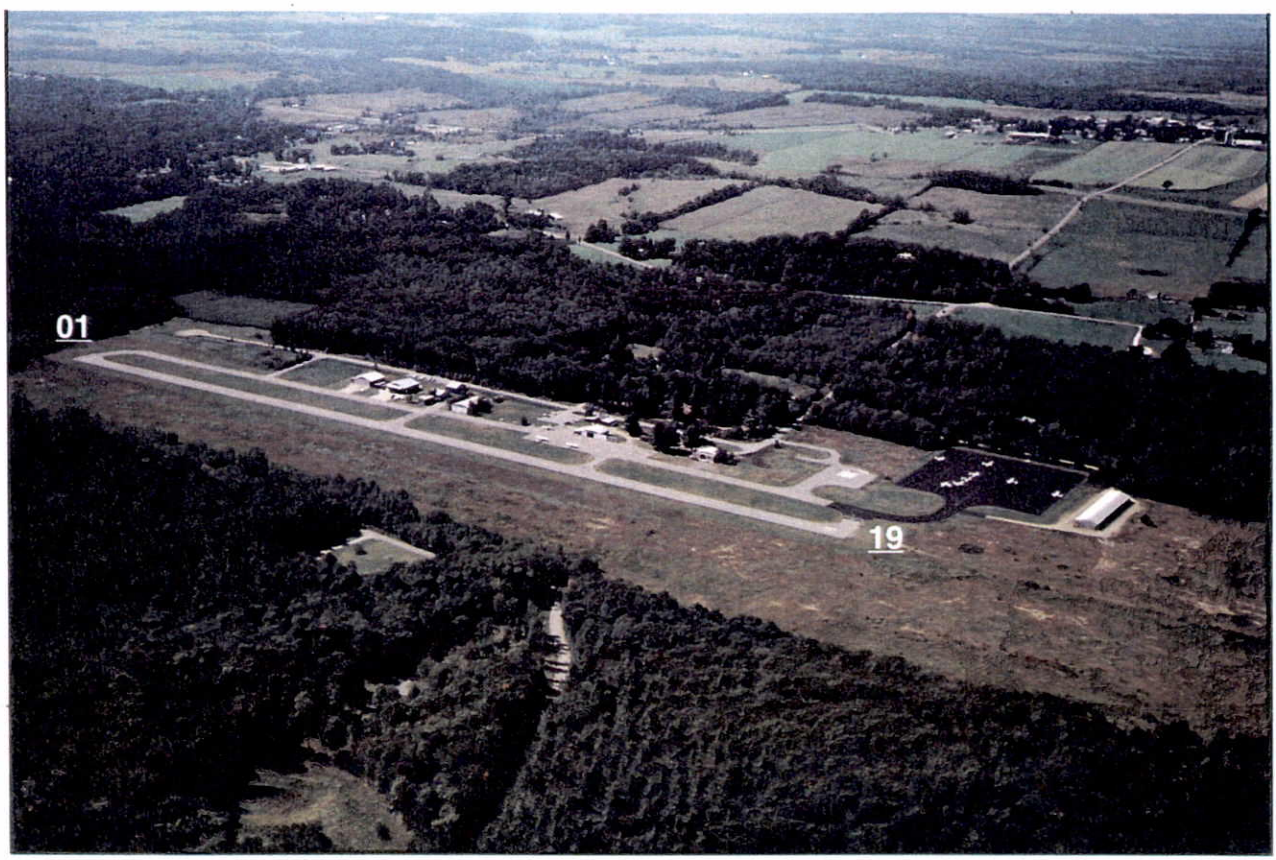
Middlebury State Airport
Airport Layout Plan Update



VTrans Working to Get You There
Vermont Agency of Transportation

Dufresne-Henry
Consulting Engineers

May, 2000

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Chapter One

INTRODUCTION

1.1 General

Middlebury State Airport, located in the Town of ~~Springfield~~ MIDDLEBURY, is one of six state-owned airports where an Airport Layout Plan Update (ALPU) is being undertaken on behalf of the Vermont Agency of Transportation (VAOT). Under the *Vermont Airport Capital Facility Program* completed in early 2000, Middlebury State Airport is classified as a General Aviation Airport. This classification is intended for airports typically designed to support personal flying and/or business flying and usually includes the provision of services for flight activities such as corporate flights, charter activity, recreational flying, flight lessons, etc.

1.2 Purpose of the ALPU

This Airport Layout Plan Update (ALPU) has been undertaken for the purposes of providing up-to-date mapping of Middlebury State Airport and to provide a comprehensive plan for developing the airport to meet the anticipated demand for new and improved facilities based on the level of projected aviation activity.

The facility developments described in this plan are also reflected in the VAOT's recently completed *Vermont Airport Capital Facility Program*. One of the primary goals of this program was to develop a strategic aviation plan for Vermont's ten state-owned airports such that facility enhancements can in the future be prioritized according to a specific set of ranking criteria.

1.3 Components of the ALPU

The Airport Layout Plan Update consists of a series of distinct components listed below.

- Inventory of existing facilities including base mapping.
- Development of aviation forecasts.
- Determination of facility requirements based on demand/capacity.
- Public input.
- Development of ALP drawings.
- Environmental review.

From the mapping of the airport and its environs, Airport Layout Plan drawings are prepared in accordance with current airport design standards mandated by the Federal Aviation Administration (FAA). The drawings accurately reflect both the existing conditions, including ground facilities, airport airspace, approach obstructions and land use, together with ultimate airport facilities required to meet aviation demand during a 20-year planning period.

The following report details these various components and provides a comprehensive plan for development of the airport within a three-phase planning period; a Short-Term phase from Year 1 through Year 5, an Intermediate-Term phase from Year 6 through Year 10 and a Long-Term phase from Year 11 through Year 20. Figure 1-1 shows the inter-relationship between these components.

1.4 The Planning Process for Middlebury State Airport

The inventory phase of the planning process consists of aerial mapping, wetland inventory, archeological overview, land use research, zoning research and the determination of current aviation activity at the airport.

In order to provide current mapping for the airport, aerial photography and photogrammetry was carried out in a two-stage process. In the first stage, aerial mapping was carried out in the Spring of 1999, prior to any leaf cover on the trees, to enable ground contours to be developed. The data gathered from this stage was used to prepare the existing airport layout plan drawing.

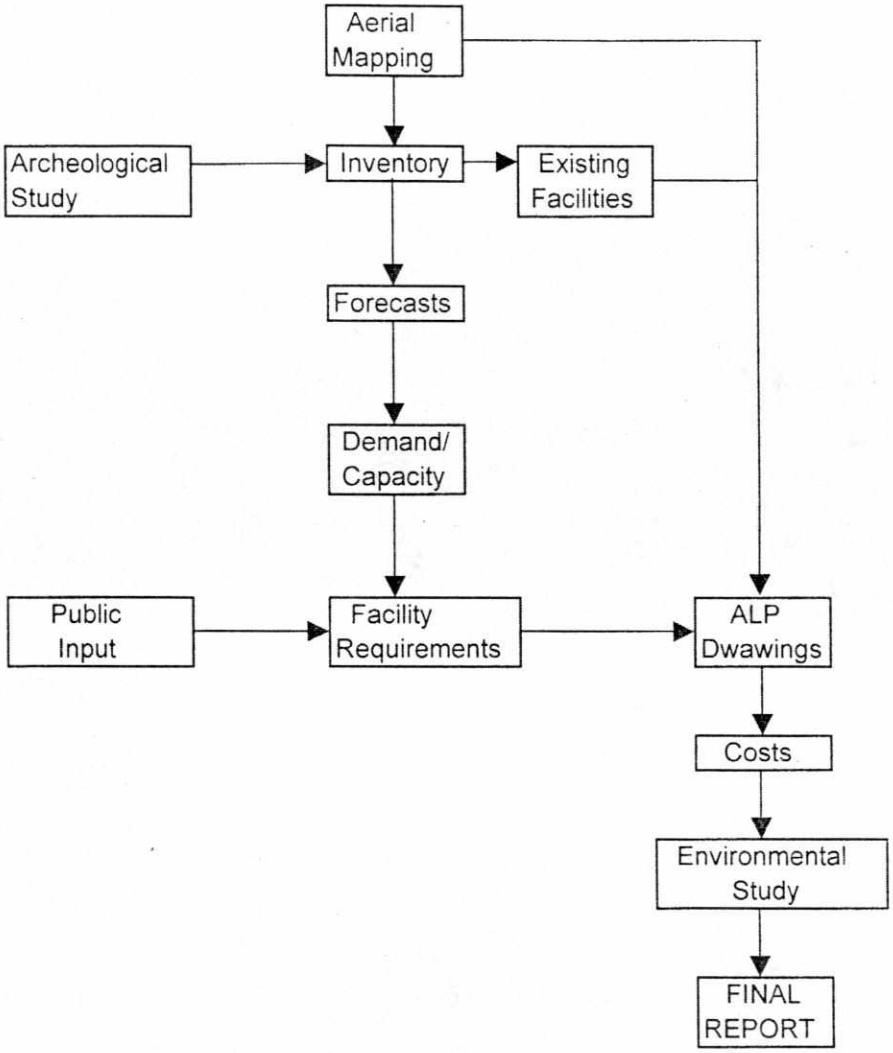
In the second stage, an additional flight was made in the Summer of 1999, after trees were in leaf, in order to determine tree height elevations. This data was then used to determine obstructions in the FAR Part 77 approach and transitional surfaces and produce the necessary airspace plans for the airport as a whole and each individual runway approach.

Existing aviation activity at the airport was based on physical counts as well as discussions with airport management and users. Forecasts of future aviation activity were based on national trend data prepared by the Federal Aviation Administration and, as such, provided unconstrained demand projections for the airport.

In determining future facility needs for an airport to cater for projected demand, the Airport Manager and the Fixed Base Operator (FBO) play a vital role, since both these sources have an intimate knowledge of operational activity and any shortcomings at the airport. Input from these sources together with information from the *Vermont Airport Capital Facility Program* mentioned above, are included in this ALPU to ensure the plans meet the objectives of the State Aviation Program.

A Public Information Meeting was held at the airport on November 17, 1999 and was attended by forty seven (47) people having interests in the development of the airport. At this meeting, VAOT staff and their consultant's representatives explained the overall planning process for an ALP update and detailed the short term (0-5 years) and long term (6-20 years) projects envisioned for the airport.

The evaluation of potential environmental impacts associated with the facility developments proposed in the ALPU is detailed in Chapter 6 of this report. Essentially, the potential impact of each proposed project is evaluated against 20 impact categories defined in the National Environmental Policy Act (NEPA). In addition, the State of Vermont requires all land use projects to comply with Act 250 legislation through the use of 10 essential criteria that must be met in order for the issue of a permit.



Middlebury State Airport

AIRPORT LAYOUT PLAN UPDATE PROCESS

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Figure 1-1

Chapter Two

INVENTORY OF EXISTING FACILITIES

2.1 Introduction

The first step in planning an airport layout plan update is to prepare an inventory of the existing facilities at the airport. This inventory was conducted using the following sources of information:

- 1989 Airport Layout Plans for the airport
- On-site visits
- Interviews with airport management, tenants, and users
- Coordination with local planning representatives
- Vermont State Airports Capital Facility Plan
- Aerial Photographs

This chapter briefly describes the physical facilities at the Middlebury State Airport, FAA airport identifier (6B0) and the surrounding community. Aviation-specific information on the airspace, other airports in the area, aviation activity at the Middlebury State Airport, and role of the airport is also described.

As previously discussed, this document represents an update to the airport layout plan. Information which has not changed significantly and is not necessary for this update, such as the history of the airport, has not been repeated in this document.

It should also be noted that airport development is a constant process, and changes to the physical facilities at the airport can occur during the preparation of the master plan. As a result, information included in the inventory section may be changed during the development of the Airport Layout Plan Update. Where possible, these changes are mentioned in later sections of this report.

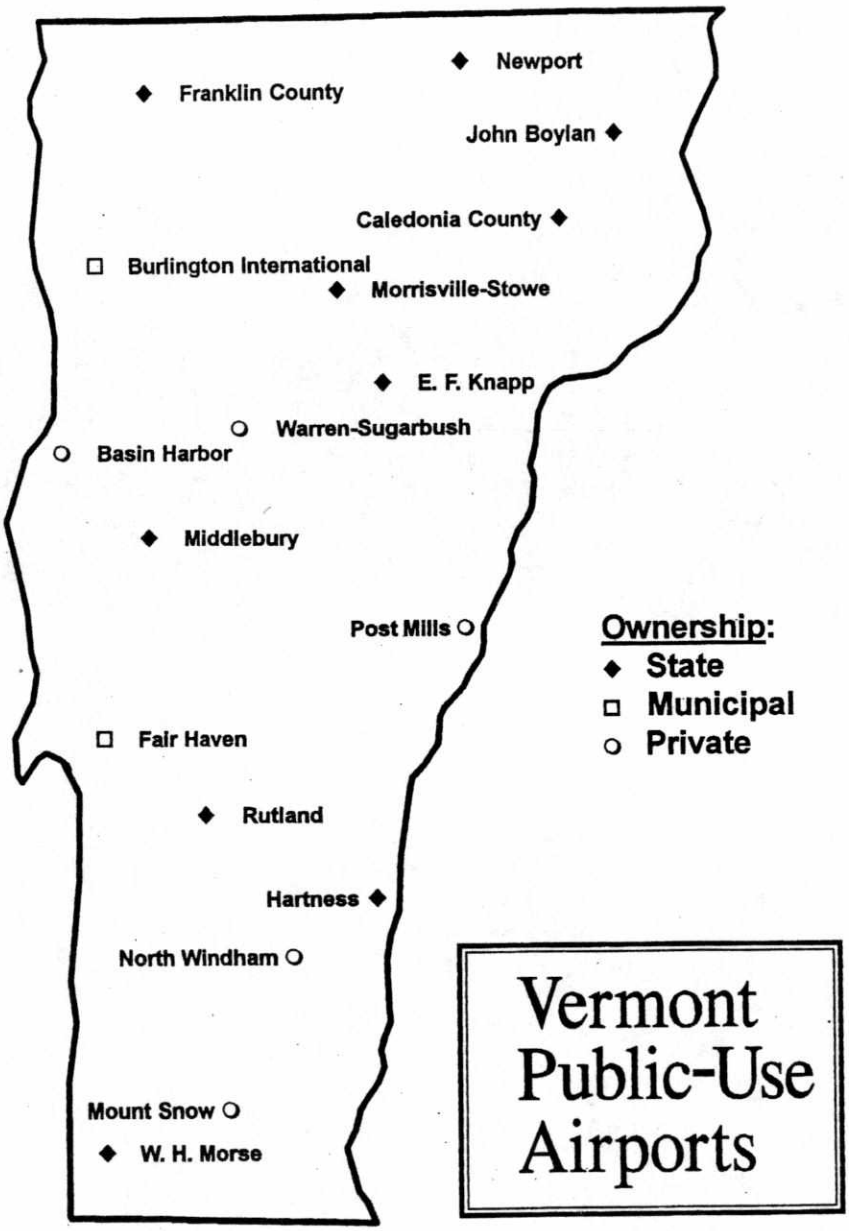
2.2 Airport Location and Role

Middlebury State Airport is located on the west side of Vermont, approximately 29 nautical miles south of the Burlington International Airport. This 156 acre site is located 3 nautical miles southeast of the City of Middlebury. The Airport Reference Point (ARP), a geographic coordinate used to locate the airport, is 43° 59' 08" N Latitude, 73° 05' 44" W Longitude, and the field elevation is 494 feet above mean sea level (MSL). Figure 2-1, Vicinity Map shows the location of the airport within Vermont, while Figure 2-2, Location Map, shows the airport within the boundary of the Town of Middlebury.

Ground access to the airport is provided by several state roads. US Route 7 provides north-south access through the city of Middlebury to a location just west of the airport. VT Route 125 provides east-west access just south of the airport.

The airport is owned by the State of Vermont, and daily operations are provided by the Middlebury Flight School. The airport mainly serves the general aviation community consisting of private, business and corporate aviators. Typical flight activities at the airport include recreational flying, airplane rides, flight instruction, business flights, aerial photography, aerobatic flying, and other various forms of flight activities. The airport facilities support 44 based aircraft which include 35 single-engine, 3 small twin-engine aircraft, 2 helicopter, and 1 ultralight aircraft. The airport supports 35,500 operations per year.

The airport is serviced by one fixed base operator (FBO). Middlebury Flight School provides the daily airport services from the hours of 8 AM until dark. During operating hours, the FBO monitors the CTAF/UNICOM (common traffic advisory frequency) for pilot requests. The FBO repairs and provides maintenance service on all airframes, small aircraft powerplants and small aircraft fabric skin repairs. Middlebury Flight School also provides pilot services such as flight instruction, aircraft fueling and other aircraft services such as overnight parking of aircraft. The FBO also utilizes the airport for supplying glider rides and lessons.



Middlebury State Airport

Figure 2-1 VICINITY MAP

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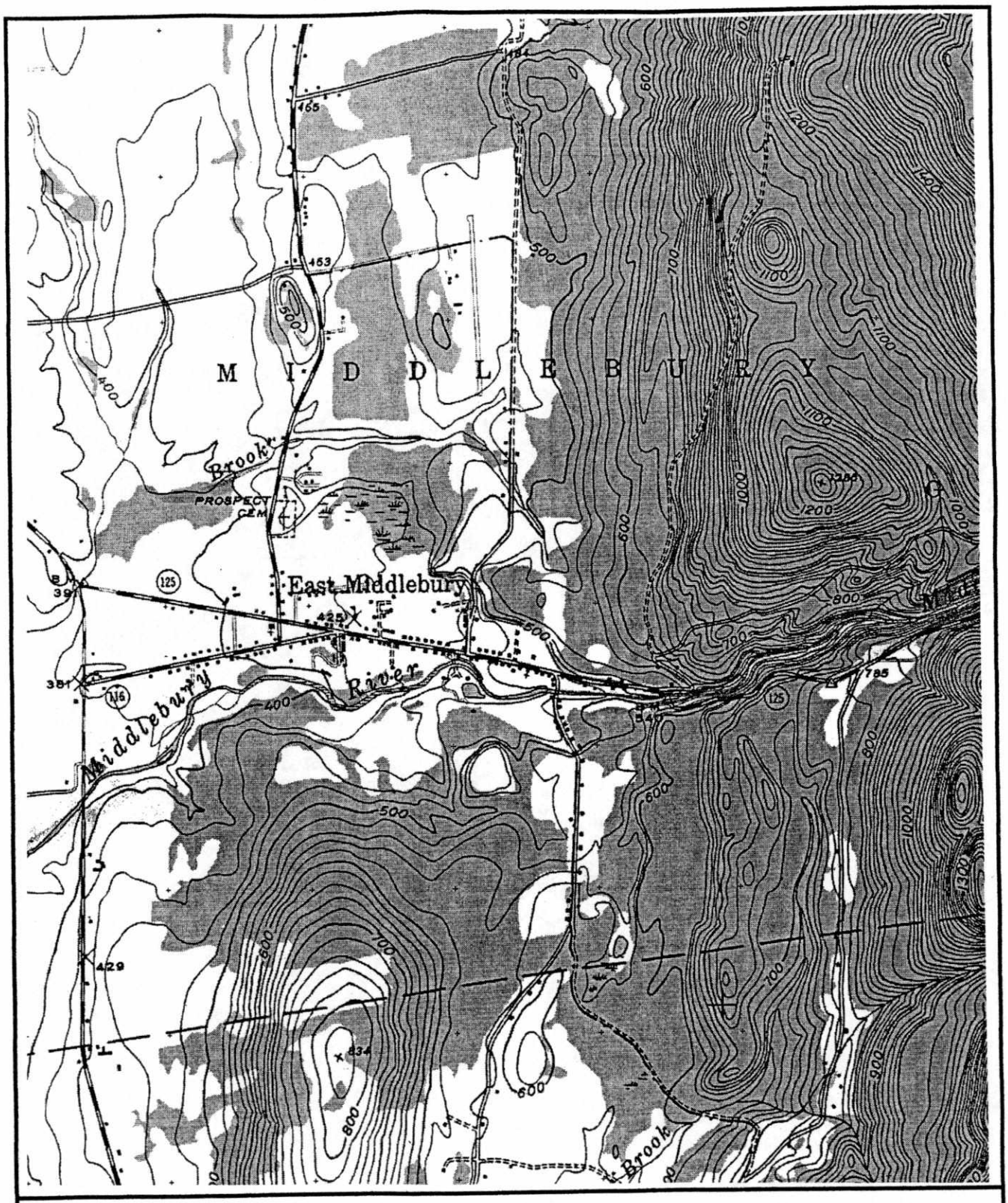

Middlebury State Airport

Figure 2-2 LOCATION MAP

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2.3 Airport Facilities

2.3.1 Runway and Taxiways

Middlebury State Airport has one asphalt runway: Runway 1-19, which is 2,500 feet long by 50 feet wide. This runway has no lighting and it is marked for a visual approach. The runway will be further described in Table 2-1 and Figure 2-3 depicts the layout of the airport.

All the pavement on the airfield was sampled and tested for condition in 1998 by the team conducting surveys for the *Vermont Statewide Pavement Management Report*. The pavement data was collected and the surface condition was evaluated using the pavement condition index (PCI) methodology. This method of assessing airport pavements is the standard of the aviation industry.

The runway Pavement conditions are defined as follows:

- PCI of 85 to 100 is rated as excellent condition,
- PCI of 70 to 85 is rated as very good condition,
- PCI of 55 to 70 is rated as good condition,
- PCI of 40 to 55 is rated as fair condition,
- PCI of 25 to 40 is rated as poor condition,
- PCI of 10 to 25 is rated as very poor condition, and
- PCI of less than 10 is pavement that has failed.

It should be noted that although a PCI of 70 is described as "very good", pavement rated at this PCI is in need of immediate and significant rehabilitation. Generally accepted pavement maintenance practices dictate that structures with a PCI of 70 or greater can be rehabilitated with normal maintenance and repair techniques (crack sealing, minor patching, etc.), but below this value, major rehabilitation is required.

The Runway pavement asphalt was last constructed in 1965. Although the runway pavement is rated in good condition, the runway currently shows longitudinal and transverse cracking and signs of rutting which is typically caused by consolidation or lateral movement of materials due to traffic

loads. The asphalt surface also shows signs of block cracking, depression, rutting, swelling and weathering.

TABLE 2-1: RUNWAY DATA		
	Runways	
	01	*19*
Length (feet)	*2,500*	
Width (feet)	*50*	
Surface Material	*Bituminous Concrete*	
Pavement Condition (PCI)	*Good (65)*	
Approach Slope (Horizontal:Vertical)	*20:1*	*20:1*
Approach Aids		
ILS	*No*	*No*
VASI	*No*	*No*
REILs	*No*	*No*
MALSR	*No*	*No*
Lighting	*No*	
Marking	*Visual*	

Source: FAA Form 5010
Notes:
ILS: instrument landing system
HIRLs: high-intensity runway lights
MIRLs: medium-intensity runway lights
REILs: runway-end identifier lights
VASI: visual-approach slope indicator
MALSR: Medium-intensity approach light system with runway alignment indicator lights.

The runway is served by four taxiways, which are also depicted in Figure 2-3. Table 2-2 summarizes the size and function of each taxiway. These taxiways were "micropaved" in 1998. The taxiway pavement condition is in excellent condition as shown by the PCI of 95. The following distresses were still seen in the pavement:

- depression which is the settlement of the foundation soil,

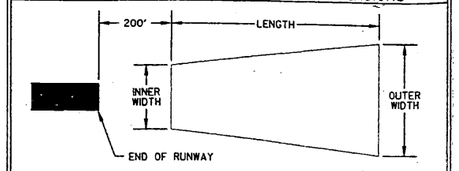
AIRPORT DATA	EXISTING
AIRPORT ELEVATION	494.3
AIRPORT REFERENCE POINT	N 43° 59' 08" E 73° 05' 44"
MEAN MAX. TEMP. OF HOTTEST MO.	80° F
TAXIWAY LIGHTING	--
TAXIWAY MARKING	--
AIRPORT/TERMINAL NAVAIDS	None
AIRPORT REFERENCE CODE (ARC)	B-I UTILITY
ACREAGE OWNED IN FEE SIMPLE	156 Acres
ACREAGE OWNED IN EASEMENT	6 Acres
USE/OWNERSHIP	General Aviation/State

EXISTING	BUILDINGS
1	T-Hangar
2	Hangar
3	Mobile Home
4	Terminal/ Maintenance Hangar
5	Storage Barn
6	Hangar
7	T-Hangar
8	T-Hangar
9	T-Hangar
10	Downey Corporation Maintenance Hangar
11	Downey Corporation Maintenance Hangar
12	Fuel Farm
EXISTING	**TERMINAL AREA PAVEMENT**
A	Lower Ramp
B	Fuel Apron
C	Upper Ramp
D	Auto Parking

LEGEND	EXISTING
GROUND CONTOUR	
AIRPORT PROPERTY	
AVIGATION EASEMENT	
BUILDING RESTRICTION LINE (BRL) *	
PART 77 APPROACH SURFACE	
OBJECT FREE AREA (OFA)	
RUNWAY SAFETY AREA (RSA)	
RUNWAY SAFETY AREA IMPROVEMENTS	N/A
RUNWAY PROTECTION ZONE (RPZ)	
TREE LINE	
SECURITY FENCE	
AIRPORT REFERENCE POINT	
SWALE/DITCH	
R/W END IDENTIFIER LIGHTS (REIL)	
WETLAND BOUNDARY	
UNIMPROVED ROADWAYS	
PAVEMENT	
AIRPORT BUILDINGS	
POTENTIAL EXISTING OBSTRUCTIONS	
POTENTIAL ARCHEOLOGICAL IMPACT	

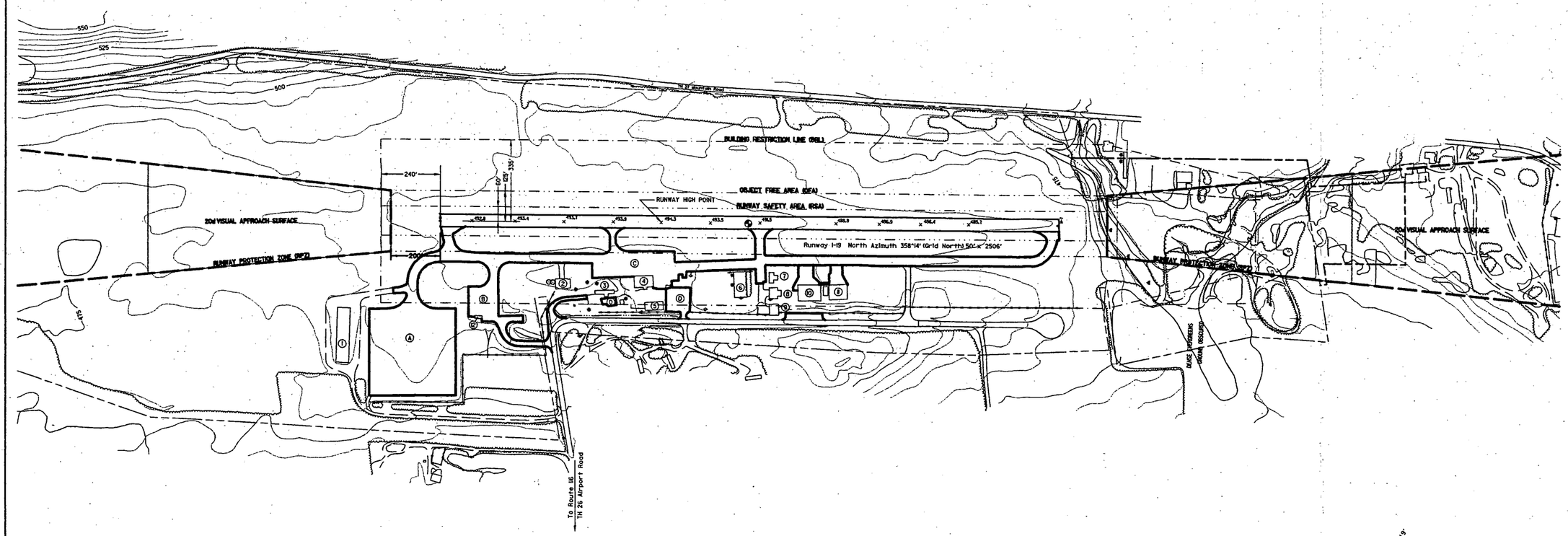
* ASSUMED BUILDING HEIGHT 30 FEET

RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS

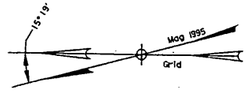


RUNWAY	APPROACH TYPE	INNER WIDTH	OUTER WIDTH	LENGTH	ACRES
R/W 1	Visual	250	450	1000	8.035
R/W 19	Visual	250	450	1000	8.035

RUNWAY DATA	EXISTING	
	1	19
PAVEMENT STRENGTH	12,500 SW	12,500 SW
APPROACH SURFACES	Visual 20:1	Visual 20:1
RUNWAY MARKINGS	Visual	Visual
RUNWAY LIGHTING	None	None
RUNWAY NAVAIDS	None	None
EFFECTIVE GRADIENT	0.3%	
RUNWAY END ELEVATIONS	484.7	492.0
RUNWAY END COORDINATES	N 43° 58' 55" W 73° 05' 43"	N 43° 59' 20" W 73° 05' 44"
RUNWAY LENGTH	2506'	2506'
RUNWAY WIDTH	50'	50'
EXTENDED RSA COMPLIANCE	NO	YES



NOTES:
1. HORIZONTAL DATUM NAD 83 (1986) INTERNATIONAL FEET.
2. VERTICAL DATUM NAVD 88 INTERNATIONAL FEET.
3. EXISTING EASEMENT AND PROPERTY LINES BASED ON "AIRPORT PROPERTY MAP PREPARED BY CLOUGH HARBOUR & ASSOCIATES MARCH 1998.



GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 feet

Dufresne-Henry

Rev.	Description	By	Date

VERMONT

MIDDLEBURY STATE AIRPORT

EXISTING AIRPORT LAYOUT PLAN

MIDDLEBURY

Project No.	8190014
Proj. Manager	MC
Proj. Designer	JMW
Drawn By	GPR
Checked By	MS
Scale	1"=200'
Approved	
Date	11-5-99

FIGURE 2-3

Sheet 2 of 7

- longitudinal and traverse cracking and rutting caused by shifts in soil, and
- swelling typically caused by frost or by swelling soil.

TABLE 2-2: Taxiway Data

Taxiway	Length	Width	Function
A	2,875 feet	38 feet	Parallel Taxiway extending from Runway 01 end to the ramp area located west of Runway 19 end.
B	138 feet	38 feet	Stub taxiway providing access from the T-hangars area; beginning at Taxiway A, ending at the runway (approximately 1,250 feet beyondRunway 01 end).
C	100 feet	23 feet	Stub taxiway providing access from the main apron area; beginning at Taxiway A, ending at the runway (approximately 730 feet beyond Runway 19 end).
D	102 feet	41 feet	Stub taxiway providing access from the north aircraft parking area; beginning at Taxiway A, ending at Runway 19 end.

Source: 1999 Aerial Photographs

2.3.2 Terminal Building and Hangars

The terminal building is located west of the runway near the mid-section of the runway's length. The building is approximately 40 feet wide by 80 feet long. Only a small section of this hangar building, approximately a 20 foot by 40 foot area, is used for the terminal purposes. The area of the building providing typical terminal or administrative services to the airport incorporates the following service areas; a pilot briefing room, a lounge area, refreshment pay machines, a restroom and an outside pay telephone. The FBO also utilizes a portion of this administrative area to conduct classroom flight instruction, as a storage area for pilot supplies and administrative purposes.

The portion of the hangar building not being utilized in terminal and administrative functions is open conventional hangar space. This 60 foot by 40 foot section located on the north side is used for aircraft hangar space to store aircraft parts, supplies and equipment such as aircraft preheating thermal blower units, as well as to store or perform maintenance on aircraft within a lighted hangar.

There are eight conventional styled hangar buildings located at the airport. Figure 2-4 presents the location of these hangar buildings on the airfield. There are also three T-hangars located south of

the airfield maintenance hangar. Each of the T-hangars provide shelter from adverse weather conditions for a single aircraft per hangar. Each T-hangar is owned by an individual for their own aircraft and will therefore not be mentioned in Table 2-3 below. It should be noted that the hangar building identification numbers are completely arbitrary. These numbers only identify facility locations as described in this document.

TABLE 2-3: Conventional Hangars

Hangar	Length	Width	Function
1	70 feet	60 feet	Aircraft storage
2	80 feet	70 feet	Aircraft storage
3	100 feet	50 feet	Airfield maintenance equipment storage
4	80 feet	40 feet	Section along south wall, approximately 20'X40' used as terminal building and FBO administrative functions. North section used for parts, equipment and aircraft storage.
5	80 feet	30 feet	Aircraft storage
6	80 feet	10 feet	Aircraft storage
7	60 feet	40 feet	Aircraft storage
8	230 feet	50 feet	Aircraft storage

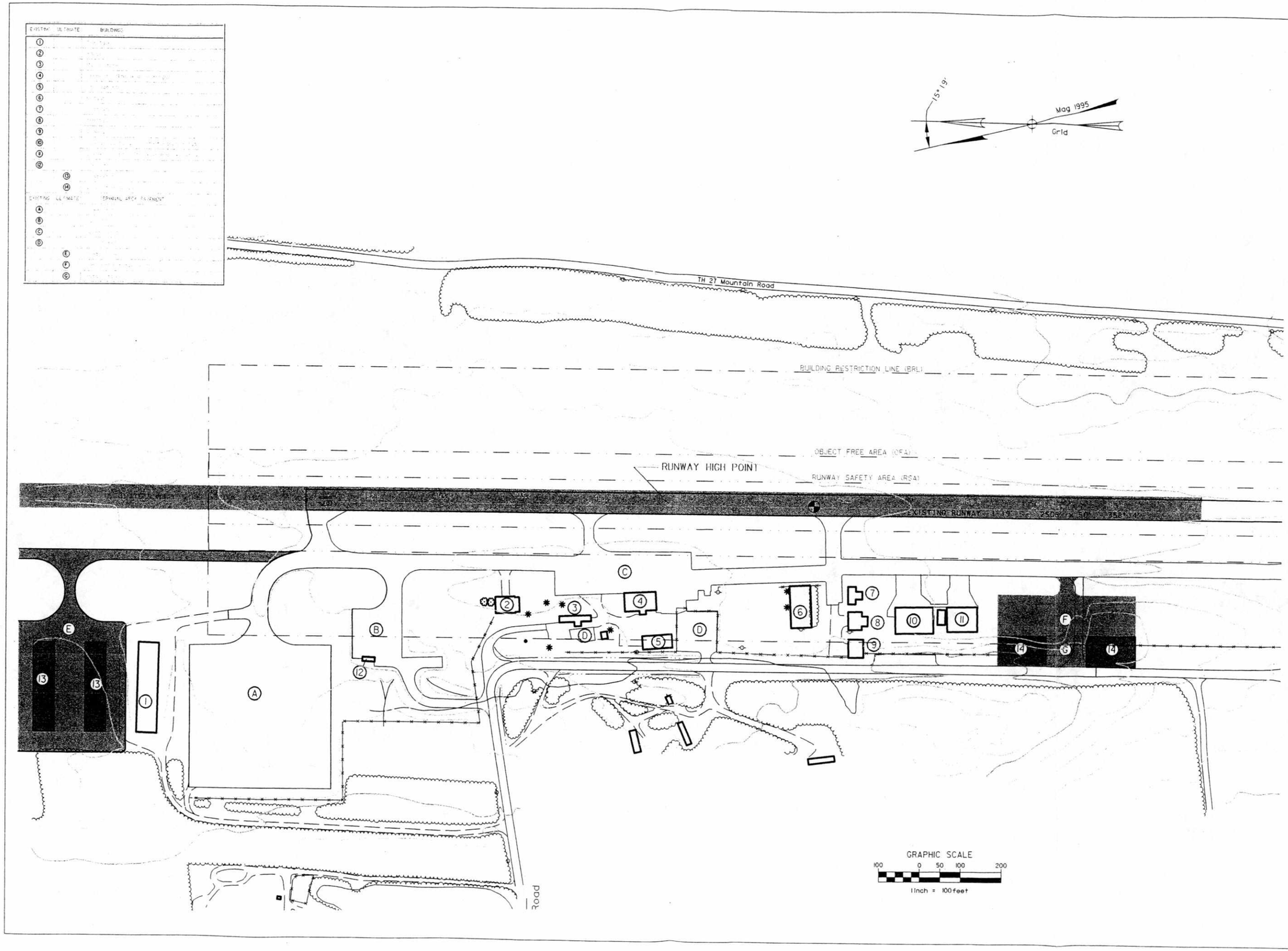
Source: Aerial Photographs
1989 Airport Layout Plan

2.3.3 Aprons and Tie-downs

The airport has approximately 169,600 square feet of aircraft apron (also known as ramps) of which 87,500 square feet is useable for aircraft parking, providing approximately 52 tie-down spaces. The apron areas are depicted in Figure 2-4. The airport has two aircraft parking aprons; one located in front of the terminal building and FBO hangar provides parking for approximately 10 aircraft and a second located northwest of Runway 19 provides aircraft parking space for 42 aircraft.

The apron pavement was found to have a pavement condition index of 89. Although this is an excellent rating, the pavement shows signs of the following stresses:

- longitudinal and traverse cracking,



Dufresne-Henry

Rev.	Description	By	Date

VERMONT

MIDDLEBURY STATE AIRPORT

TERMINAL PLAN

MIDDLEBURY

Project No.	8190014
Proj. Manager	MC
Proj. Designer	JMM
Drawn By	GPR
Checked By	MS
Scale	1"=100'
Approved	DCD
Date	9-14-99

FIGURE 2-4

Sheet 4 of 7

D

- linear cracking,
- corner spalling, and
- depression.

2.3.4 Fuel Facilities

Currently, Middlebury Flight School provides all aircraft fuel services consisting solely of Avgas.. There is a fueling apron with an aircraft turnaround area located between the ramp area in front of the terminal and the north ramp area. Access to this fueling area is via parallel Taxiway A. There is a concrete fuel pad that is 40 feet long by 40 feet wide located within the 130 foot long by 130 foot wide fueling apron. The fuel cabinet is located on the landside (west) with a dirt access road to the airport access road for fuel tanker trucks to refill the airport fuel tank(s).

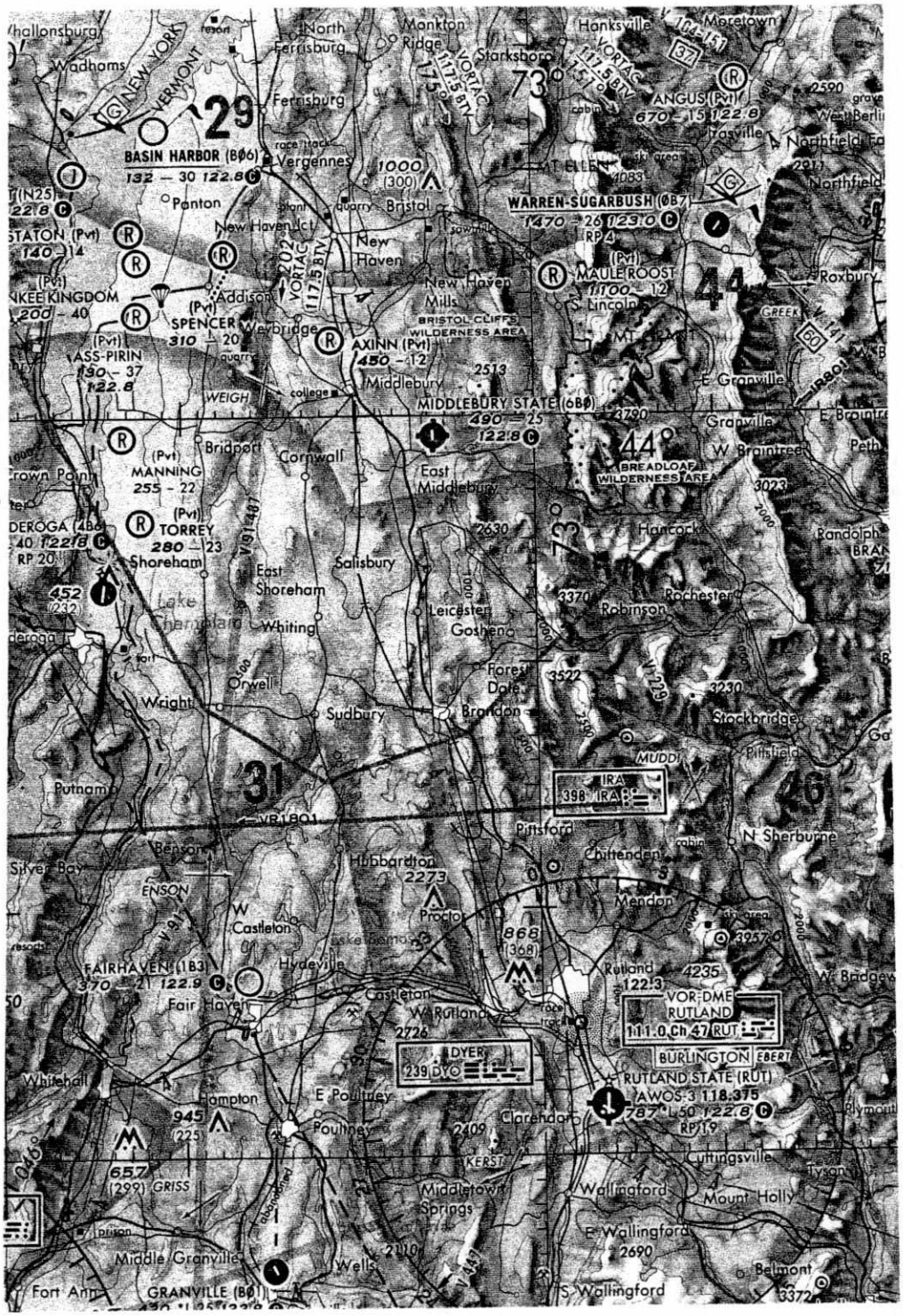
2.3.5 On-airport Ground Access and Auto Parking

Access to the terminal area of the airport from the surrounding network of roads is provided via State Route 116, a paved two lane highway. Town Road 26 is the airport access road which has been named Airport Road by the town. This road is a two lane paved road serving some homes, but primarily leading to the airport. Airport Road extends from State Route 116 east for approximately 2,000 feet to the airport. The road then turns south, parallel with the runway for another 2,000 feet to a cul-de-sac approximately 100 feet in diameter.

Approximately 500 feet beyond the ninety degree turn south, lies the paved entrance to the terminal area auto parking lot on the east (airport) side. The auto parking lot is also paved with approximately 32 marked spaces. This auto parking lot is centrally located near the terminal hangar building. An auto parking lot has also been provided for approximately 25 autos about 100 feet along the Airport Road before the turn south, which is in the proximity of the north ramp area. South of the terminal area parking lot approximately 400 feet along Airport Road is an adjacent parking area for approximately 15 autos in the vicinity of the hangars at the south end of the airfield. Additional spaces are located adjacent to each of the hangar buildings for tenants of these buildings.

2.4 Approaches

Approaches to Middlebury State Airport are visual only and no navigation aids exist for the airport. Existing airspace in the vicinity of 6BO is shown in Figure 2-5



Middlebury State Airport

AIRSPACE ENVIRONMENT

Dufresne-Henry
Consulting Engineers

Figure 2-5

Chapter Three

FORECASTS OF AVIATION ACTIVITY

3.1 Introduction

The next step in the planning process is the projection of aviation activity at the airport. The forecasts were revised based on a subjective analysis by the consultant. This analysis was performed based on field visits and counts at the airport, conversations with airport management and users, and information from the meetings for the Vermont Airport Capital Facility Program held between December 1998 and November 1999.

The forecasts presented in this chapter represent unconstrained projections; this is the estimated aviation demand at the facility based on projections of aviation growth on a national basis as prepared by the FAA. Factors such as environmental and financial considerations, airport management desires, and significant changes in economic development and community expectations may constrain or enhance the aviation activity at the airport, but are not considered in these forecasts. It is therefore important that actual activity at the airport be monitored and compared to the forecasts to determine development needs at the airport in the future.

For this update, the following activity statistics will be forecast:

- Number and type of based aircraft at the airport
- Number of annual operations, broken down into local and itinerant traffic

A determination of the proposed Airport Reference Code (ARC) will also be presented.

The primary objective of forecasting is to define the magnitude of change that can be expected over time. Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking 20 years into the future. However, a trend can be established which delineates long-term growth potential. While forecasts are often graphically depicted as a linearly increasing trend, it is important to remember that actual growth may fluctuate above and below this line. Thus, forecasts should serve only as guidelines, and planning must remain flexible to respond to unforeseen facility needs.

The reasonable levels of activity that are derived from this forecasting effort will be related to planning horizon levels rather than pre-determined dates in time. Dates will be presented in this chapter to define specific time periods: short-term (0-5 years), mid-term (6-10 years) and long-term (11-20 years); however, these dates are flexible and it is the level of activity will drive the development, not the date.

3.2 Based Aircraft Projections

A based aircraft is one which uses the Middlebury State Airport as the "home" airport. These aircraft require either tie-down or hangar space at the airport, so the projection of based aircraft directly affects facility requirements. For this update, the projection of based aircraft was developed by applying the FAA growth rate for the general aviation fleet to the current number of based aircraft. The *FAA Aviation Forecasts, Fiscal Years 1998-2009* project that the active general aviation fleet in the U.S. will grow at an annual average rate of 1.0 percent. Applying the growth rate to the current number of based aircraft at the airport yields the following projections:

TABLE 3-1: BASED AIRCRAFT PROJECTIONS

Type	*1999*	*2004*	*2009*	*2019*
Single-engine piston	*35*	*37*	*39*	*43*
Multi-engine piston	*3*	*3*	*4*	*4*
Jet	*3*	*3*	*4*	*4*
Helicopter	*2*	*2*	*2*	*3*
Ultralight	*1*	*1*	*1*	*1*
Total	*44*	*46*	*50*	*55*

Source: Dufresne-Henry analysis

3.3 Aircraft Operations Projections

An aircraft operation is defined as either a landing or a take-off. Touch-and-go operations, which occur when an aircraft lands on the runway, continues rolling, and then takes-off, are counted as two operations. For this update, the FAA projection of the numbers of hours flown in general aviation aircraft was applied to the current number of operations to develop the forecast. The FAA does not develop national forecasts of operations, since the operations statistic is directly related to a specific airport; however, there generally is a strong correlation to the number of hours flown and operations. Therefore, an average growth rate of 1.4 percent equivalent to the growth rate of the annual hours flown was applied to the base numbers to develop the forecast. Table 3-2 presents the projections.

In addition to the total operations projection, the forecast was also broken down into local and itinerant operations. Local operations are "arrivals and departures of aircraft that operate in the local traffic pattern or within sight of the tower and are known to be departing for or arriving from flights in the local practice areas within a 20-mile radius of the airport and/or control tower; plus simulated instrument approaches or low passes at the airport executed by any aircraft."[1] Itinerant operations are defined as "all aircraft arrivals and departures other than the local operations described above."[2] It should be noted that local operations are not necessarily operations by based aircraft.

To develop this breakdown of local and itinerant operations, the FAA Form 5010, *Airport Master Record*, was used as a base. The percentages from this source were subjectively adjusted based on conversations with FBOs and/or airport management as well as knowledge of the types of uses of the airport (i.e., flight training, charter operations, etc.). At the Middlebury State Airport, the split between local and itinerant operations is respectively 80 percent to 20 percent since there is a significant amount of flight training activity at the airport which tends to generate local operations. The larger concentration of local airport traffic also stems from the airport retaining the role of a "smaller-local" airport by restricting operations to fair-weather daytime use only.

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[1]FAA Advisory Circular 150/5070-6A, *Airport Master Plans*, June 1985, page 22.

[2]Ibid.

For these forecasts, it is expected that the current split between local and itinerant operations will remain relatively consistent throughout the planning period. Table 3-2 presents these forecasts.

TABLE 3-2: ANNUAL AIRCRAFT OPERATIONS PROJECTIONS				
Type	*1999*	*2004*	*2009*	*2019*
Local Operations	*28,000*	*30,000*	*32,200*	*37,000*
Itinerant Operations	*7,000*	*7,500*	*8,000*	*9,200*
Total Operations	***35,000***	***37,500***	***40,200***	***46,200***

Source: Dufresne-Henry analysis

3.4 Airport Reference Code (ARC) Determination

The ARC defines the FAA design standards at the airport, and is described in detail in Appendix A. Therefore, it is important to determine the reference code based on the growth projections at the airport. For this analysis, the type and size of aircraft projected in the previous Airport Layout Plan was used as a base and subjectively analyzed based on information gathered and conversations with users of the airport, FBO staff, and VAOT personnel.

The previous ALP was developed before the ARC formula was developed. Design standards presented on the ALP indicate that the proposed role of the airport was "Basic Utility", which is comparable to a B-I ARC. Conversations with VAOT staff at the airport indicate that the largest aircraft operating regularly at the airport is in the B-I ARC. Based on the forecasts developed in this update, it is not expected that the character of the airport will change significantly. Even if business development in the area attracts more use of the airport, it is expected that this use will remain primarily from B-I aircraft which includes Beechcraft C99's. Based on all of these factors, it appears reasonable to designate the ARC as B-I for the Middlebury State Airport for the entire planning period.

3.5 Summary of Forecasts

Table 3-3 summarizes the forecasts for the Middlebury State Airport.

TABLE 3-3: SUMMARY OF FORECASTS				
	1999	*2004*	*2009*	*2019*
Based Aircraft	*44*	*46*	*50*	*55*
Total Operations	*35,000*	*37,500*	*40,200*	*46,200*
Airport Reference Code	*B-I*	*B-I*	*B-I*	*B-I*

Source: Dufresne-Henry

Chapter Four

DEMAND/CAPACITY ANALYSIS AND FACILITY REQUIREMENTS

4.1 Introduction

The aviation demand forecasts described in Chapter 3 provide an indication of aircraft activity that can be anticipated at Middlebury State Airport over a 20-year planning period. These forecasts provide the basis on which existing airside and landside facilities are evaluated and new or expanded facilities are planned to accommodate the expected demand. The evaluation assumes an unconstrained condition such that the size or number of facilities proposed is based on forecast demand alone.

For airport facility planning purposes, the FAA typically recommends three time horizons:

- A Short Term Facilities Development Plan, covering the initial 5 years of a 20-year planning period.
- An Intermediate Facilities Development Plan, covering Year 6 to Year 10
- A Long Term Facilities Development Plan, covering Year 11 to Year 20 of the planning period.

Some of the facilities recommended are to meet safety requirements or development standard criteria specified in Appendix A. These are typical of the short term planning period. Facilities recommended to meet capacity deficiencies are typical of the intermediate and long-term planning periods. New facilities or improvements are specifically recommended with the goal of maintaining Middlebury State Airport as a viable and effective airport for its users throughout the 20-year planning period.

4.2 Airside Facility Requirements

Airside facility requirements for the 20-year planning period are based on a combination of inputs, ranging from perceived needs by the airport users to recommendations by the consultant to remedy existing safety or capacity deficiencies.

4.2.1 Runway Requirements

Middlebury State Airport has one runway (1-19), which is paved and has a length of 2,500 feet and a width of 50 feet. This length is presently for the larger ARC B-I aircraft operating at the facility and requires these aircraft to operate at less than full capacity. In order to meet the requirements for ARC B-I category aircraft to operate safely from the airport, the runway should be extended by 1200 feet to a length of 3,700 feet. This corresponds to a recommendation of the previous ALP Update.

The present runway width of 50 feet should also be widened to 60 feet, again in line with ARC B-I aircraft operations.

The runway extension should consist of a 1200 feet extension to the north of present Runway End 19. The airport owns sufficient land to enable this extension to be carried out without the need to acquire more property. At the north end, the terrain for the extension is between the 480 and 490-foot contour while the existing Runway 19 End is at an elevation of 492.8 feet. Although minimal earthmoving will be required for the extension, trees are located north of the present airport property and these may determine how far the runway can be extended while still maintaining the necessary approach obstruction clearances.

It is recommended that the necessary studies for the extension be carried out in the intermediate-term plan with final design and construction being undertaken during the long-term.

4.2.2 Runway Safety Areas

Only Runway End 19 Safety Area currently meets FAA standards. At Runway End 1, the Safety Area is only 150 feet long, i.e. short of the required 240 feet distance by 90 feet. The extension to Runway End 19 (see Section 4.2.1) would require provision of a 240 feet long by 120 feet wide safety area at the time this extension is implemented.

4.2.3 Apron Requirements.

Apron areas for aircraft are required to fulfill a number of tasks; they provide parking for aircraft, access to terminal facilities and space for aircraft fueling vehicles, deicing equipment, ground power units, tow vehicles and ground transportation. Depending upon their expected length of use, aprons are typically divided into two categories:

- Based aircraft aprons
- Itinerant aircraft aprons

Based aircraft aprons typically incorporate tie-down areas utilized by single engine aircraft and as such require a smaller area per aircraft than is the case with itinerant aprons.

At Middlebury State Airport, the two existing aprons accommodate 52 paved tie-down spaces. Based aircraft are projected to increase from a 1999 total of 44 aircraft to a total of 55 aircraft by Year 2019. It is assumed that 50 percent of these based aircraft will require tie-down space at the airport.

FAA AC 150/5300-13 recommends that based aircraft parking-apron space requirements be computed using an average area of 2,700 square feet per parked aircraft.

Itinerant aircraft also use the airport's paved aircraft parking apron with typical parking durations ranging from a few hours to several days. To conservatively estimate the apron space requirements for itinerant aircraft at Middlebury State Airport, the total number of aircraft operating during the *Peak Month Average Day* (PMAD) is increased by 10 percent to account for the busiest-day activities. Because half of itinerant operations are landings, the PMAD is reduced by 50 percent to reflect the number of actual itinerant aircraft. The number of itinerant aircraft typically using the apron during the busiest day at any one time is assumed to be 75 percent of the busiest-day operations for itinerant aircraft (i.e. three-quarters of the itinerant aircraft are parked at any given time). This reflects the fact that many of these itinerant aircraft arrive on a Friday evening and are parked on the apron throughout the weekend.

