CITY OF CONCORD

REPORT TO MAYOR AND THE CITY COUNCIL

FROM: **Martin Gross, Chair, Airport Advisory Committee**
Matthew R. Walsh, Community Development Project Manager

DATE: **May 8, 2006**

SUBJECT: **Airport Master Plan Update**

Recommendations:

Accept the following report and adopt the Airport Master Plan Update.

Background:

In July 2004, the City engaged Hoyle Tanner Associates (HTA) of Manchester, New Hampshire to complete a comprehensive Airport Master Plan update and Storm Water Pollution Prevention Plan (SWPPP). The previous master plan was completed in 1996. The study was 97.5% funded by the Federal Aviation Administration (FAA) and State of New Hampshire Division of Aeronautics. Per FAA recommendations, the City should complete an update to the master plan every 5 to 10 years.

The updated master plan contains 6 chapters and 11 appendices (A-K). Recommendations were developed through input from a Planning Advisory Committee, (PAC) which consisted of the City Airport Advisory Committee, airport users, representatives from Concord Aviation Services (City's fixed base operator and part time airport manager), City staff, as well as abutters. The PAC held 4 public forums through the master plan process, reviewing and commenting on all areas of the plan.

Discussion:

The purpose of the Airport Master Plan is to identify and inventory existing conditions, predict future aviation demands, and develop a plan to remedy existing deficiencies and anticipate future needs.

1. ***Summary of Current Conditions***: Concord Municipal Airport is a general aviation airport, which was established in 1918. The airport contains approximately 614 acres and features two runways (Runway 17-35, 6,005' x 100', and Runway 12-30, 3,200' x 75').

   A total of 92 aircraft (including military) are based at the airport. Of this total, 71% are small, private single engine aircraft. However, the facility does have some larger private aircraft, including larger corporate aircraft for local businesses (most notably Jefferson Pilot Financial).

   The airport currently maintains a B-II designation, meaning that the largest aircraft that commonly uses the airport has an approach speed of 121 knots and a wingspan of 78 feet or less. Note, the airport can (and frequently does) handle larger craft – such as Boeing 727s on NASCAR race weekends. Approximately 57,000 operations (takeoffs or landings) occur at the airport each year.

2. ***Summary of Anticipated Future Growth:*** By the year 2023, it is anticipated the airport will host 137 aircraft (a 48% increase over 2006 levels). This is due to a variety of factors, including Manchester Airport's continued trend towards commercial, not general aviation, users and a lack of available space at other regional general aviation airports (such as Nashua Municipal Airport). Though small private planes will still dominate the facility, it is anticipated that the number of small corporate jets at the airport will increase due to decreasing costs of small jets and the increasing popularity of fractional ownership. Annual operations are expected to increase from 57,000 to 85,400 per year by 2023.

3. ***Overview of Key Recommendations:*** The Master Plan contains several recommendations as well as 44 major Capital Improvement Projects totaling more than $31 million between 2006 and 2023. FAA and the State of New Hampshire would cover $23,671,000 (or 72%) of this total. Though the plan includes numerous projects and recommendations, a quick summary of some of the major projects and recommendations is as follows:

   a) Full-Time Airport Manager: Currently, the City contracts with Concord Aviation Services to provide part-time management of certain aspects of the airport, as well as Fixed Base Operator services (sale of aviation fuels, car rental, leasing of City owned hangars and tie downs, etc.) All other management activities are shared between City Administration, General Services Department Public Properties Division, Community Development Department – Engineering, Business Development, and Planning Divisions. Full-time managers are currently used at several other comparable general aviation airports in New Hampshire, including Laconia, Nashua, and Lebanon.

      Though the Master Plan recommends that the City hire a full time Airport Manager, the Airport Advisory Committee recommends that the City not undertake such action until a comprehensive management study of the airport is completed.

b) Acquisition of Abutting Private Property: The plan recommends continued acquisition of fee title or easements on several properties surrounding the airport. Several abutting properties are within key runway obstacle free zones. Therefore, acquisition of these properties is in the City's interests as ownership would (1) remove some land use conflicts near the airport and (2) allow the City to remove potential safety hazards (such as tall trees).

c) New Airport Terminal: The plan recommends construction of a new 9,000 SF airport terminal. The current terminal was constructed in 1938 and expanded in 1961. This proposal was carried over from the 1996 plan, as the terminal has several code deficiencies (including Americans with Disabilities Act), is in poor condition, and does not present a proper image for the City during high profile events at the airport (such as Presidential Primaries and NASCAR races). Total project cost is estimated at $2.6 million (design and construction). It is likely the FAA would not participate in funding a new terminal. Therefore the City would likely be responsible for all costs. City Administration continues to seek grant funds to assist with this project. Due to limited available land area and the need to expand ramps for aircraft, the Master Plan does not recommend inclusion of a new Heights fire station as part of a new terminal.

d) Available "Developable Land": Though the airport is 614 acres in size, less than 10 acres is available for development as all other portions of the airport have been reserved as conservation areas to help facilitate preservation and re-population of the Karner Blue Butterfly, a nationally endangered species. This is an important issue, as the amount of airport land reserved for conservation will impact the airport's ability to grow in the future. Therefore, the plan recommends that all land available for development be exclusively reserved for aviation related uses.

e) Future Runway Expansion: Lastly, the Master Plan recommends a 1,000-foot extension of Runway 17-35. This expansion will allow the airport to more easily accommodate roughly 80% of small jets in the aviation market place. This recommendation was included in the plan because the trend in aviation is towards fractional ownership and small jets, and growth of all aviation sectors at the airport over the next 20 years. This project is a long-term recommendation, likely beyond 2016, and has a cost of $2.103 million in 2004 dollars.

4. ***Airport's Economic Impact:*** The master plan update includes an economic impact assessment of the airport. According to this study, the airport annually stimulates $7.2 million in spending in the local and regional economy. The airport also directly creates 45 jobs in the local economy and contributes to the creation of nearly 1,670 jobs in the regional economy.

Introduction

1.0 General

The consultant, Hoyle, Tanner and Associates, Inc. (HTA), was awarded a contract by the city of Concord to complete an update to the March 1996 Airport Master Plan Update (AMPU)[i] for Concord Municipal Airport. The preparation of this document was financed jointly by the city of Concord, the New Hampshire Department of Transportation (NHDOT) – Aeronautics Division, and the Federal Aviation Administration (FAA) under the provisions of the Airport Improvement Program (AIP).[ii] This master planning effort took place between July 2004 and May 2006. The purpose of this AMPU is to:

- Provide a comprehensive update of the 1996 master plan and airport layout plan;
- Identify future activity levels over the next twenty years;
- Identify key facilities that require upgrading to meet future activity and to comply with FAA criteria;
- Review the functional and size adequacy of the terminal building and it's location and make recommendations for improvements;
- Assess roadway access issues and make recommendations for improvements;
- Identify future airport development options in regards to aircraft storage and automobile storage;
- Incorporate the natural resource management plan in to the airport layout plan (ALP);
- Consider security enhancement as part of facility development plans;
- Identify corporate aircraft needs as to runway length and ramp parking areas;
- Identify potential environmental impacts associated with future development;
- Recommend an enhanced airport management structure and review the adequacy of airport revenue generation;
- Develop a twenty-year capital improvement plan (CIP) and airport financial plan identifying key factors contributing to the airport's current self-sufficiency and discuss the outlook for continuation of that condition;
- Insure a broad public involvement in the planning process;
- Provide a Storm Water Pollution Prevention Plan (SWPPP) for the airport; and
- Complete an economic impact analysis to show the economic impact/benefit the airport has on the city of Concord.

According to FAA Advisory Circular (AC) 150/5070-6A, *Airport Master Plans*, the goal of a master plan is to provide guidelines for future airport development, which will satisfy aviation demand in a financially feasible, environmentally responsible manner.[iii] In order to insure these results for Concord Municipal Airport the city manager; city officials from the Community Development Department, Engineering Department, General Services Department, Business Development Department, and Finance Department; the airport manager/fixed based operator; members of the NHDOT, FAA and the New Hampshire Army National Guard; regional planning representatives, public citizens, and representatives of environmental concerns acted as a review group responsible for providing input and insight on issues that were addressed in the master planning process.

The twenty-year plan for development of Concord Municipal Airport, determined during the airport master plan update process, is represented in *Chapter 6 - Economic Impact Analysis, Capital Improvement Plan & Airport Operations and Finances.* The short-term phase represents more detailed plans as they are broken down by individual fiscal years and prioritized during the master plan process and through recommendations made by the airport's consultant. The long-term phase only includes a list of projects to be completed within the long-term, twenty-year planning period.

2.0 Airport Master Plan Update Report Summary

This report consists of a six chapter technical report and a package of eleven drawings, which comprise the Airport Layout Plan (ALP) set.

Chapter 1 is an inventory of Concord Municipal Airport, which is the collection of data pertinent to the airport and the area it serves. The objective of the inventory is to provide background information for subsequent phases of analysis and a "snapshot" of the airport's baseline conditions as of September 2004.

Chapter 2 contains forecasts of future activity at the airport, which estimate moderate levels of growth by the same types of aircraft over the next twenty years. The critical aircraft used throughout the master plan for facility planning purposes is the Cessna Citation II.

Chapter 3 reviews the airside and landside facilities to determine if they can accommodate the projected planning activity levels, the critical aircraft, and known airfield issues. This chapter identifies key facilities that require upgrading to meet future activity and to comply with FAA criteria. Alternatives for development and the preferred development options are provided within this chapter.

Chapter 4 provides a summary of the environmental impacts associated with the future development recommendations.

Chapter 5 includes reduced-size copies of the ALP drawing set. There are eleven drawings, which include:

- Cover/Title Sheet — Drawing 1 of 11
- Existing Airport Layout Plan (ALP) — Drawing 2 of 11
- Ultimate ALP — Drawing 3 of 11
- Ultimate ALP Data Sheet — Drawing 4 of 11
- Topographic Plan — Drawing 5 of 11
- Terminal Area Plan — Drawing 6 of 11
- Runway 17-35 Plan and Profile — Drawing 7 of 11
- Runway 12-30 Plan and Profile — Drawing 8 of 11
- Federal Aviation Regulation (FAR) Part 77 Airspace Surfaces — Drawing 9 of 11
- Land Use Plan — Drawing 10 of 11
- Sign Plan — Drawing 11 of 11

The primary facility development outlined in the plan is available for review in *Drawing 3, Chapter 5 – Airport Plans*, of this master plan report.

Chapter 6 presents a staging plan and a financial plan required to implement the future development identified in previous chapters. The staging plan considers the demand-driven need for facilities, as well as the financial feasibility of construction. The financial plan evaluates the airport's resources and

proposes revenue improvements. An Economic Impact Analysis as well as recommendations for an enhanced airport management structure are also identified within this chapter.

As part of the airport master plan update grant, a Storm Water Pollution Prevention Plan (SWPPP) was developed. Although the SWPPP is referenced within this master plan, the document is a separately bound, stand-alone document. The SWPPP is available in the City of Concord's Community Development Department as well as the fixed based operator's office, Concord Aviation Services.

Endnotes

[i] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996.

[ii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Improvement Program Handbook, Order 5100.38B*, Change 1, U.S. Government Printing Office, Washington, DC, January 8, 2004.

[iii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Master Plans, AC No. 150/5070-6A*, U.S. Government Printing Office, Washington, DC, 1985.

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The Airport Layout Plan set includes the following drawings:

Chapter 6: Economic Impact Analysis, Capital Improvement Plan & Airport Operations and Finances

Chapter One: Inventory

1.0 General

Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6A, *Airport Master Plans*, outlines the necessary steps in the development of an Airport Master Plan (AMP).[i] The initial step, inventory, is the collection of data pertinent to Concord Municipal Airport and the area it serves. The objective of the inventory task for the airport is to provide background information for subsequent phases of analysis and a "snapshot" of the airport baseline conditions as of September 2004.

This data was obtained through the collection and analysis of previous airport reports and studies such as the *March 1996 Concord Municipal Airport Master Plan Update*[ii] and the *2003 New Hampshire Aviation Airport System Plan*[iii], on-site investigations of the airport, interviews with staff members from Concord's Community Development Department, interviews with the Airport Manager/Fixed Base Operator (FBO), interviews with members of the New Hampshire Army National Guard and other airport tenants and airport users.

The airport inventory is described in the following sections:

- Airport Setting and Access
- The Airport's Management and Legal Structure
- The Airport's Financial Structure
- Land Use
- Airport Development History
- Aviation Services, Airport Tenants, and Other Aviation Activity
- Airport Facilities
- Snow Removal Equipment and Storage Building
- Fire Station and Emergency Response Facilities

A reduced 11" by 17" drawing of the existing airport facilities is available in *Chapter 5 – Airport Plans*, *Drawing 2 of 11* of this airport master plan update report.

2.0 Airport Setting and Access

This section provides a brief and general description of Concord Municipal Airport's location, access roadways, airport access, and airport security.

2.1 Airport Location and Airport Roadway Access

The 614-acre airport is located in central New Hampshire, in the City of Concord (the State's capital since 1808[iv]), approximately 2 miles east of the City center. The airport is situated south of U.S. Route 4 (also known as I-393) and north of U.S. Route 3 (Manchester Street) both of which are less than 2-miles east of Interstate Route 93. Primary access to the airport is via Airport Road, connecting to both U.S. Route 4 and U.S. Route 3. Additional access is via Regional Drive, located north of the airport, parallel to U.S. Route 4. The City center, airport location and access roadways are depicted in **Figure 1-1**.[v]

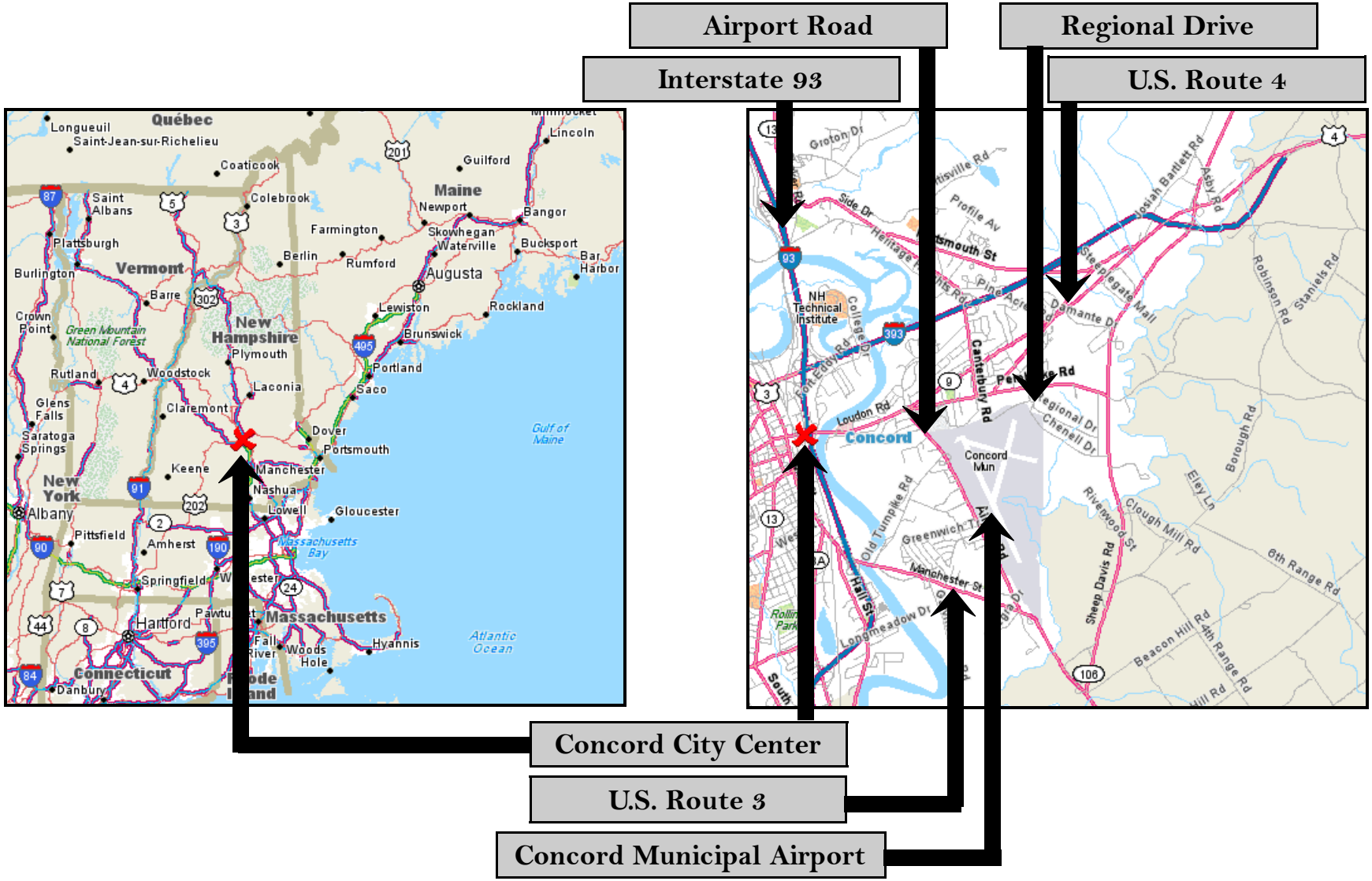


Figure 1-1: Concord Municipal Airport Location

The airport is 346 feet above Mean Sea Level (MSL),[vi] the Airport Reference Point (ARP), or approximate geometric center of all useable runway surfaces, is situated on latitude 43° 12' 09.838" N and longitude 071° 30' 08.228"W.[vii]

Concord Municipal Airport is a general aviation airport, which is an airport that does not receive scheduled commercial air service. Commercial air service airports are located in close proximity: Manchester Airport in Manchester, New Hampshire is approximately 20 miles south; Pease Airport in Portsmouth, New Hampshire is approximately 45 miles east; Lebanon Municipal Airport in Lebanon, New Hampshire is approximately 58 miles north-northwest; and Logan International Airport in East Boston, Massachusetts is approximately 70 miles south-southeast.

2.2 Airport Access and Airport Security

As indicated above, the main entrance to the airport is via Airport Road, which provides access to the terminal building, offices and hangars occupied by Concord Aviation Services (Airport Manager/FBO); private, City and State owned aircraft storage hangars; and both itinerant and based aircraft ramps. Regional Drive provides access to offices and hangars occupied by the New Hampshire Army National Guard and the airport's snow removal equipment building.

The airport's security fence encompasses approximately 2/3 of the 614-acre property. The southeastern boundary is not fenced due to terrain and safety issues. The fenced area has several key card activated electric slide gates or combination/pad lock gates that allow for vehicular access. The electric sliding gates are located along Airport Road allowing access to private, City and State owned aircraft storage hangars and other airport tenants.

3.0 The Airport's Management and Legal Structure

The City of Concord owns and operates the airport. As indicated in the *March 1996 Concord Municipal Airport Master Plan Update*,[viii] Concord Municipal Airport is managed by several of the City's departments. Although the airport is listed on the City's web site as the responsibility of the Community Development Department,[ix] the following also oversee and have responsibility for the airport and daily airport operations:[viii and x]

- The 15-member City Council consisting of a Mayor, four Councilors-at-large elected by qualified voters of the City, and ten Ward Councilors elected by qualified voters within each of the 10 wards identified in the City Charter, is responsible for overall airport policy, contracts and budget approval.
- The City Manager, who serves as the Chief Executive Officer, is responsible for the overall management of the airport.
- The Airport Advisory Committee is advisory to the City Council on matters related to planning and development of the airport and rules and regulations for airport operations.
- The General Services Department is responsible for maintaining the airport's facilities and infrastructure (buildings, runways, taxiways, roadways, utilities).
- The Community Development Department is responsible for real estate development of all airport property, airport capital improvements and other airport related activities/projects.
    - The Business Development Division is also responsible for real estate development and marketing of the airport.
    - The Engineering Department plays a key role in design and construction management for improvements at the airport. The Department is responsible for airport capital improvement projects.

- The Finance Department is responsible for the airport's daily operating expenses and accounting.
- The FBO is responsible for the oversight of daily airport operations, interior building maintenance, and servicing aircraft (both based and itinerant aircraft) at the airport. The FBO is also responsible for leasing aircraft hangars and tie-downs and serves as the on-site airport manager.
- The New Hampshire Army National Guard is responsible for the maintenance and operation of their facilities at the airport.

At the Federal level, Concord Municipal Airport is subject to the regulations of the United States Department of Transportation (USDOT) and the FAA. On a State level, the airport is subject to the regulations of the New Hampshire Department of Transportation (NHDOT) and New Hampshire Statutory Law, Title XXXIX, Chapter 422, *New Hampshire Aeronautics Act*; Chapter 423, *Municipal Airports;* and Chapter 424, *Airport Zoning*.[xi]

Concord Municipal Airport also has minimum standards in place, which were adopted on March 12, 1984 and revised on September 8, 1986.[xii] According to the Aircraft Owners and Pilots Association (AOPA), in their publication, *Minimum Standards for Commercial Aeronautical Activities*, "These minimum standards are intended to protect the level and quality of services offered to aircraft owners, pilots, and the public at large".[xiii] The FAA states in Advisory Circular (AC) 150/5190-5, *Exclusive Rights and Minimum Standards for Commercial Aeronautical Activities,*[xiv] that, where minimum standards are adopted and established by the airport sponsor, they should be applied evenhandedly and uniformly to all on-airport commercial aeronautical activities. The failure to do so may violate the FAA's policy on exclusive rights, in which an airport sponsor is prohibited from granting an exclusive right to a single operator for the provision of an aeronautical activity to the exclusion of others. Airport sponsors who receive Federal financial assistance must agree to uphold that policy through enforcement of their minimum standards to protect the level and quality of services offered to the public.

At Concord Municipal Airport, all tenant leases require the lessees adhere to the airport's rules, regulations and standards.

4.0 The Airport's Financial Structure

The FAA designates Concord Municipal Airport as a publicly owned, public-use facility. Under the Airport and Airways Improvement Act, the Secretary of Transportation is required to publish a national plan for the development of public-use airports. The plan is published as the National Plan of Integrated Airport Systems (NPIAS), which identifies more than 3,000 airports that are significant to the nation's air transportation system and thus eligible to receive Federal grants under the Airport Improvement Program (AIP). The NPIAS comprises all commercial service airports, all reliever airports, and selected general aviation airports. Development planned to receive Federal funding is identified in the NPIAS for each eligible public-use airport based on an airport's role.

The NPIAS defines an airport's service level and role by the type of public service the airport provides to its community. Concord Municipal Airport's service level is defined as a general aviation (GA) airport.[xv]

Vision 100, the Century of Aviation Reauthorization Act, reauthorizes Federal aviation programs through fiscal year 2007 and sets spending levels for the AIP and other programs that develop and maintain facilities at airports around the country. A major component of the bill is the AIP program, which provides funding for airport rehabilitation and development projects. According to AIP, GA airports under the NPIAS receive 95 percent funding from the FAA for projects that are determined to

be eligible.[xvi] This is a temporary increase (applicable during Federal fiscal years 2004 – 2007 – Vision 100) from the previous FAA funding level of 90 percent, which was applicable during Federal fiscal years 2000 – 2003. This temporary increase applies to small hub and smaller type airports, such as Concord Municipal Airport. This airport master plan update has received 95 percent funding from the FAA.

NHDOT - Division of Aeronautics provides 2.5 percent of the total cost of federally eligible projects from the State's General Court, which appropriates the money as part of the State's biennium budget.[xvii] According to the *2003 New Hampshire Aviation Airport System Plan*, the State of New Hampshire does not have an aviation trust fund. The City of Concord, as the local sponsor, and airport owner, funds the remaining 2.5 percent from the City's airport fund. Projects ineligible for Federal funding must either be funded exclusively, or by a combination of, State, City/airport and private entity funds. Recently (City fiscal year 2003/2004), due to a 26-acre land lease to the New Hampshire Army National Guard for their new office/hangar and ramp facility, airport revenues have begun to cover the airport's general operating expenses.

Further analysis of Concord Municipal Airport's finances and operating budget is included in *Chapter 6 – Capital Improvement Plan & Airport Operations/Finances.*

5.0 Land Use

Federal Aviation Regulation (FAR) Part 150, *Airport Noise Compatibility Planning*, contains Federal standards on determining land use compatibility for given airport noise levels. Airport noise is measured in terms of annual day-night average sound levels (DNL). All land uses, including residential, are deemed compatible with levels less than 65 DNL. Other land uses, such as industrial and commercial are compatible with somewhat higher DNL levels.[xviii]

The following sections provide a "snapshot" of land use on and immediately surrounding the airport, while *Chapter 4 – Environmental Review*, of this airport master plan update report, identifies existing and future airport noise levels. The information provided in this chapter and in *Chapter 4 – Environmental Review*, allows us to determine if those land uses are compatible with existing and future airport operations.

According to the *Zoning Ordinance for the City of Concord, New Hampshire*, as adopted by the City Council on November 29, 2001,[xix] every parcel of land in the City of Concord is subject to the restrictions and regulations of a Base District and any Overlay Districts established for the area. The following identifies the Base Districts and Overlay Districts as they apply to land uses on and immediately surrounding the airport.

A reduced 11" by 17" drawing of on-airport and off-airport land use is available in *Chapter 5 – Airport Plans, Drawing 10 of 11* of this airport master plan update report.

5.1 Land Use - On and Off Airport

According to the Concord Zoning Ordinance, on-airport land use consists of five Base Districts and one Overlay District, while adjacent off-airport land use consists of seven Base Districts. The basic purposes of those districts are summarized as follows (more detailed information is available in the City Zoning Ordinance):[xx]

> **Industrial District (IN) –** established for the development of manufacturing, research and development facilities, wholesaling, warehousing, distribution, and offices, wherein

full municipal utility services are available. Access may also be available to rail or air transportation.

Open Space Residential District (RO) – established to accommodate single-family dwellings as well as cluster developments, agricultural, forestry, and low impact outdoor recreational uses.

Single Family Residential (RS) – established to encompass those areas of the City that have been substantially developed under prior provisions of the zoning ordinance as standard or cluster subdivisions of single-family homes.

Office Park Performance District (OFP) – established to provide for the large scale, integrated development of professional offices, and research and development facilities.

Institutional District (IS) – established to accommodate large-scale government, educational, healthcare, and cultural facilities together with medical and professional offices and high density residential uses.

High Density Residential District (RH) - established to include existing multifamily and mobile home park developments located on large parcels.

General Commercial District (CG) - established to provide for a mixture of retail, restaurant, and service uses including motor vehicle sales and service.

Shoreland Protection (SP) District (an Overlay District) – established to protect the City's surface waters.[xxi]

5.1.1 On-Airport Land Use

According to the Concord Zoning Ordinance, on-airport land use consists of the following as identified in **Table 1-1**:

Table 1-1: On-Airport Land Use – Concord Municipal Airport

District	On-Airport Land Use
Base District	Industrial District (IN)
	Open Space Residential District (RO)
	Single Family Residential (RS)
	Office Park Performance District (OFP)
	Institutional District (IS)
Overlay District	Shoreland Protection (SP) District

5.1.2 On-Airport Land Use - Conservation Management Agreement

A Conservation Management Agreement between the City of Concord, NHDOT, the U.S. Fish and Wildlife Service and the New Hampshire Fish and Game Department was created for the purpose of managing airport lands that provide and enhance essential habitat for the Karner Blue Butterfly, a Federal and State listed endangered species.

To protect the Karner Blue Butterfly and its habitat, conservation areas, or zones, were created on the airport. *Chapter 4 – Environmental Review*, of this airport master plan update report provides more information on the Karner Blue Butterfly and the conservation zones, while the conservation zones are identified in *Chapter 5 – Airport Plans*, of this airport master plan update report.

5.1.3 Off-Airport Land Use

According to the Concord Zoning Ordinance, adjacent, off-airport land use consists of the following as identified in **Table 1-2**:

Table 1-2: Off-Airport Land Use – Concord Municipal Airport

<table>
<tr><th rowspan="2">District</th><th colspan="4">Off-Airport Land Use</th></tr>
<tr><th>Adjacent Land Use North of Airport</th><th>Adjacent Land Use East of Airport</th><th>Adjacent Land Use South of Airport</th><th>Adjacent Land Use West of Airport</th></tr>
<tr><td rowspan="4">Base District</td><td>Industrial District (IN)</td><td rowspan="4">Office Park Performance District (OFP)</td><td>High Density Residential District (RH)</td><td rowspan="2">Single Family Residential District (RS)</td></tr>
<tr><td>Single Family Residential District (RS)</td><td rowspan="2">General Commercial District (CG)</td></tr>
<tr><td>Institutional District (IS)</td><td>Institutional District (IS)</td></tr>
<tr><td>Office Park Performance District (OFP)</td><td>Open Space Residential District (RO)</td><td>Industrial District (IN)</td></tr>
<tr><td>Overlay District</td><td>None</td><td>None</td><td>None</td><td>None</td></tr>
</table>

5.2 Land Use - Airport Zoning and Control of Structures

The February 1977 Zoning Ordinance for the City of Concord identified an Airport Approach Overlay District under Article 28-11-6, in which the airports approach surfaces were identified. Subsequent updates to the cities ordinance removed the Airport Approach Overlay District from the ordinance and incorporated the airport into the Industrial District.[xxii] Although the current ordinance does not specify an airport district or airport-related zoning such as an Airport Approach or Protection Overlay Zone or Airport Clear Zone, they do identify protection of the airport's air space in *Article 28-4, Development Design Standards.*[xxiii] Under Article 28-4, height restrictions are identified and reference is made to the restrictions that surround the airport's approach surfaces. Discussions with the City's Code Administrator indicated that they rely on State statutes to enforce height restrictions around the airport. State statutes regarding control of tall structures and airport zoning is found under New Hampshire Statutes, Title XXXIX, *Aeronautics*, Chapters 422B, *Control of Tall Structures*; and 424, *Airport Zoning.*[xxiv]

While the FAA defines the criteria regarding structures that might penetrate navigable airspace, the FAA relies on State and local zoning regulations to provide height and airspace protection. Such regulation around an airport limits encroachment of the runway protection zones (RPZs) and imaginary surfaces (FAR Part 77), thereby ensuring the safety of the airspace around the airport.

To provide height and airspace protection, the FAA requires that any company proposing construction or alteration on or near the airport file FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, at least 48 hours prior to the start or construction of alteration. Once filed, the FAA reviews the proposed location and finished height and determines if the proposed construction or alteration impacts the airports runway protection zones or any of the airports imaginary surfaces.

6.0 Airport Development History

It is useful to review the historical development of the airport and prior facility recommendations to understand what has been implemented before updating the airport master plan.

A majority of this airport history section was compiled from the *1980 Airport Master Plan - Concord Municipal Airport* completed by Dufresne-Henry and PRC Speas Associates[xxv], the New Hampshire Aviation Historical Society's web page[xxvi], the airport development plan completed by the NHDOT – Division of Aeronautics entitled, *A Plan for the Development of Airports in New Hampshire 2003*[xxvii] and the *March 1996 Concord Municipal Airport Master Plan Update*.[ii]

Table 1-3 depicts the historical development that has occurred at Concord Municipal Airport from 1911 to 2004. Some development may not be listed on Table 1-3 such as routine maintenance[xxviii] and State funded maintenance projects such as pavement crack filling/sealing[xxix].

Table 1-3: Development at the Concord Municipal Airport: 1911 to 2004

Date	Description of Development
1911	This year marked the first recorded flight of any airplane operated in the State of New Hampshire, "On June 19, 1911 Harry Atwood flew a Burgess-Wright bi-plane from Waltham, MA to Nashua, Manchester and Concord."[xxvi]
1920	Robert C. Fogg becomes the first resident of New Hampshire to own an airplane and lands in Concord in his Canadian WW I "Jenny"
	Mr. Robert C. Fogg opened the first fixed base operation in New Hampshire at the National Guard Muster Grounds in Concord
	A local aviation committee in Concord is formed to raise money to purchase an "aviation field"
	Concord is the State's first airport developed at the State Muster Grounds situated along the Merrimack River
1926	Concord Airport Corporation is formed by the Aviation Syndicate of Concord and petitions the State Legislature and the Executive Council for use of State-owned property, south of the New Hampshire National Guard Headquarters, for the Concord airport
1927	July 25, 1927 Charles Lindbergh lands at Concord Airport in the Spirit of St. Louis on his U.S. tour
1928	Concord's first aircraft hangar is built
	Northeast Airways makes the first round trip flight from Concord to Manchester, to Boston
1936	The Aviation Syndicate of Concord sells the airport land to the City of Concord
	Clearing of land for the runways and the administration building begins
1937	Construction of the present Concord Municipal Airport facility (runways and administration building) begins
1939	Concord now has paved runways
1941	The Civil Air Patrol becomes active at Concord Municipal Airport
1942	The City of Concord spends $30,000 for the acquisition of more land for airport purposes. The Federal government contributes $459,000 for the site construction
1943	Concord terminal building housing FAA Flight Service and the National Weather Service is constructed
	Concord's second aircraft hangar is built
	The airport now consists of three hard-surfaced runways constructed on 800-acres of land
1946	Mr. J. Wayne Ferns and Frank Ferns opened the second fixed base operation at Concord Municipal Airport, Ferns Flying Service, Inc. (FFS)
1947	Northeast Airlines provides air carrier service to Concord

Table 1-3 Continued

1948	Grading and drainage improvements are made for the ramp, taxiways and adjacent areas
	Ramp and taxiways are paved
	Electrical conduit is installed for runway lighting
	Runway marker lights are relocated
1950	The airport access roads and automobile parking lot is paved
	The runway pavement markings are painted
	A segmented circle is constructed
1957	Concord's third aircraft hangar is built
	The Aviation Association of New Hampshire is founded in Concord
	High intensity elevated runway marker lights are installed on Runway 17-35
	Runway obstructions are cleared
1958	Runway 35 is extended
	Runway and taxiway pavement markings are painted
	Runway 35 approach is cleared
1961	The terminal building is expanded (4,680 square feet) to house the then Federal Aviation Agency (now the Federal Aviation Administration) and U.S. Weather Bureau
1962	Northeast Airlines discontinues air carrier service to Concord
1966	High intensity lights are replaced on Runway 17-35 and a Visual Approach Slope Indicator (VASI) is installed for Runway 17
1973	Runway 17-35 is extended by 1,000 feet and a partial parallel taxiway is constructed
1974	A localizer is installed for an instrument approach to Runway 35
1974	The partial parallel taxiway to Runway 17-35 is extended
1978	Two off-site airport hazard beacons are installed
	Precision Airlines based in Springfield, Vermont adds Concord to their route structure, which links Concord to Boston with connections through Manchester and Nashua
1979	Eight-foot security fencing is installed (19,000 linear feet)
1980	Precision Airlines discontinues providing air carrier service to Concord
1983	The airport drainage is improved and Runway 35 extended
1983	Glide slope antenna, middle marker, and Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) installed
1984	Snow removal equipment is acquired
1986	Land is acquired for the Runway 35 approach
1989	Runway 17-35 is rehabilitated – Phase I
1990	Runway 17-35 is rehabilitated – Phase II and the runway is marked and lighted
1990	A Precision Approach Path Indicator (PAPI) is installed for Runway 17-35
1991	The airport based aircraft ramp is expanded/reconstructed and a taxiway constructed to access the area
	The itinerant aircraft ramp is reconstructed
1993	Land is acquired for the Runway 35 approach
1994	Concord Aviation Services, the third fixed base operation is opened at Concord Municipal Airport taking over operations for Ferns Flying Service, Inc.
1994	An airport master plan update is begun
1994	The parallel taxiway is rehabilitated and the ramp is expanded
1996	The airport master plan update is completed
1998	Snow removal equipment is acquired
1999	Snow removal equipment is acquired
2000	Runway 12-30 rehabilitation design completed
2002	Runway 12-30 pavement is rehabilitated and narrowed to 75 feet
2003	Snow removal equipment building is built

Table 1-3 Continued

2004	Completion and occupancy of the newly constructed New Hampshire Army National Guard Facility
2004	Completion of Regional Drive
2004	Rehabilitation/revision of terminal automobile parking lot

Table 1-4 depicts the recommendations made in the *March 1996 Concord Municipal Airport Master Plan Update.*

Table 1-4: March 1996 Concord Municipal Airport Master Plan Update Recommendations/Project Completion

1996 Recommendations	Projects Completed	Date Completed	Projects Not Completed
Rehabilitate the existing terminal building			✓
Extend Regional Drive	✓	2004 [1]	
Construct a new Army National Guard storage hangar, office and ramp	✓	2004	
Construct a snow removal equipment building	✓	2001	
Replace existing fuel farm with a new facility	✓	1996	
Reserve the area east and west of the closed Runway 03-21 for future hangar development	✓	1996 [2]	
Rehabilitate Runway 12-30 pavement	✓	2002	
Construct a parallel taxiway to Runway 12-30			✓
Convert the closed Runway 03-21 to a taxiway			✓
Reserve the area west of the closed Runway 03-21 for future aviation compatible development	✓	1996 [2]	
Extend Canterbury Road			✓
Purchase avigation easements and properties located within the runway protection zones			✓
Complete an obstruction study for all approaches			✓
Abandon Canterbury Road and assemble a development parcel			✓
Reserve the area east of Runway 12-30 (at the approach end of Runway 30) for future light industrial/office park expansion	✓	1996 [2 & 3]	
Reserve development parcel for future airport development east of the approach end of Runway 30	✓	1996 [2 & 3]	

Source: *March 1996 Concord Municipal Airport Master Plan Update*, 1996[xxx]

Notes:

1. The Regional Drive extension was opened for automobile traffic in the 2004, with final completion estimated to be in the summer of 2005.
2. These areas have been reserved for future development and are depicted on the 1996 ultimate airport layout plan as such; however, as of September 2004, development of these properties has not occurred
3. Discussions with the City of Concord indicate that this airport property is being sold to a private developer as of September 2004

7.0 Aviation Services, Airport Tenants, and Other Aviation Activity

7.1 Aviation Services - Air Carrier Service

As indicated above, Concord Municipal Airport had, at one time, two separate companies providing air carrier service to the airport: 1) Northeast Airlines provided air carrier service at Concord Municipal Airport for 15-years (from 1947 to 1962); and 2) Precision Airlines provided air carrier service for two years (from 1978 to 1980).

Since the termination of air carrier service in 1980 by Precision Airlines, there has been no other air carrier service at Concord Municipal Airport.

7.2 Aviation Services - FBO Service

As indicated above, Mr. Robert C. Fogg opened the first fixed base operation (FBO) in Concord in 1920 and in 1946 Ferns Flying Service, Inc. (FFS) established the second FBO operations at the airport until 1994.

Since 1994, Concord Aviation Services has provided FBO services at Concord Municipal Airport providing the following:

- Aviation fuel (Jet A/100 Low Lead - LL)
- Aircraft parking (ramp and tie-down)
- Hangars
- Passenger terminal and lounge
- Flight school/flight training
- Aircraft rental
- Aerial tours/aerial sightseeing
- Aircraft maintenance – airframe
- Aircraft maintenance – powerplant
- Aircraft cleaning and detailing
- Rental cars
- Courtesy transportation
- Catering
- Pilot supplies
- Pilots lounge/snooze room
- Restrooms
- Public telephone
- Airport Management

7.3 Airport Tenants/Users

The following sections identify the airport's existing tenants, both aviation and non-aviation related and typical airport users.

The tenant's lease agreements are described in *Chapter 6 – Capital Improvement Plan & Airport Operations/Finances* of this airport master plan update.

7.3.1 Aviation Tenants

Table 1-5 depicts the aviation tenants that operate at the airport.

Table 1-5: Aviation Tenants at Concord Municipal Airport as of September 2004

Tenant	Description of Business
Concord Aviation Services	As indicated above Concord Aviation Services provides FBO services and airport management at Concord Municipal Airport. Concord Aviation Services leases hangar space from the City/airport for their office/hangar facilities.
New Hampshire Army National Guard	Concord Municipal Airport is the New Hampshire Army National Guard Headquarters for the State. The 1159th Medical Company Air Ambulance division is located at the airport. The Army leases 26-acres of land from the City/airport for their office/hangar and ramp facility.
Craig Avionics	Craig Avionics is a FAA certified avionics repair station and provides aircraft electronics (avionics) system installation and line troubleshooting of avionics aircraft problems. Craig Avionics subleases hangar/office space from Concord Aviation Services.
Concord Airport Association	Concord Airport Association (not to be confused with the Concord Aviation Association as listed in the history section above) is a flying/aviation education club that formed in 1996. According to their web site, " the association was formed by people interested in Concord Airport and general aviation".[xxxi] They host several aviation related events and aviation safety seminars. Concord Airport Association does not lease land or office space from the airport but uses the terminal building for their events/meetings.
New Hampshire Civil Air Patrol	The New Hampshire Civil Air Patrol, the State of New Hampshire's Wing Headquarters, has been active at the airport since 1941. There are currently 632 active members within the State.[xxxii] They operate out of their own building with land leased from the City/airport. They currently do not base any of their aircraft at Concord Municipal Airport.
New Hampshire State Police – Aviation Unit	The Aviation Unit operates a Cessna 182 aircraft and a Bell 206 Jet Ranger helicopter. Primary mission of the helicopter is for search and rescue, while the Cessna 182 is to enforce the State's motor vehicle laws. Over the last two years the Aviation Unit logged 700.2 hours of flight time in 345 missions.[xxxiii] The State Police own their own hangar and lease land from the City/airport.
Sunlight Corporation	Sunlight Corporation is an aircraft management company, which manages and operates aircraft for private individuals. Sunlight Corporation subleases hangar/office space from Concord Aviation Services.
C&M Management Corporation (T-hangar Tenants)	There are two multi-unit t-hangars located at the airport. There are six individual aircraft storage units, or aircraft storage bays, within each multi-unit t-hangar, for a total of 12 units. The hangars are part of a condo association, which leases land from the City/airport.
Other Hangar Tenants	Various private aircraft owners sublease aircraft storage space from Concord Aviation Services

Table 1-5 Continued

Ramp/Tie-down Tenants	There are 37 aircraft stored on the based aircraft ramp at Concord Municipal Airport. All 37 aircraft owners sublease space from Concord Aviation Services.
NOAA Environmental Technical Laboratory (ETL)	The Regional Weather and Climate Applications Division of ETL leases land from the City/airport to house and maintain an extensive collection of sensors that enable them to study and collect regional weather and climate data.
National Weather Service	The National Weather Service maintains and operates the Automated Surface Observing System (ASOS) and occupies and leases office space in the terminal building from the City/airport with plans to move into the FAA tenant space identified below.
FAA	The FAA leases office space in the terminal building and land from the City/airport to provide a radio relay antenna for Manchester approach control and Boston Center.

According to Concord Aviation Services, Pro Star Aviation, an aircraft avionics installation, service and aircraft maintenance company based at Manchester Airport, is interested in expanding their aviation maintenance capabilities at Concord Municipal Airport. They would lease hangar space or land from the airport.[xxxiv] According to Pro Star Aviation's official website,[xxxv] their customer base is Fortune 500 corporations and aircraft charter companies operating corporate type jet aircraft and some, but few, turboprop aircraft. Their maintenance department specializes in business aircraft and they are an FAA-Certified repair station for the following:

- Cessna Citation – Citation VII;
- Raytheon Hawker – 400 through 800;
- Raytheon Beechcraft King Air;
- Fairchild Merlin;
- Gulfstream II, III, and IV; and
- Bombardier Challenger 601

As of September 2004, contracts between the City/airport/Concord Aviation Services and Pro Star Aviation have not been signed. Discussions with Donald White, Pro Star Aviation's President, indicate that the company is only in the initial phases of discussion with Concord Municipal Airport and that expansion of the company depends upon Pro Star Aviation's economics and future demand.

There are no other aviation related businesses providing aviation services at the airport.

7.3.2 Non-Aviation Tenants

Table 1-6 depicts the non-aviation tenants that operate at the airport.

Table 1-6: Non-Aviation Tenants at Concord Municipal Airport as of September 2004

Tenant	Description of Business	Number of Annual Rentals	Number of Parking Slots Required Weekly	Number of Parking Slots Required During Peak Periods/Racecar Weekends
Hertz [1]	Car Rental Company subleasing space in hangar #1 from Concord Aviation Services	2,880 [2]	10 weekly	150
Henniker River Group, LLC	A non-aviation related consulting firm subleasing space in hangar #4 from Concord Aviation Services	NA		

Notes:

1. According to discussions with Hertz staff,[xxxvi] they typically rent approximately 50 cars per week. On average they need 10 parking slots per week. Those vehicles are typically parked curbside in front of the airport terminal building. They rent approximately 150 cars in July and 150 in September during the special event weekends during the summer. About 5 percent of their business is airport related. The majority of their car rentals come from businesses in the Concord area.
2. Approximately 10 percent of their car rentals are rented during race weekends

7.4 Other Aviation Activity – Airport Users

Although the companies listed in this section are not considered airport tenants (i.e. they do not actually lease land or office space from the City/airport), they frequently operate at the airport. They include a mix of fractional aircraft ownership companies[xxxvii] and other corporate operators that either have offices or conduct business within the local Concord area or are present at the airport during peak activity such as during race car events - National Association for Stock Car Auto Racing (NASCAR) events - at the New Hampshire International Speedway (see *Chapter 2 – Aviation Demand Forecasts* of this report for further information on peak airport activity).

It is helpful to document their use of the airport so that we can better determine future airport facility needs.

Table 1-7 lists the aviation related companies that typically operate aircraft at the airport, while **Table 1-8** lists the non-aviation related companies.

Table 1-7: Aviation Related Companies that Typically Operate at Concord Municipal Airport

Company Name	Company Type	Number of Annual Operations	Typical Aircraft Used
Corporate Wings, Inc. d/b/a Flight Options	Fractional Ownership	4	Cessna Citation – Bravo
		2	Cessna Citation – Citation VII
		2	Cessna Citation Jet – CJ1
		2	Cessna Citation – Citation X
		2	Gulfstream IV
		2	Embraer Legacy
		2	Dassault Falcon 50,
		2	Raytheon Hawker 800XP
		2	Raytheon Hawker 800
		2	Raytheon Beechcraft Beechjet 400
		2	Raytheon Beechcraft King Air
		2	Bombardier Challenger 601
Flight Options Total - 2003		**26**	
NetJets and Executive Jet	Fractional Ownership	20	Cessna Citation – Encore
		4	Cessna Citation - Ultra
		8	Cessna Citation – Excel
		4	Cessna Citation – Citation VII
		2	Cessna Citation – Citation X
		2	Raytheon Hawker 800XP
		4	Raytheon Hawker 1000
		0	Dassault Falcon 2000
		0	Gulfstream IV-SP
		2	Embraer Legacy
		6	Vendors [1]
NetJets and Executive Jet Total - 2003		**52**	
Citation Shares	Fractional Ownership	2	Cessna Citation - Bravo
		2	Cessna Citation - Excel
		2	Cessna Citation Jet – CJ1
		0	Cessna Citation – Sovereign
Citation Shares Total - 2003		**6**	
FlexJet, Inc	Fractional Ownership	**18** [7]	Bombardier Learjet 31
			Bombardier Learjet 40
			Bombardier Learjet 45
			Bombardier Learjet 60
			Bombardier Challenger 604
			Bombardier Challenger 300
Jefferson Pilot Financial [2]	Corporate Operator	**420**	Raytheon Beechcraft Jet 400's
JBI Helicopter Services [3]	Corporate Operator	**250** [7]	Bell - Jet Rangers
			Bell - Long Ranger
			Bell - 407
Race Team Aviation Association [4]	Corporate Operator	**16** [7]	Cessna Citation – Citation II
			Raytheon Beechcraft King Air
			Raytheon Hawker 800XP
			Gulfstream I
Roush Racing [5]	Corporate Operator	**20**	Boeing 727
Hendrick Motorsports [6]	Corporate Operator	**48** [7]	Saab 2000's
			Gulfstream III
			Gulfstream II
			Raytheon Beechcraft 1900

Table 1-7 Continued

NASCAR	Corporate Operator	**32** [7]	Dassault Falcon 2000
			Bombardier Learjet 60
			Bombardier Learjet 31
			Raytheon Hawker 800XP
			Cessna Citation – Citation III
			Cessna Citation - Citation X
Fly an Ad	Corporate Operator	**12**	
Total Number of Annual Operations		**900**	

Notes:

1. Based on a mix of all Netjet aircraft listed above
2. Jefferson Pilot Financial is an individual and group shareholder-owned life insurance company. Its corporate headquarters are located in Greensboro, North Carolina with satellite offices located in Omaha, Nebraska and Concord, New Hampshire. According to discussions with the FBO,[xxxviii] the corporate jet shuttles employees to their North Carolina office at least 4 days per week with an occasional 5-day schedule during peak business activity.
3. JBI Helicopter Services operates a full service helicopter company out of their own heliport facility in Pembroke, NH. The company typically does a lot of agricultural work and construction work. However, during NASCAR race weekends they provide helicopter transportation from Concord Airport to the racetrack in Loudon, NH for both racecar drivers and crew and for the general public. According to the office manager for JBI Helicopter Services, they typically operate on Sundays, only, during both the July and August NASCAR races [xxxix]
4. The Race Team Aviation Association (RTAA) was formed to help with air traffic during NASCAR race weekends. They have 140 aircraft and 150 pilots that operate to and from race locations for their race teams. According to discussions with the Race Team Aviation Association president, the aircraft listed are associated with the following race teams: Nemco Motorsports, Robert Yates Racing, and Joe Gibbs Racing. They typically fly in on Thursday and leave on Sunday during the two race weekends with two operations conducted per aircraft.
5. According to discussions with staff, Roush Racing supplies marketing and team services for several race teams. They fly two Boeing 727's into Concord Municipal Airport during July and September race weekends and occasionally at other times during the year.[xl]
6. According to discussions with staff, Hendrick Motorsports supplies marketing and team services for several race teams. They fly the mix of aircraft listed during race weekends with several operations taking place from Thursday through Sunday.
7. Operations by each aircraft type is not recorded

Table 1-8: Non-Aviation Companies that Typically Operate at Concord Municipal Airport

Tenant	Description of Business	Number of Annual Rentals	Number of Parking Slots Required Weekly	Number of Parking Slots Required During Peak Periods/Racecar Weekends
Enterprise Rent-A-Car [1]	Car Rental Company	150 [2]	1 weekly	50

Notes:

1. They do not lease space from the airport. They have their own office located on Manchester Street, south of the airport but they are on the airport on a regular basis. According to discussions with Enterprise Rent-A-Car staff,[xli] they typically rent approximately four cars per month (48 annually) to Concord Aviation Services' customers. Those vehicles are typically parked curbside in front of the airport terminal building. They rent approximately 100 cars during the two race weekends during the summer (July and September).
2. Approximately 66 percent, of their car rentals are rented during race weekends

8.0 Airport Facilities

This section describes the airport's existing facilities in terms of location, configuration, size and use characteristics.

8.1 Airport Pavement Condition

Typically, airport pavement condition is reported as a numerical designation from 100 (best) to 1 (worst) called the pavement condition index (PCI). The PCI indicates the relative condition of airport pavements, as described in **Table 1-9**.

Table 1-9: PCI Index Legend

PCI Index	Pavement Condition
85-100	Excellent
70-84	Very Good
55-69	Good
40-54	Fair
25-39	Poor

Source: FAA

A pavement evaluation study was completed for the NHDOT in October of 2003 identifying the condition of pavements at Concord Municipal Airport.

Runway 17-35
At the time of the evaluation, Runway 17-35 had a PCI of 84, which is very good. Reconstruction of the pavement was completed in 1990.

A crack sealing project to maintain the pavement on Runway 17-35 was completed between July and November 2001.

Runway 12-30
The reconstruction and narrowing of Runway 12-30 to 75 feet was done in 2002. At the time of the evaluation, Runway 12-30 had a PCI of 90, which is excellent.

Although the condition of the runways is listed as very good and excellent, inevitable deterioration in the pavement will occur. The FAA indicates that the estimated life of runway pavement is 15 to 20 years. The airport has completed basic pavement maintenance such as crack sealing as identified above. Although this should be sufficient maintenance to uphold the integrity of the runways, rehabilitation is necessary for Runway 17-35 and Runway 12-30 within the planning period of this master plan update. Runway 17-35 will approach its estimated life of 15 years in 2005 (last rehabilitation done in 1990), while Runway 12-30 will approach its estimated life of 15 years in 2017 (last rehabilitation done in 2002).

Taxiways
At the time of the evaluation, Taxiway A, the parallel taxiway to Runway 17-35, had a PCI of 74, which is very good. The stub taxiways had PCI's from 69 to 79, or good to very good.

The closed Runway 03-21, which is used for overflow aircraft parking and taxiing had a PCI of 85, excellent; however, the center section of the closed runway is fair.

The taxiways to the Army facilities had a PCI of 80 (access taxiway to old Army facility), which is very good, and 95 (access taxiway to new Army facility), which is excellent.

The condition of the taxiways has deteriorated since the pavement evaluation and should be reevaluated to determine when rehabilitation will be necessary.

Ramps

At the time of the evaluation, the itinerant ramp had a PCI of 78, which is very good. The based aircraft ramp was not recorded in the 2003 evaluation. However, the previous PCI (evaluated in 1998) was 85, which is excellent. The New Hampshire Army National Guard ramp was recently constructed (2003/2004) and is in excellent condition with a PCI of 95.

8.2 Runways

Two active runways serve Concord Municipal Airport, Runway 17-35 and Runway 12-30. Runway 17-35 is 6,005 feet in length by 100 feet wide with a 640-foot displaced threshold on the Runway 17 end, while Runway 12-30 is 3,200 feet in length by 75 feet wide.

Table 1-10 provides a summary of runway data for Concord Municipal Airport.

Table 1-10: Runway Data – Concord Municipal Airport

	Runway 17	Runway 35	Runway 12	Runway 30
Length (feet)	6,005 with a 640-foot displaced threshold on the Runway 17 end		3,200	
Width (feet)	100		75	
Traffic pattern	Left	Left	Left	Left
Runway heading	171 magnetic, 155 true	351 magnetic, 335 true	121 magnetic, 105 true	301 magnetic 285 true
Latitude/ Longitude	43-12.49033N 071-30.45952W	43-11.59407N 071-29.88965W	43-12.46093N 071-30.41458W	43-12.32410N 071-29.71918W
Threshold Elevation (feet)	341.0 for both threshold and displaced threshold	332.8	340.2	341.4
PCI	84		90	
Surface Material and Condition/Date Constructed, Overlaid or Reconstructed	Asphalt – in very good condition Constructed - 1938/1939 Reconstructed – 1990		Asphalt – in excellent condition Constructed - 1938/1939 Reconstructed – 2002	
Weight Limitations (pounds) [1]	SWL – 43,000 DW – 60,000		SWL – 30,000	
Runway Markings [2]	Basic – good condition	Precision – good	Non-precision - very good condition	
Runway Signs [3]	Location Direction		1 Direction Sign to the Army Facility	
Approach Lights	REILs [4]	MALSR [5]	None	None
Runway Edge Lighting	High Intensity Runway Lights (HIRLs)		Medium Intensity Runway Lights (MIRLs)	
Other Navigational and Visual Aids	• 4-light PAPI on left [6] • Unlit, windsock on left [7]	• 4-box VASI on left [6] • Middle marker off of airport property • Outer marker off of airport property	Unlit, windsock on right [7]	None
	Airport Rotating Beacon, Compass Calibration Pad and Automated Weather Observing System (AWOS) There are two hazard beacons located to the east of Runway 35's approach installed in 1978. There is at least one known obstruction light located on a security fence at the old New Hampshire Army National Guard facility			
Instrument Approach [8]	GPS	ILS, NDB or GPS	VOR or GPS	None

Sources: FAA Form 5010, *Airport Master Record*, [vii] 1996 Airport Master Plan,[xlii] Airnav.com[xliii] and 1996 Airport Master Plan Ultimate drawing[xliv]

Notes:

1. Runway weight data is a realistic estimate of the airport's pavement strength at an average level of airport activity. The acronyms pertain to the landing gear type of an aircraft and are as follows: SWL = single wheel and DW = dual wheel. According to AC 150/5320-6D, Airport Pavement Design and Evaluation, the FAA states that, "For design purposes the pavement should be designed for the maximum anticipated takeoff weight of the design aircraft".[xlv]
2. At the time of the inventory (September 2004) the runway markings for Runway 17-35 were good, however, the paint is starting to yellow
3. The runway signs are in poor condition and are confusing. Based on that knowledge, a sign plan has been added to this airport master plan update
4. REILs are runway end identifier lights, which is a type of economy runway approach lighting system. REILS are two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.[xlvi] The REILS at the approach end of Runway 17 have been inoperative since 1986 due to removal of the power source[xlvii]
5. A Medium Intensity Approach Light System with Runway Alignment Indicator Lights, or MALSR, is a type of approach lighting system (ALS) that provides pilots with a basic means to transition from instrument flight to visual flight for landing at an airport. An ALS enhances instrument approach procedures and aids pilots in locating the approach end of a runway.[xlviii] A MALSR is a 2,400-foot system with runway alignment indicator lights. The configuration of this system allows for reduced visibility minimums and is required for any airport with approach visibility minimums that are less than ¾ of a mile.[xlix]
6. A visual approach slope indicator (VASI) and a precision approach path indicator (PAPI) are similar lighting aids that provide visual approach slope guidance to the runway touch down area; [l] however, VASI's are difficult to maintain because system parts are no longer manufactured due to the replacement of such systems by the newer and more advanced PAPI systems.
7. Both are faded, torn and hard to see
8. The instrument approaches listed are as follows: a GPS is a global positioning system; an ILS is an instrument landing system; an NDB is a non-directional beacon; and a VOR is a very high frequency (VHF) omni-directional range[li and lii]

8.3 Taxiways

Concord Municipal Airport has one parallel taxiway, Taxiway A, which provides access to the approach ends of Runway 17-35. There are four-access taxiways (or stub taxiways) connecting the parallel taxiway to the runway.

Runway 12-30 is accessible via the closed Runway 03-21, which intersects at the midpoint of the runway. There is no parallel taxiway to enter the approach end of Runway 30. Pilots must back-taxi approximately 1,320 feet on the runway, from the closed Runway 03-21, to get to the approach end of Runway 30 for takeoff. The approach end of Runway 12 is accessible via the parallel taxiway, Taxiway A, and the approach end of Runway 17.

There are two-access taxiways (or stub taxiways) providing access to both the old and new NH Army National Guard facilities, one located at the approach end of Runway 17 (to access the old facility) and the other located at the approach end of Runway 12 (to access the new facility).

Currently, improvements are needed to rectify the confusing taxiway at the intersection of the approach ends of Runways 12 and 17.

Table 1-11 provides a summary of taxiway data for Concord Municipal Airport.

Table 1-11: Taxiway Data – Concord Municipal Airport

	Parallel Taxiway A	A 1	A 2	A 3	A 4	Old Army Guard Access Taxiway	New Army Guard Access Taxiway
Length (feet)	6,005	300	300	300	300	940	380
Width (feet)	50	50	50	50	75	50	50
Surface Material	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt	Concrete
Date Constructed, Overlaid or Reconstructed	Constructed 1975 Reconstructed (north section only) 1990	Constructed 1975	Constructed 1975	Constructed 1975	Constructed 1975	The majority was removed in 2004 when Regional Drive was constructed	Constructed 2003/2004
PCI	74	73	79	69	74	80	95
Surface Material Condition	Very Good	Very Good	Very Good	Good	Very Good	Good [1]	Excellent
Marking	Centerline	Centerline	Centerline	Centerline	Centerline	Centerline	Centerline Edge
Marking Condition	Poor	Poor	Poor	Poor	Poor	Poor	Excellent
Taxiway Signs	ILS Hold Runway Hold Direction Location	Direction Location	Direction Location	Direction Location	Direction Location	None	None
Lighting [2]	None	None	None	None	None	None	MITL

Notes:
1. Although a PCI rating for this pavement was not evaluated during the 2003 study, visually, the pavement appears to be in good condition
2. MITL are medium intensity taxiway lights

8.4 Airport Ramps/Aircraft Storage

Concord Municipal Airport has three aircraft ramps. The ramps are known as the south ramp, the itinerant ramp and the New Hampshire Army National Guard ramp.

The south ramp is used for based aircraft storage. The itinerant ramp is used for itinerant, or temporary, aircraft storage. And the Army, only, uses the New Hampshire Army National Guard ramp for their helicopter and aircraft operations/storage.

Although the airport does not have permanent turf ramps, they do use two turf areas for overflow aircraft parking when needed, such as during special events (NASCAR races) or when corporate jet activity utilizes all available itinerant ramp space (see *Chapter 2 – Aviation Demand Forecasts* of this report for further information on peak airport activity). Those areas are as follows:

- The grass area located south of the based aircraft storage ramp (south ramp); and
- The grass area located north of the terminal building

The closed runway (Runway 03-21) is also used for overflow parking for at least three Boeing 727 aircraft during special events (NASCAR races).

Table 1-12 provides a summary of ramps, pavement condition and aircraft storage data for Concord Municipal Airport.

Table 1-12: Concord Municipal Airport Ramps/Aircraft Storage Areas as of September 2004

Ramp/Location	Size (sf)	PCI	Surface Material	Condition	Date Constructed, Overlaid or Rehabilitated	Aircraft Storage Capacity - Ramp
Based Aircraft Storage: South Ramp	140,000	85	Asphalt	Excellent	Constructed 1991	45 [1]
Itinerant Aircraft Storage: Itinerant Ramp	75,000	78	Asphalt	Very Good	Constructed 1948 Reconstructed 1991	29 [2]
New Hampshire Army National Guard Ramp	270,000	95	Concrete	Excellent	Constructed 2003/2004	10
					Actual Civilian Based Aircraft on Ramp	**37**
					Actual Military Based Aircraft on Ramp	**0** [3]
					Total	**37**

Source: Concord Aviation Services[liii]

Notes:

1. Thirty-seven of the 49 available storage spaces are being leased to private aircraft owners as of September 2004. And four of the 49 available storage spaces are not available due to State Police helicopter traffic in the area
2. Two of the 29 available storage spaces are for large aircraft
3. The New Hampshire Army National Guard has seven Black Hawk helicopters and one King Air but they are mainly stored in the adjacent hangar (see Table 1-13 below)

8.5 Airport Buildings and Hangars/Aircraft Storage

This section includes an overview of the airport buildings and aircraft storage hangars located at Concord Municipal Airport.

Table 1-13 identifies those airport buildings and aircraft storage hangars.

Table 1-13: Airport Buildings and Aircraft Storage Hangars at Concord Municipal Airport

Building	Building Owner	Lessee/Sub-Lessee	Lease Type	Size (sf)	Condition	Actual Based Aircraft [1]
Terminal Building	City of Concord	Concord Aviation Services, FAA, and National Weather Service	Facility	9,265	Poor	None
Conventional Hangar #1	City of Concord	Concord Aviation Services/3 private aircraft owners	Facility	11,500	Fair	7 Total 6 SE 1 ME
Conventional Hangar #2	City of Concord	Concord Aviation Services/14 private aircraft owners	Facility	8,000	Fair	15 Total 13 SE 1 HE 1 UL
Conventional Hangar #3	City of Concord	Concord Aviation Services/4 private aircraft owners	Facility	8,000	Fair/Good	4 Total 3 SE 1 ME
Conventional Hangar #4	City of Concord	Concord Aviation Services/7 private aircraft owners	Facility	12,000	Excellent	7 Total 1 ME 4 TP 1 TJ 1 UL
T-Hangar 1	C&M Management Corporation	Various private aircraft owners	Land	7,000	Excellent	7 Total 7 SE
T-Hangar 2	C&M Management Corporation	Various private aircraft owners	Land	7,000	Excellent	5 Total 4 SE 1 ME
State Police Conventional Hangar	State of NH	NH State Police Aviation Unit	Land	8,000	Excellent	2 Total 1 SE 1 HE
Civil Air Patrol	City of Concord	Civil Air Patrol	Facility	1,500	Fair	None
45 Airport Drive	City of Concord	None/Vacant	Facility	1,800	Poor	None
NH Army National Guard Facility	NH Army National Guard	None	Land	55,000	Excellent	8 Total 1 TP 7 HE
Snow Removal Equipment Facility	City of Concord	None	None	4,200	Excellent	None
Civilian Aircraft Capacity - Hangars				61,500		
Actual Civilian Based Aircraft - Hangars						47
Actual Military Based Aircraft - Hangars						8
Total						55

Sources/Notes: *March 1996 Concord Municipal Airport Master Plan Update*[liv] and Concord Aviation Services[lii]

1. The acronyms pertain to the following: SE-single engine, ME-Multi-engine, UL-Ultralight, HE-helicopter, TP-turboprop, and TJ-turbojet

8.5.1 Terminal Building

Concord Municipal Airport's terminal building is located adjacent to the primary access road, Airport Road, on the west side of the airport.

The building is a 9,265 square foot, two-story, brick and wood frame structure built in 1938 and expanded in 1961. Inspection of the building and discussions with City and airport staff, indicate that the building is generally in poor condition and in need of major renovation.

According to discussions with City officials and terminal reports, "the building has several significant code violations, structural deficiencies, does not meet Americans with Disabilities Act of 1990 (ADA) regulations, and does not have appropriate security devices to monitor access to the runway."[lv] Although the *March 1996 Concord Municipal Airport Master Plan Update* indicates that the amount of space available in the building is adequate (9,265 square feet) to meet projected space requirements for public and tenant space, it also indicates that the existing structure would have to be renovated to address the code violations, structural deficiencies, ADA regulations, security, and individual tenant needs.[lvi]

The *March 1996 Concord Municipal Airport Master Plan Update*[lvii] also indicates that the terminal building serves as the "gateway" to the City for those flying into the airport to: 1) conduct business in Concord; 2) vacation in central New Hampshire; 3) attend various special events such as NASCAR races at the New Hampshire International Speedway; and 4) participate in New Hampshire Presidential Primaries. The City has proposed to either renovate or construct a new terminal facility that not only addresses code violations but also addresses the need for a terminal facility that presents a modern, functional "front door" to the City.

Existing facilities in the building include the following:

- Office space;
- Storage space;
- Pilot's lounge with kitchen (sink, refrigerator, microwave, etcetera), television, pilot workspace to log flight activity; and telephone;
- Vending machines
- Conference room;
- Common space used as a central meeting place and waiting space for pilots, visitors and passengers; and
- Public rest rooms

8.6 Automobile Parking

Concord Municipal Airport provides ten paved automobile parking lots. **Table 1-14** lists the automobile parking lots and their automobile storage capacity for both public and private use automobile parking.

