUM TAKEOFF WEIGHT TABLES.

Interp

30
5050

32
5302

35
5680

WEIGHT = 14100 LBS VENR = 152 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	10 KTS DIST FT	20 KTS V1 KIAS	20 KTS DIST FT	30 KTS V1 KIAS	30 KTS DIST FT	VR KIAS	V2 KIAS
-25	109	3960	109	2970	109	2700	108	2460	107	2230	109	117
[illegible]	[illegible]	[illegible]	109	3020	109	2750	108	2510	107	2280	109	117
[illegible]	[illegible]	[illegible]	109	3070	109	2800	108	2560	107	2330	109	117
[illegible]	[illegible]	[illegible]	109	3130	109	2850	108	2610	107	2370	109	117
[illegible]	[illegible]	[illegible]	109	3190	109	2910	108	2660	107	2420	109	117
[illegible]	[illegible]	[illegible]	109	3260	109	2960	108	2710	107	2470	109	117
5	107	4560	109	3380	109	3060	108	2800	108	2560	109	117
10	108	4780	109	3550	109	3210	109	2930	108	2670	109	117
15	108	5080	109	3770	109	3420	109	3080	109	2810	109	117
20	109	5500	110	4120	110	3730	110	3370	110	3020	110	117
25	109	5990	110	4540	110	4110	110	3700	110	3320	110	117
30	110	6640	110	5050	110	4570	110	4110	110	3680	110	118
35	110	7500	110	5680	110	5130	110	4610	110	4120	110	118
40	110	8440	110	6370	110	5750	110	5160	110	4600	110	118
43	110	9130	110	6870	110	6190	110	5550	110	4940	110	118
45	110	9660	110	7280	110	6530	110	5850	110	5200	110	118
47	110	10280	110	7980	110	6920	110	6190	110	5490	110	118

WEIGHT = 13500 LBS VENR = 151 KIAS

TEMP DEG C	TAILWIND 10 KTS V1 KIAS	TAILWIND 10 KTS DIST FT	ZERO WIND V1 KIAS	ZERO WIND DIST FT	HEADWINDS 10 KTS V1 KIAS	10 KTS DIST FT	20 KTS V1 KIAS	20 KTS DIST FT	30 KTS V1 KIAS	30 KTS DIST FT	VR KIAS	V2 KIAS
-25	107	3570	106	2710	106	2480	105	2250	104	2040	107	115
-20	107	3640	106	2760	106	2520	105	2300	104	2090	107	115
-15	106	3710	106	2810	105	2570	105	2340	104	2130	107	115
-10	106	3780	106	2860	105	2620	105	2390	104	2170	107	115
-5	106	3860	106	2910	105	2670	105	2440	104	2220	107	115
0	105	3930	106	2960	105	2720	105	2480	104	2260	107	115
5	105	4070	106	3060	106	2810	105	2570	104	2340	107	115
10	106	4270	107	3190	106	2930	106	2680	105	2440	107	116
15	106	4530	107	3400	107	3080	106	2820	106	2570	107	115
20	107	4880	107	3700	107	3350	107	3020	106	2750	107	115
25	107	5350	107	4070	107	3680	107	3310	107	2970	107	115
30	107	5930	107	4500	107	4070	107	3660	107	3280	107	115
35	107	6650	107	5040	107	4550	107	4090	107	3650	107	115
40	107	7430	107	5610	107	5060	107	4540	107	4060	107	115
45	108	8410	108	6330	108	5700	108	5110	108	4550	108	116
47	108	8870	108	6660	108	6000	108	5370	108	4780	108	115
50	108	9670	108	7240	108	6510	108	5820	108	5170	108	115
51	108	9960	108	7460	108	6700	108	5880	108	5110	108	116

TAKEOFF FIELD LENGTH - FEET, WITH FLAPS - 15°

Determine takeoff field length, V_1, V_R, V_2 and V_{ENR} from Figure 4-16 and correct for runway gradient and anti-icing requirements using the tables below.

If the required distance is greater than the available distance, the airplane weight must be reduced until distance required is less than or equal to distance available.

TAKEOFF CORRECTION FACTORS - FLAPS 15°

If the runway has a gradient and/or airplane anti-ice systems on, the following correction factors must be applied to the distances and V_1 speeds.

RUNWAY GRADIENT	V_1 *	MULTIPY DISTANCE BY
2% UPHILL	ADD 4 KNOTS	1.30
1% UPHILL	ADD 2 KNOT	1.12
1% DOWNHILL	SUBTRACT 3 KNOTS	1.05
2% DOWNHILL	SUBTRACT 6 KNOTS	1.05

* If the adjusted V1 is greater than VR, the value of VR must be used for V1.