FAA AC 150/5300-13 recommends that itinerant aircraft parking-apron space requirements be computed using an average area of 3,240 square feet per parked aircraft.

Table 4.1 provides a summary of apron space requirements over the 20-year planning period.

A new T-Hangar apron is proposed in the short-term plan, located to the north of the existing lower ramp (apron). In the long-term plan, a new corporate apron with two corporate hangars are proposed to the south of the two Downey Corporation maintenance hangars.

TABLE 4-1: APRON REQUIREMENTS				
	Existing (1999)	Short Term (2004)	Intermediate Term (2009)	Long Term (2019)
Based-aircraft Apron Requirements				
Total Based Aircraft	44	46	50	55
50% of Based Aircraft (Requiring tie-down space)	22	23	25	28
Based Aircraft Apron (SF) (2700 SF per aircraft)	59,400	62,100	67,500	75,600
Itinerant Aircraft Apron Requirements				
Itinerant Operations	7,000	7,500	8,000	9,200
Peak Month Operations (15% greater than average)	671	719	767	882
Peak Month Avg. Day (PMAD)	22	24	26	29
PMAD x 110% (Reflects peak day parking demand)	24	26	29	32
50% of Peak Day (Actual aircraft vs. operations)	12	13	15	16
Itinerant Parking Demand (75% of Itinerant Aircraft)	9	10	11	12
Itinerant Aircraft Apron (SF) (3,240 SF per aircraft)	29,160	32,400	35,640	38,880
Total Based and Itinerant Apron Demand (SF)	88,560	94,500	103,140	114,480
Existing Apron Area (SF)	87,500	87,500	112,500	125,000
Excess or Deficit (SF)	(1,060)	(7,000)	9,360	10,520

4.2.4 Parallel Taxiway.

An extension to the existing parallel taxiway should be carried out in the long-term plan to provide aircraft access to the extended Runway 19 End that will occur once the runway is extended.

The proposed taxiway width should be 25 feet, making it compatible with ARC B-I category aircraft. It is recommended that the studies for the parallel taxiway be carried out concurrently with the runway extension study in the intermediate-term plan with final design and construction taking place in the final-term plan.

4.2.5 NAVAIDS

It is anticipated that Middlebury State Airport will remain a daytime VFR facility throughout the 20-year planning period and therefore no NAVAIDS are presently needed.

4.2.6 Obstruction Removal

The Approach Surface at Runway End 1 is presently impacted by trees that penetrate this imaginary surface. These trees need to be topped in the short-term plan.

4.3 Landside Facility Requirements

4.3.1 Hangar and Building Requirements

In the short-term, a new T-Hangar complex is proposed to the north of the existing lower ramp.

In the long-term, two corporate hangars are proposed for a new corporate apron located to the south of the two Downey Corporation maintenance hangars. One of the corporate hangars should incorporate a new administration building.

The existing terminal building has structural problems and is not ADA compliant. A new terminal building should be constructed in the intermediate or long-term plan.

4.3.2 Security Fencing

Security fencing should be installed on the areas where the greatest potential for unwanted public access exists. Since lack of adequate security fencing is a major safety concern, installation of fencing in the most critical areas should be carried out in the short-term plan with full airport coverage occurring by the end of the long-term plan.

4.3.3 Airport Picnic Area

In the short-term plan, an area of land on airport property should be allocated for a picnic area facility to provide an additional attraction for airport users. In addition to wooden picnic tables, brick barbeque grills would further enhance this facility.

TABLE 4-2: SUMMARY OF FACILITY IMPROVEMENT RECOMMENDATIONS

	Short Term (2004)	Intermediate Term (2009)	Long Term (2019)
Airport Reference Code	B-I	B-I	B-I
Runway Dimensions Runway 1-19	2,500 x 50 feet	Study for runway extension	3,700 x 60 feet
Airport Pavement Strength	12,500 pounds SW	12,500 pounds SW	12,500 pounds SW
Apron Requirements	T-Hangar Apron	none	Corporate Hangar Apron
Taxiway Development	none	Study for parallel taxiway	Construct parallel taxiway
Runway Safety Areas	none	none	RSA for Runway 19 extension
Airport Pavement Markings and Signage	none	none	Mark New Taxiway & Runway extension
Terminal Building	none	Construct new terminal building	none
Airport Picnic Area	Provide area with picnic tables and grills	none	none
Additional Hangar-space Requirements	New T-Hangars	none	New Corporate Hangars/Admin Bldg.
Airport Security Fence	Partial Airport Coverage	none	Full airport coverage

Chapter Five

AIRPORT LAYOUT PLAN SET

5.1 Introduction

A product of this Airport Layout Plan Update (ALPU) is the graphical presentation of the recommended airport improvement projects for Middlebury State Airport. The ALP set presents this data. The following subsections briefly describe the contents of each sheet in the ALP set, which has been reduced in size and is included in this chapter. All recommended airport improvements shown on these sheets are representational in nature and may be modified as necessary to meet the needs of the county and airport users or the future design requirements of the FAA or VAOT.

5.2 Title Sheet

This sheet identifies the airport location and provides a table of contents for the ALP set, as well as wind data.

5.3 Existing Airport Facilities Plan

This sheet identifies details of existing airport facilities. Also shown are FAA imaginary surfaces and design criteria. Tables provide additional data about the usage and dimensions of the airport and its facilities.

5.4 Ultimate Airport Layout Plan

This sheet identifies details of the recommended airport facility improvements and their likely impact on surrounding land uses based on the recommendations set forth in Chapter Four. Tables provide additional data about the likely ultimate usage and dimensions of the airport and its facilities. FAA design criteria also are depicted on the ALP.

5.5 Terminal Area Plan

This sheet provides a close-up view of the recommended airport facility improvements in the vicinity of the airport terminal building. For easy reference, tables are provided that duplicate those of the ultimate ALP.

5.6 Runway 1-19 Approach Plans and Profiles

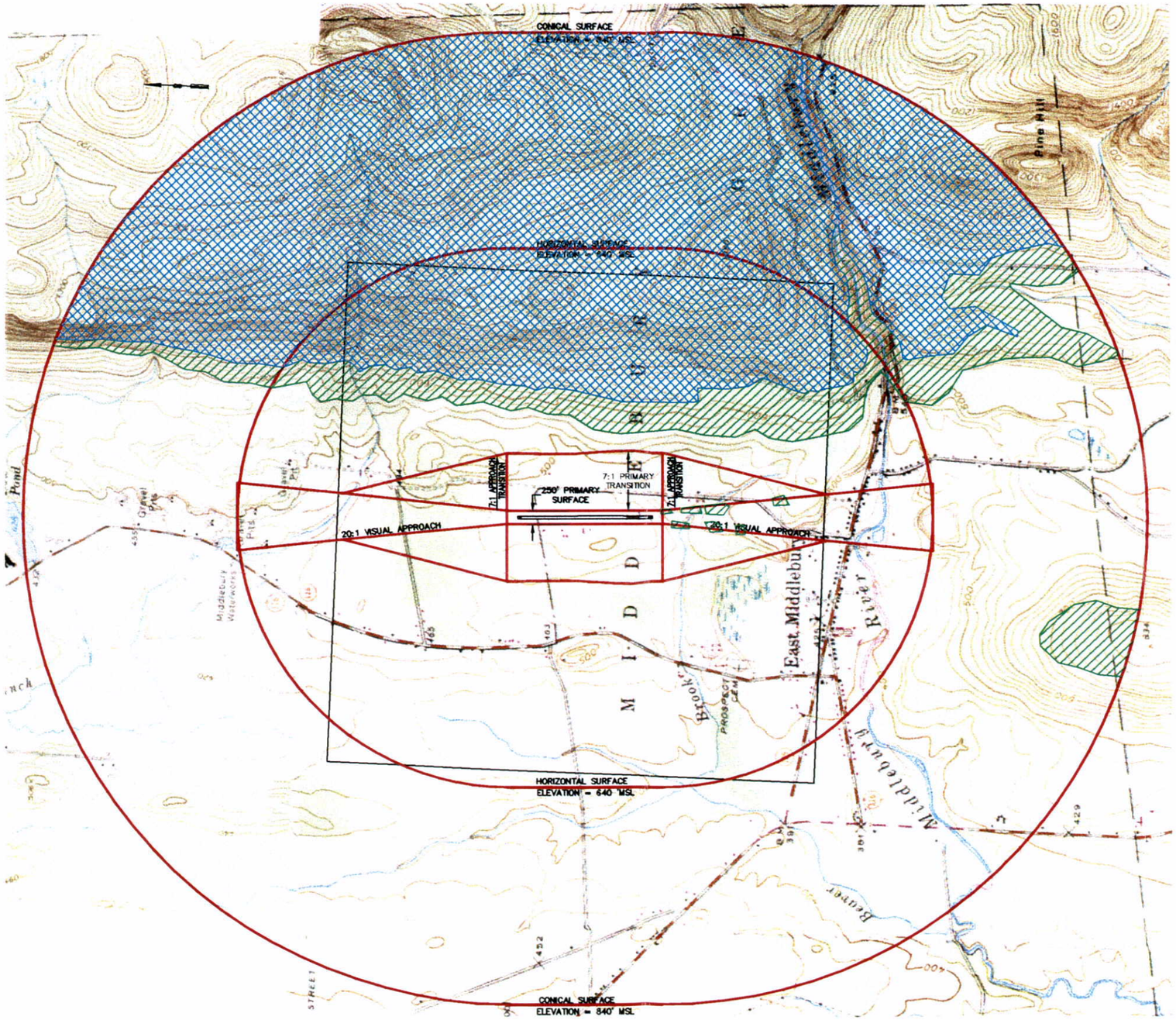
These sheets highlight the ground topography and object heights relative to FAR Part 77 approach surfaces in the vicinity of the RPZs for existing and ultimate conditions.

5.7 FAR Part 77 Imaginary Surfaces Plan

This sheet identifies all FAR Part 77 imaginary surfaces for the airport, representing ultimate conditions. The approach surfaces for Runways 1 and 19 have an inner width of 250 feet, an outer width of 1,250 feet, a length of 5,000 feet, and a slope of 20:1. These surfaces are superimposed on a USGS map. Likely ground and tree penetrations are highlighted.

5.8 Land-Use Plan

This sheet shows the airport and its surrounding land uses.



LEGEND

- TREE PENETRATION AREA
- GROUND PENETRATION AREA
- F.A.R. PART 77 SURFACES

80' TREE HEIGHT ASSUMED

GRAPHIC SCALE

1000 0 500 1000 2000

1 inch = 1000 feet

Dufresne-Henry
Consulting Engineers
SOUTH BURLINGTON, VT 05407
Tel. (802) 864-5223 • FAX (802) 864-0165 • www.d-hinc.com

Rev.	Description	By	Date

MIDDLEBURY STATE AIRPORT

FAR PART 77 IMAGINARY SURFACES PLAN

MIDDLEBURY VERMONT

Project No.	8180014
Proj. Manager	JW
Proj. Designer	JW
Drawn By	MRB
Checked By	JW
Scale	1" = 1000'
Approved	DCD
Date	01/00

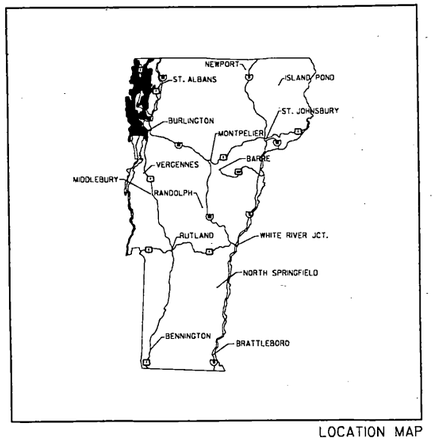
Sheet of

D

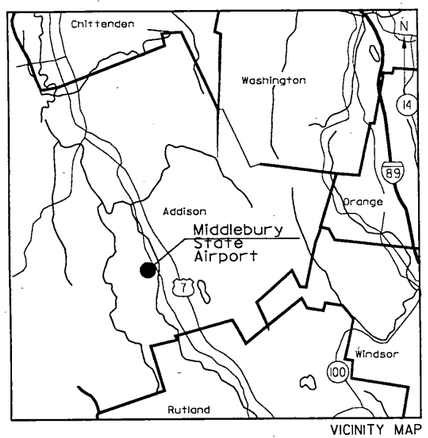
AIRPORT LAYOUT PLAN UPDATE

MIDDLEBURY STATE AIRPORT
MIDDLEBURY, VERMONT

MAY 2000



LOCATION MAP



VICINITY MAP

SHEET	TITLE
1	COVERSHEET
2	EXISTING ALP
3	ULTIMATE ALP
4	TERMINAL AREA PLAN
5	PLAN & PROFILE
6	FAR PART 77
7	LAND USE PLAN

INDEX OF SHEETS

Dufresne-Henry

OFFICES:
No. Springfield, Vermont
Montpelier, Vermont
Manchester, New Hampshire
Portland, Maine
Westford, Massachusetts
Greenfield, Massachusetts
Boston, Massachusetts
Port Charlotte, Florida
Sarasota, Florida
Naples, Florida
Saratoga Springs, New York
Webster-Martin division
So. Burlington, Vermont

ENGINEERING DISCIPLINES
Civil
Electrical
Environmental
Industrial
Mechanical
Solid Waste
Structural
Transportation
Wastewater
Water

ASSOCIATED DISCIPLINES
Construction Management
Site Assessments
Surveying

APPLIED SCIENCES
Geologic
Hydrologic
Water Quality

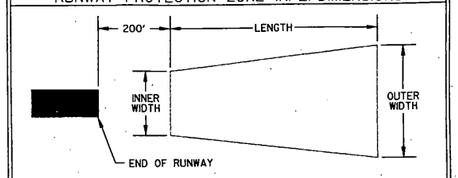
AIRPORT DATA	EXISTING
AIRPORT ELEVATION	494.3
AIRPORT REFERENCE POINT	N 43° 59' 08" E 73° 05' 44"
MEAN MAX. TEMP. (HOTTEST MO.)	80° F
TAXIWAY LIGHTING	--
TAXIWAY MARKING	--
AIRPORT/TERMINAL NAVAIDS	None
AIRPORT REFERENCE CODE (ARC)	B-I UTILITY
ACREAGE OWNED IN FEE SIMPLE	156 Acres
ACREAGE OWNED IN EASEMENT	6 Acres
USE/OWNERSHIP	General Aviation/State

EXISTING	BUILDINGS
1	T-Hangar
2	Hangar
3	Mobile Home
4	Terminal/ Maintenance Hangar
5	Storage Barn
6	Hangar
7	T-Hangar
8	T-Hangar
9	T-Hangar
10	Downey Corporation Maintenance Hangar
11	Downey Corporation Maintenance Hangar
12	Fuel Farm
EXISTING	**TERMINAL AREA PAVEMENT**
A	Lower Ramp
B	Fuel Apron
C	Upper Ramp
D	Auto Parking

LEGEND	EXISTING
GROUND CONTOUR	
AIRPORT PROPERTY	
AVIGATION EASEMENT	
BUILDING RESTRICTION LINE (BRL) *	
PART 77 APPROACH SURFACE	
OBJECT FREE AREA (OFA)	
RUNWAY SAFETY AREA (RSA)	
RUNWAY SAFETY AREA IMPROVEMENTS	N/A
RUNWAY PROTECTION ZONE (RPZ)	
TREE LINE	
SECURITY FENCE	
AIRPORT REFERENCE POINT	
SWALE/DITCH	
R/W END IDENTIFIER LIGHTS (REIL)	
WETLAND BOUNDARY	
UNIMPROVED ROADWAYS	
PAVEMENT	
AIRPORT BUILDINGS	
POTENTIAL EXISTING OBSTRUCTIONS	
POTENTIAL ARCHEOLOGICAL IMPACT	

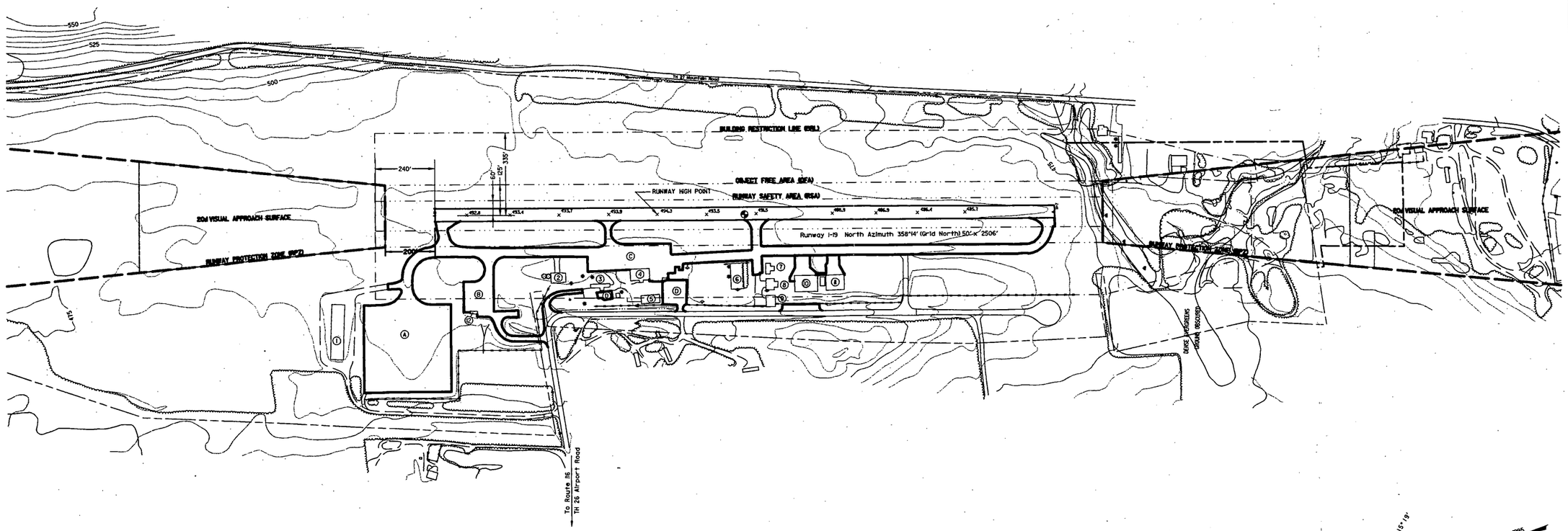
* ASSUMED BUILDING HEIGHT 30 FEET

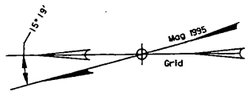
RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS



RUNWAY	APPROACH TYPE	INNER WIDTH	OUTER WIDTH	LENGTH	ACRES
R/W 1	Visual	250	450	1000	8.035
R/W 19	Visual	250	450	1000	8.035

RUNWAY DATA	EXISTING	
	1	19
PAVEMENT STRENGTH	12,500 SW	12,500 SW
APPROACH SURFACES	Visual 20:1	Visual 20:1
RUNWAY MARKINGS	Visual	Visual
RUNWAY LIGHTING	None	None
RUNWAY NAVAIDS	None	None
EFFECTIVE GRADIENT	0.3%	
RUNWAY END ELEVATIONS	484.7	492.0
RUNWAY END COORDINATES	N 43° 58' 55" W 73° 05' 43"	N 43° 59' 20" W 73° 05' 44"
RUNWAY LENGTH	2506'	2506'
RUNWAY WIDTH	50'	50'
EXTENDED RSA COMPLIANCE	NO	YES





NOTES:
1. HORIZONTAL DATUM NAD 83 (1986) INTERNATIONAL FEET.
2. VERTICAL DATUM NAVD 88 INTERNATIONAL FEET.
3. EXISTING EASEMENT AND PROPERTY LINES BASED ON "AIRPORT PROPERTY MAP" PREPARED BY CLOUGH HARBOUR & ASSOCIATES MARCH 1986.

GRAPHIC SCALE
200 0 100 200 400
1 inch = 200 feet

Dufresne-Henry

Rev.	Description	By	Date

VERMONT

MIDDLEBURY STATE AIRPORT

EXISTING AIRPORT LAYOUT PLAN

MIDDLEBURY

Project No.	81900014
Proj. Manager	MC
Proj. Designer	JHW
Drawn By	GPR
Checked By	MS
Scale	1"=200'
Approved	
Date	11-5-98

Sheet 2 of 7

D

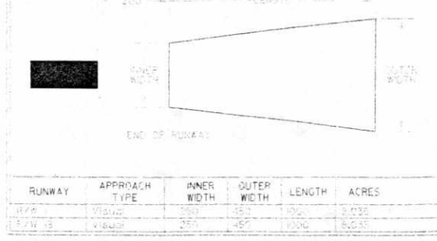
AIRPORT DATA	EXISTING	ULTIMATE
AIRPORT ELEVATION	1,494.0	1,494.0
AIRPORT REFERENCE POINT	N 43° 51' 55.1" W 73° 12' 14.1"	N 43° 51' 55.1" W 73° 12' 14.1"
MEAN MAX TEMP. HOTTEST MO.	80.4° F	80.4° F
WIND COVERAGE	95%	95%
RUNWAY MARKING	Visual	Visual
AIRPORT TERRAIN	Hilly	Hilly
AIRPORT RESERVE (USE GRA)	50	50
MORGAN RANGE TO FT. SAMPLE	1 in 40 Ac	1 in 40 Acres
AIRPORT OWNERSHIP EASEMENT	30 Acres	30 Acres
LOS POWER LINE	1 Overhead Distribution	Overhead Distribution

EXISTING	ULTIMATE	BUILDINGS
1		T-Hangar
2		Hangar
3		Maintenance
4		Terminal, Administration, Hangar
5		Storage Shed
6		Hangar
7		T-Hangar
8		T-Hangar
9		T-Hangar
10		Owners Corporation Maintenance Hangar
11		Runway Crash Rescue Maintenance Hangar
12		Fuel Farm
	13	T-Hangar
	14	Corporate Hangar
EXISTING	**ULTIMATE**	**TERMINAL AREA PAVEMENT**
A		Lower Apron
B		Taxiways
C		Upper Apron
D		Auto Parking
	E	T-Hangar Apron
	F	Corporate Hangar Apron
	G	Auto Parking

LEGEND	EXISTING	ULTIMATE
AIRPORT PROPERTY		SAME
AIRPORT PROPERTY		SAME
AVIGATION EASEMENT		
RUNWAY CONTROLLING OBJECT		SAME
EAST TO OBJECT FREE AREA		SAME
OBJECT FREE AREA (OFA)		SAME
RUNWAY SAFETY AREA (RSA)		SAME
RUNWAY OBJECT AREA IMPROVEMENTS		
RUNWAY PROTECTION ZONE (RPZ)		
TREE LINE		
SECURITY FENCE		
AIRPORT REFERENCE POINT		SAME
WHALE BELLY		
PILOT CONTROLLED LIGHTS (PCL)		SAME
NET LINE OVERFLIGHT		SAME
UNIMPROVED ROADWAY		SAME
PAVEMENT		
AIRPORT BUILDINGS		

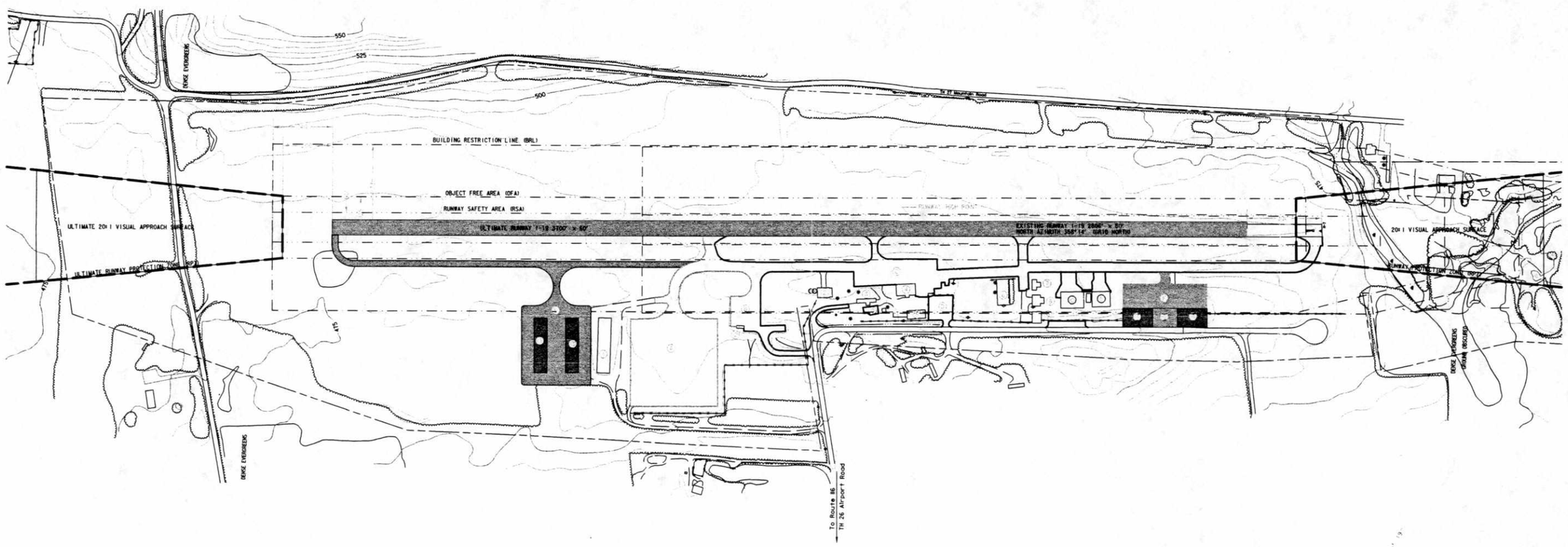
* ASSUMED BUILDING HEIGHT 30 FEET

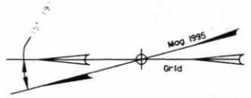
RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS



RUNWAY	APPROACH TYPE	INNER WIDTH	OUTER WIDTH	LENGTH	ACRES
19/01	Visual	250	450	1000	8.035
7/25	Visual	250	450	1000	8.035

RUNWAY DATA	EXISTING		ULTIMATE
	1	19	
PAVEMENT STRENGTH	35,000 LBS	35,000 LBS	35,000 LBS
APPROACH SURFACES	Visual 20:1	Visual 20:1	Visual 20:1
RUNWAY MARKINGS	Visual	Visual	Visual
RUNWAY LIGHTING	None	None	None
RUNWAY MARKERS	None	None	None
EFFECTIVE GRADIENT	0.0%		
RUNWAY END ELEVATIONS	1494.0	1494.0	To Be Determined
RUNWAY END COORDINATES	N 43° 51' 51.8" W 73° 12' 16.1"	N 43° 51' 58.0" W 73° 12' 12.1"	
RUNWAY LENGTH	2500'	2500'	3100'
RUNWAY WIDTH	50'	50'	60'
EXTENDED RSA COMPLIANCE	NO	YES	YES





NOTES:
1. HORIZONTAL DATUM NAD 83 (1986) INTERNATIONAL FEET.
2. VERTICAL DATUM NAVD 88 INTERNATIONAL FEET.
3. EXISTING EASEMENT AND PROPERTY LINES BASED ON "AIRPORT PROPERTY MAP" PREPARED BY CLOUGH HARBOUR & ASSOCIATES MARCH 1999.