Table 1-14: Automobile Parking - Concord Municipal Airport

Parking Lot/Location	Size (sf)	Surface Material	Condition	Automobile Storage Capacity	Use
Civil Air Patrol	7,800	Asphalt	Good	36	Private
Terminal	25,500	Asphalt	Very Good	56	Public
Terminal	3,400	Asphalt	Very Good	18	Public
T-Hangar	1,800	Asphalt	Very Good	9	Private
Hangar #4	3,200	Asphalt	Very Good	15	Public
State Hangar	3,400	Asphalt	Very Good	19	Private
SRE Building	1,200	Asphalt	Excellent	7	Private
NH Army National Guard 1	10,200	Asphalt	Excellent	79	Private
NH Army National Guard 2	3,400	Asphalt	Excellent	18	Private
NH Army National Guard 3	5,000	Asphalt	Excellent	30	Private
			Automobile Capacity Total	**287**	
			Automobile Capacity Total – Public Use	**89**	
			Automobile Capacity Total – Private Use	**198**	

Concord Aviation Services indicated a need for an additional **public** automobile parking lot to accommodate increases in automobile storage requirements during special events as indicated below.

- According to discussions with Concord Aviation Services, during busy summer/fall weekends and special events such as NASCAR races at the New Hampshire International Speedway, the available automobile parking storage is inadequate. The shortage at those times is primarily due to the increase in rental automobile storage needs and for the general public (at least 500 plus fans congregate in the area during race weekends to catch a glimpse of the drivers and race teams). Typically, Concord Aviation Services stores rental automobiles on grassy areas located on the airfield side (within the airport's security fence), east of the two t-hangars. Additional parking for the general public is provided on the landside (outside of the airport's security fence), west of the two t-hangars and the terminal building. Parking within the fence is a safety concern because of the mix of aircraft and automobiles. At least 150 additional rental automobiles are trucked in by Hertz to accommodate increases in demand.
- Not only is additional automobile storage needed during special events, but additional automobile parking is also needed for employees of Jefferson Pilot Financial, a life insurance company with offices located in Concord. According to discussions with staff at Jefferson Pilot Financial and Concord Aviation Services, several employees make weekly trips from the Concord, New Hampshire office to the corporate headquarters located in Greensboro, North Carolina. Most employees spend anywhere from two to three nights in North Carolina, requiring the employee to leave their automobiles in the terminal parking lot overnight.
- Additional automobile parking is also warranted during Parent's weekend at St. Paul's School.

8.7 Fuel Facilities

Concord Municipal Airport has the storage capacity of 28,370-gallons of fuel (15,085-gallons of Jet A and 13,285 100LL), which is stored within underground tanks, installed in 1996, located on the itinerant aircraft storage ramp and within two fuel trucks used to service aircraft on the ramp. The fuel farm is a self-service fuel farm that is maintained and operated by Concord Aviation Services.

During busy summer and race weekends, they provide a third 5,000-gallon Jet-A fuel truck to meet increases in fuel demand and because the existing fuel farm is too small to provide the capacity needed during those busy weekends.

Table 1-15 and **Table 1-16** lists the aviation fuel storage capacity that is available at Concord Municipal Airport.

Table 1-15: Jet-A Aviation Fuel Storage Capacity

Fuel Type	Storage	Capacity (gallons)
Jet-A	Underground storage tank	12,085
	Fuel truck	3,000
	Typical Jet-A Fuel Capacity Total	**15,085**

Table 1-16: 100LL Avgas Aviation Fuel Storage Capacity

Fuel Type	Storage	Capacity (gallons)
100 LL Avgas	Underground storage tank	12,085
	Fuel truck	1,200
	Typical 100LL Avgas Fuel Capacity Total	**13,285**

Although the airport has a total capacity for over 28,000-gallons of fuel, the actual usable fuel is less than capacity due to the following:

1. Federal and State regulations require that tanks never be filled more than 90 percent; and
2. The fuel pump plumbing within the underground storage tanks cannot extract the last 600-gallons from within the tanks;

Table 1-17 lists the **usable** amounts of aviation fuel available at Concord Municipal Airport.

Table 1-17: Usable Aviation Fuel

Fuel Type	Storage	Capacity (gallons)	Useable Fuel (gallons)
Jet-A	Underground storage tank	12,085	10,200
	Fuel truck	3,000	2,700
	Total Jet-A Capacity	**15,085**	
		Total Usable Jet-A	**12,900**
100 LL Avgas	Underground storage tank	12,085	10,200
	Fuel truck	1,200	1,080
	Total 100 LL Avgas Capacity	**13,285**	
		Total Usable 100 LL Avgas	**11,280**

Discussions with Concord Aviation Services indicate that there is a need for **an additional 18,000-gallon Jet-A fuel tank** to accommodate the increased fuel demand during special events. They would like the additional tank to be installed and hooked up in parallel to the existing tank thus allowing for the use of the existing pumping and filtering equipment. The additional 18,000-gallon tank would provide a total gross capacity of approximately 28,500-gallons of useable Jet-A fuel. This would allow storage of slightly more than 3 tractor-trailer loads in the fuel farm tanks (maximum transport load allowed per truck is 8,000-gallons).

Typically, Concord Aviation Services pumps over 12,000-gallons of Jet-A fuel during special events. On July 25, 2004, Concord Aviation Services set a new record for jet fuel pumped in one day, 15,572-gallons. This represents a 20 percent increase of their previous best one-day fuel total of 12,754-gallons. The 15,572-gallons was dispensed into 40 aircraft, averaging 390-gallons per aircraft. Even with 12,900-gallons of total usable fuel available, and the additional third 5,000-gallon Jet-A fuel truck to meet increases in fuel demand, Concord Aviation Services is concerned that they could potentially run out of available Jet-A fuel, especially if the 5,000-gallon fuel truck were unavailable and if five additional aircraft required the average request for fuel (390-gallons) that day.

Although they could receive a fuel delivery, discussions with staff,[lviii] indicate that it typically takes approximately eight or more hours between the request for fuel and the actual time that the fuel can be pumped into an aircraft after delivery, which translates into significant wait time and inconvenience for the pilots/airport customers. The lag time can be attributed to transportation and testing, timing of deliveries with fuel tank availability, settling requirements and delivery delay.

Table 1-18 illustrates the fuel flowage at the airport for the last five years, which is expressed as the gallons of fuel sold and purchased by Concord Aviation Services for 1999 through 2003.

Table 1-18: Fuel Sold and Purchased – Concord Municipal Airport

Year	Annual Gallons Purchased Jet A	Annual Gallons Sold Jet A	Annual Gallons Purchased 100 LL	Annual Gallons Sold 100 LL
1999	215,845	212,793	74,004	80,155
2000	231,729	228,167	72,006	67,698
2001	212,965	215,583	71,216	75,714
2002	217,319	218,457	78,917	73,925
2003	228,032	222,687	57,040	59,200
Average	**221,178**	**219,537**	**70,637**	**71,338**

Source: Concord Aviation Services
Note:
In 2001 and 2002 it appears that more gallons were sold than purchased. However, this is not the case. The discrepancy is due to inventory overlap from the previous year.

8.8 Airport Drainage & Catch Basins

Concord Municipal Airport has in-pavement catch basins located along either side of Runway 17-35, on the edges of the runway, and catch basins and drainage swales located along either side of Runway 12-30 and Taxiway A.

For drainage reference, a reduced 11" by 17" drawing of the existing airport facilities is available in *Chapter 5 – Airport Plans, Drawing 2 of 11* of this airport master plan update.

8.9 Utilities

Utilities at the airport include electrical power to the terminal buildings, hangars, rotating beacon, runway lights, and navigational equipment. Water and sewer are both municipally provided.

8.10 Wind

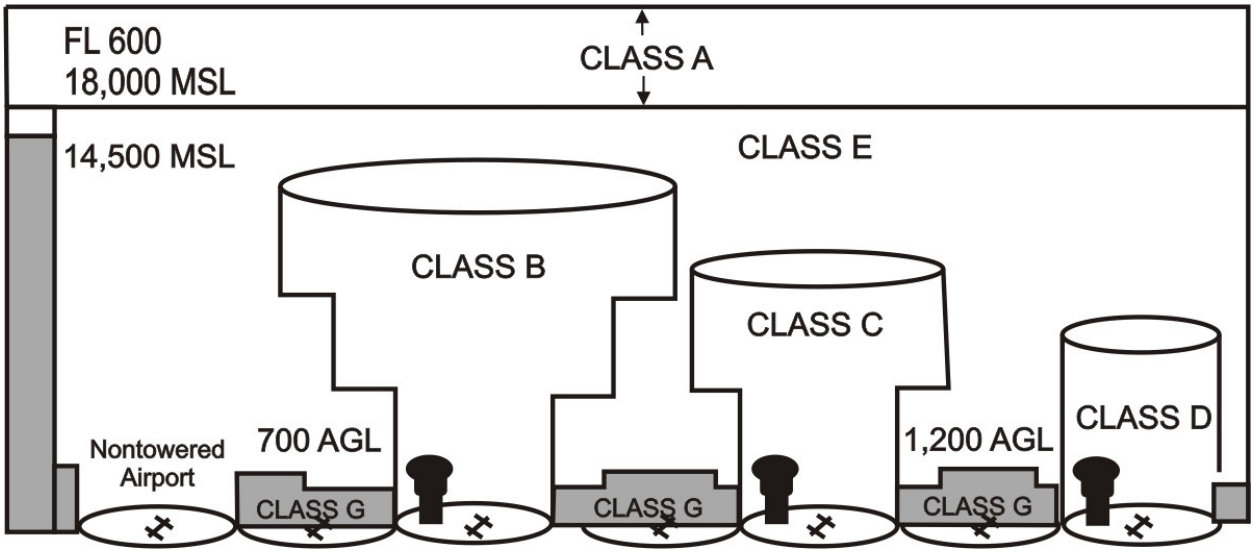
Runway orientation and usage is based on predominant wind direction and minimizing crosswind components. Review of wind data is necessary to develop and determine the runways' wind coverage values. Typically, wind data from on-site airport weather stations or from nearby airports/weather stations are used to compile data for the airport.

The desirable wind coverage for all airport runways is 95 percent. That means crosswinds should not exceed 13 knots for Airport Reference Codes (ARC) A-II and B-II aircraft more than five percent of the time (see further discussion on the ARC in *Chapter 2 – Aviation Demand Forecasts*).[lix] According to the *March 1996 Concord Municipal Airport Master Plan Update*, the airport is a B-II airport.[lx]

In previous studies, Concord Municipal Airport has used historical wind data compiled by the National Climatic Center from 1960 to 1964.[lxi] For the purposes of this master planning effort, and because we are not anticipating changing either runway orientation, the aforementioned historical wind data is used in this airport master plan update. Observations are posted for all-weather and instrument flight rule (IFR) wind observations. Concord Municipal Airport's All-Weather Wind Rose is depicted on Drawing 2, Existing Airport Layout Plan of the plan set.

8.11 Airspace, Pattern Use and Instrument Approaches

The surrounding airspace for Concord Municipal Airport is designated as Class E, which is controlled airspace that extends upward from the surface[lxii] (or in Concord's case from 700 feet) to the overlying, or adjacent, controlled airspace. It is any airspace that is not defined or designated as Class A, B, C or D. A graphic depiction of the United States airspace system is provided below.



Source: FAA website (www.faa.gov)[lxiii]

Concord Municipal Airport is a non-towered airport, which is common for many general aviation airports. The airport does have a designated UNICOM[1], or common traffic advisory frequency (CTAF), 122.7,[lxiv] which pilots can utilize to announce their position to other pilots in the area for safety purposes. This frequency can also be used to activate the following airport lighting and visual aids:

- High intensity runway lights (HIRLs) – Runway 17-35
- Medium intensity runway lights (MIRLs) – Runway 12-30
- Visual Approach Slope Indicator (VASI) - Runway 35
- Precision Approach Path Indicator (PAPI) – Runway 17
- Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) – Runway 35

Instrument flight rule (IFR) operations procedures are coordinated through the Manchester Control Tower (Manchester Approach/Departure Control) on frequency 127.35, and Manchester Clearance Delivery on frequency 133.65.

All traffic at Concord Municipal Airport for both runways uses a standard left-hand traffic pattern at 1,346 feet MSL or 1,000 feet Above Ground Level (AGL) for non-turbine aircraft and 1,546 feet MSL or 1,200 feet AGL for turbine aircraft.[lxv] **Table 1-19** identifies the percentage of runway use as reported by staff at Concord Aviation Services.

Table 1-19: Aircraft Operations Per Runway

Runway	Runway 17	Runway 35	Runway 12	Runway 30
Runway Use (percent)	75		25	
	25	50	10	15

There are seven low altitude Federal Airways, known as Victor Airways, in the vicinity of Concord Municipal Airport. A Victor Airway is a fixed route system established for air navigation purposes above 1,200 feet AGL. It connects navigational aids, such as VOR's to facilitate navigation from one point to another.

As indicated in Table 1-10: Runway Data – Concord Municipal Airport above, the airport has four instrument approaches, their approach minimums are depicted in **Figures 1-2** through **1-5.**

[1] UNICOM is a non-government communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications.

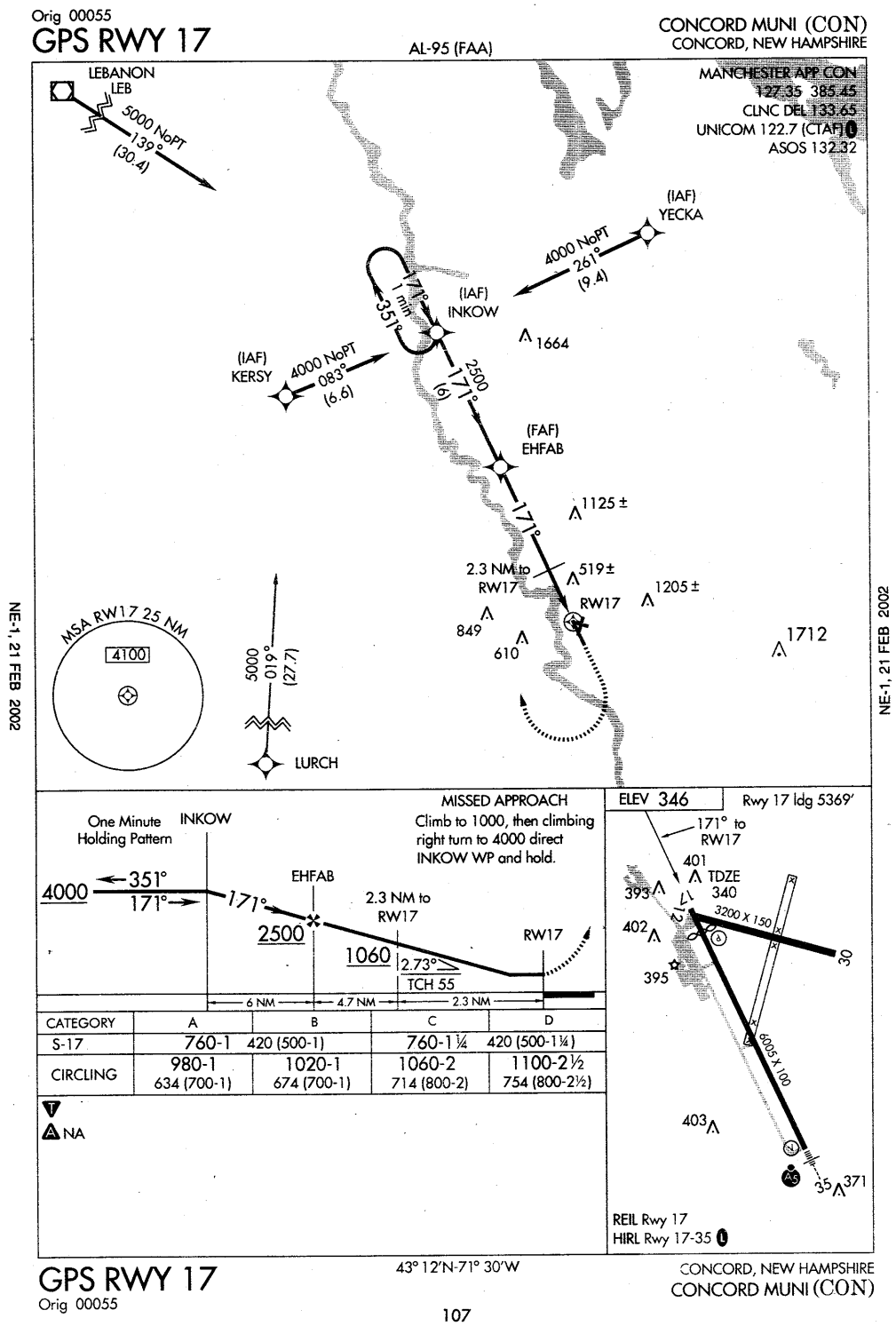


Figure 1-2: Concord Municipal Airport GPS Approach – Runway 17

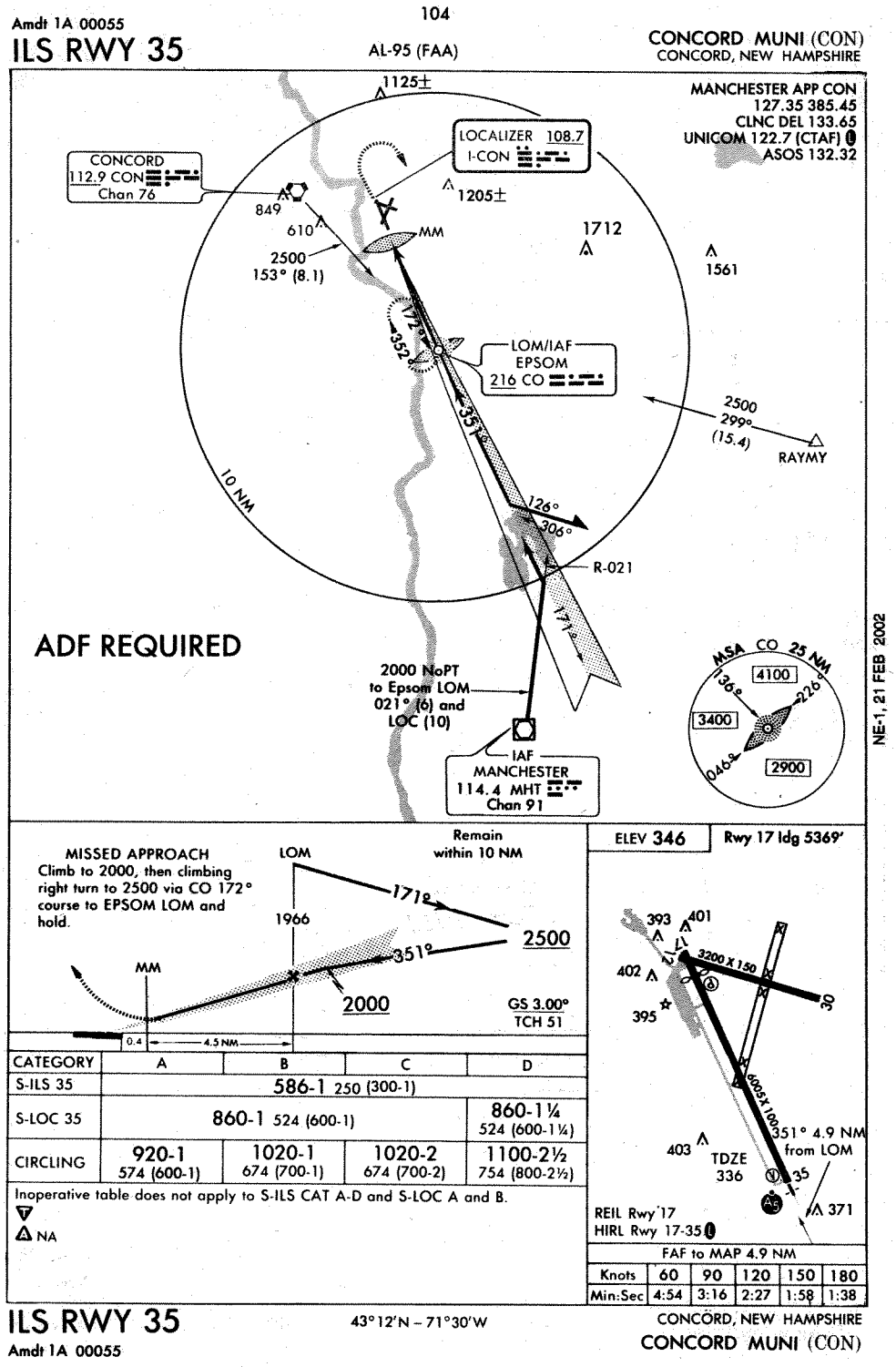


Figure 1-3: Concord Municipal Airport ILS Approach – Runway 35

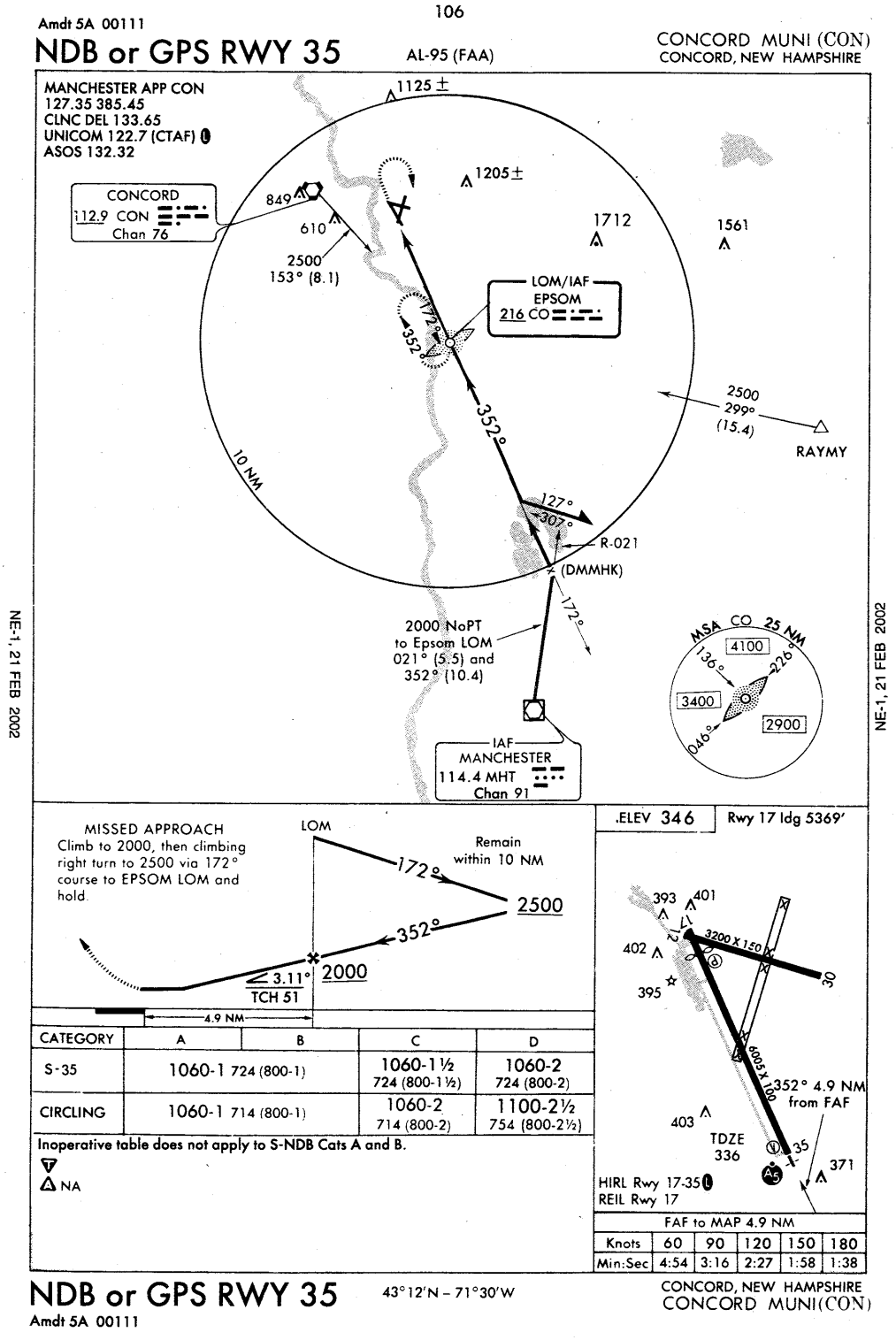


Figure 1-4: Concord Municipal Airport NDB/GPS Approach – Runway 35

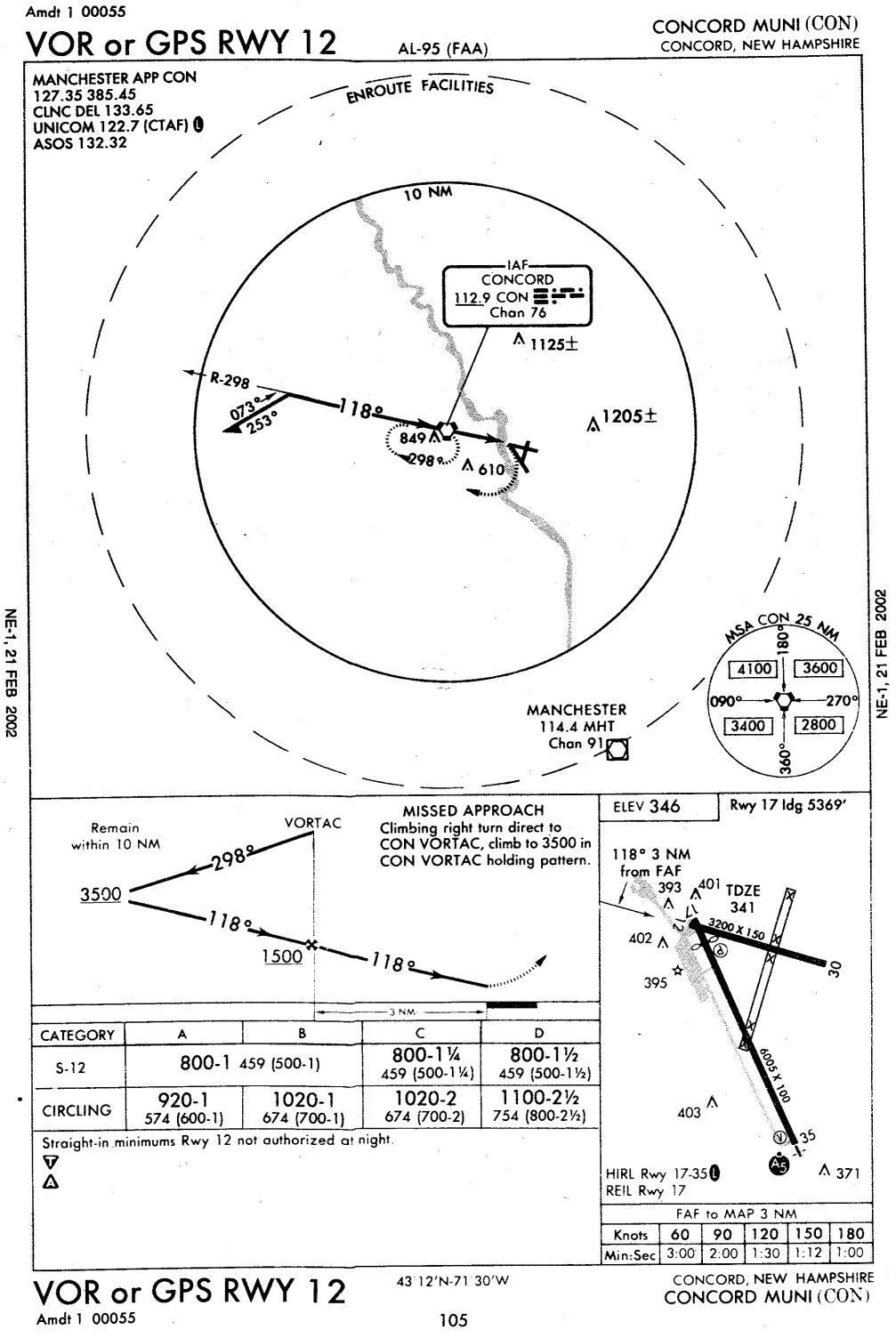


Figure 1-5: Concord Municipal Airport VOR/GPS Approach – Runway 12

9.0 Snow Removal Equipment and Storage Building

The airport currently has five (5) pieces of snow removal equipment (SRE) as follows:

- 1999 International 10-wheel dump truck with 12-foot front plow and double 14-foot wings;
- 1998 John Deere 644H loader with a 20-foot push plow, 20-foot angles plow, a 6-yard snow bucket, and a 3-yard standard bucket;
- 1988 1- ton pickup truck with front plow;
- 2002 1 - ton material spreader for deicing applications;
- 2003 Oshkosh snow blower; and
- 2003 Sweepster broom

The airport's 4,200 square-foot SRE building is a three bay garage used to house the SRE equipment. It was constructed in 2003 and is in excellent condition.

10.0 Fire Station and Emergency Response Facilities

The airport does not have a dedicated airport fire department; however, there is a City fire station, Concord Heights, Station #7, located off airport property on nearby Loudon Road. The Heights Station, typically followed by other area stations as back up, provides initial response to the airport for any aircraft/airport incidents and/or accidents.

The station has the following pieces of equipment, which are staffed by four firefighters and an officer:

1. A fire engine with 750-gallons of water capacity and 50-gallons of Aqueous Film Forming Foam agent (AFFF) to be used for aircraft fires. It is occupied by two firefighters and an officer; and
2. A rescue truck occupied by two firefighters, one of which is also a paramedic.

Discussions with a staff member indicate that one firefighter from the Heights Station has attended aircraft rescue and fire fighting courses provided at the New Hampshire Fire Academy - Aircraft Rescue Firefighting facility in Concord, New Hampshire. He anticipates that other staff members will be added to the training curriculum. He also mentioned that on occasion the Heights Station firefighters train with the New Hampshire Army National Guard regarding helicopter systems and helicopter fire fighting.[lxvi]

Discussions with a staff member from the City of Concord Community Development Department indicate that the City will conduct a study to determine the best location for a new fire station facility based on call volumes and population. Exploration of combining a new terminal building with a new structural fire station has been discussed but a determination has not yet been made.[lxvii]

Endnotes

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[xix] City of Concord, *Zoning Ordinance of the City of Concord*, City of Concord Code Enforcement Office, Concord, Maine, November 29, 2001, p. 2-1.

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[lvii] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, pp. 4-11 – 4-14.

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[lxiii] U.S. Airspace Classes at a Glance Card, *Airspace Classes Brochure*, September 16, 1993 <http://www.asy.faa.gov/safety_products/airspacecard.html>(June 2, 2004).

[lxiv] U.S. Department of Transportation, Federal Aviation Administration, *Airport/Facility Directory - Northeast U.S.*, National Aeronautical Charting Office, Riverdale, MD, 2001, p. 93.

[lxv] Aircraft Owners and Pilots Association, *AOPA's Airport Directory, Concord – Concord Municipal Airport (CON)*, Publications Division, Frederick, MD, 2003-2004, p. 3-353.

[lxvi] Lt. Robinson, Tim (Lutenient – Concord Heights Station, Station #7). Personal Interview. Sept 11, 2004.

[lxvii] Walsh, Matt. (Project Manager – City of Concord Community Development Department). Telephone conversation. July 23, 2004.

Chapter Two: Aviation Demand Forecasts

1.0 General

The purpose of this chapter is to present a 20-year forecast of aviation activity at Concord Municipal Airport and to select the critical, design aircraft to be used throughout the forecast period. The forecasts serve as the basis for planning the facilities needed to meet the area's aviation demand. These forecasts will update and replace the projections presented in the *March 1996 Concord Municipal Airport Master Plan Update*.[i] The forecasts from the *2003 New Hampshire Aviation Airport System Plan*[ii], (NHAASP), are used as the basis, customized for Concord with data received from airport tenants and airport users. The NHAASP forecasts of aviation activity are from 2000 through 2010. Therefore, to provide a 20-year forecast for Concord Municipal Airport (2003 – 2023), extrapolation of the NHAASP data is provided where necessary. The aviation activity forecasts within this report provide the short (0 to 10 years), and long-term (11-20 years) ranges of activity.

The components of projected aviation demand will consist of both annual and peak season levels of activity.

The following are forecasted within this chapter, as they are key indicators of an airport's future development:

- Based Aircraft
- Aircraft Operations
- Critical Aircraft
- Fuel Flowage

1.1 Forecasts and Growth

Forecasts are estimates of future activity levels. The numbers projected for each of the categories above are not a policy statement as to the level of activity that should be at the airport. The projections are estimates of future activity based largely on past aviation trends in the area relating to the elements listed above and on other indicators such as population growth, income growth, etcetera, that historically track closely with aviation activity.

2.0 Based Aircraft Forecast

The NHAASP's method for determining the numbers of future based aircraft tests four methodologies: 1) applied socioeconomic growth rates (i.e. population growth rates); 2) Federal Aviation Administration (FAA) national growth rates; 3) population market share analysis; and 4) trend line analysis.[iii]

The results from the four projection methodologies for based aircraft were reviewed and the Population Market Share methodology was chosen as the preferred based aircraft projection for the State.

The Population Market Share forecast used historic and forecasted population data for the State and for each region within the State as the basis for the forecast. Using the population data (2000 is the base year) for each region and dividing that data by the number of based aircraft located within the region derived a population ratio. Applying that ratio to population forecasts within each region produced individual, or regional, based aircraft forecasts.

Table 2-1 outlines the projected based aircraft for Concord Municipal Airport as calculated in the NHAASP.

Table 2-1: Projected Based Aircraft – According to NHAASP

Year	Projected Based Aircraft for Concord Municipal Airport
2000 [1]	***81***
2005	***89***
2010	***99***

Source: *2003 New Hampshire Aviation Airport System Plan*[iv]
Note:
1. Actual data based on actual NHAASP site visits/inventory

The number of existing based aircraft presented in the *2003 New Hampshire Aviation Airport System Plan*, are slightly lower than the number (92) counted in the September 2004 inventory, approximately 3 percent higher than the NHAASP forecast for 2005.

To adjust for the slight increase in based aircraft as reported by airport tenants, 2004 data is used as the base year along with the NHAASP based aircraft forecasting method and extrapolation to adjust the projected based aircraft for 2008, 2013, and 2023 for Concord Municipal Airport as presented in **Table 2-2**.

Table 2-2: Adjusted Projected Based Aircraft - Concord Municipal Airport

Year	Adjusted Projected Based Aircraft
2004 [1]	***92***
2008	***100***
2013	***112***
2023	***137***

Note:
1. Actual data based on site visits/inventory data received from Concord Aviation Services[v]

2.1 Fleet Mix

Current information received from the records of Concord Aviation Services identifies the 2004 based aircraft fleet mix for Concord Municipal Airport as shown in **Table 2-3** along with the based aircraft fleet mix at both the State and national levels.

Table 2-3: Existing Based Aircraft Fleet Mix - State of New Hampshire/United States

Equipment Type	Concord Municipal Airport	Percent of Based	State of NH	Percent of Based	United States	Percent of Based
Single Engine (SE)	65	71	1,024	82	143,350	68
Multi-Engine (ME)	7	8	107	9	17,500	8
Turboprop (TP)	4	4	-	0	6,860	3
Turbo Jet (TJ)	1	1	33	3	8,500	4
Helicopter (HE)	2	2	19	1	6,650	3
Other: Ultralight (UL)	5	5	24	2	-	0
Other: Glider (GL)	0	0	13	1	-	0
Other: equipment type not specified	-	0	-	0	6,380	3
Experimental (EXP)	0	0	-	0	21,950	11
Military	8	9	20	2	-	0
Total Based Aircraft	***92***	***100***	***1,240***	***100***	***211,190***	***100***

Sources: Concord Aviation Services[v]
2003 New Hampshire Aviation Airport System Plan[vi]
FAA Aerospace Forecasts, Fiscal Years 2004-2015[vii]

Notes:
1. Dashed line indicates that data is not available for the equipment type listed
2. All data based on 2003/2004 based aircraft inventories (site visits/inventory data received from Concord Aviation Services)[v] with the exception of the data received from the State of New Hampshire, which is based on 2001 based aircraft inventories

As indicated in Table 2-3 above, the based aircraft fleet mix at Concord Municipal Airport closely correlates with the national based aircraft fleet mix reported by the FAA in *FAA Aerospace Forecasts, Fiscal Years 2004-2015.*[viii] The aircraft active fleet mix forecasted by the FAA in *FAA Aerospace Forecasts, Fiscal Years 2004-2015* indicates the following:

- Slow growth in general aviation in 2003 and 2004 with a return to normal growth patterns in 2005.
- The growth patterns for turbojet aircraft appear to be different than the growth patterns for piston, turboprop, rotorcraft and experimental aircraft.
- According to the FAA the single engine piston aircraft active fleet is projected to decrease in 2002 and 2003, maintain their levels in 2004, followed by a period of slow recovery in 2005, which represents an average annual growth rate of 0.3 percent throughout the forecast period (2004 – 2015).
- The FAA predicts the active multi-engine piston aircraft fleet will decline by 0.5 percent per year over the forecast period.
- The rotorcraft fleet is forecast to grow 0.6 percent annually followed by experimental aircraft at an annual growth rate of 0.4 percent.
- The turbine-powered fleet (turboprop and turbojet) is projected to increase at an average annual rate of 3.5 percent over the same time period.
- Turboprop aircraft are expected to increase at an average annual growth rate of 1.3 percent.
- Turbojet aircraft are expected to have the highest rate of increase at 4.9 percent annually.[ix]

The growth in the turbine-powered fleet (turboprop and turbojet) indicates that the general aviation fleet mix is moving toward more sophisticated, corporate aircraft, while single engine, multi-engine, rotorcraft, and experimental aircraft are projected to experience an average annual growth rate of less than 0.6 percent per year.

The future based aircraft fleet mix for Concord Municipal Airport is projected for 2008, 2013, and 2023 using the FAA forecasting methodology as presented in **Table 2-4**.

Table 2-4: Projected Based Aircraft Fleet Mix – Concord Municipal Airport

Year	2008		2013		2023	
Equipment Type	**Based Aircraft**	**Percent of Total**	**Based Aircraft**	**Percent of Total**	**Based Aircraft**	**Percent of Total**
Single Engine (SE)	71	71	80	71	99	72
Multi-Engine (ME)	7	7	8	7	9	7
Turboprop (TP)	4	4	4	4	6	5
Turbo Jet (TJ)	1	1	2	2	3	2
Helicopter (HE)	2	2	2	2	3	2
Other: Ultralight (UL)	5	5	6	5	7	5
Other: Glider (GL)	0	0	0	0	0	0
Other: equipment type not specified	0	0	0	0	0	0
Experimental (EXP)	0	0	0	0	0	0
Military	10	10	10	9	10	7
Total Based Aircraft	**100**	**100**	**112**	**100**	**137**	**100**

Source: *FAA Aerospace Forecasts, Fiscal Years 2004-2015*
Note:
The military anticipate increasing their fleet by two helicopters by the end of 2004

3.0 Aircraft Operations Forecast

The aircraft operations forecast presented in the following sections outlines annual and peak period aircraft activity at Concord Municipal Airport.

3.1 Annual Aircraft Operations Forecast

The NHAASP's method for projecting annual aircraft operations was based on testing three methodologies: 1) applied socioeconomic growth rates (i.e. population growth rates); 2) FAA operations-per-based-aircraft (OPBA); and 3) trend line analysis.[x]

The results from the three projection methodologies for annual aircraft operations were reviewed and the OPBA methodology was chosen as the preferred annual aircraft operations projection for the State.

The OPBA methodology divides the number of aircraft operations by the number of based aircraft to develop an average number of operations per based aircraft, which in turn is applied to the based aircraft forecast to obtain operations forecast.

Airport tenants estimated the total annual airport operations for 2003 at approximately 85,000,[v] which is 40 percent higher than the 61,677 annual operations forecast for 2010, identified in the *2003 New Hampshire Aviation Airport System Plan.* Due to the discrepancies, we looked at forecasting methods used at other general aviation airports similar to Concord Municipal.

Typically, collecting annual airport operations data at non-towered general aviation airports is difficult due to the lack of air traffic control. Characteristically, greater confidence can be placed in based aircraft data because based aircraft are more easily counted than annual airport operations. Discussions with aviation tenants and airport users and application of the OPBA methodology used in the *2003 New*

Hampshire Aviation Airport System Plan indicate that the existing total number of airport operations is closer to approximately 55,000 operations as indicated in **Table 2-5**.

Table 2-5: Annual Operations - Reported By Airport Tenants/Airport Users (September 2004)

Airport Tenant or Airport Users	Reported Number of Annual Operations [1]	Based Aircraft or Typical Aircraft Used [2]	
Based Aircraft – Airport Tenants (92 Based Aircraft)			
Concord Aviation Services Sub-Lease Tenants and Rental Aircraft: 70 total aircraft (33 total aircraft in hangars and 37 total aircraft on tie-downs)			
Concord Aviation Services Rental Fleet: 5 total rental fleet aircraft	3,115	5 SE 3 Cessna 172 1 Cessna 182 1 Beechcraft Bonanza	
Sub-Lease Hangar Tenants - Private Aircraft Owners: 24 total private aircraft owners leasing hangar space	14,952	17 SE Various	1 HE Various
		3 ME Various	2 UL Various
		1 TP Various	
Sub-Lease Hangar Tenants - Sunlight Corporation: 4 total aircraft leasing hangar space [4]	1,100 [3]	3 TP Fairchild Merlins	
	360 [3]	1 TJ Canadair Challenger	
Sublease Tie-down Tenants - Private Aircraft Owners: 37 total private aircraft owners leasing aircraft tie-downs	23,051	31 SE Various	2 UL Various
		3 ME Various	1 EXP Various
New Hampshire Army National Guard: 8 total aircraft/helicopters [5]	1,600 [3]	7 HE Black Hawks	
	400 [3]	1 TP C-12 or King Air	
New Hampshire State Police – Aviation Unit: 2 total aircraft leasing hangar space [6]	630 [3]	1 SE 1 Cessna 182	
	350 [3]	1 HE Bell 407	
C&M Management Corporation (T-Hangar Tenants): 12 total private aircraft owners leasing hangar space	7,476	11 SE Various	
		1 ME Various	
Total Estimated Based Aircraft Operations	**53,034**		

Table 2-5 Continued

Itinerant Aircraft – Non-Airport Tenants		
Concord Civil Air Patrol (CAP) [7]	1,300 [3]	6 SE 2 Cessna 172's 3 Cessna 182's 1 Maule
Aviation Related Companies that Typically Operate at Concord Municipal Airport (Data from Table 1-7, *Chapter 1 – Inventory*)	900 [3]	
Total Estimated Itinerant Aircraft Operations	**2,200** [3]	
Total Estimated Aircraft Operations	**55,234**	

Notes:
1. The annual number of operations for most of the based aircraft is based on the operations per based aircraft (OPBA) methodology reported in the *2003 New Hampshire State Airport System Plan Update*,[xi] which listed 50,430 annual operations in 2000 and 81 based aircraft for a total of 623 OPBA. The OPBA divides the number of aircraft operations by the number of based aircraft to develop an average amount of operations per based aircraft.
2. The listed based aircraft acronyms are as follows: Single-Engine Piston (SE), Multi-Engine Piston (ME), Turboprop (TP), Helicopter (HE), Turbo Jet (TJ), Ultralight (UL) and Experimental (EXP).
3. Annual operations data based on discussions with airport tenants/users not based on the OPBA method
4. The Fairchild Merlin is a twin turboprop aircraft. According to discussions with the owner, Sunlight Corporation owns and operates three Fairchild Merlin's on a daily basis. The Canadair Challenger is a corporate type jet aircraft. Although not based at the airport, it does operate to and from the airport on a daily basis with more frequency during the winter months.[xii]
5. Discussions with Army personnel[xiii] indicate that the Black Hawk Helicopters conduct approximately 30 operations per week, while the C-12 aircraft conducts approximately 8 operations per week. Army personnel indicated that the C-12 is used mainly for administrative transportation, while the helicopters are used for medical flights. They anticipate to increase the based helicopters by two in December of 2004 bringing the total to 9 Black Hawk helicopters based at the airport.
6. Data collected from discussions with New Hampshire State Police – Aviation Unit personnel[xiv]
7. Discussions with CAP personnel indicate that on average 25 operations are conducted weekly by the mix of aircraft listed.[xv]

The difference between the calculations in Table 2-5 and the projections in the operations forecast presented in the *2003 New Hampshire Aviation Airport System Plan* are not significant. Since it is best to use the upper levels of a range when forecasting to insure adequate space will be set aside, the NHAASP forecast method is used to estimate the existing and project annual airport operations for 2008, 2013, and 2023 for Concord Municipal Airport as presented in **Table 2-6**.

Table 2-6: Projected Aircraft Operations (Rounded to the Nearest 100)

Year	Based Aircraft Projections	Operations Per Based Aircraft	Annual Operations
2004*	92	623	**57,300**
2008	100	623	**62,300**
2013	112	623	**69,800**
2023	137	623	**85,400**

* Based on estimates of the airports baseline conditions as of September 2004 and the OPBA methodology

3.2 Peak Period (Peak Hour) Aircraft Operations Forecast

Peak hour operations are used to determine facility requirements such as ramp and terminal space requirements.

According to discussions with airport tenants,[v] the airport experiences the greatest amount of activity in the months of May through September, with peak activity taking place in the month of August. The following events contribute to increases in airport activity:

- Third week of July: National Association for Stock Car Auto Racing (NASCAR) races at the New Hampshire International Speedway
- Third week of September: NASCAR races at the New Hampshire International Speedway
- Week prior to Labor Day: Students return to area prep schools
- Week prior to Memorial Day: Students leave area prep schools
- Weeks/Weekends of Memorial Day (May), Independence Day (July), Labor Day (September), and Columbus Day (October)

Holidays such as Thanksgiving and Christmas also contribute to increased airport activity, as do special events such as the New Hampshire Presidential Primary (every four years).

The busiest hours of operation are between 7:00 AM and 10:00 AM and 3:00 PM and 6:00 PM.

Continuing the methodology presented in the *March 1996 Concord Municipal Airport Master Plan Update*,[xvi] projected peak hour operations are calculated below in **Table 2-7**.

The peak month is derived by assuming that the peak month is 20 percent busier than the average month and it is assumed that 20 percent of the daily operations would occur in the peak hour.

Table 2-7: Projected Peak Hour Aircraft Operations

Year	Annual Operations	Peak Month Operations (Rounded to the Nearest 100)	Peak Day Operations (Rounded to the Nearest 10)	Peak Hour Operations
2004*	**57,300**	(57,300/12) x 1.2 = 5,700	(5,700/30) = 190	(190 x 20%) = **38**
2008	**62,300**	(62,300/12) x 1.2 = 6,200	(6,200/30) = 210	(210 x 20%) = **42**
2013	**69,800**	(69,800/12) x 1.2 = 7,000	(7,000/30) = 230	(230 x 20%) = **46**
2023	**85,400**	(85,400/12) x 1.2 = 8,500	(8,500/30) = 280	(280 x 20%) = **56**

* Based on estimates of the airports baseline conditions as of September 2004

3.3 Other Aircraft Operations Forecast

3.3.1 Aircraft Operations Per Runway

The information provided in this section is used to determine typical runway use and to identify potential noise impacts at Concord Municipal Airport.

Aircraft operations per runway are presented in *Chapter 1 – Inventory* of this airport master plan update. Due to the availability of numerous navigational approaches at the airport, the unlikelihood of more sophisticated navigational aids, and the continued existence of the two useable runways; aircraft operations per runway would remain constant throughout the planning period as shown in **Table 2-8.**

Table 2-8: Projected Aircraft Operations Per Runway (Rounded to the Nearest 100)

Year	Runway	Runway 17	Runway 35	Runway 12	Runway 30
	Runway Use (percent)	75		25	
		25	50	10	15
	Projected Operations	Runway 17	Runway 35	Runway 12	Runway 30
2004*	**57,300**	14,300	28,700	5,700	8,600
2008	**62,300**	15,600	31,200	6,200	9,300
2013	**69,800**	17,500	34,900	7,000	10,500
2023	**85,400**	21,400	42,700	8,500	12,800

* Based on estimates of the airports baseline conditions as of September 2004

3.3.2 Local and Itinerant Aircraft Operations

The FAA defines local operations as operations performed by aircraft that:

1. Operate in the local traffic pattern or within sight of an airport;
2. Are known to be departing for or arriving from flight in local practice areas located within a 20-mile radius of the airport; or
3. Are executing simulated instrument approaches or low passes at an airport

Itinerant operations are considered to be all operations (general aviation, military, air carrier, or air taxi) other than those listed above. Local and itinerant operations for Concord Municipal Airport are estimated to be 40 and 60 percent, respectively, per discussions with FBO personnel.

It is assumed that these percentages will remain the same throughout the planning period. Projected annual and peak hour local and itinerant operations for Concord Municipal Airport are shown in **Table 2-9.**

Table 2-9: Projected Local and Itinerant Operations (Rounded to the Nearest 100)

Year	Total Annual Operations	Percent of Local Operations	Annual Local Operations	Peak Hour Local Operations	Percent of Itinerant Operations	Annual Itinerant Operations	Peak Hour Itinerant Operations
2004*	57,300	40	**22,900**	**15**	60	**34,400**	**23**
2008	62,300	40	**24,900**	**17**	60	**37,400**	**25**
2013	69,800	40	**27,900**	**18**	60	**41,900**	**28**
2023	85,400	40	**34,200**	**22**	60	**51,200**	**34**

* Based on estimates of the airports baseline conditions as of September 2004

3.3.3 Touch-and-Go Aircraft Operations

Of the local flights, approximately 30 percent are reported as touch-and-go operations and are expected to remain as such throughout the planning period. Airport personnel indicate, "Concord's geographic location, type of traffic, and available navigational aids make it a routine training facility for student pilots. Because of these factors, we see a higher than usual T&G [touch and go] component

[operations]. We estimate local operations at 25-30 percent T&G'.[xvii] **Table 2-10** shows the projected number of touch-and-go operations for Concord Municipal Airport.

Table 2-10: Projected Touch-and-Go Operations (Rounded to the Nearest 100)

Year	Annual Local Operations	Percent of Local Operations	Annual Touch-and-Go Operations
2004*	22,900	30	**6,900**
2008	24,900	30	**7,500**
2013	27,900	30	**8,400**
2023	34,200	30	**10,300**

* Based on estimates of the airports baseline conditions as of September 2004

3.3.4 Nighttime Versus Daytime Aircraft Operations

Airport personnel report that the activity occurring at night (10:00 PM to 7:00 AM) is approximately 20 percent of the annual number of operations and are expected to remain as such throughout the planning period. Projected annual and peak hour nighttime and daytime activity is outlined in **Table 2-11**.

Table 2-11: Projected Nighttime Versus Daytime Operations (Rounded to the Nearest 100)

Year	Total Annual Operations	Nighttime *(10:00 PM – 7:00 AM)*			Daytime *(7:00 AM – 10:00 PM)*		
		Percent of Nighttime Operations	Annual Nighttime Operations	Peak Hour Nighttime Operations	Percent of Daytime Operations	Annual Daytime Operations	Peak Hour Daytime Operations
2004*	57,300	20	**11,500**	**8**	80	**45,800**	**31**
2008	62,300	20	**12,500**	**8**	80	**49,900**	**33**
2013	69,800	20	**14,000**	**9**	80	**55,900**	**37**
2023	85,400	20	**17,100**	**10**	80	**68,300**	**46**

* Based on estimates of the airports baseline conditions as of September 2004

From discussions with airport personnel, it is reported that visual flight rule (VFR) flights account for approximately 60 percent of the total operations, while the remaining 40 percent are instrument flight rules (IFR) flights. It is assumed that instrumentation will not change so the relationship of IFR and VFR operations will remain constant throughout the study period. Projected annual and peak hour VFR and IFR activity is outlined in **Table 2-12.**

Table 2-12: Projected Operations (VFR versus IFR) – Rounded to the Nearest 100

Year	Total Annual Operations	VFR			IFR		
		Percent of VFR Operations	Annual VFR Operations	Peak Hour VFR Operations	Percent of IFR Operations	Annual IFR Operations	Peak Hour IFR Operations
2004*	57,300	60	**34,400**	**23**	40	**22,900**	**15**
2008	62,300	60	**37,400**	**25**	40	**24,900**	**17**
2013	69,800	60	**41,900**	**27**	40	**27,900**	**19**
2023	85,400	60	**51,200**	**33**	40	**34,200**	**23**

* Based on estimates of the airports baseline conditions as of September 2004

4.0 Critical Aircraft

Airports need to be maintained and developed according to the characteristics of the most demanding aircraft expected to use the airport on a regular basis. The aircraft with the most critical approach speed, wingspan and weight is the "critical aircraft" using the airport on a regular basis. The FAA defines a "regular basis" as at least 500 operations per year. The FAA, in Advisory Circular (AC) 150/5300-13 *Airport Design*, has established the Airport Reference Code (ARC) as the method of determining airport design criteria based on the critical aircraft.[xviii]

Aircraft Approach Category

Category A: Speed less than 91 knots
Category B: Speed 91 knots or more but less than 121 knots
Category C: Speed 121 knots or more but less than 141 knots
Category D: Speed 141 knots or more but less than 166 knots
Category E: Speed 166 knots or more

Airplane Design Group

Group I: Wingspan up to but not including 49 feet
Group II: 49 feet up to but not including 79 feet
Group III: 79 feet up to but not including 118 feet
Group IV: 118 feet up to but not including 171 feet
Group V: 171 feet up to but not including 214 feet
Group VI: 214 feet up to but not including 262 feet

The *March 1996 Concord Municipal Airport Master Plan Update* identified the overall design code for Concord Municipal Airport as B-II with the Gulfstream I as the critical aircraft.[xix] However, the NHAASP identified the overall design code for Concord Municipal Airport as C-II.[xx]

Discussions with airport tenants and airport users identified the typical aircraft using the airport. For the most part, Concord Municipal Airport serves primarily small turbo-prop aircraft, single and twin-engine piston aircraft, and the occasional business jet traffic, (jet traffic accounts for approximately 2 percent of the annual aircraft operations – approximately 900 of the 55,000 annual aircraft operations).[xxi] The larger turboprop and jet aircraft with the most critical approach speed, wingspan and weight are the "critical aircraft". The critical aircraft that typically operate at Concord Municipal Airport and their approach category and airplane design group (airport reference code) are depicted in **Table 2-13**.

Table 2-13: Typical Critical Aircraft Operating at Concord Municipal Airport

Aircraft Type	Airport Reference Code	Estimated Annual Operations as of September 2004
Cessna Aircraft (Citation Jet and Citation II); and Raytheon Aircraft (Beechcraft Beechjet 400)	B-I	430
Cessna Aircraft (Bravo, Encore, Excel, and III); Gulfstream Aircraft (Gulfstream I); Raytheon Aircraft (Hawker 800, 800XP, 1000, Beechcraft King Air, Beechcraft 1900); and Dassualt Aircraft (Falcon 50)	B-II	370
Cessna Aircraft (Citation VII and Citation X); Gulfstream Aircraft (Gulfstream III); Bombardier Aircraft (Challenger 300, 601 and 604); Dassault Aircraft (Falcon 2000); and Embraer Aircraft (Legacy)	C-II	32
Boeing Aircraft (727) and Saab (2000)	C-III	32
Bombardier Aircraft (Lear 31, 40, 45 and 60)	D-I	24
Gulfstream Aircraft (Gulfstream III and IV)	D-II	12

Sources: Discussions with airport tenants and users, *Aviation Week & Space Technology*[xxii], FAA's Advisory Circular AC 150/5300-13, *Airport Design*[xxiii], and *Aircraft Characteristics*[xxiv]

The data provided above indicates that existing critical aircraft operations (as of September 2004) occur with more aircraft that fall into the B-I/B-II airport design criteria (approximately 800 operations by B-I/B-II aircraft and approximately 100 operations by C-II, C-III, D-I and D-II aircraft). As indicated, aircraft with more stringent design standards (C-II, C-III, D-I and D-II criteria) currently utilize the airport; however, with less frequency than B-I/B-II aircraft. Discussions with airport tenants and users indicate that although there are some operations conducted by these larger aircraft (the majority are seasonal operations or operations during peak periods or special events), it is assumed that future critical aircraft would most likely remain in the B-I/B-II airport design criteria family.

In accordance with the data presented above regarding the frequency of activity by B-I/B-II aircraft, and in the interest of remaining consistent with past planning criteria, it would appear appropriate to designate the design code for Concord Municipal Airport as B-II. However, discussions with airport tenants, airport users and the FAA indicate that there is a need to analyze both B-II and C-II airport design criteria for Runway 17-35 only due to the potential increase in the use of larger aircraft at the airport in the future. Therefore, in an effort to avoid constraining potential airport growth and potentially underestimating the airports future needs, B-II versus C-II design criteria is further analyzed here and in subsequent chapters.

If the number of operations by C-II, C-III, D-I and D-II aircraft were to substantially increase, more stringent design standards in regards to runway width, runway safety areas, object free areas, and all other design criteria would be required to accommodate those larger aircraft. **Table 2-14** illustrates the design criteria for a B-II airport and the airport design criteria for the other classifications. The major differences in runway design standards between the existing B-II standards and the standards required for C-II, C-III, D-I and D-II aircraft are identified within the table in bold and italicized type.

Table 2-14: Design Criteria

Design Elements	Design Criteria (feet unless otherwise indicated)			
	B-II Existing and Future Design Criteria	C-I and D-I Design Criteria	C-II and D-II Design Criteria	C-III and D-III Design Criteria
Runway:	**Visibility not lower than ¾-mile**			
Width	75	***100***	***100***	***100***
Runway Shoulder Width:	10	10	10	***20***
Runway Blast Pad:				
Length	150	100	150	***200***
Width	95	***120***	***120***	***140***
Runway Safety Area:				
Length beyond runway end	300	***1,000***	***1,000***	***1,000***
Width	150	***400 and 500***	***400 and 500***	***500***
Runway Obstacle Free Zone:				
Length beyond runway end	200	200	200	200
Width	400	400	400	400
Runway Object Free Area:				
Length beyond runway end	300	***1,000***	***1,000***	***1,000***
Width	500	***800***	***800***	***800***
Taxiway/Taxilane:				
Width	35	25	35	***50***
Taxiway Edge Safety Margin	7.5	5	7.5	***10***
Taxiway Shoulder Width	10	10	10	***20***
Taxiway Safety Area Width	79	49	79	***118***
Taxiway Object Free Area Width	131	89	131	***186***
Taxilane Object Free Area Width	115	79	115	***162***
Runway Separation Standards:	**Visual runways and runways with not lower than ¾-statute mile approach visibility minimums**			
Runway centerline to taxiway/taxilane centerline	240	***300***	***300***	***400***
Runway centerline to aircraft parking area	250	***400***	***400***	***500***
Taxiway/Taxilane Separation Standards:				
Taxiway centerline to parallel taxiway/taxilane centerline	105	69	105	***152***
Taxiway centerline to a fixed or moveable object	65.5	44.5	65.5	***93***
Taxilane centerline to parallel taxilane centerline	97	64	97	***140***
Taxilane centerline to a fixed or moveable object	57.5	39.5	57.5	***81***

Source: Advisory Circular 150/5300-13, *Airport Design*[xxv]

Note:

1. According to Advisory Circular 150/5300-13, *Airport Design*, for ARC C-I and C-II, a runway safety area of 400 feet is permissible

If the airport were to remain as a B-II airport, the Cessna Citation II (Citation Bravo) with an approach speed of 112 knots and a wingspan of 51.8 feet is selected as the critical aircraft, or most demanding aircraft, using the facility. The *March 1996 Concord Municipal Airport Master Plan Update* identified the Gulfstream I as the design aircraft; however, this aircraft is older and is no longer used as often. Discussions with Concord Aviation Services indicate that the Cessna Citation is the most common jet aircraft using the facility.

5.0 Fuel Flowage

Fuel sales are an indication of growth at the airport, and can identify the rates of growth occurring in the turbine aircraft sector (indicated by jet fuel sales) and single and multi-engine piston sector (indicated by 100 LL Avgas sales).

The existing fuel storage capacity and the need for additional fuel storage for Concord Municipal Airport are identified in *Chapter 1 – Inventory.*

Fuel sales forecasts are developed in this section to quantify the additional capacity already indicated as necessary by on-airport personnel and to estimate the airport revenues that may be received from fuel flowage fees. Projections are developed using the average fuel growth rates from the *FAA Aerospace Forecasts, Fiscal Years 2004-2015* growth rates.[xxvi] Fuel sales projections are detailed in **Table 2-15**.

Table 2-15: Fuel Sales Projections (Rounded to the Nearest 100)

Year	Jet A Yearly Total (In gallons)	100 LL Avgas Yearly Total (In gallons)
2003*	222,687	59,200
2008	265,200	74,400
2013	318,100	78,300
2023	457,400	86,700

* Base on a "snapshot" of the airports actual sales as of December 2003 (not rounded)

6.0 Forecast Summary

Table 2-16 displays the forecast summary for the major forecast elements previously discussed in this chapter.

Table 2-16: Concord Municipal Airport Forecast Summary

Activity	2008	2013	2023
Based Aircraft:			
Single Engine (SE)	71	80	99
Multi-Engine (ME)	7	8	9
Turboprop (TP)	4	4	6
Turbo Jet (TJ)	1	2	3
Helicopter (HE)	2	2	3
Other: Ultralight (UL)	5	6	7
Other: Glider (GL)	0	0	0
Other: equipment type not specified	0	0	0
Experimental (EXP)	0	0	0
Military	10	10	10
Total Based Aircraft	**100**	**112**	**137**
Annual Operations:			
Total Annual Operations	**62,300**	**69,800**	**85,400**
Peak Hour Operations	**42**	**46**	**56**
Local/Itinerant Operations:			
Annual Local	24,900	27,900	34,200
Peak Hour Local	17	18	22
Itinerant	37,400	41,900	51,200
Peak Hour Itinerant	25	28	34
Touch-and-Go Operations:	7,500	8,400	10,300
Night/Day Operations:			
Annual Nighttime	12,500	14,000	17,100
Peak Hour Nighttime	8	9	10
Annual Daytime	49,900	55,900	68,300
Peak Hour Daytime	33	37	46
VFR Operations:			
Annual VFR Operations	37,400	41,900	51,200
Peak Hour VFR Operations	25	27	33
IFR Operations:			
Annual IFR Operations	24,900	27,900	34,200
Peak Hour IFR Operations	17	19	23
Critical Aircraft:			
Overall ARC	B-II		
Critical Aircraft Type	Cessna Citation II (Citation Bravo)		
Critical Aircraft Wingspan	51.6 feet		
Critical Aircraft Approach Speed	112 knots		
Fuel Sales:			
Jet A (gallons)	265,200	318,100	457,400
100 LL Avgas (gallons)	74,400	78,300	86,700

Endnotes

[i] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996.

[ii] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003.

[iii] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, pp. 5-27 to 5-30.

[iv] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, p. 5-29.

[v] David Rolla dmr@confbo.com, "Master Plan info," September 3, 2004, office email communication (September 3, 2004).

[vi] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, pp. 2-8 – 2-9.

[vii] U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecast – Fiscal Years 2004 – 2015*, U.S. Government Printing Office, Washington, DC, March 2004, Table 31.

[viii] U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecast – Fiscal Years 2004 – 2015*, U.S. Government Printing Office, Washington, DC, March 2004.

[ix] U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecast – Fiscal Years 2003 – 2015*, U.S. Government Printing Office, Washington, DC, March 2004. pp. V-14 to V-17.

[x] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, p. 5-30.

[xi] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, p. 2-10.

[xii] Armstrong, Bruce (Owner, Sunlight Corporation). Personal Interview. September 1, 2004.

[xiii] Col. Burritt, Stephen C. (Engineer - New Hampshire Army National Guard). Personal Interview. August 5, 2004.

[xiv] Lombardi, Tom (Sergeant with the New Hampshire State Police – Aviation Unit). Personal Interview. August 13, 2004.

[xv] Lt. Col. Ninness, Darin (Commander – Civil Air Patrol). Personal Interview. September 1, 2004.

[xvi] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, p. 2-12.

[xvii] David Rolla dmr@confbo.com, "RE: Touch and Goes," September 30, 2004, office email communication (September 30, 2004).

[xviii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 7*, U.S. Government Printing Office, Washington, DC, October 2002, p.1.

[xix] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, p. 2-13.

[xx] Edwards and Kelcey, Inc. in collaboration with RKG Associates, Inc, and New Hampshire Department of Transportation – Division of Aeronautics, *New Hampshire Aviation Airport System Plan*, Edwards and Kelcey, Inc., Manchester, New Hampshire, 2003, p. 2-7.

[xxi] David Rolla dmr@confbo.com, "Master Plan info," September 3, 2004, office email communication (September 3, 2004).

According to David, the most common aircraft using the airfield are as follows: Beechcraft BeechJet 400, Beechcraft King Air, Cessna Citation, Cessna 172, and Piper Warrior.

[xxii] Stanley W. Kandebo with a team of Aviation Week & Space Technology editors, " Outlook/Specifications – Business & General Aviation Aircraft", *Aviation Week & Space Technology*, Aerospace Source Book 2000, January 13, 2003.

[xxiii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 7*, U.S. Government Printing Office, Washington, DC, October 2002.

[xxiv] Burns & McDonnell, *Aircraft Characteristics, 7th Edition*, Burns & McDonnell, Kanas City, MI, ND.

[xxv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 7*, U.S. Government Printing Office, Washington, DC, October 2002, pp. 14,15, 16, 22, 24, 25, 26, and 36.

[xxvi] U.S. Department of Transportation, Federal Aviation Administration, *FAA Aerospace Forecast – Fiscal Years 2004 – 2015*, U.S. Government Printing Office, Washington, DC, March 2004, Table 25.

Chapter Three: Facility Requirements and Alternative Development

1.0 General

The previous two chapters (*Chapter 1 – Inventory* and *Chapter 2 – Aviation Demand Forecasts*) identify the airports existing facilities and provide a 20-year projection of aviation activity for Concord Municipal Airport. The information provided in those chapters serves as the foundation for this and subsequent chapters.

Note that the New Hampshire Army National Guard is responsible for future development and maintenance of their facilities within their leased area. Although their operational facilities are identified within previous chapters, they will not be analyzed within this chapter or as part of this airport master plan update.

The purpose of this chapter is to use the data collected within the inventory and aviation forecast chapters to: 1) determine the adequacy of the existing airport facilities; 2) determine if the facilities at Concord Municipal Airport can accommodate the projected planning activity levels; 3) determine if the existing and future airport facilities do meet, or can meet, Federal Aviation Administration (FAA) airport design criteria; and 4) determine the best method, or alternative design option, for future airport development.

This chapter did not focus on theoretical runway capacity levels as calculated in the FAA Capacity Manual as operational capacity is not an issue at current and future operations levels.