CORRECTION FACTORS - ANTI-ICE ON	
V_1 - KIAS	NO CORRECTION
TAKEOFF FIELD LENGTH - FEET	MULTIPLY DISTANCE BY 1.30

EXAMPLE:

Ambient Temperature = 5°C
Pressure Altitude = 7000 FEET
Gross Weight = 13,500 POUNDS

Wind = 30 KNOTS (HEADWIND)
Runway Gradient = 0%
Anti-Ice Systems = ON

From Figure 4-16, the Takeoff Field Length is 3810 X 1.30 = 4953 FEET
V_1 is 107 KNOTS
V_R is 107 KNOTS
V_2 is 115 KNOTS
V_{ENR} is 145 KNOTS

5051 x 1.12 = 5,657 ft.
rounded down to 5,600, actual runway gradient is 0.5%

Figure A-13

TAKEOFF FIELD LENGTH - 15° FLAPS

(Distance to 35 Feet Above the Runway)
Zero Wind, Anti-Ice Systems Off, Cabin Bleed Air On

Elevation = Sea Level

Ambient Temp. °C / °F	Takeoff Weight (lbs) 16,300	16,000	15,500	15,000	14,500	14,000	13,000	12,000
0 / 32	3020	2920	2750	2600	2480	2470	2440	2430
10 / 50	3130	3020	2850	2690	2570	2550	2530	2520
15 / 59	3180	3070	2900	2740	2610	2600	2570	2560
20 / 68	3260	3150	2970	2800	2650	2620	2590	2580
25 / 77	3350	3230	3040	2870	2700	2640	2610	2590
30 / 86	3510	3390	3190	3000	2820	2660	2560	2540
35 / 95	3710	3580	3370	3170	2970	2790	2500	2470
40 / 104	3940	3800	3570	3350	3150	2950	2580	2400
45 / 113	4200	4040	3800	3560	3340	3130	2730	2380
50 / 122	4480	4310	4050	3790	3550	3320	2900	2510
Climb Wght Temp Limits °C/°F	52/126	53/127	54/129	54/129	54/129	54/129	54/129	54/129
Field Length at Temp Limits (ft)	4600	4480	4260	3990	3730	3490	3030	2620

Interp
32 3590

500 ft. PA Interp.
3719 Use this in Fig. A-14

Elevation = 1,000 Feet

Ambient Temp. °C / °F	Takeoff Weight (lbs) 16,300	16,000	15,500	15,000	14,500	14,000	13,000	12,000
0 / 32	3100	3000	2830	2670	2590	2580	2550	2540
10 / 50	3220	3110	2930	2770	2690	2670	2640	2630
15 / 59	3330	3180	3000	2830	2710	2690	2660	2650
20 / 68	3420	3300	3110	2930	2760	2680	2650	2630
25 / 77	3560	3430	3230	3040	2860	2690	2630	2610
30 / 86	3760	3620	3410	3200	3010	2820	2570	2540
35 / 95	3980	3840	3610	3390	3180	2980	2610	2470
40 / 104	4230	4080	3830	3590	3370	3150	2750	2400
45 / 113	4510	4340	4070	3820	3580	3350	2920	2530
50 / 122	—	4630	4350	4070	3800	3560	3090	2670
Climb Wght Temp Limits °C/°F	48/118	50/122	52/126	52/126	52/126	52/126	52/126	52/126
Field Length at Temp Limits (ft)	4690	4630	4460	4170	3900	3650	3170	2740

Interp.
32 3848

Figure A-14

Cessna, Model 560

TAKEOFF FIELD LENGTH - FEET, WITH FLAPS 15°

Determine takeoff field length, V_1, V_R, V_2 and V_{ENR} from Figure 4-20 and correct for runway gradient and anti-icing requirements using the tables below.

If the required distance is greater than the available distance, the airplane weight must be reduced until distance required is less than or equal to distance available.

TAKEOFF CORRECTION FACTORS - FLAPS 15°

If the runway has a gradient and/or airplane anti-ice systems on, the following correction factors must be applied to the distances and V_1 speeds.