GRAPHIC SCALE

200 0 100 200 400

1 inch = 200 feet

Dufresne-Henry

Rev.	Description	By	Date

VERMONT

MIDDLEBURY STATE AIRPORT

ULTIMATE AIRPORT LAYOUT PLAN

MIDDLEBURY

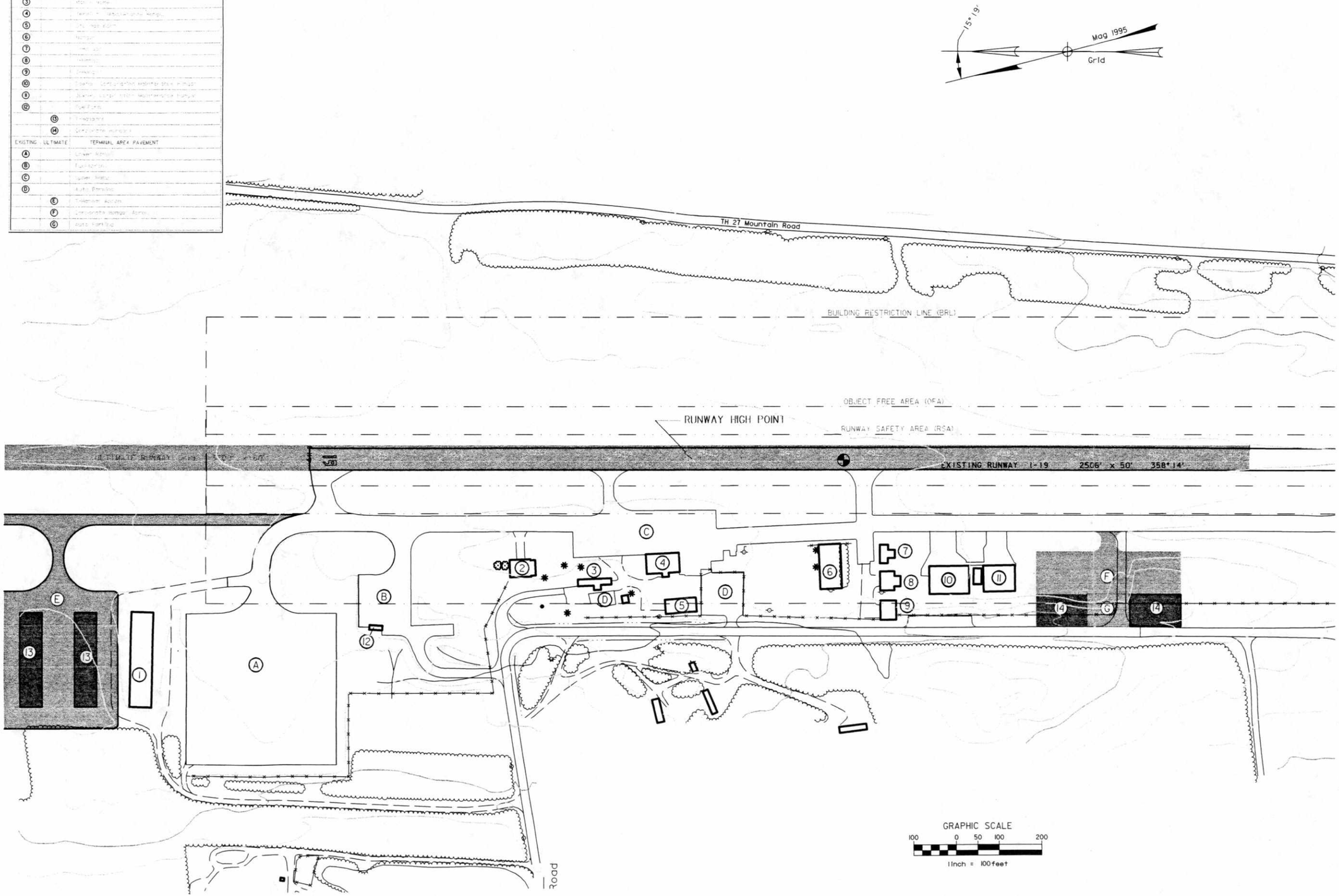
Project No.	8190014
Proj. Manager	MC
Proj. Designer	JMM
Drawn By	GPR
Checked By	MS
Scale	1"=200'
Approved	
Date	11-12-99

Sheet 3 of 7

D

EXISTING	ULTIMATE	BUILDINGS
①		[illegible]
②		[illegible]
③		[illegible]
④		[illegible]
⑤		[illegible]
⑥		[illegible]
⑦		[illegible]
⑧		[illegible]
⑨		[illegible]
⑩		[illegible]
⑪		[illegible]
⑫		[illegible]
	⑬	[illegible]
	⑭	[illegible]

EXISTING	ULTIMATE	TERMINAL AREA PAVEMENT
Ⓐ		[illegible]
Ⓑ		[illegible]
Ⓒ		[illegible]
Ⓓ		[illegible]
	Ⓔ	[illegible]
	Ⓕ	[illegible]
	Ⓖ	[illegible]



Dufresne-Henry

Rev.	Description	By	Date

VERMONT

MIDDLEBURY STATE AIRPORT

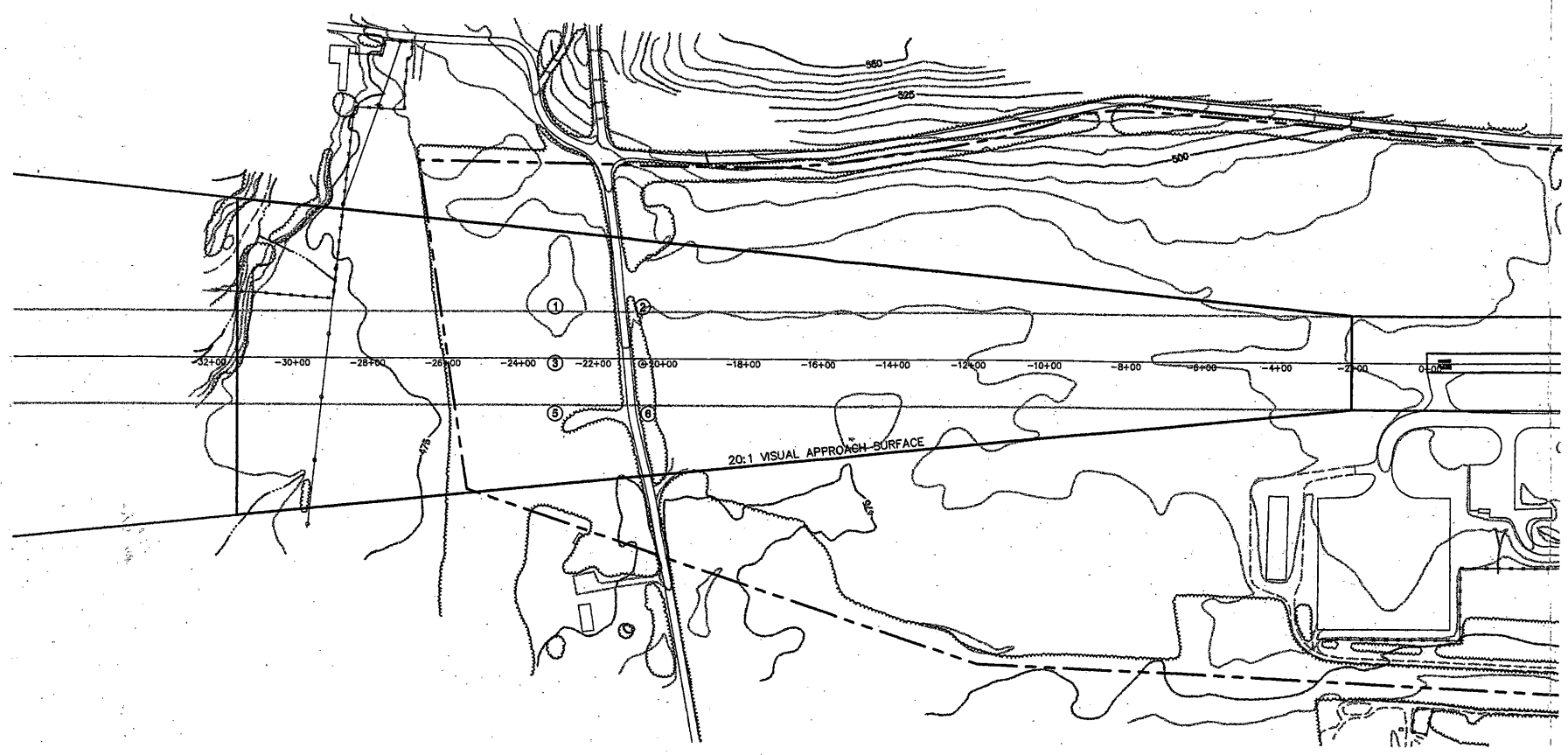
TERMINAL PLAN

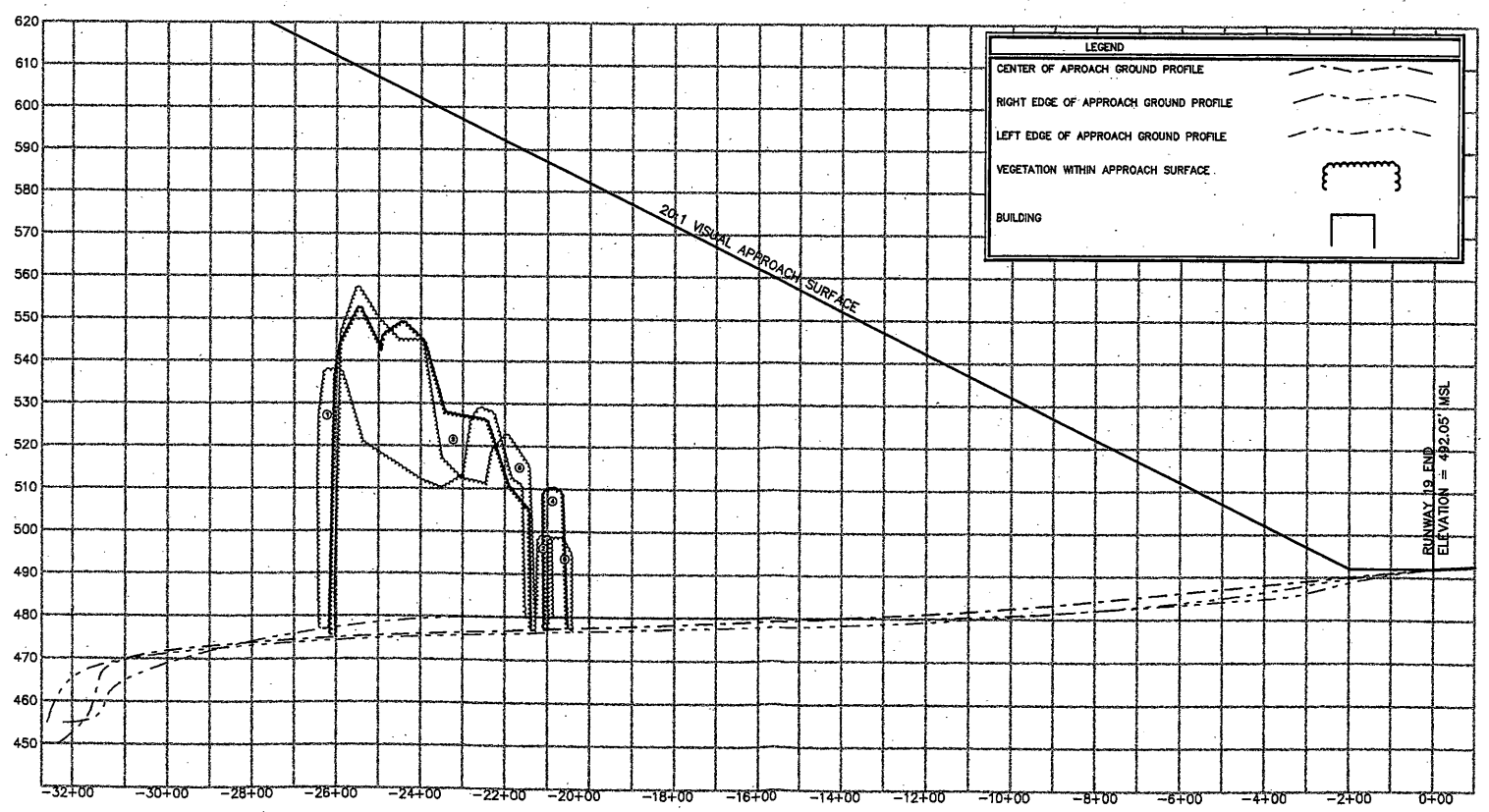
MIDDLEBURY

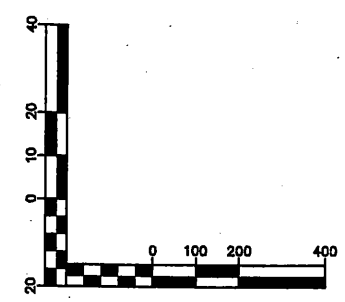
Project No.	8190014
Proj. Manager	MC
Proj. Designer	JWM
Drawn By	GPR
Checked By	MS
Scale	1"=100'
Approved	DCD
Date	9-14-99

Sheet 4 of 7

D







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Consulting Engineers
SOUTH BURLINGTON, VT 05407
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Rev.	Description	By	Date

MIDDLEBURY STATE AIRPORT

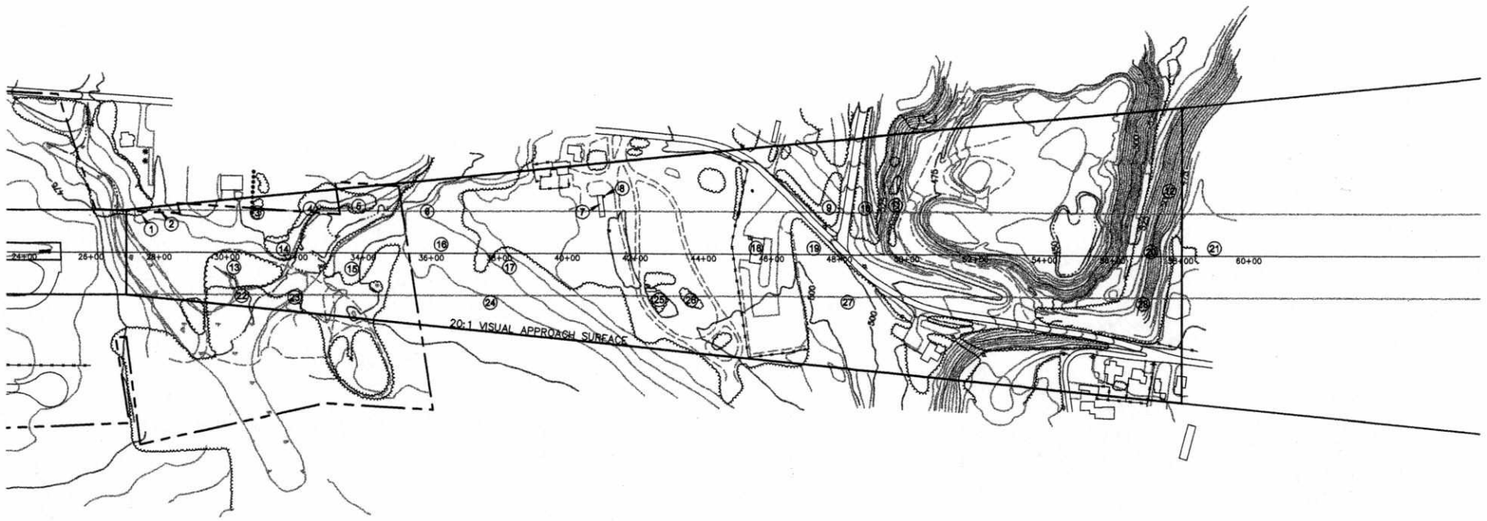
RUNWAY 19
F.A.R. PART 77 PLAN AND PROFILE

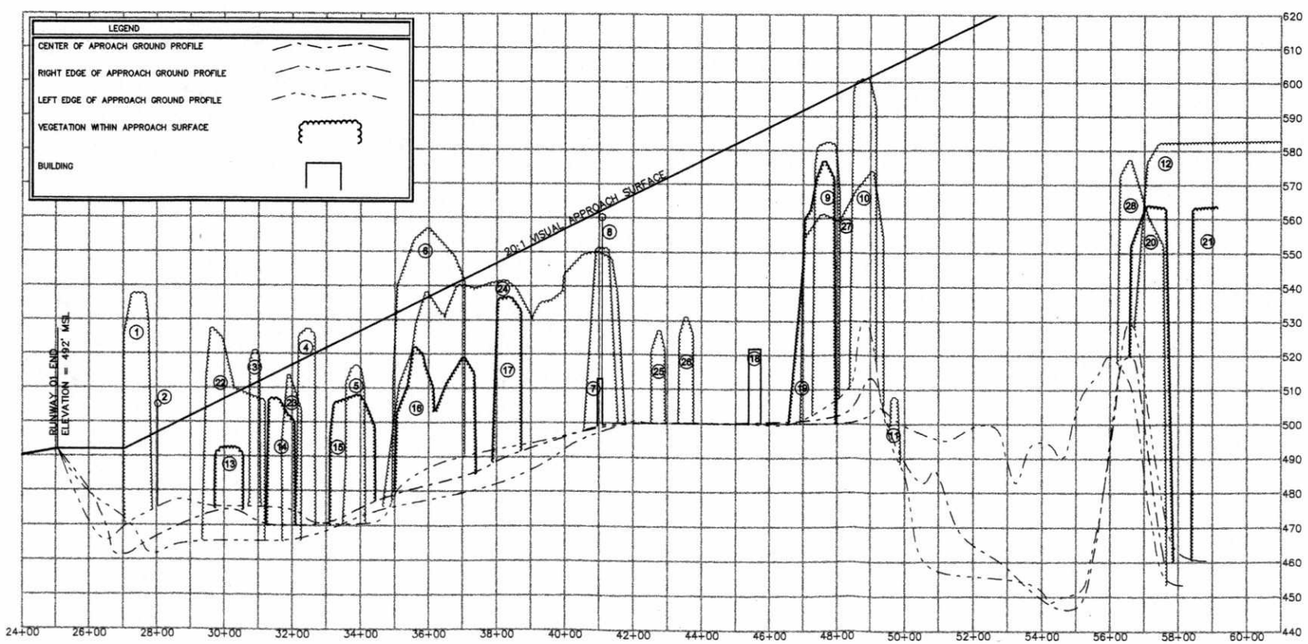
MIDDLEBURY VERMONT

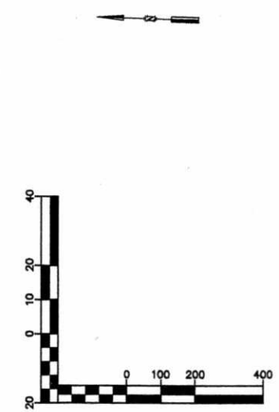
Project No.	6150014
Proj. Manager	JW
Proj. Designer	JW
Drawn By	MRS
Checked By	JM
Scale	1" = 200'
Approved	
Date	05/00

Sheet 1 of 2

D







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Rev.	Description	By	Date

MIDDLEBURY STATE AIRPORT

VERMONT

RUNWAY 01
F.A.R. PART 77 PLAN AND PROFILE

MIDDLEBURY

Project No.	8190014
Proj. Manager	JW
Proj. Designer	JW
Drawn By	MRB
Checked By	JW
Scale	1" = 200'
Approved	
Date	05/09

Sheet 2 of 2

D

Chapter Six
ENVIRONMENTAL OVERVIEW

6.1 Purpose and Intent

The purpose of this chapter is to evaluate impacts associated with airport improvement projects proposed in the short term at Middlebury State Airport. This analysis is conducted pursuant to guidelines presented in FAA Order 5050.4A, *Airport Environmental Handbook*, and FAA Order 1050.1D, *Policies and Procedures for Considering Environmental Impacts*. These FAA documents are based on the general requirements for compliance with the 1969 National Environmental Policy Act (NEPA). NEPA requires all federal agencies to give equal weight to environmental as well as economic and operational considerations when evaluating actions of the federal government. This evaluation is also conducted pursuant to the State of Vermont's Act 250 requirements in order to protect and conserve the lands and the environment of the state and to insure that these lands and the environment are devoted to uses which are not detrimental to the public welfare and interest.

The environment consists of natural and human resources (i.e., wetlands and places of public assembly) that can often dictate the use of a particular area of land as well as the location and layout of proposed development projects at an airport. This environmental analysis provides guidance and information regarding the extent of environmental impacts and level of permitting associated with those proposed improvement projects within the first five years of the airport development program.

The guideline utilized by the FAA (for projects eligible for federal funding) when considering the potential environmental impacts is the reasonably foreseeable future or the first five years of the planning period. By definition, the short-term capital improvement plan (CIP) includes projects proposed within the first five years of the 20 year planning period. Projects not associated with the short-term CIP are not assessed for environmental impacts because environmental regulations and the needs of the airport change over time.

The projects to be proposed during the short-term planning period and the associated potential environmental impacts are included in Table 6-1:

TABLE 6-1
SUMMARY OF SHORT TERM PROJECTS AND POTENTIAL ENVIRONMENTAL IMPACTS

Project Type	Short Term Projects	Potential Environmental Impacts
Airport Reference Code	B-I	None
Obstruction Removal	Remove obstructions in FAR Part 77 Surfaces.	Water Quality, Archeological, Biotic Communities, Wetlands
Additional Hangar-space Requirements	Two 6 unit T-Hangars	None
Apron Requirements	Additional 89,600 square feet	None
Taxilane Construction	Additional 650 linear feet	None
Airport Security Fence	Partial airport coverage	None

6.2 Environmental Impact Review

The following environmental analysis evaluates the 21 impact categories identified in FAA Order 5050.4A, *Airport Environmental Handbook*, that are required for FAA review of the proposed airport improvement projects.

6.2.1 Noise

A noise analysis is not required for utility or transport airports that serve Design Group I and II aircraft and conduct less than 90,000 annual propeller-aircraft operations or less than 700 annual jet operations. Studies[1] have shown that significant aircraft noise levels (i.e., 65 day-night average A-weighted sound level [Ldn]) generally remain within the landing surface area of the airport. Table 6-2 lists different "single-event" noise activities and their associated Ldns for comparative purposes (note that a comparison of average noise levels to single-event noise levels cannot be directly compared).

[1]FAA Report No. FAA-AS-71-1, *Developing Noise Exposure Contours for General Aviation Airports.*

TABLE 6-2
MIDDLEBURY STATE AIRPORT
REPRESENTATIVE NOISE LEVELS FOR COMPARISON TO AIRPORT LEVELS

NOISE EVENT	NOISE LEVEL (dbA)
Rustle of Leaves	10
Watch Ticking	30
Ordinary Conversation	60
Vacuum Cleaner	70
Garbage Disposal	80
Boeing 727 on Takeoff from ¼-Mile	100
Rock-music Concert	110
Air-raid Siren	130

Source: Dufresne-Henry, Inc., analysis

A noise-level threshold of 65 dbA was established by the FAA and other federal agencies (i.e., the Department of Housing and Urban Development and the U.S. Environmental Protection Agency [USEPA]) because studies have demonstrated that this level of noise exposure becomes a nuisance to humans.

Middlebury State Airport currently serves Airport Reference Code (ARC) B-I category aircraft. The airport's B-I designation and the current number of annual aircraft operations (35,000 operations were reported in 1999) have not necessitated an aircraft noise analysis. Furthermore, the forecast for annual operations in the short term (through the year 2004) is expected to reach 37,500, well below the threshold of 90,000 annual operations established by the FAA in Order 5050.4A. Therefore, no noise analysis will be required as a result of proposed short-term airport improvement projects. Noise impacts associated with short-term projects identified in this ALPU are not expected.

6.2.2 Compatible Land Uses

The compatibility of existing and planned land uses in an airport vicinity are usually associated with the extent of potential noise impacts from the airport. As previously stated in Subsection 6.2.1, no noise impacts are anticipated as a result of the proposed projects identified for the short term at Middlebury State Airport.

To further ensure the compatibility of existing and planned land uses, FAA Order 5050.4A states "The Land Use section of the Environmental Assessment shall include documentation to support the required sponsor's assurance under Section 511 (a)(5) of the 1982 Airport Improvement Act

that appropriate action, including the adoption of zoning laws, has been or will be taken, to the extent reasonable to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft. The assurance must be related to existing and planned land uses."

Airport property is currently zoned as Airport District and Agricultural Rural Residential by the town of Middlebury, Vermont. Zoning districts adjacent airport property include Medium Density Residential, and Forest Conservation Area, see Figure 6-1. Designated land uses for the Airport District and Forest Conservation Area zones are deemed compatible with airport operations. Residential development (permitted within the Agricultural Rural Residential and the Medium Density Residential districts), however, is not considered a land use that is compatible with airport operations as residential developments in close proximity to the airport may potentially encounter noise impacts resulting from aviation activities. Furthermore, residential development areas within the vicinity of the airport may pose potential safety hazards to aircraft operations.

Impacts associated with land use incompatibility are unlikely to occur as a result of the proposed actions identified for short term in this ALPU. However, the town of Middlebury may wish to consider amending the Agricultural Rural Residential and Medium Density Residential zoning districts, at least within the vicinity of the airport, to prevent future impacts associated with land use incompatibility.