The following known airport issues and/or development needs were identified during the initial airport master plan update meeting (held on October 7, 2004):

- Identify issues and/or impacts associated with wildlife/security fence installation (enclose the airport operations area) and make recommendations for wildlife/security fence completion;
- Construct a perimeter road;
- Calculate existing and future snow removal building and equipment needs;
- Identify the pavement condition of all runways, taxiways and ramps and make recommendations for pavement rehabilitation;
- Identify existing and potential land use conflicts and make recommendations for improvements;
- Identify airport obstructions and make recommendations for removal and/or obstruction lighting;
- Identify obstructions within the approach for Runway 17-35 – it is possible that the visibility minimums could be reduced if the obstructions were removed;
- Assess aircraft storage requirements (hangars and tie-downs) during both peak activity demand and typical airport use;
- Analyze typical airport users and make recommendations for the establishment of future facilities to accommodate those users;
- Review existing airport navigational and visual aids and make recommendations for improvement;
- Analyze the need for an extension to Runway 17-35;
- Make recommendations to improve runway and taxiway signs, lighting and markings. They currently are in poor condition;
- Analyze the need for a parallel taxiway to Runway 12-30;

- Provide alternatives and recommendations for improvement for the confusing intersection at the approach ends of Runways 17 and 12;
- Make recommendations to improve automobile parking requirements during peak activity;
- Assess converting the old, closed runway, Runway 03-21, into a taxiway/ramp;
- Review terminal building reconstruction and/or upgrades and terminal building location/relocation options;
    - Assess the possibility of a joint use terminal building facility with the Concord Heights Fire Station;
- Assess fuel facility requirements and the potential need for an additional 18,000-gallon underground Jet A fuel storage tank; and
- Evaluate the current airport management system and make recommendations for improvement

Recommendations made within this chapter address the known issues and/or development needs listed above with the exception of the potential land use conflicts, which are covered in more detail in *Chapter 4 – Environmental Review* and the evaluation of the current airport management system, which is covered in *Chapter 6 – Capital Improvement Plan & Airport Operations/Finances*.

Any potential environmental impacts associated with the following recommendations for improvement are outlined in *Chapter 4 – Environmental Review*, while a graphic depiction of the proposed development is shown in *Chapter 5 – Airport Plans* of this report.

Construction cost estimates for future development are provided in *Chapter 6 – Capital Improvement Plan & Airport Operations/Finances*.

1.1 Previous Airport Master Plan Update Recommendations

In the context of a master plan update, it is necessary to compare prior facility recommendations and analyze what has been implemented before updating the current needs. Recommendations made in the *March 1996 Concord Municipal Airport Master Plan Update* to meet deficiencies found at Concord Municipal Airport are presented in *Chapter 1 – Inventory*, Table 1-4. Projects not completed since the 1996 recommendations are depicted below in **Table 3-1**.

Table 3-1: March 1996 Airport Master Plan Update - Projects Recommended/Not Completed

Rehabilitate the existing terminal building
Construct a parallel taxiway to Runway 12-30
Convert the closed Runway 03-21 to a taxiway
Extend Canterbury Road
Purchase avigation easements and properties located within the runway protection zones (RPZs)
Complete an obstruction study for all approaches
Abandon Canterbury Road and assemble a development parcel

The projects listed above, or some variation thereof, continue to be recommended, as detailed in subsequent sections of this chapter. However, the following exceptions apply:

- The Canterbury Road projects (extend and abandon) have been eliminated and will not be carried over into this master plan effort. Discussions with the City of Concord indicate that the Canterbury Road projects were abandoned during the Regional Drive extension project.

Some, but not all, of the recommended avigation easements have been purchased.

An obstruction study of the runway approaches is being completed concurrently with this master plan update.

The following elements are examined within this chapter:

- ***Development Considerations***
  - Protected Surfaces
    - Airport Design Criteria
    - Navigational Aid Critical Areas
    - Imaginary Surfaces
    - The Runway Visibility Zone
  - Existing Terrain
  - Environmentally Sensitive Areas
- ***Landside Facility Requirements and Alternative Development***
  - Aircraft Storage
  - Automobile Storage
  - Terminal Building Disposition
  - Aircraft Fuel Facility
- ***Airside Facility Requirements and Alternative Development***
  - Runways
  - Taxiways
  - Pavement Condition
  - Visual and Navigational Aids
    - Marking, Lighting, Signs and Navaids
  - Airside Obstructions/Imaginary Surfaces
- ***Storm Water Pollution and Prevention Plan***
- ***Airport Wildlife/Security Fencing Requirements***
- ***Airport Perimeter Road Requirements***
- ***Snow Removal Equipment Requirements***

2.0 Development Considerations – Protected Surfaces

The primary goals of an airport manager/owner are the safe and efficient operation of the airport and the design and development of that airport to satisfy local, regional or national aviation needs. To improve safety at our nation's airports, Federal regulations and standards exist that regulate airport design, development and maintenance. Those standards identify areas, both on and off of airport owned property, that are to be protected and maintained for the safety of the flying public. Those protected surfaces surround runways, taxiways, navigational aids and the airspace above airports. The following are examined:

- Airport Design Criteria;
- Navigational Aid Critical Areas;
- Imaginary Surfaces; and
- The Runway Visibility Zone

Future development must consider these protected surfaces when making recommendations for improvement and prior to the implementation of new or improved facilities.

2.1 Protected Surfaces - Airport Design Criteria

In an effort to identify the adequacy of existing airport facilities and land availability for future airport development, the ultimate airport design criteria must first be determined.

Airport development and design is based upon the types of aircraft, or the most demanding aircraft group, expected to use the airport facility on a regular basis (a regular basis is considered at least 500 annual operations). The FAA has established the Airport Reference Code (ARC) as the method of determining airport design. The ARC is an alphanumeric code based on the approach speed (alpha) and wingspan length (numeric) of the critical aircraft, or most demanding aircraft or aircraft group using the airport on a regular basis. The ARC outlines the dimensional design requirements such as length and width for runways and taxiways and their associated protected surfaces such as safety areas and safety zones. The higher the alphanumeric code, the more stringent the design criteria. The existing ARC for Concord Municipal Airport is B-II for both Runways 17-35 and 12-30. Category B is for aircraft with approach speeds of 91 knots or more but less than 121 knots and group II is for aircraft with wingspans of at least 49 feet up to but not including 79 feet.

Discussions with airport tenants, airport users, the New Hampshire Department of Transportation (NHDOT) and the FAA identified the need to analyze the merits and limitations of implementing more stringent design criteria such as C-II design criteria for Runway 17-35, only. To do so, the following analysis is required: 1) we must first identify whether or not future C-II design criteria can be reasonably met at Concord Municipal Airport; and 2) we must determine if the future C-II design criteria would adversely impact existing facilities, the environment or future airport development plans.

Table 3-2 below identifies Concord Municipal Airport's existing B-II design criteria for both Runways 17-35 and 12-30 and potential C-II design criteria for Runway 17-35, only. The ***bold and italicized*** dimensions depicted in the table identify C-II design criteria that either cannot be met due to existing conditions and/or runway and taxiway configuration, or can be met, but with difficulty.

Table 3-2: Airport Design Criteria (Existing B-II and Potential C-II for Runway 17-35)

Design Elements	Design Criteria (feet unless otherwise indicated)					
	Existing Design Criteria Runway 17-35 and Existing and Future Design Criteria Runway 12-30				Potential Design Criteria Runway 17-35 Only	
	B-II				C-II	
	Visibility not lower than ¾-mile				Visibility lower than ¾-mile [1]	
Runway	Runway 17-35		Runway 12-30		Runway 17-35	
	17	35	12	30	17	35
Runway Protection Zone:						
Length	1,000	1,700	1,000	1,000	***1,700***	***2,500***
Inner Width	500	1,000	500	500	***500***	***1,000***
Outer Width	700	1,510	700	700	***1,010***	***1,750***
Total Acreage	13.770	48.978	13.770	13.770	***29.465***	***78.914***
Runway Width:						
Required Runway Width (actual)	75' (100')		75' (75')		100' (100')	
Runway Shoulder:						
Required width (actual)	10' (10'+)	10' (10'+)	10' (10'+)	10' (10'+)	10' (10'+)	10' (10'+)
Runway Blast Pad:						
Required length beyond runway end (actual)	150' (150'+)	150' (150'+)	150' (150'+)	150' (150'+)	150' (150'+)	150' (150'+)
Required width beyond runway end (actual)	95' (95'+)	95' (95'+)	95' (95'+)	95' (95'+)	120' (120'+)	120' (120'+)
Runway Safety Area:						
Required length prior to landing threshold (actual)	300' (300'+)	300' (300'+)	300' (300'+)	300' (300'+)	600' (600'+)	600' (600'+)
Required length beyond runway end (actual)	300' (300'+)	300' (300'+)	300' (300'+)	300' (300'+)	1,000' ***(400')***	1,000' (1,000')
Required width (actual)	150' (150'+)	150' (150'+)	150' (150'+)	150' (150'+)	400' or 500' [2] (500')	400' or 500' [2] (500')
Runway Object Free Area:						
Required length beyond runway end (actual)	300' (300'+)	300' (300'+)	300' (300'+)	300' (300'+)	1,000' ***(400')***	1,000' (1,000')
Required width (actual)	500' (500')	500' (500')	500' (500'+)	500' (500'+)	800' (800')	800' ***(500')***
Runway Obstacle Free Zone:						
Required length beyond runway end (actual)	200' (200'+)	200' (200'+)	200' (200'+)	200' (200'+)	200' (200'+)	200' (200'+)
Required width (actual)	400' (400'+)	400' (400'+)	400' (400'+)	400' (400'+)	400' (400'+)	400' (400'+)
Required inner-approach OFZ length (actual) [3 & 4]	N/A	2,600' (2,600')	N/A	N/A	N/A	2,600' (2,600')
Required inner-approach OFZ width (actual) [3]	N/A	500' (500')	N/A	N/A	N/A	800' ***(500')***
Required inner-approach OFZ Slope (actual) [3 & 5]	N/A	50:1 (34:1)	N/A	N/A	N/A	50:1 ***(34:1)***
Required inner-transitional OFZ (actual) [6]	N/A	N/A	N/A	N/A	N/A	See note 6

Table 3-2 Continued

Taxiway:		
Width (actual)	35' (50')	35' (50')
Taxiway Edge Safety Margin (actual)	7.5' (7.5')	7.5' (7.5')
Taxiway Shoulder Width (actual)	10' (10')	10' (10')
Taxiway Safety Area Width (actual)	79' (79')	79' (79')
Taxiway Object Free Area Width (actual)	131' (131')	131' (131')
Runway Separation Standards:	**Visual runways/runways with not lower than ¾-statute mile approach visibility minimums**	**Runways with lower than ¾-statute mile approach visibility minimums**
Runway centerline to taxiway/taxilane centerline (actual)	240' (400')	400' (400')
Runway centerline to aircraft parking area (actual)	250' (500)'	500' (500')

Notes:

1. According to discussions with the FAA, there are approach obstructions (trees) located within the approach of both Runway 17 and 35, which restricts the runways visibility minimums to greater than ¾ of a mile. Although this master plan update recommends the removal of those obstructions to allow for lower visibility minimums, the FAA must ultimately determine the visibility minimums that can reasonably be met and should be contacted so that an analysis can be conducted. The C-II design criteria listed reflects the criteria based on the lowest possible visibility minimums, lower than ¾-mile.
2. According to *Advisory Circular (AC) 150/5300-13, Airport Design*, for ARC C-I and C-II, a runway safety area width of either 400 feet or 500 feet is permissible.
3. The inner approach OFZ (length, width and slope) applies only to Runway 35 at Concord Municipal Airport.
4. The inner approach OFZ length extends 200 feet beyond the last approach light system (ALS) light unit. The Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR) for Runway 35 extends 2,400 feet beyond the end of the runway threshold; therefore, the inner approach OFZ length is 2,600 feet.
5. A slope of 50 feet horizontally and 1-foot vertically is the required OFZ slope for this design criteria. However, a slope of 34 feet horizontally and 1-foot vertically is widely accepted in the New England area due to the mountainous terrain. However, achievement of the 50:1 slope is desirable.
6. The inner-transitional OFZ applies only to runways with lower than ¾-statute mile approach visibility minimums, such as the potential visibility for Runway 17-35 if obstructions are removed. For Runway 35 (a Category I precision instrument runway), the inner-transitional OFZ begins at the edges of both the runway OFZ and inner-approach OFZ, then rises vertically for a height of 55 feet, and then slopes 6 feet (horizontally) to 1-foot (vertically) out to a height of 150 feet above the established airport elevation (346 feet), or 496 feet.

As indicated by the ***bold and italicized*** dimensions in the table above, the dimensional standards for the runway protection zone (RPZ), runway safety area (RSA), runway object free area (ROFA) and runway obstacle free zone (ROFZ) currently cannot be met. The following defines those design elements and identifies their existing limitations.

The **runway protection zone (RPZ)** is a trapezoidal surface on the ground, centered on the extended runway centerline, and begins 200 feet from the end of usable runway. In *AC 150/5300-13, Airport Design*, the FAA recommends that certain land uses, such as residences and buildings for public assembly, be prohibited from within the RPZ. They also recommend the exclusion of land uses that attract wildlife within the RPZ. If the RPZ surface extends into lands that are not owned by the airport, the FAA recommends that the airport either acquire the property or obtain easements that allow the airport to control the height of objects within the RPZ.

As identified in the table above, an increase in design criteria would also constitute an increase in the dimensional standards for Runway 17-35s RPZ. The RPZ area for Runway 17 would increase by approximately 46 percent (from 13± acres to 29± acres), while the RPZ surface for Runway 35 would increase by approximately 62 percent (from 48± acres to 78± acres).

The runway safety area (RSA) is a graded, rectangular area, centered on the runway centerline, and extended beyond the runway ends and runway edges. The RSA must be cleared, appropriately graded and drained. It must be free of objects, except those that need to be there due to their function, such as navigational aids. It should be capable of supporting airport mobile equipment, rescue equipment, and the occasional passage of aircraft under dry conditions. Any object located within the RSA higher than three inches must be constructed with frangible supports, with the frangible point no higher than three inches above grade. The airport should own the land that constitutes the RSA so that maintenance and the control of objects can be accomplished.

The **runway object free area (ROFA)** requires clearing of above ground objects protruding above the RSA edge elevation, except for navigational aids as mentioned above. Similar to the RSA, the airport should own the land that constitutes the ROFA.

The **runway obstacle free zone (ROFZ)** is a defined volume of airspace centered above the runway centerline. It prohibits taxiing and parked aircraft and requires clearing of object penetrations.

As identified in Table 3-2, an increase in design criteria would also constitute an increase in the dimensional standards of the RSA, ROFA and ROFZ for Runway 17-35. The RSA and ROFA length beyond runway end would increase from its existing required length of 300 feet to a 1,000-foot requirement. Currently, only 400 feet of available airport owned land exists beyond the Runway 17 approach end. Beyond that is the newly constructed Regional Drive as well as several privately owned residential properties. The 1,000-foot standard can be met on Runway 35.

Implementation of C-II design criteria would also increase the ROFA and ROFZ width from a 500-foot requirement (250 feet either side of runway centerline) to an 800-foot requirement (400 feet either side of runway centerline). Currently, only 250 feet on the east side of Runway 35 is available. Beyond that there exist tree obstructions as well as significant terrain issues (for more information see *Section 2.5 – Development Considerations – Existing Terrain* of this chapter or *Chapter 5 – Airport Plans, Drawing 5* for a topographic plan). The full 800-foot width of the ROFA and ROFZ can be met on the Runway 17 end.

Analysis of the C-II design criteria, the limitations that exist, and comparing the two dimensional design standards (B-II versus C-II) identified the following:

1. Increases in the size of the RPZ for Runway 17 would incorporate additional incompatible land uses such as residences and buildings for public assembly. The existing RPZ surface includes approximately 10 residential properties. Increases in design criteria would more than double that amount. The City has plans to either acquire the existing 10 residential properties or obtain avigation easements. However, an upgrade in design criteria would require the City to acquire even more land above and beyond what they have already planned to purchase.
2. Increases in the RPZ dimensions would also adversely impact future off-airport development plans.
    a. The New Hampshire Army National Guard has a facility located off of airport owned property, north of Regional Drive and Runway 17's approach. The Army has both short and long-term plans to expand their existing facilities at this site. Although short-term plans would not be impacted by an increase in RPZ dimensions, it would limit future long-term expansion plans. The larger RPZ for Runway 17 would incorporate an additional 7±-acres of the New Hampshire Army National Guard facility, thus, impacting their long-term future expansion plans, which is undesirable.
3. Increases in the size of the RSA and ROFA may limit future runway length expansion possibilities and would impact existing available runway length. Since the *March 1996 Concord Municipal Airport Master Plan Update*, recommendations have been made to increase Runway 17-35s length on the 35 approach end. The additional length is also recommended within this

master plan update (see *Section 4.1.4 – Runway Issues* of this chapter for further information); however, an increase to C-II design criteria may limit expansion possibilities. Although the airport has the land available to meet C-II RSA and ROFA design criteria on the Runway 35 approach end, they lack available space on the Runway 17 end due to the close proximity of Regional Drive and residential properties. In order to meet the C-II design standards on the Runway 17 end, the airport would have to either use a combination of the existing turf and displaced threshold to meet the 1,000-foot RSA/ROFA standard or relocate the threshold, both of which would decrease the operational lengths available for takeoff and landing. Such outcomes are undesirable since the airport desires more runway length not less. Likewise, a 1,000-foot RSA and ROFA on the Runway 35 end could be met but, depending on the alternative chosen on the Runway 17 approach end, may limit the amount of land available for future expansion on the opposite end.

4. Increases in the RSA and ROFA dimensions would impact the established conservation zones (see *Chapter 4 – Environmental Review* "Conservation Management Agreement" for further information), which have been created for the purpose of managing airport lands that provide essential habitat for the Karner Blue Butterfly, a federally and State listed endangered species. The increase in the dimensional standards for runway safety areas and safety zones would require that more land be cleared, mowed, maintained and graded, thus, impacting the habitat that is being protected.
5. Increases in the ROFA dimensions would preclude full installation of the airport wildlife/security fence. Currently the eastern half of the airport is not fenced. Current B-II design standards allows for full installation (wildlife/security fencing must be placed outside of the ROFA). The C-II standards call for wider ROFA width requirements, which cannot be met on the eastern side of Runway 35 due to significant tree obstructions as well as terrain issues. The significantly sloping terrain makes fence installation extremely difficult, perhaps impossible.
    a. A modification of airport design standards to meet local conditions would be required for the wildlife/security fence installation if C-II design criteria were used.
6. The airport currently can accommodate aircraft that fall into the C-II design category, while functioning as a B-II airport. We assume that this practice will continue in the future. Data collected for the forecast potion of the master plan update *(Chapter 2 – Aviation Demand Forecasts)* indicates that existing and future aircraft operations (as of September 2004) occur with more aircraft that fall into the B-I/B-II airport design criteria. Aircraft with more stringent design standards (C-II, C-III, D-I and D-II criteria) currently utilize the airport; however, with less frequency than B-I/B-II aircraft. Discussions with airport tenants and users indicate that although there are some operations conducted by these larger aircraft, the majority are seasonal operations or operations during peak periods or special events, and would not necessitate a change in ARC at this time.

For these reasons it is recommend that the airport maintain its current status as a B-II airport, thus, subsequent recommendations will abide by those standards.

2.2 Protected Surfaces - Navigational Aid Critical Areas

Runway 17-35 has an instrument landing system (ILS) approach to Runway 35. An ILS typically consists of the following electronic components and visual aids that provide course guidance to the runway in low visibility conditions:

- Localizer
- Glideslope
- Marker Beacons
- Approach Lights

Of those components, the localizer and the glideslope have safety areas, known as critical areas, which surround each piece of electronic equipment. The electronic equipment is susceptible to signal interference from sources such as power lines, fences, metal buildings, aircraft and vehicles. Therefore, those critical areas must be kept free of such objects. ***Section 4.3 – Visual and Navigational Aids*, of this chapter recommends improvements to the airport's visual marking aids to assist in protecting these surfaces.**

2.3 Protected Surfaces - Imaginary Surfaces

Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*,[ii] establishes imaginary surfaces above airports to protect navigable airspace from objects/obstructions that may penetrate the airspace. According to Part 77, obstructions are considered to be any manmade objects, objects of natural growth, such as trees or brush, and terrain (ground penetrations) that should be either removed or marked as an obstruction.

The airport's imaginary surfaces are based on the classification of the runway and the type of approach available. Logically, the dimensions of the imaginary surfaces for a precision instrument approach runway (such as Runway 17-35) are larger than those associated with a visual or non-precision runway approach (such as Runway 12-30), to provide greater safety margins for operations in low visibility/instrument conditions.

The following defines the imaginary surfaces that must be protected, while **Table 3-3** depicts the existing and future FAR Part 77 airspace imaginary surfaces for Concord Municipal Airport. **Figures 3-1 and 3-2** provide a graphical depiction of those surfaces.

- **Primary Surface:**
  - A surface centered longitudinally along the runway, which extends 200 feet beyond the paved thresholds. The width is dependent on the type of approach (precision, non-precision, visual, etcetera).
- **Approach Surface:**
  - A surface centered longitudinally on the extended runway centerline. This surface extends upward and outward from each end of the primary surface.
- **Horizontal Surface:**
  - A horizontal plane established 150 feet above the airport elevation. The limit of the horizontal surface is defined by the radius from the center of each end of the primary surface. Tangents connect each radius.
- **Conical Surface:**
  - A surface extending upward and outward from the horizontal surface at a slope of 20 feet horizontally to 1-foot vertically for a distance of 4,000 feet.
- **Transitional Surfaces:**
  - A surface extending outward and upward from the edges of each primary and approach surface at right angles to the runway centerline at a slope of 7 feet horizontally to 1-foot vertically. The transitional surface terminates at the horizontal surface.

Table 3-3: FAR Part 77 Airspace Surfaces – Concord Municipal Airport

Airport Data	Runway 17		Runway 35		Runway 12		Runway 30	
	Existing	**Ultimate**	**Existing**	**Ultimate**	**Existing**	**Ultimate**	**Existing**	**Ultimate**
Runway Classification	Non-Precision Instrument	Same	Precision Instrument	Same	Non-Precision	Same	Visual	Same
Approach	Non-precision	Same	Precision	Same	Non-precision	Same	Visual	Same
Visibility Minimums	1 mile	Same	1 mile	¾ mile	1 mile	Same	3 miles	Same
Airport Elevation (feet)	346							
Airport Imaginary Surfaces	**Existing**	**Ultimate**	**Existing**	**Ultimate**	**Existing**	**Ultimate**	**Existing**	**Ultimate**
Horizontal Surface:								
Horizontal Surface Elevation (feet)	496							
Horizontal Surface Radius (feet)	10,000	Same	10,000	Same	10,000	Same	5,000	Same
Conical Surface:								
Conical Surface Elevation (feet)	696							
Horizontal Distance (feet)	4,000	Same	4,000	Same	4,000	Same	4,000	Same
Slope	20:1	Same	20:1	Same	20:1	Same	20:1	Same
Primary Surface:								
Length beyond runway end (feet)	200	Same	200	Same	200	Same	200	Same
Width (feet)	1,000 [1]	Same	1,000 [1]	Same	500 [1]	Same	500 [1]	Same
Approach Surface:								
Inner Edge Width (feet)	1,000	Same	1,000	Same	500	Same	500	Same
Outer Edge Width (feet)	3,500	Same	16,000	Same	3,500	Same	1,500	Same
Horizontal Distance (feet)	10,000	Same	10,000 and 40,000 [2]	Same	10,000	Same	5,000	Same
Slope	20:1	Same [3]	34:1 [2]	Same	20:1	34:1	20:1	Same
Transitional Surfaces:	7:1	Same	7:1	Same	7:1	Same	7:1	Same

Source: *FAR Part 77, Objects Affecting Navigable Airspace*

Notes:

1. The width of the primary surface of a runway is the width prescribed for the most precise approach for either end of that runway; therefore, the precision approach to Runway 35 determines the primary surface width of 1,000 feet for Runway 17. Likewise, the non-precision approach to Runway 12 determines the primary surface width of 500 feet for Runway 30.
2. Federal Aviation Regulation Part 77's approach surface standards require a horizontal distance of 10,000 feet at a slope of 50 feet (horizontally) to 1-foot (vertically) with an additional 40,000 feet at a slope of 40 feet (horizontally) to 1-foot (vertically) for all precision instrument runways, such as Runway 35, a precision instrument approach runway. However, many airports within New England cannot meet the 50:1 slope requirements due to the mountainous terrain. Therefore, a slope of 34:1 is acceptable but the airport should strive to meet the 50:1 requirement if reasonably possible. An FAA modification to standards from 50:1 should be obtained.
3. According to discussions with SEA Consultants, Inc.,[iii] the engineering firm that designed Regional Drive, the roadway design was based on the clearances necessary for a 20:1 approach slope, which was listed as the existing and future slope on the 2001 approved and signed airport layout plan (ALP). However, the runway is a non-utility runway with a non-precision instrument approach, which requires a 34:1 approach slope. Due to the location of Regional Drive, the airport cannot meet the 34:1 standard.

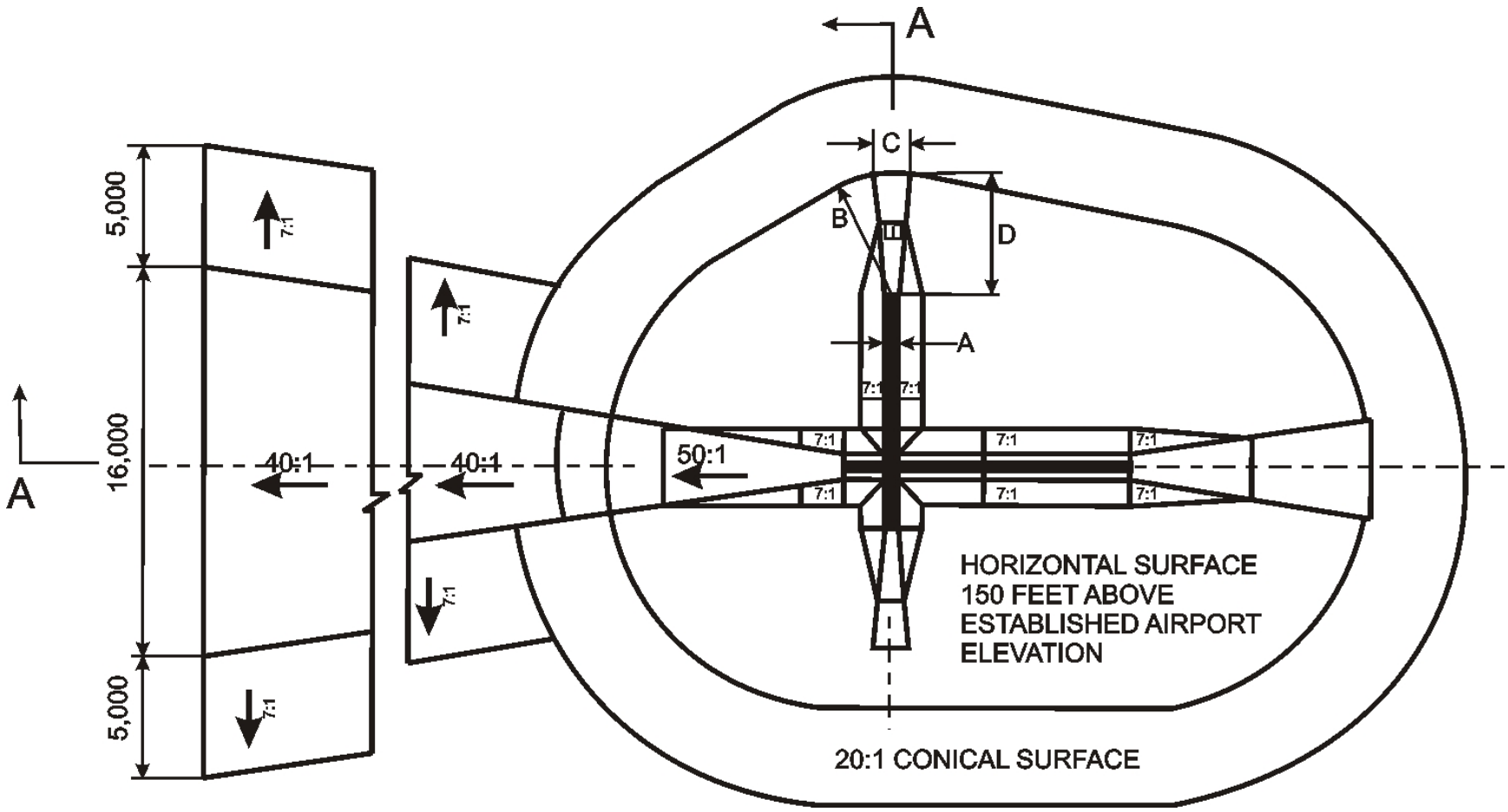


Figure 3-1: 2-Dimensional Graphical Depiction of FAR Part 77's Imaginary Surfaces

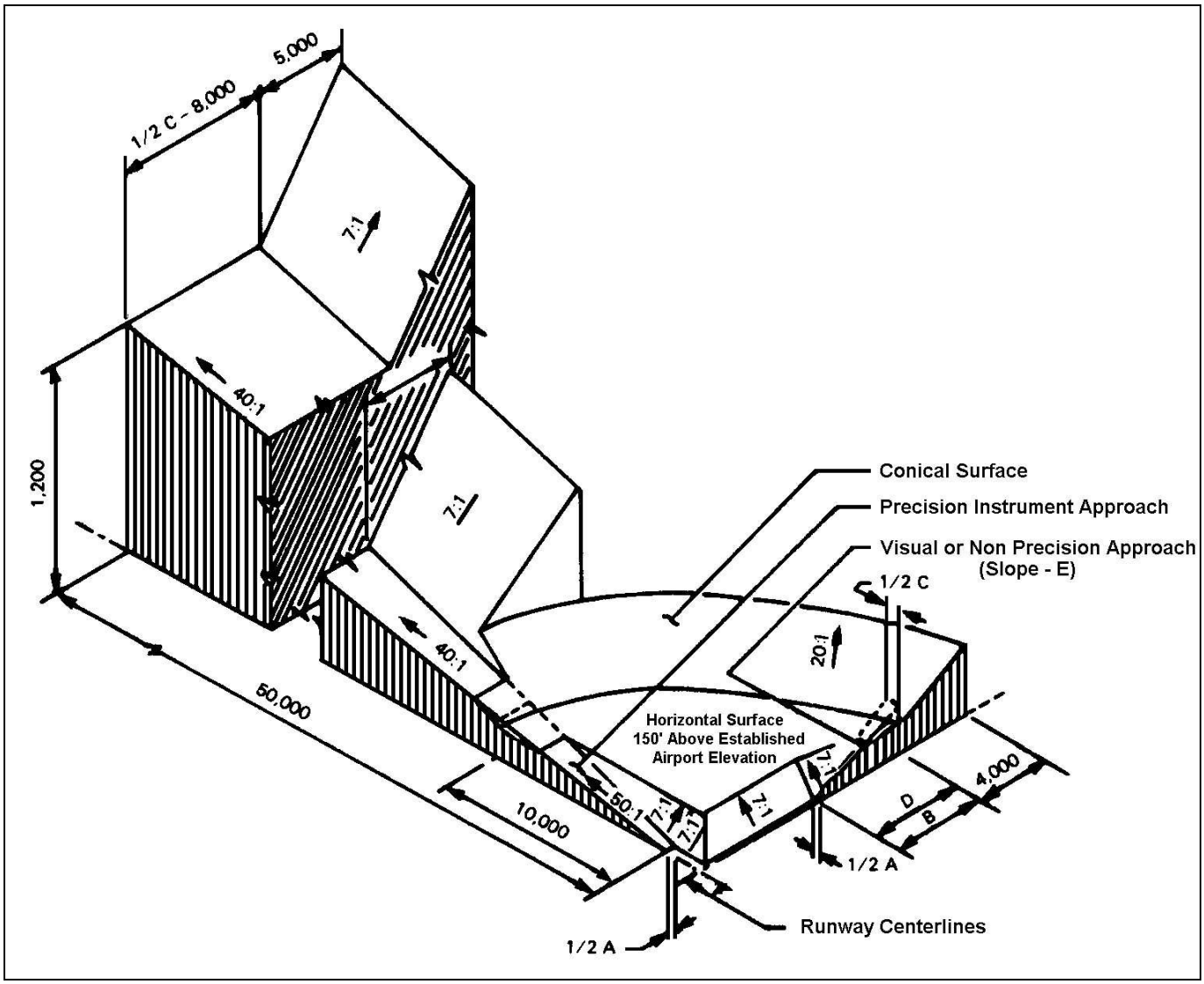


Figure 3-2: 3-Dimensional Graphical Depiction of FAR Part 77's Imaginary Surfaces

***Section 4.4 – Airside Obstructions/Imaginary Surfaces*, of this chapter, recommends improvements to protect navigable airspace from existing objects/obstructions.**

2.4 Protected Surfaces – Runway Visibility Zone

Line of sight standards are developed to allow clear visibility for individual runways from one end of the runway to the other, or for intersecting runways (similar to Concord Municipal Airport), from one end of an intersecting runway to another.[iv]

The FAA recommends that terrain within the visibility zone of the intersecting runways be graded and buildings sited in such a way so as to allow for unobstructed visibility from one runway end to the other.

***Section 4.4 – Airside Obstructions/Imaginary Surfaces*, of this chapter, recommends improvements to protect navigable airspace from existing objects/obstructions.**

2.5 Development Considerations – Existing Terrain

The Concord Municipal Airport is located on a plateau (known as the Concord Heights), which sits approximately 75 – 100 feet above the Merrimack and Soucook Rivers and their tributaries. Dense tree growth and significant terrain issues exist on the northeast and east sides of the airport. The terrain in this area drops steeply to the banks of the Merrimack and Soucook Rivers at a negative grade of 14 percent or more.

2.6 Development Considerations – Environmentally Sensitive Areas

As indicated in *Chapter 1 – Inventory*, a Conservation Management Agreement (see *Chapter 4 – Environmental Review* for further information) has been created for the purpose of managing airport lands that provide and enhance essential habitat for the Karner Blue Butterfly, a federally and State listed endangered species.

To protect the Karner Blue Butterfly and other State listed endangered and threatened species and their habitat, conservation areas, or zones, have been created on the airport. The airport is restricted from developing within the designated conservation zones.

For reference, the conservation zones (CZs) and development zones (DZs) are identified in *Chapter 5 – Airport Plans*, of this airport master plan update report.

2.7 Development Considerations Summary

Although the airport exists on 614-acres, land available for future airport development is limited due to the aforementioned protected surfaces, terrain issues and environmentally sensitive areas. Property acquisition for future airport development is also limited due to existing off-airport abutting properties that consist of major infrastructure, existing and/or planned industrial parks and commercial development, and residential dwellings.

Of the 614-acres of airport property, approximately 10 acres, less than 2 percent, is available for future airport development.

Facility improvements and future development recommendations within the remaining developable airport land are identified within the following sections.

3.0 Landside Facility Requirements and Alternative Development

The following sections assess the need for improvements to existing landside facilities and/or the need for additional facilities based on airport design criteria, known airport issues, and projected planning activity levels, while a graphic depiction of the proposed landside airport projects is shown in *Chapter 5 – Airport Plans*.

The following are evaluated:

- Aircraft Storage Facilities and Requirements (ramps and hangars)
  - Pavement Condition (ramps) and Rehabilitation Requirements
  - Based Aircraft Storage and Requirements
  - Itinerant Aircraft Storage and Requirements
- Automobile Storage Facilities and Requirements
- Terminal Building Facility and Requirements
- Aircraft Fueling Facilities and Requirements

Several alternative landside development options for the above facilities were presented at both the second and third airport master plan update workshop meetings held on February 3, 2005 and April 21, 2005. The preferred development options chosen within the following sections are the result of recommendations made by the consultant and discussions with the Planning Advisory Committee (PAC).

3.1 Aircraft Storage Facilities and Requirements

The following identifies the condition of the airport's aircraft storage facilities, the need for improvements to those facilities, and/or the need for additional facilities.

3.1.1 Pavement Condition (Ramps) and Rehabilitation Requirements

The typical life of pavement is 15 to 20 years. Of the three ramps at the airport, two are controlled, operated and maintained by the City (the based aircraft storage ramp and the itinerant aircraft storage ramp). The based aircraft storage ramp (south ramp) was constructed and the itinerant aircraft storage ramp reconstructed in 1991.

Based on typical life estimates, both the based aircraft ramp and the itinerant aircraft ramp are due for rehabilitation in 2011, or during the mid-term phase of this planning period.

3.1.2 Based Aircraft Storage and Requirements

As projected in *Chapter 2 – Aviation Demand Forecasts*, the based aircraft fleet is expected to grow from 92-based aircraft in 2004 to 137 in 2023, adding 45 based aircraft.

Table 3-4 identifies the based aircraft storage demand for both hangars and aircraft tie-downs at Concord Municipal Airport.

Table 3-4: Projected Based Aircraft Storage Demand

Year	2004 [1]		2008		2013		2023	
Equipment Type	Based Aircraft	Aircraft Storage Space Requirements @ 300 S.Y. per Aircraft [2]	Based Aircraft	Aircraft Storage Space Requirements @ 300 S.Y. per Aircraft [2]	Based Aircraft	Aircraft Storage Space Requirements @ 300 S.Y. per Aircraft [2]	Based Aircraft	Aircraft Storage Space Requirements @ 300 S.Y. per Aircraft [2]
Single Engine (SE)	65	19,500	71	21,300	80	24,000	99	29,700
Multi-Engine (ME)	7	2,100	7	2,100	8	2,400	9	2,700
Turboprop (TP)	4	1,200	4	1,200	4	1,200	6	1,800
Turbo Jet (TJ)	1	910 [3]	1	910 [3]	2	1,820 [3]	3	2,730 [3]
Helicopter (HE)	2	600	2	600	2	600	3	900
Other: Ultralight (UL)	5	1,500	5	1,500	6	1,800	7	2,100
Other: Glider (GL)	0	0	0	0	0	0	0	0
Other: type not specified	0	0	0	0	0	0	0	0
Experimental (EXP)	0	0	0	0	0	0	0	0
Military	8	2,400	10	3,000	10	3,000	10	3,000
Totals	**92**	28,210	**100**	30,610	**112**	34,820	**137**	42,930
Total Civilian Storage Need	**84**	**25,810**	**90**	**27,610**	**102**	**31,820**	**127**	**39,930**
Total Military Storage Need	**8**	**2,400**	**10**	**3,000**	**10**	**3,000**	**10**	**3,000**
Existing Based Aircraft Ramp Storage Space (S.Y.) [4]		15,555		15,555		15,555		15,555
Existing Based Aircraft Hangar Storage Space (S.Y.) [4]		6,833		6,833		6,833		6,833
Total Existing Based Aircraft Storage Space - Civilian (S.Y.) [4]		22,388		22,388		22,388		22,388
Total Surplus (Deficit) Based Aircraft Storage Space - Civilian (S.Y.) [4]		**(3,422)**		**(5,222)**		**(9,432)**		**(17,542)**
Surplus (Deficit) Storage Space for Small Single Engine/Light Multi-engine aircraft (S.Y.) [4]	**(8)**	**(2,512)**	**(14)**	**(4,312)**	**(25)**	**(7,612)**	**(49)**	**(14,812)**
Surplus (Deficit) Storage Space for Jet Aircraft (S.Y.) [4]	**(1)**	**(910)**	**(1)**	**(910)**	**(2)**	**(1,820)**	**(3)**	**(2,730)**

Notes:

1. Existing as of July 2004
2. According to the FAA in *AC 150/5300-13, Airport Design*, allowing 300 square yards is typical for based aircraft parking requirements for small single engine and light multi-engine aircraft[v]
3. As indicated in note 2, the 300 square yards per based aircraft rule is typical for small single engine and light multi-engine aircraft; however, this rule of thumb is too small for jet aircraft. Therefore, the square footage used is based on the critical aircraft, the Cessna Citation II, which requires approximately 910 square yards for aircraft parking per jet aircraft. This figure allows for the appropriate wingtip clearance needed for this aircraft.
4. Does not include the military based aircraft, only the civilian. The New Hampshire Army National Guard provides storage space for their aircraft/helicopters within their own facility and do not use the ramp space provided to the general public. They are responsible for the development of their own facilities and their based aircraft numbers are not used to justify additional aircraft storage space needed for the airport. Their numbers are only mentioned here to be consistent with previous chapters and provide the reader with a true indication of based aircraft needs.

As indicated in the table above, additional based aircraft storage space is required to meet both existing and projected demand.

To meet that demand, several alternative development options for based aircraft storage were created and provided to the PAC for review (see **Appendix A** located at the end of this report for based aircraft alternatives). **The PAC identified development zones 1, 3, 4 and 6 (see *Chapter 5 – Airport Plans* for locations) as the preferred areas for future aircraft storage development. The preferred alternative depicts development in areas that avoid impacts to conservation land.**

Discussions with airport tenants as well as visual inspection indicate a need to replace hangars 1, 2 and 3, which are some of the oldest aircraft storage hangars.[vi] The *March 1996 Concord Municipal Airport Master Plan Update*[vii] also recommended the rehabilitation and/or replacement of hangars 1, and 2. Further deterioration has occurred since the previous master plan, necessitating the replacement of all three hangars. **Therefore, it is recommended that the three aging hangars be replaced. Discussions with Concord Aviation Services, the airport's FBO, and the City identified phasing the replacement of the hangars as the preferred alternative. This method allows the City to continue to generate revenue from two hangars, while the remaining is undergoing replacement.** Current tenants have requested that the airport's water lines be extended to the new hangars in order to wash their hands and other sanitary purposes.

Typically there is more of a demand for hangars than based aircraft tie-down storage space, as aircraft owners prefer to have their aircraft under cover rather than exposed to the weather.

The actual mix between hangars and tie-down development should be based on the market demand, i.e. responding to an actual development proposal.

3.1.3 Itinerant Aircraft Storage and Requirements

There are currently 29 available itinerant aircraft storage spaces (two large) on the terminal ramp. However, that number fluctuates depending on the size of itinerant aircraft using the facility.

Chapter 2 – Aviation Demand Forecasts, projects that itinerant aircraft operations will remain at approximately 60 percent of the total number of annual operations throughout the planning period; currently approximately 34,400 (rounded to the nearest 100) of the total annual operations of 57,300. This equals approximately 94 itinerant aircraft operations per day. The number of total operations projected for 2023 is 85,400. This equals approximately 51,200 itinerant aircraft operations annually and 140 per day. It is poor planning, however, to assume that all existing 94 and future 140 itinerant aircraft would require aircraft storage space at the same time. Therefore, the peak hour itinerant operations outlined in *Chapter 2 – Aviation Demand Forecasts*, are used to determine future itinerant aircraft facility requirements.

Table 3-5 identifies the projected itinerant aircraft storage demand at Concord Municipal Airport.

Table 3-5: Projected Itinerant Aircraft Storage Demand

Year	Existing 2004	2008	2013	2023
Total Peak Hour Itinerant Operations [1]	23	25	28	34
Aircraft Storage Space Requirements @ 910 S.Y. per Aircraft [2]	20,930	22,750	25,480	30,940
Total Existing Itinerant Ramp Storage (S.Y.)	8,333	8,333	8,333	8,333
Surplus (Deficit) S.Y. (rounded to the nearest 100)	**(14 aircraft) or (12,600 SY)**	**(16 aircraft) or (14,400 SY)**	**(19 aircraft) or (17,200 SY)**	**(25 aircraft) or (22,600 SY)**

Notes:

1. Data collected from *Chapter 2 – Aviation Demand Forecasts, Table 2-9: Projected Local and Itinerant Operations (Rounded to the Nearest 100)*
2. According to the FAA in *AC 150/5300-13, Airport Design*, allowing 360 square yards is typical for itinerant aircraft parking requirements; [viii] however, 360 square yards does not provide adequate spacing for the larger multi-engine and jet aircraft that typically make up the mix of itinerant aircraft using the airport as indicated in *Chapter 1 – Inventory, Table 1-7: Aviation Related Companies that Typically Operate at Concord Municipal Airport.* Since it is best to use the upper levels of a range when forecasting to insure adequate space will be set aside, the square footage used is based on the wingtip clearance requirements for the critical aircraft, the Cessna Citation II, which requires approximately 910 square yards for aircraft parking.

As indicated in the table above, additional itinerant aircraft storage space is required to meet both existing and future demand. In addition to the projected demand, Roush Racing also requires storage space for two-Boeing 727's that operate at the airport during the National Association for Stock Car Auto Racing events (NASCAR races) held at the New Hampshire International Speedway on select weekends in July and September. The aircraft are also used occasionally at other times during the year conducting charter flights.[ix] Typically, the two aircraft are parked on the closed runway (Runway 03-21) during race events.

To meet itinerant aircraft storage demands, several alternative development options were created and provided to the PAC for review (see **Appendix B** located at the end of this report for itinerant aircraft alternatives). **The PAC identified the preferred alternative to be continued use of the existing terminal ramp and the closed runway when necessary for overflow itinerant aircraft storage during busy race weekends. They also identified the need to construct a concrete ramp to accommodate larger and heavier jet aircraft such as the Boeing 727's used by Roush Racing. The area chosen for the concrete ramp is located north of the terminal building (see *Chapter 5 – Airport Plans* for location).**

The advantages of constructing a concrete ramp are:[x]

1. The ability to carry aircraft loads heavier than the design load;
2. Concrete paving resists degradation by fuel spillage, oil drippings, jet heat and blast;
3. Concrete paving resists rutting under parked aircraft;
4. Concrete paving does not require the periodic resurfacing or surface sealing required by asphalt paving;
5. Concrete paving has a longer life expectancy than asphalt paving; and
6. Provides a suitable area for larger and heavier jet aircraft, reducing the need for those aircraft to park on existing failing and/or unsuitable pavement

It is also recommended that the airport implement all necessary safeguards, especially during busy periods when overflow itinerant aircraft storage is required on the closed runway, to help ensure avoidance of any pedestrian/aircraft incident.

3.1.4 Aircraft Storage Facilities and Requirements Summary

The development necessary to accommodate future aircraft storage identifies the use of the existing development zones and the closed runway for overflow aircraft storage during special events and busy NASCAR race weekends. Review of aircraft storage facility projections indicates both an existing and future deficit. Analysis of land available at the airport for such development also indicates a future deficit. This land deficit is projected to take place in the long-term future (i.e. within the next 10 to 20 years). Discussions with the United States Fish and Wildlife Service and the New Hampshire Fish and Game Department in March 2005 to address the land deficit (see **Appendix C** for overview of meeting) led to the possibility of adjusting the boundaries between conservation zones and development zones in a way that creates more aircraft storage areas while maintaining or improving essential habitat for the Karner Blue Butterfly.

Ideally, aircraft storage facilities are constructed in close proximity to existing facilities such as fuel facilities, the terminal building, restrooms and other amenities. Currently, a majority of the land surrounding the existing based and itinerant aircraft storage facilities is conservation land, thus limiting future expansion of the existing aircraft storage facilities. Conservation zone 4, located between the existing parallel taxiway and Airport Road, would be the ideal place for future aircraft storage development. Thus, we discussed the possibility of re-designating development zone 8 to a conservation zone and conservation zone 4 to a development zone.

Representatives of the United States Fish and Wildlife Service[xi] and the New Hampshire Fish and Game Department[xii] indicate that an inventory of both development zone 8 and conservation zone 4 is required before a determination can be made regarding a zone re-designation. As of June 2005, a determination regarding re-designation had not been made. However, it is recommended that the City of Concord pursue re-designation possibilities with both agencies in the future.

3.2 Automobile Storage Facilities and Requirements

Concord Municipal Airport has ten paved automobile parking lots with 287 parking stalls, 89 of which are available to the general public. All others are privately owned and used by airport tenants under existing airport lease agreements.

As identified in *Chapter 1 – Inventory* of this report, the airport is in need of additional **public** automobile parking during busy NASCAR race weekends. During NASCAR race weekends at least 200 additional rental automobiles are trucked in by Hertz and Enterprise-Rent-A-Car to accommodate increases in demand. Also, at least 500 plus fans congregate at the airport during race weekends to catch a glimpse of the drivers and race teams.

To handle the increases in demand, the airport utilizes grass areas located inside and outside of the airport security fence for additional automobile parking. However, parking inside of the secure airport is a safety concern due to the potential for runway incursions (because of the mix of aircraft and automobiles) and a safety problem the airport desires to remedy with additional parking outside of the secure airport area.

Several development options to meet peak automobile storage demand were created and provided to the PAC for review (see **Appendix D** located at the end of this report for automobile storage alternatives). **The PAC agreed that the existing parking lot should be expanded to the southeast, closer to hangar #3, and that two access points, one located off of Regional Drive and one located off of Airport Road, should be created. They also identified the development of a turf parking lot for overflow automobile rental and fan parking located northwest of Regional Drive (see *Chapter 5 – Airport Plans* for location).** The FAA indicated that they would allow for automobile parking beneath the runway protection zone for Runway 12 during peak activity.[xiii]

A turf parking lot is desired for the following reasons:

1. Overflow automobile parking is necessary only during special events and busy NASCAR race weekends (at most, 2 to 4 times per year). Year-round maintenance of a gravel and/or paved parking lot would be expensive and burdensome;
2. Maintaining a turf surface allows the City/airport some flexibility, enabling them to use that area for some other revenue producing use in the future; and
3. A turf surface would not increase the airport's impervious surfaces, providing a more environmentally desirable alternative

3.3 Terminal Building Facility and Requirements

Chapter 1 – Inventory identified the terminal building as an old structure (brick and wood frame structure built in 1938 and expanded in 1961), that is in poor condition with several significant code violations, structural deficiencies, inadequate security devices and inability to meet the 1990 Americans with Disabilities Act (ADA) regulations without major renovations. An updated and/or new facility is definitely required.

The City is proposing to either renovate the existing structure or construct a new facility that not only addresses the code violations but also addresses the need for a terminal facility that presents a modern, functional "front door" to the City.

The City asked that the master plan analyze the following:

- Re-evaluate the need for a new terminal building location;
- Provide access, if at all possible, to the terminal building from the Regional Drive extension; and
- Explore the possibility of combining a new terminal building with a new structural fire station (Concord Heights Fire Station) that would benefit both the neighborhood and the airport

3.3.1 Provision of a New Terminal Building Location

Advisory Circular (AC) 150/5360-9, Planning and Design of Airport Terminal Facilities at Nonhub Locations, identifies terminal location factors that should be considered when analyzing terminal building site locations.[xiv] Although the advisory circular is geared towards nonhub airports with air carrier activity, rather than general aviation airports, such as Concord Municipal Airport, the location factors identified within the AC are good tools to use to evaluate the terminal building site location options for Concord Municipal Airport.

The following four major terminal location factors are identified within the AC:

1. Relationship of the terminal building to the airfield;
2. Relationship of the terminal building to other airport facilities;
3. Physical siting considerations; and
4. Relationship of the terminal building to roadways

The *March 1996 Concord Municipal Airport Master Plan Update*[xv] used these terminal location factors to analyze terminal building renovation and relocation options. It was determined in that plan that although the building is in need of significant rehabilitation, the location of the existing building, …"is well located in relation to the major aviation components of the airport (i.e., ramp, tie-downs, fuel farm, hangar space, etcetera)."[xvi]

Prior to coming to that conclusion, the March 1996 master plan identified the following three alternatives in regards to the terminal building location/modification:

1. Option 1A – Rehabilitate the existing building
2. Option 1B – Construct a new building in the same general location
3. Option 1C – Construct a new terminal in a new location

Option 1A, rehabilitate the existing building, was chosen as the preferred option in the March 1996 master plan because it was the least-cost option, remained in close proximity to major aviation components and because the space needs for the airport could be met within the footprint of the ground floor. Option 1B, although a good option, was more costly and was not chosen. And Option 1C was considered far too removed from existing aviation components and infrastructure and would include the added expense of extending Regional Drive and utilities and thus was not considered a viable location.

Review of the three options provided in the March 1996 master plan also identified the existing terminal building location to be the best location to either renovate or to build a new facility. Although utilities were extended in 2001 to the area identified as Option 1C (due to the construction of the snow removal equipment building) and as of December 2004, the Regional Drive extension was opened for

automobile traffic, the location (Option 1C) was not chosen within this master plan for the following reasons:

1. The remote area is considered far too removed from existing aviation components and infrastructure (i.e., fixed based operator, ramp, tie-downs, fuel farm, etcetera);
2. The needs of the itinerant traveler are better met at the existing terminal location due to the existing aforementioned aviation components; and
3. As of the 2001 signed airport layout plan, the location identified as Option 1C has been identified as the best location for future based aircraft storage development. In fact, plans for the development of additional hangars is anticipated to take place in the summer/fall of 2005

Due to these considerations, maintaining the terminal building in the same general location is recommended. Two possible approaches exist for the development of the terminal facility: 1) the renovation of the existing terminal building, or 2) the construction of an entirely new terminal facility in the same general location. An evaluation of the merits and challenges associated with each approach has been performed, **and the construction of a new terminal building is the recommended approach**. A review of the factors leading to this recommendation is included below.

3.3.2 Renovation Approach

Consideration of the renovation option begins with a visual assessment of the facility's condition, and known building code requirements. Overall the facility's structure is viewed to be in poor condition. Significant upgrades to, and in many cases outright replacement of the facility's systems and construction would be required, as well as alterations to comply with current ADA accessibility requirements. If considered as part of a renovation project, the amount of alteration/renovation required is significant enough to characterize the project as a 'gut' renovation, rather than selective alteration. The budget required for this approach would reflect the significant level of renovation, which would likely be required.

Summary of Perceived Advantages of the Renovation Approach

1. Potentially less costly than build new; and
2. The building can remain open (phased construction) while renovations take place in different areas of the building.

Summary of Perceived Limitations of the Renovation Approach

1. The phased approach could take longer i.e. longer overall construction schedule, which may mean greater contractor overhead and general conditions costs;
2. Additional costs may be associated with a temporary construction (dust and debris control, safety partitions, temporary structures to maintain terminal operations and security during construction); and
3. The airport would need to perform multiple 'moves' to conduct terminal operations in some areas while allowing for construction to proceed in others.

3.3.3 Build New Approach

The primary limitation on building a new facility is the need to demolish the existing building to allow for new building development.

Summary of Perceived Advantages of the Build New Approach

1. An entirely new facility can be constructed without phased construction. This approach avoids costs associated with temporary construction, phased construction, and a longer overall construction schedule; and
2. The build-new approach would result in a coherent unified facility providing the best aesthetic and functional experience for both passengers/visitors and airport tenants. Under the renovation approach, some compromises and functional/aesthetic difficulties would inevitably remain.

3.3.4 Order-of-Magnitude Cost Estimate

When analyzing terminal building size requirements peak hour passenger levels are used. A rule of thumb factor commonly used is an average of 3 passengers {pilot and passengers} per itinerant aircraft operation and 1.5 passengers {pilot and passengers} per local aircraft operation.[xvii] Using the rule of thumb method and data from the previous master plan report the following space requirements are calculated for a terminal building at Concord Municipal Airport:[xviii]

1. Lobby/public waiting area		± 1,900 square feet
2. Departure area/lounge/miscellaneous		± 500 square feet
a. Telephones		
b. Concession machines		
c. Restrooms		
3. Tenant/office area		
a. Car rental company		± 100 square feet
b. Other tenant/office areas		± 2,000 square feet
c. Leased area (i.e. a restaurant)		± 1,500 square feet
4. Airport management		± 250 square feet
a. Conference room		± 400 square feet
	Subtotal:	**6,650 square feet**
5. Building mechanical systems (15 percent of gross terminal area)		± 1,000 square feet
6. Circulation space (20 percent of gross terminal area)		± 1,330 square feet
	Total:	**8,980 square feet**

This calculated space requirement equals roughly the same size of the existing building, a 9,000 square-foot building. The cost factors (based on 2004 construction dollars) for a 9,000 square foot building are as follows:

Renovation:	$150.00 - $200.00 per square foot
New Construction:	$200.00 - $250.00 per square foot

The actual per square foot cost will vary within the above range based upon actual selection of finish materials, design complexity, and market conditions. For the purposes of this analysis, a midrange cost of $175.00 per square foot for renovation and $225.00 per square foot for new construction is being carried. **Note that these costs represent building construction costs only**, and are independent from site/civil, landscaping, furniture and equipment, and soft costs which would normally be associated with a project of this type. A summary of the anticipated construction cost for the various approaches is outlined in **Table 3-6**.

Table 3-6: Anticipated Terminal Building Construction Cost – Renovation Versus Build New

Renovation Approach			Build New Approach		
Building Size (Square Foot)	**Cost Estimate per Square Foot**	**Building Cost Estimate**	**Building Size (Square Foot)**	**Cost Estimate per Square Foot**	**Building Cost Estimate**
9,000	$175	$1,575,000	9,000	$225	$2,025,000

Note 1: Above budgets represent preliminary terminal construction costs only, in 2004 dollars. Amounts do not include construction contingency allowances, 'soft costs' such as designer fees, testing, owner-related administrative costs, furniture and equipment, or technology.

Note 2: The 'Build New' approach is likely to involve site/civil engineering and construction costs which are not included above, and which would likely not be required to the same degree as part of the Renovation Approach.

Note 3: The purpose of this comparison is to illustrate the potential cost differences between the Renovation and Build New approaches, and not necessarily to set a project budget for one or the other. Upon selection of a project approach, likely schedule, and definition of related civil work, a more accurate anticipated project budget can be developed.

3.3.5 Terminal Building (New Versus Renovate) - Recommendations and Conclusions

Although renovation of the existing facility is definitely a potential option, the efficiencies associated with the construction of a new facility, the potential for constructing a smaller facility because of a more effective floor plan and the relatively small cost difference between the two approaches, result in the recommendation to build a new terminal facility in the location of the existing facility. This approach provides the most long-term benefits and flexibility while avoiding the challenges associated with renovation of the existing facility.

The provision of access to the terminal building from the Regional Drive extension is covered in *Section 3.2 - Automobile Storage Facilities and Requirements*, in which the preferred alternative would create two access points, one off of Regional Drive and one off of Airport Road.

3.3.6 Exploration of Combining New Terminal Building With Concord Heights Fire Station

Discussions with staff at the Concord Heights Fire Station[xix] indicate that a fire station site location study is planned to start this year (summer 2005). The study is intended to determine the best location for the City's fire station facilities based on call volumes and population within the City of Concord. They also indicate that if the airport were chosen as the best location for their new facility, the most desirable locations would be a joint terminal/fire station facility in the location of the existing terminal building or along Regional Drive, west of the new New Hampshire Army National Guard facility.

The size of the fire station facility needed is approximately 8,200 square feet (3,900 of which is strictly for fire vehicles, while the remainder is for living, exercising, working and dining space).[xx]

Many fire stations desire an equipment storage bay with operating front and back doors and a circular driveway that allows the fire vehicles to be driven into the bays, avoiding the need to back the vehicles into the bays for storage. The Concord Heights Fire Station staff member indicates that they do not need to have such a design. However, they did indicate instead that they would like to have one door open to the airfield if they have a dedicated airport fire vehicle and the rest of the doors to open to the public roadway.

It is recommended that the fire station facility and the terminal building facility be constructed separately due to the following:

- The airport is in dire need of ramp and automobile space. The best place for the terminal building is where it is located. Development of a fire station on property that is prime real estate for aircraft storage space and aviation related businesses/uses is not a good use of airport land when other property locations and options within the City are available for the fire station; and
- The fire vehicles would require access directly onto a public roadway, possibly eliminating the potential for additional automobile parking in front of the terminal building, an undesirable option since additional parking at the airport is in great demand.

Those present at the February 3, 2005 meeting agreed with this recommendation as the preferred alternative.

3.4 Aircraft Fueling Facilities and Requirements

In *Chapter 1 – Inventory*, Concord Aviation Services, an airport operator, expressed a need for **an additional 18,000-gallon Jet-A fuel storage tank** to accommodate the increased fuel demand during special events. The additional tank should be installed and hooked up in parallel to the existing tank thus allowing for the use of the existing pumping and filtering equipment.

An airport safety and compliance inspection completed by the FAA on July 21, 2004 (**Appendix E** provides copy of the inspection letter) indicated that aircraft fueling trucks were not within FAA specified guidelines. For purposes of safety and separation, the FAA recommends that aircraft fueling trucks be parked a minimum of 10 feet apart and no closer than 50 feet from buildings.

It is recommended that the additional tank be installed in the earlier stages of this planning period or during rehabilitation of the based or itinerant aircraft ramp. Installation during pavement rehabilitation may reduce some of the cost associated with the project.

4.0 Airside Facility Requirements and Alternative Development

The following sections assess the need for improvements to existing airside facilities and/or the need for additional facilities based on airport design criteria, known airport issues, and projected planning activity levels, while a graphic depiction of the proposed airside airport projects is shown in *Chapter 5 – Airport Plans.*

The following facilities are examined:

- Runways
- Taxiways
- Visual and Navigational Aids
    - Marking, Lighting, Signs and Navaids
- Airside Obstructions/Imaginary Surfaces

Several alternative airside development options for the above facilities were presented at both the second and third airport master plan update workshop meetings held on February 3, 2005 and April 21, 2005. The preferred development options chosen within the following sections are the result of recommendations made by the consultant and discussions with the PAC.

4.1 Runways

The following identifies the condition of Runways 17-35 and 12-30 and identifies facility improvements where necessary.

4.1.1 Runway Pavement Condition

As indicated in *Chapter 1 – Inventory*, Runway 17-35 was reconstructed in 1990 and narrowed from 150 feet to 100 feet, by changing the paint marking to indicate a 100-foot runway. The 50-feet of pavement still remains and turned into 25-foot paved runway shoulders located on either side of the runway. For the most part, the runway pavement is in very good condition. However, the shoulders are in fair condition with vegetation growth, cracking and loose pieces of asphalt.

Runway 12-30's pavement is in excellent condition. The reconstruction and narrowing of Runway 12-30 from 100 feet to 75 feet was completed in 2002.

The life expectancy of pavement is 15 to 20 years. Runway 17-35 will reach the end of its designed pavement life within the next five years, in 2010, or during the short-term phase of this planning period. Runway 12-30 will require rehabilitation prior to 2022, or during the long-term phase of this planning period. **Due to the data provided above, it is recommended that both runways be scheduled for rehabilitation within this planning period. It is also recommended that the two 25-foot runway shoulders for Runway 17-35 be removed and converted to turf for the following reasons:**

1. Removal of shoulders will eliminate the potentially hazardous condition of loose pieces of asphalt and rock that could appear on the runway surface and be ingested into an aircraft engine;
2. Elimination of the shoulders will reduce the amount of pavement requiring maintenance; and
3. Removal of the shoulders will decrease the amount of impervious surface on the airport, providing an environmental improvement

4.1.2 Airport Design Criteria and Condition

As indicated in *Section 2.1 - Protected Surfaces - Airport Design Criteria*, of this chapter, the preferred airport design criteria is B-II for both Runways 17-35 and 12-30. The dimensional design requirements for a B-II airport are outlined in Table 3-2 of Section 2.1.

The following defines the design criteria that must be met, identifies the existing conditions for each design element and makes recommendations for improvement for those items not meeting criteria.

Runway Protection Zones (RPZ)
Within *Section 2.1 - Protected Surfaces - Airport Design Criteria*, of this chapter, the basic design criteria for runway protection zones is provided identifying items that are either permissible or prohibited from within the RPZ. The following identifies the condition of the RPZ for each runway and makes recommendations for improvement.

Runway 12 - Approximately half of the existing RPZ for Runway 12 is located within airport property boundaries. The other half (approximately 7 acres) extends over land not owned by the airport, existing over buildings for public assembly (the old New Hampshire Army National Guard facility) and public roadways, Regional Drive.

Runway 30 - The entire RPZ for Runway 30 is located within airport property situated over conservation land.

Runway 17 - Approximately 6 acres, or 44 percent of the existing RPZ extends into lands that are not owned by the airport and lies over residential buildings/property.

Runway 35 – A majority of the RPZ for Runway 35 is located within airport property boundaries. A small portion lies over residentially owned property.

The *March 1996 Concord Municipal Airport Master Plan Update* identified the need to either purchase avigation easements or land that is not owned by the airport to protect the RPZ for each runway. As of this master plan update, easements have been acquired for the properties located within the existing RPZ for Runway 35. Also, some properties, which are located within the existing RPZ for Runway 17 have been purchased by the City: a 0.71 acre parcel, a 4.66 acre parcel and a 1.32 acre parcel.

The City is aware of the need to purchase additional avigation easements and/or properties due to recommendations made in the March 1996 master plan update. Such purchases are currently included in their five-year airport Capital improvement Plan (CIP). **This master plan recommends that the airport continue to plan for the purchase of easements and/or properties in an effort to protect the RPZ that extends into lands that are not owned by the airport and to allow the airport to control the height of objects within the RPZ for Runways 12 and 17. Future plans to extend Runway 35 (see *Section 4.1.4 – Runway Issues* of this chapter) may require the acquisition of additional easements and/or property in the future.**

Runway Width

As indicated in Table 3-2, the required runway width is 75 feet. Both runways meet or exceed the existing runway width criteria. Runway 17-35 is 100 feet in width, while Runway 12-30 is 75 feet. Although Runway 17-35 is 25 feet wider than required, width reduction is **not** recommended due to the following:

- The additional width should be maintained to provide a buffer/safety zone during crosswind landings; and
- As established earlier, the majority of aircraft using the airport fall into the B-II design criteria requiring a 75-foot runway. However, operations by larger aircraft typically requiring a 100-foot wide runway exist. Therefore, to better accommodate those larger jet aircraft that frequent the airport, the 100-foot width should be maintained

Due to the above reasoning, runway width reductions and/or increases in runway width are not warranted and, thus, are not recommended within this planning period for Concord Municipal Airport.

Runway Shoulders, Blast Pads, Safety Areas, Object Free Areas and Obstacle Free Zones

The following defines design standards for runway shoulders, blast pads, safety areas, object free areas and obstacle free zones and makes recommendations for improvement for those items not meeting criteria.

Runway shoulders and blast pads are designed to provide resistance to blast erosion.[xxi] They are typically designed as turf (grass) areas allowing for good coverage of the surrounding soil to reduce the possibility of soil erosion. If the soil is unprotected adjacent to runways and taxiways it typically is susceptible to erosion.