CORRECTION FACTORS - RUNWAY GRADIENT				
RUNWAY GRADIENT	SHADED AREA		NONSHADED AREA	
	V_1*	MULTIPLY DISTANCE BY	V_1*	MULTIPLY DISTANCE BY
2% UPHILL	ADD [illegible] KNOTS	1.7**	ADD 4 KNOTS	1.7**
1% UPHILL	ADD 2 KNOTS	[illegible]	ADD 2 KNOTS	1.2
1% DOWNHILL	SUBTRACT [illegible] KNOTS	[illegible]	ADD 1 KNOT	1.02
2% DOWNHILL	SUBTRACT [illegible] KNOTS	[illegible]	ADD 1 KNOT	1.05

CORRECTION FACTORS - ANTI-ICE ON	
V_1* - KIAS	ADD 1 KNOT
TAKEOFF FIELD LENGTH - FEET	MULTIPLY DISTANCE BY 1.10

* If the adjusted V_1 is greater than V_R, the value of V_R must be used for V_1.

** Takeoffs prohibited for corrected takeoff field lengths greater than 11,000 feet.

EXAMPLE:

Ambient Temperature = 5°C
Pressure Altitude = 7000 FEET
Gross Weight = 16,300 POUNDS

Wind = 30 KNOTS (HEADWIND)
Runway Gradient = 0%
Anti-Ice Systems = OFF

From Figure 4-20, the Takeoff Field Length is 3600.

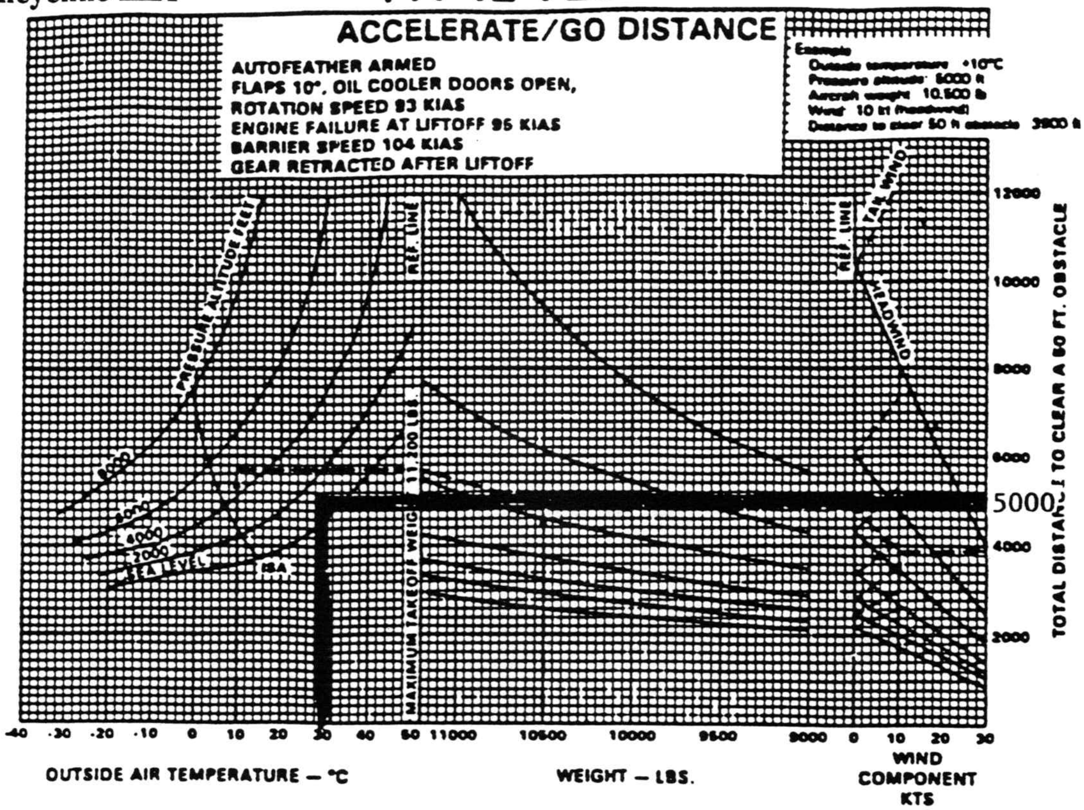
V_1 is 97 KNOTS
V_R is 102 KNOTS
V_2 is 112 KNOTS
V_{ENR} is 160 KNOTS

3719 x 1.2 = 4,463
rounded down to 4,400 ft.
actual runway gradient is 0.6%

Piper, Cheyenne IIIA

Figure A-15

PA-42-720



ACCELERATE/GO DISTANCE
FLAPS 10 DEGREES
Figure 5-31a