6.2.3 Social Impacts

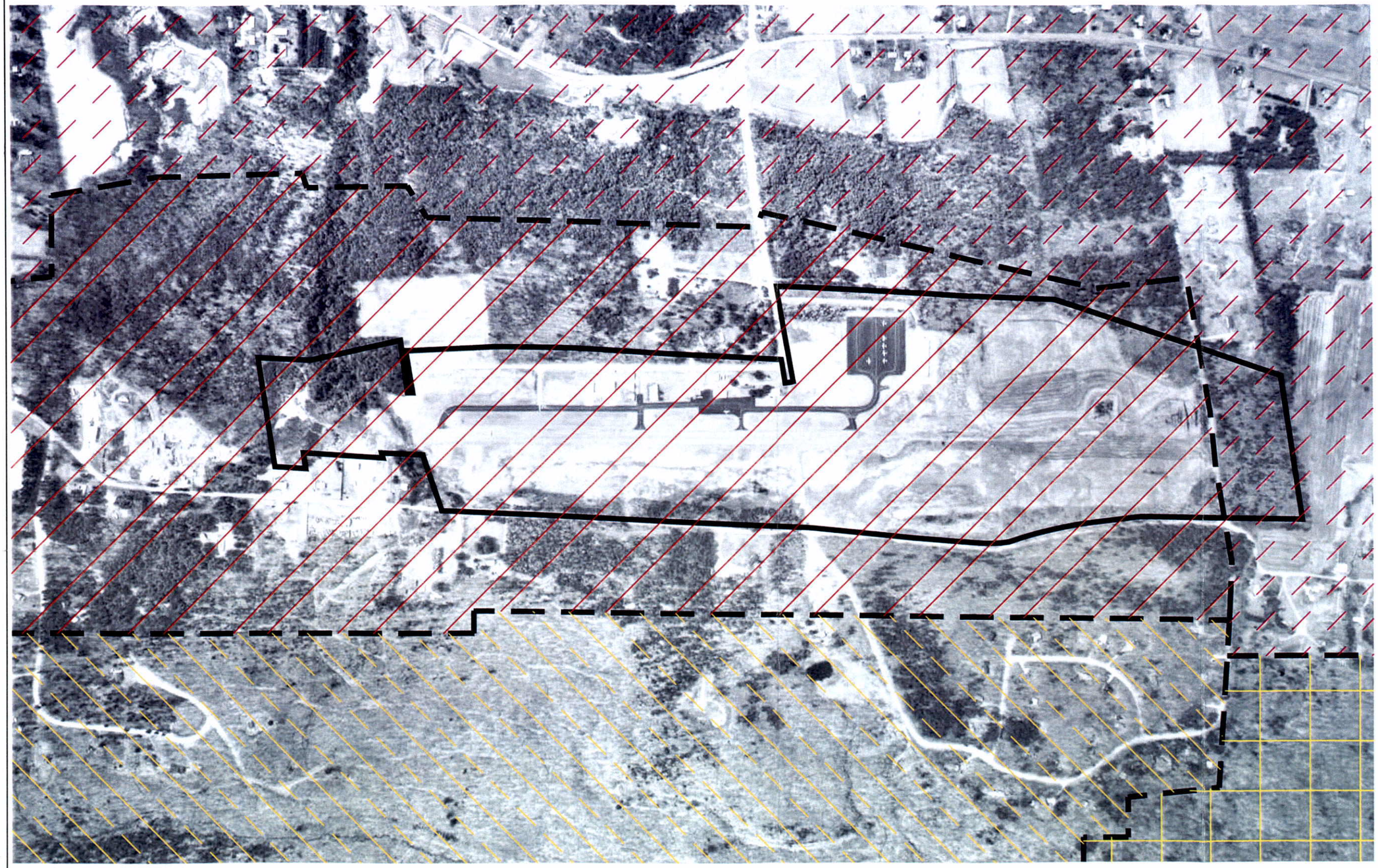
Social impacts are typically associated with large projects that cause community disruption. Community disruptions include projects that require the relocation of any residence or business; alter surface-transportation patterns; divide or disrupt established communities; disrupt orderly, planned development; or create an appreciable change in employment. This ALPU does not anticipate any such activities resulting from the proposed short-term airport improvement projects. Therefore, no social impacts are expected.

6.2.4 Induced Socioeconomic Impacts

Induced socioeconomic impacts are usually associated with large airport improvement projects. Such projects are considered actions that would have secondary impacts on the surrounding community including shifts in population patterns and changes in businesses and public-service demand. Induced socioeconomic impacts resulting from airport improvement projects are typically insignificant, unless there are substantial impacts to other categories such as noise, land-use, or direct social impacts. The projects proposed at Middlebury State Airport in the short term are not anticipated to result in any adverse socioeconomic impacts.

6.2.5 Air Quality

Section 176 (c) of the Clean Air Act Amendments of 1977 states, in part, that no federal agency shall engage in, support in any way, provide financial assistance for, license, permit, or approve



N

LEGEND

AIRPORT DISTRICT

MEDIUM DENSITY RESIDENTIAL

FOREST CONSERVATION AREA

AGRICULTURAL RURAL RESIDENTIAL

ZONING BOUNDARY

AIRPORT PROPERTY LINE

GRAPHIC SCALE

600 0 300 600 1200

1 inch = 600 feet

Dufresne-Henry
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Portland, Maine

MIDDLEBURY STATE AIRPORT

FIGURE 6-1
ZONING MAP

MIDDLEBURY VERMONT

Project No.	8190014
Proj. Mgr.	MLC
Scale	1"=600'
Date	05-09-00
B	

any activity that does not conform to a state implementation plan for meeting air-quality standards after it has been approved or promulgated under Section 110 of that Act. It is the FAA's responsibility to ensure that federal airport actions conform to state plans for controlling area-wide air pollution impacts.

FAA Order 5050.4A also stipulates that any general aviation airport projecting less than 180,000 operations annually does not require an air quality analysis as part of an Environmental Assessment. The projected number of aircraft operations at Middlebury State Airport for the short term is 37,500 in the year 2004 (46,200 operations are forecasted for the long term, through the year 2019), which is significantly below the 180,000 annual aircraft operations threshold for an air-quality review. Therefore, no significant impacts to air quality are anticipated in the short term.

6.2.6 Water Quality

The Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977, provides the authority to establish water-quality standards and control discharges into surface and subsurface water bodies. Section 402 of the Clean Water Act (33 USC 1344) gave the U.S. (EPA) authority to regulate certain high-priority stormwater discharges. On September 29, 1995, the USEPA published the *Final National Pollutant Discharge Elimination System* (NPDES) *Multi-Sector General Permit for Industrial Activities* (*Federal Register*, Vol. 60, No. 189). Under this regulation, all airports are required to file a Notice of Intent (NOI) with the U.S. Environmental Protection Agency and prepare a Storm Water Pollution Prevention Plan (SWPPP).

Currently, the State of Vermont is the delegated authority that regulates and monitors the federal storm water program. However, according to the State of Vermont, their pollution discharge elimination system is under review and has not been implemented. Therefore, industrial facilities such as airports do not have to file a notice of intent with the State of Vermont nor must they prepare a storm water pollution prevention plan until the program is enacted. However, all construction projects impacting five acres or more must comply with the State of Vermont General Permit 3-9001 for Stormwater Runoff from Construction Sites.

Several water resources located on and in the vicinity of the airport should be considered when planning airport development projects. The Middlebury River is located roughly one-half miles south of airport property. Beaver Brook, which receives a portion of the storm water runoff from the airport, flows through airport property south of the Runway 1 End and eventually drains into the Middlebury River. An unnamed brook is located north of the northern edge of the airport property boundary. Wetlands associated with Beaver Brook are also present on and adjacent to airport property. These wetlands also receive storm water runoff from the facility and should be considered when planning future airport improvement projects.

Vegetation removal projects conducted in and adjacent to wetland areas pose the potential to impact water quality. Impacts to water quality in wetlands will be avoided through compliance with federal, state and local permit requirements, engineering and design controls, and the

implementation of erosion and sediment control best management practices (BMPs). Tree clearing activities in wetland areas will be conducted in a manner which minimizes soil disturbance. Vegetation will be removed using non-mechanized methods during summer months when the ground is dry or during winter months when the ground is frozen. No grubbing or grading will occur in these areas. Impacts to groundwater resources are not expected as a result from any of the proposed projects in the short term.

6.2.7 U.S. Department of Transportation Act, Section 4(f)

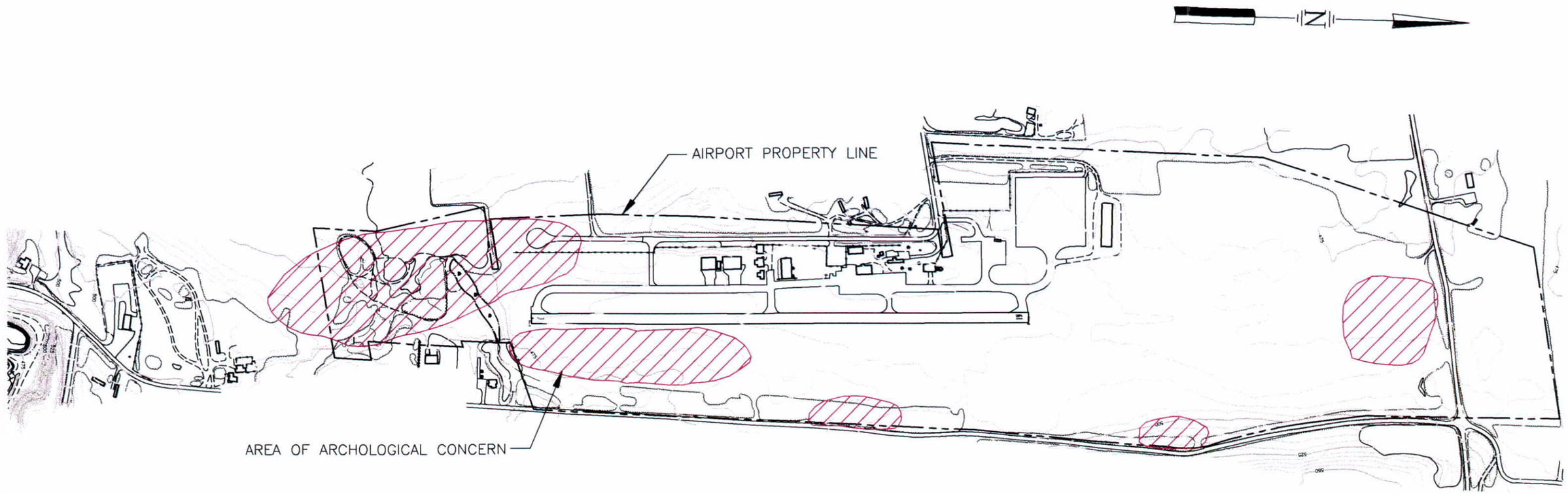
Section 4(f) of the Department of Transportation Act requires that the Secretary of Transportation investigate all alternatives before impacting any publicly owned lands designated as public parks; recreation areas; wildlife or waterfowl refuges of national, state, or local significance; or land on an historic site of national, state, or local significance.

As there are no Section 4(f) lands within the vicinity of the airport, impacts associated with proposed airport improvement projects in the short term are not anticipated.

6.2.8 Historic, Architectural, Archeological, and Cultural Resources

Two federal laws apply to this category of impact. The National Historic Preservation Act of 1966 established the Advisory Council on Historic Preservation to advise the President and Congress on historic-preservation matters while the Archeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistoric, historical, archeological, or paleontological data.

The Vermont Agency for Historic Preservation was contacted to determine the existence of any historic, cultural, or archeological resources within the vicinity of Middlebury State Airport. Response from this agency indicated that comments on Vermont Agency of Transportation (VAOT) projects should be provided by the historic preservation specialist within VAOT, see letter dated March 13, 2000 in Appendix C. The Vermont Agency of Transportation was subsequently contacted to determine the presence of any historic, cultural, or archeological resources within the vicinity of the airport. A Phase IA archaeological investigation has also been conducted in conjunction with this project to determine the existence and location of any of the aforementioned resources located on or adjacent to airport property, see Figure 6-2. Based on a preliminary review of the proposed projects, the historic preservation specialist with VAOT identified three hangars at the airport which date from the early 1950s. These hangars are important examples of their type and are relatively uncommon in Vermont. Although these structures are not yet eligible for the National Register as they are less than 50 years of age, they will most likely become eligible for the National Register when they become 50 years of age, see letter dated May 9, 2000 in Appendix C. VAOT also identified several properties of state and national historic significance within the vicinity of the airport. Although impacts to historic resources are not expected as a result from any of the proposed short-term improvement projects, the historic specialist with VAOT should be consulted prior to the commencement of future projects. A copy of the archeological report is presented in Appendix B.



GRAPHIC SCALE

500 0 250 500 1000

1 inch = 500 feet

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MIDDLEBURY STATE AIRPORT

FIGURE 6-2
AREAS OF ARCHEOLOGICAL CONCERN

MIDDLEBURY VERMONT

Project No.	8190014
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Scale	1"=500"
Date	05-09-00
B	

Impacts to archeological resources may occur as a result of the obstruction removal project proposed for the short-term due to the disturbance of soil.

6.2.9 Biotic Communities

The natural environment of the airport and vicinity consists primarily of mowed grassy areas, agricultural areas, mixed deciduous/coniferous forest, a stream, and wetlands. Forested areas associated with the airport are located north of Runway 19 End and south of Runway 1 End and are dominated by hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*). A majority of the wetland areas are located south of Runway 1 End and are associated with Beaver Brook. This area is also characterized by a dense stand of hemlocks which provides suitable habitat for deer and small furbearers as there are several beaver dams constructed along the brook. A small mowed wetland is located north of Runway 19 End and is enveloped by an annually planted corn crop.

Impacts in the short term will consist of habitat conversion. Forested areas may be cleared during the obstruction removal projects. Upland forested areas will be converted to grassy areas to be easily maintained as field. Impacts to wetland areas resulting from the proposed obstruction removal project may involve clearing wetland vegetation to remove obstructions from the airport's protected airspace pursuant to FAR Part 77, *Objects Affecting Navigable Airspace.* No grubbing or grading will occur in wetland areas. If clearing in wetland areas is required, these areas will be maintained as palustrine scrub-shrub wetlands. Low growth species will be encouraged in an effort to avoid future penetrations to navigable airspace.

6.2.10 Endangered and Threatened Species

The U.S. Fish and Wildlife Service (USFWS), the Vermont Fish and Wildlife Department (VF&W), and the Vermont Nongame and Natural Heritage Program were contacted to identify rare, threatened or endangered species, and exemplary natural communities on or adjacent to airport property. No occurrences of any listed species within the airport vicinity were identified by the USFWS, therefore impacts resulting from the proposed short-term projects are not anticipated, see letter dated April 12, 2000 in Appendix C. These agencies should, however, be consulted prior to the commencement of proposed short-term projects which pose the potential to impact natural resources. **Comments from Vermont Nongame and Natural Heritage Program and Vermont Department of Fish & Wildlife are forthcoming.**

6.2.11 Wetlands

Wetlands are regulated and defined by many different levels of government. Federal regulations, implemented by the U.S. Army Corps of Engineers (ACOE), are based on Section 404 of the Federal Clean Water Act. The federal definition of a wetlands is provided in the *Corps of Engineers Wetland Delineation Manual (1987),* in which wetlands are characterized by a three-parameter approach including vegetation, hydrology, and soils. The State of Vermont regulates

wetlands through the Agency of Natural Resources; the basic state definition of a wetlands is similar to the federal definition.

The airport and immediate vicinity was investigated to identify wetlands subject to federal, state, and/or local jurisdiction. A sketch-level wetland delineation was completed in 1999, see Figure 6-3.

Located south of the Runway 1 End is a palustrine forested/scrub-shrub wetland that is associated with Beaver Brook. This wetland area is characterized by a dense stand of hemlocks (*Tsuga canadensis*) as wells as speckled alder *(Alnus rugosa)* and may provide suitable habitat for deer and small furbearers, as there are several beaver dams constructed along the brook. A small mowed wetland is located north of the Runway 19 End and is enveloped by an annually planted corn crop. This wetland is dominated by mixed grasses as well as sedges *(Juncus sp.)*.

Based on the sketch-level wetland delineation, impacts in the short term will consist of habitat conversion. Forested wetland areas may be cleared during the obstruction removal project. However, no grubbing or grading will occur in wetland areas. These areas will be maintained as scrub-shrub wetlands. Low growth species will be encouraged in an effort to avoid future penetrations to navigable airspace.

A variety of methods exist for the mitigation of direct wetlands impacts required by federal and state regulations. Where the direct filling of wetlands is proposed (which is not likely with any of the short-term projects), the following strategies can be employed to sufficiently mitigate the impacts:

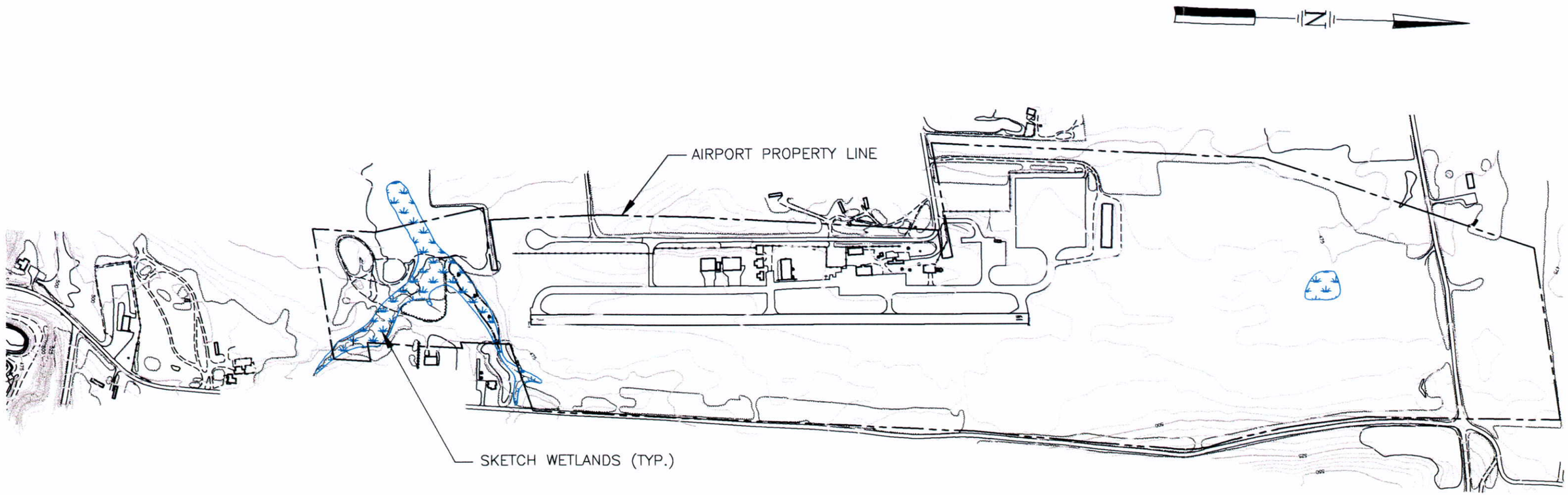
- ❑ creation of new wetlands (through grading and planting) in an uplands area (known as wetlands replication) that may or may not violate FAA AC 150/5200-33 regarding the siting of land uses adjacent to airports that may attract hazardous wildlife

- ❑ the purchase of existing high-quality wetlands, which are then protected from further impacts through the use of land-restriction easements

- ❑ the enhancement of an existing wetlands area (through plantings, improved hydrology, and/or debris removal)

When only temporary wetlands impacts occur and the topography and hydrology are not modified (often the case with vegetative obstruction removal), other forms of mitigation are used, including the following:

- ❑ employ construction techniques that reduce soil disturbance (i.e., low ground-pressure vehicles)



GRAPHIC SCALE

500 0 250 500 1000

1 inch = 500 feet

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Consulting Engineers
Portland, Maine

MIDDLEBURY STATE AIRPORT

FIGURE 6-3
SKETCH WETLANDS

MIDDLEBURY VERMONT

Project No.	8190014
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Scale	1"=500"
Date	05-09-00
B	

- ❑ replace disturbed vegetation with low-growing native species based on a plant inventory completed for an adjacent wetlands
- ❑ use erosion control practices that limit the disturbance to a well-defined area
- ❑ complete all in-wetlands work during the winter or late summer months when the ground is less susceptible to damage due to the presence of frost or low soil moisture

Prior to commencing any proposed projects anticipated to impact wetlands, a formal wetlands delineation of pertinent areas must be prepared to accurately assess the extent of the impacts. The extent of the impacts will define both the permits that will be required and the level of those permits that must be addressed. This is especially pertinent for the obstruction-removal project, where access to off-airport sites was not obtained for this ALPU; therefore, the extent of wetlands in all of the identified obstruction areas is not known. For this reason, the exact extent of wetlands impacts associated with the obstruction removal project cannot be calculated at this time.

6.2.12 Floodplains

The National Flood Insurance Program is administered by the Federal Emergency Management Agency (FEMA). FEMA conducted a detailed study of the 100-year floodplain within the town of Middlebury, creating a Flood Insurance Rate Map that shows the extent of the 100-year floodplain in relation to airport property, see Figure 6-4. FEMA determined that the 100-year floodplain does not encroach upon airport property. Therefore, no impacts to flood loss or flood capacity are anticipated with the projects proposed in the short term.

6.2.13 Coastal Zone Management

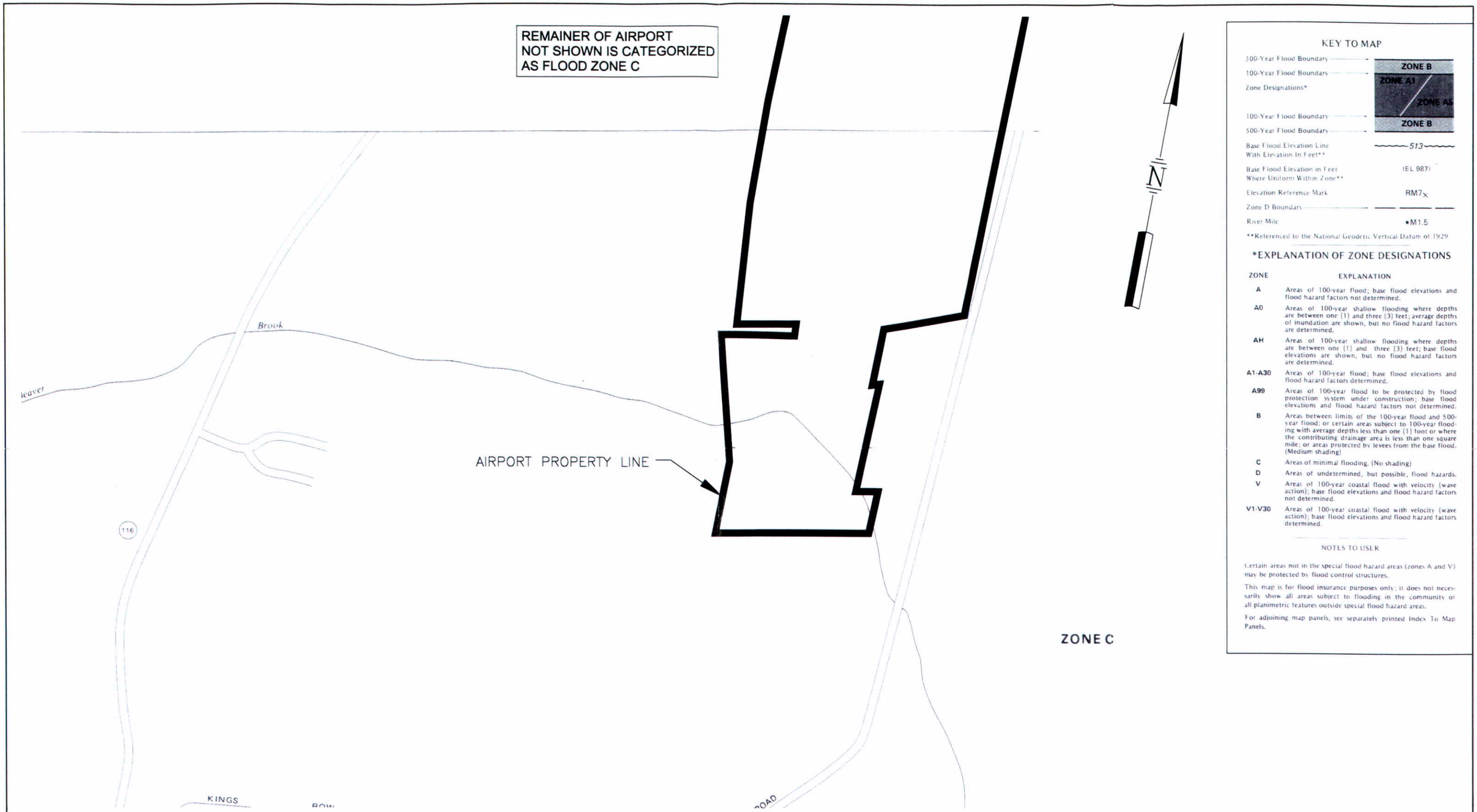
Middlebury State Airport is not located within a coastal zone, therefore potential impacts to coastal areas are not associated with the proposed ALPU projects.

6.2.14 Coastal Barriers

There are no coastal barriers in the vicinity of the airport, therefore potential impacts to coastal barriers will not be associated with the proposed ALPU projects.

6.2.15 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (PL 90 542 as amended) affords protection to those river areas eligible for inclusion in the National Wild and Scenic River System. Impacts to these resources are regulated by the National Park Service. There are no rivers or river segments listed in the national inventory within the vicinity of the airport. Therefore, impacts to wild and scenic rivers will not be associated with the proposed ALPU projects.



SOURCE:
BASE MAP FROM FLOOD INSURANCE RATE MAP FOR TOWN OF MIDDLEBURY, VERMONT, ADDISON COUNTY, BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY, DATED JANUARY 3, 1985.

GRAPHIC SCALE

400 0 400 400 800

1 inch = 400 feet

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MIDDLEBURY STATE AIRPORT

FIGURE 6-4
FLOOD MAP

MIDDLEBURY VERMONT

Project No.	8190014
Proj. Mgr.	MLC
Scale	1" = 400'
Date	05-09-00
B	

6.2.16 Farmland

The soil series present at Middlebury State Airport have been mapped by the Natural Resources Conservation Service (NRCS) field office in Middlebury, Vermont, see Figure 6-5. The majority of these soils are designated as Adams loamy fine sand, Colton gravelly sandy loam, and Rockland series soils. Soil series located adjacent to airport property include Walpole silt loam, Elmwood fine sandy loam, and Berkshire and Marlow extremely stony loams. Elmwood soils are considered prime farmland according to the NRCS. Walpole soils are considered prime only if adequately drained. Adams and Colton soils are considered of statewide agricultural importance and are evaluated with prime soils for purposes of Act 250 review.

According to the Farmland Protection Policy Act, PL 97-98, "prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, and oilseed crops." The NRCS has determined that prime farmland soils are located on Middlebury State Airport property, see letter dated March 28, 2000 in Appendix C. Any action which converts prime farmland soils for nonagricultural use requires consent from the United States Department of Agriculture. None of the projects identified for the short term in this ALPU will impact prime agricultural soils. It should be noted that land clearing for the purposes of obstruction removal is not considered a conversion of farmland soil for nonagricultural use.

The NRCS should be consulted prior to the construction of propose short-term projects to ensure compliance with the Farmland Protection Policy Act. Soils of statewide importance may be impacted by several of the proposed short-term projects. Impacts to these soils must be addressed in the Act 250 permit application.

6.2.17 Energy and Natural Resources

The proposed hangar additions may require minimal increased electrical supplies and the expected increase in based aircraft will result in higher fuel usage. The extent of these increases in electrical and fuel usage is minimal compared to most development and, therefore, is not anticipated to place a significant adverse demand on available energy and natural resources.