The runway safety area (RSA) is a graded, rectangular area, centered on the runway centerline, and extended beyond the runway ends and runway edges. The RSA must be cleared, appropriately graded and drained. It must be free of objects, except those that need to be there due to their function, such as navigational aids. It should be capable of supporting airport mobile equipment, rescue equipment, and

the occasional passage of aircraft under dry conditions. Any object located within the RSA higher than three inches must be constructed with frangible supports, with the frangible point no higher than three inches above grade. The maximum permissible longitudinal grade requirement for the first 200 feet of the RSA, beyond the runway ends, is between 0 and 3 percent sloping downward from the runway ends. The maximum permissible longitudinal grade for the remainder of the safety area is a negative grade of 5 percent. The negative grade is to ensure that no part of the RSA penetrates the approach surface for that runway.

The **runway object free area (OFA)** requires clearing of above ground objects protruding above the RSA edge elevation, except for navigational aids as mentioned above.

The **runway obstacle free zone (OFZ)** is defined as a volume of airspace centered above the runway centerline. This area prohibits taxiing and parked aircraft. It is to remain free of obstacles and object penetrations, except for objects that need to be located there because of their function, such as navigational aids.

The design standards for the above elements are currently not being met due to the following:

- The soil surrounding each runway does not have good coverage due to the clumping of grass caused by the lack of mowing and has caused erosion. Although this is the case for both runways, the eroding soil on the north side of Runway 12-30 (at the intersection of the closed runway) has allowed for a runway edge lip to be greater than the maximum three inches above grade. Likewise, the eroding soil on the south side of Runway 12-30 (east of the intersection of the closed runway) has allowed for the same runway edge lip to be greater than the maximum three inches above grade.[xxii];
- Vegetation growth around existing drainage catch basins (Runway 17-35 and it's parallel taxiway) has allowed for poor drainage within the runway safety areas and safety zones;
- Obstacles such as small trees and brush, reaching heights greater than 3 feet are located within the following safety areas and safety zones for both runways:
    - Runway object free areas;
    - Runway obstacle free zones;
- Some navigational aids, such as signs and lighting, which are allowed within safety areas and safety zones, albeit, constructed with frangible supports, have the frangible point ***higher*** than the standard three inches above grade; and
- Some navigational aids, such as signs and lighting are obscured due to vegetation growth

The above discrepancies were noted during the airport inventory (July 2004) and an airport safety and compliance inspection completed by the FAA on July 21, 2004[xxiii] (see **Appendix E** for the compliance inspection letter).

In an effort to meet FAA regulations regarding the condition of the runway shoulders, blast pads, RSA, ROFA and ROFZ the following is recommended:

1. To reestablish a more appropriately graded and suitable surface surrounding both runways, it is recommended that the necessary fill, grading of the turf surfaces and re-seeding be accomplished in the areas identified with poor soil coverage and in those areas where the runway edge lips are greater than the maximum three inches above grade;
2. To meet FAA criteria regarding the height of the frangible point on several airfield sign bases and light bases, necessary fill, grading of the turf surfaces and re-seeding is necessary and recommended to establish the frangible point at the required maximum of three inches above grade;

3. Remove the small trees located within the ROFA/ROFZ and other penetrating brush/vegetation growing near the drainage catch basins; and
4. Allow for regular mowing and maintenance to avoid grass clumping and vegetation accumulating around the runway edges, signs, light bases and drainage catch basins.

Due to the existing Conservation Management Agreement and supplemental Habitat Management and Monitoring Plan, coordination with the New Hampshire Fish and Game Department and the United States Fish and Wildlife Department is necessary prior to any mowing and/or improvement to ensure that both the airport's safety goals and the habitat management goals are being reasonably met (see the airport's mowing schedule, **Appendix F**, which should be viewed as a frequently updated maintenance and mowing schedule).

Runway Separation Standards

All runways have separation standards that are determined by the airport's approach category and approach visibility minimums. Separation standards are developed for airports to provide a safe separation between different airport operations. Runway separation standards are determined from the runway centerline to a parallel runway, a holdline, a taxiway/taxilane centerline, an aircraft parking area, or a helicopter touchdown pad.

As indicated in the Table 3-2, both Runways 17-35 and 12-30 meet the minimum required runway separation standards. **Therefore, upgrades are not required and/or recommended within this planning period. However, it is recommended that all future development meet the required separation criteria.**

4.1.3 Runway Issues

At the onset of this study, it became clear that there are two primary runway issues that need to be addressed. They are as follows:

1. The confusing intersection at the approach ends of Runways 17 and 12; and
2. An extension to Runway 17-35

Intersection of Runways 17 and 12

Inspections by FAA personnel have cited the intersection of Runways 17 and 12 as confusing due to the following factors:

- The existing signage at the intersection of the approach ends of both Runways 17 and 12 does not provide adequate direction to either approach end;
- The taxiway and runway paint markings leading to the approach ends of both runways are dull and faded and need to be repainted;
- The grass is too high obscuring signage and lights; and
- The taxiway leading to the approach end of both runways is a large asphalt area that adds to the confusion due to the lack of marking, lighting and signage to direct you to the approach end of the runway.

Several development options to alleviate the confusion at the intersections were created and provided to the PAC for review (see **Appendix G** located at the end of this report for each alternative). The options presented included major reconfiguration of the area to rectify the situation. The **PAC members indicated that major reconfiguration of the area is unnecessary and identified the preferred development alternative to be better marking, signage, lighting and overall maintenance of the area to rectify the problem. It is also noted that the stub taxiway, Taxiway A1, should be realigned to provide more cohesion between the taxiway and both runway ends with the existing**

taxiway being used for aircraft engine run-up/preflight engine and aircraft systems monitoring prior to takeoff.

Runway Length – Purpose and Need

Appendix H of this report provides technical support identifying the need for additional runway length for Runway 17-35 at Concord Municipal Airport. The analysis indicates that the current runway length of 6,005 feet is capable of safely accommodating nearly every single-engine piston, multi-engine piston, and a majority of the twin turbo-prop general aviation aircraft. However, the 6,005-foot runway is deemed inadequate for a majority of the most commonly used business jet aircraft.

Industry trends indicate business jet aircraft use in the United States is on the rise. According to the FAA in the *FAA Aerospace Forecasts, Fiscal Years 2004 – 2015*,[xxiv] "…corporate/business flyers are turning more toward private/company jets to conduct domestic and international business in times of heightened security. Despite the slowdown in the demand for business jets, the current forecast assumes that business use of general aviation aircraft will expand at a more rapid pace than that for personal/sport use." More and more business travelers and corporations have also turned to business jet aircraft as alternatives to business travel. The onset of on-demand charter flights and fractional jet aircraft ownership provides corporations and individuals with the freedom, flexibility, convenience, and access to a jet aircraft to fly whenever and wherever they want in order to meet individual business or personal objectives. Such freedom of travel has spurred business travelers to fly into smaller hub and general aviation airports that are closer to their final destination than the typical large hub airports. Concord Municipal Airport happens to be one of many general aviation airports within the New England region that have witnessed a rise in business jet traffic. To accommodate the rise, the airport desires to provide business travelers and business jet aircraft users with adequate airport facilities, such as ramp storage space, fuel, a modern terminal facility, and additional runway length.

Improvements to the runway's overall length are needed to: 1) accommodate existing and future jet traffic operations; 2) improve safety; and 3) increase the economic viability of the airport. Existing business jet users are currently required to compensate for the shorter runway by operating at less than useful load (i.e. less fuel, passengers or cargo). A longer runway would allow existing business jet users to operate closer to 100 percent of their useful load. Such increases in length not only improve safety by providing adequate runway length for the most common business jet aircraft, but also increase the economic viability of the airport. A longer runway and increased operational capability translates into more fuel sold; increased taxes from fuel sales; and potentially additional rent and property taxes from the lease of aircraft and hangar storage space to aircraft owners that otherwise would not have used the airport.

The runway length analysis identified the types of aircraft the airport is capable of serving today and those it can serve in the future with additional runway length. The analysis documented runway length requirements for 48 of the most popular business jet aircraft used today. The following list provides the number of aircraft that various runway extensions would support.

Runway Length (feet)	Number of Business Jet Aircraft Supported
6,005 (current)	19 of 48 (39%)
6,505	36 of 48 (75%)
6,755	40 of 48 (83%)
7,000	43 of 48 (90%)
7,500	48 of 48 (100%)

Based on the calculations conducted for these specific aircraft, the current 6,005-foot runway at Concord Municipal Airport can only accommodate 19, or 39 percent, of the 48 most popular business jet aircraft without any weight restrictions. In an effort to accommodate the airport's existing and future jet traffic, additional runway length should be considered in future development plans for Concord Municipal Airport.

Runway Length – Alternative Development Options

It is apparent from the list above that the operational benefits increase with additional runway length. However, the question is, what runway length is justifiably reasonable for Concord Municipal Airport and at what level of impact? Some would infer that the alternative providing the best operational benefit, such as the 1,500-foot runway extension, would be the most appropriate alternative. However, the benefits and impacts associated with such an extension must first be analyzed and compared to other alternatives.

Four runway length alternatives are evaluated for Runway 17-35: a 500, 750, 1,000 and 1,500-foot runway extension. The operational benefits of each alternative are identified and summarized in **Table 3-7.** Potential impacts associated with each alternative are identified and summarized in **Table 3-8** with a graphic depiction of those impacts illustrated in **Figures 3-3** through **3-6.**

Additional runway length will be constructed on the Runway 35 approach end due to obstructions and other developmental constraints associated with the Runway 17 approach end.

Each alternative also ensures that the runway safety areas can be reasonably met.

Table 3-7: Concord Municipal Airport – Runway 17-35 Length Analysis – Operational Benefits

Alternatives	RSA Dimensions (feet)		Runway Pavement Length (feet)	Runway 17 Displaced Threshold Length (feet)	Operational Runway Length (feet) [1]					Most popular business jet aircraft accommodated [2] (percent)
	Length	Width			Runway	TORA	TODA	ASDA	LDA	
Existing	300	150	6,005	640	**Runway 17**	6,005	6,005	6,005	5,365	39
					Runway 35	6,005	6,005	6,005	6,005	
1	300	150	6,505	640	**Runway 17**	6,505	6,505	6,505	5,865	75
					Runway 35	6,505	6,505	6,505	6,505	
2	300	150	6,755	640	**Runway 17**	6,755	6,755	6,755	6,115	83
					Runway 35	6,755	6,755	6,755	6,755	
3	300	150	7,005	640	**Runway 17**	7,005	7,005	7,005	6,365	90
					Runway 35	7,005	7,005	7,005	7,005	
4	300	150	7,505	640	**Runway 17**	7,505	7,505	7,505	6,865	100
					Runway 35	7,505	7,505	7,505	7,505	

Notes:

1. Runway 17 has a 640-foot displaced threshold. The threshold of the runway was displaced due to existing obstructions that are located in Runway 17s approach surface. Due to the displacement, the available operational runway length for landings on Runway 17 is less than the full pavement length available. Landing prior to the designated displaced threshold is prohibited. However, the paved area before the displaced threshold (marked by white arrows) is available for aircraft taxiing, landing rollout, and takeoff only. Thus, all takeoff operations would have full pavement length for departures. Due to the existing obstructions and as of December 2004, the completion of a new public roadway, Regional Drive, it is recommended that the existing displaced threshold remain in its current location with any additional length added to the Runway 35 end. The acronyms listed pertain to declared distance information used for calculating maximum operating capacity and are as follows: TORA = takeoff run available (the length of runway declared available after safety parameters are in place), TODA = takeoff distance available (the TORA plus the length of any remaining runway declared available after safety parameters are in place), ASDA = accelerated stop distance available (the length of runway declared available for accelerated stop distance requirements after safety parameters are in place), and LDA = landing distance available (the length of runway declared available for landing distance requirements after safety parameters are in place).
2. Based on runway length analysis of 48 of the most popular business jet aircraft used today. Currently 39 percent of the most popular business jet aircraft are accommodated on the existing 6,005-foot runway. Increases in runway length in turn increase the number of business jet aircraft that can use the runway without weight limitations/restrictions, i.e. at 100 percent useful load (full load of passengers, fuel and baggage/cargo).

Table 3-8: Concord Municipal Airport – Runway 17-35 Length Analysis - Potential Impacts

Alternatives [9]	Runway Pavement Length (feet)	Most popular business jet aircraft accommodated [1] (percent)	Impacts to MALSR [2]	Property Easement or Acquisition Required/Amount to Protect Both the MALSR and RPZ		Approach Impacts	Impacts to Soucook River	Noise Impacts [8]
				Required	Amount (acres)			
Existing	6,005	39	No	No	0	No	No	Yes
1	6,505	75	Yes [3]	Yes [3]	5 [4]	Yes [5]	No	Yes
2	6,755	83	Yes [6]	Yes [6]	7 [4]	Yes [5]	No	Yes
3	7,005	90	Yes [6]	Yes [6]	12 [4]	Yes [5]	No	Yes
4	7,505	100	Yes [6 & 7]	Yes [6 & 7]	27 [4]	Yes [5]	Yes [7]	Yes

Notes:

1. Same as note 2 for Table 3-7 above.
2. A Medium Intensity Approach Light System with Runway Alignment Indicator Lights, or MALSR, is a type of approach lighting system (ALS) that provides pilots with a basic means to transition from instrument flight to visual flight for landing at an airport. The MALSR is a lighting system that begins at the approach end of the runway and extends into the approach path of that runway for 2,400 feet with each light stanchion located at 200-foot intervals. Extension of the runway in each alternative requires the movement of the MALSR to accommodate the new runway threshold and location. Each alternative requires a portion of the approach light system to be located off of airport owned property requiring either the purchase of land or easements to install and maintain the lighting equipment.
3. This alternative requires one MALSR light stanchion (the last one) to be located off of airport property. This alternative also places the RPZ over land not owned by the airport or over land where no easement exists. Thus, property acquisition and/or acquisition of easements are necessary to implement this alternative.
4. Property easements and/or property acquisition is required for each alternative. The acreage depicted includes both the land area needed beneath the RPZ and the land area needed to accommodate the MALSR light stanchion/stanchions
5. Movement and/or extension of Runway 17-35 also moves/extends the Runway 35 approach surface, which must be protected from obstructions and object penetrations such as any manmade objects or objects of natural growth such as trees, brush, and/or terrain (ground penetrations). The analysis indicates that the longer the extension, the more obstructions exist requiring removal or lighting of the obstructions.
6. Similar to alternative 1, alternatives 2, 3 and 4 require property acquisition and/or easements to protect land beneath the RPZ not owned by the airport and to accommodate the MALSR light stanchion installation. Three light stanchions would be located off of airport property in alternative 2, four in alternative 3 and six in alternative 4.
7. The last light stanchion would be located in the Soucook River. An impact that is environmentally undesirable due to the fact that the river is both a wetland and zoned as shoreland protection zone under the City of Concord's zoning ordinance. According to the City, a light stanchion is considered an incompatible use within this zone.
8. Noise impacts associated with aircraft operations at Concord Municipal Airport are evaluated in *Chapter 4 – Environmental Review* of this report. Using runway geometry, forecast operations, typical flight tracks and aircraft types noise contours are created representing areas of noise impact around the airport. The noise contours represent average daily noise levels that occur over a 24-hour period at the airport. The contours identify which areas are likely to have noise concerns. Generally, those areas falling within the 65-decibel contour are considered to be subject to noise disturbance. As the runway length increases within each alternative more land surrounding the airport is incorporated into the 65-decibel contour. See *Chapter 4 – Environmental Review* of this report for further information.
9. See **Figures 3-4 through 3-7** for areas of impact.

Figure 3-3: Runway Length Alternatives – Impacts – 500-Foot Extension

Figure 3-4: Runway Length Alternatives – Impacts – 750-Foot Extension

Figure 3-5: Runway Length Alternatives – Impacts – 1,000-Foot Extension

Figure 3-6: Runway Length Alternatives – Impacts – 1,500-Foot Extension

As indicated in both the tables above and in the attached figures, impacts to the existing approach light system, or MALSR; the need of additional property acquisitions and/or easements; impacts to Runway 35's approach surface; and impacts to nearby communities associated with aircraft noise take place within each alternative, albeit at varying levels. Relocation of the MALSR approach light system and the approach surface would require property easements and/or property acquisition beyond the approach end of Runway 35 for the following reasons:

1. To maintain and install the lighting equipment for the relocated MALSR system; and
2. To protect the new approach surface and RPZ in areas not owned by the airport

As depicted in the *March 1996 Concord Municipal Airport Master Plan Update* future noise contours exist outside of airport owned property, which overlay incompatible land uses such as residential properties. Movement of the threshold within each alternative will shift the noise contours and incorporate additional properties not previously included, thus, potentially impacting nearby communities (see *Chapter 4 – Environmental Review* for further information).

Impacts to the Soucook River exist in alternative 4, only.

Analysis of the runway length alternatives indicates that a 1,000-foot extension is preferred and justifiably reasonable. A review of the factors leading to this determination is included below.

1. Of the four runway length alternatives evaluated for Runway 17-35 (a 500, 750, 1,000 and 1,500-foot runway extension), alternative 4, the 1,500-foot extension (bringing the runway to an overall length of 7,505 feet) cannot be justified for Concord Municipal Airport due to the following:
    a. Aircraft that require a 7,505-foot runway fall into a higher design category such as C-II/D-II. Higher dimensional standards exist for C-II/D-II type aircraft such as the standards for runway safety areas. Logically, if the airport were to provide users with a 7,505-foot runway, it should also provide them with the design standards associated with such a length. The existing and future design category for Concord Municipal Airport is B-II and requires a 300-foot by 150-foot runway safety area. A 1,000-foot by 400-foot runway safety area is the required dimensions for a C-II/D-II airport. At Concord Municipal Airport both a 1,500-foot extension and the standard 1,000-foot by 400-foot runway safety area located beyond runway end can not be met due to extreme differences in elevation, environmental constraints, and cost associated with the fill needed to implement such a project;
    b. The number of operations by aircraft requiring such length at Concord Municipal Airport is minimal. Although C-II/D-II type aircraft operate at the airport, they are a small minority of annual operations. Establishment of a longer runway is not based on a "if you build it, they will come" scenario, but on existing and future aircraft needs, which involve more aircraft that fall into the B-II category as indicated in *Section 2.1 – Protected Surfaces – Airport Design Criteria*, of this chapter; and
    c. Although a 1,500-foot runway extension would accommodate 100 percent of the most commonly used business jet aircraft, the impacts associated with a 1,500-foot extension cannot be justified especially when other alternatives exist. The 1,000-foot extension, which can accommodate 90 percent of the most commonly used business jet aircraft, a relatively small difference when compared to the 1,500-foot extension.
2. Although both the 500-foot, alternative 1, and 750-foot, alternative 2, extensions are more in-line with B-II airport design standards (i.e., runway lengths between 6,000 feet and 6,750 feet support most business jet aircraft that fall into the B-II category), a 1,000-foot extension, alternative 3, would provide the airport with more flexibility. This approach would neither limit potential growth nor would it build more than is necessary for Concord Municipal Airport. In other words, it would provide the airport with the option of expanding a full 1,000 feet in the future, if future activity demands require it, but it would also allow the airport to develop some lesser extension (say a 500-foot or 750-

foot extension) if the 1,000-foot extension were deemed unnecessary. It would allow the airport to develop the overall length in phases based on future needs of the most commonly used business jet aircraft;

3. A 1,000-foot extension would accommodate 90 percent of the most commonly used business jet aircraft and allow them to operate at 100 percent useful load, i.e., without weight limitations, versus 75 percent with a 500-foot extension, alternative 1, or 83 percent with a 750-foot extension, alternative 2;
4. A 1,000-foot extension identifies the maximum runway length that can be reasonably met and still allow for it's associated safety areas and safety zones for either the existing ARC of B-II or an increase in the ARC higher than B-II. For example, a 1,000-foot extension would still allow for the development and creation of a larger safety area if an increase in the ARC is required in the future;
5. Although the 1,000-foot expansion has more impacts associated with it when compared to alternatives 1 and 2, the impacts are reasonably similar with the most significant difference associated with the amount of land and/or easements that would be required to implement the extension.

Given the above analyses, it is recommended that land be preserved to allow for a 1,000-foot expansion, on Runway 17-35. While this length may not be needed immediately, it is recommended that the airport sponsor properly plan to ultimately provide for such an expansion in the future. This includes acquiring land and/or obtaining the necessary easements required to: 1) relocate the approach lighting system; 2) protect the airspace and other safety zones from obstructions/object penetrations; and 3) to provide the airport with the control to remove and/or light those obstructions located within the proposed RPZ and approach surface. It is also recommended that a benefit-cost-analysis be completed prior to project implementation that outlines the following:

- Potential benefits to the aviation public and surrounding community
    - Benefits and costs affecting the aviation public or directly attributable to aviation
- Potential economic benefits
    - Both benefits realized in the form of monetary gains (i.e. increase in fuel sales, fuel taxes and property taxes) and non-monetary resources (i.e. improved travel time, convenience to airport business users)

4.2 Taxiways

The following identifies the condition of Concord Municipal Airport's taxiways and identifies facility improvements where necessary.

4.2.1 Taxiway Pavement Condition

As indicated in *Chapter 1 – Inventory*, Concord Municipal Airport has seven taxiways (one of which is used to access the New Hampshire Army National Guard facility): one parallel taxiway, Taxiway A; four-access taxiways (or stub taxiways) connecting the parallel taxiway to the runway (Taxiways A1 through A4) and two-access taxiways providing access to both the old and new New Hampshire Army National Guard facilities.

Taxiway A was constructed 1975 and reconstructed (the north section only) in 1990. The overall condition of the north section pavement is very good. The four-access taxiways connecting the parallel taxiway to the runway were constructed in 1975. No rehabilitation has taken place on the access taxiways or on the south section of the parallel taxiway since its construction. The south section pavement is in poor to fair condition. A majority of the access taxiway providing access to the old New Hampshire Army National Guard facility was removed in 2004 when Regional Drive was constructed; however a portion is still used by pilots wishing to check their magnetic compass heading against the directional headings provided on the surface painted compass rose located on this taxiway.

Although all public use taxiways have been maintained though basic maintenance and crack sealing, the condition of the taxiways has deteriorated since the pavement evaluation (completed in October of 2003) and should be reevaluated to determine when rehabilitation is necessary. The rule of thumb is a life expectancy of 15 to 20 years. Thus indicating that Taxiway A (the south section) and its four-access taxiways have reached the end of their designed pavement life in 1995 and are overdue for pavement rehabilitation. Recent visits to the airport (June 2005) indicate that crack sealing is no longer a viable option due to extensive movement in the pavement. Such movement that has created cracks in some places to be at least five-inches in depth and three to four-inches in width.

In accordance with the discussion above, it is recommended that Taxiway A (the south section) and its four-access taxiways be scheduled for rehabilitation within the short-term phase of this planning period. Taxiway A (the north section) is due for rehabilitation in 2010.

4.2.2 Airport Design Criteria and Condition

Table 3-2 of this chapter identifies the B-II dimensional design requirements for taxiways. In addition to the dimensional design criteria listed in the table, taxiways also have standards for the condition of each taxiway design element. The following defines taxiway design criteria, identifies the existing conditions for each design element and makes recommendations for improvement for those items not meeting criteria.

Taxiway Width

The B-II taxiway design standard requires a 35-foot taxiway. All taxiways exceed design standard (see *Chapter 1 – Inventory, Table 1-11* for taxiway information). **Although the taxiway widths exceed B-II design standards, reductions are not warranted due to the following:**

1. The additional width allows for ease of maintenance of taxiway edge safety margins (requiring a 7.5-foot margin) and taxiway shoulders (requiring a 10-foot shoulder);
2. The additional width better accommodates larger business jet aircraft (typically requiring larger taxiway widths) that currently operate at Concord Municipal Airport during special events such as NASCAR races; and
3. It is possible that the additional width may be required in the long-term future, i.e., if the type of aircraft or the number of operations by larger jet aircraft that fall into higher design categories were to substantially increase

Taxiway Edge Safety Margins, Shoulders, Safety Areas, and Object Free Areas

The following identifies design standards for taxiway edge safety margins, shoulders, safety areas, and object free areas and makes recommendations for improvement for those items not meeting criteria.

Taxiway edge safety margins are the minimum acceptable distance between the outside of the airplane wheels and the pavement edge.

Taxiway shoulders are designed to provide resistance to blast erosion.[xxv] They are typically designed as paved shoulders and exist to reduce the possibility of blast erosion and engine ingestion problems associated with jet engines, which overhang the edge of the taxiway pavement. Typically, soil and/or turf shoulders are not suitable for this purpose. A low cost paved surface is more desirable.

Taxiway safety areas (TSA) are similar to runway safety areas. The TSA is a rectangular area, centered on the taxiway centerline, which is to remain free of obstacles or rough terrain, except for objects that need to be located in the TSA because of their function, such as navigational aids. The TSA provides a suitable surface that reduces the risk of damage to aircraft in the event that an aircraft leaves the taxiway environment.

The **taxiway object free area (OFA)** surrounds the TSA. Service vehicle roads, parked aircraft, and fixed or moveable objects are prohibited. Only objects that need to be located in the taxiway OFA, because of their function, such as navigational aids, are allowed.

Although the dimensional taxiway design criteria can be met, the following identifies taxiway design elements that cannot be met:

- As indicated above, the TSA is to remain free of rough terrain and provide a suitable surface for an aircraft to travel on in the event the aircraft leaves the taxiway environment. This standard cannot be met due to several large humps in the soil caused by previous snow removal operations and soil erosion due to the clumping of grass that has been caused by the lack of mowing.

In an effort to meet FAA regulations regarding the condition of the TSA, it is recommended that the necessary fill be brought into the area and/or the turf rolled to reestablish a more appropriately graded and suitable surface.

4.2.3 Taxiway Issues

Parallel Taxiway to Runway 12-30

Runway 12-30 is accessible via the closed Runway 03-21, which intersects at the midpoint of the runway, and Taxiway A (the approach end of Runway 12 is accessible via Taxiway A and the approach end of Runway 17). There is no parallel taxiway, or access taxiway, to enter the approach end of Runway 30. Pilots are required to back-taxi approximately 1,320 feet on the runway, from the closed Runway 03-21, to get to the approach end of Runway 30 for takeoff. The *March 1996 Concord Municipal Airport Master Plan Update,*[xxvi] identified the need for a parallel taxiway to avoid back-taxiing. Review of this recommendation indicates that there is still a need for a parallel taxiway for Runway 12-30. Discussions with the airport sponsor (the City of Concord), airport staff, United States Fish and Wildlife Service, and the New Hampshire Fish and Game Department indicate that the parallel taxiway should be located on the south side of Runway 12-30 for the following reasons:

1. To be consistent with past planning recommendations; and
2. To be consistent with the Conservation Management Agreement (see *Chapter 4 – Environmental Review* for further information) and the conservation and development zones, which designate development of a future parallel taxiway on the south side of Runway 12-30

A parallel taxiway to Runway 12-30 continues to be recommended, as described above, and identified on the ultimate airport layout plan.

Convert the Closed Runway, Runway 03-21, Into A Taxiway/Ramp

Following the closure of Runway 03-21, the paved area has historically been used for overflow aircraft parking during special events such as NASCAR races. The *March 1996 Concord Municipal Airport Master Plan Update,*[xxvii] identified conversion of this 150-foot pavement into a 35-foot taxiway.

Review of this recommendation indicates that the closed runway should be converted into a taxiway, albeit maintaining its existing width of 150 feet due to the fact that the area is used as overflow parking of larger business jet aircraft and two Boeing 727s during NASCAR race weekends. Although recommendations within this chapter identify the development of additional aircraft storage ramps to accommodate those aircraft, overflow parking for large aircraft is still necessary. A 35-foot taxiway will not accommodate those larger aircraft. **Therefore, it is recommended that the entire width (150 feet) of closed runway be converted to a taxiway/ramp. It is also recommended that the pavement be rehabilitated (as of July 2004 the condition of the pavement was fair) and strengthened to support the larger business jet aircraft.**

4.3 Visual and Navigational Aids

Visual Aids include any visual device on the airport surface, which provides guidance information or position data guidance to pilots maneuvering on airports. They include airport markings on paved runways, taxiways, ramps and roadways; airport lighting; and airport signs.

Navigational Aids (Navaids) include any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight.[xxviii]

Chapter 1 – Inventory, Tables 1-10 and 1-11, identifies Concord Municipal Airport's visual and navigational aids, while the following identifies the condition of those aids and known issues. This section also recommends facility improvements where necessary.

Visual Aids – Marking Paved Areas - Runways

Advisory Circular (AC) 150/5340-1J, Standards for Airport Marking, provides the standards for marking paved areas on airports (runways, taxiways, ramps, and roadways). **Table 3-9** identifies runway markings that are required for Concord Municipal Airport based on the type of runway approach, i.e., precision, non-precision, or visual.

Table 3-9: Required Runway Marking Elements

Runways	Runway 17	Runway 35	Runway 12	Runway 30
Approach Type	**Non-Precision**	**Precision**	**Non-Precision**	**Visual**
Runway Length (feet)	**6,005**		**3,200**	
Runway Marking Element				
Designation	X	X	X	X
Centerline	X	X	X	X
Threshold marking	X	X	X	X [1]
Aiming Point	X [2]	X	X [2]	X [2]
Touchdown Zone		X		
Side Stripes	X [3]	X	X [3]	X [3]
Holding Position Markings on Runways			X [4]	

Source: *Advisory Circular (AC) 150/5340-1J, Standards for Airport Marking*[xxix]

Notes:

1. Only required on runways used, or intended to be used, by international commercial transport.
2. On runways 4,000 feet (1200 m) or longer used by jet aircraft.
3. Used when the full pavement width may not be available as a runway.
4. These markings are installed on a runway normally used as a taxiway such as Runway 12-30.

Analysis of the existing runway markings indicates that for the most part Concord Municipal Airport has the required pavement markings, with the exception of aiming point markings on Runway 17. **Therefore, it is recommended that the airport paint the aiming point marker on Runway 17.**

The pavement markings on Runway 17-35 are faded and yellow, while the pavement markings on Runway 12-30 are in very good condition**. In an effort to maintain runway marking visibility, it is recommended that the airport repaint their runway markings on a regular basis.** According to discussions with several airport managers within the New England region,[xxx] the most common repainting schedules are either an annual rotating paint schedule, or a tri-annual paint schedule. An annual rotating paint schedule includes painting some, but not all, airport surfaces annually, i.e., all taxiways in the first year, runways in the second,

and ramps in the third followed by taxiways again, etcetera. A tri-annual paint schedule includes repainting all paved surfaces every three years.

During the airport safety and compliance inspection completed by the FAA on July 21, 2004[xxxi] (see **Appendix E** for the compliance inspection letter), **it was recommended that side stripes be painted at the intersection of Runway 12-30 and the old runway to help prevent inadvertent entry**.

Visual Aids – Marking Paved Areas - Taxiways

Table 3-10 identifies the taxiway markings that are recommended/required for Concord Municipal Airport.

Table 3-10: Taxiway Marking Elements

Taxiway Marking Element	Recommended	Required
Taxiway Centerline		X
Enhanced Taxiway Centerline	X	
Taxiway Edge	X	
Runway Holding Position		X
Runway Holding Position for an Instrument Landing System		X
Surface Painted Holding Position Signs	X	
Surface Painted Apron Entrance Point Signs	X	

Source: *Advisory Circular (AC) 150/5340-1J, Standards for Airport Marking*[xxxii]

Review of the required and recommended taxiway pavement markings, indicates that the airport has most of the required markings necessary with the exception of the runway holding position marking for the instrument landing system (ILS). **Therefore, it is recommended that an ILS hold position marking be painted on Taxiway A.** This recommendation was also made during the FAA compliance inspection.

The taxiway pavement markings are poor. Similar to the runway paint markings, **it is recommended that the airport repaint their taxiway markings on a regular basis in an effort to maintain marking visibility, especially the runway hold position markings.**

Visual Aids – Marking Paved Areas – Other Markings

Table 3-11 identifies the other pavement markings, other than runway and taxiway markings, that are recommended/required.

Table 3-11: Other Marking Elements

Other Marking Element	Recommended	Required
VOR Receiver Checkpoint (Compass Rose)		X
Marking and Lighting of Permanently Closed Runways and Taxiways		X
Converting a Runway to a Taxiway		X

Source: *Advisory Circular (AC) 150/5340-1J, Standards for Airport Marking*[xxxiii]

During the FAA's compliance inspection[xxxiv] the following "other" marking improvements were recommended and should be implemented at Concord Municipal Airport:

- Repaint the VOR checkpoint if the VOR is to remain active;
- Remove all markings on the closed runway with the exception of the yellow "X" demoting that the runway is closed. Removal of the marking should be done through sand blasting rather than simply blacking out the marking; and
- Use glass beads in yellow and white paint markings as indicated in *AC 150/5340-1J, Standards for Airport Marking*.
    - According to *AC 150/5340-1J*,[xxxv] "Markings that cannot be seen by pilots and others operating on marked surfaces are useless."[xxxvi] Outlining pavement markings in black or applying glass beads (glass beads should not be used in conjunction with the black paint) are two of the most common methods used to increase the visibility of markings at airports. Outlining all edges of the marking with a black border increases the visibility of markings situated on light colored pavement surfaces such as concrete. On the other hand, glass beads have also been used to highlight pavement markings and to increase marking visibility during nighttime operations, low visibility conditions and during periods when the pavement surface may be wet.

Visual Aids – Airport Lighting

Advisory Circular (AC) 150/5340-30A, Design and Installation Details for Airport Visual Aids, provides guidance and recommendations on the installation of airport visual aids such as runway and taxiway lights, rotating beacons, lighted wind cones, obstruction lights, economy approach light systems, etcetera. This AC is used to identify airport lighting needs and to recommend facility improvements where necessary. Concord Municipal Airport's existing visual and navigational aids are identified in *Chapter 1 – Inventory, Tables 1-10 and 1-11*, of this airport master plan update report.

Table 3-12 lists the airport lighting aids that should be upgraded and/or established for Concord Municipal Airport.

Table 3-12: Visual Aids to be Upgraded and/or Established at Concord Municipal Airport

Visual Aid to be Upgraded/Established	Recommendation
Medium Intensity Taxiway Lights (MITLs)	Taxiway A, the parallel taxiway serving Runway 17-35 does not have taxiway edge lighting. According to *AC 150/5340-30A, Design and Installation Details for Airport Visual Aids,*[xxxvii] medium intensity taxiway lights (MITLs) are recommended for taxiways and ramps on airports using medium intensity runway lights (MIRLs) or high intensity runway lights (HIRLs). Runway 17-35 has HIRLs. **In an effort to improve the utility of the airport during nighttime operations and to increase visibility during low visibility weather conditions, installation of MITLs are recommended for Taxiway A and it's four-access taxiways. It is also recommended that until the lights can be installed, that low cost taxiway retroreflective markers be installed (see *AC 150/5345-39, FAA Specification L-853, Runway and Taxiway Retroreflective Markers*). MITLs are also recommended for the proposed parallel taxiway to access Runway 12-30.**
Taxiway Centerline Lights	Although taxiway centerline lighting typically is not required at general aviation airports (most taxiway centerline lighting is for airports with air carrier operations), installation is recommended where a taxiing problem exists to improve guidance for complex taxiway configurations.[xxxviii] The intersection of Runway 17 and 12 may qualify for such installation. **Although a costly alternative, it is recommended that taxiway centerline lighting be installed at Taxiway A1 to enhance taxiway centerline visibility. A less costly alternative is the installation of low-cost retroreflective taxiway centerline markers.**
Supplemental Windsocks	Discussions with the airport tenants/users indicate a need for supplemental wind direction indicators for Runways 30 and 35. The source of wind information on an airport that is reported to pilots may be 2 to 3 miles from the approach end of a runway. Factors such as topography and weather could result in different wind conditions near runway ends than reported to pilots. Under such circumstances, supplemental windsocks provide pilots with a continuous visual indication of wind conditions. **Therefore, in an effort to meet the goals and objectives of airport tenants/users, and to enhance safety, it is recommended that supplemental windsocks be provided at the approach ends of Runway 30 and 35.**
Runway End Identifier Lights (REILs) and Precision Approach Path Indicators (PAPIs)	Economy approach lighting aids were developed to make visual aids available to airports at a low cost. The FAA recommends the installation of low-cost economy approach lighting aids on runways where the visibility is greater than 1-statute mile. Lighting aids such as REILs and PAPIs provide better visibility for pilots approaching the runway end for landing. REILs aid in early identification of the runway and runway end.[xxxix] And they are beneficial in areas having a large concentration of lights such as the lights from commercial businesses surrounding the airport. The PAPIs provides visual approach slope guidance to the runway touchdown area. The PAPI was designed to replace the visual approach slope indicator (VASI) due to several shortcomings of the existing VASI system and to provide more stable and accurate tracking to final approach. The PAPI was accepted and certified in 1981 by the International Civil Aviation Organization (ICAO), while the VASI system lost its ICAO certification in 1995. Runways 17 and 12, both non-precision approaches, would benefit from such low-cost economy approach lighting aids. Runway 17 has REILs but they are inoperative and have been since 1986 due to the removal of the power source. **Therefore, in an effort to improve the visibility of an approach to Runway 17, it is recommended that REILS be reestablished and the power source provided. Likewise, it is recommended that REILS be installed at the approach end of Runway 12 to improve visibility and to enhance the approach for that runway.** The VASI, located at the approach end of Runway 35, may be difficult to maintain in the future because system parts are no longer manufactured. **Although Runway 35 has a much more sophisticated approach lighting aid (the MALSR), it is recommended that the VASI be replaced with the newer and more advanced PAPI system.** The installation of these systems would not reduce visibility minimums for either runway; however, such systems aid pilots in locating the approach end of a runway and enhance the pilot's visibility of the runway environment, thus enhancing the safety of the non-precision or visual approach.

Visual Aids – Airport Signs

Advisory Circular (AC) 150/5340-18D, Standards for Airport Sign Systems, provides the standards for runway and taxiway signs on airports.

According to *AC 150/5340-18D, Standards for Airport Sign Systems*, a properly designed and standardized runway and taxiway guidance sign system is essential to allow both aircraft and ground vehicles to easily determine where they are on the airport. Runway and taxiway signs should easily identify the designation or name of any taxiway or runway on which the aircraft or ground vehicle is located. The signs should readily identify routes toward a desired destination such as a directional sign indicating the route to the ramp for aircraft parking or to another runway or taxiway. Airport signs should also indicate mandatory holding positions when operating during low-visibility weather operations and to identify boundaries for approach areas, Instrument Landing System (ILS) critical areas, etcetera.

The taxiway and runway signs at Concord Municipal Airport are in poor condition and are confusing. During the inventory phase of this master Plan update (July 2004) it was noted that some of the sign panels were falling off or were the wrong size. Some were also faded, unlit, covered with grass and generally hard to read. Being aware of the problem, the airport asked that a sign plan be completed as part of this airport master plan update. The sign plan is available for review in *Chapter 5 – Airport Plans* of this report. **Replacement of the existing signs and installation of new signs is recommended based on the aforementioned established sign plan.**

Navigational Aids

Chapter 1 – Inventory, Table 1-10, identifies Concord Municipal Airport's navigational aids. Discussions with airport tenants and users indicated that the existing systems in place are adequate for existing and future operations. **Therefore, additional navigational aids are not warranted and, thus, are not recommended within this planning period for Concord Municipal Airport. However, navigation to the airport could be improved if obstructions within the approach for Runway 35 were removed.** If the obstructions are removed it is possible that the visibility minimums could be reduced as detailed in the following sections.

4.4 Airside Obstructions/Imaginary Surfaces

As indicated earlier in this chapter, FAR Part 77, *Objects Affecting Navigable Airspace*,[xl] establishes imaginary surfaces above airports to protect navigable airspace from objects/obstructions that may penetrate the airspace.

During a site visit to Concord Municipal Airport and the completion of an obstruction study of the runway approaches (completed in October 2004) the existing and potential future imaginary surface obstructions were noted.

A graphic depiction of the airport imaginary surfaces and imaginary surface obstructions is shown in *Chapter 5 – Airport Plans*.

In an effort to enhance safety, it is recommended that clearing and grubbing of trees, brush, and terrain located both on and off of airport property within the airport's imaginary surfaces take place within this planning period. If trees and/or terrain cannot be removed, it is recommended that the areas be identified with obstruction beacons/lighting. Although the airport currently has some avigation easements for those areas of impact, additional avigation easements are required and must be obtained prior to the removal of obstructions that are located off of airport property.

5.0 Storm Water Pollution Prevention Plan (SWPPP)

The purpose of a SWPPP is to identify sources of pollution potentially affecting the quality of storm water discharges associated with industrial activity at an airport and to ensure implementation of practices to minimize and control pollutants in storm water discharges. A SWPPP is a continuously updated plan providing data regarding new sources of pollution and/or changes in practices to minimize and control those pollutants.

A SWPPP is being completed concurrently with this master plan update. A final plan is available for review at the airport through Concord Aviation Services or through the City of Concord's Community Development Department.

The plan includes the following:

- An inventory of the activities at the airport;
- Identification of site drainage patterns;
- Recommendations for corrective and/or protective measures;
- Creation of a model for inspection, compliance evaluation and documentation; and
- Suggestions that present a method to maintain and upgrade the SWPPP as conditions and/or facility usage changes

The inventory of airport activities includes a review of facilities located at the airport and sources of potential pollution from those facilities. It identifies materials and chemicals stored or handled at each of those facilities.

Drainage patterns are identified to determine the direction of drainage to storm water from each airport facility. Review of those patterns indicate that storm water leaves the Concord Municipal Airport both through closed drainage systems and by overland sheet flow. All of the water is either recharged to the sandy soils of the airport or flows to the Atlantic Ocean via the Merrimack River. On a local scale, the run-off either flows to the Merrimack River on the west or to the Soucook River on the east, which in turn joins the Merrimack River south of the airport.

In an effort to minimize contact with storm water and to prevent discharge of oil into navigable waters of the United States, best management practices and pollution prevention and control measures should be implemented.

According to the Environmental Protection Agency (EPA)[xli] and regulations issued under the Clean Water Act, transportation facilities are required to prepare a Spill Prevention Control and Countermeasures (SPCC) Plan if: 1) the facility stores oil in bulk; and 2) the facility is located in an area where storm water runoff drains into navigable waters of the United States. The SPCC is to be prepared by the owner/operator of a facility that falls under the SPCC rule. A facility may be subject to SPCC rule if it has at least one of the following bulk oil storage capacities:

1. If a facility has a total aboveground oil storage capacity greater than 1,320 gallons; or
2. If a facility has a completely buried oil storage capacity greater than 42,000 gallons

Analysis of the facilities located at the airport and the list of materials and chemicals stored or handled at each indicates that a SPCC Plan is required for Concord Aviation Services.

6.0 Airport Security/Wildlife Fencing Requirements

As indicated in *Chapter 1 – Inventory*, the airport's security fence encompasses approximately 2/3 of airport property. The southeastern boundary is not fenced due to terrain and safety issues.

Although airport security fencing is not required under current FAA regulations for Concord Municipal Airport, it is advised by the FAA that the nation's airports provide security fencing as public protection in order to prevent possible wildlife hazards and inadvertent entry to the airport movement area (runways and taxiways) by unauthorized persons or vehicles. Also, increased security awareness is warranted in the wake of the September 11, 2001 attacks.

Therefore, it is recommended that the remaining 1/3 of the airport's property boundary be fenced.

7.0 Perimeter Road Requirements

In an effort to maintain a separation between automobiles and aircraft and to avert runway incursions, airports around the nation have constructed perimeter airport roads. Perimeter roads are made available at airports so that airport ground vehicles such as fuel, maintenance, and operations vehicles can move between areas on the airport avoiding the need to cross runways and taxiways. Discussions with City and airport staff, United States Fish and Wildlife Service, the New Hampshire Fish and Game Department, the Concord Municipal Airport Advisory Board and the PAC indicate a need for a perimeter road at Concord Municipal Airport. This road is not a public access road. It is strictly used for airport personnel and occasional emergency vehicles.

Discussions with the United States Fish and Wildlife Service and the New Hampshire Fish and Game Department indicate that the construction of a perimeter road is advantageous to them because it would not only provide better separation between aircraft and ground vehicles, it would also provide their scientists with a designated roadway to access the airport to monitor and manage habitat for the Karner Blue Butterfly (see *Chapter 4 – Environmental Issues* for further information).[xlii]

In an effort to increase safety at the airport, to reduce the possibility of runway incursions, and to meet the airport's goals, it is recommended that a perimeter road be constructed at the airport. A turf roadway is preferred so that little maintenance is required and so that the area can still be used for the growth and protection of the Karner Blue Butterfly. A portion of a turf type perimeter road exists west of the parallel taxiway, Taxiway A, from the based aircraft storage ramp (south ramp) to the approach end of Runway 35. The airport desires to continue this road on the east side of the airport.

8.0 Snow Removal Equipment Requirements

This section analyzes snow removal equipment requirements at Concord Municipal Airport.

According to *AC 150/5220-20, Airport Snow and Ice Control Equipment*,[xliii] the minimum snow removal equipment required for an airport is determined by: 1) the type airport (commercial or non-commercial); 2) the number of annual operations; and 3) the amount of annual snowfall.[xliv]

Concord Municipal Airport is considered a non-commercial service airport with approximately 55,234 reported annual operations for 2004, and an average of 64.6 inches of annual snowfall reported by the National Weather Service – Eastern Region Headquarters weather web site for Concord, New Hampshire from 1971 through 2000.

According to *AC 150/5220-20*,[xlv] and the data provided above, the existing and future minimum snow removal equipment requirements for Concord Municipal Airport are as follows:

- One high-speed rotary plow, which may be self propelled or attached to a supporting, all-wheel drive, carrier vehicle;[1]
- Two displacement plows of equal capacity, two all-wheel drive carrier vehicles to support the two displacement plows and accessories; and [1]
- Support equipment such as sweepers, wheel loaders and material spreaders to complete the removal of snow from all operational areas including secondary runways, taxiways or ramps

The airport currently has the following snow removal equipment (SRE):

- 1 - 1965 Tractioneer snow blower (military surplus); [2]
- 1 - 1999 International 10-wheel dump truck with 12-foot front plow and double 14-foot wing plows; [3]
- 1 - 1998 John Deere 644H loader with a 20-foot push plow, 20-foot angle plow, a 8-yard snow bucket, and a 3-yard standard bucket; [3]
- 1 - 1988 1- ton truck with front plow (military surplus); [2]
- 1 - 2002 1 - ton material spreader for deicing applications; [3]
- 1 - 2003 Oshkosh snow blower; [3] and
- 1 - 2003 Sweepster towed type sweeper broom [3]

Comparison of the primary and secondary snow removal areas with the existing equipment indicates that for the most part the airport has the equipment required to remove snow at Concord Municipal Airport without the need to purchase additional equipment. However, some of the dated pieces of equipment should be replaced. Discussions with the City[xlvi] indicate that there is a need to maintain a better equipment replacement schedule. In the recent past, the airport's dated snow removal equipment has historically cost more to maintain than to simply reinvest in new equipment. **Therefore, it is recommended that typical life expectancies of each piece of equipment be monitored and new equipment ordered in a timely fashion**. A review of the factors leading to these recommendations is included below.

8.1 Snow Removal Equipment Needs Analysis

Table 3-13 identifies both the primary and secondary snow removal areas as detailed in the airport's winter operations plan.[xlvii]

[1] By FAA definition, a rotary plow, also called a snow blower, is used to cast heavy concentrations of snow away from airport operational areas such as runways and taxiways. A displacement plow is described as a plow with a cutting edge to shear snow from the pavement.
[2] Purchased through government surplus programs
[3] Purchased with FAA AIP grants

Table 3-13: Existing Snow Removal Areas

Snow Removal Areas – First Priority	Approximate Area (square feet)
Runway 17-35 (6,005 feet by 100 feet)	600,500
Taxiway A (6,005 feet by 50 feet)	300,250
Taxiway "Stub" A1 (300 feet by 50 feet)	15,000
Taxiway "Stub" A2 (300 feet by 50 feet)	15,000
Taxiway "Stub" A3 (300 feet by 50 feet)	15,000
Taxiway "Stub" A4 (300 feet by 75 feet)	22,500
Total primary area to be cleared [1]	**968,300**
Snow Removal Areas – Second Priority	
Terminal Ramp to Based Aircraft Ramp (75,000 square feet + 140,000 square feet)	215,000
Ramp in front of State Police Hangar (70 feet by 50 feet)	3,500
Driveway entrances (approximate square footage for the four access roads located along Airport Road)	12,000
Terminal automobile parking lot (25,500 square feet + 3,400 square feet)	28,900
Total secondary area to be cleared	**259,400**

Notes:
1. Rounded to the nearest 100

The existing snow removal equipment, the primary and secondary snow removal calculations and the sample graphical solutions provided in *AC 150/5220-20, Airport Snow and Ice Control Equipment*, are used to determine the airports snow removal equipment needs.

Snow Blower Equipment Requirements for Concord Municipal Airport

Using *Figure 2-4* from *AC 150/5220-20, Airport Snow and Ice Control Equipment*[xlviii] and the assumptions listed below indicates that either two Class I or one Class II rotary plow is required for Concord Municipal Airport to effectively remove snow from the primary surface areas.

Assumptions used to determine rotary plow needs -

- Snow depth = 1 inch
- Plow efficiency = 70 percent
- Snow density = 25 pounds per cubic foot
- 40,000 or more annual operations
- 900,000 to 1,000,000 square feet of primary surface area to be cleared

The airport's 1965 Tractioneer snow blower and the 2003 Oshkosh snow blower provide the necessary equipment to effectively remove snow at Concord Municipal Airport and meet the minimum equipment requirements for a rotary plow. **Although the requirements can be met with the existing equipment, replacement of the 1965 Tractioneer snow blower is recommended due to its age and to meet the concerns of City staff in regards to replacing dated equipment.**

Displacement Plow Equipment Requirements for Concord Municipal Airport

Using *Figures 3-2, 3-3, 3-4, and 3-6* from *AC 150/5220-20, Airport Snow and Ice Control Equipment*[xlix] and the assumptions listed below indicates that at least two 12 foot displacement plows with carrier vehicles is required for Concord Municipal Airport to effectively remove snow from the primary surface areas.

Assumptions used to determine displacement plow needs -

- Snow displacement in tons per hour = 1,300 tons per hour
- Operating speed = 15 to 30 mph (an average of 20 mph assumed)
- Plow efficiency = 70 percent
- Blade cutting angle

The airport's existing equipment exceeds the minimum equipment requirements for displacement plows. Thus, the purchase of additional displacement plows is not necessary.

Support Equipment Requirements for Concord Municipal Airport

Supplemental support equipment such as the 2002 1 - ton material spreader and the 2003 Sweepster, a towed type sweeper broom, provide the airport with the additional support equipment needed to effectively remove snow from all operational areas including secondary runways, taxiways or ramps. **Therefore, additional support equipment is not necessary.**

9.0 Airport Improvements – Preferred Development

Table 3-14 outlines the airport projects identified within this chapter that will allow Concord Municipal Airport to upgrade existing airport facilities; accommodate projected planning activity levels outlined in *Chapter 2 – Aviation Demand Forecasts*; meet airport design criteria and accommodate the goals and objectives of the City of Concord, the airport advisory committee, airport tenants, airport users, NHDOT and the FAA.

Some of the development projects should be completed in conjunction with other projects as a logical sequence of development and to reduce the cost for such development. Where that is the case, it is indicated within the table.

Table 3-14: Preferred Airport Development – Concord Municipal Airport

Landside Facility Requirements/Improvements
Ramp Pavement Rehabilitation
Rehabilitate based aircraft storage ramp (estimated date for rehabilitation – 2011)
Rehabilitate itinerant aircraft storage ramp (estimated date for rehabilitation – 2011)
Aircraft Storage Facilities
Construct based aircraft storage hangars and rehabilitate or replace hangars 1, 2, and 3
Expand itinerant aircraft storage ramp with concrete paving material to accommodate larger jet aircraft such as the occasional use by Boeing 727's
Automobile Parking Storage Facilities
Expand and redesign the existing automobile parking lot located in front of the terminal building creating access from both Airport Road and Regional Drive
Create a turf parking lot for overflow automobile rental and fan parking
Terminal Facility
Demolish and construct a new 9,000 square foot terminal facility in the location of the existing facility
Fuel Facilities
Install an additional 18,000 gallon Jet-A fuel tank during rehabilitation of the based or itinerant aircraft ramps
Airside Facility Requirements/Improvements
Runway 17-35 Improvements
Rehabilitate Runway 17-35 and remove 25-foot shoulders (estimated date for rehabilitation – 2010)
Determine ultimate Runway visibility minimums for Runway 35
Extend Runway 17-35 by 1,000 feet on the 35 end and relocate the approach light system (the MALSR)
Runway 12-30 Improvements
Rehabilitate Runway 12-30 (estimated date for rehabilitation – 2022)
Intersection of Runways 17 and 12
Provide better marking, signage, lighting and overall maintenance at the intersections of Runway 17 and 12
Runway Protection Zone Improvements
Acquire property or obtain easements within the RPZ for Runway 12, 17 and ultimately 35
Improvements for Runway Shoulders, Blast Pads, Safety Areas (RSA), Object Free Areas (OFA) and Obstacle Free Zones (OFZ)
Fill and re-seed the terrain within the runway shoulders, runway blast pads and runway safety areas of both runways
Remove the small trees growing within the RSA, OFA and OFZ of both runways
Fill and re-grade the terrain surrounding airfield sign bases and light bases
Update mowing schedule within conservation zones

Taxiway Improvements
Rehabilitate Taxiway A (south section) and its four stub taxiways (estimated date for rehabilitation – 2005/2006). Rehabilitate Taxiway A, the north section (estimated date for rehabilitation – 2010)
Fill and reseed the taxiway safety area to reestablish a more appropriately graded and suitable surface.
Construct a full-length parallel taxiway to Runway 12-30 and install medium intensity taxiway lights (MITLs)
Realign the stub taxiway, Taxiway A1
Convert the closed runway, Runway 03-21, into a taxiway/ramp and rehabilitate the pavement
Visual and Navigational Aid Improvements
Repaint runway, taxiway and ramp markings every three years.
Paint an aiming point marker on Runway 17 to meet paint marking standards for the non-precision runway
Paint side stripes at the intersection of Runway 12-30 and the old runway until this area is converted into a taxiway/ramp, which at such a time, runway hold markings should be painted
Paint an ILS hold position marking on Taxiway A
Repaint the VOR checkpoint/compass rose
Remove all markings on the closed runway with the exception of the yellow "X" demoting that the runway is closed
Use glass beads in yellow and white paint markings as indicated in *AC 150/5340-1J, Standards for Airport Marking*
Visual Aids – Airport Lighting
Install MITLs for Taxiway A, it's four-access taxiways and the proposed parallel taxiway to Runway 12-30
Install taxiway centerline lighting or low cost retroreflective centerline markers at Taxiway A1
Install supplemental windsocks at the approach ends of Runway 30 and 35.
Reestablish the REILS for Runway 17 and install REILS at the approach end of Runway 12
Replace Runway 35's VASI with the newer and more advanced PAPI system.
Visual Aids – Airport Signs
Replace existing airport signs and install new as necessary per the established sign plan
Airside Obstructions/Imaginary Surfaces
Remove airport obstructions as indicated
Airport Security/Wildlife Fence
Install airport security/wildlife fencing
Airport Perimeter Road
Install a turf perimeter road
Other
Complete an SPCC Plan for Concord Aviation Services
Replace the 1965 Tractioneer snow blower with a new modern piece of equipment

Endnotes

[i] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996.

[ii] U.S. Department of Transportation, Federal Aviation Administration, *Federal Aviation Regulations, Part 77, Objects Affecting Navigable Airspace*, U.S. Government Printing Office, Washington, DC, March, 1993.

[iii] Fink, Rick. (SEA Consultants, Inc.) Phone Interview. April 14, 2005.

[iv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 8*, U.S. Government Printing Office, Washington, DC, September, 2004, pp. 56 - 57.

[v] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 8*, U.S. Government Printing Office, Washington, DC, September, 2004, p. 118.

[vi] Rolla, David. (Concord Aviation Services). Telephone conversation. Monday June 13, 2005.

[vii] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996. p. 4-10.

[viii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 8*, U.S. Government Printing Office, Washington, DC, September, 2004, p. 117.

[ix] Zantop, Dave (Staff – Roush Racing). Personal Interview. September 7, 2004.

[x] American Concrete Pavement Association, Pavement Technologies, *Concretes Advantages*, < http://www.pavement.com > (January 26, 2005).

American Concrete Pavement Association, *Concrete Information, Concrete Pavement for General-Aviation, Business and Commuter Aircraft*, Washington, DC, 2002, p. 1.

[xi] Amaral, Michael. (Endangered Species Specialist, United States Department of the Interior, U.S. Fish and Wildlife Service – New England Field Office) Meeting at Concord City Hall. March 16, 2005.

[xii] Goulet, Celine. (New Hampshire Fish and Game Department) Meeting at Concord City Hall. March 16, 2005.

[xiii] Nicosia-Rusin, Ralph. (Federal Aviation Administration – Airports). Personal Interview. February 3, 2005.

[xiv] U.S. Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5360-9, Planning and Design of Airport Terminal Facilities at Nonhub Locations*, U.S. Government Printing Office, Washington, DC, April 4, 1980, pp. 11 – 18.

[xv] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, pp. 6-1 to 6-4.

[xvi] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, p. 6-1.

[xvii] In order to properly size each of the individual terminal components, an understanding of the likely number of people using the terminal at a given time must be established. The FAA recommends using the Typical Peak Hour

Passenger (TPHP) value for this purpose. In general terms, the calculation of this value is used to establish the total number of people the terminal is designed to handle at a single time.

[xviii] U.S. Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5360-9, Planning and Design of Airport Terminal Facilities at Nonhub Locations*, U.S. Government Printing Office, Washington, DC, April 4, 1980.

[xix] Mitchell, Sean (Fire Fighter at Concord Heights Fire Station). Personal Interview. January 27, 2005.

[xx] Based on discussions with Sean Mitchell, the vehicle/equipment bays includes four 12-foot wide by 80-foot deep bays and living space, which includes the following:

- Four work spaces;
- Living room/day room;
- Exercise room;
- Unisex bathrooms with laundry and shower facilities;
- Sleeping quarters for up to ten personnel;
- Dinning room for up to 10 personnel; and
- Kitchen

[xxi] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 8*, U.S. Government Printing Office, Washington, DC, September, 2004, p. 21.

[xxii] It was noted by FAA staff that the clumping grass and soil erosion is due to the airport's inability to mow and maintain the area due to the existing Conservation Management Agreement (see *Chapter 4 – Environmental Review* for further information).

[xxiii] Laurie J. Hyman, memorandum for Mr. Duncan Ballantyne, City Manager, City of Concord, "Concord Municipal Airport Compliance Inspection", 19 August 2004.

[xxiv] Federal Aviation Administration, *FAA Aerospace Forecasts, Fiscal Years 2004 – 2015*, < http://apo.faa.gov/foreca03/Table%20of%20Contents%2004.htm> (March 11, 2005).

[xxv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 8*, U.S. Government Printing Office, Washington, DC, September, 2004, p. 33.

[xxvi] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, p. 4-5.

[xxvii] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996, p. 6-7.

[xxviii] Welcome to SmartRegs – Interactive FAR, *Smart Regs Glossary* – Navigational Aid, <http://www.smartregs.com/data/sa373.htm> (May 19, 2005).

[xxix] U.S. Department of Transportation, Federal Aviation Administration, *Standards for Airport Marking, AC No. 150/5340-1J*, U.S. Government Printing Office, Washington, DC, April 29, 2005, pp. 3-8.

[xxx] Diane Cooper laa@metrocast.net, "Airfield Painting," May 20, 2005, email/office communication (May 20, 2005).

Robert Cossette bhbairport@acadia.net, "Airfield Painting," May 20, 2005, email/office communication (May 20, 2005).

Evan McDougal ermcdougal@sanfordmaine.org, "Airfield Painting," May 20, 2005, email/office communication (May 20, 2005).

[xxxi] Laurie J. Hyman, memorandum for Mr. Duncan Ballantyne, City Manager, City of Concord, "Concord Municipal Airport Compliance Inspection", 19 August 2004.

[xxxii] U.S. Department of Transportation, Federal Aviation Administration, *Standards for Airport Marking, AC No. 150/5340-1J*, U.S. Government Printing Office, Washington, DC, April 29, 2005, pp. 8-16.

[xxxiii] U.S. Department of Transportation, Federal Aviation Administration, *Standards for Airport Marking, AC No. 150/5340-1J*, U.S. Government Printing Office, Washington, DC, April 29, 2005, pp. 17-19.

[xxxiv] Laurie J. Hyman, memorandum for Mr. Duncan Ballantyne, City Manager, City of Concord, "Concord Municipal Airport Compliance Inspection", 19 August 2004.

[xxxv] U.S. Department of Transportation, Federal Aviation Administration, *Standards for Airport Marking, AC No. 150/5340-1J*, U.S. Government Printing Office, Washington, DC, April 29, 2005, pp. 1-2.

[xxxvi] U.S. Department of Transportation, Federal Aviation Administration, *Standards for Airport Marking, AC No. 150/5340-1J*, U.S. Government Printing Office, Washington, DC, April 29, 2005, p. 1.

[xxxvii] U.S. Department of Transportation, Federal Aviation Administration, *Design and Installation Details for Airport Visual Aids, AC No. 150/5340-30A*, U.S. Government Printing Office, Washington, DC, April 11, 2005, p. 3.

[xxxviii] U.S. Department of Transportation, Federal Aviation Administration, *Design and Installation Details for Airport Visual Aids, AC No. 150/5340-30A*, U.S. Government Printing Office, Washington, DC, April 11, 2005, p. 15.

[xxxix] U.S. Department of Transportation, Federal Aviation Administration, *Design and Installation Details for Airport Visual Aids, AC No. 150/5340-30A*, U.S. Government Printing Office, Washington, DC, April 11, 2005, p. 42.

[xl] U.S. Department of Transportation, Federal Aviation Administration, *Federal Aviation Regulations, Part 77, Objects Affecting Navigable Airspace*, U.S. Government Printing Office, Washington, DC, March, 1993.

[xli] U.S. Environmental Protection Agency, *Enforcement in New England*, <http://www.epa.gov/region1/enforcement/oilspills/index.html> (June 22, 2005).

[xlii] Amaral, Michael. (Endangered Species Specialist, United States Department of the Interior, U.S. Fish and Wildlife Service – New England Field Office) Meeting at Concord City Hall. March 16, 2005.

Goulet, Celine. (New Hampshire Fish and Game Department) Meeting at Concord City Hall. March 16, 2005.

[xliii] U.S. Department of Transportation, Federal Aviation Administration, *AC 150/5220-20, Airport Snow and Ice Control Equipment, Change 2*, U.S. Government Printing Office, Washington, DC, March 1, 1994.

[xliv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Snow and Ice Control Equipment, AC No. 150/5220-20*, U.S. Government Printing Office, Washington, DC, *Change 2*, 1994, p. 3.

[xlv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Snow and Ice Control Equipment, AC No. 150/5220-20*, U.S. Government Printing Office, Washington, DC, *Change 2*, 1994, p. 29.

[xlvi] Joe Andrews JAndrews@onconcord.com, "Snow Equipment," June 23, 2005, email/office communication (June 23, 2005).

[xlvii] City of Concord, General Services Department, Public Properties Division, *Concord Municipal Airport Winter Operations Plan*, City of Concord, Public Properties Division, Concord, NH, November 1, 2004.

[xlviii] U.S. Department of Transportation, Federal Aviation Administration, *AC 150/5220-20, Airport Snow and Ice Control Equipment, Change 1*, U.S. Government Printing Office, Washington, DC, March 1, 1994, p. 7.

[xlix] U.S. Department of Transportation, Federal Aviation Administration, *AC 150/5220-20, Airport Snow and Ice Control Equipment, Change 1*, U.S. Government Printing Office, Washington, DC, March 1, 1994, pp. 14 - 18.

Chapter Four: Environmental Review

1.0 General

The purpose of this chapter is to: 1) identify development proposals that require further environmental action; 2) review existing environmental conditions; and 3) identify environmental impacts associated with the proposed facility development recommendations made in the preceding chapter, *Chapter 3 - Facility Requirements and Alternative Development.*

1.1 Governmental Policy

The National Environmental Policy Act of 1969 (NEPA) was the first act designed to raise environmental awareness of a number of industry practices. It required affected industries, including airports, to fully consider the impacts a project would have on the environment before capital improvement projects are funded. It also required coordination with Federal agencies before the issuance of any permits, and it required public involvement in the planning and environmental review process.[i]

According to NEPA, any project funded by the Federal government that affects the quality of the environment requires Federal action or environmental processing. Environmental processing falls into three categories depending on the particulars of the proposed project as outlined in the Federal Aviation Administration (FAA) *Order 5050.4A, Airport Environmental Handbook* (and subsequent revisions).[ii] They include: 1) actions requiring an environmental impact statement (EIS); 2) actions requiring an environmental assessment (EA); and 3) actions which are categorically excluded.

As defined in the FAA's *Advisory Circular (AC) 150/5070-6A, Airport Master Plans*, "…actions categorically excluded are actions which have been found, in normal circumstances, to have no potential [individually or cumulatively] for significant environmental impact." Actions requiring an environmental assessment may or may not have significant environmental impacts but due to the unknown, further analysis is required. And lastly, actions with known significant impacts require an environmental impact statement. [iii]

Table 4-1 identifies the level of environmental processing, if any, required for the projects recommended within this airport master plan update.

Table 4-1: Proposed Development - Requirement of Further Environmental Processing

Airport Development Proposals/Airport Improvements	Actions Requiring An Environmental Impact Statement [2]	Actions Requiring an Environmental Assessment	Actions That Are Categorically Excluded
Rehabilitate based aircraft storage ramp	No	No	Yes [1]
Rehabilitate itinerant aircraft storage ramp	No	No	Yes [1]
Construct based aircraft storage hangars and rehabilitate or replace hangars 1, 2, and 3	Possibly (see note 2)	Possibly [3]	No
Expand itinerant aircraft storage ramp with concrete paving material to accommodate larger jet aircraft such as the occasional use by Boeing 727's	Possibly (see note 2)	Possibly [3]	No
Expand and redesign the existing automobile parking lot and entrance roadway located in front of the terminal building creating access from both Airport Road and Regional Drive	Possibly (see note 2)	Possibly [4]	Yes [1 & 4]
Create a turf parking lot for overflow automobile rental and fan parking	Possibly (see note 2)	Possibly [3]	No
Demolish and construct a new 9,000 square foot terminal facility in the location of the existing facility	No	No	Yes [1]
Install an additional 18,000 gallon Jet-A fuel tank during rehabilitation of the based or itinerant aircraft ramps	Possibly (see note 2)	Yes [5]	No
Rehabilitate Runway 17-35 and remove 25-foot shoulders (estimated date for rehabilitation – 2010)	No	No	Yes [1]
Determine ultimate Runway visibility minimums for Runway 35	No	No	Yes [1]
Extend Runway 17-35 by 1,000 feet on the 35 end and relocate the approach light system (the MALSR) and the glide slope antenna. Extend the parallel taxiway to meet the new runway end.	Possibly (see note 2)	Yes [6]	No [6]
Rehabilitate Runway 12-30	No	No	Yes [1]
Provide better marking, signage, lighting and overall maintenance at the intersections of Runway 17 and 12	No	No	Yes [1]
Acquire property or obtain easements within the RPZ for Runway 12, 17 and ultimately 35	Possibly (see note 2)	Possibly [7]	Yes [1 & 7]
Fill and re-seed the terrain within the runway shoulders, runway blast pads and runway safety areas of both runways	No	No	Yes [1]
Remove the small trees growing within the RSA, OFA and OFZ of both runways	No	No	Yes [1]
Fill and re-grade the terrain surrounding airfield sign bases and light bases	No	No	Yes [1]
Update mowing schedule within the RSA, OFA and OFZ for both runways	No	No	Yes [1 & 8]

Table 4-1 Continued

Airport Development Proposals/Airport Improvements	Actions Requiring An Environmental Impact Statement [2]	Actions Requiring an Environmental Assessment	Actions That Are Categorically Excluded
Rehabilitate Taxiway A (south section) and its four stub taxiways (estimated date for rehabilitation – 2005/2006). Rehabilitate Taxiway A, the north section (estimated date for rehabilitation – 2010)	No	No	Yes [1]
Fill and reseed the taxiway safety area to reestablish a more appropriately graded and suitable surface.	No	No	Yes [1]
Construct a full-length parallel taxiway to Runway 12-30 and install medium intensity taxiway lights (MITLs)	No	No	Yes [1]
Realign the stub taxiway, Taxiway A1	No	No	Yes [1]
Convert the closed runway, Runway 03-21, into a taxiway/ramp and rehabilitate the pavement	No	No	Yes [1]
Repaint runway, taxiway and ramp markings every three years.	No	No	Yes [1]
Paint an aiming point marker on Runway 17 to meet paint marking standards for the non-precision runway	No	No	Yes [1]
Paint side stripes at the intersection of Runway 12-30 and the old runway until this area is converted into a taxiway/ramp, which at such a time, runway hold markings should be painted	No	No	Yes [1]
Paint an ILS hold position marking on Taxiway A	No	No	Yes [1]
Repaint the VOR checkpoint/compass rose	No	No	Yes [1]
Remove all markings on the closed runway with the exception of the yellow "X" demoting that the runway is closed	No	No	Yes [1]
Use glass beads in yellow and white paint markings as indicated in *AC 150/5340-1J, Standards for Airport Marking*	No	No	Yes [1]
Install MITLs for Taxiway A, its four access taxiways and the proposed parallel taxiway to Runway 12-30	No	No	Yes [1]
Install taxiway centerline lighting or low cost retroreflective centerline markers at Taxiway A1	No	No	Yes [1]
Install supplemental windsocks at the approach ends of Runway 30 and 35.	No	No	Yes [1]
Reestablish the REILS for Runway 17 and install REILS at the approach end of Runway 12	No	No	Yes [1]
Replace Runway 35's VASI with the newer and more advanced PAPI system.	No	No	Yes [1]
Replace existing airport signs and install new as necessary per the established sign plan	No	No	Yes [1]

Table 4-1 Continued

Airport Development Proposals/Airport Improvements	Actions Requiring An Environmental Impact Statement [2]	Actions Requiring an Environmental Assessment	Actions That Are Categorically Excluded
Remove airport obstructions	No	No	Yes [1]
Install airport security/wildlife fencing	No	No	Yes [1]
Install a turf perimeter road	No	No	Yes [1]
Complete an SPCC Plan	N/A	N/A	N/A
Replace the 1965 Tractioneer snow blower with a new modern piece of equipment	No	No	Yes [1]

Notes:

1. As indicated in the *Airport Environmental Handbook*, *Order 5050.4A*, *Chapter 3*, *Environmental Action Choices*, *Paragraph 23*, *Categorical Exclusions*,[iv] the proposed development listed is categorically excluded and typically does not require an EA. However, according to *Environmental Impacts: Policies and Procedures*, *Order 5050.1E*,[v] " An action on the categorically excluded list is not automatically exempted from environmental review under NEPA. The responsible FAA official must determine if extraordinary circumstances exist (see text following this table) before deciding to categorically exclude a proposed action."
2. According to the *Airport Environmental Handbook*, *Order 5050.4A*, and based on the results of an EA, two action choices follow the completion of an EA. They are as follows: 1) the completion of an EIS, or 2) findings of no significant impact. If the EA identifies significant impacts associated with any of the airport development proposals, further environmental processing is required and an EIS must be completed. If significant impacts **were not** identified within the EA, a statement identifying a finding of no significant impact must be completed indicating that further environmental action is not required[vi]
3. Although not categorically excluded, the proposed development is intended to take place within designated development zones. According to the Conservation Management Agreement (see *Section 9.0 – Conservation Management Agreement*, of this chapter for further information), the development zones were created to allow for future airport development, while the conservation zones were created to allow for the protection of the Karner Blue Butterfly and its habitant (State and Federally listed endangered species). According to discussions with an FAA staff member,[vii] the airport should be allowed to develop within the designated development zones without completing an EA. However, he did caution that other impacts might exist that trigger the need for an EA. Therefore, prior to development, preliminary site surveys must be conducted to identify any potential impacts that affect the quality of the environment
4. Both automobile projects involve the construction of new parking lots and service roads to access the lots from both Airport Road and Regional Drive. Typically construction, relocation or repair of entrance and service roads is categorically excluded. However, if the installation adversely affects the capacity of public roadways, an EA is required. Traffic congestion that already exists along Airport Road may require an EA to determine the extent of capacity impacts.
5. According to *Environmental Impacts: Policies and Procedures*, *Order 5050.1E*, *Paragraph 310u*,[viii] " Repair or replacement of underground storage tanks (UST's) and aboveground storage tanks (AST's), or replacement of UST's with AST's at the same location" are categorically excluded. However, the installation of **new** tanks is not mentioned in the *Airport Environmental Handbook*, *Order 5050.4A*. Therefore, discussions with the responsible FAA official are required before installation to ensure compliance with NEPA regulations.
6. An EA is required for the establishment or relocation of an instrument landing system (ILS), which is proposed here. Typically runway extensions and taxiway construction are categorically excluded. However, major runway extensions, which results in a 1.5 decibel or greater increase in noise over any noise sensitive area located within the 65 DNL contour require an EA (see *Section 3.0 – Aircraft Noise and Compatible Land Use* of this chapter for further information).
7. The acquisition of the property located within the RPZ is to allow for airport control over the area so that it can be maintained and obstructions to air navigation removed. Typically the acquisition of property is categorically excluded for grading or obstruction removal and erosion control on off airport properties where no impacts exist. However, if the land in question has impacts that affect the quality of the environment, than an EA is required.
8. The routine mowing of grass within the RSA, OFA and OFZ at Concord Municipal Airport is in conflict with the Conservation Management Agreement, which is in place to protect endangered and/or threatened species, such as the Karner Blue Butterfly. Mowing of the grass impacts the habitat that the Karner Blue Butterfly thrives on. Discussions with an FAA staff member [vii] indicate that an EA is not necessary. However, coordination with the U.S. Fish and Wildlife Service and the New Hampshire Fish and Game is required when planning the airports mowing schedule.

The table above identifies projects that are categorically excluded as well as projects requiring further environmental action. Categorically excluded projects are typically exempt from further environmental review. However, *FAA Order 5050.1E, Environmental Impacts: Policies and Procedures*,[v] states that, "Some actions that would normally be categorically excluded could require additional environmental analysis to determine the appropriate NEPA documentation. A determination of whether a proposed action, that is normally categorically excluded, requires an EA or EIS depends on whether the proposed action involves extraordinary circumstances." Although not a complete list (see *FAA Order 5050.1E, Environmental Impacts: Policies and Procedures, Chapter 3, Paragraph 304* for a full list), the following identifies some of the extraordinary circumstances that would require the completion of an EA or EIS for normally categorically excluded projects:

- An action that has an adverse effect on cultural resources protected under the National Historic Preservation Act of 1966, as amended;
- An action that has an impact on natural, ecological (e.g., invasive species), or scenic resources of Federal, Tribal, State, or local significance (for example: Federally listed or proposed endangered, threatened, or candidate species or designated or proposed critical habitat under the Endangered Species Act), resources protected by the Fish and Wildlife Coordination Act; wetlands; floodplains; prime, unique, State or locally important farmlands; energy supply and natural resources; and wild and scenic rivers, including study or eligible river segments and solid waste management;
- An action that causes a division or disruption of an established community, or a disruption of orderly, planned development, or an inconsistency with plans or goals that have been adopted by the community in which the project is located;
- An action that causes an increase in congestion from surface transportation;
- An action that has an impact on noise levels of noise-sensitive areas

Due to the potential extraordinary circumstances that would require the completion of an EA or EIS for what would normally be categorically excluded projects and the FAA's request to identify all proposed projects and their potential cumulative impacts in one study, it is recommended that an EA be completed to include a review of all projects proposed within this airport master plan update. This will provide the responsible FAA official with the data necessary to determine what further environmental actions are required. Since the typical shelf life of an EA is three years, updates to that study will be required if there have been changes since completion of the original EA.

2.0 Environmental Conditions

The purpose of this section is to briefly review the airport's existing environmental conditions and identify potential environmental impacts associated with the proposed facility development recommendations. This section, although much more abbreviated than an EA, touches upon those items, which will be included in an environmental assessment at Concord Municipal Airport and include the:

- Aircraft noise and compatible land use;
- Social impacts;
- Air quality;
- Water quality and wetlands;
- Historic, archaeological, architectural, and cultural resources;
- Federally and State listed endangered species; and
- The Conservation Management Agreement

2.1 The Airport's Environmental Setting

The previous master plan for Concord Municipal Airport (the *March 1996 Concord Municipal Airport Master Plan Update*[ix]) identified the airport's environmental setting as follows:

> The Concord Municipal Airport is located in an area known as the Concord Heights, which can be topographically described as a plateau, which sits some 60 to 75 feet above the Merrimack and Soucook Rivers and their tributaries. The Airport is located in the Concord Pine Barrens, which is a 500-acre area characterized by pitch pine woodlands, scrub oak thickets and grass and heath (low growing shrubs) openings. This area is significant in that it is a rare community that once was in excess of 4,500 acres in size, but through development has been reduced by almost 90 percent in the last 100 years.

Although airport development has taken place since the completion of the 1996 master plan (see Table 1-4, *Chapter 1 – Inventory*), the City of Concord, the New Hampshire Department of Transportation (NHDOT), the United States Fish and Wildlife Service, the New Hampshire Fish and Game Department and the New Hampshire Army National Guard are aware of the airport's environmental setting and rare community and have identified conservation areas and development alternatives in an effort to protect the airport's natural resources.

The data collected to complete the following sections is derived from review of *FAA Order 5050.4A, Airport Environmental Handbook;* discussions with the FAA, the United States Department of the Interior - Fish and Wildlife Services; the New Hampshire Fish and Game Department; the New Hampshire Division of Historical Resources; airport tenants and users; and from previous reports and studies.

3.0 Aircraft Noise and Compatible Land Use

Noise from aircraft is one of the most controversial issues facing airports today. Aircraft noise is one of the most prominent indicators to the public that there is an airport operating locally. Even at general aviation airports such as Concord Municipal Airport, noise complaints are commonly the most prevalent commentary regarding airports from the general public.

Potential noise impacts at Concord Municipal Airport are evaluated using the latest version of the FAA's Integrated Noise Model (INM)[x]. Using runway geometry, forecast operations, typical flight tracks and aircraft types the program creates noise contours representing areas of noise impact around the airport. The noise contours are created using annual day-night average sound levels (DNL) for Concord Municipal Airport. The DNL represents average daily noise levels that occur over a 24-hour period, with a 10-decibel penalty added to the noise levels of aircraft operating between the hours of 10:00 pm and 7:00 am (the penalty is based on the premise that there is a greater sensitivity to noise events occurring at night, when it is generally quieter and most residents are either sleeping or relaxing). The contours identify which areas are likely to have noise concerns. Generally, those areas falling within the 65 DNL contour are considered to be subject to noise disturbance.

Federal Aviation Regulation (FAR) Part 150, *Airport Noise Compatibility Planning*,[xi] contains Federal standards on determining land use compatibility for given airport noise levels measured in terms of DNL thresholds. All land uses, which include: residential, public use, commercial use, manufacturing and production, and recreational, are deemed compatible with levels less than 65 DNL. Other land uses, such as industrial and commercial, are compatible with somewhat higher DNL levels. Using the 65 DNL contour allows the identification of noise sensitive communities within all compatible land uses. Therefore, this metric is used as the principal measure of noise impact for Concord Municipal Airport.

Chapter 5 – Airport Plans, Drawing 10 of 11, Land Use Plan/Area Zoning/Existing and Future Noise Contours, identify the existing 2004 and future 2023 65 DNL noise contours, for Runways 17-35 and 12-30. As indicated in the drawing, both the existing and future 65 DNL noise contours extend beyond airport property boundaries and into lands considered incompatible within the 65 DNL noise contour. The impact by land use type is outlined in **Table 4-2.**

Table 4-2: 65 DNL Noise Impact (2004 and 2023)

Land Use Impacted	2004 Acres Impacted	2023 Acres Impacted
Industrial District (IN)	11	11
Single Family Residential (RS) - Incompatible	0	3
Office Park Performance District (OFP)	8	9
Institutional District (IS) - Incompatible	2	13
Shoreland Protection (SP) District	0	2
Total Acres Impacted	**21**	**38**
Total Compatible Land Use [1]	**19**	**22**
Total Incompatible Land Use [2]	**2**	**16**

Source:
Concord Zoning ordinance[xii].
Notes:
1. Compatible land uses within the 65 DNL noise contour include the following: Industrial District (IN), Office Park Performance District (OFP) General Commercial District (CG) and Shoreland Protection (SP) District. Although the Institutional District (IS) includes land used for government services, which are considered compatible with noise levels above 65 DNL, the IS also accommodates educational, healthcare, and cultural facilities together with medical and professional offices and high density residential uses, which are not compatible and are therefore, included in the incompatible land use category.
2. Incompatible land uses within the 65 DNL noise contour include the following: Open Space Residential District (RO), Single Family Residential (RS) and Institutional District (IS).

As indicated in the table above, the future (2023) 65 DNL noise contour will impact approximately 14-acres of incompatible land as compared to 2-acres for the existing (2004) 65 DNL noise contour. **Because of the anticipated increase in the area of incompatible land use, noise will be a significant part of the EA for the airport development, especially the runway extension.**

Recommendations for dealing with the incompatible land uses around Concord Municipal Airport are described, below.

Two acres of Open Space Residential District (RO) will be impacted by the future 65 DNL contour. According to the City's zoning ordinance, RO land can accommodate single-family dwellings as well as cluster developments (incompatible uses), agricultural, forestry, and low-impact outdoor recreational uses (compatible uses). Currently, none of the incompatible land uses have occurred on the 2-acres. **Therefore, we recommended the City of Concord take appropriate action to reduce the probability of future incompatible development within this area of potential impact.**

The airport is surrounded on both the north and west boundary by highly developed Single Family Residential (RS) land. Although only a small amount of future impact is projected (1-acre), any additional residential development has the potential to present future land use conflicts with the airport. **Therefore, to the extent possible, we recommend the City of Concord undertake efforts to reduce the probability of the establishment of future residences in close proximity to the airport.**

Future development plans call for the airport to purchase property beyond the approach end of Runway 17 to obtain properties located beneath the runway protection zone (RPZ) for that runway. If purchased, the 1-acre of potential impact to residentially zoned land would be further reduced.

Approximately 11-acres of Institutional District (IS) land will be impacted by the future 65 DNL noise contour. As indicated in the table above, IS zoned land includes both compatible and incompatible land uses. IS land used for government services is compatible with noise levels above 65 DNL. However, IS land used for educational, healthcare, cultural, medical, professional offices and high-density residential uses are incompatible. The New Hampshire Army National Guard currently uses a majority of the 11-acres for government services; however, incompatible land uses adjacent to Airport Road exist. The incompatible IS zoned land located along Airport Road is ideal for future airport development opportunities. **We recommended the City purchase these properties for airport development and to keep them from incompatible development, at the first opportunity.**

4.0 Social Impacts

According to *FAA Order 5050.4A, Airport Environmental Handbook*, "The principal social impacts to be considered are those associated with relocation or other community disruption which may be caused by the proposal [proposed airport development]." The potential for social impacts from the following proposed developments will need to be assessed:

- Extension of Runway 17-35;
- Property acquisition to protect the land located beneath the runway protection zones for Runways 17, 35 and 12; and
- Obstruction removal

The proposed extension will place the 65 DNL noise contour over incompatible residential lands not currently impacted. Such impacts may require noise reduction through sound insulation but may also require the need to relocate residences, businesses or established communities in the long-term future. Likewise, property acquisition of the land located beneath the runway protection zones for Runways 17, 35 and 12 may also require the need to relocate established communities. Obstruction removal will most likely not require the relocation of residences, but may impact established communities if the removal of obstructions such as trees and terrain is required within their population. **Such potential impacts require further social impact analysis, within the framework of an environmental assessment, to determine if significant social impacts exist and whether any mitigation is required.**

5.0 Air Quality

Due to the damaging affects of air pollutants, Congress passed the Clean Air Act in 1970 and updated it in 1990. The Clean Air Act sets National Ambient Air Quality Standards (NAAQS) for specified criteria pollutants such as ozone, carbon monoxide, particulates, sulfur dioxide, nitrogen dioxide, and lead.

Examples of toxic air pollutants include benzene, which is found in gasoline and methylene chloride, which is used as a solvent and paint stripper. Sources of air pollutants include mobile sources such as cars, trucks, buses, and aircraft; stationary sources such as factories, refineries, and power plants; and indoor sources such as building materials and activities such as cleaning.[xiii]

Potential sources of emissions at airports include aircraft, ground support equipment, ground access vehicles, stationary sources, and construction activities.

A general aviation airport project that increases airport capacity must only be assessed for its impact on air quality, according to *FAA Order 5050.4A, Airport Environmental Handbook*, [xiv] if the level of airport activity exceeds 180,000 operations annually. As indicated in *Chapter 2 – Aviation Demand Forecasts*, annual airport activity projected for 2023 is 85,400, well below the threshold. **Therefore, no detailed air quality analysis is needed for Concord Municipal Airport.**

6.0 Water Quality and Wetlands

As indicated in *Section 2.0 – Environmental Conditions* of this chapter, Concord Municipal Airport is located in an area known as the Concord Heights, a plateau, which sits some 60 to 75 feet above the Merrimack and Soucook Rivers and their tributaries. There are no formally delineated wetlands within the boundaries of Concord Municipal Airport. The nearest water body, the Soucook River, serves as the airport's southeasterly boundary for a distance of approximately two miles. The Merrimack River is located west of the airport. The soils underlying Concord Municipal Airport are sandy so other than at the river's edge, there are no wet areas on the airport. All storm water temporarily trapped between runways and taxiways either is captured by catch basins or fairly quickly infiltrates back into the ground.

Storm water leaves Concord Municipal Airport both through closed drainage systems and by overland sheet flow. All of the water is either recharged to the sandy soils of the airport or flows to the Merrimack or Soucook Rivers. The latter joins the Merrimack River south of the airport.

Water quality standards, the control of discharges into surface and subsurface waters, the development of waste treatment management plans and practices, and the issuance of permits for discharges and for dredged or fill material were established under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977. To meet water quality standards the Environmental Protection Agency (EPA) requires owners of industrial facilities such as air transportation facilities to complete a Storm Water Pollution Prevention Plan (SWPPP), file a Notice of Intent (NOI) form and obtain storm water permits.

Storm Water Pollution Prevention Plans assure that run-off from a facility does not carry industrial pollutants into nearby Municipal Separate Storm Sewer Systems (MS4's) or any water bodies of the United States. The operator of the facility evaluates potential pollution sources at the site and selects/implements appropriate measures to prevent or control discharge of pollutants in storm water. A SWPPP is being completed concurrently with this master plan update.

In addition to the SWPPP, the airport is required to obtain permits that outline the proposed airport development and the design, mitigation measures, and construction controls necessary to demonstrate State water quality standards and any Federal, State, and local permit requirements can be met.[xv]

Therefore, completion of a drainage study and the acquisition of appropriate drainage and storm water permits are required for any project implementation at Concord Municipal Airport. As part of this process, *FAA Order 5050.4A, Airport Environmental Handbook*[xv] recommends early consultation between local, State, and Federal agencies charged with implementation of water quality regulations and issuance of permits.

7.0 Historic, Archaeological, Architectural, and Cultural Resources

The National Historic Preservation Act was established in 1966 to advise the President and Congress on historic issues; recommend measures to coordinate Federal historic preservation activities; and to

comment on Federal actions affecting properties included in or eligible for inclusion on the National Register of Historic Places.

The National Register of Historic Places is the United States' official list of cultural resources considered worthy of preservation. It is a part of a national program to bring together public and private efforts to identify, evaluate and protect historic and archaeological resources.

Properties, which are older than 50 years and are historically, architecturally, archaeologically, or culturally significant are eligible to be listed on the National Register.

State Historic Preservation Officers (SHPOs) administer the national historic preservation program at the State level. Therefore, the New Hampshire Division of Historical Resources was contacted to determine if there were any historically, architecturally, archaeologically, or culturally significant properties within the airport's boundaries or in an area of proposed development.

The New Hampshire Division of Historical Resources replied indicating that there are known archaeological resources located within, and in close proximity to, the proposed project area [airport].[xvi] The area is sensitive to Native American sites and historic sites. However, they indicated that additional information on the presence or absence of archaeological resources and standing structures must be collected before the division could make an informed comment on potential impacts. **We recommend that an on-airport archaeological survey, as suggested by the New Hampshire Division of Historical Resources, be conducted prior to implementation of any proposed development.** Their response letter is provided in **Appendix I**.

8.0 Federally and State Listed Endangered Species

The Endangered Species Act was passed by Congress in 1973[1] because of concerns that many flora and fauna species were at risk. According to the U.S. Environmental Protection Agency website, "The Endangered Species Act provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found."[xvii] The United States Department of the Interior – U.S. Fish and Wildlife Service retains a list of all endangered and threatened species.

The New Hampshire Legislature passed the Endangered Species Conservation Act in 1979 to protect, maintain and enhance wildlife species and their habitat normally occurring within the State, which may be in jeopardy of disappearance. The Legislature also passed the Native Plant Protection Act in 1987, which protects indigenous plant species. Several Federal and State agencies are responsible for the implementation of these acts and have policies in place that recognize the importance of natural resource conservation.

According to the United States Fish and Wildlife Service website, there are currently 10 species (seven animal and three plant species), listed under the Federal Endangered Species Act, as Endangered or Threatened within the State of New Hampshire.[xviii]

According to the New Hampshire Fish and Game Department, there are currently 36 species listed as Endangered or Threatened under New Hampshire's Endangered Species Conservation Act[xix] ten of which are also listed under the Federal Endangered Species Act. The two lists differ in that the Federal Endangered Species Act applies to species imperiled throughout the United States, while the New Hampshire Endangered Species Conservation Act applies to species imperiled in the State.

[1] Several amendments have taken place with the latest amendment adopted on November 24, 2003

Letters were sent to The United States Department of the Interior - Fish and Wildlife Service, the New Hampshire Department of Resources and Economic Development – Divisions of Forests and Lands, and the New Hampshire Fish and Game Department to verify the data obtained from the above listed websites and to determine if there were any Federal Endangered or Threatened species located within airport property boundaries. The letters sent to the above agencies are available for review in **Appendix J**.

The United States Department of the Interior - Fish and Wildlife Service replied, stating that, "Except for transient bald eagles (Haliaeetus leucocephalus), the only Federally-listed or proposed, threatened or endangered species under the jurisdiction of the United States Fish and Wildlife Service that is known to occur in the project area is the Karner Blue Butterfly (Lycaeides Melissa samuelis)".[xx] The response letter and report regarding this analysis is provided in **Appendix K**.

The New Hampshire Fish and Game Department replied via office email identifying seven species listed under the Federal Endangered Species Act and New Hampshire's Endangered Species Conservation Act, which have been identified or observed at Concord Municipal Airport (see **Table 4-3**).

Table 4-3: Federal and State Listed Endangered/Threatened Species Found at Concord Municipal Airport

Species	Status	Federal or State Endangered/Threatened	Remarks
Karner Blue Butterfly	Endangered	Federal and State	Present
Frosted Elfin Butterfly	Endangered	State	Present
Persius Duskywing Skipper Butterfly	Endangered	State	Present
Pine Barrens Zanclognatha Moth	Threatened	State	Present
Wild Lupine (*Lupinus perennis*)	Threatened	State	Present
Golden Heather (*Hudsonia ericoides*)	Threatened	State	Present
Blunt Leaved Milkweed	Threatened	State	Possibly present

Sources:
1. United States Department of the Interior - Fish and Wildlife Service[xx]
2. New Hampshire Fish and Game Department[xxi]

The New Hampshire Department of Resources and Economic Development – Divisions of Forests and Lands did not reply to our inquiries but Table 4-3 is regarded as a comprehensive list of species of concern.

We recommend surveys be conducted in the area of proposed development to identify either the presence of or lack of any State or Federal endangered or threatened species prior to development implementation.

9.0 Conservation Management Agreement

As indicated in *Section 2.1 - The Airport's Environmental Setting*, of this chapter, the airport is located in a rare community known as the Concord Pine Barrens, which is essential habitat for a handful of Federally and State Listed Endangered and Threatened species. In an effort to protect this rare community and the species, which thrive here, and to still allow the airport to develop necessary infrastructure, a Conservation Management Agreement between the City of Concord, NHDOT, the

United States Fish and Wildlife Service and the New Hampshire Fish and Game Department was created.

The Conservation Management Agreement was created for the purpose of managing airport lands that provide and enhance essential habitat for several Federally and State Listed Endangered and Threatened species such as the Karner Blue Butterfly and others listed in the table above.

According to the New Hampshire Fish and Game Department, the Karner Blue Butterfly lives and thrives in the Concord Pine Barrens habitat. The Pine Barrens habitat's sandy soil provides the ideal location for the growth of the wild lupine plant, which is the only food that the Karner Blue Caterpillar will eat.

Concord Municipal Airport happens to be one of the last remaining Pine Barren habitat areas in the eastern United States. Wild lupine plants have largely vanished due to the significant reduction in Pine Barren habitat. Thus, so have the number of Karner Blue Butterflies.

Based on this knowledge, the Conservation Management Agreement was executed and identifies areas on the airport that are considered conservation areas, or zones, which are to be protected from future airport development. The agreement also identifies airport development zones on which future airport development can occur.

One of the primary issues identified in the SWPPP is the need for erosion repair at the intersection of Runways 30 and 17. Upon completion, the development area would create additional habitat for the Karner Blue Butterfly, that perhaps could be used as offset to spur agreement by the New Hampshire Fish and Game Department to give up part of the originally agreed upon conservation land area along Airport Road. Adding the narrow strip of conservation land to the narrow strip of developable land will make the area viable for much needed revenue-producing development for the airport.

Chapter 5 – Airport Plans, depicts the location of the conservation and development zones. **This master plan recommends future airport development plans within this airport master plan update that make every effort to abide by the Conservation Management Agreement and the conservation/development zone areas.**

10.0 Environmental Evaluation Summary

In summary, an EA should be completed for all projects proposed within this airport master plan update with subsequent updates to the EA if time lapses or there have been plan changes since the original.

In response to incompatible land uses within the 65 DNL noise contour, the airport should make every effort to restrict the development of residential properties, or other incompatible land use, within the identified areas of potential impact and from those properties located within close proximity to the airport's property boundaries. Property acquisition is also recommended for properties located along Airport Road.

An airport drainage study should be completed for future airport development so that the necessary permits can be obtained to demonstrate that State water quality standards and any Federal, State, and local permit requirements can be met.

Surveys should be conducted prior to implementation of any proposed development project to determine if there are any historic, archaeological, architectural, cultural or State/Federal endangered or threatened species within the project area.

Endnotes

[i] Quilty, Stephen M., A.A.E., *American Association of Airport Executives, Accreditation Module, Environmental Regulations*, American Association of Airport Executives, Alexandria, Virginia, *Version 1a*, 1999, p. 3.

[ii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Environmental Handbook, Order 5050.4A*, U.S. Government Printing Office, Washington, DC, 1985, p. 9.

[iii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Master Plans, AC No. 150/5070-6A*, U.S. Government Printing Office, Washington, DC, June, 1985, p. 48.

[iv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Environmental Handbook, Order 5050.4A*, U.S. Government Printing Office, Washington, DC, 1985, pp. 11-16.

[v] U.S. Department of Transportation, Federal Aviation Administration, National Policy, *Environmental Impacts: Policies and Procedures, Order 5050.1E*, U.S. Government Printing Office, Washington, DC, June 8, 2004, p. 3-5.

[vi] U.S. Department of Transportation, Federal Aviation Administration, *Airport Environmental Handbook, Order 5050.4A*, U.S. Government Printing Office, Washington, DC, 1985, p. 10.

[vii] Silva, John. (Federal Aviation Administration, Office of Planning and Development, Manager of Environmental Programs). Telephone conversation. Thursday June 30, 2005.

[viii] U.S. Department of Transportation, Federal Aviation Administration, National Policy, *Environmental Impacts: Policies and Procedures, Order 5050.1E*, U.S. Government Printing Office, Washington, DC, June 8, 2004, p. 3-12.

[ix] Rist-Frost-Shumway Engineering, P.C. in collaboration with Greiner, Inc. and Applied Economic Research, *Concord Municipal Airport Master Plan Update*, Rist-Frost-Shumway Engineering, P.C., Laconia, New Hampshire, March, 1996.

[x] U.S. Department of Transportation, Federal Aviation Administration, Office of Environment and Energy (AEE-100), et al. (March 4, 2003). Integrated Noise Model (Version 6.1) [Computer software]. Washington, DC.

[xi] U.S. Department of Transportation, *Federal Aviation Regulation Part 150: Airport Noise Compatibility Planning*, Office of the Federal Register, National Archives and Records Administration, Washington, DC, June, 10, 2003.

[xii] City of Concord, *Zoning Ordinance of the City of Concord*, City of Concord Code Enforcement Office, Concord, Maine, November 29, 2001 and Revised August 29, 2003.

[xiii] United States Environmental Protection Agency, "Overview Pollutants and Programs," *Mobile Source Air Toxics*, July 6, 2005, < http://www.epa.gov/OMSWWW/toxics.htm > (July 6, 2005).

[xiv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Environmental Handbook, Order 5050.4A, Chapter 5 – Early Planning, Preparation of Environmental Assessments, State and Local Review, Public Hearings*, U.S. Government Printing Office, Washington, DC, 1985.

[xv] U.S. Department of Transportation, Federal Aviation Administration, *Airport Environmental Handbook, Order 5050.4A, Chapter 5 – Early Planning, Preparation of Environmental Assessments, State and Local Review, Public Hearings*, U.S. Government Printing Office, Washington, DC, 1985, p 35.

[xvi] Letter from Edna Feighner to Katie R. Servis, Hoyle, Tanner and Associates, Inc., 28 January, 2005, *New Hampshire Division of Historical Resources*, Concord NH.

[xvii] United States Environmental Protection Agency, "Finding Answers," *Endangered Species Act*, 2004, < http://www.epa.gov/region5/defs/html/esa.htm > (January 14, 2005).

[xviii] United States Department of the Interior, U.S. Fish and Wildlife Service, "Species Information – Threatened and Endangered Animals and Plants," *Threatened and Endangered Species System (TESS) – Listings by State and Territory as of 01/14/05, New Hampshire*, January 14, 2005, < http://ecos.fws.gov/tess_public/TESSWebpageUsaLists?usMap=1&status=listed&State=NH> (January 14, 2005).

[xix] New Hampshire Fish and Game Department, *Endangered and Threatened Wildlife of New Hampshire*, <http://www.wildlife.State.nh.us/Wildlife/Nongame/endangered_list.htm> (January 14, 2005).

[xx] Letter from Michael J. Amaral to Katie R. Servis, Hoyle, Tanner and Associates, Inc., 3 February, 2005, *United States Department of Interior, Fish and Wildlife Service, New England Field Office*, Concord NH.

[xxi] Goulet, Celine CGoulet@WILDLIFE.STATE.NH.US, "CMA Master Plan Table and Map," March 10, 2005, email/office communication (March 10, 2005).

Chapter Five: Airport Plans

1.0 General

The Airport Layout Plan (ALP) is a graphic presentation to scale of both the current airport facilities and the proposed airport development. The future development is the result of input from the Planning Advisory Committee (PAC) airport master plan update meeting process and the analysis completed in previous chapters.

The ALP set consists of drawings that illustrate detail required by the Federal Aviation Administration (FAA) in Advisory Circular (AC) *150/5070-6A, Airport Master Plans*[i] and *AC 150/5300-13, Airport Design.*[ii]

The ALP set includes the following drawings:

- Cover/Title Sheet 1 of 11
- Existing Airport Layout Plan (Existing ALP) 2 of 11
- Ultimate Airport Layout Plan (Ultimate ALP) 3 of 11
- Ultimate Airport Layout Plan Data Sheet 4 of 11
- Topographic Plan 5 of 11
- Terminal Area Plan 6 of 11
- Runway 17-35 Plan and Profile 7 of 11
- Runway 12-30 Plan and Profile 8 of 11
- Federal Aviation Regulation (FAR) Part 77 Airspace Surfaces 9 of 11
- Land Use Plan/Area Zoning/Future Noise Contours 10 of 11
- Airport Sign Plan 11 of 11

The airport plans provide the physical details of the 20-year development plan. The primary drawing is the Ultimate ALP, which is the overall development plan for the airport showing both the existing and ultimate facilities. The Federal Aviation Administration (FAA), the New Hampshire Department of Transportation – Division of Aeronautics (NHDOT), the City of Concord, Concord Aviation Services, and other airport tenants and users refer to the ALP set as a guide for future airport development.

The ALP must be approved by the FAA in order for Concord Municipal Airport to be eligible for Federal funding for airport development projects. Likewise, the plan must be approved by the NHDOT for the airport to receive State funding of eligible airport development projects.

Standard 22-inch by 34-inch sheets of the ALP drawings are available through the City of Concord, Concord Aviation Services, FAA and NHDOT. Reduced 11 by 17 inch copies of the plans are included at the end of this chapter (**Drawing Numbers 1 through 11**). A brief description of each drawing is provided in the following sections.

2.0 Cover/Title Sheet

Sheet one of eleven, the Cover/Title Sheet, lists the subsequent drawings within the ALP set. It also provides the reader with a map depicting the general location of the airport within the State of New Hampshire and the City of Concord.

3.0 Existing and Ultimate Airport Layout Plans (ALPs)

The Existing ALP, sheet two of eleven, is provided as both a reference document to identify existing facilities (including runways, taxiways, buildings and other structures) and a presentation document to identify a beginning point to this study.

The Ultimate ALP, sheet three of eleven, is a graphic depicting all of the existing facilities as well as the detail of the ultimate improvement for the 20-year development plan for Concord Municipal Airport, as identified in *Chapter 3 – Facility Requirements and Alternative Development*, and refined by the PAC meeting process. This allows the viewer the opportunity to visually identify all future development relative to the existing facilities.

4.0 Ultimate Airport Layout Plan (ALP) Data Sheet

The ALP Data Sheet, sheet four of eleven, provides a broad-spectrum of information about Concord Municipal Airport. Data included (keyed to the Ultimate ALP) consists of general airport data, approach slope data, property ownership data, and other key information regarding the airport.

5.0 Topographic Plan

To simplify the Ultimate ALP drawing and give a "cleaner" look to that drawing, no topographic contours were placed on the Existing and Ultimate ALPs. This Topographic Plan, sheet five of eleven, provides the topographic information obtained from the City's GIS files. The only details included with the topographic data are the airport boundary and the outlines of the runways, for reference purposes.

6.0 Terminal Area Plan

This plan, sheet six of eleven, depicts a detailed development plan for the operations area of the airport in the area of the terminal building and existing hangars. The drawing is a "blow-up" of the area from the Ultimate ALP.

7.0 Runway Plan and Profiles

The runway plans and profiles, sheets seven and eight of eleven, illustrate the runways (Runway 17-35 and Runway 12-30) and the approach areas immediately beyond the ends of the runways at Concord Municipal Airport. The runways are shown in profile with an exaggerated vertical scale to clearly depict any obstacles located within the existing and ultimate approaches to the runways and to depict runway elevation differences.

8.0 Federal Aviation Administration (FAR) Part 77 Airspace Surfaces

The FAA describes imaginary airspace surfaces on and around an airport in *Federal Aviation Regulations, Part 77, Obstructions Affecting Navigable Airspace.*[iii] These surfaces, when kept clear, protect aircraft from manmade and natural obstructions in the airspace around the airport. The FAR Part 77 Airspace Surfaces, sheet nine of eleven, depicts those imaginary airspace surfaces.

FAR Part 77 surfaces are utilized in zoning and land use planning adjacent to the airport to protect the navigable airspace from encroachment by hazards, which would potentially affect the safety of airport operations. The FAR Part 77 Airspace Surfaces plan depicts the physical features of the area around the airport, the Part 77 surfaces, and obstructions to the outer surfaces (close in obstructions are shown on the Plan and Profile drawings, sheets seven and eight.

9.0 Land Use Plan/Noise Contours

The Land Use Plan (Zoning) overlain with the Noise Contour Plan, sheet ten of eleven, depicts both the existing and ultimate on and off-airport land use as well as the ultimate 65 DNL noise contour.

10.0 Airport Sign Plan

This plan depicts an airside sign plan for the airport for all runways, taxiways and aprons.

Endnotes

[i] U.S. Department of Transportation, Federal Aviation Administration, *Airport Master Plans, AC No. 150/5070-6A*, U.S. Government Printing Office, Washington, DC, June 1985.

[ii] U.S. Department of Transportation, Federal Aviation Administration, *Airport Design, AC No. 150/5300-13, Change 8*, U.S. Government Printing Office, Washington, DC, September 30, 2004, Appendix 7. pp. 130 -138.

[iii] U.S. Department of Transportation, Federal Aviation Administration, *Federal Aviation Regulations, Part 77, Objects Affecting Navigable Airspace*, U.S. Government Printing Office, Washington, DC, March, 1993.

Chapter Six: Economic Impact Analysis, Capital Improvement Plan & Airport Operations and Finances

1.0 Economic Impact Analysis – General

An analysis of Concord Municipal Airport's impact and influence on the City of Concord's economy was conducted to provide an understanding of what the airport and its economic activities provide for the City.

2.0 Impact Analysis Methodology

The primary economic impact of any airport is the direct economic activity that occurs within airport businesses. For this study, this direct economic information was determined through base year 2004 survey information. A somewhat abbreviated approach was necessary due to lack of survey response from airport tenants.

In an effort to obtain the most accurate and best possible survey results, all respondents were assured that their information would only be presented in summary form and in a manner that would not allow any individual business to be identified. A copy of the survey distributed to all Concord Municipal Airport tenants is provided as **Appendix L**.

2.1 Regional Input-Output Modeling System (RIMS II)

A frequently used tool called the regional input-output modeling system (RIMS II), was used to calculate Concord Municipal Airport's economic impact. The Bureau of Economic Analysis, an agency of the Federal Department of Commerce, developed RIMS II. Multipliers identified by the modeling system specific to both the State of New Hampshire, as well as the transportation industry were used. The methodology is consistent with that advocated by the FAA.

3.0 Summary and Conclusion

The study methodology described above is an 'impact' approach rather than a 'transportation benefits' approach, which is considered conservative and guards against overstatement of economic impacts. Therefore, the study does not explore the efficiencies, productivity, or benefits associated with air travel. Rather, it measures the significance of the airport as an industry, in terms of the output, earnings, and employment it generates.

Table 6-1 identifies both the direct and total economic impact of Concord Municipal Airport on the City of Concord.

Table 6-1: Direct and Total Economic Impact of Concord Municipal Airport

	Direct Impact	Multiplier	Total Impact
Output			
Operating Expenditures	$1,565,000		
Payroll	$1,540,000		
Capital Improvements	$655,000		
Total	**$3,760,000**	**1.9228**	**$7,229,728**
Employment			
Number of Jobs	**45**	**37.1**	**1,670**

Source: HTA, City of Concord and U.S. Department of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis, Regional Multipliers.

While the study results detail the airport's economic impacts as an operating unit, the results do not indicate the airport's full benefit to its local economy. The results are considered an understatement for two primary reasons. First, not all of the surveys distributed were returned. Therefore, the calculations for this analysis were conservatively estimated from the limited data received. Secondly, the FAA methodology specifically does not attempt to measure the transportation benefits travelers receive from general aviation, which include increased schedule flexibility, time savings, convenience, efficiency, security and privacy. Although general aviation has historically provided most of these service values, they are intangible; there simply is not a recognized method to quantify their impact.

An essential impact of Concord Municipal Airport occurs through its gateway function for local businesses and travelers. The facilities that the airport provides are clearly advantageous. The airport is an investment in public transportation infrastructure, a part of the City's commitment to business enhancement that benefits the surrounding community.

4.0 Capital Improvement Plan & Airport Operations and Finances – General

A phasing plan and a financial plan are presented within this chapter to describe the steps required to reach the development discussed in *Chapter 3 - Facility Requirements and Alternative Development* and illustrated in *Chapter 5 - Airport Plans*. The phasing plan considers the demand-driven need for facilities according to *Chapter 2 – Aviation Demand Forecasts*, as well as the financial feasibility of construction as determined in this task. The financial plan evaluates the airport's resources and proposes financial actions and revenue improvements.

5.0 Capital Improvement Plan (CIP)

The CIP represents a phasing and cost estimate for implementing the airport improvements that emerged from the AMPU process. The CIP is divided into two phases: short-term (2005-2010), and long-term (2011-2023). The CIP must be viewed as a constantly evolving document. Planning for Concord Municipal Airport should remain flexible and should incorporate annually updated estimates of costs and priorities.

The CIP is structured in a manner that presents a logical sequence of improvements, while attempting to reflect available funding from State (NHDOT) and Federal (FAA) sources. Those airport

improvements, which are eligible for Airport Improvement Plan (AIP) funding, receive 95 percent funding from the FAA, 2.5 percent from NHDOT, and the remaining 2.5 percent from the local sponsor, the City of Concord. Projects ineligible for AIP funding must either be funded by the State, the City or by private entities, such as airport businesses or private developers.

The following depicts the proposed airport improvements for both the short-term phase, which is prioritized and presented by individual fiscal years, as well as the long-term phase of the CIP. The long-term phase depicts all other projects from which the City can select projects for implementation as the five-year CIP is accomplished and updated. **Table 6-2** and **Table 6-3** contain details for the short-term and the long-term phases of the CIP, respectively.

Table 6-2: Short-Term (2005-2010) CIP

	Airport Development Proposals/Airport Improvements	Federal Fiscal Year	Local (2.5%)	State (2.5%)	Federal (95%)	Construction Cost	Engineering and Contingency Cost (25%)	NHDES Cost	TOTAL PROJECT COST
1	Construct 2 based aircraft storage hangars (private - approximate price per hangar is $75,000)	2005	$0	$0	$0	$150,000	$37,500	$10,000	$197,500
2A	Repaint runway, taxiway and ramp markings every three years.	2005	$2,000	$2,000	$74,900	$78,800	$0	$0	$78,800
2B	Paint aiming point marker on Runway 17	2005	$300	$250	$9,500	$10,000	$0	$0	$10,000
2C	Paint side stripes at the intersection of Runway 12-30 and the old runway	2005	$25	$25	$1,000	$1,000	$0	$0	$1,000
2D	Paint ILS hold position marking on Taxiway A	2005	$25	$25	$1,000	$1,000	$0	$0	$1,000
2E	Repaint the VOR checkpoint/compass rose	2005	$50	$50	$1,900	$2,000	$0	$0	$2,000
3	Remove the small trees growing within the RSA, OFA and OFZ of both runways	2005	$300	$300	$9,500	$8,000	$2,000	$0	$10,000
4	Fill and re-grade the terrain surrounding airfield sign bases and light bases	2005	$100	$100	$3,800	$4,000	$0	$0	$4,000
	Subtotal	**2005**	**$2,800**	**$2,750**	**$101,600**	**$254,800**	**$39,500**	**$10,000**	**$304,300**
1	Complete an EA for all projects proposed within this airport master plan update (note that subsequent updates to the EA may be required if time lapses or there have been plan changes since the original). The EA should also include surveys of the proposed development areas to determine the presence/absence of any historic, archaeological, architectural, cultural or State/Federal endangered or threatened species.	2006	$6,300	$6,300	$237,500	$0	$0	$0	$250,000

Table 6-2: Short-Term CIP cont.

	Airport Development Proposals/Airport Improvements	Federal Fiscal Year	Local (2.5%)	State (2.5%)	Federal (95%)	Construction Cost	Engineering and Contingency Cost (25%)	NHDES Cost	TOTAL PROJECT COST
2	Provide better marking, signage, lighting and overall maintenance at the intersections of Runway 17 and 12	2006	$800	$800	$28,500	$24,000	$6,000	$0	$30,000
3	Acquire 2 properties within the RPZ for Runway 17 (10 properties to be purchased through 2010 @ $350,000/purchase, including appraisals, survey, acquisition, and relocation costs)	2006	$17,500	$17,500	$665,000	$700,000	$0	$0	$700,000
4A	Obtain easements within the RPZ for Runway 12	2006	$800	$800	$28,500	$30,000	$0	$0	$30,000
4B	Obtain easements within the RPZ for Runway 35	2006	$2,100	$2,100	$80,800	$85,000	$0	$0	$85,000
5A	Grade and re-seed the terrain within the runway shoulders, runway blast pads and runway safety areas of both runways	2006	$4,500	$4,500	$170,000	$143,100	$35,800	$0	$178,900
5B	Grade and reseed the taxiway safety area	2006	$5,800	$5,800	$221,700	$186,700	$46,700	$0	$233,400
6A	Rehabilitate and light south section of Taxiway A (and its four stub taxiways)	2006	$43,400	$43,400	$1,650,600	$1,390,000	$347,500	$0	$1,737,500
6B	Install MITLs for Taxiway A and its four access taxiways	2006	$11,400	$11,400	$433,700	$365,200	$91,300	$0	$456,500
6C	Install taxiway centerline lighting at Taxiway A1	2006	$900	$900	$34,000	$28,600	$7,200	$0	$35,800
7	Design for itinerant ramp expansion, Runway 12-30 parallel taxiway, and wildlife/security fencing	2006	$8,000	$8,000	$304,000	$0	$200,000	$120,000	$320,000
8	Drainage Study and SPCC Plan	2006	$1,300	$1,300	$47,500	$50,000	$0	$0	$50,000
9	Install airport security/wildlife fencing	2006	$5,900	$5,900	$223,250	$188,000	$47,000	$0	$235,000
	Subtotal	**2006**	**$108,700**	**$108,700**	**$4,125,050**	**$3,190,600**	**$781,500**	**$120,000**	**$4,342,100**

Table 6-2: Short-Term CIP cont.

	Airport Development Proposals/Airport Improvements	Federal Fiscal Year	Local (2.5%)	State (2.5%)	Federal (95%)	Construction Cost	Engineering and Contingency Cost (25%)	NHDES Cost	TOTAL PROJECT COST
1	Construct 2 based aircraft storage hangars (private - approximate price per hangar is $75,000)	2007	$0	$0	$0	$150,000	$37,500	$10,000	$197,500
2	Expand and light itinerant aircraft storage ramp with concrete paving material to accommodate larger jet aircraft (Boeing 727's)	2007	$40,000	$40,000	$1,520,000	$1,280,000	$320,000	$0	$1,600,000
3	Remove all markings on the closed runway with the exception of the yellow "X" denoting that the runway is closed	2007	$100	$100	$3,800	$4,000	$0	$0	$4,000
4	Construct a full-length parallel taxiway to Runway 12-30 and install medium intensity taxiway lights (MITLs). Phase I (located east of the closed runway)	2007	$11,300	$11,250	$427,500	$360,000	$90,000	$0	$450,000
5	Acquire 1 property within the RPZ for Runway 17 ($350,000/property - see note under item 3, 2006)	2007	$8,750	$8,750	$332,500	$350,000	$0	$0	$350,000
6	Remove airport obstructions Runway 12 (approximately 4 acres)	2007	$700	$700	$25,200	$21,200	$5,300	$0	$26,500
7	SWPPP Items: 1. Pipe and CB repair, and 2. TV, inspect, seal, and repair drainage lines and structures at ramp area	2007	$3,100	$3,100	$116,400	$98,000	$24,500	$0	$122,500
8	Purchase SRE Equipment	2007	$7,400	$7,400	$280,300	$0	$0	$0	$295,000
	Subtotal	**2007**	**$71,350**	**$71,300**	**$2,705,700**	**$2,263,200**	**$477,300**	**$10,000**	**$3,045,500**

Table 6-2: Short-Term CIP cont.

	Airport Development Proposals/Airport Improvements	Federal Fiscal Year	Local 2.5%	State 2.5%	Federal 95%	Construction Cost	Engineering and Contingency Cost (25%)	NHDES Cost	TOTAL PROJECT COST
1	Rehabilitate taxiway, old Runway 3-21	2008	$90,100	$90,100	$3,422,400	$2,850,000	$712,500	$40,000	$3,602,500
2	Acquire 2 properties within the RPZ for Runway 17 ($350,000/property - see note under item 3, 2006)	2008	$17,500	$17,500	$665,000	$700,000	$0	$0	$700,000
3	Repaint runway, taxiway and ramp markings every three years.	2008	$78,800	$0	$0	$78,800	$0	$0	$78,800
4	Remove airport obstructions Runway 30 (approximately 24 acres)	2008	$3,800	$3,800	$142,500	$121,200	$30,300	$0	$150,000
5	Install airport security/wildlife fencing	2008	$5,900	$5,900	$223,250	$188,000	$47,000	$0	$235,000
	Subtotal	**2008**	**$196,100**	**$117,300**	**$4,453,150**	**$3,938,000**	**$789,800**	**$40,000**	**$4,766,300**
1A	* Demolish and construct a new 9,000 square foot terminal facility in the location of the existing facility	2009	$1,452,000	$64,300	$1,053,700	$2,056,000	$514,000	$40,000	$2,570,000
1B	Expand and redesign the existing automobile parking lot and entrance roadway located in front of the terminal building	2009	$162,800	$0	$0	$122,200	$30,600	$10,000	$162,800
1C	Create a turf parking lot for overflow automobile rental and fan parking	2009	$157,800	$0	$0	$126,200	$31,600	$0	$157,800
2	Remove airport obstructions Runway 35 (approximately 38 acres)	2009	$6,000	$6,000	$228,000	$192,000	$48,000	$0	$240,000
3	Acquire 2 properties within the RPZ for Runway 17 ($350,000/property - see note under item 3, 2006)	2009	$17,500	$17,500	$665,000	$700,000	$0	$0	$700,000
	Subtotal	**2009**	**$1,796,100**	**$87,800**	**$1,946,700**	**$3,196,400**	**$624,200**	**$50,000**	**$3,830,600**

Table 6-2: Short-Term CIP cont.

	Airport Development Proposals/Airport Improvements	Federal Fiscal Year	Local 2.5%	State 2.5%	Federal 95%	Construction Cost	Engineering and Contingency Cost (25%)	NHDES Cost	TOTAL PROJECT COST
1	Construct 4 based aircraft storage hangars (private - approximate price per hangar is $75,000)	2010	$0	$0	$0	$300,000	$75,000	$10,000	$385,000
2A	Rehabilitate Runway 17-35 and remove 25-foot shoulders	2010	$150,000	$150,000	$5,700,000	$4,800,000	$1,200,000	$0	$6,000,000
2B	Rehabilitate Taxiway A, the north section	2010	$20,300	$20,300	$771,900	$650,000	$162,500	$0	$812,500
2C	Redesign the stub taxiway, Taxiway A1, to include an aircraft engine run-up area and to allow for better access/egress by larger jet aircraft.	2010	$5,900	$5,900	$222,700	$155,500	$38,900	$40,000	$234,400
3	Replace Runway 35's VASI with the newer and more advanced PAPI system	2010	$0	$0	$20,000	$16,000	$4,000	$0	$20,000
4	SWPPP Item: Erosion repair at 30/17 intersection	2010	$43,200	$43,200	$1,640,600	$1,381,500	$345,400	$0	$1,726,900
5	Acquire 2 properties within the RPZ for Runway 17 ($350,000/property - see note under item 3, 2006)	2010	$17,500	$17,500	$665,000	$700,000	$0	$0	$700,000
6	Replace existing airport signs and install new as necessary per the established sign plan	2010	$2,500	$2,500	$95,000	$80,000	$20,000	$0	$100,000
	Subtotal	**2010**	**$239,400**	**$239,400**	**$9,115,200**	**$8,083,000**	**$1,845,800**	**$50,000**	**$9,978,800**
	Short-Term Total	**2006 - 2010**	**$2,411,650**	**$624,500**	**$22,345,800**	**$20,671,200**	**$4,518,600**	**$270,000**	**$25,963,300**

Table 6-3: Long-Term (2011-2023) CIP

	Airport Development Proposals/Airport Improvements	Local (2.5%)	State (2.5%)	Federal (95%)	Construction Cost	Engineering and Contingency Cost (25%)	NHDES Site Specific Permit Estimated Cost	TOTAL PROJECT COST
1A	Extend Runway 17-35 by 1,000 feet on the 35 end and relocate the approach light system (the MALSR) and the glide slope antenna. Extend the parallel taxiway to meet the new runway end.	$52,600	$52,600	$1,997,900	$1,650,500	$412,600	$40,000	$2,103,100
1B	Rehabilitate based aircraft storage ramp	$23,100	$23,100	$878,700	$739,900	$185,000	$0	$924,900
1C	Rehabilitate itinerant aircraft storage ramp	$21,000	$21,000	$796,600	$670,800	$167,700	$0	$838,500
2	Install an additional 18,000 gallon Jet-A fuel tank during rehab of ramp(s)	$38,000	$0	$0	$28,000	$0	$10,000	$38,000
3	Repaint runway, taxiway and ramp markings every three years (2011, 2014, 2017, 2020, etc.)	$78,800	$0	$0	$78,800	$0	$0	$78,800
4	Construct 4 based aircraft storage hangars (private - approximate price per hangar is $75,000)	$0	$0	$0	$300,000	$75,000	$10,000	$385,000
5	Replace Hangars 1, 2 and 3	$4,116,300	$0	$0	$3,293,000	$823,300	$0	$4,116,300
6	Rehabilitate Runway 12-30 (estimated date for rehab – 2022)	$25,000	$25,000	$950,000	$800,000	$200,000	$0	$1,000,000
7	Construct a full-length parallel taxiway to Runway 12-30 and install medium intensity taxiway lights (MITLs). Phase II (located west of the closed runway)	$9,500	$9,500	$361,100	$304,100	$76,000	$0	$380,100
8	Install supplemental windsocks at the approach ends of Runway 30 and 35 (lighted, non- lighted windcones are estimated to cost $6,000 each)	$800	$800	$28,500	$24,000	$6,000	$0	$30,000
9	Reestablish the REILS for Runway 17 and install REILS at the approach end of Runway 12	$0	$0	$35,000	$28,000	$7,000	$0	$35,000
	Long-Term Total	**$4,365,100**	**$132,000**	**$5,047,800**	**$7,917,100**	**$1,952,600**	**$60,000**	**$9,929,700**

The majority of projects identified in Concord Municipal Airport's CIP are scheduled during the short-term phase of development (2005-2010). These developments relate primarily to airfield safety issues, meeting FAA specified design criteria, as well as capacity enhancement to meet existing and forecast demand.

6.0 Financial/Management Plan

This section deals with the financial and management structure of Concord Municipal Airport. It reviews the airport management structure, the existing leases, revenue sources, and airport operating expenses and makes recommendations for improvement where necessary.

6.1 Management

The airport's management structure is described in detail in section 3.0 of *Chapter 1 – Inventory* of this report. That section details ten "bullet points" describing management entities with some involvement in the operation of the airport. Such a diffuse management structure fails to achieve a point of focus within the City for airport issues. No one person responds to airport issues and advocates only for the airport. Everyone in the management structure described in Chapter 1 has other responsibilities and duties that, understandably, distract them from both the day-to-day operation of, and the long-term planning for the airport. Even the City's web site requires "drilling down" several levels before a reader can even determine there is an airport within the City (from Community Development to Business Development to Economy to Airport Facilities). We strongly recommend the City create the office of full-time "Airport Manager" as part of the City's management team. From the perspective of what would work best for the airport, the position would be most effective reporting directly to the City Manager. But more important than the reporting point is the creation of the position to provide the focus that is currently missing.

The Airport Manager position would be responsible for negotiating leases with tenants, overseeing planning and design projects for capital development, coordinating with and advocating for NHDOT-Aeronautics and FAA funding, insuring FAA criteria and operating regulations are upheld, meeting with airport neighbors to address their concerns, preparing annual operating and capital budgets, coordinating field maintenance efforts by other departments or private contractors and generally dealing with the myriad details involved in operating and maintaining an airport. Currently, all these functions are spread throughout the City's management structure, making decision-making and airport advocacy difficult to accomplish.

An Airport Manager for an airport the size and operational profile of Concord Municipal Airport should be obtainable for $55,000 to $70,000 in annual salary, depending on experience. Any candidate to be considered by the City should either hold or be able to achieve Accredited Airport Executive (A.A.E.) status from the American Association of Airport Executives, a national airport management group. The A.A.E. designation is obtained through a rigorous process of a written exam, research paper and oral interview by senior airport managers, thereby assuring the City that any candidate with the accreditation, or in the process, is an airport management professional.

6.2 Leases

Typically, airport leases should provide for revenue generation from several different and separately recognized sources. A lease which only calls for a lump sum payment from the lessee does not clearly identify what the lessee is paying for and makes it more difficult to alter the lease if the lessee's conditions change in such a way as would warrant an adjustment in the lease terms. The following six major revenue components should be identifiable in an airport lease, as applicable:

Land Rent: Land is an airport's major resource and the airport should be compensated for its use. Airport land should be leased, not sold, and at rates comparable to commercial and industrial rates.

Facility Rent: The airport should be adequately compensated by users who rent or lease space in airport-owned facilities, e.g. terminal buildings, hangars, aprons, etc.

Gross Receipts Fee (GRF): This fee is based on the fact that the airport's existence creates the market on which a commercial operator depends. The airport should be compensated for the expense of maintaining the airport and creating that market opportunity. However, due to the difficulty of determining a commercial operator's gross, the GRF can be challenging to administer.

Access Fees: There are instances when the owner of a public airport permits access to the public landing area by independent operators offering an aeronautical activity or by aircraft based on land adjacent to, but not a part of, the airport property. This type of arrangement is commonly called a through-the-fence operation. Through-the-fence operations include businesses or individuals that have access to the airport infrastructure from outside airport property, or that utilize airport property to conduct a business but do not rent land or facilities from the airport sponsor/owner. More common types of through-the-fence agreements are for free-lance flight instruction, aircraft maintenance, and aircraft hangars. Typically, through-the-fence operations are discouraged, as they tend to dilute the market available to on-airport tenants. No through-the-fence operations are anticipated at Concord Municipal Airport. However, where they are unavoidable, the City should charge an access fee to the individual or operator for the expense of maintaining the airport and providing that access opportunity.

Fuel Flowage Fee: The fuel flowage fee is a predetermined charge owed to the airport for each gallon of fuel purchased by the users of the airport.

Service Fees: These are charges to direct users of the airport. Typical examples are fees assessed to transient aircraft for apron parking and landing fees. The latter are negatively regarded by most airport users and are very difficult to collect at an airport without an air traffic control tower, such as Concord Municipal Airport. A reasonable compromise is to assess a landing fee only on turbine aircraft as a class. Such fees are typically collected by the FBO on a revenue sharing basis with the City. Apron parking fees should be collected by FBO's for aircraft parked within their leased premises, the revenue from which is reflected in the City's GRF fee (see above). Any City-owned aprons should have a parking fee structure with the revenue going directly to the City.

Table 6-4 summarizes the primary provisions of the current lease agreements in place at Concord Municipal Airport and the revenues generated by them for 2004. These revenues are separate from the fuel flowage fee collected by the airport.

Table 6-4: Current Lease Agreements and Revenues

Lessee	Lease Dates and Terms	Premises Leased	Payments (2004)
NH National Guard (NHARNG)	50-Year Lease, Expires 2052	26 Acres	$167,375.00
NH Civil Air Patrol (NHCAP)	30-Year Lease, Expires March 29, 2006	1.3 Acres	$500.00
Concord Aviation Services FBO	5-Year Lease, Expires June 30, 2009	4 Hangars, Tie-downs, and Fuel Pumps	$113,864.00[1]
Concord Aviation Services Terminal	5-Year Renewable Until 2014, Expires 2014	1,600 SF	$7,744.00
C & M Management Corporation	20-Year Lease, Expires May, 2012	40,000 SF and 11 T-hangars	$3,866.00
Federal Aviation Administration	1-Year Renewable Until 2012, Expires 2012	1,030 SF	$3,840.00
NOAA Terminal Lease	5-Year Lease, Expires 2008	366 SF	$2,630.00
NOAA Land Lease	1-Year Renewable Until 2008, Expires 2008	5,000 SF	$3,378.00
NH Department of Safety - State Police Hangar	15-Year Renewable Until 2012,	.56 Acres and 8,000 SF Hangar	$12,469.00

Source: City of Concord
Note: 1. Payment includes FBO's fuel flowage fee and annual fuel sales based Revenue Share.

The City has generally done an excellent job in establishing leases that fairly compensate the City for the cost of operating the airport and identifying the elements described above. A notable recent lease, with the New Hampshire Army Reserve National Guard for their new hangar/apron/auto-parking complex has made a major contribution to the airport's financial viability. Not withstanding other recent leases such as the 25-year East Coast Hangar land lease for t-hangars.

Table 6-5 shows the last five years of the airport's revenues, expenses and required subsidy from the City's General Fund. Those subsidies were ended in 2003, as the new Army Guard lease revenue became a part of the finances, providing the ability of the airport to generate a modest budget surplus.

Table 6-5: Subsidy History

	2000	2001	2002	2003	2004
Revenue	$116,097	$114,755	$196,535	$273,433	$308,007
Expenditures	$197,547	$203,086	$228,810	$320,521	$239,386
Net	($81,450)	($88,331)	($32,275)	($47,088)	$68,621
General Fund Subsidy	$123,860	$136,329	$112,179	0	0

Source: City of Concord Airport Budget Reports.

Per Federal regulations, any revenues generated from airport land and facilities must remain in an airport's account to be used to offset any airport expenses. The City of Concord has a dedicated airport fund, into and from which airport revenues and expenses are deposited and withdrawn. This accounting

practice ensures the airport's revenues are specifically used for airport improvement purposes and also allows greater accuracy when tracking the airport's finances.

The City should continue to seek ways to improve the revenue-generating capability of the airport leases as was done with the Army Guard lease. Revenue surpluses will be required to offset the local share of the ambitious CIP described at the outset of this chapter. Additionally, funding will be required to put the full-time airport manager in place as recommended by this report. However, an experienced, focused airport manager should actually help to make revenues keep pace and control costs, materially assisting the implementation of this master plan.

Appendix A: Aircraft Storage (Based Aircraft) Future Requirements/Alternative Development

Aircraft Storage (Based Aircraft) Future Requirements/Alternative Development

The following identifies future based aircraft storage requirements for Concord Municipal Airport and alternative development options to accommodate those future needs. The data below was presented to the planning advisory committee at the October 7, 2004 airport master plan update workshop meeting. The preferred development alternative is identified in *Chapter 3 – Facility Requirements and Alternative Development* of this airport master plan update report.

Future Requirements/Alternative Development

It is projected that 52 aircraft storage spaces are needed by 2023 (49 small single engine and light multi-engine aircraft and 3 jet aircraft).

Areas on the airport available for future aircraft storage facilities are limited to development zones 1, 3, 4 and possibly a small area within zones 6 and 8.