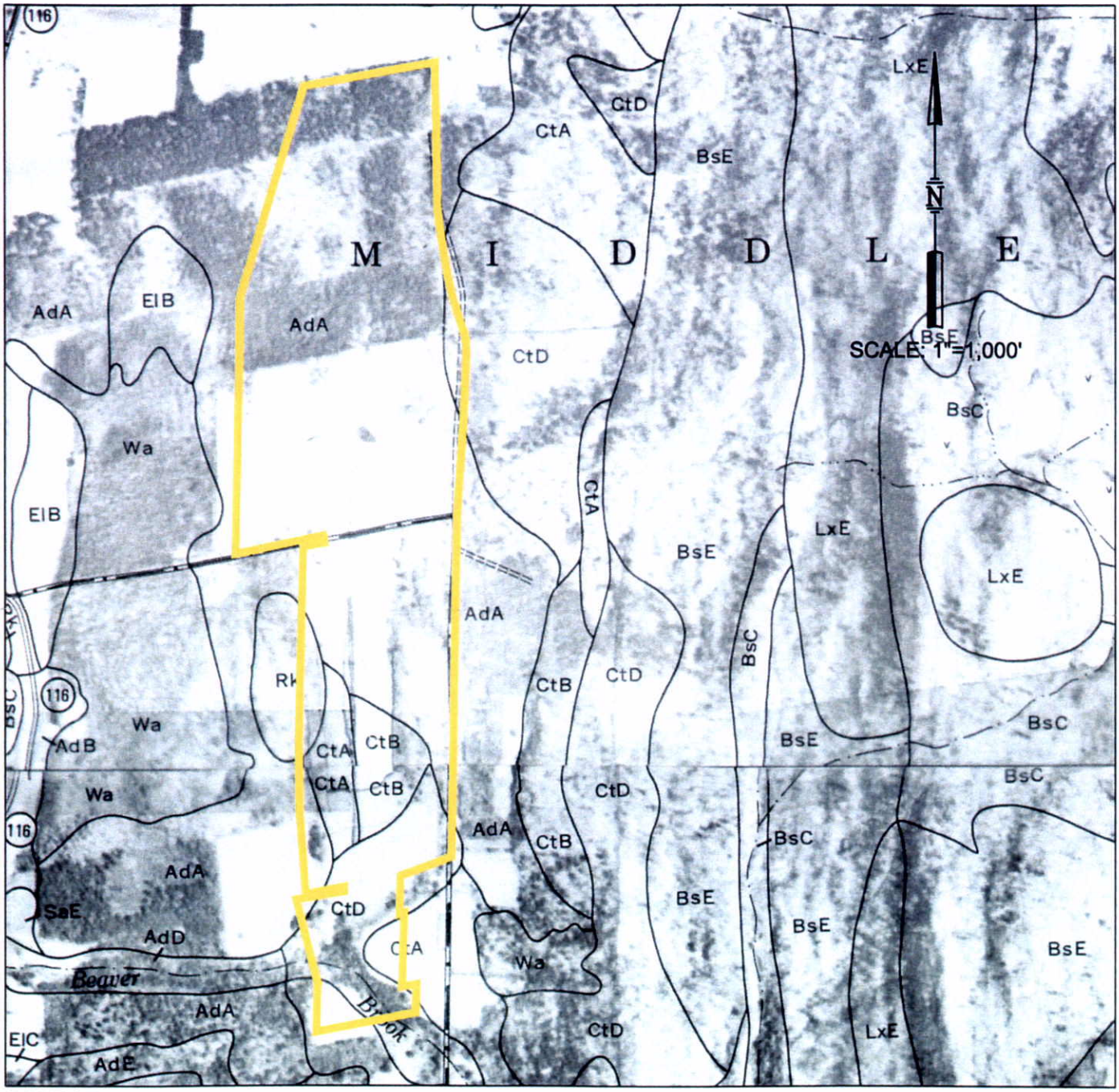
6.2.18 Light Emissions

Potential adverse impacts from light emissions refer to the potential for creating an annoyance to residents in the vicinity of the lighting installation or modification. FAA Order 5050.4A states that "Only in unusual circumstances, as for example when high-intensity strobe lights would shine directly into people's homes, will the impact of light emissions be considered sufficient to warrant special study and a more detailed examination of alternatives in an environmental impact statement." The installation of an external light on the hangars is not likely to cause an adverse impact. No impacts are expected as a result of any of the proposed short term improvement projects.

SOILS LEGEND

AdA	Adams loamy fine sand, 0-5%	S	CtD	Colton gravelly sandy loam, 12-30%	
BsC	Berkshire and Marion extremely stony loams, 3-20%		ElB	Elmwood fine sandy loam, 0-8%	P
BsE	Berkshire and Marion extremely stony loams, 20-50%		Rk	Rockland	
CtA	Colton gravelly sandy loam, 0-5%	S	Wa	Walpole silt loam	P-b
CtB	Colton gravelly sandy loam, 5-12%				

NOTES: S = Statewide, P = Prime, b = prime or statewide ag soil only when drained
S or P = Primary Agricultural Soil Under Act 250



SOURCE:
BASE MAP FROM U.S.D.A., SOIL CONSERVATION SERVICE,
SOIL SURVEY FIELD SHEET, ADDISON COUNTY, VERMONT.

AIRPORT PROPERTY LINE

Dufresne-Henry
Consulting Engineers
Portland, Maine

MIDDLEBURY STATE AIRPORT

FIGURE 6-5
SOILS MAP

MIDDLEBURY VERMONT

Project No.	8190014
Proj. Mgr.	MLC
Scale	1"=1000'
Date	05-09-00
A	

6.2.19 Solid Waste

Airport actions which relate only to airfield development (runways, taxiways, and related items) will not normally include any direct relationship to solid waste collection, control, or disposal other than that associated with construction activities, see 6.2.20.

Middlebury State Airport currently produces only a minimal amount of solid waste, which is transported to an off-site facility. Impacts to solid waste are not anticipated by any of the proposed short-term projects. Construction bid documents will require that the demolition debris becomes the property of the contractor and is disposed of according to all applicable federal, state, and local regulations.

The obstruction removal project may generate significant wood waste in the short term. Where clearing Wood debris will be disposed of in accordance with local, state, and federal regulations.

6.2.20 Construction Impacts

Construction impacts have the potential to create temporary undesirable environmental effects at the airport. These impacts typically are associated with noise from construction equipment, dust associated with earth moving, air pollution from burning debris, and water pollution from soil disturbance and erosion. Generally, construction impacts are temporary and are eliminated once the project is completed. However, to ensure that avoidable impacts are minimized, it is important to consider potential effects of the construction process on adjacent protected resources. Projects proposed in the short term have the potential to create construction impacts.

Construction impacts will be mitigated through the implementation of responsible design practices, appropriate project scheduling, and erosion and sedimentation control plans. It is recommended that project specifications include the provisions of AC 150/5370, *Standards for Specifying Construction of Airports*, which specifies the use of responsible design practices, appropriate project scheduling, and erosion/sedimentation control plans.

6.2.21 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, was issued on February 11, 1994. This Order established procedures for the U.S. Department of Transportation (USDOT) to "achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including interrelated social and economic effects, of its programs, policies, and activities on minority populations and low-income populations in the United States."

In preventing disproportionately high and adverse effects on minority and low-income populations, it is USDOT policy to "actively administer and monitor its operations and decision-making to assure that nondiscrimination is an integral part of its programs, policies, and activities.

USDOT currently administers policies, programs, and activities that are subject to the requirements of the NEPA, Title VI of the Civil Rights Act, Uniform Relocation Assistance and Real Property Acquisition Policies Act, Intermodal Surface Transportation Efficiency Act, and other USDOT statutes that involve human health or environmental matters, or interrelated social and economic impacts. These requirements will be administered to identify, early in the development of the program, policy, or activity, the risk of discrimination so that positive corrective action can be taken.

The projects proposed as part of the short-term CIP do not involve the creation of any significant noise impacts, the disruption of any town services, traffic impacts, social impacts, induced socioeconomic impacts, or the separation of minority or low-income individuals.

6.3 Jurisdictional Authorities, Actions, and Permits

Environmental rules and regulations change frequently; prior to initiating any proposed airport improvement project, a thorough investigation of all current rules and regulations is necessary.

NEPA, implemented through the FAA on airport projects, encompasses all environmental regulations at the federal level. NEPA requires all federal actions that utilize federal funds and impact environmental resources such as wetlands, floodplains, and/or endangered species to conduct an Environmental Assessment (EA).

The following is a summary of the jurisdictional authorities, actions, and permits that may apply to the short-term projects proposed at Middlebury State Airport:

6.3.1 Summary of Required Actions and Permits

Federal Requirements

- Environmental Assessment pursuant to National Environmental Policy Act
- U.S. Army Corps of Engineers 404 Wetlands Permit
- 402 Clean Water Act Water Quality Certification
- Section 176(c) Clean Air Act Air Quality Certification

State Requirements

- Act 250 Land Use Permit pursuant to Title 10 V.S.A. Chapter 151
- Wetland Permit pursuant to Title 10 V.S.A. Chapter 37
- General Permit 3-9001 for Stormwater Runoff from Construction Sites

Local Requirements

- Project site plan is subject to review by the town of Middlebury
- Construction Permit pursuant to the town of Middlebury's Zoning Ordinance

The following is a more detailed discussion on jurisdictional authorities.

6.3.2 Federal Jurisdictions

National Environmental Policy Act (NEPA): NEPA is this nation's basic charter for protection of the environment. NEPA was enacted with two primary objectives in mind: (1) preventing environmental damage, and (2) ensuring that federal agencies consider environmental factors with regard to federal actions. NEPA also established the federal Council on Environmental Quality (CEQ), which is responsible for promulgating NEPA regulations (40 CFR §§ 1500-1508).

NEPA regulations mandate environmental protection for all federal agencies (excluding Congress, the judiciary, and the President). They also require federal agencies to assist in implementing the CEQ's NEPA regulations by adopting policy and procedures consistent with NEPA. The FAA has two such documents: FAA Orders 5050.4A, *Airport Environmental Handbook*, and 1050.1.D, *Policies and Procedures for Considering Environmental Impacts*.

The environmental analysis and documentation provided in an EA enables the FAA to either issue a **Finding of No Significant Impact (FONSI)**, or to require an **Environmental Impact Statement (EIS)**. It is likely the FAA would issue a FONSI for the projects proposed at Middlebury State Airport should an EA be required, as no impacts were found to be significant as defined in FAA Order 5050.4A.

U.S. Army Corps of Engineers 404 Wetlands Permit: The 404(b)(1) guidelines are substantive criteria used in evaluating discharges of dredged or fill material into waters (including wetlands) of the United States under section 404 of the Clean Water Act. Should any of the proposed projects identified in the ALPU result in soil disturbances, such as grubbing and grading, in wetlands, a Section 404 wetlands permit will be required. Section 404 wetland permits are administered by the U.S. Army Corps of Engineers, often in conjunction with designated state environmental agencies.

Clean Water Act 402 Water Quality Certification: As required by section 402 of the federal Clean Water Act, discharges into surface and subsurface waters requires a water quality certification. A water quality certification is implied if a permit is issued from the Vermont Agency of Natural Resources, pursuant to the Vermont Wetlands Act, and/or the ACOE pursuant to the CWA section 404.

Section 176(c) Clean Air Act Air Quality Certification: As required by section 176(c) of the federal Clean Air Act, if a federal action increases airport capacity then it must conform to the Vermont State Implementation Plan. An air quality certification will be required.

6.3.3 State Jurisdictions

Act 250 Land Use Permit: The State of Vermont employs a broad permitting tool when considering the impacts of proposed construction permits - the Act 250 Land Use Permit. This permit covers 10 criteria, as summarized below:

- ❑ Criterion 1: The project will not cause air and water pollution.
- ❑ Criterion 2&3: The project will have sufficient water and will not burden existing water supplies.
- ❑ Criterion 4: The project will not cause unreasonable soil erosion nor interfere with the ability of the land to hold water.
- ❑ Criterion 5: The project will not cause unreasonable congestion or unsafe conditions with respect to the use of highways or other means of transportation.
- ❑ Criterion 6: The project will not be an unreasonable burden on educational services.
- ❑ Criterion 7: The project will not place an unreasonable burden on municipal services.
- ❑ Criterion 8: The project will not have an undue adverse impact on scenic or natural beauty, aesthetics, historic sites, or natural areas.
- ❑ Criterion 8(A): The project will not destroy or significantly imperil any necessary wildlife habitat or endangered species.
- ❑ Criterion 9: The project is in conformance with the capability and development plan
- ❑ Criterion 10: The project is in conformance with the local or regional plan or capital program.

These criteria have a number of sub-criteria, and provide a very thorough review of both environmental and social impacts of the proposed projects. Under Rule 21 of the Act 250 Environmental Board Rules, comprehensive master plans such as this report are eligible for review, although this does not exempt the proposed projects from any further review. This plan will be submitted to the appropriate district Act 250 coordinator, and comments from this review will be incorporated in the report.

Vermont Wetlands Permit: Under the Authority of the Environmental Board pursuant to Title 10 V.S.A. Chapter 37, it is the policy of the State of Vermont to identify and protect significant wetlands and values and functions which serve in such a manner that the goal of no net loss of such wetlands and their functions is achieved.

General Permit 3-9001 for Stormwater Runoff from Construction Sites: This permit covers the discharge of stormwater runoff from construction sites, including clearing, grading, and excavation activities, that will result in the disturbance of five acres or more. This coverage includes the discharge of stormwater runoff from construction sites that result in the disturbance of less than five acres but which are part of a larger common plan of development or sale that will result in the disturbance of a total of five or more acres.

6.3.4 Local Jurisdictions

Prior to initiating project activities, the project site plan is subject to the review of the town of Middlebury. Construction Permits are required pursuant to the Middlebury Zoning Ordinance.

Chapter Seven

DEVELOPMENT COSTS & SCHEDULE

7.1 Introduction

This chapter provides estimated costs for the various facility improvements described in Chapter 4. The improvements are categorized into the three previously described planning periods, i.e.:

- a short-term plan (zero to five years)
- an intermediate-term plan (six to ten years)
- a long-term plan (eleven to twenty years)

Only capital improvement projects are included under the three planning periods. Minor building repairs, grass cutting etc. are considered to be routine maintenance and the cost of this work is not included in the following cost and development schedule.

7.2 Development Schedule

A schedule for implementing the various facility improvements within the three phases of the twenty year overall planning period is shown in Table 7-1, 7-2 and 7-3. This schedule acknowledges that fiscal restraints may be imposed by the Federal Aviation Administration in the future that could delay the implementation of one or more of these projects. The present development schedule does, however, represent projects that have been identified in the recent *Vermont Airport Capital Facility Program* (VACFP). This Program, using a ranking system based on fourteen (14) criteria ranging from the number of annual operations at the airport to the degree of local interest and support for the airport, produced a score for each of the projects for the State-wide airport system within a proposed five-year development program.

Additionally, a candidate list of projects for the State-wide system was produced which would be used to select additional projects to be added to the 5- year development program to replace projects once they have been completed and removed from the program.

For the current Development Schedule in this ALPU, projects at Middlebury State Airport that are ranked in the VACFP 5-year Development Program will also form the projects in the short-term (0-5 years) plan in this document.

Projects from the Candidate List of the VACFP will be categorized into either the intermediate or long-term plan according to their individual scores within the ranking process, i.e. higher scoring projects will be placed in the intermediate plan, lower scoring projects will be placed in the longer -term plan.

7.3 Cost Estimates

The cost estimates provided in this chapter should be considered as budgetary planning costs only. Once a particular project is selected for implementation, the overall construction cost would be refined during the design stage of the project.

The following cost estimates are based on current (Year 2000) dollar values. Costs for projects in the two latter planning stages have not been inflated to allow for potential increases in labor, materials and equipment.

A Construction Cost Index (CCI) is published by *Engineering News Record* and is revised weekly to reflect changes in typical labor rates. This information is also available on the Worldwide Web at *http://www.enr.com/cost/costcci.asp.* Using current CCI values, the following estimates can be updated in the future to reflect inflationary trends by using the following ratio:

$$\frac{(\text{2000 Project Costs}) \times (\text{Future CCI})}{\text{2000 CCI}}$$

7.4 Project Financing

Middlebury State Airport is one of twelve airports within Vermont recognized under the FAA's National Plan of Integrated Airport Systems (NPIAS) as being eligible for Federal funding. Under the NPIAS classification, Middlebury State Airport ranks as a General Aviation Airport primarily

designed to accommodate privately owned small aircraft used for pleasure and small business aircraft.

Projects must appear on a Federally-approved Airport Layout Plan in order to receive consideration for FAA Airport Improvement Program (AIP) funding. For any approved project at the airport, the FAA grant will be 90% of the overall cost with the State required to provide the 10% balance. While capital improvements are generally funded from AIP State Apportionment Funds, the FAA also has discretionary funds available under this same program. These funds can be allocated where sufficient justification can be shown for a particular project, especially those which enhance safety at an airport. Again, a 10% State match is required.

Since the annual level of FAA AIP State Apportionment Funds for Vermont has generally been in the order of $750,000, it has been necessary to combine consecutive annual apportionments in order to fund a major project, such as a runway extension, at one of the State-owned airports. Smaller capital projects may be totally State-funded using appropriations under VAOT's Annual Transportation Bill.

TABLE 7-1 : Short-Term Capital Costs (2000-2005)			
Item	**Construction Cost**	**Contingencies and Engineering**	**Total Development Costs**
Obstruction Removals	$90,000	$10,000	$100,000
New T-Hangars (Site Prep.)	$72,000	$8,000	$80,000
Security Fencing (partial)	$36,000	$4,000	$40,000
Airport Picnic Area	$5,000	-	$5,000
Total Short-Term Capital Costs	**$203,000**	**$22,000**	**$225,000**

TABLE 7-2: Intermediate-Term Capital Costs (2006-2010)			
Item	**Construction Cost**	**Contingencies and Engineering**	**Total Development Costs**
Study for Runway Extension	-	$15,000	$15,000
Study for Parallel Taxiway	-	$15,000	$15,000
New Terminal Building	$ 450,000	$50,000	$500,000
Total Intermediate-Term Capital Costs	**$ 450,000**	**$80,000**	**$530,000**

TABLE 7-3: Long-Term Capital Costs (2011-2020)			
Item	**Construction Cost**	**Contingencies and Engineering**	**Total Development Costs**
Construct Runway Extension	$720,000	$80,000	$800,000
Construct Parallel Taxiway for Runway 5-23	$450,000	$50,000	$500,000
Corporate Hangar Apron	$216,000	$24,000	$240,000
Corporate Hangar/ Admin Building	$450,000	$50,000	$500,000
Security Fencing (full)	$31,500	$3,500	$35,000
Total Long-Term Capital Costs	**$1,867,500**	**$207,500**	**$2,075,000**

TABLE 7-4: Total Capital Costs for 20-Year Plan			
Item	**Construction Cost**	**Contingencies and Engineering**	**Total Development Costs**
Short-Term	$203,000	$22,000	$225,000
Intermediate-Term	$450,000	$80,000	$530,000
Long-Term	$1,867,500	$207,500	$2,075,000
TOTAL	**$2,520,500**	**$309,500**	**$2,830,000**

APPENDIX A

APPENDIX A - AIRPORT CLASSIFICATION & DEVELOPMENT STANDARDS

A.0 INTRODUCTION

To assist VAOT in the determination of appropriate levels of development for the System Airports, the Consultant created standards which all airports should consider when evaluating their future facility needs. These standards are broken down into two primary categories - safety, which is generally addressed by FAA standards, and facility development, which is generally addressed by VAOT standards, as defined under this project. The Facility Development Standards are based on appropriate levels of facility improvements as determined by VAOT. Section A.2 addresses the establishment of these standards. Preceding this section is a discussion on the classification of the Vermont Airport System. The FAA Safety Standards are nationally recognized guidelines, based exclusively on the design aircraft, which is defined by the largest aircraft which regularly uses the facility. Section A.3 addresses the establishment of these standards.

A.1 AIRPORT CLASSIFICATION

Prior to creating appropriate development standards, it is necessary to define the role of the airport. Once this definition is complete, standards that are appropriate for the activity type and level at the airports can be defined. In a working meeting with the TAC on June 21, 1999, the classification system for the Vermont Airports was created. A review of this definition process follows:

A.1.1. Existing Airport Classification. While it is not currently used for development standards, the existing airport system was classified by VAOT in a study completed in 1973, and subsequently updated in 1983. This classification system was comprised of four types of airports - Air Carrier, Economic Development General Aviation Airports, Aviation Specialty Airports, and Other Public Landing Strips. Table A-1 summarizes the classifications of the current public use airports in Vermont, with their associated definitions.

TABLE A-1
1983 VERMONT AIRPORT SYSTEM PLAN AIRPORT CLASSIFICATIONS FOR PUBLIC USE FACILITIES[1]

FACILITY	CLASSIFICATION	DESCRIPTION
Burlington International	Air Carrier	Airports designed to support scheduled air service; 5,000 foot long and 150 foot wide minimum paved runway
Rutland State		
William Morse State	Economic Development General Aviation Airports	Airports designed to support corporate aircraft; must have all-weather operational reliability; 4,000 foot long and 100 foot wide minimum paved runway; emergency landing strip potential
E.F. Knapp State		
Newport State		
Caledonia County		
Franklin County		
Middlebury State		
Morrisville-Stowe State		
Mount Snow		
Hartness State		
Basin Harbour	Aviation Specialty Airports	Airports designed to serve sport and pleasure flying; recreational; emergency landing strip potential; 3,000 to 4,000 foot minimum paved runway
Fair Haven		
John Boylan State		
Post Mills		
Warren-Sugarbush		
North Windham	Other Public Landing Strips	Airports designed to serve owners of small aircraft; casual operations; emergency landing strip potential; 2,000 foot minimum grass runway

[1]Source - Vermont Airport System Plan, 1973, Updated 1983

A.1.2. FAA NPIAS Classification. The National Plan of Integrated Airport Systems (NPIAS) provides for five levels of classifications, including:

- ❑ Commercial Service Airports (Primary)
- ❑ Other Commercial Service Airports (Non-Primary)
- ❑ Reliever Airports
- ❑ General Aviation Airports
- ❑ Non-NPIAS Airports

The NPIAS is tied into both the activity level of the airport {Commercial Service Airports (Primary) and Other Commercial Service Airports (Non-Primary)} and the airport's functional role {Reliever Airports and General Aviation Airports}. However, the NPIAS does not give the definition of the smaller, general aviation airports that comprise the majority (11 of the 12 airports) of the Vermont Airport System.

A.1.3. Other State Airport Classifications. In addition to the FAA's NPIAS classifications, and VAOT's existing classification system, other classification systems from various states were reviewed. A brief summary of the distinctives used, along with comments on their applicability to Vermont, are as follows:

- ❑ Facility Type (Airport, Heliport, Seaport)
- ■ *Comments - All aviation facilities considered under the Vermont Airport Capital Facility Program (VACFP) are Airports.*

- ❑ Facility Use (Public, Private)
- ■ *Comments - All aviation facilities considered under the VACFP are Public Use Facilities.*

- ❑ Service Population
- ■ *Comments - Service population is already considered under the project ranking criteria.*

- ❑ Planning Regions
- ■ *Comments - Planning regions do not necessarily distinguish airport classifications and roles, as is desired under the VACFP.*

- ❑ Airport Class (Airport Reference Code) Categories
- ■ *Comments - Airport class categories are useful in defining FAA safety and planning criteria.*

A.1.4. Recommended Vermont State Airport Classification. After a review of the various classification systems used by other states, the TAC elected to use a two-tiered classification system, which incorporates a facility use descriptor (the airport role or function) and the FAA's

facility classification, which is otherwise known as the Airport Reference Code. The facility use descriptor will generally define the development standards, whereas the Airport Reference Code (ARC) will generally define the FAA required safety standards. A detailed discussion of these descriptors follows.

A.1.4.1 - Facility Use. The facility use descriptors that were established for Vermont are:

- **Commercial Service** - The basis of airport activity is developed around providing services for operations with scheduled passenger service. This service could be attributed to a single commuter flight or hundreds of daily airline flights.

- **General Aviation** - The airport bases its activities and operations upon general aviation use, which typically incorporates services for personal flying and/or business flying. Airport activity would involve the provision of services for flight activities such as corporate flights, charter activity, recreational flying, sight seeing, flight lessons, etc.

- **Aviation Specialty** - The activity in this category typically involves a small niche of flight service such as aerobatic lessons, flying clubs, seasonal operators, experimental aircraft support, parachuting, ultralights, gliding, etc.

Table A-2 shows each of the Vermont system airports and their associated facility use classifications.

TABLE A-2
VERMONT AIRPORT SYSTEM FACILITY USE DESCRIPTORS

Airport	Facility Use Descriptor
Burlington International Airport	Commercial Service
Rutland State Airport	Commercial Service
Caledonia County State Airport	General Aviation
E. F. Knapp State Airport	General Aviation
Franklin County State Airport	General Aviation
Hartness State Airport	General Aviation
Newport State Airport	General Aviation
William H. Morse State Airport	General Aviation
Middlebury State Airport	General Aviation
Morrisville-Stowe State Airport	General Aviation
John H. Boylan State Airport	Aviation Specialty
Fair Haven Municipal Airport	Aviation Specialty

The second part of the airport classification is the Airport Reference Code (ARC). The ARC is a coding system the FAA developed to assist airports and airport sponsors in establishing which particular design standards are appropriate for which airport. The ARC employs characteristics for both the physical component of the aircraft and the operational component. The Approach Category is the portion of the ARC which describes a grouping based upon aircraft operating characteristics, namely, the approach speed of the aircraft. The Airplane Design Group is the portion of the ARC which describes a grouping based upon the aircraft physical characteristics. The Approach Category and the Airplane Design Group are defined below:

A.1.4.2 - Approach Category. The approach category groups operational characteristics of aircraft based upon its approach speed. The FAA considers the approach speed to be equal to 1.3 times the stall speed in a landing configuration at the aircraft's maximum certificated landing weight. Runway design standards are partially based upon the approach category. The approach categories are delineated into the following five groups:

Category A:	Approach speed equals less than 91 knots.
Category B:	Approach speed equals 91 knots or more, but less than 121 knots.
Category C:	Approach speed equals 121 knots or more, but less than 141 knots.
Category D:	Approach speed equals 141 knots or more, but less than 166 knots.
Category E:	Approach speed equals 166 knots or more.

A.1.4.3 - Design Group. The Airplane Design Group considers the physical characteristics of aircraft based upon wingspan. Certain runway design standards are based upon the airplane design group and taxiway design standards are entirely based upon this group. The Airplane Design Group is delineated into the following six groups:

Group I:	Airplane wingspan up to 49 feet
Group II:	Airplane wingspan equals 49 feet up to 79 feet
Group III:	Airplane wingspan equals 79 feet up to 118 feet
Group IV:	Airplane wingspan equals 118 feet up to 171 feet
Group V:	Airplane wingspan equals 171 feet up to 214 feet
Group VI:	Airplane wingspan equals 214 feet up to 262 feet

The airport or airport sponsor typically refers to the ARC to ensure that airfield projects adhere to the appropriate design standards. The airport or airport sponsor should also periodically compare

aircraft operating at the airport and the established airport ARC. The ARC should be equal to the most demanding aircraft that operates or intends to operate at the airport on a regular basis.