The following identifies the existing conditions and/or some of the issues associated within the listed development zones:

DZ1	Cannot construct in southwest half of DZ-1 due to imaginary surfaces for Runways 12-30 (500-foot primary surface) and 17-35 (1,000-foot primary surface). However, the northeastern portion is available.
DZ2	The land is available but access from DZ-2 for aircraft operations requires constructing a taxiway through conservation land. Some other use may be more appropriate.
DZ 3	All land available for future aircraft storage
DZ4	All land available for future aircraft storage
DZ5	No longer airport property
DZ6	The majority of this area is for future runway expansion. For the most part, the only area available for aircraft storage is closest to Airport Road (safety areas and safety zones occupy the remainder of the development zone). There may be room for tie-downs and/or hangars (depending on the height of the hangar). Only obstacle is that it may require constructing a taxiway through conservation land
DZ7	A majority of DZ-7 lies within the imaginary surfaces for Runways 12-30 and 17-35. A small potion may be available for future aircraft storage such as tie-downs
DZ8	Land available for perhaps tie-downs but access from DZ8 may require constructing a taxiway through conservation land

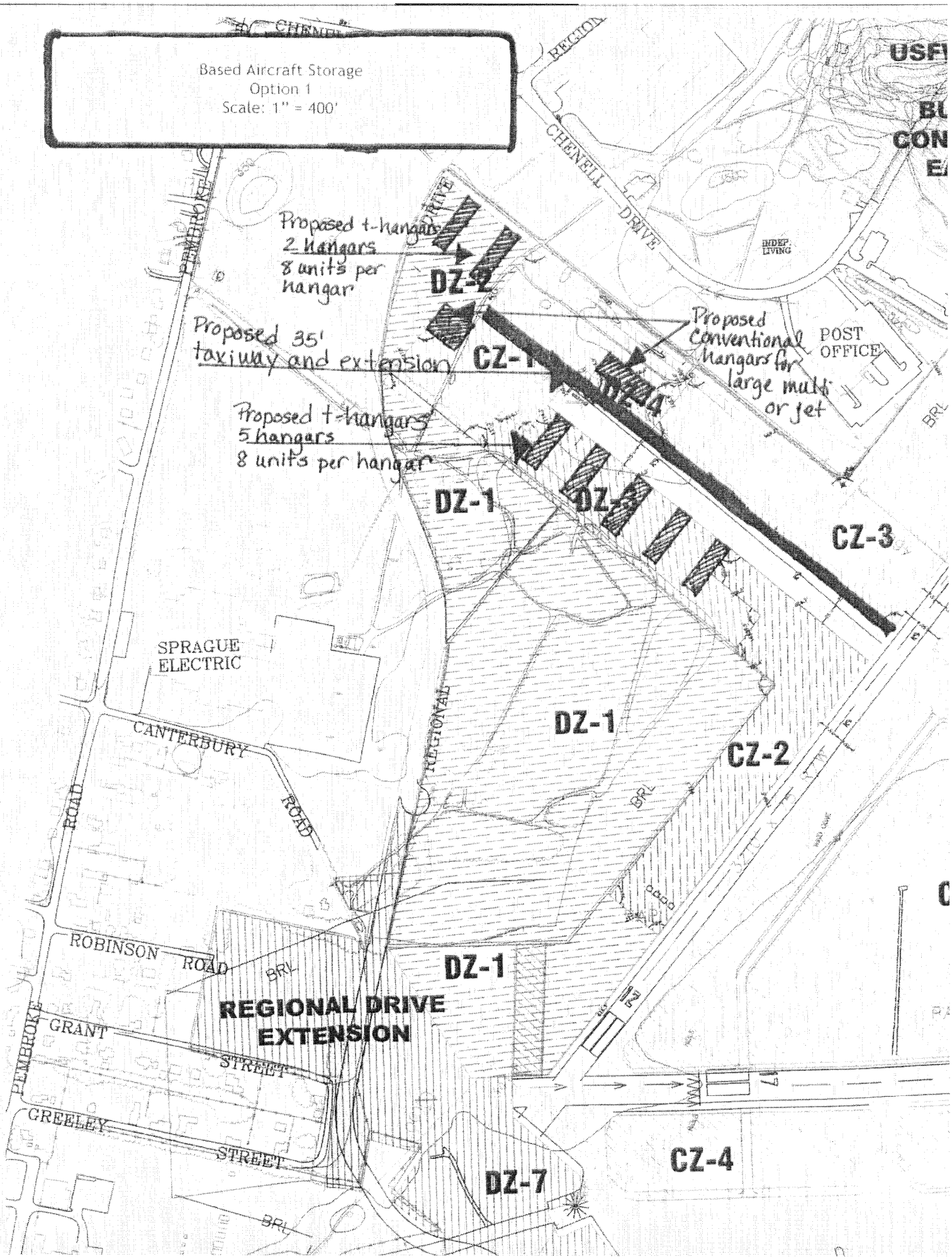
The following options were presented (also see the figures located at the end of this document, which depicts each alternative option).

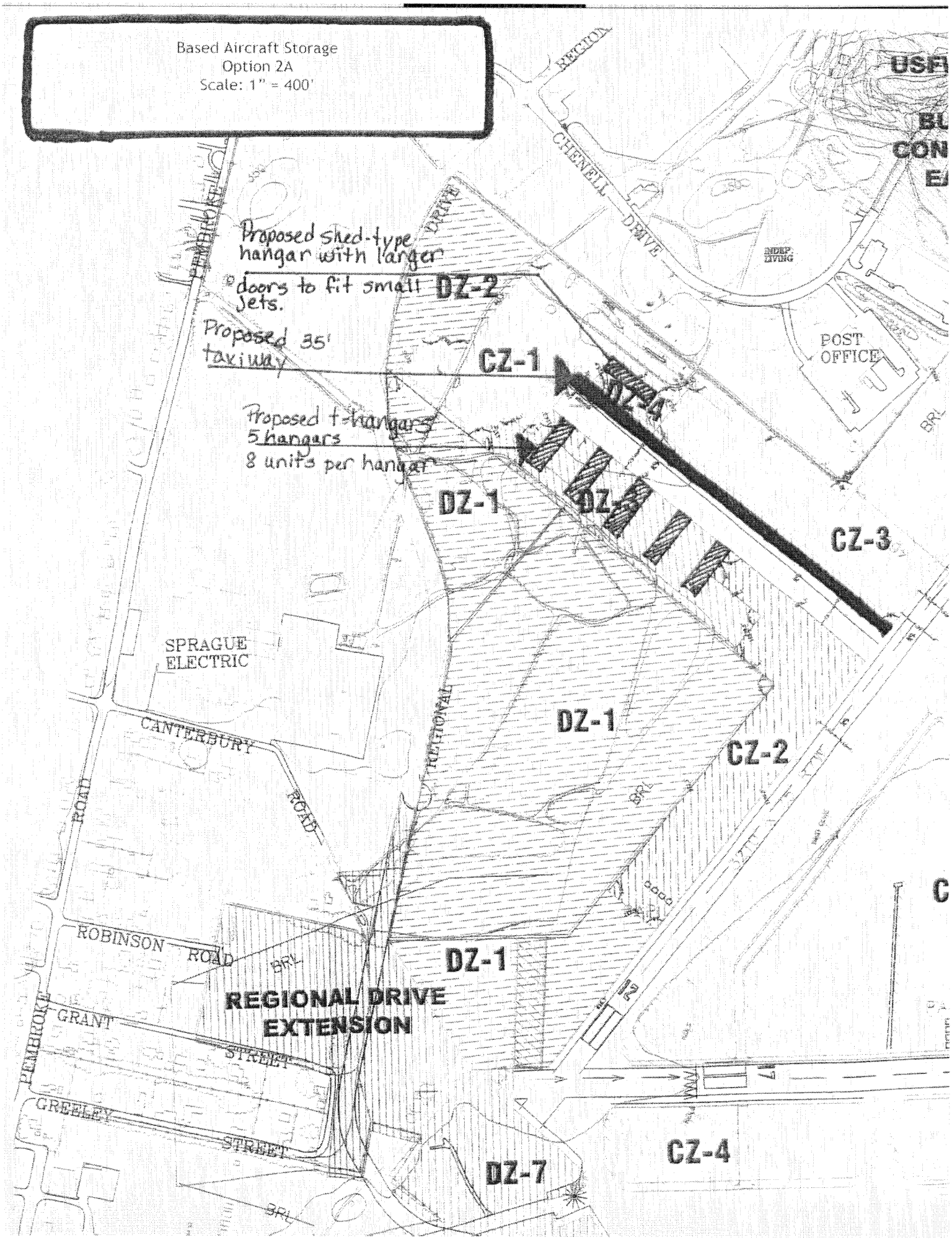
Option 1 – Use all available space within DZ-2, DZ-3 and DZ-4. Construct a taxiway through conservation land to access DZ-2. The pros and cons of this option are listed below, while a graphic representation of this option is attached (see Option 1).

Option 1 Pros	Option 1 Cons
Utilizes all available space within DZ-2, DZ-3 and DZ-4	Impacts conservation zone (CZ-1). Taxiway construction would be required through the existing CZ-1
DZ-2, DZ-3 and DZ-4 have easy access to utilities and access roads	
DZ-2, DZ-3 and DZ-4 are in close proximity to industrial use land rather than residential use land. DZ-6 and DZ-8 are closer to residential use land	
Future development in DZ-2, DZ-3 and DZ-4 meets projected demand	

Option 2 - Use all available space within DZ-3 and DZ-4 and develop the area within DZ-6 and DZ-8 closest to Airport Road for tie-downs and 1 hangar. The pros and cons of this option are listed below, while a graphic representation of this option is attached (see Option 2A and 2B).

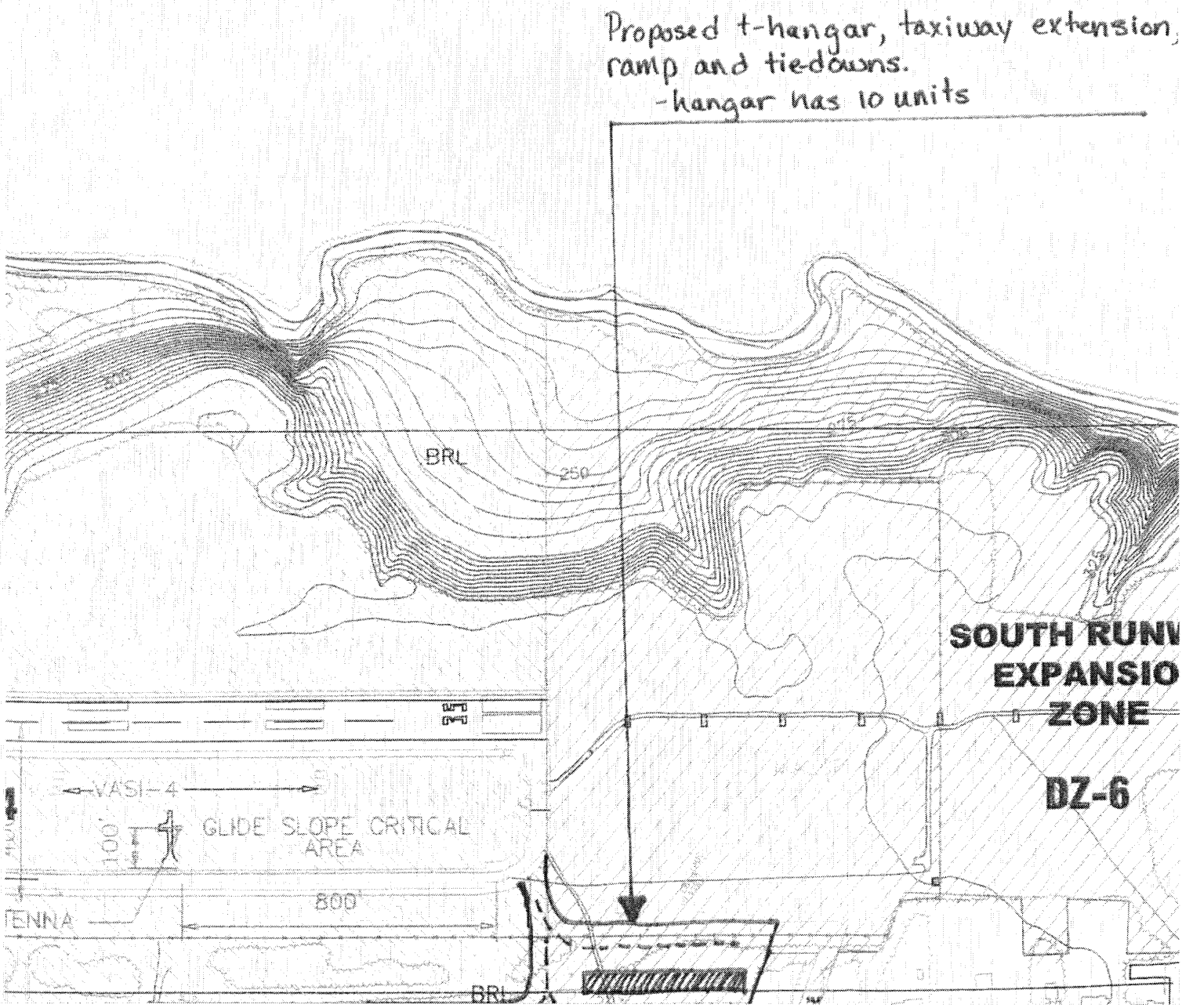
Option 2 Pros	Option 2 Cons
Utilizes all available space within both DZ-3 and DZ-4	May impact conservation land to extend taxiway from DZ-6 or DZ-8
DZ-3, DZ-4, DZ-6 and DZ-8 have easy access to utilities and access roads	A majority of the development is in close proximity to industrial use land. However, DZ-6 and DZ-8 are closer to residential land
Future development in DZ-3, DZ-4, DZ-6 and DZ-8 meets projected demand	


Based Aircraft Storage
Option 1
Scale: 1" = 400'
CHENEL DRIVE
REGIONAL
USF
BU
CON
EA
INDEP. LIVING
PEMBROKE
Proposed t-hangars
2 hangars
8 units per hangar
DZ-2
Proposed 35' taxiway and extension
CZ-1
Proposed conventional hangars for large multi or jet
POST OFFICE
Proposed t-hangars
5 hangars
8 units per hangar
DZ-1
DZ-
CZ-3
SPRAGUE ELECTRIC
CANTERBURY ROAD
REGIONAL
DZ-1
CZ-2
BRL
ROBINSON ROAD
DZ-1
REGIONAL DRIVE EXTENSION
GRANT STREET
GREELEY STREET
CZ-4
DZ-7


Based Aircraft Storage
Option 2A
Scale: 1" = 400'
Proposed shed-type hangar with larger doors to fit small jets.
Proposed 35' taxiway
Proposed t-hangars
5 hangars
8 units per hangar
DZ-2
CZ-1
DZ-1
DZ-1
CZ-3
DZ-1
CZ-2
DZ-1
DZ-7
CZ-4
REGIONAL DRIVE EXTENSION
CHENELL DRIVE
POST OFFICE
SPRAGUE ELECTRIC
CANTERBURY ROAD
ROBINSON ROAD
GRANT STREET
GREELEY STREET
PEMBROKE ROAD
BRL

Based Aircraft Storage
Option 2B
Scale: 1" = 400'

Proposed t-hangar, taxiway extension, ramp and tie-downs.
-hangar has 10 units



Appendix B: Aircraft Storage (Itinerant Aircraft) Future Requirements/Alternative Development

Aircraft Storage (Itinerant Aircraft) Future Requirements/Alternative Development

The following identifies future itinerant aircraft storage requirements for Concord Municipal Airport and alternative development options to accommodate those future needs. The data below was presented to the planning advisory committee at the October 7, 2004 airport master plan update workshop meeting. The preferred development alternative is identified in *Chapter 3 – Facility Requirements and Alternative Development* of this airport master plan update report.

Future Requirements/Alternative Development

It is projected that 25 itinerant aircraft storage spaces are needed by 2023. The future needs are based on peak activity and may be considered as temporary storage spaces.

The following options were presented (also see the figures located at the end of this document, which depicts each alternative option).

Option 1 – Use **all** of the existing based aircraft space on existing based aircraft ramp for itinerant aircraft. Construct a new based aircraft ramp within conservation zone (CZ) 4 to accommodate misplaced based aircraft. Construct a new itinerant aircraft ramp within development zone (DZ) 7 with enough area to allow for the parking of two 727's. The pros and cons of this option are listed below, while a graphic representation of this option is attached (see Figures 1 and 2).

Option 1 Pros	Option 1 Cons
Utilizes existing space that is in close proximity to other aviation facilities for itinerant aircraft. Based aircraft do not need to be in close proximity to such facilities.	Impacts conservation zone (CZ-4)
	Requires relocation/movement of based aircraft tenants

Option 2 – Use **a portion** of the existing based aircraft space on existing based aircraft ramp for itinerant aircraft. Construct a new (but smaller than option 1) based aircraft ramp within CZ-4 and a temporary storage ramp on the closed runway to accommodate misplaced based aircraft. Construct a new itinerant aircraft ramp within DZ-7 with enough area to allow for the parking of two 727's (see Figure 2). The pros and cons of this option are listed below, while a graphic representation of this option is attached (see Figure 3).

Option 2 Pros	Option 2 Cons
Utilizes **a portion of, but not all of** the existing based aircraft space that is in close proximity to other aviation facilities for itinerant aircraft. Based aircraft do not need to be in close proximity to such facilities.	Impacts conservation zone (CZ-4)
	Requires relocation/movement **of some, but not all,** based aircraft tenants
	Requires temporary relocation/movement **of some, but not all,** based aircraft tenants to the closed runway/ramp
	Requires escorts from airport personnel to individual aircraft on closed runway

Option 3 – Use **all** of the existing based aircraft space on the existing based aircraft ramp for itinerant aircraft on a **temporary basis**, i.e. during peak activity only. Temporarily relocate/move based aircraft to the closed runway. Construct a new itinerant aircraft ramp within DZ-7 with enough area to allow for the parking of two 727's (see Figure 2). The pros and cons of this option are listed below, while a graphic representation of this option is attached (see Figure 4).

Option 3 Pros	Option 3 Cons
Utilizes existing space that is in close proximity to other aviation facilities for itinerant aircraft on a temporary basis (assumes that after peak activity, based aircraft will move back to existing location). Based aircraft do not need to be in close proximity to such facilities.	Requires temporary relocation/movement of based aircraft tenants to the closed runway/ramp
Does not impact conservation zones	Requires escorts from airport personnel to individual based aircraft on closed runway during peak activity (allows for more of a potential for runway incursions)

Option 4 – Uses any variation of the options above and identifies a different layout for the 727's to allow for additional itinerant parking (see Figure 5).

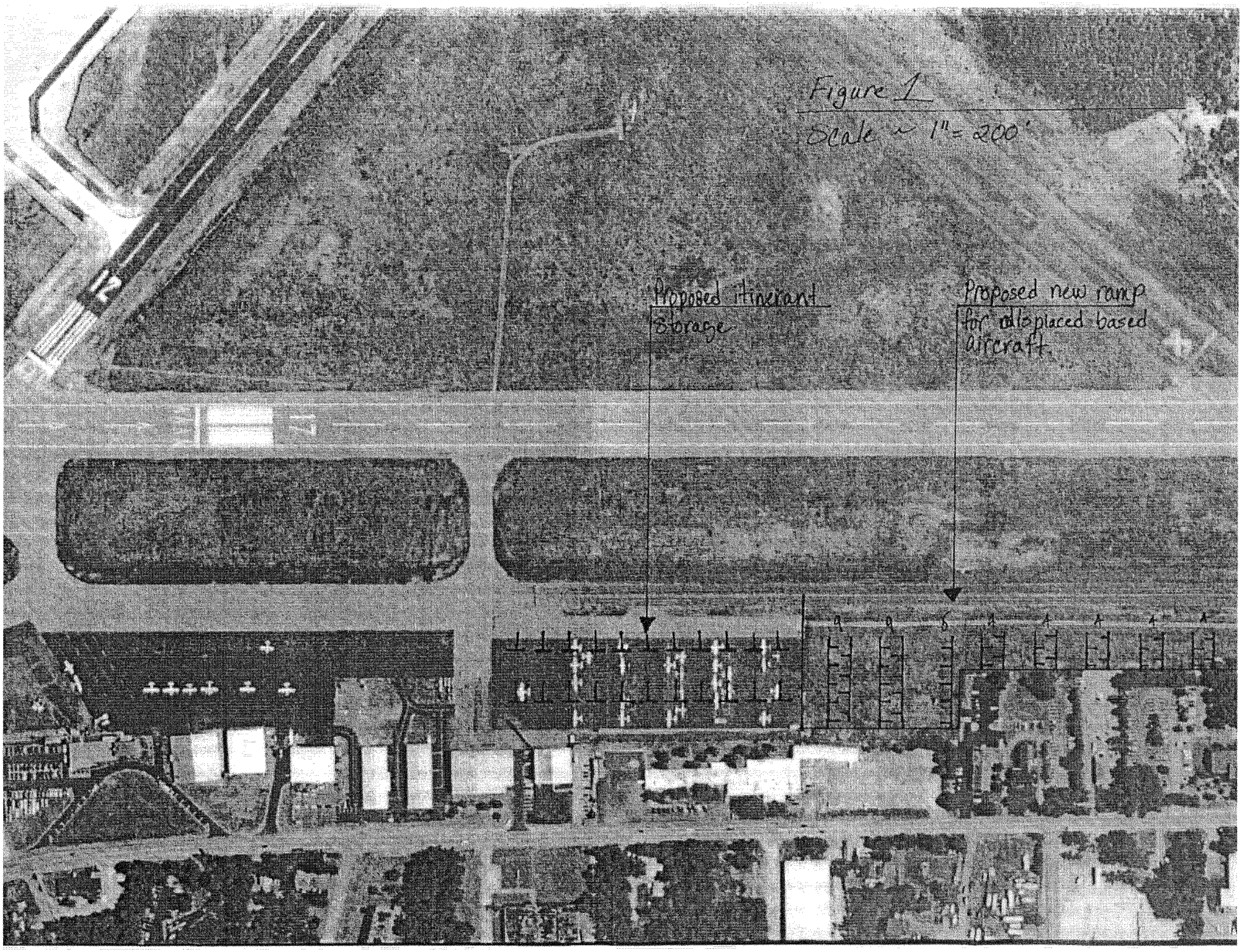


Figure 1

Scale ~ 1" = 200'


NEW TAXIWAY
PAVEMENT
B 727-100
CITATION II
REGIONAL DRIVE
TERMINAL
BLDG
HANGAR

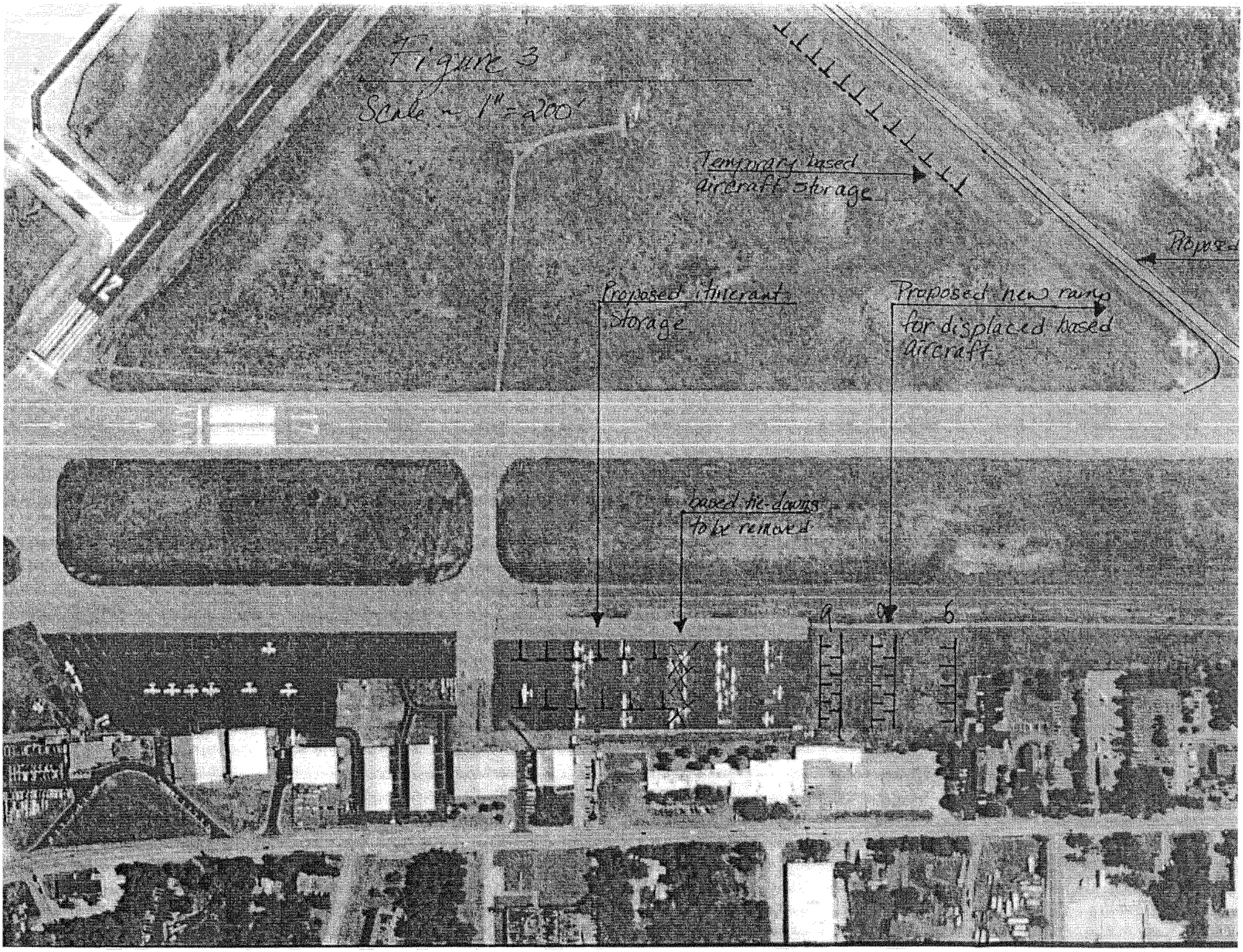


Figure 3
Scale - 1" = 200'
Temporary based aircraft storage
Proposed itinerant storage
Proposed new ramp for displaced based aircraft
based tie-downs to be removed
A
B
6

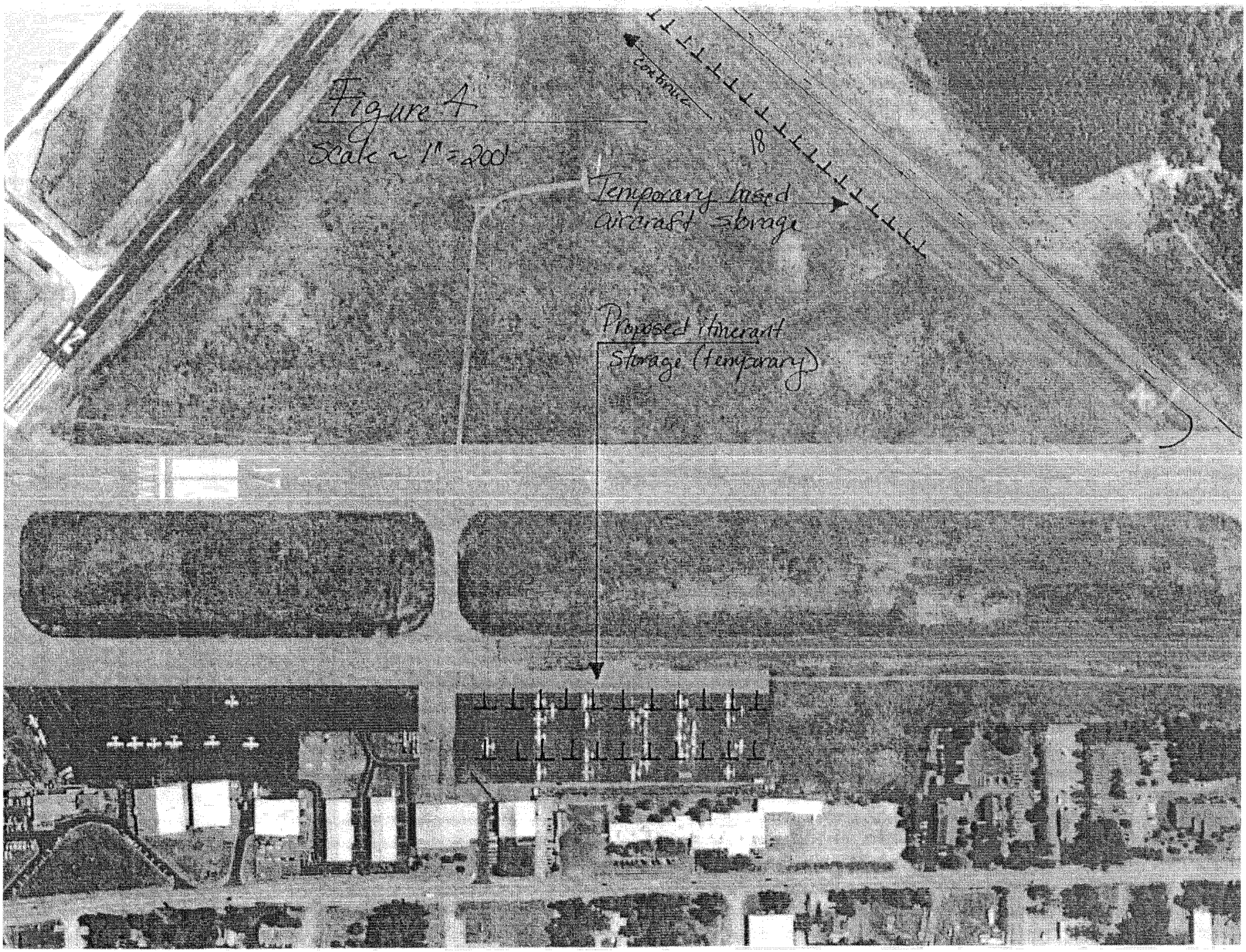
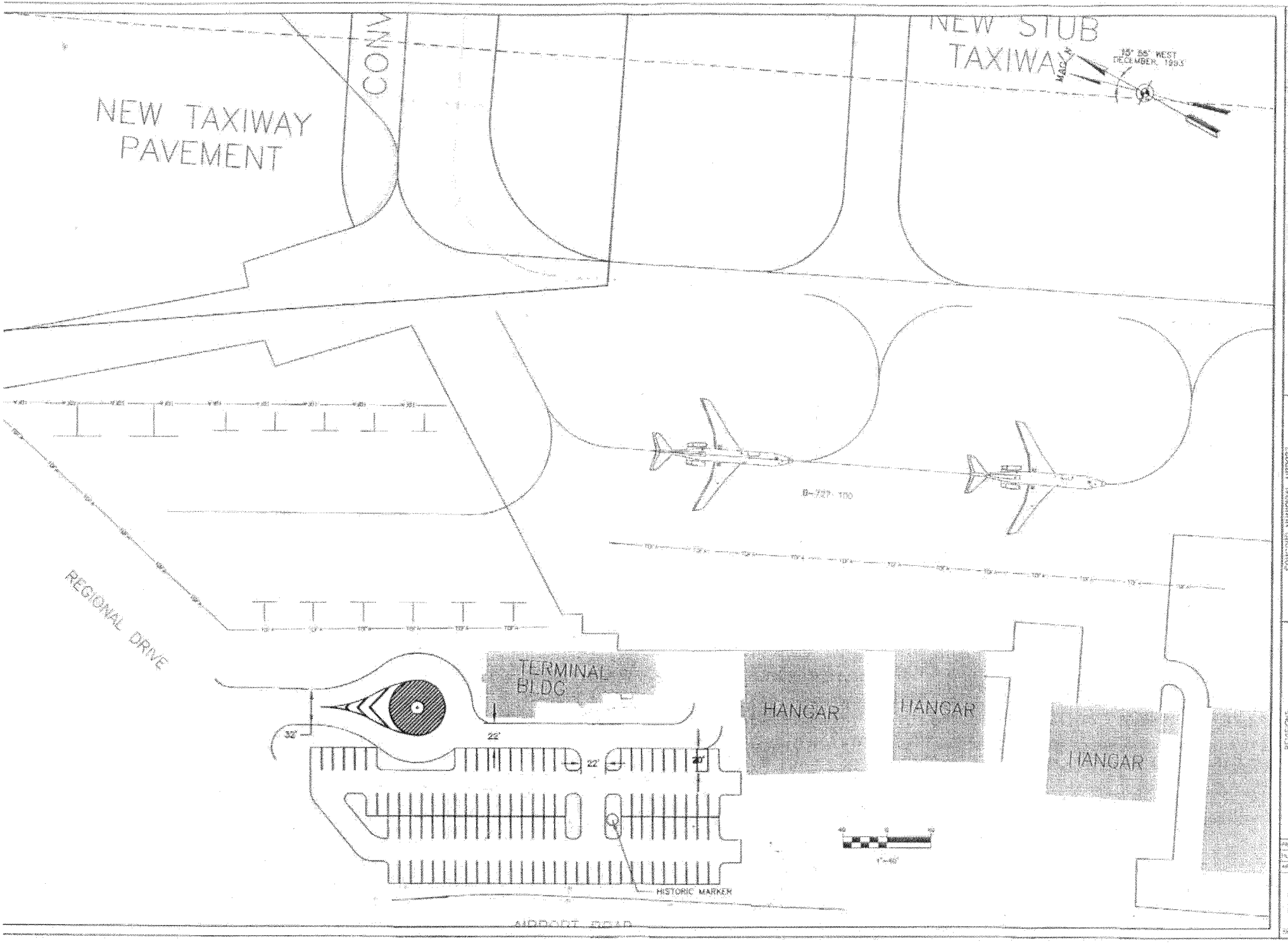


Figure 4
Scale ~ 1" = 200'
Centerline
18
Temporary based aircraft storage
Proposed itinerant storage (temporary)


NEW TAXIWAY PAVEMENT
CONN
NEW STUB TAXIWAY
MARCH
15° 55' WEST
DECEMBER, 1995
B-727-100
REGIONAL DRIVE
TERMINAL BLDG
HANGAR
HANGAR
HANGAR
32'
22'
22'
40'
HISTORIC MARKER
AIRPORT ROAD
PROJECT DESIGNER
CONCORD MUNICIPAL AIRPORT
REVISIONS

Appendix C: Letter to the United States Fish and Wildlife Service and the New Hampshire Fish and Game Department in March 2005 (to address the future land deficit for airport development)

March 21, 2005

Michael Amaral, Endangered Species Specialist
United States Department of the Interior
U.S. Fish and Wildlife Service – New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087

Celine Goulet
New Hampshire Fish and Game Department
2 Hazen Drive
Concord, New Hampshire 03301-6500

Dear Mr. Amaral and Ms. Goulet,

On behalf of our client, the city of Concord, I would like to thank you for meeting with staff members from the city of Concord, the New Hampshire Department of Transportation – Aeronautics Division, the Federal Aviation Administration and Hoyle, Tanner and Associates, Inc., the cities airport planning and engineering firm, on Wednesday March 16, 2005 regarding the Concord Municipal Airport Master Plan Update.

To recap, the premise of our meeting was to discuss the following:

1. Timeline of the master plan process;
2. Examining existing conservation/development zones;
3. Perimeter Road installation; and
4. A mowing and maintenance schedule for runway safety areas and object free areas

As indicated in the meeting, the master plan update process is approximately 50 percent complete, which includes completion of an airport inventory of existing conditions, a twenty-year forecast of aviation activity, and identification of future airport development.

Airport development recommendations identify future development only within the designated development zones; however projections of aviation activity identify a future deficit in available developable airport land for both based and itinerant aircraft storage. This deficit is projected to take place in the long-term future (i.e. within the next 10 to 20 years). To address this deficit we discussed the possibility of adjusting the boundaries between conservation zones and development zones in a way that creates more aircraft storage area while maintaining or improving the butterfly habitat.

Ideally, aircraft storage facilities are constructed in close proximity to existing facilities such as fuel facilities, the terminal building, restrooms and other amenities. Currently, a majority of the area surrounding the existing based and itinerant aircraft storage facilities is conservation land, thus limiting future expansion of existing aircraft storage facilities. Development within conservation zone 4 (between the existing parallel taxiway and Airport Road) for ramp expansion/hangar development would be the ideal place for future aircraft storage. To accomplish that we discussed the possible re-designation of development zone 8 to

conservation land and conservation zone 4 (between the existing parallel taxiway and Airport Road) to a development zone.

We understand that both areas need to be inventoried by your respective organizations before a determination can be made regarding a zone re-designation. We appreciate your willingness to consider this option and await any information you can provide the City.

In an effort to monitor the airport's perimeter/security fence and to maintain a separation between automobiles and aircraft, airports around the nation have constructed perimeter airport roads. The design and construction of perimeter roads has varied from turf and gravel to paved surfaces. Your respective organizations desire a turf/dirt perimeter road rather than a gravel or paved road so that some biological activity could continue within the road right-of-way. A gravel or paved road would not allow such activity. Therefore, our recommendation within the master plan update is for the construction of a well-marked (by the use of flags or other demarcation devises) turf perimeter road. Modifications may be necessary in areas on the airport that have known flood and/or wet spots. Those areas will be addressed on a case-by-case basis.

The mowing and maintenance schedule for runway safety areas and object free areas is an on-going operational concern and is not a master planning issue. Mowing schedules that provide for operational safety while protecting the area's special habitat will be accomplished through annual discussions between the City and your respective organizations.

Thank you for your time and we hope that you will be in contact with the City regarding the topics above in the near future. Please join us at the next master plan update meeting scheduled for Thursday April 21, 2005 at 5:00 PM in the City's Council Chambers.

Sincerely,

Katie R. Servis

Katie R. Servis
Airport Planner – Hoyle, Tanner and Associates, Inc.

CC: Matt Walsh – City of Concord Community Development Department
Ken Lurvey -City of Concord Community Development Department
Tricia Lambert – NH Department of Transportation – Aeronautics Division
Ralph Nicosia-Rusin – Federal Aviation Administration
Dick Ludders - Hoyle, Tanner and Associates, Inc.

Appendix D: Automobile Storage Future Requirements/Alternative Development

Automobile Storage Future Requirements/Alternative Development

The following identifies future automobile storage requirements for Concord Municipal Airport and alternative development options to accommodate those future needs. The data below was presented to the planning advisory committee at the October 7, 2004 airport master plan update workshop meeting. The preferred development alternative is identified in *Chapter 3 – Facility Requirements and Alternative Development* of this airport master plan update report.

Future Requirements/Alternative Development

Additional automobile parking is required to accommodate the over 200 additional rental automobiles that are trucked in by Hertz and Enterprise-Rent-A-Car to accommodate increases in demand during NASCAR events. Also 500 plus fans congregate in the area during race weekends. Currently only 89 public automobile parking stalls are available for automobile parking (74 of which are near the terminal building). The grass areas inside and outside of the airport security fence are used for overflow parking during busy weekends. Parking inside of the secure airport is a safety concern because of the mix of aircraft and automobiles (potential for ramp/taxiway/runway incursions).

The following options were presented (also see the figures located at the end of this document, which depicts each alternative option).

Option 1 – Redesign the grass area in front of the terminal building to allow for rental car ready parking with access from Regional Drive. Provide a gravel/dirt or turf parking lot for overflow rental car and fan parking within development zone (DZ) 7, northwest of Regional Drive. Allow for automobile parking beneath RPZ for Runway 12 during peak activity since the runway is typically closed during those events. The pros and cons of this option are listed below, while a graphic representation of this option is attached (see Figure P1).

Option 1 Pros	Option 1 Cons
Utilizes existing airport land northwest of Regional Drive that cannot be used for aviation type uses because Regional Drive disconnects a portion of DZ-7 from runways and taxiways	Uses airport land that could be leased to other potential tenants, thus, reducing the potential for revenue producing facilities
Allows for needed automobile parking outside of the secure airport operations area.	
Reduces the probability of ramp/taxiway/runway incursions	
Does not impact conservation zones	May require temporary closure of Runway 12-30 to allow for automobile parking beneath the RPZ for Runway 12
Allows for less curb cuts on Airport Road, in which traffic has increased	
Answers City's desire to have the main airport access from Regional Drive rather than from Airport Road	

Option 2 – Redesign grass area in front of the terminal building to allow for rental car ready parking with access from Airport Road. Provide a gravel/dirt or turf parking lot for overflow rental car and fan parking within DZ-7, northwest of Regional Drive. Allow for automobile parking beneath RPZ for Runway 12 during peak activity since the runway is typically closed during those events. The pros and cons of this option are listed below, while a graphic representation of this option is attached (see Figure P2).

Option 2 Pros	Option 2 Cons
Utilizes existing airport land northwest of Regional Drive that cannot be used for aviation type uses because Regional Drive disconnects a portion of DZ-7 from runways and taxiways	Uses airport land that could be leased to other potential tenants, thus, reducing the potential for revenue producing facilities
Allows for needed automobile parking outside of the secure airport operations area.	May require temporary closure of Runway 12-30 to allow for automobile parking beneath the RPZ for Runway 12
Reduces the probability of runway incursions	Maintains existing curb cuts on Airport Road, in which traffic has increased
Does not impact conservation zones	Does not answers City's desire to have the main airport access from Regional Drive rather than from Airport Road

Fig. P1

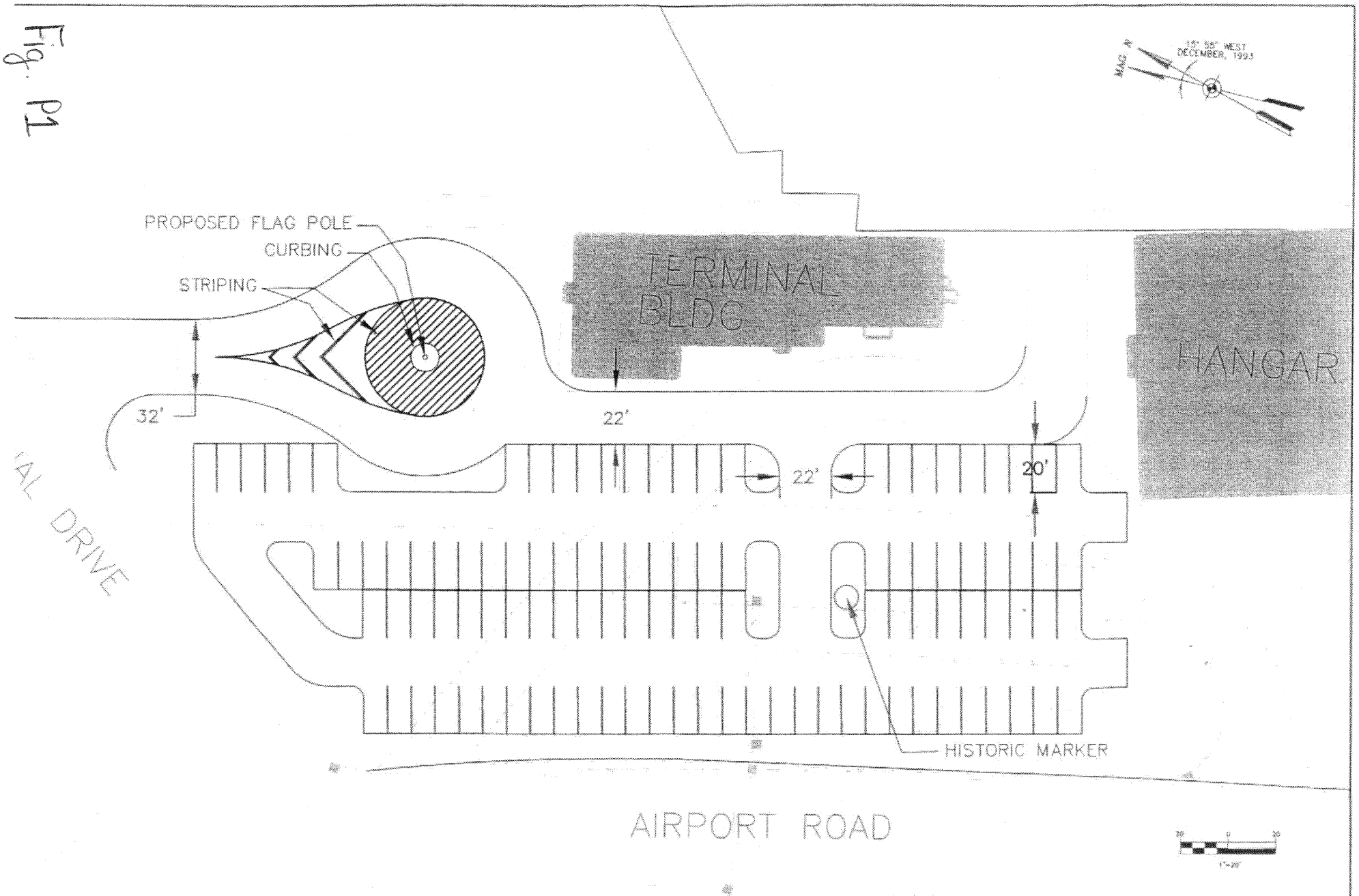
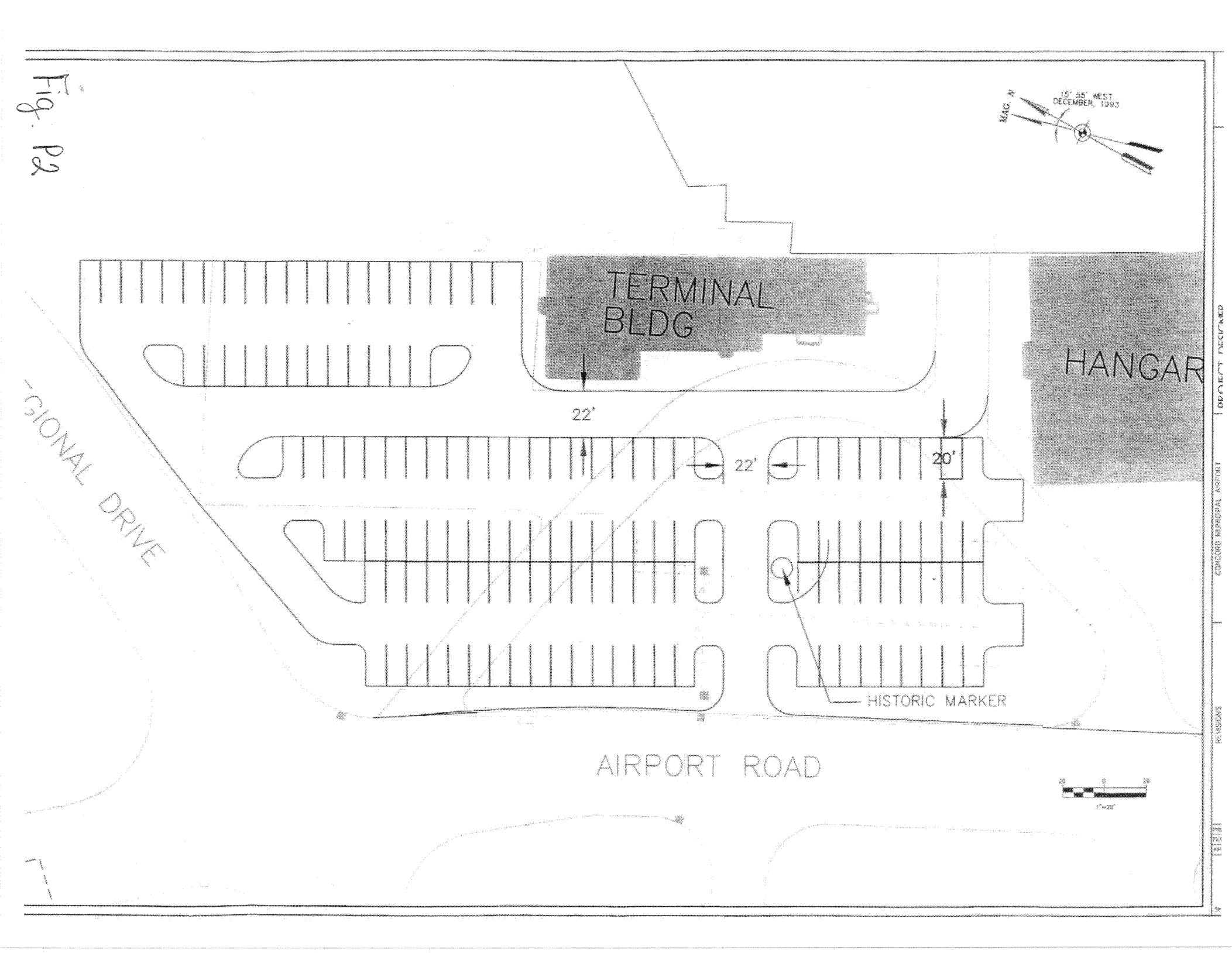

PROPOSED FLAG POLE
CURBING
STRIPING
32'
22'
TERMINAL BLDG
HANGAR
22'
20'
HISTORIC MARKER
AIRPORT ROAD
15° 58' WEST
DECEMBER, 1993
MAG N
PROJECT DESIGNER
CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE
ALTERNATIVE 1
REVISIONS
DRAWN
P-1

Fig. P2


MAG. N
15° 55' WEST
DECEMBER, 1993
TERMINAL
BLDG
HANGAR
22'
22'
20'
-GIONAL DRIVE
HISTORIC MARKER
AIRPORT ROAD
CONCORD MUNICIPAL AIRPORT
REVISIONS

Appendix E: FAA Compliance Letter

August 19, 2004

Mr. Duncan Ballantyne
City Manager
City of Concord New Hampshire
41 Green Street
Concord, NH 03301

Dear Mr. Ballantyne:

Concord Municipal Airport
Compliance Inspection

On July 21, 2004, Laurie-Jane Hyman, Laurie Suttmeier, Victor Lung and Jennifer Donahue of the FAA conducted an inspection of the Concord Municipal Airport to determine compliance with obligations under previous grant agreements. Also present at the inspection were the Airport Manager, Robert Rolla; Barry Lawrence and Tricia Lambert of NH DOT – Division of Aeronautics; Martha Drukker and Joe Andrews from the City Concord; Karen Frink, Woody Wilson, and Katie Servis from Hoyle Tanner Associates, NH; and Alina Pyzikiewicz of NH Fish & Game.

COMPLIANCE ISSUES

Based upon this inspection, it appears that the Concord Municipal Airport may be in non-compliance with its previous grant agreements for the following reasons:

Vegetation

1. All vegetation in the runway and taxiway safety areas should be cut to no higher than 14 inches above grade. It is our understanding that due to the restricted access allowed in the safety areas by airport maintenance personnel, no mowing operations have been conducted on the Airport, and in particular in the runway safety areas, for at least two years. As a result, the vegetation has flourished. Currently, tall vegetation obscures most of the airport runway lighting and signage. Although sparse, grass on the edge of Runway 12/30 is approximately 24" high.
2. The runway hold sign located directly opposite the Terminal/Administration building is almost completely overtaken by grass.
3. Grass is obstructing the signs all along TWY Alpha.

Lighting and Signage

The existing signage and marking at the intersection of RWY 12 and RWY 17 is confusing and needs to be re-examined. We recommend this be resolved during the current Master Plan/Airport Layout Plan update project, if feasible. An Airport Sign Plan should be submitted

to the FAA for review as soon as possible, to ensure that each sign and the overall plan meets current FAA sign standards.

1. You may want to consider the use of a "12" location sign on the backside of the Runway Hold Position Sign for RWY 17.
2. At the intersection of TWY Alpha with RWY 17/35, the "17" panel is the wrong size.
3. On TWY Alpha, the "A/35" sign is obscured by dirt on the face of the sign and needs to be cleaned.
4. The ILS hold position sign is obscured by dirt and needs to be cleaned.
5. At the second stub taxiway entering RWY 17/35, the "35" panel is skewed a bit. The directional sign is missing the arrow.
6. A Yield sign is needed on the NAVAID service road as it intersects TWY Alpha.
7. We recommend edge reflectors on TWY Alpha.

Markings

1. The Runway Hold Position Markings for 17/35 need to be repainted. We recommend the use of 12" stripes.
2. We recommend the use of side stripes at the intersection of RWY 12/30 with the old RWY to prevent inadvertent entry.
3. All markings on the closed runway should be removed except for the yellow "X".
4. An ILS hold position marking is needed.
5. The VOR checkpoint needs to be repainted if the VOR is active
6. The practice of painting black paint over unused markings to eliminate these markings is no longer an acceptable method of removing these markings. As the black paint wears, the old markings tend to show through. These markings must be physically removed by sandblasting or some other method.
7. In accordance with new standards for airport markings, the City should ensure that glass beads are being used in all yellow and white paint markings.

RWY 17/35 Safety Area

1. No object shall be in the runway safety area except those that are fixed by function. Due to the lack of maintenance of the safety areas for RWY 17-35, there are numerous small trees taking hold. Several of these trees are more than three feet in height. These trees must be removed immediately.
2. The frangible points of several of the sign bases and light bases in the runway safety area are more than 3" above grade. Each object in the runway safety area should be checked and either the light stakes should be reset in to the ground or the surrounding grade brought up so that there is no more than 3 inches between surrounding grade and the frangible point of any required object in the safety area.
3. The remains of an out-of-service REIL is located on the left side of RWY 17, in the runway safety area. This equipment debris should be removed.
4. We noted clumping grass in the RWY 17 runway safety area on the left side. This clumping is caused by lack of maintenance and not mowing on a periodic basis, which results in an uneven and rough surface.
5. The catch basins along the north edge of RWY 17-35 are accumulating vegetation. The catch basins should be cleaned out on a regular basis to ensure proper drainage of the runway safety areas.

Taxiway Alpha

1. On Taxiway Alpha, several larger cracks need to be crack-filled.
2. The safety areas along TXY Alpha have several large humps as a result of snow removal operations from last winter. These need to be knocked down and the ground

made as flat as possible. We recommend rolling the safety area to produce a smooth and even grade.

Runway 12/30 Safety Area

1. The north side of RWY 12-30 was washed out and in some areas the runway edge lip is more then 3". This area needs to be repaired and seeded.
2. The runway edge lip at the runway's southeast corner has more than a 5" lip.
3. We observed vegetation greater than 18 inches in the RSA left side of Runway 12.
4. A Threshold End Light is cracked and should be replaced immediately.

Other Airfield Maintenance

1. We discovered an open electrical hole on the edge of the aircraft parking apron, covered with old plywood. The cover needs to be replaced so as not to cause an obstruction in the safety area, and should be constructed of material that could withstand the weight of airfield maintenance machinery or an aircraft, and without causing damage to an aircraft or vehicle.
2. The windsock is faded and torn and needs to be replaced.

Wildlife Issues

1. Scat was found on many of the pavement surfaces and deer have been reported in the vicinity of RWY 17-35 where the area is unfenced.
2. Flocks of Starlings and evidence of bird debris (feathers and droppings) were observed on the airport.
3. We recommend that USDA, Wildlife Services be contacted for a more complete wildlife evaluation.
4. The ground at the southeast edge of the safety area for RWY 17-35 drops off drastically. Along this edge there is high vegetation, trees and brush growing uncontrollably. Deer have been reported to frequent this area. We recommend a project to fence this area to exclude deer from the Airport Operations Area. Due to the embankment at the edge of the safety area and the need to occasionally access the area with a brush-hog, it is recommended that the correct placement of a wildlife control fence be studied under the current Master Plan Update project and coordinated with USDA.

Runway Obstruction Analysis

1. We observed the following penetrations to the runway approach surfaces:
    a. RWY 12: 18:1 tree, located off to the left of red building.
    b. RWY 30: 18:1.
    c. RWY 17: 18:1 tree. If the observed tree were removed, the apparent controlling obstruction would be a house and the obstruction slope would decrease to 34:1. In any case obstruction lighting on the house is recommended.
    d. RWY 35: 34:1 on the left, slightly better than 34:1 on the centerline.
2. All trees should be cut to meet Part 77 surfaces. The FAA recommends that obstructions be surveyed to identify the exact penetrations to Part 77 approach slopes.

SAFETY RECOMMENDATIONS

In addition to the items noted above, the following recommendations are made based on our observations of the airport during the inspection. Completion of the following items will enhance safety at the Concord Municipal Airport.

Aircraft Fueling

1. Fuel trucks should be parked a minimum of 10 feet apart and no closer than 50 feet from the building.
2. Fuel delivery hoses should be relocated outside of the drive lane to ensure that they are protected from damage
3. The Emergency Fuel Shut Off (EFSO) sign on the building needs to be bigger. EFSO signs should be visible from 25 feet.
4. The direction of operation must be indicated on the EFSO placard.
5. All fire extinguishers should be protected from snow and ice.

A Master Plan / Airport Layout Plan update is currently underway at the Concord Municipal Airport. Several of the issues noted above, including signage, marking, lighting and wildlife hazard management should be brought to the attention of the planners and addressed as part of this update. It is recommended that the Airport Sponsor work with the FAA to schedule projects within the next five years to address the recommendations of the Airport Master Plan related to airport signage, marking and fencing improvements.

Thank you for your cooperation during the inspection. If you have any questions about the compliance issues or safety recommendations, please contact me at 781.238.7632 or Laurie Suttmeier at 781.238.7630.

Sincerely,

Laurie J. Hyman
Airport Certification Safety Inspector

File:
WP: Concord2004DEF.DOC
ANE-620:L.Hyman:KVC:781-238-7632:08/23/2004

Appendix F: Airport Maintenance Schedule for Summer and Fall 2004

New Hampshire
Fish and Game Department

11 Hazen Drive, Concord, NH 03301-6500
Headquarters: (603) 271-3421
Web site: www.wildlife.state.nh.us

TDD Access: Relay NH 1-800-735-2964
Fax (603) 271-1438
E-mail: info@wildlife.state.nh.us

Lee E. Perry
Executive Director

MEMORANDUM

TO: Tricia L. Lambert, DOT
Mathew Walsh, COC

DATE: August 30, 2004

FROM: Steven Fuller, NHFG

SUBJECT: Airport maintenance schedule for summer and fall of 2004

As agreed upon at the August 18th Habitat Plan meeting, New Hampshire Fish and Game is allowing vegetation maintenance to occur within the safety areas of the Concord Municipal Airport prior to the accepted date of October 1st. We recognize the airport's need of maintaining appropriate grass heights in order to comply with FAA regulations as well provide a safe environment for aircraft and crew. In acknowledgement of such obligations, New Hampshire Fish and Game has, therefore, agreed to an amended maintenance schedule for 2004. The approved maintenance includes the mowing along the main runway, 200 feet from center, as well as the secondary runway, 150 feet from center, utilizing the same equipment employed in previous maintenance operations. This maintenance may occur after August 31 of this year and requires no further consultative actions by either party.

Sincerely,

Steven G. Fuller
Terrestrial Systems Ecologist
Nongame and Endangered Species Program

CMA Maintenance Areas

ROFA (Runway Object Free Areas) are 300ft beyond each active runway. These areas can be mowed as frequently as once a year after October 1, with a mower height no less than 9in.

Runway Lighting Area is 15ft beyond the edge of the runway, spanning the length of the runway. This area will be mowed to a height and at a frequency set by FAA regulation standards.

Adjacent Areas to ROFA are 50ft beyond the ROFA areas which can be mowed after October 1 no more than every third year with a mower height no less than 9 in.

Appendix G: Alternatives and Recommendations for Improvement of Confusing Intersection at the Approach End of Runways 12 and 17

Alternatives and Recommendations for Improvement of Confusing Intersection at the Approach End of Runways 12 and 17

The following identifies alternatives and recommendations for improvement for the confusing intersection at the approach ends of Runways 12 and 17 at Concord Municipal Airport. The data below was presented to the planning advisory committee at the October 7, 2004 airport master plan update workshop meeting. The preferred development alternative is identified in *Chapter 3 – Facility Requirements and Alternative Development* of this airport master plan update report.

Future Requirements/Alternative Development

All alternatives use the airport design criteria for either the existing B-II or the potential C-II design criteria while maintaining the existing runway length.

Six possible methods are analyzed. The descriptions of the alternatives are summarized below and in the following figures.

1. Alternative 1 – Use B-II design criteria and eliminate/remove Runway 17's displaced threshold pavement;
2. Alternative 2 - Use C-II design criteria and eliminate/remove Runway 17's displaced threshold pavement;
3. Alternative 3 - Use B-II design criteria and regain use of Runway 17's displaced threshold;
4. Alternative 4 - Use C-II design criteria and regain use of Runway 17's displaced threshold;
5. Alternative 5 - Use B-II design criteria and regain a portion of Runway 17's displaced threshold and extend Runway 12 and relocate Runway 12's threshold further to the west;
6. Alternative 6 - Use C-II design criteria and regain a portion of Runway 17's displaced threshold and extend Runway 12 and relocate Runway 12's threshold further to the west;

Alternative 1 - Use B-II design criteria and eliminate/remove Runway 17's displaced threshold pavement (see figure 3-1A/B):

Alternative 1 looks at eliminating/removing Runway 17's displaced threshold pavement in an effort to improve the confusing intersection at the approach ends of Runways 12 and 17. To maintain the existing runway length (6,005 feet) and the required 300-foot runway safety area beyond runway end, alternative 1 re-grades 900 feet beyond the existing Runway 35 end. Six hundred feet of the re-graded surface is paved for runway use and the remaining 300 feet is maintained as turf for runway safety area use.

The pros and cons associated with Alternative 1 are outlined below, while a graphic representation of this option is attached (see Figures 3-1A and 3-1B).

Alternative 1 Pros	Alternative 1 Cons
It maintains the existing 6,005-foot runway	It requires taxiing to Runway 12 through the approach surface of Runway 17
It maintains the 300-foot required safety area beyond runway end for both Runways 17 and 35	
It may no longer require purchase of land off of the approach end of 17 (1996 master plan recommendation) due to relocated threshold	
It allows for separation of runway entrances to both Runways 12 and 17, eliminating some of the confusion	It reduces the amount of available land on the 35 end for a runway extension
It still allows for potential extension of the runway on 35 end	It increases the number of obstructions within the Runway 35 approach surface
It eliminates the displaced threshold allowing for all operations to use the full 6,005 feet of runway with no need for declared distances	It requires the movement of existing approach lighting system on Runway 35's end and may require the purchase of nearby land and/or easements to erect the light poles for the light system
It allows for the localizer antenna to remain outside of the runway safety area	

Alternative 2 – Use C-II design criteria and eliminate/remove Runway 17's displaced threshold pavement (see figure 3-2A/B):

Similar to Alternative 1 but uses C-II design criteria.

The pros and cons associated with Alternative 2 are outlined below, while a graphic representation of this option is attached (see Figures 3-2A and 3-2B).

Alternative 2 Pros	Alternative 2 Cons
It maintains the existing 6,005-foot runway	It requires taxiing to Runway 12 through the approach surface and safety area of Runway 17
It allows for the 1,000-foot required safety area beyond runway end for both Runways 17 and 35	It allows for the localizer antenna to remain inside of the runway safety area
It may no longer require purchase of land off of the approach end of 17 (1996 master plan recommendation) due to relocated threshold	It increases the number of obstructions within the Runway 35 approach surface
It allows for separation of runway entrances to both Runways 12 and 17, eliminating some of the confusion	It requires a larger safety area, which limits the potential for a longer runway
It eliminates the displaced threshold allowing for all operations to use the full 6,005 feet of runway with no need for declared distances	It requires the movement of existing approach lighting system on Runway 35's end and may require the purchase of nearby land and/or easements to erect the light poles for the light system

Alternative 3 - Use of B-II design criteria and regains use of Runway 17's displaced threshold (see figure 3-3A/B):

Alternative 3 (using B-II criteria) looks at regaining Runway 17's displaced threshold by relocating the threshold to the end of pavement. This also maintains the existing runway length (6,005 feet) and the required 300-foot runway safety area beyond runway end.

The pros and cons associated with Alternative 3 are outlined below, while a graphic representation of this option is attached (see Figures 3-3A and 3-3B).

Alternative 3 Pros	Alternative 3 Cons
It maintains the existing 6,005-foot runway	It may require the purchase of more land off of the approach end of 17 (1996 master plan recommendation) due to relocated threshold
It maintains the 300-foot required safety area beyond runway end for both Runways 17 and 35	
It eliminates the displaced threshold allowing for all operations to use the full 6,005 feet of runway with no need for declared distances	
It does not require movement of existing approach lighting system on 35 end	It does not fully allow for separation of runway entrances to both Runways 12 and 17, thus, not entirely eliminating some of the confusion
It still allows for potential extension of the runway on 35 end	
It allows for the localizer antenna to remain outside of the runway safety area	

Alternative 4 - Use C-II design criteria and regains use of Runway 17's displaced threshold (see figure 3-4A/B):

Similar to Alternative 3 but uses C-II design criteria.

The pros and cons associated with Alternative 4 are outlined below, while a graphic representation of this option is attached (see Figures 3-4A and 3-4B).

Alternative 4 Pros	Alternative 4 Cons
It maintains the existing 6,005-foot runway	It may require the purchase of more land off of the approach end of 17 (1996 master plan recommendation) due to relocated threshold
It eliminates the displaced threshold allowing for all operations to use the full 6,005 feet of runway with no need for declared distances	It cannot meet the 1,000-foot required safety area beyond runway end for Runway 17 due to Regional Drive and residential dwellings within the area
It does not require movement of existing approach lighting system on 35 end	It does not fully allow for separation of runway entrances to both Runways 12 and 17, thus, not entirely eliminating some of the confusion
	It requires a larger safety area, which limits the potential for a longer runway
	It allows for the localizer antenna to remain inside of the runway safety area

Alternative 5 - Use of B-II design criteria and regains use of 200 feet of Runway 17's displaced threshold (see figure 3-5A/B):

Alternative 5 (using B-II criteria) looks at regaining approximately 200 feet of Runway 17's displaced threshold by relocating the threshold. To maintain the existing runway length (6,005 feet) and the required 300-foot runway safety area beyond runway end, alternative 5 re-grades 700 feet beyond the existing Runway 35 end. Four hundred feet of the re-graded surface is paved for runway use and the remaining 300 is maintained as turf for runway safety area use.

The pros and cons associated with Alternative 5 are outlined below, while a graphic representation of this option is attached (see Figures 3-5A and 3-5B).

Alternative 51 Pros	Alternative 5 Cons
It maintains the existing 6,005-foot runway	It requires taxiing to Runway 12 through the approach surface and safety area of Runway 17
It maintains the 300-foot required safety area beyond runway end for both Runways 17 and 35	It may still require purchase of land off of the approach end of 17 (1996 master plan recommendation) due to relocated threshold
It allows for separation of runway entrances to both Runways 12 and 17, eliminating some of the confusion	It reduces the amount of available land on the 35 end for a runway extension
	It increases the number of obstructions within the Runway 35 approach surface
It eliminates the displaced threshold allowing for all operations to use the full 6,005 feet of runway with no need for declared distances	It requires the movement of existing approach lighting system on Runway 35's end and may require the purchase of nearby land and/or easements to erect the light poles for the light system
It allows for the localizer antenna to remain outside of the runway safety area	

Alternative 6 - Uses C-II design criteria and regains use of 200 feet of Runway 17's displaced threshold (see figure 3-6A/B):

Similar to Alternative 5 but uses C-II design criteria.

The pros and cons associated with Alternative 6 are outlined below, while a graphic representation of this option is attached (see Figures 3-6A and 3-6B).

Pros and Cons - Alternative 6

Alternative 6 Pros	Alternative 6 Cons
It maintains the existing 6,005-foot runway	It requires taxiing to Runway 12 through the approach surface and safety area of Runway 17
It only meets the 1,000-foot runway safety area on the 35 end	It may still require purchase of land off of the approach end of 17 (1996 master plan recommendation) due to relocated threshold
	It cannot meet the 1,000-foot required safety area beyond runway end for Runway 17 due to Regional Drive

It allows for separation of runway entrances to both Runways 12 and 17, eliminating some of the confusion	It reduces the amount of available land on the 35 end for a runway extension
	It increases the number of obstructions within the Runway 35 approach surface
It eliminates the displaced threshold allowing for all operations to use the full 6,005 feet of runway with no need for declared distances	It requires the movement of existing approach lighting system on Runway 35's end and may require the purchase of nearby land and/or easements to erect the light poles for the light system
	It allows for the localizer antenna to remain inside of the runway safety area

Figure 3-1A

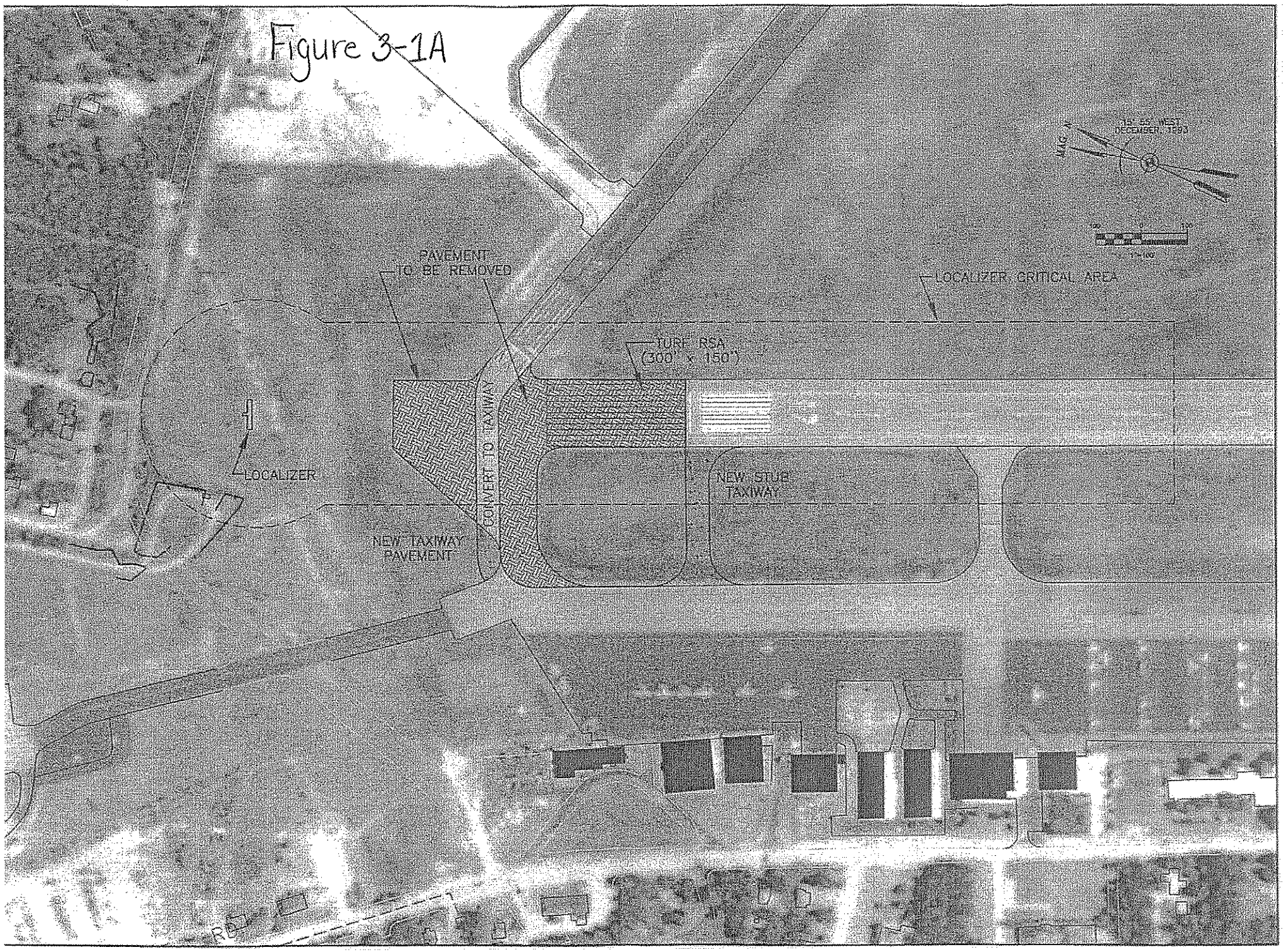

PAVEMENT TO BE REMOVED
LOCALIZER CRITICAL AREA
TURF RSA (300' x 150')
LOCALIZER
CONVERT TO TAXIWAY
NEW STUB TAXIWAY
NEW TAXIWAY PAVEMENT
PROJECT DESIGNER
CONCORD MUNICIPAL AIRPORT
REVISIONS

Figure 3-1B


600'
NEW RUNWAY
PAVEMENT
TURF RSA
(300' x 150')
VASI
GLIDE SLOPE
MONITOR
GLIDE SLOPE CRITICAL AREA
PAVEMENT
TO BE REMOVED
NEW TAXIWAY
PROJECT DESIGNER
CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE
REVISIONS
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Figure 3-2A

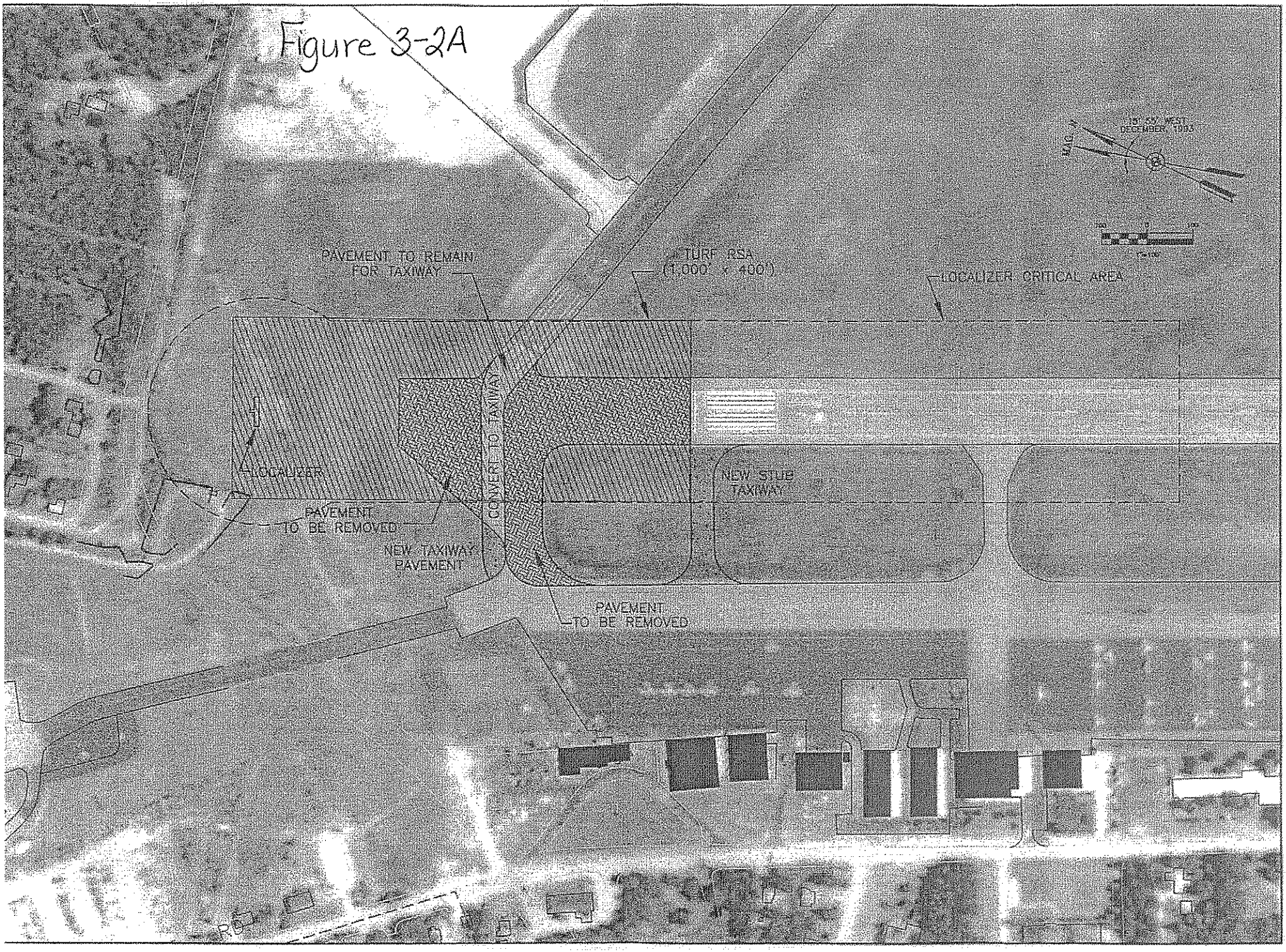

PAVEMENT TO REMAIN FOR TAXIWAY
TURF RSA (1,000' x 400')
LOCALIZER CRITICAL AREA
LOCALIZER
PAVEMENT TO BE REMOVED
NEW TAXIWAY PAVEMENT
CONNECT TO TAXIWAY
NEW STUB TAXIWAY
PAVEMENT TO BE REMOVED

Figure 3-2B

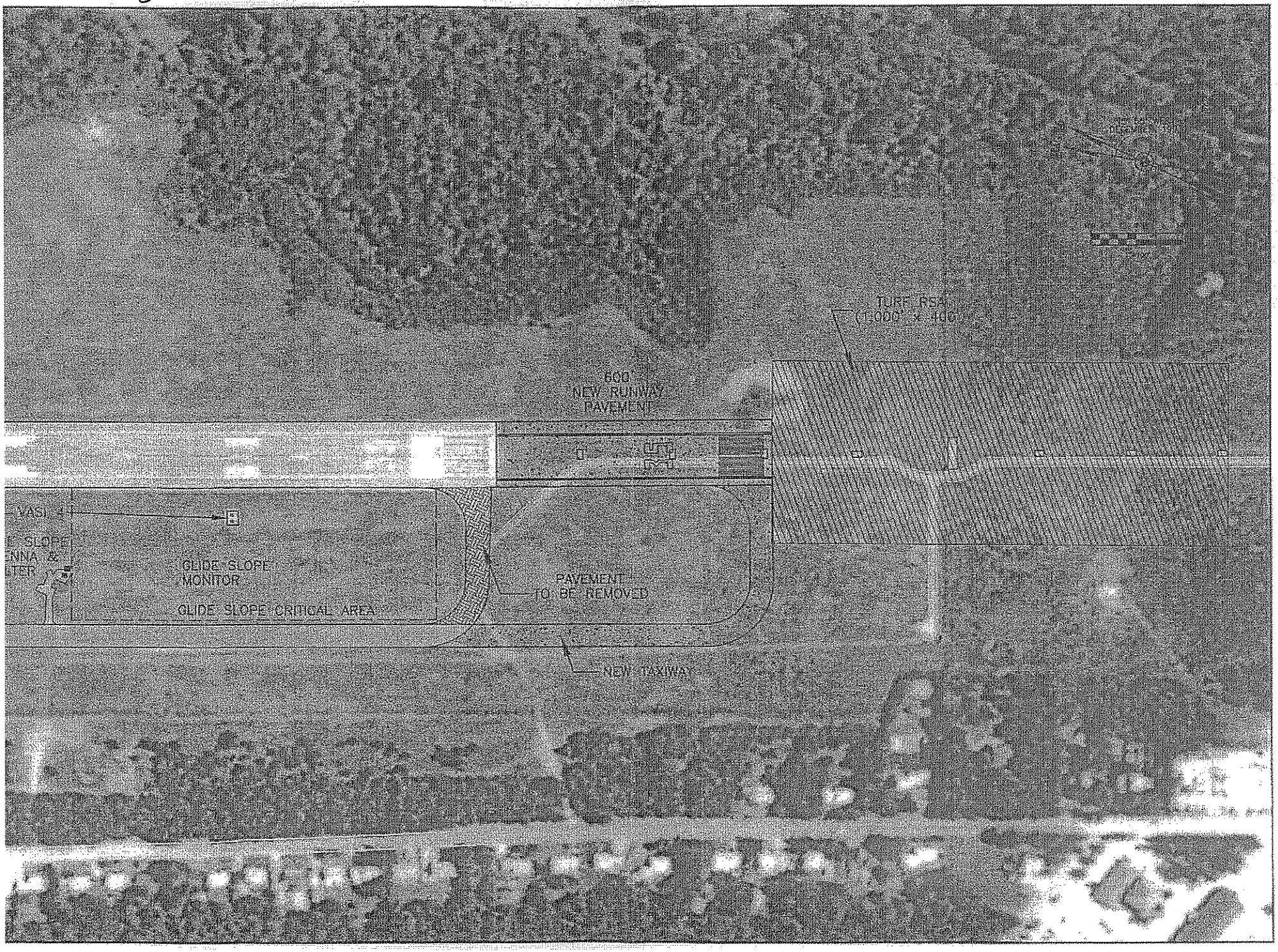

TURF RSA
600'
NEW RUNWAY
PAVEMENT
VASI
SLOPE
NNA &
LTER
GLIDE SLOPE
MONITOR
GLIDE SLOPE CRITICAL AREA
PAVEMENT
TO BE REMOVED
NEW TAXIWAY

Figure 3-3A

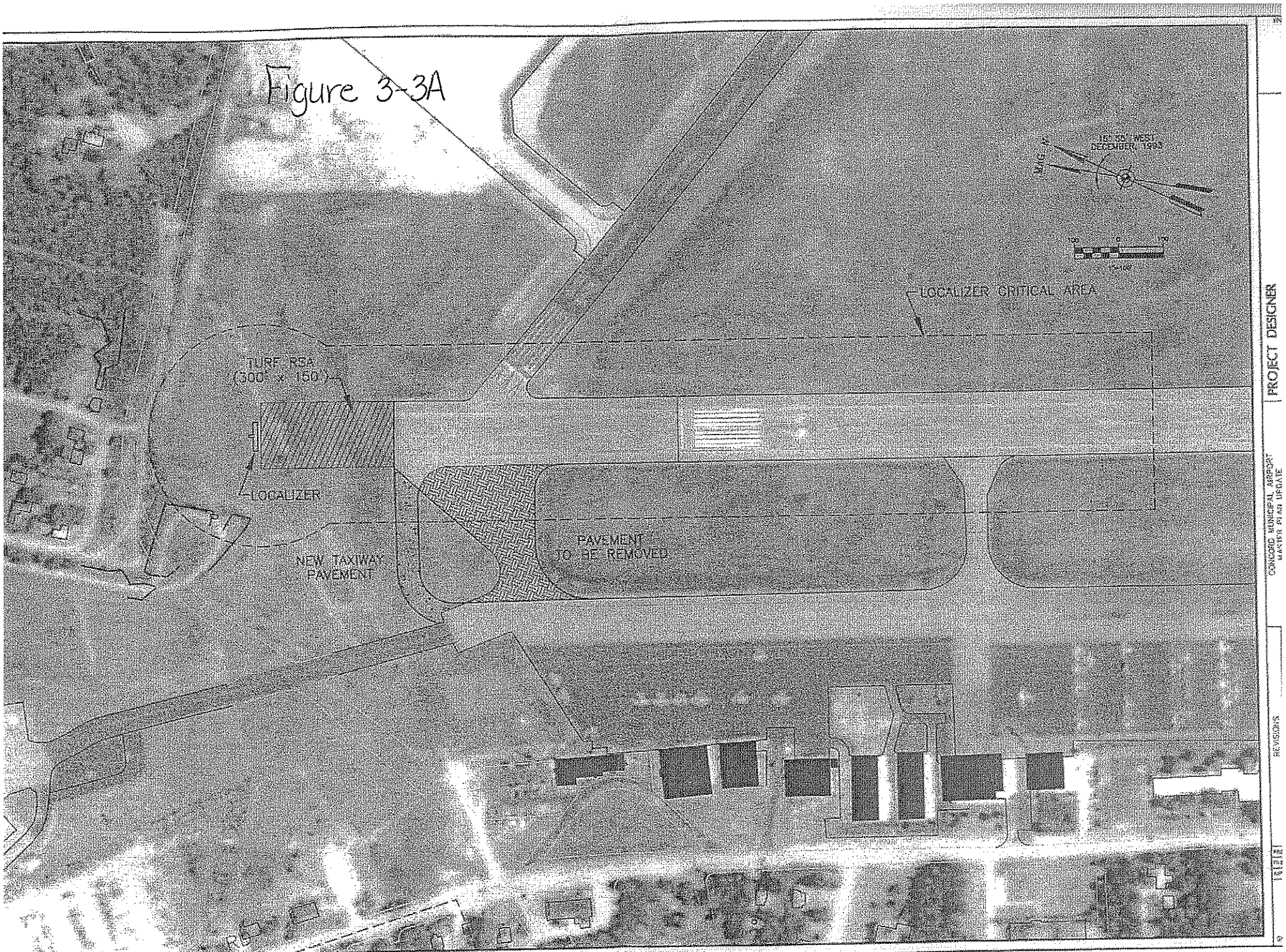

16° 05' WEST
DECEMBER, 1993
MAGNETIC
LOCALIZER CRITICAL AREA
TURF RSA
(300' x 150')
LOCALIZER
NEW TAXIWAY
PAVEMENT
PAVEMENT
TO BE REMOVED
PROJECT DESIGNER
CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE
REVISIONS
INITIAL

Figure 3-3B


TURF RSA
(300' x 150')
VASI
GLIDE SLOPE
ANTENNA &
SHELTER
GLIDE SLOPE
MONITOR
GLIDE SLOPE CRITICAL AREA

Figure 3-4A

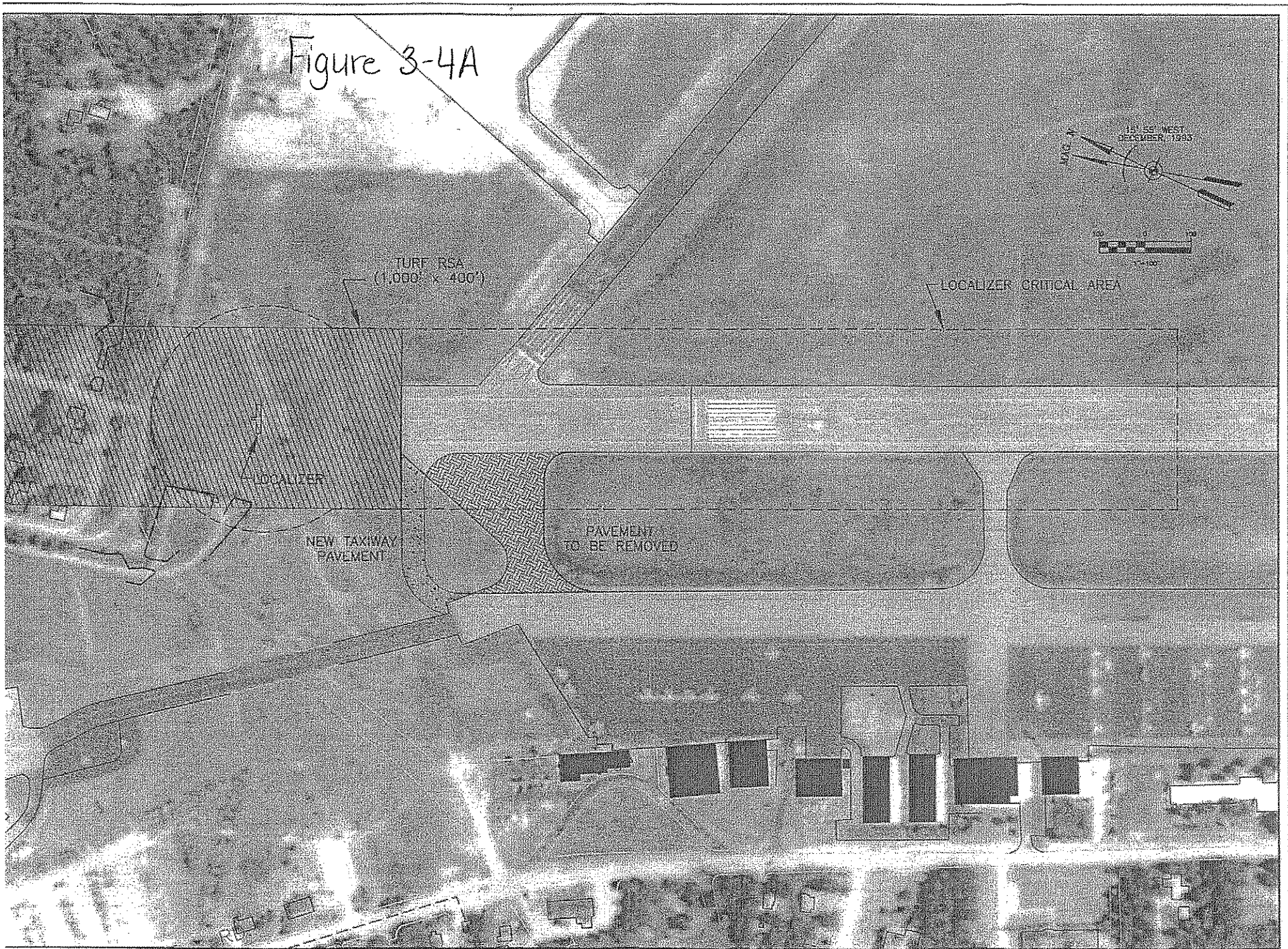

TURF RSA
(1,000' x 400')
LOCALIZER CRITICAL AREA
LOCALIZER
NEW TAXIWAY
PAVEMENT
PAVEMENT
TO BE REMOVED
15° 55' WEST
DECEMBER 1993
PROJECT DESIGNER

Figure 3-4B


TURF RSA
(1,000' x 400')
VASI
GLIDE SLOPE
MONITOR
GLIDE SLOPE CRITICAL AREA

Figure 3-5A

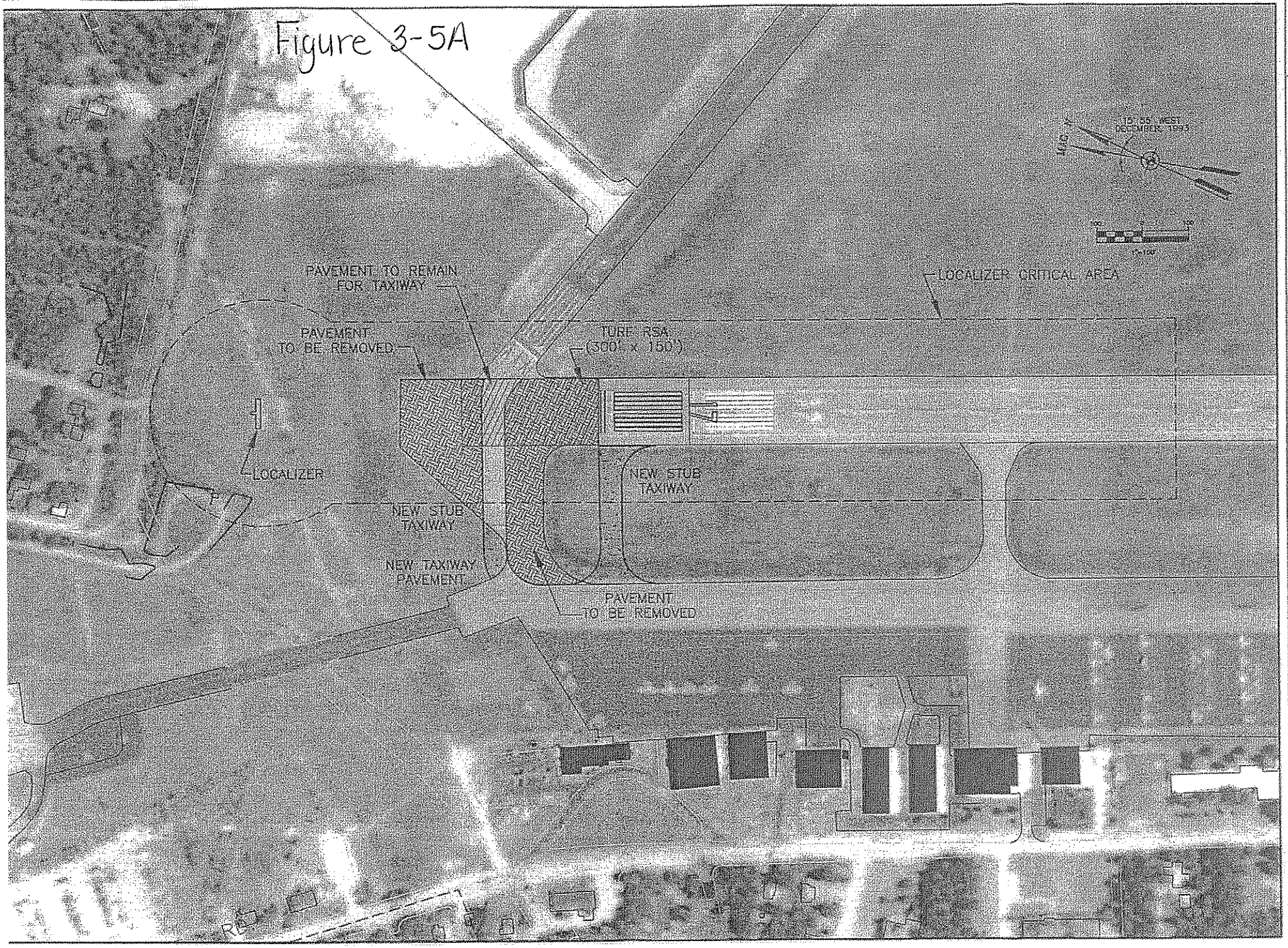

15° 55' WEST
DECEMBER 1993
MAG N
PAVEMENT TO REMAIN FOR TAXIWAY
LOCALIZER CRITICAL AREA
PAVEMENT TO BE REMOVED
TURF RSA (300' x 150')
LOCALIZER
NEW STUB TAXIWAY
NEW STUB TAXIWAY
NEW TAXIWAY PAVEMENT
PAVEMENT TO BE REMOVED
RW

Figure 3-5B

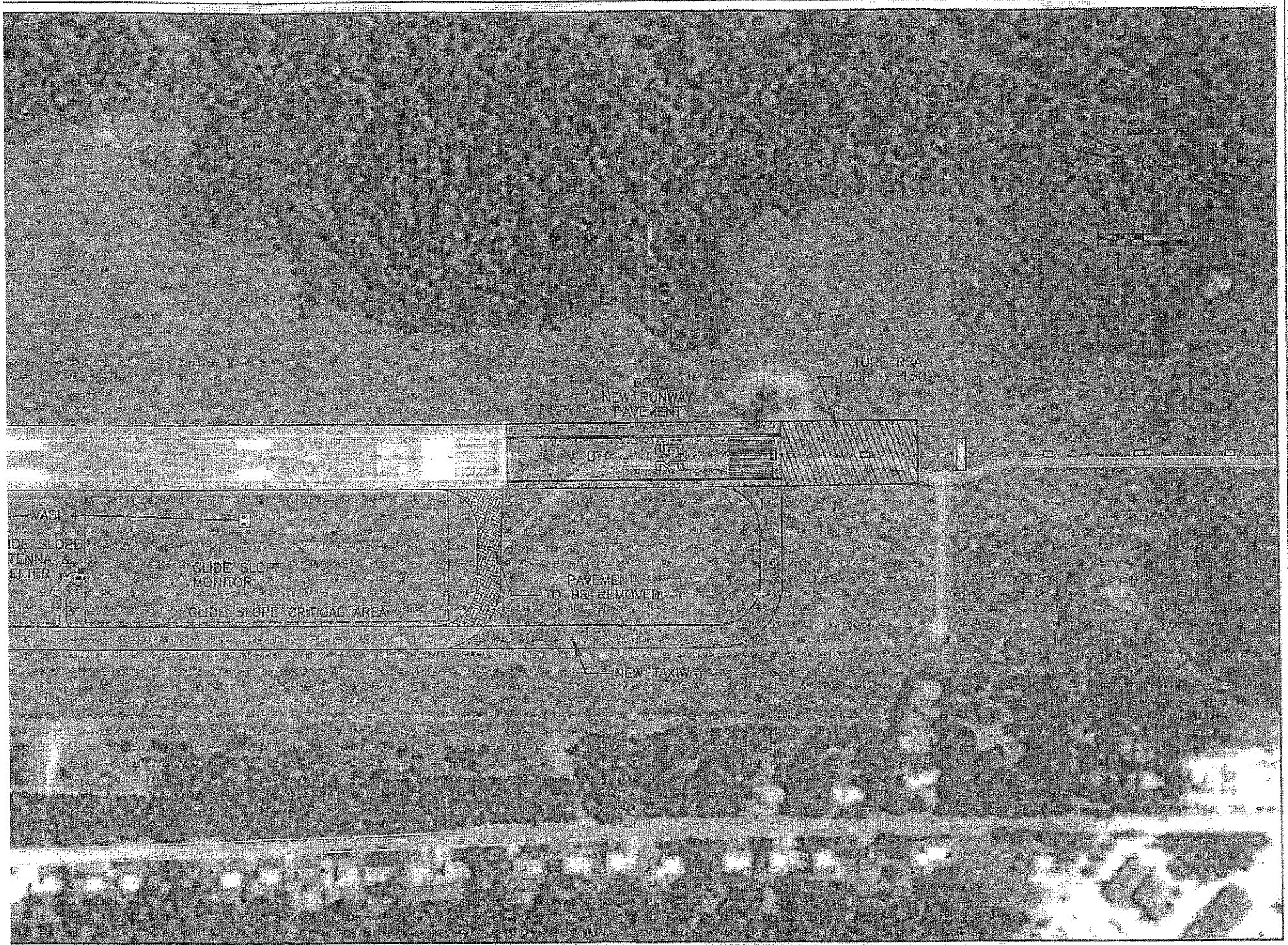

600'
NEW RUNWAY
PAVEMENT
TURF RSA
(300' x 150')
VASI 4
GLIDE SLOPE
MONITOR
GLIDE SLOPE CRITICAL AREA
PAVEMENT
TO BE REMOVED
NEW TAXIWAY
PROJECT DESIGNER
CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE
ALTERNATIVES
REVISIONS
DESCRIPTION
DATE
BY
3-

Figure 3-6A

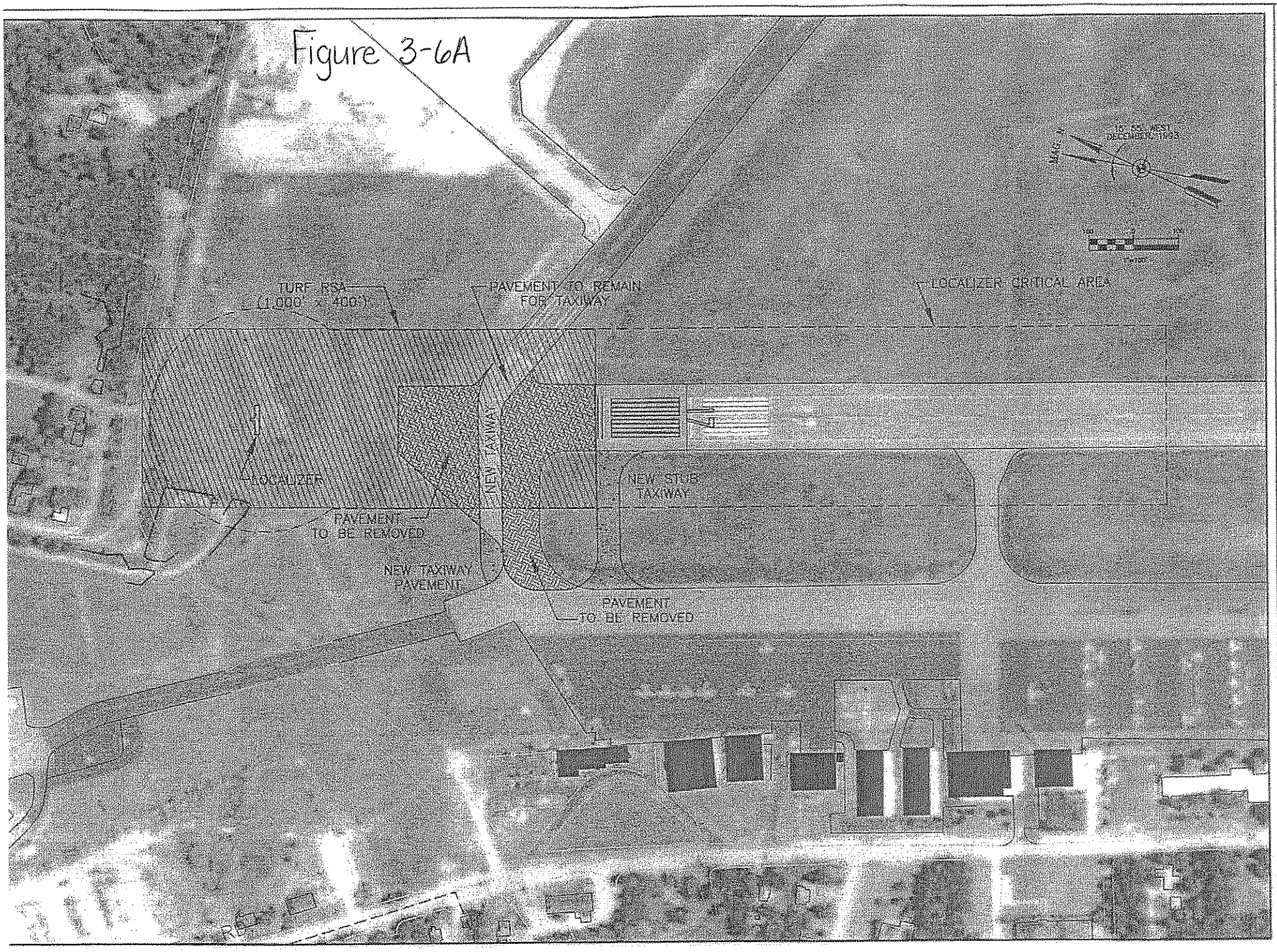
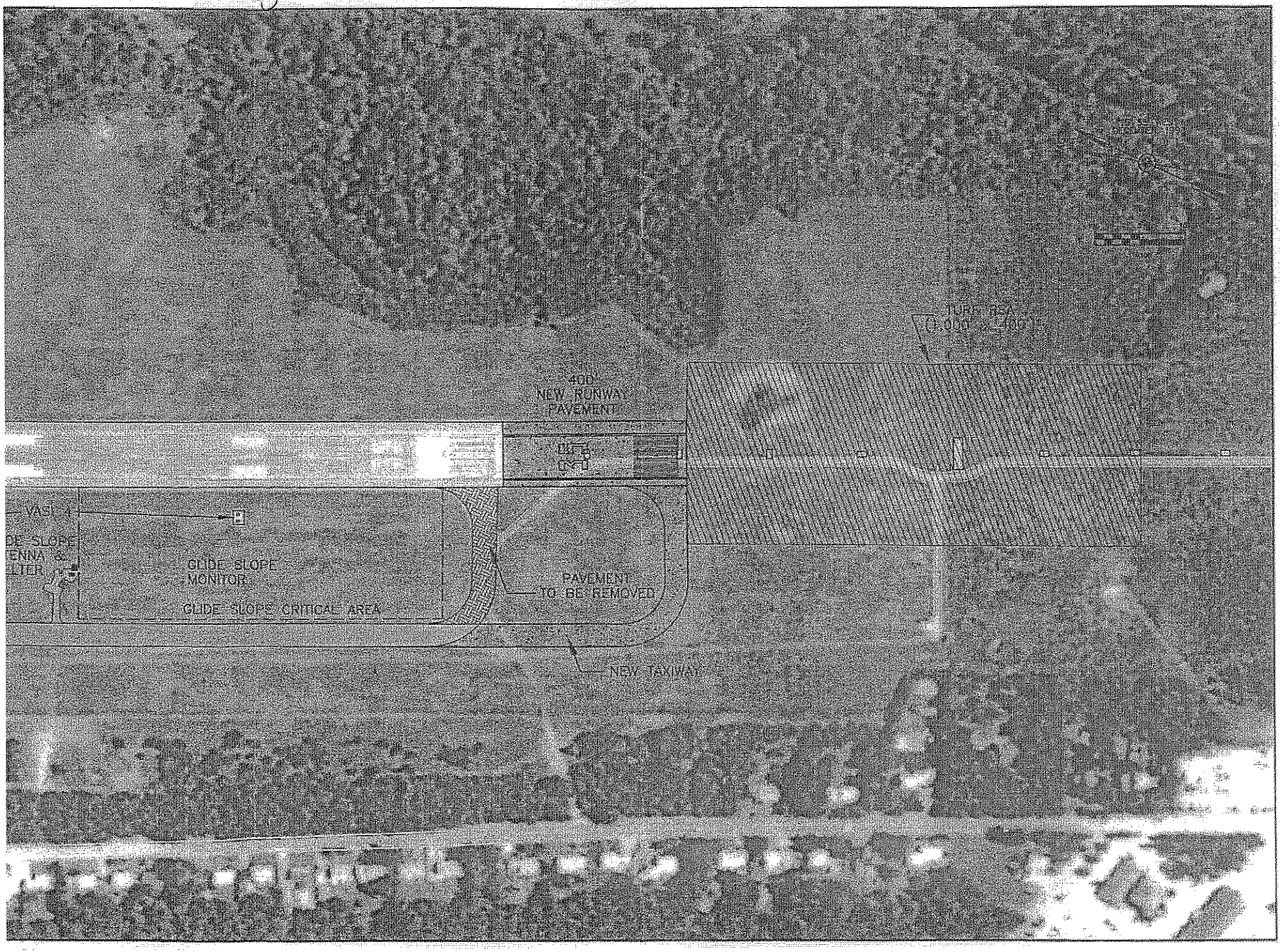

TURF RSA
(1,000' x 400')
PAVEMENT TO REMAIN
FOR TAXIWAY
LOCALIZER CRITICAL AREA
LOCALIZER
PAVEMENT
TO BE REMOVED
NEW TAXIWAY
PAVEMENT
NEW STUB
TAXIWAY
PAVEMENT
TO BE REMOVED
MAG N
16° 55' WEST
DECEMBER, 1993

Figure 3-6B



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MASTER PLAN UPDATE

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Appendix H: Runway Length Analysis – Runway 17-35

Runway Length Analysis – Runway 17-35

The following identifies alternatives and recommendations for runway length improvement for Runway 17-35 at Concord Municipal Airport. The data below was presented to the planning advisory committee at the October 7, 2004 airport master plan update workshop meeting. The preferred development alternative is identified in *Chapter 3 – Facility Requirements and Alternative Development* of this airport master plan update report.

1.0 Introduction

The Concord Municipal Airport is located on 614-acres in central New Hampshire, in the city of Concord (the state's capital since 1808), approximately 2-miles east of the city center.

Concord Municipal Airport is a general aviation airport, which is an airport that does not receive scheduled commercial air service. Commercial air service airports are located in close proximity: Manchester Airport in Manchester New Hampshire is approximately 20 miles south; Pease Airport in Portsmouth, New Hampshire is approximately 45 miles east; Lebanon Municipal Airport in Lebanon, New Hampshire is approximately 58 miles north-northwest; and Logan International Airport in East Boston, Massachusetts is approximately 70 miles south-southeast.

Currently the Airport is located in a fast growing suburban area constrained by a mix of other land uses such as residential, industrial, and commercial development. Such constraint prompted this analysis so that the city of Concord and the Airport could evaluate what would be the ultimate runway length to safely accommodate the anticipated general aviation operations.

The primary output of this analysis is the identification of the types of aircraft the airport is capable of serving today and those it can serve in the future with additional runway length. It is intended for these findings to assist the airport sponsor (city of Concord) in properly planning for the future of the airport, before further development encroaches the airfield. By doing so, the airport can preserve its ability to accommodate the role it has been designated to serve.

2.0 Runway Characteristics

Runway 17-35 has an overall length of 6,005 feet and width of 100 feet with a 640-foot displaced threshold on the Runway 17 end. There is a full-length parallel taxiway serving both ends of the runway. Currently Runway 35 has precision instrument approach capability with not lower than ¾ statute mile approach visibility minimums. Approaches to Runway 17 are limited to non-precision instrument approaches with not lower than ¾ statute mile visibility minimums.

Any runway development is very dependant upon the size and type of aircraft activity the airport will be expected to serve. By determining the aircraft types expected to use the airport, it is possible to establish a critical design aircraft that is then used for facility planning and design purposes. This critical aircraft is usually the most demanding aircraft using the airport. To be considered a critical aircraft, there must be a minimum of 500 operations conducted at the airport each year by the aircraft.

During the master plan update process, the Cessna Citation II (Citation Bravo) with an approach speed of 112 knots and a wingspan of 51.6 feet was selected as the critical aircraft, or most demanding aircraft, using the facility.

The Once the critical aircraft has been determined, an Airport Reference Code (ARC) is established based on specific characteristics of that aircraft. The two characteristics defining the ARC are the approach speed and wingspan. The ARC is identified using an alphanumeric designation, a letter designation followed by a Roman numeral. The letter designator is used to identify the Approach Category and the Roman numeral designates the Design Group in terms of wingspan. **Table A** and **Table B** delineate the criteria used in defining Aircraft Approach Categories and Aircraft Design Groups according to Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5300-13 Change 8, "Airport Design."

Table A
AIRCRAFT APPROACH CATEGORIES

Category	Approach Speed (knots)
A	< 91
B	91 – 121
C	121 – 141
D	141 – 166
E	> 166

Source: FAA AC 150/5300-13 Change 8.

Table B
AIRCRAFT DESIGN GROUPS

Design Group	Wingspan (feet)
I	< 49
II	49 – 78
III	79 – 117
IV	118 – 170
V	171 – 213
VI	214 – 262

Source: FAA AC 150/5300-13 Change 8.

Based on the existing runway width, parallel taxiway width, and the centerline separation between the two, the airfield facilities at Concord Municipal Airport appear to have been designed to accommodate operations of aircraft with either an ARC of B-II or C-II.

The biggest question lies in what criteria have been established with respect to the FAA required Runway Safety Area and Runway Object Free Area. The criteria for both are very different and using C-II criteria may not allow for additional runway length. Regardless of the requirements of the design criteria, navigational equipment would still require additional land off the 35 end. This is one of the reasons that this analysis serves to aid the airport sponsor in identifying current deficiencies that could limit the airport's ultimate potential.

3.0 Runway Requirements

As the primary airfield component at any airport, a runway must have the proper length, width, and strength to safely accommodate the critical aircraft expected to use the airfield. FAA AC 150/5325-4A, "Runway Length Requirements for Airport Design" and the FAA Airport Design software, Version 4.2D, provide guidelines to determine the ultimate runway length required at an airport facility. Runway width requirements for airport design are delineated in FAA AC 150/5300-13 Change 8. The design standards are based on the ARC and the airport's approach visibility minimums. Pavement

strength is predicated upon the critical aircraft's weight and how that weight is distributed through the landing gear configuration.

3.1 Runway 17-35 Length Considerations

The current runway length at Concord Municipal Airport is capable of safely accommodating nearly every single-engine piston, multi-engine piston, and a majority of the twin turbo-prop general aviation aircraft. Therefore, the length analysis was conducted to determine what aircraft in the current business jet fleet could operate to and from the airfield. In addition, the lengths required to accommodate additional business jet aircraft were also outlined to help determine the ultimate runway length that should be preserved. Specific airport characteristics were utilized in establishing the required runway lengths including: local temperature averages, precipitation levels, airfield elevations, and the proximity of the airport within the national airspace system.

3.2 FAA Runway Length Recommendations

The FAA, when reviewing need for runway lengthening, generally relies on its own runway length software program that is part of the Airport Design software package. This program provides an assessment of runway length needs for generalized groupings of aircraft and factors in several key airport and runway elements, which include: airport elevation, mean daily maximum temperature (of the hottest month), maximum difference in runway centerline elevation, average length of haul (for aircraft over 60,000 pounds), and typical weather conditions.

3.2.1 Runway Length Requirements for Specific Aircraft

In addition to the FAA calculations, another more detailed runway length analysis was conducted. This analysis calculated runway length figures using airfield conditions for Concord Municipal Airport and input from specific aircraft manufacturers, industry databases, and aircraft performance manuals. The resulting lengths, shown in **Table C**, list some of the most common business jets today, their ARC, maximum allowable takeoff weight, and the corresponding runway length required. Although this is not a complete list of the aircraft expected to utilize the airfield, it does provide greater detail than the more general figures calculated by the FAA software.

Table C
RUNWAY LENGTHS REQUIRED FOR BUSINESS JETS
Concord Municipal Airport

Aircraft	Airport Reference Code (ARC)	Maximum Allowable Takeoff Weight (pounds)	Maximum Allowable Takeoff Length (feet)
Learjet 28/29	B-I	15,000	3,878
Citation I	B-I	11,850	3,914
Citation V	B-II	15,900	4,009
Citation Ultra	B-II	16,300	4,032
Learjet 24	C-I	13,000	4,056
Citation Excel	B-II	18,700	4,310
Citation II	B-II	13,300	4,352
Learjet 31A	C-I	16,500	4,399
Premier Jet	B-I	12,500	4,756
Beechjet 400A	B-I	16,100	4,768
Learjet 25	C-I	15,000	5,002

Learjet 40	C-I	20,350	5,340
Learjet 45	C-I	20,500	5,416
Sabreliner 80	C-II	24,500	5,452
Falcon 10	B-I	18,740	5,594
Citation VI	C-II	22,000	5,819
Citation VII	C-II	22,450	5,819
Falcon 50	B-II	37,480	5,830
Sabreliner 40	B-I	18,650	5,949
Falcon 50EX	B-II	39,700	6,055
Falcon 900	B-II	45,500	6,109
Falcon 900C	B-II	45,500	6,109
Falcon 20	B-II	28,660	6,126
Learjet 35A/36A	D-I	18,300	6,152
Hawker 800XP	B-II	28,000	6,221
Sabreliner 60	B-I	20,000	6,304
Gulfstream III	C-II	68,700	6,321
Citation X	C-II	36,100	6,351
Citation III	B-II	22,200	6,363
Sabreliner 65	B-II	24,000	6,363
Falcon 200	B-II	30,650	6,422
Falcon 7X	B-III	63,700	6,422
Falcon 900EX	B-II	47,185	6,440
Hawker Horizon	B-II	36,000	6,481
IAI Westwind 1124A	C-I	23,500	6,481
Boeing 727	C-III	169,000	6,496
Challenger 601	B-II	43,250	6,659
Falcon 2000	B-II	35,000	6,706
Gulfstream IV	D-II	71,780	6,718
Learjet 60	C-I	23,500	6,718
Learjet 55C	C-I	21,500	6,893
Global Express	C-III	91,000	6,919
Gulfstream II	D-II	65,300	6,925
Challenger 604	C-II	47,600	7,012
Falcon 2000EX	B-II	40,700	7,085
Boeing Business Jet	C-III	171,000	7,120
Falcon 20-5	B-II	29,100	7,156
Gulfstream V	C-III	89,000	7,357

Source: Aircraft manufacturers, industry databases, and aircraft performance manuals.

There are 48 of the most popular business jet aircraft today listed in **Table C**. Based on the calculations conducted for these specific aircraft, the current 6,005-foot runway at Concord Municipal Airport will only accommodate 19 of the 48 business jets without any weight restrictions. While this table is not

intended to imply that each specific aircraft listed will frequent the airport, it does serve to illustrate that the current runway length is not adequate for a majority of the business jet fleet operating today. Therefore, an extension to increase the capability of the runway should be considered.

The following list provides the number of aircraft that various runway extensions would support from the listing in **Table C**.

5,000 feet	11 of 48 (23%)
5,500 feet	14 of 48 (29%)
6,005 feet (current)	19 of 48 (39%)
6,505 feet	36 of 48 (75%)
7,005 feet	43 of 48 (90%)
7,505 feet	48 of 48 (100%)

If Runway 17-35 at Concord Municipal Airport were increased to 6,500 feet, it would only accommodate 17 additional unrestricted aircraft.

3.2.2 Recommended Runway Length for Concord Municipal Airport

The methodology utilized for the specific aircraft was based on each aircraft operating under the most demanding situation, which is takeoff at the maximum allowable weight. The results from **Table C** show that 75 percent of the 48 aircraft analyzed could operate off of a 6,500-foot runway with a 100 percent useful load.

Most popular business jets are capable of operating on stage lengths far greater than the average 1,500 miles, which are utilized in the FAA runway length model. In fact, most of today's active business jets can easily fly distances that range from 2,000 to upwards of 6,500 miles. This translates into very few instances where the aircraft listed in **Table C** would actually operate out of Concord Municipal Airport at their maximum allowable takeoff weight. Therefore, a runway length of 6,500 feet would adequately serve all 48 of the business jet aircraft analyzed with only a few requiring restrictions on the useful load.

Given the above analyses, it is recommended that the ultimate ability to provide a minimum of 6,500 feet of runway should be preserved at Concord Municipal Airport. While this length may not be needed immediately, it is recommended that the airport sponsor properly plan to ultimately have the ability to provide such a length in the future. This includes protecting (or acquiring) the land and airspace associated with this length. An overall length of 6,500 feet would enhance the ability to serve the entire business/corporate fleet of jet aircraft. Such a length would also enhance the airport's role as a community business airport.

Appendix I: Letter to the New Hampshire Division of Historical Resources and Their Response

HTA
Consulting Engineers
45 Bromfield Street, Suite 1001 • Boston • MA 02108 • 617 423 3600 • Fax 617 423 4168 • www.hoyletanner.com

January 13, 2005

James McConaha
State Historic Preservation Officer
New Hampshire Division of Historical Resources
PO Box 2043 or 19 Pillsbury Street, 2nd floor
Concord, New Hampshire 03302-2043

Dear Mr. McConaha:

Re: Historical status of the area surrounding Concord Municipal Airport, Concord, New Hampshire

Hoyle, Tanner & Associates, Inc., is preparing a Master Plan Update for the Concord Municipal Airport located in Concord, New Hampshire. The development of this document involves collecting and evaluating data relating to the airport and surrounding area; and forecasting future growth at the airport. This information is then used as the basis for planning the facilities needed to meet future aviation demands in the area.

Please provide us with any information regarding the status of the surrounding area as to the historic, architectural and archaeological importance of the area, and any impact the project may have on properties listed on or eligible for the National Register of Historic Places or the State Register of Historic Places.

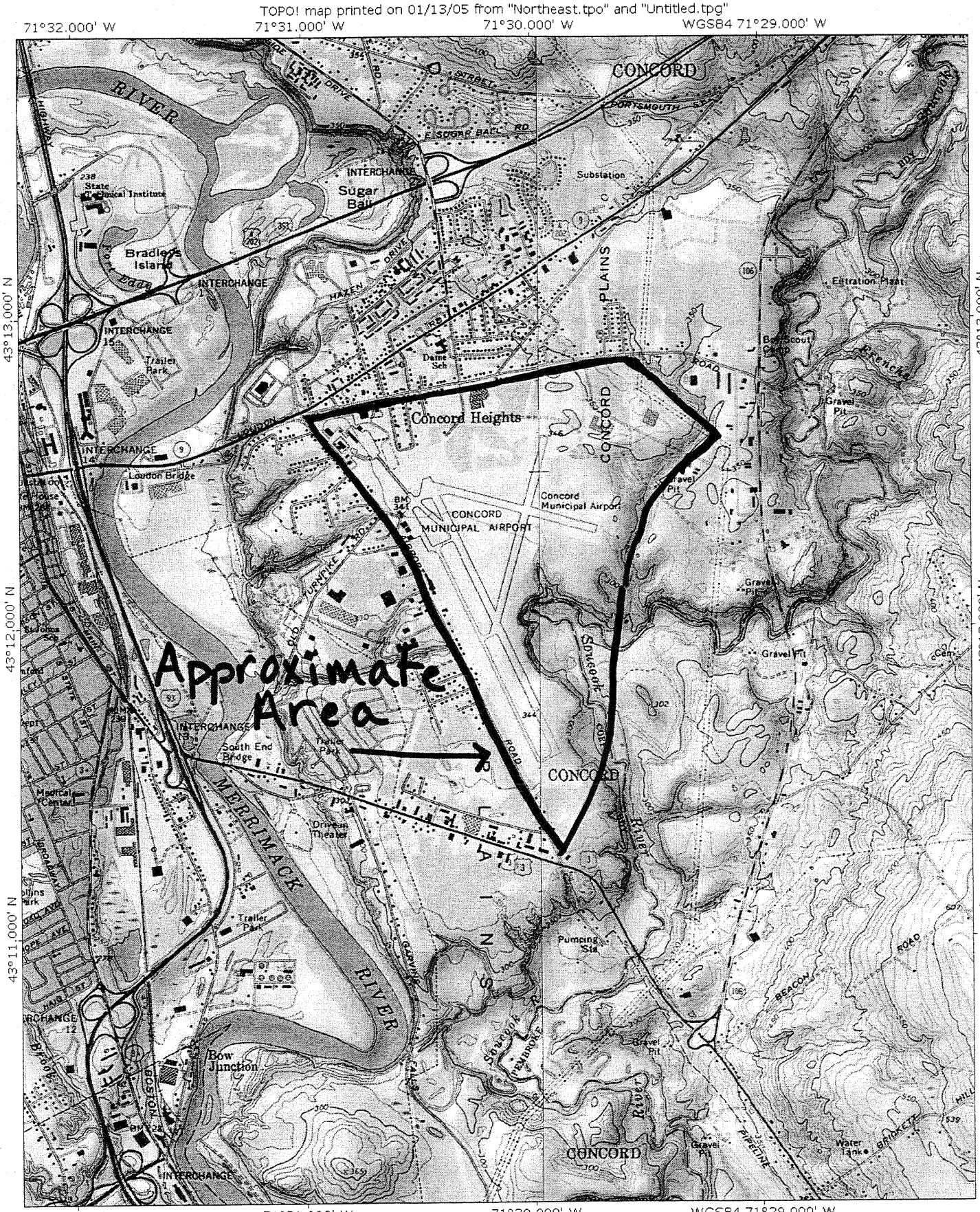
See the attached maps for the project location.

Please e-mail me at kservis@hta-ma.com or call me at (617) 423-3600 if you have any questions.

Sincerely,

Katie R. Servis

Katie R. Servis
Airport Planner - Hoyle, Tanner and Associates, Inc.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71°32.000' W
71°31.000' W
71°30.000' W
WGS84 71°29.000' W
43°13.000' N
43°12.000' N
43°11.000' N
Approximate Area
Concord Heights
CONCORD
CONCORD MUNICIPAL AIRPORT
Concord Municipal Airport
MERRIMACK RIVER
Bradley's Island
Sugar Ball
Bow Junction
South End Bridge
INTERCHANGE 15
INTERCHANGE 14
INTERCHANGE 13
INTERCHANGE 12
Trailer Park
Gravel Pit
Substation
Pumping Sta.
Water Tank
Filtration Plant
Boy Scout Camp
Drive-in Theater
Loudon Bridge
Madbury Cemetery
MILE
1000 FEET
500
1000 METERS
MN 15½°
TN
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State of New Hampshire, Department of Cultural Resources
19 Pillsbury Street, Concord, NH 03301-3570
TDD Access: Relay NH 1-800-735-2964
www.nh.gov/nhdhr

603-271-3483
603-271-3558
FAX 603-271-3433
preservation@nhdhr.state.nh.us

January 28, 2005

Katie Servis
Hoyle, Tanner and Associates, Inc.
45 Bromfield Street, Suite 1001
Boston, MA 02108

Re: Concord Municipal Airport Master Plan, Concord, NH
FAA Environmental Review-Section 106 Review Request

Dear Ms. Servis:

This letter is in response to your letter requesting review for the above referenced proposed plan. Before the Division of Historical Resources (DHR) can make an informed comment on your proposed project impacts to historical resources, our office needs additional information on the presence or absence of archaeological resources and standing structures that may be located within the project area of impact.

There are known archaeological resources located within and in close proximity to the proposed project area. The entire parcel has not been surveyed. This area appears to be archaeologically sensitive with regards to Native American sites and historic sites. The DHR recommends that a professional archaeologist be consulted and that a Phase I Archaeological Survey be conducted.

In addition, the Division needs information with regards to the standing structures located within the project area. More information is needed concerning this resource and a project area survey is required for the above ground resources present. An architectural historian is required to complete this survey.

Thank you. If you have any questions, please call me at 271-2813. Good luck.

Sincerely,

Edna Feighner

Edna Feighner
Review and Compliance Coordinator, NHDHR

cc: James McConaha, SHPO
R. Boisvert, State Archaeologist

Appendix J: Letters Sent to the United States Department of the Interior - Fish and Wildlife Service, the New Hampshire Department of Resources and Economic Development – Divisions of Forests and Lands, and the New Hampshire Fish and Game Department

HTA
Consulting Engineers
45 Bromfield Street, Suite 1001 • Boston • MA 02108 • 617 423 3600 • Fax 617 423 4168 • www.hoyletanner.com

January 13, 2005

United States Department of the Interior
Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

To whom it may concern:

Re: Presence of federally listed and proposed endangered or threatened species at Concord Municipal Airport, Concord, New Hampshire

Hoyle, Tanner & Associates, Inc., is preparing a Master Plan Update for Concord Municipal Airport located in Concord, New Hampshire. The development of this document involves collecting and evaluating data related to the airport and surrounding area; and forecasting future growth at the airport. This information is then used as the basis for planning the facilities needed to meet future aviation demands in the area.

Please provide us with any information on federally listed and/or proposed endangered or threatened species, which utilize the area. We are fully aware of the existing Conservation Management Agreement between the city of Concord, New Hampshire Department of Transportation (NHDOT), the New Hampshire Fish and Game Department and yourselves, which was created for the purpose of managing airport lands that provide and enhance essential habitat for the Karner Blue Butterfly, a Federally and State listed endangered species. However, we need to identify any other federally listed and/or proposed endangered or threatened species, which utilize the area.

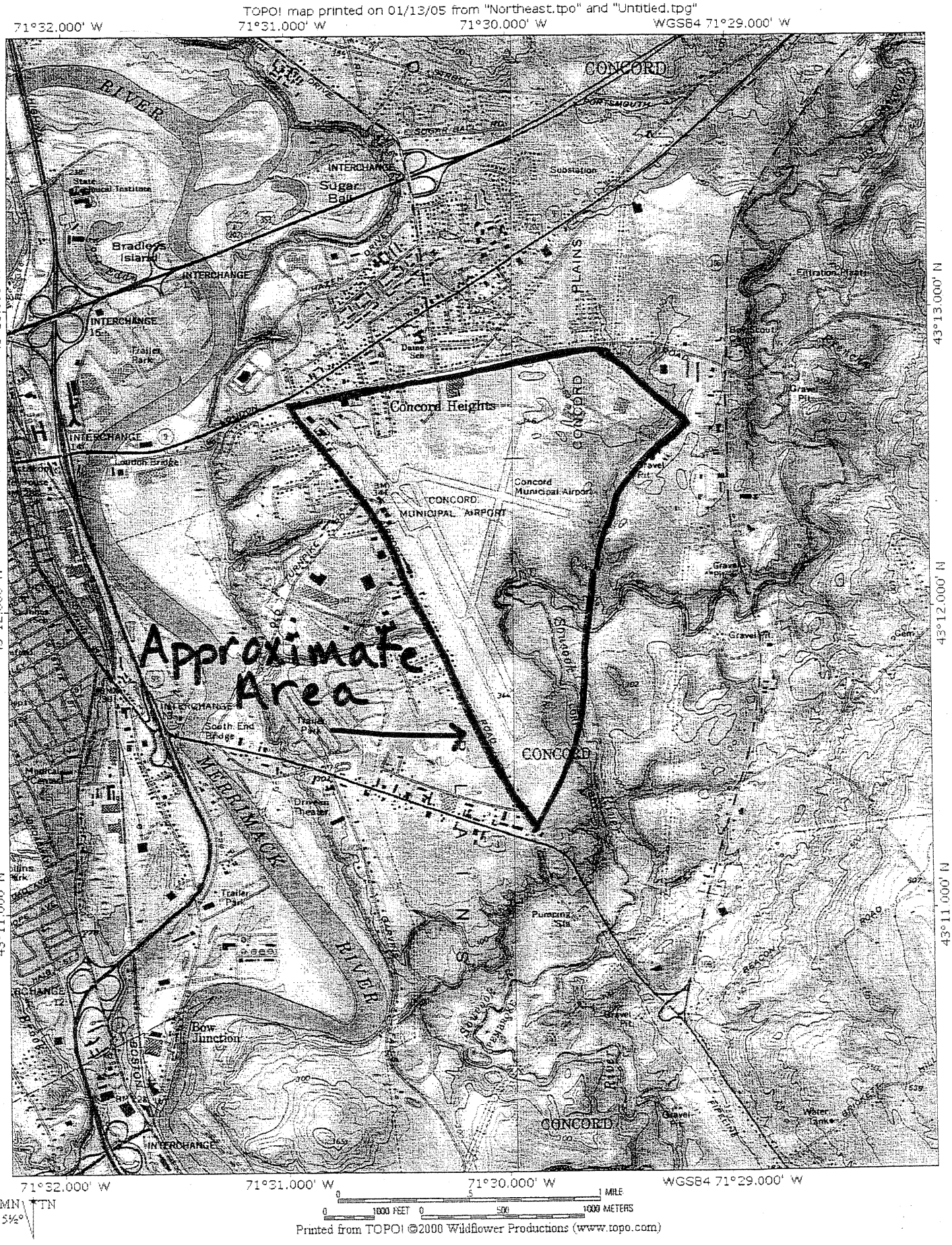
See the attached maps for the project location.

Please e-mail me at kservis@hta-ma.com or call me at (617) 423-3600 if you have any questions.

Sincerely,

Katie R. Servis

Katie R. Servis
Airport Planner - Hoyle, Tanner and Associates, Inc.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43°11.000' N
CONCORD
Concord Heights
Approximate Area
CONCORD MUNICIPAL AIRPORT
Concord Municipal Airport
MERRIMACK RIVER
Bow Junction
Sugar Ball
Bradley Island
INTERCHANGE
Loudon Bridge
South End Bridge
Drive-in Theater
Trailer Park
Gravel Pit
Substation
Filtration Plant
Pumping Sta.
Water Tank
MN 15½°
TN
0 5 1 MILE
0 1000 FEET 0 500 1000 METERS
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HTA
Consulting Engineers
45 Bromfield Street, Suite 1001 • Boston • MA 02108 • 617 423 3600 • Fax 617 423 4168 • www.hoyletanner.com

January 13, 2005

New Hampshire Fish and Game Department
2 Hazen Drive
Concord, New Hampshire 03301-6500

To whom it may concern:

Re: Presence of state-listed and proposed endangered or threatened species at Concord Municipal Airport, Concord, New Hampshire

Hoyle, Tanner & Associates, Inc., is preparing a Master Plan Update for the Concord Municipal Airport located in Concord, New Hampshire. The development of this document involves collecting and evaluating data relating to the airport and surrounding area; and forecasting future growth at the airport. This information is then used as the basis for planning the facilities needed to meet future aviation demands in the area.

Please provide us with any information on state-listed and/or proposed endangered or threatened species in the area. We are fully aware of the existing Conservation Management Agreement between the city of Concord, New Hampshire Department of Transportation (NHDOT), the Fish and Wildlife Service and yourselves, which was created for the purpose of managing airport lands that provide and enhance essential habitat for the Karner Blue Butterfly, a Federally and State listed endangered species. However, we need to identify any other state listed and/or proposed endangered or threatened species, which utilize the area.

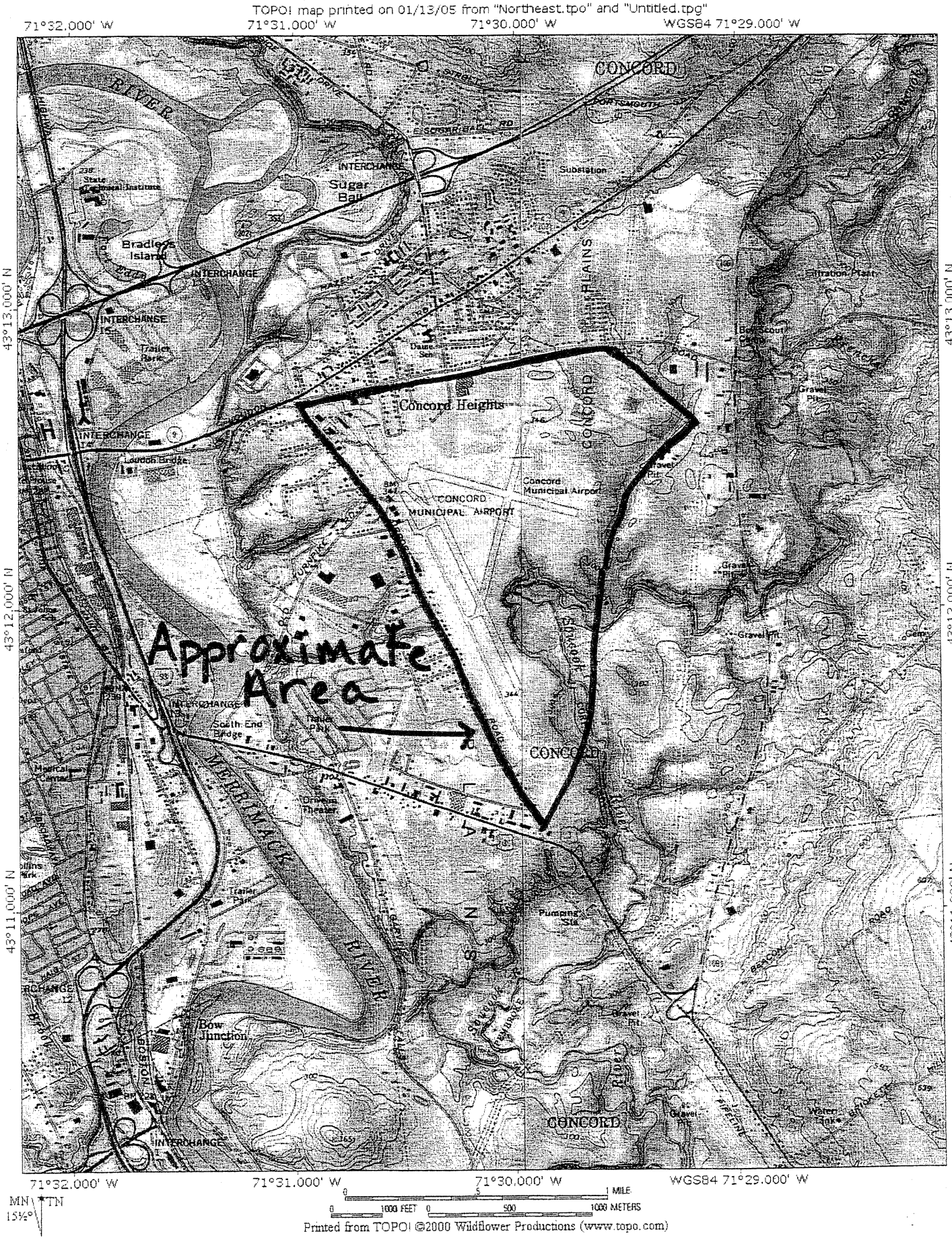
See the attached maps for the project location.

Please e-mail me at kservis@hta-ma.com or call me at (617) 423-3600 if you have any questions.

Sincerely,

Katie R. Servis

Katie R. Servis
Airport Planner - Hoyle, Tanner and Associates, Inc.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CONCORD
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INTERCHANGE
Sugar Ball
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Concord Municipal Airport
Approximate Area
MERRIMACK RIVER
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South End Bridge
Loudon Bridge
Trailer Park
Gravel Pit
Pumping Sta.
Water Tank
MILE
1000 FEET
500
1000 METERS
MN
TN
15½°
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Appendix K: Response Letter From the United States Department of the Interior - Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

February 3, 2005

Katie R. Servis
Hoyle, Tanner & Associates, Inc.
45 Bromfield Street, Suite #1001
Boston, MA 02108

Dear Ms. Servis:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the Master Plan update for the Concord Municipal Airport, Concord, New Hampshire.