Airports containing two or more runways should design most airfield facilities to the most demanding ARC and design specific areas to a less restrictive ARC. This will avoid the unnecessary over-development and the additional maintenance needs that go along with the excess development. The following table shows the Vermont system airports, their established ARC and the airplane characteristics that pertain to this ARC:

Table A - 3
Established Airport Reference Codes

Airport	ARC	Designed for the following Aircraft Characteristics
Burlington International Airport	D-V	Approach speed equals 141 knots up to 166 knots. Wingspan equals 171 feet up to 214 feet.
Rutland State Airport	C-II	Approach speed equals 91knots up to 121 knots. Wingspan equals 49 feet up to 79 feet.
Caledonia County State Airport	B-II	Approach speed equals 91knots up to 121 knots. Wingspan equals 49 feet up to 79 feet.
E. F. Knapp State Airport	B-II	Approach speed equals 91knots up to 121 knots. Wingspan equals 49 feet up to 79 feet.
Franklin County State Airport	B-II	Approach speed equals 91knots up to 121 knots. Wingspan equals 49 feet up to 79 feet.
Hartness State Airport	B-II	Approach speed equals 91knots up to 121 knots. Wingspan equals 49 feet up to 79 feet.
Newport State Airport	B-II	Approach speed equals 91knots up to 121 knots. Wingspan equals 49 feet up to 79 feet.
William H. Morse State Airport	B-II	Approach speed equals 91knots up to 121 knots. Wingspan equals 49 feet up to 79 feet.
Morrisville-Stowe State Airport	B-II	Approach speed equals 91knots up to 121 knots. Wingspan equals 49 feet up to 79 feet.
Middlebury State Airport	B-I	Approach speed equals 91knots up to 121 knots. Wingspan equals less than 49 feet.
John H. Boylan State Airport	A-I	Approach speed equals less than 91 knots. Wingspan equals less than 49 feet.
Fair Haven Municipal Airport	A-I	Approach speed equals less than 91 knots. Wingspan equals less than 49 feet.

A.2 VAOT AVIATION DEVELOPMENT STANDARDS

This Section of the Vermont Capital Facility Program establishes the airport development standards for the Vermont state airports under study. This evaluation primarily focuses on the airport terminal area (aprons, hangars, fuel farms, auto parking and access, and administration/terminal buildings).

The airport development standards analysis uses two primary means of establishing levels of improvements - the airport facility use (Commercial Service, General Aviation, Aviation Specialty), and the activity level of the airport. An inventory of terminal facilities is presented, and then these results are compared to theoretical facility requirements. Requirements are determined from the unconstrained forecasts of aircraft operations and planning guidelines presented in Advisory Circular 150/5300-13 *Airport Design.*

New facilities or facility improvements are recommended with the goal of maintaining a viable and effective airport for its users. The following subsections address the ability of the existing airport facilities to accommodate current aviation demands and to recommend the appropriate development standards to add or improve these facilities to meet these demands.

A.2.1. Aircraft Parking Aprons. Aprons are areas at the airport which provide aircraft parking, access to terminal facilities, fueling, deicing, ground power units, tow vehicles, ground transportation to terminal areas and other typical support needs for aircraft. Apron areas are typically divided into two categories for determining the existing aircraft parking needs, as well as future aircraft parking needs. The two apron categories are based upon the expected length of use. The two apron categories are transient aprons and aprons for based aircraft.

Transient aprons are normally located closest to the terminal. The determining factor for transient aprons is that the aircraft may stay for a period of time (from quick stops to overnights) but the aircraft is not based at the airport. Aprons for based aircraft are typically separate from these aprons. Based aircraft aprons are typically located near hangars, tie down areas and aircraft service areas.

To determine total apron demand, transient apron requirements are determined from a formula derived from the itinerant operations forecast developed earlier. Based aircraft apron needs are calculated from an assumed percentage of the based aircraft forecasts.

A.2.1.1. - Transient Apron. Advisory Circular 150/5300-13, Appendix 5 presents a methodology for calculating itinerant parking demand in instances where actual field surveys are unavailable. The following calculations are presented to estimate itinerant parking demand.

Calculate the average peak daily itinerant operations for the most active month. Assume the active month is 15% busier than average month

Assume the average busy itinerant day is 10 percent more active than the average day.

Assume that a certain portion of the itinerant airplanes will be on the apron during the day. For this analysis it will be assumed that 30 percent of the total busy day itinerant operations will be parked on the apron at any one time.

Calculate the area needed on the basis of 360 square yards (s.y.) of apron space for all transient aircraft (*Airport Design* recommends a range of 300 SY for single engine up to 700 SY for General Aviation jets. A weighted mid-point of 360 SY will be applied).

A.2.1.2 - Based Aircraft Apron. The first step is to obtain the number of based aircraft requiring apron tie-down space. For purposes of this analysis, it will be assumed that 50 percent of all based aircraft will opt for tiedowns over more expensive hangars. Because most based aircraft that use tiedowns in lieu of hangars are single engine aircraft, a budget of 300 SY of parking apron per aircraft will be used to calculate demand.

There will be variations on this assumption from airport to airport depending upon a number of caveats. This includes the availability of existing hangars and the respective cost to each aircraft owner. A surplus capacity of low cost hangars will tend to lessen tiedown demand at northern tier airports, with severe winter conditions, such as experienced at the Vermont system facilities.

There may also be a specific use such as the air freight operation at the William H. Morse State Airport, that results in a significant number of the larger twin engine aircraft remaining on the apron instead of being hangared. Nonetheless, this system analysis will provide a theoretical determination of apron demand which should be further refined as individual Master Plan is developed.

A.2.1.3. – Aircraft Parking Apron Demand. Apron area required for the Vermont System Airports within the next five years (Year 2004) and the existing apron availability is summarized in Table A-4.

TABLE A-4
EXISTING APRON SPACE AND APRON SPACE NEEDED FOR APPROPRIATE STANDARDS - 2004

	Rutland State Airport	Caledonia County Airport	E.F. Knapp State Airport	Franklin County State Airport	Hartness State Airport	Newport State Airport	W. H. Morse State Airport	Middlebury State Airport	Morrisville-Stowe State Airport	John H. Boylan State Airport	Fair Haven Mun. Airport
Based-Aircraft Apron Standards											
Total Based Aircraft	46	19	49	57	42	20	49	46	36	1	2
50% of Based Aircraft (Requiring tiedown space)	23	9	25	28	21	10	24	23	18	1	1
Based Aircraft Apron (SY) (300 SY per aircraft)	6,900	2,700	7,500	8,400	6,300	3,000	7,200	6,900	5,400	300	300
Itinerant Aircraft Apron Standards											
Total Operations	32,400	6,400	15,750	37,500	26,800	8,100	16,100	37,500	21,100	600	500
Itinerant Operations	20,520	3,300	6,300	18,700	8,000	5,000	7,700	7,500	7,400	400	400
Peak Month Operations (15% Greater then Average)	1,966	316	604	1,792	767	479	738	719	709	38	38
Peak Month Avg. Day (PMAD) (10% Greater then Average)	72	11	20	60	26	16	25	24	24	1	1
Itinerant Parking Demand (30% of PMAD)	22	3	6	18	8	5	7	7	7	0	0
Itinerant Aircraft Apron (SY) (360 SY per aircraft)	7,787	1,138	2,174	6,451	2,760	1,725	2,656	2,587	2,553	138	138
Total Apron Demand (SY)	14,687	3,839	9,674	14,852	9,060	4,725	9,857	9,488	7,953	438	438
Existing Apron Area (SY)[1]	12,000	6,900	5,400	9,000	18,000	8,000	12,500	12,500	8,200	0	0
Excess or (Deficit) (SY)	(2,687)	3,062	(4,274)	(5,852)	8,940	3,275	2,644	3,013	247	(438)	(438)

Source: Dufresne-Henry, Inc., analysis

[1] Existing Apron Area Does not Account for Grass Tie-Downs

A.2.2. Hangar Demand. Hangar demand is a function of a number of different variables. This includes airport location, type of aircraft to be hangared, costs and seasonal variation. As previously stated, most higher performance aircraft will be hangared, while single engine and light twins are usually split between tiedowns and storage facilities. In the northern climes, some aircraft owners will hangar their aircraft in the winter and tiedown in the summer.

At most airports with a preponderance of GA activity, there are two types of hangars that are available to aircraft owners. The first is the T-hangar, typically an individual unit strictly providing storage to single engine and light twin aircraft. Often the individual units are "nested" together to form singular hangar structures ranging from five to ten units per structure.

The second style of hangar is the corporate type. This structure not only provides storage capabilities to based aircraft, but can also provide a venue for aircraft maintenance, FBO offices, and pilot lounges. Generally, these structures range from 5,000 SF to 10,000 SF.

Forecasting hangar demand is very subjective. Because hangars are ineligible for AIP funding and are usually financed by the private sector, cost is usually the determining factor. If an FBO or corporate operation decides to construct a new hangar, this can occur overnight with no correlation to based aircraft hangar needs. On the other hand, there may be a strong demand for new T-hangars, but due to costs to respective aircraft owners, the project does not happen.

It will be assumed that there may be a need to construct some type of hangar(s) at all of the airports under study within the five year development period. The underlying purpose is to ensure that there is adequate space to provide these facilities for each of the airports. For those airports with current Master Plans, hangar demand is depicted on each of the respective ALPs, and is carried over into this study. For all other facilities, the following development assumptions will be applied to project hangar demand through the five year planning period.

Table A- 5
Hangar Requirements

Airport Reference Code	Hangar Requirements
Aviation Specialty	1 - 5 unit T-Hangar
General Aviation	1 - 10 Unit T-Hangar
	1 - 5,000 SF Corporate Hangar
Commercial Service	1 - 10 Unit T-Hangar
	2 - 10,000 SF Corporate Hangars

A.2.3. Fueling Facilities. Fueling facilities at GA airports are similar to hangars. They are typically funded by the private sector, or built by the Sponsor and leased to an FBO. As a matter of policy, all attended airports should, at a minimum, have an available supply of AVGAS. The need for Jet-A should be made at each airport based on demand and the services provided by the FBO.

A.2.4. Terminal/Administration Buildings. Airport buildings are designed to house specific airport support needs or functions. The fixed base operator (FBO) building typically provides commercial space for aircraft maintenance and repair, flight lessons, charter, fuel sales, and other aircraft commercial support activities. The administration building can accommodate the pilot, passengers, public, and the airport management. The administration building should be located near the FBO but sufficiently separated to preclude conflict between airplanes operating from these areas. In keeping with VAOT policy, all public facilities should be ADA compliant.

It should be noted that lower activity airports may not initially justify the construction of either an FBO or administrative building. The initial airport building is often a maintenance hangar with the attached offices. For an airport to consider construction of a separate administrative type building, there should be a minimum of ten departures and arrivals during the peak hours of a busy day. All attended airports should have as a minimum an area set aside in a hangar or other similar structure which provides a public phone (accessible 24 hours a day); ADA compliant rest rooms; a telephone recording describing the airport facilities and operating hours; a pilot's lounge or waiting area; and a bulletin board.

If construction of an administrative building is necessary, the minimum facilities should accommodate a pilot briefing area, restrooms, an informational booth or bulletin board, a public phone (accessible 24 hours a day) and a telephone recording. This room should have easy access to the restrooms and parking areas. Table 4-6, Existing Administration Building Ammenities describes the current availability of the services described in the above text at each of the Vermont state-owned airports. Airports with commercial service should allow for access to public transportation services at the administration building in addition to the above minimum services. This can range from providing a regularly scheduled bus stop to a simple information kiosk which has phone numbers and information for services such as cabs, rental cars, hotels, restaurants, etc.

Where feasible, airports should also attempt to provide multi-modal links to other transportation networks. One existing example is the parking lot at the Morrisville-Stowe State Airport, which is utilized as a park-and-ride facility due to its proximity to Route 100.

Table A - 6
Existing Administrative Building Amenities

Airport Name	Amenities Provided?					
	Public Phone	Rest Rooms	Food	Telephone Recording	Pilot Lounge	Bulletin Board
Rutland State	yes	yes	yes	yes	yes	yes
Caledonia County State	yes	yes	no	yes	yes	yes
E. F. Knapp State	yes	yes	yes	yes	yes	yes
Franklin County State	yes	yes	no	yes	yes	yes
Hartness State	yes	yes	no	yes	yes	yes
Newport State	yes	yes	no	yes	yes	yes
William H. Morse State	yes	yes	no	yes	yes	yes
Middlebury State	yes	yes	no	yes	yes	yes
Morrisville-Stowe State	yes	yes	no	yes	yes	yes
John H. Boylan State	yes	no	no	no	no	yes
Fair Haven Municipal	no	no	no	no	no	no

A.2.5. Auto Parking. Auto parking at commercial service facilities is divided between airline passengers and other users and tenants of the airport. Users and tenants include GA passengers and pilots, airport based employees and often rental car companies.

There is only one commercial service airport under study, and based on a review of the current Master Plan, parking needs for airline passengers have been determined to be adequate through the planning period. At the other GA airports there are several general planning guidelines that should be used to assess parking needs.

For GA passengers and pilots it is recommended that there should be one space for fifty percent of the based aircraft and 1.5 spaces for the peak day itinerant aircraft parked on the itinerant apron. There should also be adequate parking for airport employees and other visitors. For purposes of this analysis, a total demand of ten employees and visitors will be assumed. It is understood that there may be several airports with a greater demand, but generally this demand is accommodated at each tenants' base of operation. Parking facilities for public buildings should provide for appropriate levels of ADA compliant parking spaces. For airports with nighttime operations, the parking lots should provide for some type of security lighting.

As was done to quantify airport apron needs, parking requirements are determined from existing Master Plans where applicable. Table A-7 summarizes the parking demand using either the above assumptions or Master Plan data.

Based on review of the table, it would appear that most airports within the system study are under capacity for auto parking. Field reconnaissance of these facilities indicates that the analysis may overstate the parking shortage. This is likely due to several factors, including the basis of the

analysis deriving from a peak demand quantification that will only occur sporadically during the summer months. It should also be acknowledged that the assessment of existing parking may not account for many based pilots parking their autos near their aircraft, or in their hangars.

A.2.6. Auto Access. Auto access at any airport focuses on two issues; access to the airport and internal access to airport facilities. At a minimum, access to all airports with paved runways should be a paved, two lane roadway and conform to the minimum standards set forth in each municipalities' bylaws concerning roadway development.

Internal access should be designed to provide a positive separation between airside and terminal area facilities. Ideally, there should be no auto traffic on airport runways, taxiways or aprons. Internal access roads are usually separated from these airside areas with security fencing and gates. In addition to terminal area facility access, there should also be adequate access provided for airport maintenance and emergency vehicles to reach all points of the airfield operation areas.

A.2.7. Airfield Navigational Aids. Navigational Aids is a broad term which encompasses equipment which is utilized by the pilot either on the approach to the airport, or in preparation to depart the airport. The equipment necessary for each type of airport varies, but generally should consist of some type of weather information, vertical approach guidance, horizontal approach guidance, and airfield lighting. The type of equipment necessary is dependant on the approach type of the airport - either a visual approach or a non-precision approach. Table A-8 summarizes the navigational aid requirements of the Vermont Airport System.

Table A- 7
Existing and Required Vehicle Parking

Airport Name	Spaces Needed					Existing Spaces	Surplus or Deficit
	Based A/C	50% Based	Itinerant	1.5 * Itinerant	Total		
Rutland State	46	23	72	108	131	100	-31
Caledonia County State	19	10	11	17	26	15	-11
E. F. Knapp State	49	25	20	30	55	50	-5
Franklin County State	57	29	60	90	119	50	-69
Hartness State	42	21	26	39	60	50	-10
Newport State	20	10	16	24	34	30	-4
William H. Morse State	49	25	25	38	62	50	-12
Middlebury State	46	23	24	36	59	35	-24
Morrisville-Stowe State	36	18	24	36	54	50	-4
John H. Boylan State	1	1	1	2	2	0	-2
Fair Haven Municipal	2	1	1	2	3	0	-3

Table A- 8
Appropriate Airport Navigational Aids

Airport Name	Approach Type	Glide Slope Indicator	Lighting	Hazard Beacons	Rotating Beacon	GCO	AWOS	Wind Direction Indicator
Rutland State	Non-Precision	PAPI	MIRLS	yes	yes	yes	yes	yes
Caledonia County State	Non-Precision	PAPI	MIRLS	yes	yes	yes	yes	yes
E. F. Knapp State	Precision	PAPI	HIRLS	yes	yes	yes	yes	yes
Franklin County State	Non-Precision	PAPI	MIRLS	yes	yes	yes	yes	yes
Hartness State	Non-Precision	PAPI	MIRLS	yes	yes	yes	yes	yes
Newport State	Non-Precision	PAPI	MIRLS	yes	yes	yes	yes	yes
William H. Morse State	Non-Precision	PAPI	MIRLS	yes	yes	yes	yes	yes
Middlebury State	Visual	no	no	no	no	no	no	yes
Morrisville-Stowe State	Non-Precision	PAPI	MIRLS	yes	yes	yes	yes	yes
John H. Boylan State	Visual	no	no	no	no	no	no	yes
Fair Haven Municipal	Visual	no	no	no	no	no	no	yes

A/C - Aircraft **PAPI** - Precision Approach Path Indicator **MIRLS** - Medium Intensity Runway Lights **HIRLS** - High Intensity Runway Lights
GCO - Ground Communication Outlet **AWOS** - Automated Weather Observation System

A.2.7.1. - Visual Airport Navigational Aids. For airports with no published approach, the appropriate airfield navigational aids should be considered as a lighted wind sock for rudimentary weather information (wind direction) and airport identification. No visual approach guidance is necessary.

A.2.7.2. - Non-Precision Airport Navigational Aids. For airports with a non-precision approach, the appropriate weather reporting equipment should be considered as a lighted wind sock for rudimentary weather information (wind direction), and an Automated Weather Observation System (AWOS) or an Automated Surface Observation System (ASOS). These two systems consist of identical equipment, with the only difference being that ASOS were installed under a Federal Program by the National Oceantic and Atmospheric Administration (NOAA), whereas AWOS are funded by the airport sponsor. An AWOS or ASOS consists of a 30-35 foot high tower, and several smaller towers within an fenced area of approximately 20 feet by 30 feet. These towers support several weather observation sensors which provide wind, visibility and precipitation data to pilots utilizing the airport.

Visual approach guidance should be provided via a Precision Approach Path Indicator (PAPI) or equivalent for at least one runway at the airport.

Airports that have nighttime operations should provide nighttime visual guidance with pilot controlled Medium Intensity Runway Lights (MIRLs). For airports with nighttime Instrument Flight Rule (IFR) operations, to assist the pilot during low weather operations, any required obstruction lights and an airport rotating beacon are required.

All airports which have either a non-precision or a precision approach should have a ground communication outlet (GCO). Without an GCO, there is no direct radio communication link between pilots and the Terminal Control Area (TCA). When departing from an Airport under IFR conditions, the pilot must file a flight plan and obtain a clearance from TCA prior to departure. Without the GCO, the pilots must use a payphone at the airport, and are given a void time limit of 5-15 minutes. If the pilot has not departed by this time, another clearance must be obtained. The GCO would allow the pilot to contact TCA directly from the aircraft, which could save several minutes. During inclement weather conditions, or while waiting for a aircraft making an approach to the airport, these few minutes could be the difference between departing on time, or having to leave the aircraft, return to the terminal building, and contact TCA for another clearance.

A.2.8. Airport Instrument Approaches. At the end of January, 1999, results concluding a six month long risk assessment test sponsored by the FAA confirmed that augmented GPS can be the only "sole-service" navigation system installed in an aircraft. GPS has planned to make most precision approaches within then next ten years. Currently, the FAA has determined that GPS establishes a safer approach than both the Non-Directional Beacon (NDB) and the Very-high frequency Omnidirectional Range (VOR) for turning or circling approaches. Because of the effort that the FAA is putting into GPS, it is anticipated that eventually precision approaches will be executed utilizing GPS rather then ground based equipment. However, the completion date for GPS precision approaches has been delayed several times, and at the time of the writing of this report, no official deadline has been established.

Currently, the FAA is funding a Local Area Augmentation System (LAAS) to augment the GPS satellites. The LAAS will provide land-based equipment developed to incorporate additional

accuracy into the airspace system. This system will provide the accuracy needed to conduct precision approaches. Since the FAA is currently no longer procuring and installing land-based conventional instrument approach equipment (such as localizers and glideslopes) as a general practice, and GPS precision approaches may still be several years from implementation, other types of precision approach equipment should be considered for installation at the Vermont System Airports that require an upgrade to a precision approach. If this upgrade is required, the airport and VAOT will have to work closely with the FAA to justify this expenditure. One such airport which is investigating this option is Rutland State, which is evaluating the feasibility of a Transponder Landing System (TLS) to provide a precision approach. This equipment is not yet certified by the FAA, but is expected to be shortly. It has the capability of providing curved and "dog-leg" approach and missed approaches, which could have significant benefits for airports in mountainous terrain such as the Vermont Airports.

To be considered as a potential candidate for a precision approach upgrade, the airport must have a minimum of five peak hour instrument operations, and the upgrade must provide a minimum of a 10% reduction in the ceiling or visibility minimums. Since it is likely that the FAA will be requested to provide funding, or at least to take over maintenance of the approach equipment once the installation is complete, FAA concurrence of the installation of a full precision approach is mandatory.

A.2.9. Security Fencing. All of Vermont state-owned airports should have a full perimeter fence installed to protect against the inadvertent entry of personnel or wildlife. Most all of the Vermont state-owned airports currently have at least partial security fencing installed.

A.2.10. Taxiway Systems. As stated in Advisory Circular 150/5300-13, a basic airport should consist of at least one runway, a full parallel taxiway and adequate transverse(connecting) taxiways. Although there are no specific guidelines indicating when a full parallel taxiway should be added to the airfield layout, it is recommended that all commercial service airports within the state system have a full parallel taxiway for each runway. It is also recommended that those GA airports with an ARC of B-II or higher be evaluated for a full parallel taxiway on each airport's primary runway.

The requirement for a taxiway system is typically triggered by either an airfield capacity constraint, or the need to increase airfield safety. The recommendation for a full parallel taxiway cannot be justified for any of the airports due to airfield capacity, but it should be a goal for at least a partial parallel taxiway to the primary runway end. As an interim measure, if a partial parallel taxiway cannot be justified due to economic or environmental constraints, a runway turnaround (a widened section of pavement at the runway end to facilitate the turning around of aircraft) should be installed at all runway ends without taxiway access.

A.2.11. Current Airport Layout Plan. To be considered for FAA funding, a project must be shown on an approved Airport Layout Plan (ALP). The FAA requires that all ALPs be kept current. At a minimum, the ALP should be updated every 10 years, and sooner if there has been a significant change in the level of operations or the type of aircraft regularly operating at the airport.

A.2.12. Americans with Disabilities Act (ADA) Compliance. It is the policy of the State of Vermont and the Federal Government to not discriminate on the basis of disabilities. All public

use facilities at the airport (terminals, FBO offices and administrative buildings) should be constructed or modified to meet current ADA requirements.

A.2.13. Maintenance of Infrastructure. The FAA, VAOT and the local community have invested literally millions of dollars into the construction of the airport facilities in Vermont. As a policy, it is incumbent on VAOT to regularly maintain and repair these facilities. Those projects which are required to maintain the existing airports (i.e., runway pavement overlays, building rehabilitations, or major NAVAID repair) should be given a high priority.

A.2.14. Airport Picnic Areas. VAOT has received numerous requests to install picnic facilities at the airports for the use of itinerant pilots, as well as the general public. As part of VAOT's desire to reach out to the local population and explore possible uses of the airport that could benefit the community, consideration should be given for the installation of low cost picnic facilities. These sites should be located in areas where there is convenient public access, but not in areas which would encourage inadvertent entrance to the airside. If necessary, security fencing could be installed to provide positive separation between the picnic area and the airside.

A.3 FAA SAFETY STANDARDS

The FAA has published guidelines that will establish the appropriate airport safety standards for each of the Vermont system airports. The safety guidelines outlined below have been previously developed by the FAA for airport development and improvement in the Airport Design Advisory Circular (AC 150/5300-13). These guidelines ensure that safety is the main focus of any airport facility improvement or development. The FAA recommends that all airports and airport sponsors follow these guidelines.

The Airport Design Advisory Circular (AC) transitions from a recommendation status to becoming a requirement for airports or airport sponsors requesting federal aid. These guidelines have been established over many years of research and development testing by the FAA, National Transportation Safety Board (NTSB) and the United States Department of Transportation (USDOT). The Airport Design Advisory Circular is periodically appended with changes in design standards as the operational characteristics of aircraft change and new safety enhancements are developed. The Airport Design Advisory Circular provides many airport development standards that will be complimentary to the appropriate standards for the Vermont state airports.

A.3.1. Aircraft Characteristics. Many design standards pertaining to aircraft operating areas found in the Airport Design Advisory Circular are based upon aircraft characteristics and approach visibility minimums. There are aircraft characteristics that set specific design criteria for the aircraft intending to operate at the airport. These aircraft characteristics provide a basis to determine which specific design standard are appropriate for an individual airport. The three aircraft characteristics which the airport design standards refer to are the weight, the approach speed and the wingspan. The following section explains each of the above aircraft characteristics.

A.3.1.1 - Aircraft Weight. The FAA refers to an aircraft's maximum certificated takeoff weight when establishing runway and taxiway design standards in the Airport Design AC. The following two aircraft sizes reference this weight.

Small Aircraft:	aircraft weighing 12,500 pounds or less at the maximum certificated takeoff weight.
Large Aircraft:	aircraft weighing more than 12,500 pounds at the maximum certificated takeoff weight.

A.3.1.2 - Airport Reference Code. The next two aircraft characteristics which provide guidance to the specific standards that will be applicable to the airport have been grouped into the FAA Airport Reference Code system. This coding system was previously described in Section 4.1.4.

A.3.2. Runway Design Standards. This section describes the various runway design standards, as established in the Airport Design Advisory Circular. This section will reference the layouts depicted in Figure A-1.

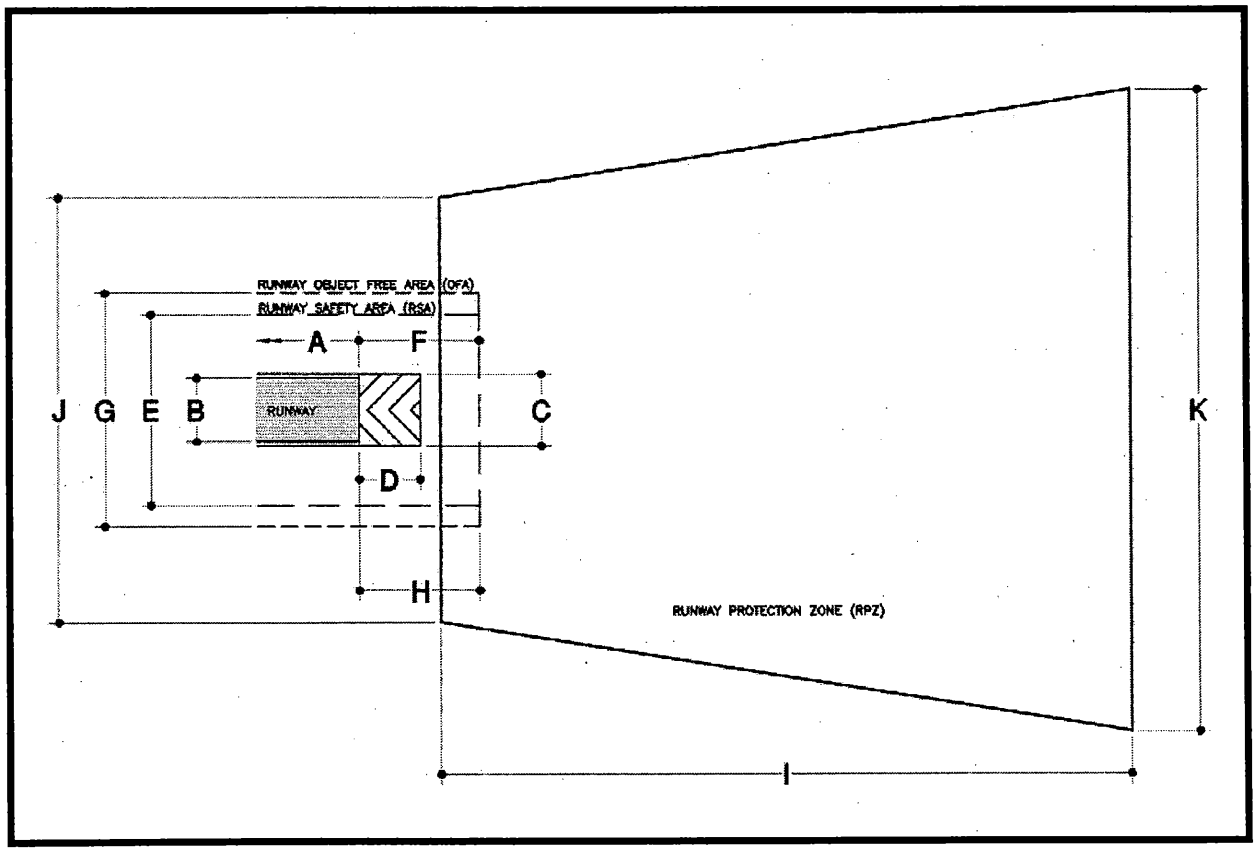


Figure A-1 - Runway Design Standards

A.3.2.1 - Runway Safety Area (RSA). The RSA is an imaginary protection surface centered along the runway centerline, surrounding each runway. The terrain in the RSA must be clear of all obstacles to reduce the risk of damage to airplanes in the event of an undershoot, overshoot,

or excursion from the runway. The RSA must have the following design characteristics:

- clear of obstacles, graded and it must contain no hazardous ruts, humps, depressions, or other surface variations;
- drained by grading or storm sewers to prevent water accumulation;
- in dry conditions it must be capable of supporting snow removal equipment, aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and
- free of objects, except for objects that need to be located in the runway safety area because of their function, such as a NAVAID antenna. These objects must be designed to easily breakaway on impact at a point no more than three inches above grade.