Except for transient bald eagles (*Haliaeetus leucocephalus*), the only federally-listed or proposed, threatened or endangered species under the jurisdiction of the U.S. Fish and Wildlife Service that is known to occur in the project area is the Karner Blue Butterfly (*Lycaeides melissa samuelis*). There are, however, approximately 50 records of state-listed rare species and exemplary natural communities in the vicinity of the Concord Municipal Airport. The New Hampshire Natural Heritage Bureau and the New Hampshire Fish and Game Department should be consulted during the development of the Master Plan update to avoid adverse impacts to those species.

The U.S. Fish and Wildlife Service has cooperated with the Federal Aviation Administration and the City of Concord (and its consultants) in the preparation of previous Concord Airport Master Plan updates (e.g., 1996) and intends to participate in the development of this update as well. Preparation of a Biological Assessment or formal consultation with us under Section 7 of the Endangered Species Act is not required at this time, but informal consultation through involvement in meetings and review of draft updates should continue.

This concludes our review of listed species and critical habitat (none designated) in the project location and environs referenced above. Thank you for your coordination. Please contact us at 603-223-2541 when we can be of further assistance.

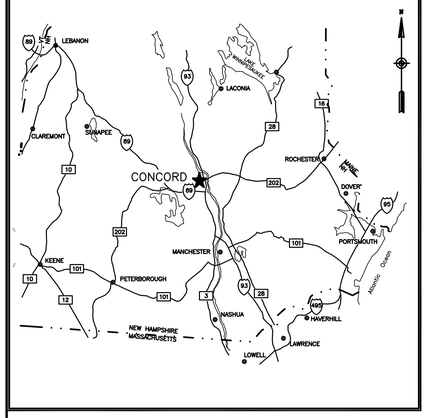
Sincerely yours,

Michael J. Amaral

Michael J. Amaral
Endangered Species Specialist
New England Field Office

CONCORD MUNICIPAL AIRPORT
CONCORD, NEW HAMPSHIRE

MASTER PLAN UPDATE



VICINITY MAP
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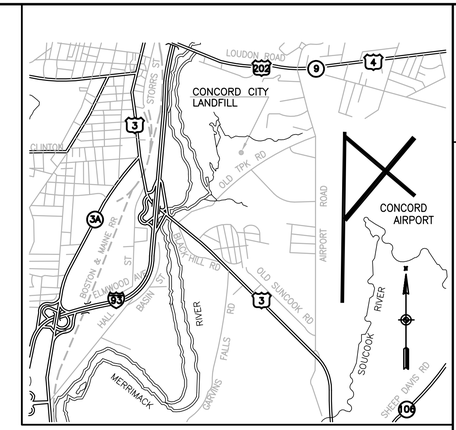


LOCATION MAP
NOT TO SCALE

HTA PROJECT NO. 046312.23
FEDERAL/STATE PROJECT NO. 3-33-0004-17-2004

INDEX TO DRAWINGS

MAY, 2006

ENGINEER'S SEAL

PROJECT DESIGNER
HTA
Consulting Engineers
150 Dow Street – Manchester, NH 03101-1227
Tel 603-669-5555, Fax 603-669-4168
Web Page: www.hta-nh.com

DESIGNED BY: KRS
DRAWN BY: DDS
CHECKED BY: JRL

CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

COVER / TITLE SHEET

SCALE: NONE
DATE: MAY. 2006

REVISIONS

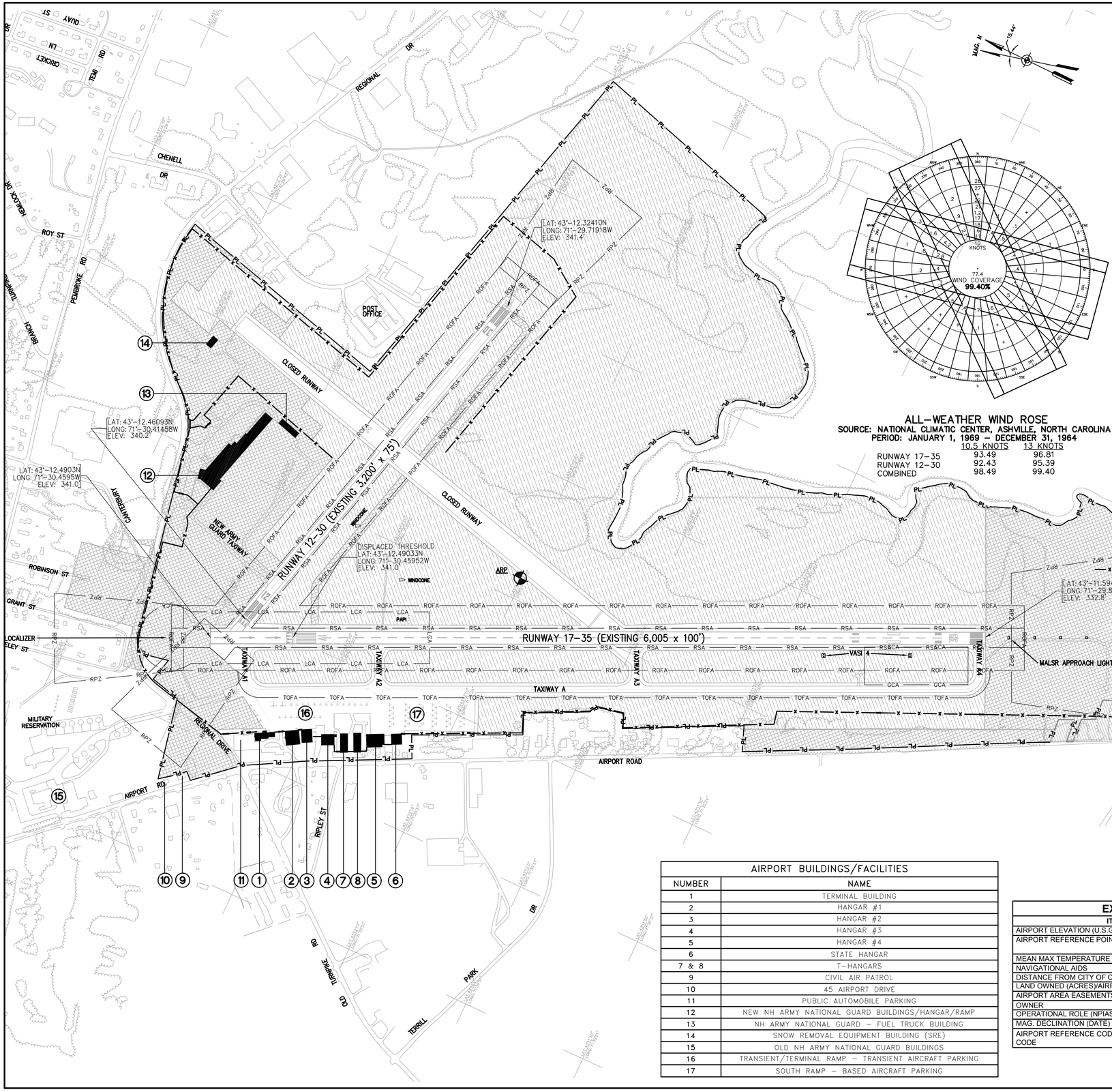
REV. NO.	DATE	DESCRIPTION	BY

DO NOT SCALE DRAWING

PROJ. No.: 046312
FILE NAME: CONCVR
AIP No.: 3-33-0004-17-2004

DRAWING NO.
1

SHEET 1 OF 11



ALL-WEATHER WIND ROSE

SOURCE: NATIONAL CLIMATIC CENTER, ASHVILLE, NORTH CAROLINA
PERIOD: JANUARY 1, 1969 – DECEMBER 31, 1964

	10.5 KNOTS	13 KNOTS
RUNWAY 17-35	93.49	96.81
RUNWAY 12-30	92.43	95.39
COMBINED	98.49	99.40

MAG. N 15.44°

10 KNOTS
77.4
WIND COVERAGE
99.40%

400 0 400
1"=400'

EXISTING RUNWAY DATA

ITEM	RUNWAY 17–35	RUNWAY 12–30
	EXISTING	EXISTING
LENGTH	6005' with a 640-foot displaced threshold on the Runway 17 end	3,200'
WIDTH	100'	75'
TRUE BEARING	RWY 17: 155	RWY 12: 105
	RWY 35: 335	RWY 30: 285
PCI (2003 DATA)	84	90
PAVEMENT STRENGTH (POUNDS)	SWL – 43,000	SWL – 30,000
	DW – 60,000	
SURFACE MATERIAL (CONDITION)	ASPHALT (VERY GOOD)	ASPHALT (EXCELLENT)
	CONSTRUCTED – 1938/1939	CONSTRUCTED – 1938/1939
	RECONSTRUCTED IN 1990	RECONSTRUCTED IN 2002
EFFECTIVE GRADIENT	0.13%	0.07%
CLASSIFICATION/APPROACH CATEGORY	RWY 17: NON-PRECISION	RWY 12: NON-PRECISION
	RWY 35: PRECISION	RWY 30: VISUAL
LOWEST APPROACH MINIMUMS (VISIBILITY/CEILING)	DH 586' & VIS NOT LOWER THAN 3/4-MILE	MDA 800' & VIS NOT LOWER THAN 3/4-MILE
VISUAL/APPROACH AIDS	RWY 17: 4-LIGHT PAPI ON LEFT, UNLIT WINDSOCK ON LEFT	RWY 12: UNLIT WINDSOCK ON RIGHT
	RWY 35: 4-BOX VASI ON LEFT, MM, OM, MALSR	RWY 30: NONE
NAVIGATIONAL AIDS	RWY 17: GPS	RWY 12: VOR OR GPS
	RWY 35: ILS, NDB & GPS	RWY 30: NONE
RUNWAY LIGHTING	HIRL	MIRL
RUNWAY MARKING	RWY 17: NON-PRECISION	RWY 12: NON-PRECISION
	RWY 35: PRECISION	RWY 30: BASIC
DESIGNATED INSTRUMENT RUNWAY	35	NONE
AIRPORT REFERENCE CODE	B-II	B-II
PARALLEL TAXIWAY (WIDTH)	A (50')	NONE
TAXIWAY LIGHTING	NONE	NONE
NOTES:		

EXISTING LEGEND

ITEM	
	BUILDINGS ON AIRPORT PROPERTY
	BUILDINGS OFF AIRPORT PROPERTY
	DEVELOPMENT ZONES (SEE NOTE 1)
	CONSERVATION ZONES (SEE NOTE 1)
PL	AIRPORT PROPERTY LINE
TOFA	TAXIWAY OBJECT FREE AREA
ROFA	RUNWAY OBJECT FREE AREA
RSA	RUNWAY SAFETY AREA
RPZ	RUNWAY PROTECTION ZONE
x x	FENCELINE
	TREELINE
LCA	LOCALIZER CRITICAL AREA
GCA	GLIDESLOPE CRITICAL AREA
	AIRCRAFT TIE-DOWN
	VOR CHECKPOINT / COMPASS ROSE
	AIRPORT REFERENCE POINT (ARP)
	EXISTING EASEMENTS

AIRPORT BUILDINGS/FACILITIES

NUMBER	NAME
1	TERMINAL BUILDING
2	HANGAR #1
3	HANGAR #2
4	HANGAR #3
5	HANGAR #4
6	STATE HANGAR
7 & 8	T-HANGARS
9	CIVIL AIR PATROL
10	45 AIRPORT DRIVE
11	PUBLIC AUTOMOBILE PARKING
12	NEW NH ARMY NATIONAL GUARD BUILDINGS/HANGAR/RAMP
13	NH ARMY NATIONAL GUARD – FUEL TRUCK BUILDING
14	SNOW REMOVAL EQUIPMENT BUILDING (SRE)
15	OLD NH ARMY NATIONAL GUARD BUILDINGS
16	TRANSIENT/TERMINAL RAMP – TRANSIENT AIRCRAFT PARKING
17	SOUTH RAMP – BASED AIRCRAFT PARKING

EXISTING AIRPORT DATA

ITEM	EXISTING
AIRPORT ELEVATION (U.S.G.S. - M.S.L.)	341'
AIRPORT REFERENCE POINT (ARP)	LAT. N43°-12'-06" LONG. W 71°-30'-35"
MEAN MAX TEMPERATURE HOTTEST MONTH	83°F
NAVIGATIONAL AIDS	ILS/GPS/NDB/VOR
DISTANCE FROM CITY OF CONCORD	2 MILES E
LAND OWNED (ACRES)/AIRPORT AREA FEE	614
AIRPORT AREA EASEMENTS (ACRES)	6.4
OWNER	CITY OF CONCORD
OPERATIONAL ROLE (NPIAS)	GA
MAG. DECLINATION (DATE)	15° 30' W (2005)
AIRPORT REFERENCE CODE/AIRPORT DESIGN CODE	B-II

NOTES:
1. A CONSERVATION MANAGEMENT AGREEMENT BETWEEN THE CITY OF CONCORD, THE NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION, THE U.S. FISH AND WILDLIFE SERVICE AND THE NEW HAMPSHIRE FISH AND GAME DEPARTMENT WAS CREATED IN 1995 FOR THE PURPOSE OF MANAGING AIRPORT LANDS THAT PROVIDE AND ENHANCE ESSENTIAL HABITAT FOR THE KARNER BLUE BUTTERFLY, A FEDERALLY AND STATE LISTED ENDANGERED SPECIES. TO PROTECT THE KARNER BLUE BUTTERFLY AND IT'S HABITAT, CONSERVATION AREAS, OR ZONES, WERE CREATED ON THE AIRPORT AND ARE IDENTIFIED HERE ON THE EXISTING AIRPORT LAYOUT PLAN.
2. SUPPLEMENTAL MAINTENANCE AGREEMENT ALLOWS THE CITY TO PERFORM MAINTENANCE ACTIVITIES ON THE PAVEMENT PLUS 15' OFF THE PAVEMENT EDGE.

SOURCE: CITY OF CONCORD, HTA COMPANIES

ENGINEER'S SEAL

PROJECT DESIGNER
HTA Consulting Engineers
150 Dow Street – Manchester, NH 03101-1227
Tel 603-669-5555, Fax 603-669-4168
Web Page: www.hta-nh.com

DESIGNED BY KRS | DRAWN BY DDS | CHECKED BY JRL

CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

EXISTING AIRPORT LAYOUT PLAN

SCALE: 1"=400' | DATE: MAY. 2006

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

DO NOT SCALE DRAWING

PROJ. No.: 046312
FILE NAME: CONEALP
AIP No.: 3-33-0004-17-2004

DRAWING NO. 2

SHEET 2 OF 11

AIRPORT BUILDINGS/FACILITIES

NUMBER	NAME
1	TERMINAL BUILDING
2	HANGAR #1
3	HANGAR #2
4	HANGAR #3
5	HANGAR #4
6	STATE HANGAR
7 & 8	T-HANGARS
9	CIVIL AIR PATROL
10	45 AIRPORT DRIVE
11	PUBLIC AUTOMOBILE PARKING
12	NEW NH ARMY NATIONAL GUARD BUILDINGS/HANGAR/RAMP
13	NH ARMY NATIONAL GUARD - FUEL TRUCK BUILDING
14	SNOW REMOVAL EQUIPMENT BUILDING (SRE)
15	OLD NH ARMY NATIONAL GUARD BUILDINGS
16	TRANSIENT/TERMINAL RAMP - TRANSIENT AIRCRAFT PARKING
17	SOUTH RAMP - BASED AIRCRAFT PARKING

NON-CONFORMING CONDITIONS

DESCRIPTION	EXISTING/ PLANNED	STANDARD	REMARKS	DATE APPROVED
None				

AIRPORT DATA

ITEM	EXISTING/ULTIMATE
AIRPORT ELEVATION (U.S.G.S. - M.S.L.)	341'
AIRPORT REFERENCE POINT (ARP)	LAT. N43°-12'-06" LONG. W 71°-30'-35"
MEAN MAX TEMPERATURE HOTTEST MONTH	83°F
NAVIGATIONAL AIDS	ILS/GPS/NDB/VOR
DISTANCE FROM CITY OF CONCORD	2 MILES E
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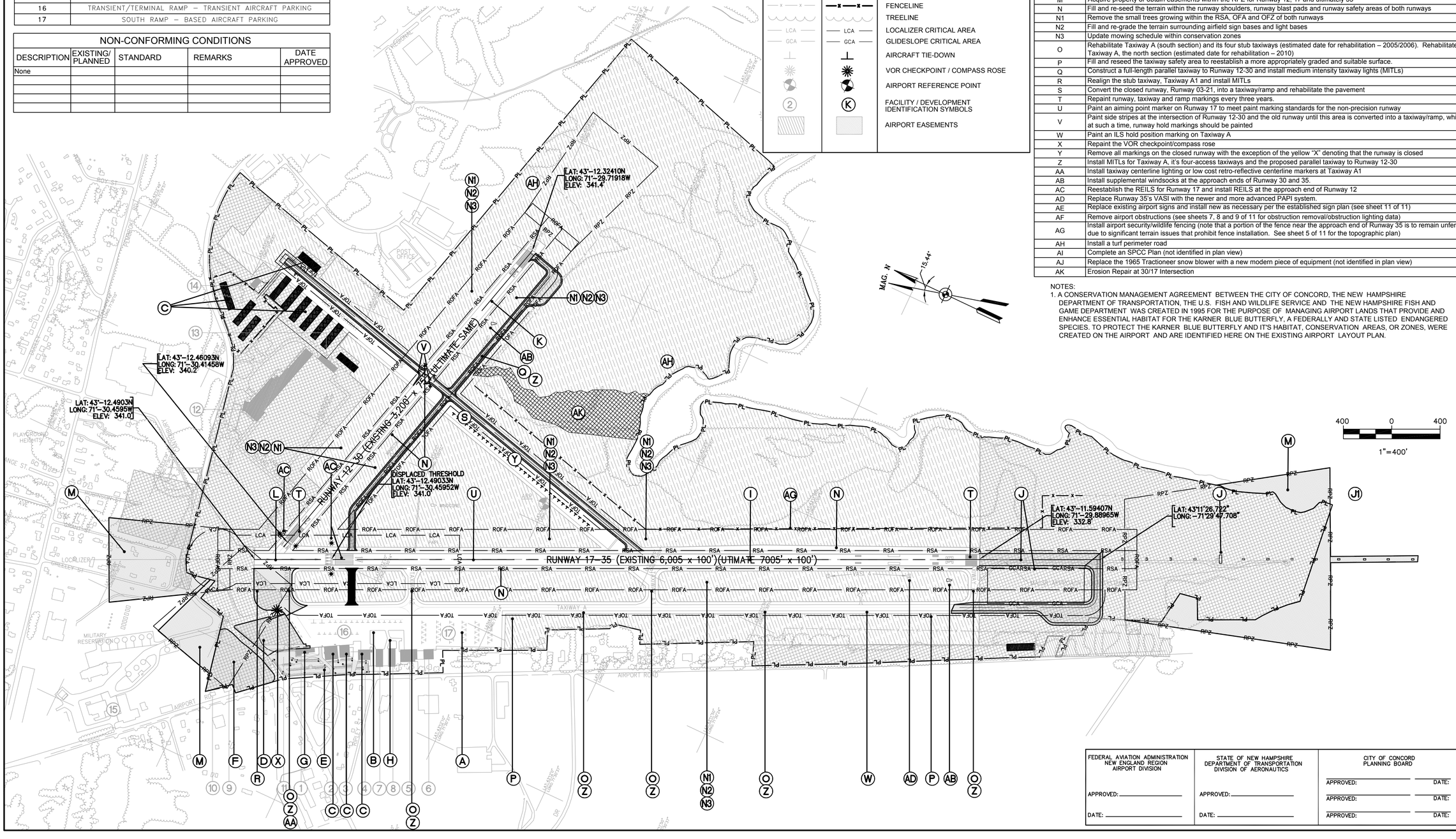
AIRPORT AREA EASEMENTS (ACRES)	6.4
OWNER	CITY OF CONCORD
OPERATIONAL ROLE (NPIAS)	GA
MAG. DECLINATION (DATE)	15° 30' W (2005)
AIRPORT REFERENCE CODE/AIRPORT DESIGN CODE	B-II

ULTIMATE LEGEND

EXISTING	ULTIMATE	ITEM
		BUILDINGS ON AIRPORT PROPERTY
		BUILDINGS OFF AIRPORT PROPERTY
	SAME	DEVELOPMENT ZONES (SEE NOTE 1)
	SAME	CONSERVATION ZONES (SEE NOTE 1)
PL	PL	AIRPORT PROPERTY LINE
TOFA	TOFA	TAXIWAY OBJECT FREE AREA
ROFA	ROFA	RUNWAY OBJECT FREE AREA
RSA	RSA	RUNWAY SAFETY AREA
RPZ	RPZ	RUNWAY PROTECTION ZONE
x x	x x	FENCELINE
		TREELINE
LCA	LCA	LOCALIZER CRITICAL AREA
GCA	GCA	GLIDESLOPE CRITICAL AREA
		AIRCRAFT TIE-DOWN
		VOR CHECKPOINT / COMPASS ROSE
		AIRPORT REFERENCE POINT
2	K	FACILITY / DEVELOPMENT IDENTIFICATION SYMBOLS
		AIRPORT EASEMENTS



Development ID	Proposed Airport Development
A	Rehabilitate based aircraft storage ramp (estimated date for rehabilitation – 2011)
B	Rehabilitate itinerant aircraft storage ramp (estimated date for rehabilitation – 2011)
C	Construct based aircraft storage hangars and rehabilitate or replace hangars 1, 2, and 3
D	Expand itinerant aircraft storage ramp with concrete paving material to accommodate larger jet aircraft such as the occasional use by Boeing 727's
E	Expand and redesign the existing automobile parking lot located in front of the terminal building creating access from both Airport Road and Regional Drive
F	Create a turf parking lot for overflow automobile rental and fan parking
G	Demolish and construct a new 9,000 square foot terminal facility in the location of the existing facility (see sheet 5 of 11 for more terminal area development detail)
H	Install an additional 18,000 gallon Jet-A fuel tank during rehabilitation of the based or itinerant aircraft ramps
I	Rehabilitate Runway 17-35 and remove 25-foot shoulders (estimated date for rehabilitation – 2010)
J	Extend Runway 17-35 by 1,000 feet on the 35 end and relocate the approach light system (the MALSR),ILS Glideslope Antenna,and Windcone. Extend the parallel taxiway to meet the new runway end.
J1	Determine ultimate Runway visibility minimums for Runway 35
K	Rehabilitate Runway 12-30 (estimated date for rehabilitation – 2022)
L	Provide better marking, signage, lighting and overall maintenance at the intersections of Runway 17 and 12
M	Acquire property or obtain easements within the RPZ for Runway 12, 17 and ultimately 35
N	Fill and re-seed the terrain within the runway shoulders, runway blast pads and runway safety areas of both runways
N1	Remove the small trees growing within the RSA, OFA and OFZ of both runways
N2	Fill and re-grade the terrain surrounding airfield sign bases and light bases
N3	Update mowing schedule within conservation zones
O	Rehabilitate Taxiway A (south section) and its four stub taxiways (estimated date for rehabilitation – 2005/2006). Rehabilitate Taxiway A, the north section (estimated date for rehabilitation – 2010)
P	Fill and reseed the taxiway safety area to reestablish a more appropriately graded and suitable surface.
Q	Construct a full-length parallel taxiway to Runway 12-30 and install medium intensity taxiway lights (MITLs)
R	Realign the stub taxiway, Taxiway A1 and install MITLs
S	Convert the closed runway, Runway 03-21, into a taxiway/ramp and rehabilitate the pavement
T	Repaint runway, taxiway and ramp markings every three years.
U	Paint an aiming point marker on Runway 17 to meet paint marking standards for the non-precision runway
V	Paint side stripes at the intersection of Runway 12-30 and the old runway until this area is converted into a taxiway/ramp, which at such a time, runway hold markings should be painted
W	Paint an ILS hold position marking on Taxiway A
X	Repaint the VOR checkpoint/compass rose
Y	Remove all markings on the closed runway with the exception of the yellow "X" denoting that the runway is closed
Z	Install MITLs for Taxiway A, it's four-access taxiways and the proposed parallel taxiway to Runway 12-30
AA	Install taxiway centerline lighting or low cost retro-reflective centerline markers at Taxiway A1
AB	Install supplemental windsocks at the approach ends of Runway 30 and 35.
AC	Reestablish the REILS for Runway 17 and install REILS at the approach end of Runway 12
AD	Replace Runway 35's VASI with the newer and more advanced PAPI system.
AE	Replace existing airport signs and install new as necessary per the established sign plan (see sheet 11 of 11)
AF	Remove airport obstructions (see sheets 7, 8 and 9 of 11 for obstruction removal/obstruction lighting data)
AG	Install airport security/wildlife fencing (note that a portion of the fence near the approach end of Runway 35 is to remain unfenced due to significant terrain issues that prohibit fence installation. See sheet 5 of 11 for the topographic plan)
AH	Install a turf perimeter road
AI	Complete an SPCC Plan (not identified in plan view)
AJ	Replace the 1965 Tractioneer snow blower with a new modern piece of equipment (not identified in plan view)
AK	Erosion Repair at 30/17 Intersection

NOTES:
1. A CONSERVATION MANAGEMENT AGREEMENT BETWEEN THE CITY OF CONCORD, THE NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION, THE U.S. FISH AND WILDLIFE SERVICE AND THE NEW HAMPSHIRE FISH AND GAME DEPARTMENT WAS CREATED IN 1995 FOR THE PURPOSE OF MANAGING AIRPORT LANDS THAT PROVIDE AND ENHANCE ESSENTIAL HABITAT FOR THE KARNER BLUE BUTTERFLY, A FEDERALLY AND STATE LISTED ENDANGERED SPECIES. TO PROTECT THE KARNER BLUE BUTTERFLY AND IT'S HABITAT, CONSERVATION AREAS, OR ZONES, WERE CREATED ON THE AIRPORT AND ARE IDENTIFIED HERE ON THE EXISTING AIRPORT LAYOUT PLAN.

FEDERAL AVIATION ADMINISTRATION NEW ENGLAND REGION AIRPORT DIVISION	STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION DIVISION OF AERONAUTICS	CITY OF CONCORD PLANNING BOARD
APPROVED: _____	APPROVED: _____	APPROVED: _____ DATE: _____
DATE: _____	DATE: _____	APPROVED: _____ DATE: _____
		APPROVED: _____ DATE: _____

ENGINEER'S SEAL

PROJECT DESIGNER

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DESIGNED BY KRS | DRAWN BY DDS | CHECKED BY JRL

CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

ULTIMATE AIRPORT LAYOUT PLAN

DATE: MAY, 2006

SCALE: 300

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

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PROJ. No.: 046312

FILE NAME: CONPALP

AIP No.: 3-33-0004-17-2004

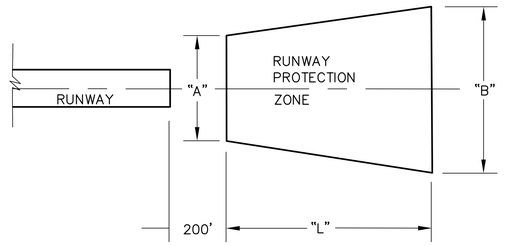
DRAWING NO. 3

SHEET 3 OF 11

ULTIMATE RUNWAY DATA

ITEM	RUNWAY 17-35	RUNWAY 17-35	RUNWAY 12-30	RUNWAY 12-30
	EXISTING	ULTIMATE	EXISTING	ULTIMATE
LENGTH	6005' with a 640-foot displaced threshold on the Runway 17 end	7005' with a 640-foot displaced threshold on the Runway 17 end	3,200'	SAME
WIDTH	100'	SAME	75'	SAME
RUNWAY THRESHOLD COORDINATES - NAD 83	RUNWAY 17-35	RUNWAY 17-35	RUNWAY 12-30	RUNWAY 12-30
	RUNWAY 17	RUNWAY 17	RUNWAY 12	RUNWAY 12
	43-12.49033N	SAME	43-12.46093N	SAME
	071-30.45952W	SAME	071-30.41458W	SAME
	RUNWAY 35	RUNWAY 35	RUNWAY 30	RUNWAY 30
	43-11.59407N	43-11.26722	43-12.32410N	SAME
	071-29.88965W	071-29.47708	071-29.71918W	SAME
RUNWAY THRESHOLD ELEVATION	RWY17: 341.0' (FOR BOTH THE THRESHOLD AND DISPLACED THRESHOLD)	RWY17: 341.0' (FOR BOTH THE THRESHOLD AND DISPLACED THRESHOLD)	RWY 12: 340.2'	SAME
	RWY 35: 332.8'	RWY 35: TBD	RWY 30: 341.4'	SAME
TRUE BEARING	RWY 17: 155	RWY 17: 155	RWY 12: 105	SAME
	RWY 35: 335	RWY 35: 335	RWY 30: 285	SAME
PCI (2003 DATA)	84	UNKNOWN BUT WILL DETERIORATE WITH TIME	90	UNKNOWN BUT WILL DETERIORATE WITH TIME
PAVEMENT STRENGTH (POUNDS)	SWL - 43,000	SAME	SWL - 30,000	SAME
	DW - 60,000	SAME		
SURFACE MATERIAL (CONDITION)	ASPHALT (VERY GOOD)	UNKNOWN BUT WILL DETERIORATE WITH TIME		
	CONSTRUCTED - 1938/1939			
	RECONSTRUCTED IN 1990			
EFFECTIVE GRADIENT	0.13%	TBD	0.07%	SAME
CLASSIFICATION/APPROACH CATEGORY	RWY 17: NON-PRECISION	SAME	RWY 12: NON-PRECISION	SAME
	RWY 35: PRECISION	SAME	RWY 30: VISUAL	SAME
LOWEST APPROACH MINIMUMS (VISIBILITY/CEILING)	DH 586' & VIS NOT LOWER THAN 3/4-MILE	TBD	MDA 800' & VIS NOT LOWER THAN 3/4-MILE	SAME
VISUAL/APPROACH AIDS	RWY 17: 4-LIGHT PAPI ON LEFT, UNLIT WINDSOCK ON LEFT	RWY 17: 4-LIGHT PAPI ON LEFT, REILS, UNLIT WINDSOCK ON LEFT	RWY 12: UNLIT WINDSOCK ON RIGHT	RWY 12: UNLIT WINDSOCK ON RIGHT, REILS
	RWY 35: 4-BOX VASI ON LEFT, MM, OM, MALSR	RWY 35: 4-LIGHT PAPI ON LEFT, MM, OM, MALSR, SUPPLEMENTAL WINDSOCK	RWY 30: NONE	RWY 30: SUPPLEMENTAL WINDSOCK
NAVIGATIONAL AIDS	RWY 17: GPS	SAME	RWY 12: VOR OR GPS	SAME
	RWY 35: ILS, NDB & GPS	SAME	RWY 30: NONE	SAME
RUNWAY LIGHTING	HIRL	SAME	MIRL	SAME
RUNWAY MARKING	RWY 17: NON-PRECISION	SAME	RWY 12: NON-PRECISION	SAME
	RWY 35: PRECISION	SAME	RWY 30: BASIC	SAME
DESIGNATED INSTRUMENT RUNWAY	35	SAME	NONE	SAME
AIRPORT REFERENCE CODE	B-II	SAME	B-II	SAME
PARALLEL TAXIWAY (WIDTH)	A (50')	SAME	NONE	35
TAXIWAY LIGHTING	NONE	MITL	NONE	MITL

NOTES:



RUNWAY PROTECTION ZONE DATA - EXISTING AND ULTIMATE

	RUNWAY	"L"	"A"	"B"
FUTURE	17 (b)	SAME	SAME	SAME
	35 (a)	SAME	SAME	SAME
	12 (b)	SAME	SAME	SAME
	30 (b)	SAME	SAME	SAME
EXISTING	17 (b)	1,000	500	700
	35 (b)	1,700	1,000	1,510
	12 (b)	1,000	500	700
	30 (b)	1,000	500	700

NOTES:
(a) APPROACH MINIMUMS LOWER THAN 3/4 MILE
(b) APPROACH MINIMUMS NOT LOWER THAN 1-MILE

EXISTING AND ULTIMATE B-II AIRPORT DESIGN CRITERIA

Design Elements	B-II Design Criteria (feet unless otherwise indicated)			
Runways				
	17	35	12	30
Runway Protection Zone:	Visibility minimums not lower than 1-mile	Visibility minimums not lower than ¾-mile	Visibility minimums not lower than 1-mile	Visibility minimums not lower than 1-mile
Length	1,000	1,700	1,000	1,000
Inner Width	500	1,000	500	500
Outer Width	700	1,510	700	700
Total Acreage	13.77	48.978	13.77	13.77
Design criteria for category A & B visual runways and runways with not lower than ¾ statute mile visibility minimums				
Runway Width:				
Required Runway Width (actual)	75' (100')		75' (75')	
Runway Shoulder:				
Required width (actual)	10' (10'+)	10' (10'+)	10' (10'+)	10' (10'+)
Runway Blast Pad:				
Required length beyond runway end (actual)	150' (150'+)	150' (150'+)	150' (150'+)	150' (150'+)
Required width beyond runway end (actual)	95' (95'+)	95' (95'+)	95' (95'+)	95' (95'+)
Runway Safety Area:				
Required length prior to landing threshold (actual)	300' (300'+)	300' (300'+)	300' (300'+)	300' (300'+)
Required length beyond runway end (actual)	300' (300'+)	300' (300'+)	300' (300'+)	300' (300'+)
Required width (actual)	150' (150'+)	150' (150'+)	150' (150'+)	150' (150'+)
Runway Object Free Area:				
Required length beyond runway end (actual)	300' (300'+)	300' (300'+)	300' (300'+)	300' (300'+)
Required width (actual)	500' (500')	500' (500')	500' (500'+)	500' (500'+)
Runway Obstacle Free Zone:				
Required length beyond runway end (actual)	200' (200'+)	200' (200'+)	200' (200'+)	200' (200'+)
Required width (actual)	400' (400'+)	400' (400'+)	400' (400'+)	400' (400'+)
Required inner-approach OFZ length (actual)	N/A	2,600' (2,600')	N/A	N/A
Required inner-approach OFZ width (actual)	N/A	500' (500')	N/A	N/A
Required inner-approach OFZ Slope (actual)	N/A	50:1 (34:1)	N/A	N/A
Required inner-transitional OFZ (actual)	N/A	N/A	N/A	N/A
Taxiways				
Width (actual)	35' (50')			
Taxiway Edge Safety Margin (actual)	7.5' (7.5')			
Taxiway Shoulder Width (actual)	10' (10')			
Taxiway Safety Area Width (actual)	79' (79')			
Taxiway Object Free Area Width (actual)	131' (131')			
Runway Separation Standards				
Runway centerline to taxiway/taxilane centerline (actual)	240' (400')			
Runway centerline to aircraft parking area (actual)	250' (500')			

APPROACH SLOPE DATA

	RUNWAY	APPROACH CATEGORY	APPROACH SLOPE
FUTURE	17 (a)	SAME	SAME
	35 (b)	SAME	SAME
	12 (c)	SAME	34:1
	30	SAME	SAME
EXISTING	17 (a)	NON-PRECISION	20:1
	35 (b)	PRECISION	34:1
	12	NON-PRECISION	20:1
	30	VISUAL	20:1

NOTES:

(a) SAME FOR DISPLACED THRESHOLD APPROACH SLOPE

(b) FAR PART 77'S APPROACH SURFACE STANDARDS REQUIRE AN APPROACH SLOPE OF 50:1 FOR A PRECISION APPROACH RUNWAY SUCH AS RUNWAY 35. HOWEVER, THE FAA ACCEPTED A SLOPE OF 34:1 DUE TO THE SURROUNDING MOUNTAINOUS TERRAIN, A COMMON PHENOMENON WITHIN THE NEW ENGLAND REGION. ALTHOUGH THE APPROACH SLOPE OF 50:1 CANNOT BE MET, OTHER IMAGINARY SURFACE CRITERIA, SUCH AS THE HORIZONTAL DISTANCE OF 50,000 FEET, WHICH IS THE STANDARD DISTANCE REQUIRED FOR A 50:1 SLOPE, SHOULD BE MAINTAINED IF AT ALL POSSIBLE.

(c) FAR PART 77'S APPROACH SURFACE STANDARDS REQUIRE AN APPROACH SLOPE OF 34:1 FOR A NON-PRECISION APPROACH RUNWAY SUCH AS RUNWAY 12. HOWEVER, EXISTING STRUCTURES AND OBSTRUCTIONS ONLY ALLOW THE AIRPORT TO MEET A 20:1 SLOPE. THE AIRPORT SHOULD STRIVE TO MEET THE 34:1 REQUIREMENT IF REASONABLY POSSIBLE.

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CHECKED BY: JRL

CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

DATA SHEET

DATE: MAY. 2006
SCALE: NTS

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

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PROJ. No.: 046312
FILE NAME: CONDATA
AIP No.: 3-33-0004-17-2004

DRAWING NO.
4

SHEET 4 OF 11

PROJECT DESIGNER

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CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

TOPOGRAPHIC PLAN

SCALE: 1"=300' | DATE: MAY. 2006

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

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PROJ. No.: 046312

FILE NAME: CONTOPO

AIP No.: 3-33-0004-17-2004

DRAWING NO.

5

SHEET 5 OF 11

300 0 300

1"=300'

REALIGN TAXIWAY
R/W 17 END

ITINERANT RAMP
EXPANSION/DEVELOPMENT

TURF AUTOMOBILE PARKING
LOT DEVELOPMENT AREA

TERMINAL AUTOMOBILE PARKING
LOT DEVELOPMENT AND
REDEVELOPMENT AREA

HISTORIC MARKER

EXISTING AND ULTIMATE
TERMINAL BUILDING

HANGAR #1

HANGAR #2

HANGAR #3

T-HANGAR

T-HANGAR

HANGAR #4

LAT. 43°12'09"
LONG. 71°30'37"

340 338 336 328 330 332 334

LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	PROPOSED DEVELOPMENT	T	EXISTING TIE DOWN
	EXISTING PAVEMENT	TSA	TAXIWAY SAFETY AREA
230	EXISTING CONTOUR (TYP)	TOFA	TAXIWAY OBJECT FREE AREA
	EXISTING BUILDINGS	PL PL PL	AIRPORT PROPERTY LINE
			OFF AIRPORT BUILDINGS

NOTE:
SEE SHEET 3 OF 11 FOR ALL PROPOSED AIRPORT DEVELOPMENT.

60 0 60
1"=60'

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CHECKED BY JRL

CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

TERMINAL AREA PLAN

SCALE: 60
DATE: MAY. 2006

REVISIONS

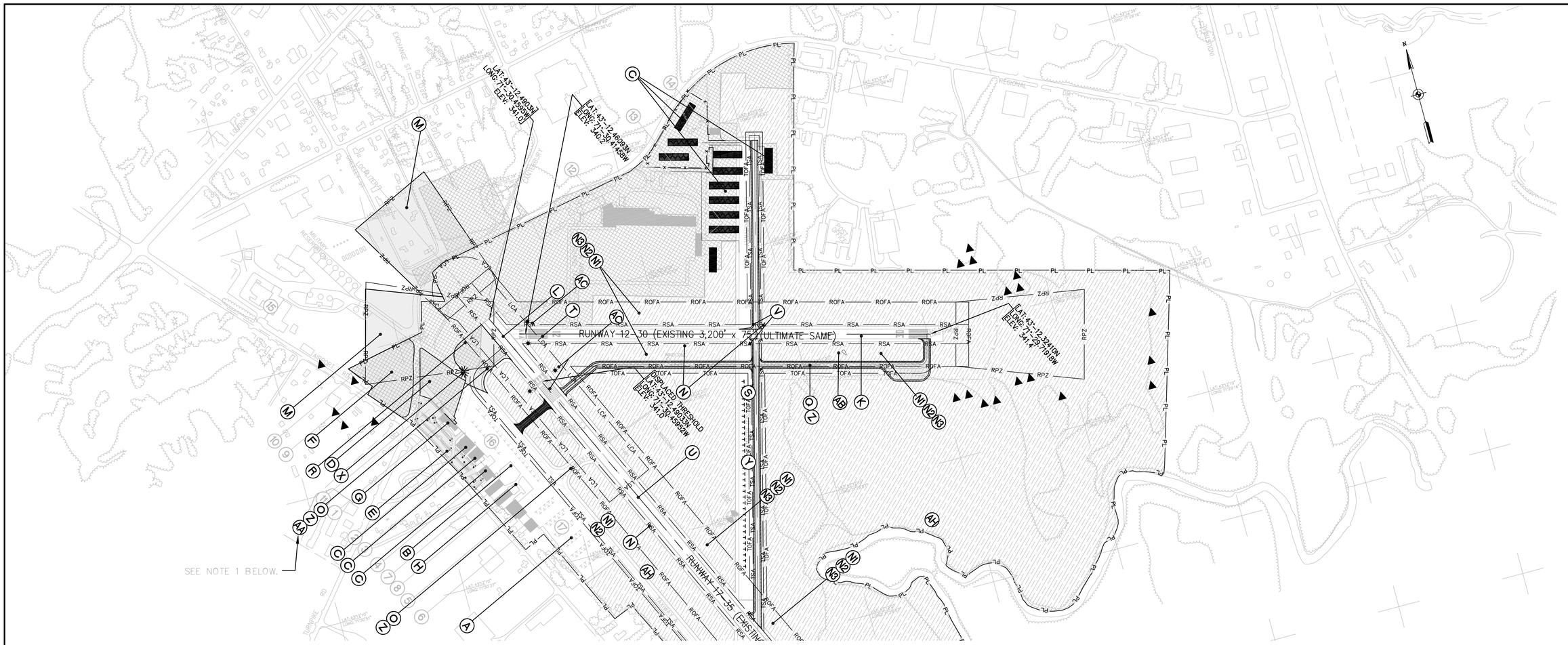
REV. NO.	DATE	DESCRIPTION	BY

DO NOT SCALE DRAWING

PROJ. No.: 046312
FILE NAME: CONTERM
AIP No.: 3-33-0004-17-2004

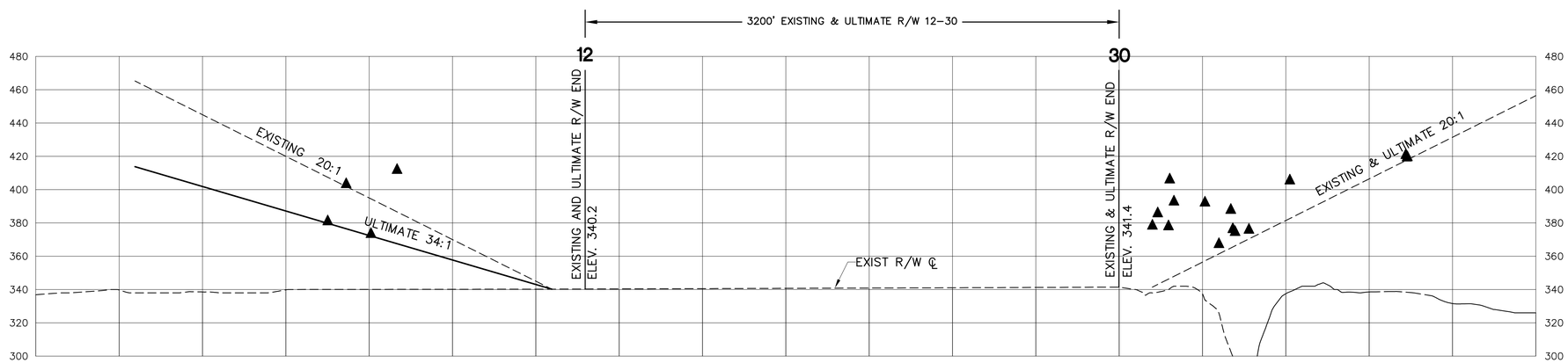
DRAWING NO.
6

SHEET 6 OF 11



PLAN

SCALE: 1"=400'



PROFILE

HORIZONTAL SCALE: 1"=400'
VERTICAL SCALE: 1"=40'

HORZ. SCALE = 1" = 400'
400 0 400
40 0 40
VERT. SCALE = 1" = 40'

▲ APPROACH SURFACE OBJECT PENETRATION

NOTES:

1. SEE SHEET 3 OF 11. WHICH DEPICTS THE PROPOSED DEVELOPMENT THAT IS ASSOCIATED WITH THESE ALPHA-NUMERIC IDENTIFIERS.

ENGINEER'S SEAL

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CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

RUNWAY 12-30 PLAN & PROFILE

SCALE: 1"= 400'
DATE: MAY. 2006

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

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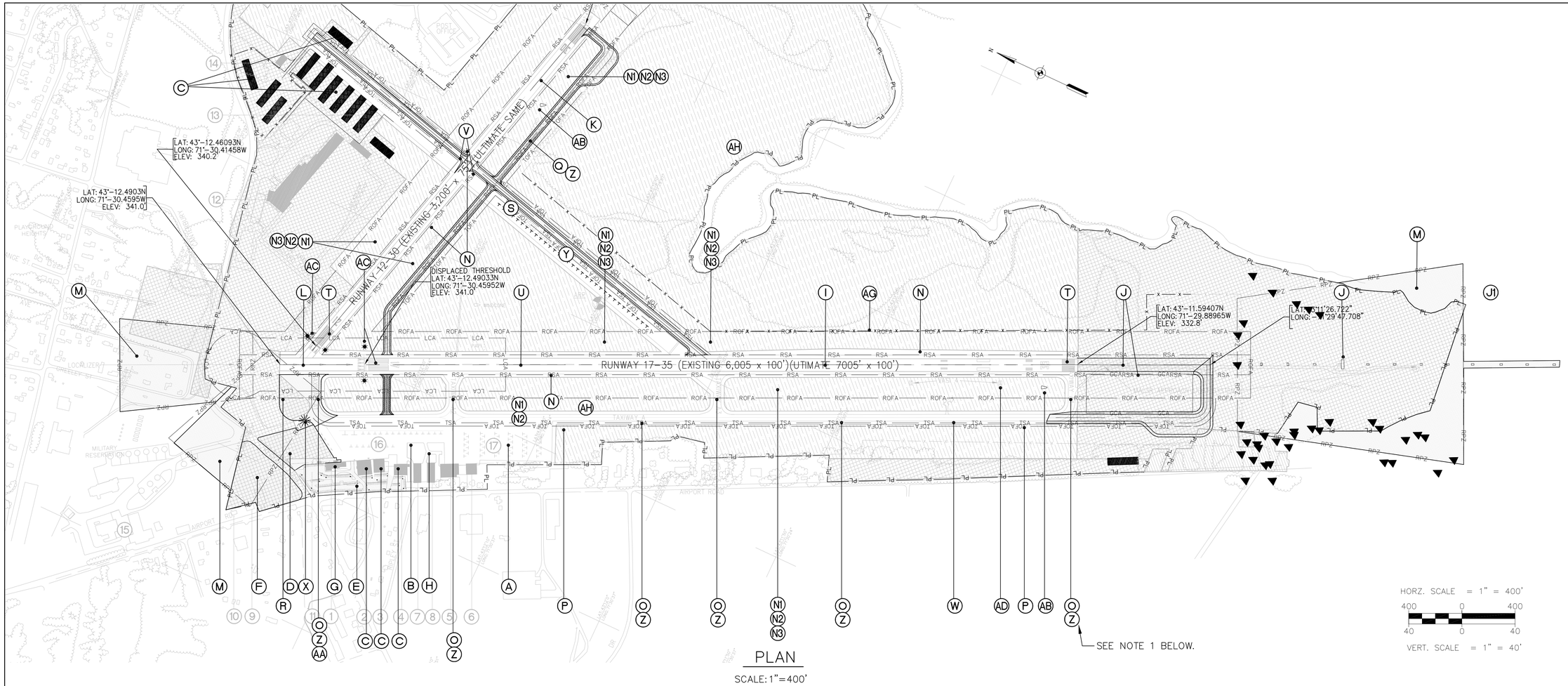
PROJ. No.: 046312
FILE NAME: CONPR12-30
AIP No.: 3-33-0004-17-2004

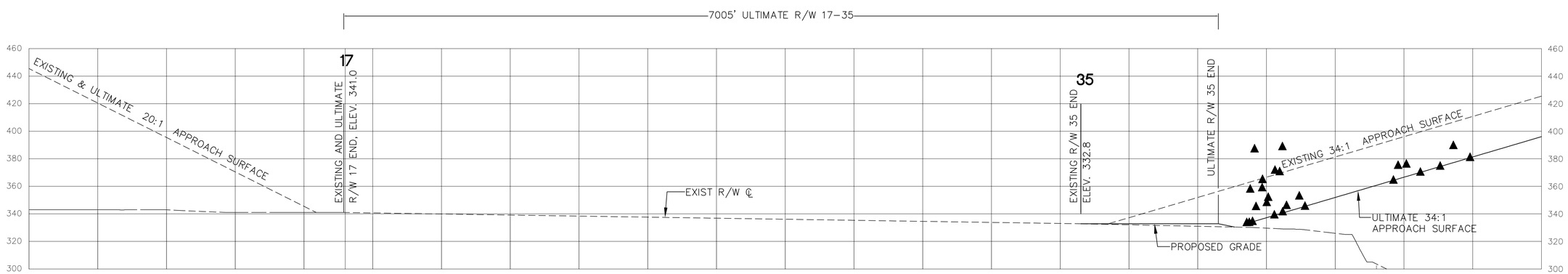
DRAWING NO.
7

SHEET 7 OF 11



PLAN

SCALE: 1"=400'



PROFILE

HORIZONTAL SCALE: 1"=400'
VERTICAL SCALE: 1"=40'

▲ APPROACH SURFACE OBJECT PENETRATION

NOTES:

1. SEE SHEET 3 OF 11. WHICH DEPICTS THE PROPOSED DEVELOPMENT THAT IS ASSOCIATED WITH THESE ALPHA-NUMERIC IDENTIFIERS.

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CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

RUNWAY 17-35 PLAN & PROFILE

DATE: MAY. 2006
SCALE: 1" = 400'

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

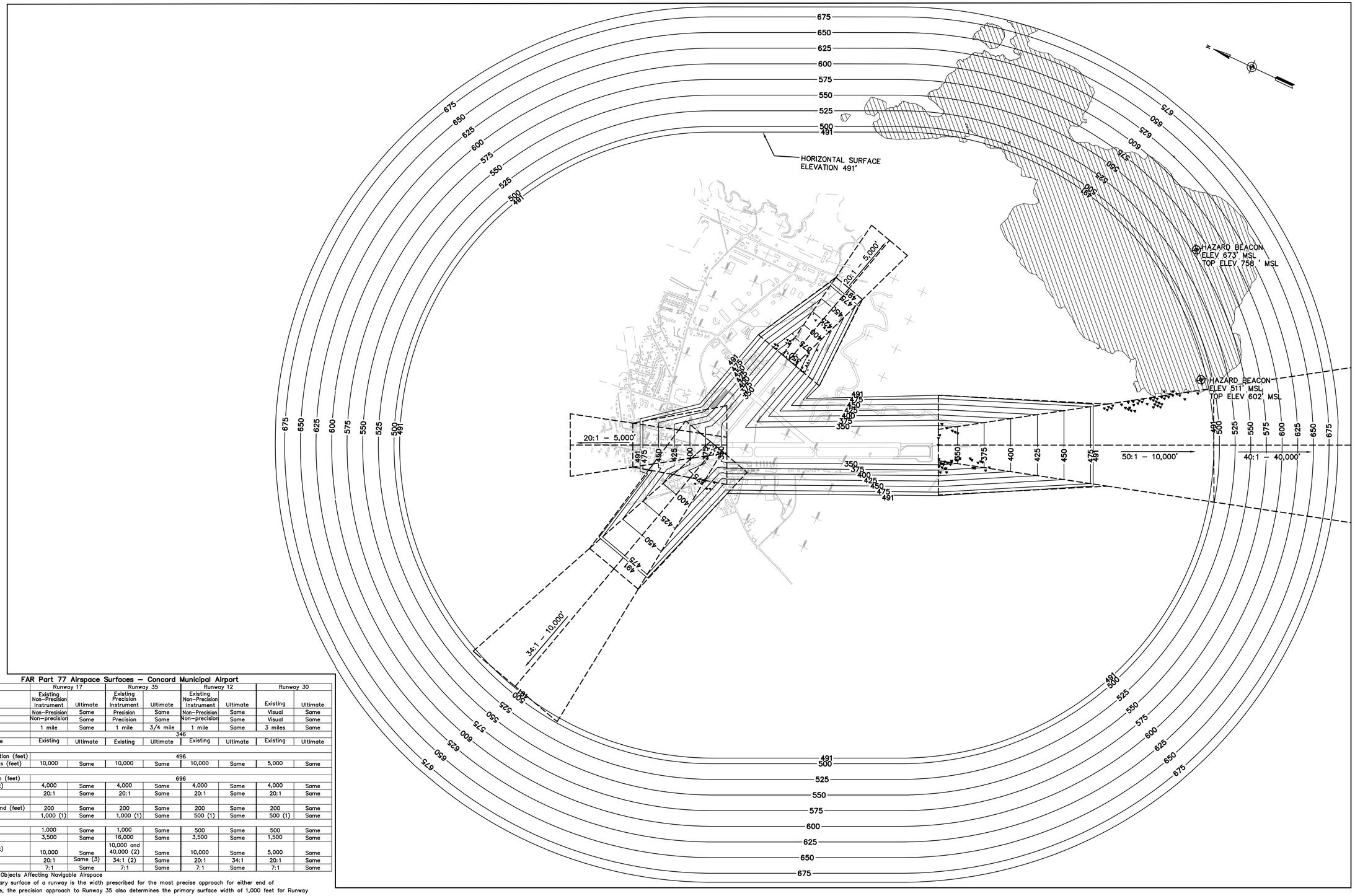
DO NOT SCALE DRAWING

PROJ. No.: 046312
FILE NAME: CONPR17-35
AIP No.: 3-33-0004-17-2004

DRAWING NO.

8

SHEET 8 OF 11



FAR Part 77 Airspace Surfaces – Concord Municipal Airport

Airport Data	Runway 17		Runway 35		Runway 12		Runway 30	
	Existing Non-Precision Instrument	Ultimate	Existing Precision Instrument	Ultimate	Existing Non-Precision Instrument	Ultimate	Existing	Ultimate
Runway Classification	Non-Precision	Same	Precision	Same	Non-Precision	Same	Visual	Same
Approach	Non-precision	Same	Precision	Same	Non-precision	Same	Visual	Same
Visibility Minimums	1 mile	Same	1 mile	3/4 mile	1 mile	Same	3 miles	Same
Airport Elevation (feet)	346							
Airport Imaginary Surface	Existing	Ultimate	Existing	Ultimate	Existing	Ultimate	Existing	Ultimate
Horizontal Surface:								
Horizontal Surface Elevation (feet)	496							
Horizontal Surface Radius (feet)	10,000	Same	10,000	Same	10,000	Same	5,000	Same
Conical Surface:								
Conical Surface Elevation (feet)	696							
Horizontal Distance (feet)	4,000	Same	4,000	Same	4,000	Same	4,000	Same
Slope	20:1	Same	20:1	Same	20:1	Same	20:1	Same
Primary Surface:								
Length beyond runway end (feet)	200	Same	200	Same	200	Same	200	Same
Width (feet)	1,000 (1)	Same	1,000 (1)	Same	500 (1)	Same	500 (1)	Same
Approach Surface:								
Inner Edge Width (feet)	1,000	Same	1,000	Same	500	Same	500	Same
Outer Edge Width (feet)	3,500	Same	16,000	Same	3,500	Same	1,500	Same
Horizontal Distance (feet)	10,000	Same	10,000 and 40,000 (2)	Same	10,000	Same	5,000	Same
Slope	20:1	Same (3)	34:1 (2)	Same	20:1	34:1	20:1	Same
Transitional Surfaces:	7:1	Same	7:1	Same	7:1	Same	7:1	Same

Source: FAR Part 77, Objects Affecting Navigable Airspace

1. The width of the primary surface of a runway is the width prescribed for the most precise approach for either end of that runway; therefore, the precision approach to Runway 35 also determines the primary surface width of 1,000 feet for Runway 17. Likewise, the non-precision approach to Runway 12 also determines the primary surface width of 500 feet for Runway 30.
2. Federal Aviation Regulation Part 77's approach surface standards require a horizontal distance of 10,000 feet at a slope of 50 feet (horizontally) to 1-foot (vertically) with an additional 40,000 feet at a slope of 40 feet (horizontally) to 1-foot (vertically) for all precision instrument runways, such as Runway 35, a precision instrument approach runway with 1-mile visibility minimums. However, many airports within New England cannot meet the 50:1 slope requirements due to the mountainous terrain. Therefore, a slope of 34:1 is acceptable but the airport should strive to meet the 50:1 requirement if reasonably possible.
3. According to discussions with SEA Consultants, Inc., the engineering firm that designed Regional Drive, the roadway was design based on the clearances necessary for a 20:1 approach slope, which was listed as the existing and future slope at the time of the roadway design. However, the runway is a non-utility runway with a non-precision instrument approach, which requires a 34:1 approach slope. The airport should strive to meet the 34:1 requirement if reasonably possible.

LEGEND	
	EXISTING AND ULTIMATE HAZARD BEACONS
	AREAS OF PENETRATION
	PENETRATION POINTS

1500 0 1500

1"=1500'

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CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

FAR PART 77 AIRSPACE SURFACES

SCALE: 1"=1000' | DATE: MAY. 2006

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

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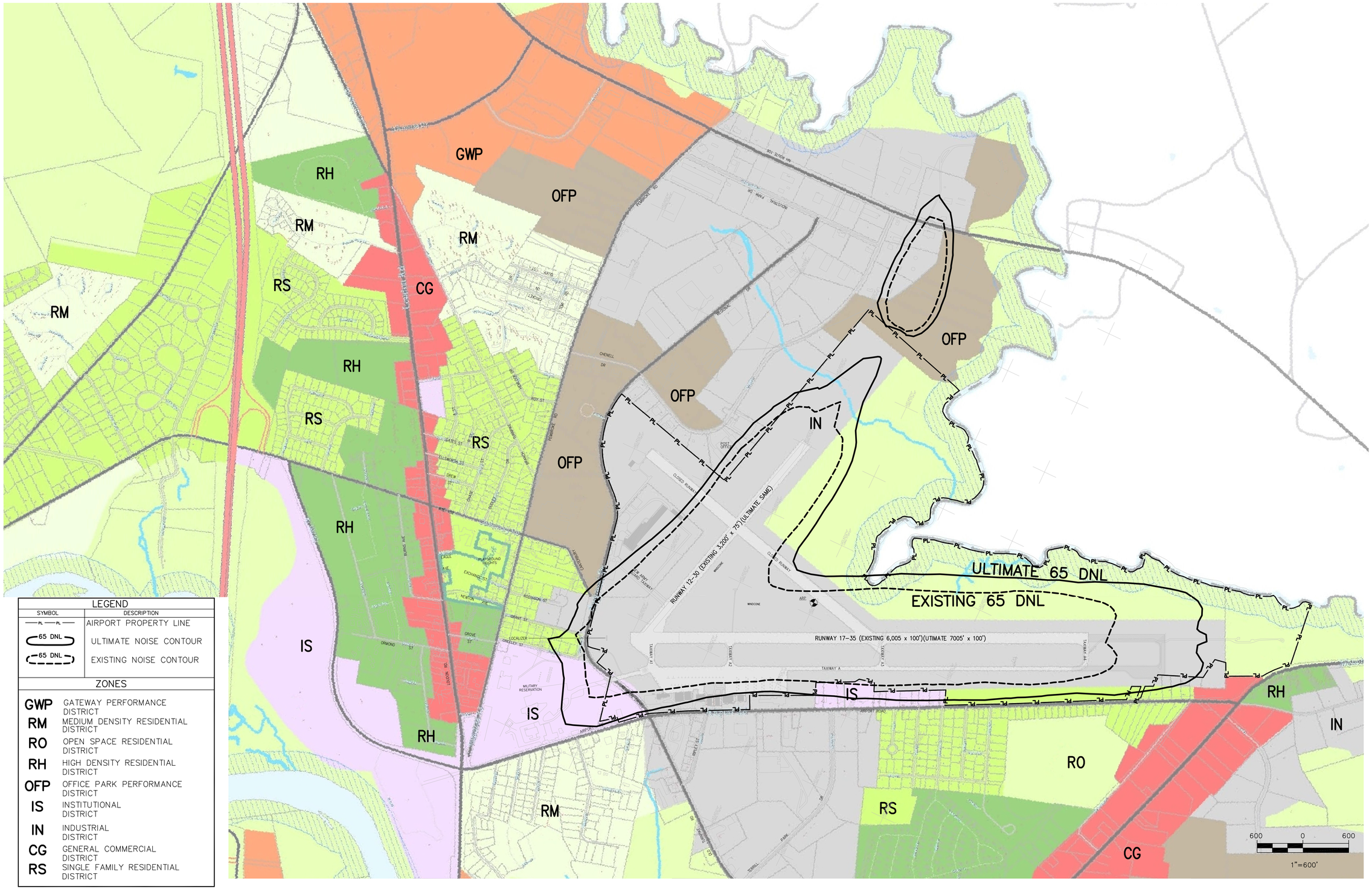
PROJ. No.: 046312

FILE NAME: CONFP77

AIP No.: 3-33-0004-17-2004

DRAWING NO. 9

SHEET 9 OF 11



LEGEND	
SYMBOL	DESCRIPTION
PL — PL	AIRPORT PROPERTY LINE
65 DNL	ULTIMATE NOISE CONTOUR
65 DNL	EXISTING NOISE CONTOUR

ZONES	
GWP	GATEWAY PERFORMANCE DISTRICT
RM	MEDIUM DENSITY RESIDENTIAL DISTRICT
RO	OPEN SPACE RESIDENTIAL DISTRICT
RH	HIGH DENSITY RESIDENTIAL DISTRICT
OFP	OFFICE PARK PERFORMANCE DISTRICT
IS	INSTITUTIONAL DISTRICT
IN	INDUSTRIAL DISTRICT
CG	GENERAL COMMERCIAL DISTRICT
RS	SINGLE FAMILY RESIDENTIAL DISTRICT

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CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

LAND USE AND NOISE CONTOUR

SCALE: 1"=600' | DATE: MAY. 2006

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

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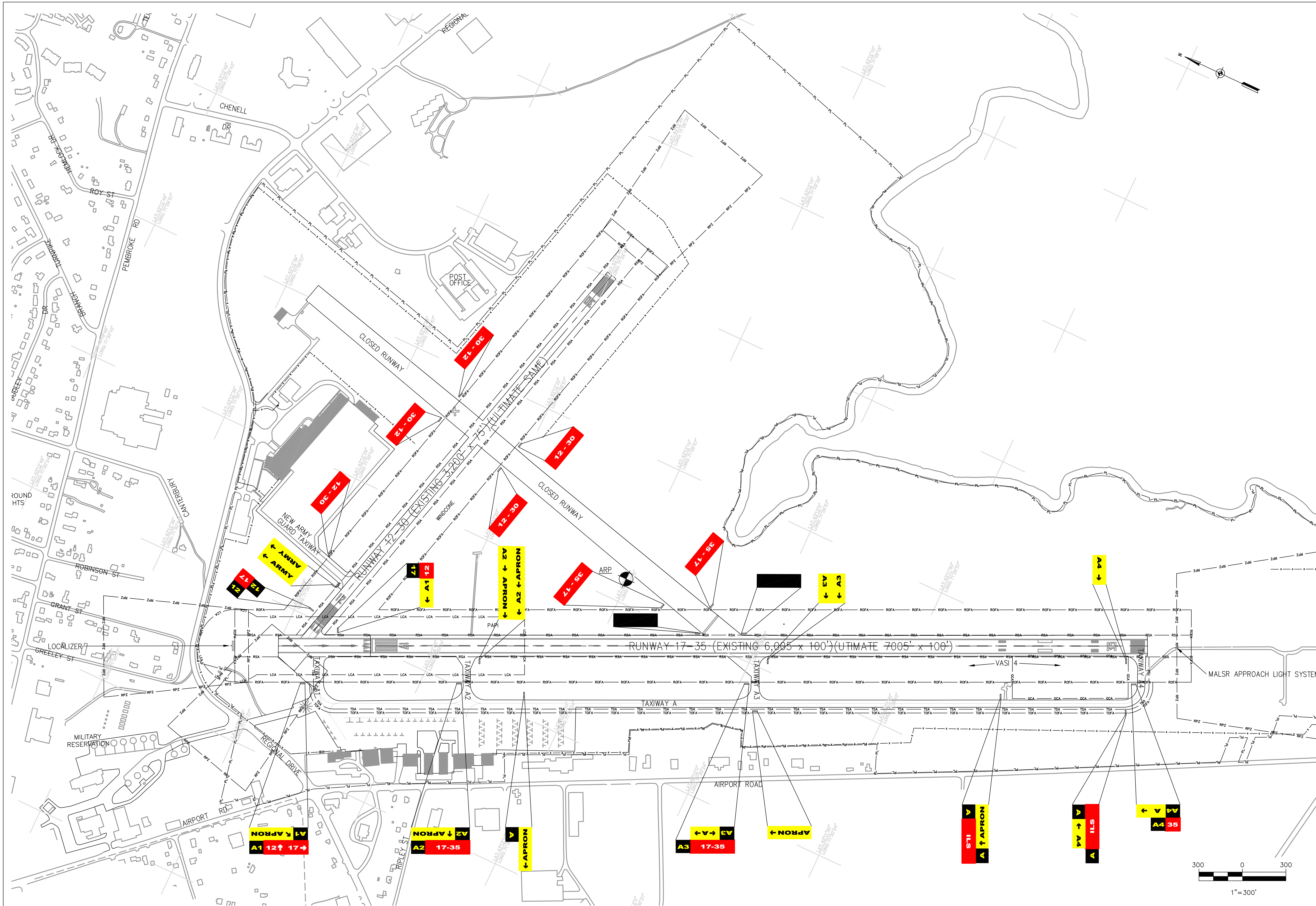
PROJ. No.: 046312
FILE NAME: CONLNDUSE
AIP No.: 3-33-0004-17-2004

DRAWING NO.
10

SHEET 10 OF 11



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CONCORD MUNICIPAL AIRPORT
MASTER PLAN UPDATE

SIGN PLAN

DATE: MAY 2006

SCALE: 1"=300'

REVISIONS

REV. NO.	DATE	DESCRIPTION	BY

DO NOT SCALE DRAWING

PROJ. No.: 046312
FILE NAME: conSIGN.dwg
AIP No.: X-XX-XXXX-XX

DRAWING NO.

11

SHEET 11 OF 11