A.3.2.2 - Runway Protection Zone (RPZ). The RPZ is an area off the runway end that enhances the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered about the extended runway centerline. It is related to the approach and begins 200 feet beyond the runway end, regardless of whether or not the runway has a displaced threshold. The RPZ consists of the following Runway Object Free Area (OFA) and Controlled Activity Area.

Table A-9
Runway Protection Zone (RPZ) Dimensions

Approach Visibility Minimums	Facilities Expected to Serve	Runway Protection Zone Dimensions			
		Length (I)	Inner Width (J)	Outer Width (K)	RPZ Acres
Visual and Not Lower Than 1 - Mile	Small Aircraft Exclusively	1,000 ft.	250 ft.	450 ft.	8.035
Visual and Not Lower Than 1 - Mile	Aircraft Approach Categories A & B	1,000 ft.	500 ft.	700 ft.	13.770
Visual and Not Lower Than 1 - Mile	Aircraft Approach Categories C & D	1,700 ft.	500 ft.	1,010 ft.	29.465
Not Lower Than 3/4 - Mile	All Aircraft	1,700 ft.	1,000 ft.	1,510 ft.	48.978
Lower Than 3/4 - Mile	All Aircraft	2,500 ft.	1,000 ft.	1,750 ft.	78.914

Notes:
1. The RPZ dimensional standards are for the runway end with the specified approach visibility minimums. The departure RPZ dimensional standards are equal to or less than the approach RPZ dimensional standards. When a RPZ begins other than 200 feet beyond the runway end, separate approach and departure RPZs should be provided. Refer to AC 150/5300-13 Change 5, Appendix 14 for approach and departure RPZs.
2. Letters correspond to the dimensions on **Runway Design Standards Figure**.

Source: Advisory Circular 150/5300-13 Change 5 "Airport Design".

A.3.2.3 - Runway Object Free Area (ROFA) is an area on the surface centered along the runway centerline that is free of any objects, except for the objects that need to be located there

because of their function. The only obstacles that are allowed in the ROFA are those that need to be located there due to their function. These obstacles may be lighting, navigational aids, signs and service roads. All objects installed in the ROFA must be designed to break away easily on impact.

A.3.2.4 - Controlled Activity Area is the portion of the RPZ beyond and to the sides of the ROFA. The function and use in this area is restricted.

The ROFA and the Controlled Activity Area vary in size according to the Aircraft Design Group for which the runway is designed and the approach procedures to the runway (visual, non-precision, and precision).

A.3.2.5 - Obstacle Free Zone (OFZ). The OFZ is the three dimensional airspace situated along the runway and extended runway centerline. This airspace is above the established airport elevation and below 150 feet. This area is required to be cleared of taxiing and parked airplanes and object penetrations, with the exception of NAVAIDs that have been designed to easily break away on impact. The OFZ contains the runway OFZ, the inner-approach OFZ and the inner-transitional OFZ.

The Runway OFZ is the area surrounding the runway along the runway centerline and at the same elevation as the runway centerline. The Runway OFZ extends 200 feet beyond each end of the runway. The width of the Runway OFZ is determined by the aircraft size which the runway serves. The Runway OFZ widths are:

- runways serving large aircraft - the larger of 400 feet, or 180 feet plus the wingspan of the most demanding airplane plus 20 feet for every 1,000 feet of airport elevation.

- runways serving only small aircraft - 300 feet for precision instrument runways, 250 feet for runways serving aircraft with approach speeds of 50 knots or more, or 120 feet for runways serving aircraft with approach speeds of less than 50 knots.

The Inner-Approach OFZ is an area centered along the approach area and only applies to runways with an approach lighting system. The inner-approach OFZ begins 200 feet beyond the runway threshold at the same elevation as the runway threshold and extends 200 feet beyond the last light unit in the approach lighting system. The width is equal to the Runway OFZ. The inner-approach OFZ rises in elevation at a slope of 50:1 away from the runway end.

The Inner-Transitional OFZ is an area located along the sides of precision instrument runways and the inner-approach OFZ. The inner-transitional OFZ surface slopes 3:1 out from the edges of the Runway OFZ and Inner-Approach OFZ to a height of 150 feet above the established airport elevation.

A.3.2.6 - Primary Surface. The Primary Surface is an imaginary surface area surrounding the runway and centered along the runway. The elevation at any point is the same as the elevation of the nearest point on the runway centerline. The width of the primary surface is as follows:

- 250 feet for utility runways with a visual approach and 500 feet for utility runways with a non-precision instrument approach.

- 250 feet for other than utility runways with a visual approach, 500 feet for other than utility runways with a non-precision instrument approach and visibility minimums greater than ¾ of a statute mile, and 1,000 feet for other than utility runways with either a non-precision instrument approach and visibility minimums lower than ¾ of a statute mile or a precision approach.

A.3.2.7 - Obstacle Transition Surface. The Transition Surface is a two-dimensional plane beginning at the edge of the Primary Surface rising at an upward slope of 7:1.

A.3.2.8 - Runway Line of Sight Standards. Along individual runways, two points five feet above the runway centerline must be mutually visible along the entire runway length. If the runway has a parallel taxiway extending the full runway length, then the line of sight may be obstructed for any point five feet above the runway centerline to any other point five feet above the runway centerline, for only one-half of the runway's length.

A.3.2.9 - Runway Threshold. The runway threshold is the beginning pavement area of the runway suitable for landing. Runway thresholds located other than at the beginning of the runway pavement are referred to as follows:

- Relocated Threshold - the pavement beyond this threshold is not available for landing but is available for taxiing aircraft.

- Displaced Threshold - the pavement beyond this threshold may be available for takeoffs in either direction, yet are only available for landings as overruns from the opposite direction.

TABLE A-10 Runway Design Standards for Airplane Approach Category A & B Visual And Not Lower Than ¾ - Statute Mile Approach Visibility Minimums

RUNWAY CHARACTERISTICS	DIMENSION	AIRPLANE DESIGN GROUP				
		I	I	II	III	IV
Runway Length	A	Refer to AC 150/5325 - 4				
Runway Width	B	60 ft.	60 ft.	75 ft.	100 ft.	150 ft.
Runway Shoulder Width	N/A	10 ft.	10 ft.	10 ft.	20 ft.	25 ft.
Runway Blast Pad						
Width	C	80 ft.	80 ft.	95 ft.	140 ft.	200 ft.
Length	D	60 ft.	100 ft.	150 ft.	200 ft.	200 ft.
Runway Safety Area						
Width	E	120 ft.	120 ft.	150 ft.	300 ft.	500 ft.
Length Beyond Runway End	F	240 ft.	240 ft.	300 ft.	600 ft.	1,000 ft.
OFZ Width and Length	Refer to AC 150/5300-13 Change 5					
Runway Object Free Area						
Width	G	250 ft.	400 ft.	500 ft.	800 ft.	800 ft.
Length Beyond Runway End[3]	H	240 ft.	240 ft.	300 ft.	600 ft.	1,000

Notes:
1. Letters correspond to the dimensions on **Runway Design Standards** figure.
2. These dimensional standards pertain to facilities for only small airplanes. Small airplanes are aircraft 12,500 pounds or less maximum certificated takeoff weight.
3. The runway safety area and runway object free area lengths begin at each runway end when stopway is not provided. When stopway is provided, these lengths begin at stopway end.

Source: Advisory Circular 150/5300-13 Change 5 "Airport Design".

TABLE A-11 Runway Design Standards for Airplane Approach Category A & B
Lower Than ¾ - Statute Mile Approach Visibility Minimums

RUNWAY CHARACTERISTIC	DIMENSION	AIRPLANE DESIGN GROUP				
		I	I	II	III	IV
Runway Length	A	Refer to AC 150/5325 - 4				
Runway Width	B	75 ft.	100 ft.	100 ft.	100 ft.	150 ft.
Runway Shoulder Width		10 ft.	10 ft.	10 ft.	20 ft.	25 ft.
Runway Blast Pad						
Width	C	95 ft.	120 ft.	120 ft.	140 ft.	200 ft.
Length	D	60 ft.	100 ft.	150 ft.	200 ft.	200 ft.
Runway Safety Area						
Width	E	300 ft.	300 ft.	300 ft.	400 ft.	500 ft.
Length Beyond Runway End	F	600 ft.	600 ft.	600 ft.	800 ft.	1,000 ft.
OFZ Width and Length	Refer to AC 150/5300-13 Change 5					
Runway Object Free Area						
Width	G	800 ft.	800 ft.	800 ft.	800 ft.	800 ft.
Length Beyond Runway End[3]	H	240 ft.	240 ft.	600 ft.	800 ft.	1,000 ft.

Notes:
1. Letters correspond to the dimensions on **Runway Design Standards** figure.
2. These dimensional standards pertain to facilities for only small airplanes. Small airplanes are aircraft 12,500 pounds or less maximum certificated takeoff weight.
3. The runway safety area and runway object free area lengths begin at each runway end when stopway is not provided. When stopway is provided, these lengths begin at stopway end.

Source: Advisory Circular 150/5300-13 Change 5 "Airport Design".

TABLE A-12 Runway Design Standards for Airplane Approach Category C & D

RUNWAY CHARACTERISTICS	DIMENSION	AIRPLANE DESIGN GROUP					
		I	II	III	IV	V	VI
Runway Length	A	Refer to AC 150/5325 - 4					
Runway Width	B	100 ft.	100 ft.	100 ft.	150 ft.	150 ft.	200 ft.
Runway Shoulder Width		10 ft.	10 ft.	20 ft.	25 ft.	35 ft.	40 ft.
Runway Blast Pad							
Width	C	120 ft.	120 ft.	140 ft.	200 ft.	220 ft.	280 ft.
Length	D	100 ft.	150 ft.	200 ft.	200 ft.	400 ft.	400 ft.
Runway Safety Area							
Width	E	500 ft.	500 ft.	500 ft.	500 ft.	500 ft.	500 ft.
Length Beyond Runway End	F	1,000 ft.	1,000 ft.	1,000 ft.	1,000 ft.	1,000 ft.	1,000 ft.
OFZ Width and Length	Refer to AC 150/5300-13 Change 5						
Runway Object Free Area							
Width	G	800 ft.	800 ft	800 ft	800 ft.	800 ft.	800 ft.
Length Beyond Runway End[3]	H	1,000 ft.	1,000 ft.	1,000 ft.	1,000 ft.	1,000 ft.	1,000 ft.

Notes:
1. Letters correspond to the dimensions on **Runway Design Standards** figure.
2. These dimensional standards pertain to facilities for only small airplanes. Small airplanes are aircraft 12,500 pounds or less maximum certificated takeoff weight.
3. The runway safety area and runway object free area lengths begin at each runway end when stopway is not provided. When stopway is provided, these lengths begin at stopway end.

Source: Advisory Circular 150/5300-13 Change 5 "Airport Design".

A.3.3 - Taxiway Design Standards. This section describes the various taxiway design standards, as established in the Airport Design AC. Taxiways are paved areas (separate access ways or lanes painted on aprons) over which airplanes move (taxi) from one part of an airport to another. One of their more important uses is to provide access between airside terminal areas and the runways.

There are three types of taxiways: parallel, exit and access. Taxiways parallel to runways generally provide a route for aircraft to reach certain distant points on the runway. Exit taxiways, which usually connect runways to parallel taxiways, provide paths for aircraft to leave the runway after they have landed. Access taxiways and taxilanes provide a means for aircraft to move among the various airside components of the airport - T-hangars, terminal tie-downs, fueling areas, runways, etc.

Since aircraft often land and/or takeoff at a relatively great distance from a terminal, good access to those distant points helps to improve the overall operational efficiency of an airport.

The design of the airfield taxiway system is intended to increase airfield capacity and enhance

operational safety between arriving and departing aircraft. Throughout the Vermont system airports included in this program, taxiway development for the sake of increasing operational capacity can not be justified. This issue is typically limited to the nation's large air carrier airports. However, there are related safety concerns at these smaller commercial service and GA airports that should be addressed. This includes the need to avoid back-taxiing on active runways, especially at uncontrolled fields with commercial service and/or a relatively high number of larger GA aircraft operations.

A.3.3.1 - Taxiway Safety Area (TSA). The TSA is the imaginary surface surrounding the taxiway. The terrain in the TSA must be clear of objects to reduce the risk of damage to an airplane that unintentionally strays off the taxiway. The TSA must also incorporate the following characteristics:

- ❑ graded with no hazardous bumps, ruts etc.;
- ❑ drained by grading or storm sewers to prevent water accumulation;
- ❑ capable of supporting aircraft rescue and firefighting equipment and to allow occasional passage of an aircraft in dry conditions, without causing structural damage to that aircraft; and
- ❑ free of all objects except objects that need to be located in this area because of their function. Objects higher than three inches will be designed to easily break away if impacted. Other objects should be constructed at grade.

A.3.3.2 - Distance from Taxiway Centerline to Fixed or Movable Object. The distance from the taxiway's centerline to a distance where no objects are allowed, even the maintenance and service road edges.

A.3.3.3 - Taxiway and Taxilane Object Free Area (OFA). A taxilane is the portion of the aircraft parking area used for access between taxiways and aircraft parking positions. The taxiway and taxilane OFAs are centered on the taxiway and taxilane centerlines. The taxiway and taxilane clearing standards prohibit service vehicle roads, parked airplanes, and above ground objects, except for objects that need to be there for navigational and aircraft ground maneuvering purposes. Vehicles may operate within the OFA provided they give the right-of-way to on-coming aircraft.

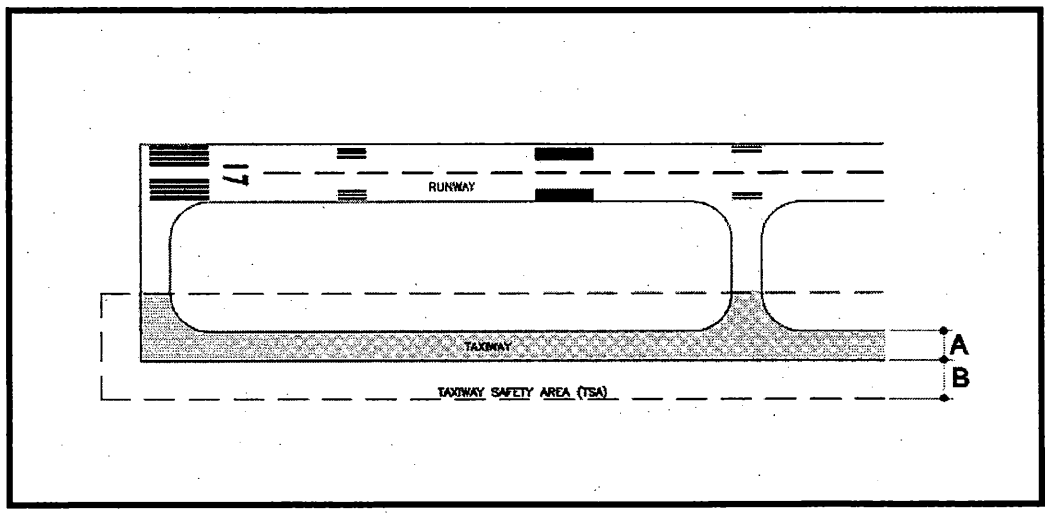
TABLE A-13 Taxiway Standards

TAXIWAY CHARACTERISTICS	DIMENSIONS	AIRPLANE DESIGN GROUP					
		I	II	III	IV	V	VI
Taxiway Width	A	25 ft.	35 ft.	50 ft.	75 ft.	75 ft.	100 ft.
Taxiway Edge Safety Margin		5 ft.	7.5 ft.	10 ft.	15 ft.	15 ft.	20 ft.
Taxiway Pavement Fillet Configuration	Refer to AC 150/5300-13 Change 5						
Taxiway Shoulder Width		10 ft.	10 ft.	20 ft.	25 ft.	35 ft.[5]	40 ft.[5]
Taxiway Safety Area Width	B	49 ft.	79 ft.	118 ft.	171 ft.	214 ft.	262 ft.
Taxiway Object Free Area Width		89 ft.	131 ft.	186 ft.	259 ft.	320 ft.	386 ft.
Taxilane Object Free Area Width		79 ft.	115 ft.	162 ft.	225 ft.	276 ft.	334 ft.

Notes:

1 Letters correspond to the dimensions on **Taxiway Design Standards** figure.
2 For airplanes in Airplane Design Group III with a wheelbase equal to or greater than 60 feet, the standard taxiway width is 60 feet.
3 The taxiway edge safety margin is the minimum acceptable distance between the outside of the airplane wheels and the pavement edge.
4 For airplanes in Airplane Design Group III with a wheelbase equal to or greater than 60 feet, the taxiway edge safety margin is 15 feet.
5 Airplanes in Airplane Design Groups V and VI normally require stabilized or paved taxiway shoulder surfaces.

Source: Advisory Circular 150/5300-13 Change 5 "Airport Design".



A.3.4 Airport Safety Standard Summary

The following tables summarize the Pertinent Development and Safety Standards for the 11 publically owned, public use general aviation airports in the Vermont Airport System. At the conclusion of these tables is a summary of the VAOT and FAA standards for the Vermont Airport system, which can be found in Table A-14.

PERTINENT DEVELOPMENT AND SAFETY STANDARDS

✈ Middlebury State Airport (6BO)						
Design Criteria Airport Reference Code B-I		Design Standards (Runway Ends)		Existing Conditions (Runway Ends)		Within Standards
		1	19	1	19	
Runway Safety Area	Length	240 feet		150	240	No
	Width	120 feet		120	120	Yes
Runway Protection Zone (Should Own or Have Land Use Control Over Property in RPZ)	Length	1,000 feet		-		No
	Inner Width	500 feet		-		No
	Outer Width	700 feet		-		No
Runway Object Free Area	Length Beyond Runway End	240 feet		240	240	Yes
	Width	250 feet		250	250	Yes
Part 77 Primary Surface Width		500 feet		N/A		N/A
Taxiway Safety Area Width		79 feet		79		Yes
Taxiway Object Free Area Width		131 feet		131		Yes
Runway Width		60 feet		50		No
Taxiway Width		35 feet		25		No
Runway/Taxiway Separation		240 feet		150		No

Source: Dufresne-Henry Analysis

PERTINENT DEVELOPMENT AND SAFETY STANDARDS (CONT.)

✈ Middlebury State Airport (6BO)		
VAOT Development Standards		
Item	Criteria	Within Standards
Aircraft Parking Aprons	Based on Transient and Based Aircraft Activity.	Yes
Fueling Systems	For attended airports, adequate supply of Avgas. Jet-A storage based on demand.	Yes
Terminal/Administrative Building	Minimum of 10 peak hour operations to warrant separate administrative building. Otherwise, provide phone, rest rooms, telephone recording, lounge and bulletin board.	Yes
Auto Parking	One public parking space for 50% of each based aircraft, and 1.5 parking spaces for each peak day itinerant operation.	Yes
VFR Airport NAVAIDS	Lighted Windsock	Yes
IFR Airport NAVAIDS	Lighted Windsock, AWOS, PAPI or equivalent for primary runway end, MIRLs, Rotating Beacon, Necessary Obstruction Lights, GCO,	N/A
Precision Approach	Minimum of five peak hour instrument operations, and the upgrade must provide a minimum of a 10% reduction in the ceiling or visibility minimums.	N/A
Security Fencing	Full perimeter fencing to the extent feasible.	No
Taxiway System	Full parallel taxiway for commercial service airports. For B-II ARC and greater, consider full or at a minimum a partial parallel taxiway to the primary runway end.	Yes
ALP	Update ALP at least every 10 years, or sooner if there are significant changes in the character of the airport.	Yes
ADA Compliance	All public facilities should be ADA compliant.	No
Picnic Facilities	Where appropriate and safe, picnic and/or camping facilities should be constructed at the airport for use by both the local population and itinerant pilots.	No

Source: Dufresne-Henry Analysis

TABLE A-14 VAOT and FAA Standards

Reference Section	Item	Criteria/ Dimensions
VAOT Development Standards		
A.2.1	Aircraft Parking Aprons	Based on Transient and Based Aircraft Activity. Calculate area for 30% of peak day activity of transient aircraft, and 50% of total number of based aircraft.
A.2.2	Hangar Demand	Since hangars are constructed with private funds, development will be accomplished as needed. Space should be set aside for hangars as summarized in Table A-5.
A.2.3	Fueling Systems	For attended airports, adequate supply of Avgas. Jet-A storage based on demand.
A.2.4	Terminal/Administrative Building	Minimum of 10 peak hour operations to warrant a separate administrative building. Otherwise, provide phone, rest rooms, telephone recording, lounge and bulletin board. Commercial service airports should provide access to public transportation. Intermodal access to other transportation networks should be encouraged.
A.2.5	Auto Parking	One public parking space for 50% of each based aircraft, and 1.5 parking spaces for each peak day itinerant operation.
A.2.7.1	VFR Airport NAVAIDS	Lighted Windsock
A.2.7.2	IFR Airport NAVAIDS	Lighted Windsock, AWOS, PAPI or equivalent for primary runway end, MIRLs, Rotating Beacon, Necessary Obstruction Lights, GCO
A.2.8	Precision Approach Upgrade	Minimum of five peak hour instrument operations, and the upgrade must provide a minimum of a 10% reduction in the ceiling or visibility minimums. FAA concurrence is required.
A.2.9	Security Fencing	Full perimeter fencing to the extent feasible.
A.2.10	Taxiway System	Full parallel taxiway for commercial service airports. For B-II ARC and greater, consider full or at a minimum a partial parallel taxiway to the primary runway end.
A.2.11	ALP	All airports should have an ALP update at least every 10 years, or sooner if there are significant changes in the character of the airport.

Reference Section	Item	Criteria/ Dimensions
A.2.12	ADA Compliance	All public facilities should be ADA compliant.
A.2.13	Maintenance of Infrastructure	Priority should be given to projects which maintain existing infrastructure.
A.2.14	Picnic Facilities	Where appropriate and safe, picnic and/or camping facilities should be constructed at the airport for use by both the local population and itinerant pilots.
FAA Safety Standards		
A.3.2.1	Runway Safety Area - Width and Length Beyond Runway End	Based on Airplane Approach Category, Airplane Design Group and Visibility
		Approach Category A & B Visual Approach and Not Lower than 3/4 Mile I - 120 ft Wide, 240 ft. beyond Runway End II - 150 ft Wide, 300 ft. beyond Runway End III - 300 ft Wide, 600 ft. beyond Runway End IV - 500 ft Wide, 1000 ft. beyond Runway End Lower than 3/4 Mile I-III - 300 ft Wide, 600 ft. beyond Runway End IV - 500 ft Wide, 1000 ft. beyond Runway End
		Approach Category C & D 500 ft Wide, 1000 ft. beyond Runway End
A.3.2.2	Runway Protection Zone	Dimensions based on approach minimums, aircraft size and aircraft approach categories. (See Table 4-11). FAA policy is to either own or have easement control over RPZs.

Reference Section	Item	Criteria/ Dimensions
A.3.2.3	Runway Object Free Area Width and Length Beyond Runway End	Based on Airplane Approach Category, Airplane Design Group and Visibility
		Approach Category A & B Visual Approach and Not Lower than 3/4 Mile I - 250 ft Wide, 240 ft. beyond Runway End II - 500 ft Wide, 300 ft. beyond Runway End III - 800 ft Wide, 600 ft. beyond Runway End IV - 800 ft Wide, 1000 ft. beyond Runway End Lower than 3/4 Mile I - 800 ft Wide, 240 ft. beyond Runway End II - 800 ft Wide, 600 ft. beyond Runway End III - 800 ft Wide, 800 ft. beyond Runway End IV - 800 ft Wide, 1000 ft. beyond Runway End
		Approach Category C & D 800 ft Wide, 1000 ft. beyond Runway End
A.3.2.6	Primary Surface Width	Width Based on Airport Use and Approach Category
		Utility Runway Visual Approach - 250 ft Non-precision Approach - 500 ft.
		Other Then Utility Runway Visual Approach - 250 ft Non-precision Approach, >3/4 Mile - 500 ft. Non-precision Approach, <3/4 Mile - 1000 ft. Precision Approach, - 1000 ft.
A.3.2.8	Runway Line of Sight	Two points five feet above runway must be mutually visible along entire runway length.
A.3.3	Taxiway Width	Based on Airplane Design Group I - 25 ft. II - 35 ft. III - 50 ft. IV, V - 75 ft. VI - 100 ft.

Reference Section	Item	Criteria/ Dimensions
A.3.3.1	Taxiway Safety Area Width	Based on Airplane Design Group I - 49 ft. II - 79 ft. III - 118 ft. IV - 171 ft. V - 214 ft. VI - 262 ft.
A.3.3.3	Taxiway Object Free Area Width	Based on Airplane Design Group I - 89 ft. II - 131 ft. III - 186 ft. IV - 259 ft. V - 320 ft. VI - 386 ft.
A.3.3.3	Taxilane Object Free Area Width	Based on Airplane Design Group I - 79 ft. II - 115 ft. III - 162 ft. IV - 225 ft. V - 276 ft. VI - 334 ft.

APPENDIX B

Phase IA Archeological Investigations for the Airport Layout Plan of Six State Airports:

Caledonia County State Airport
Franklin County State Airport
Hartness State Airport
John H. Boylan State Airport
Middlebury State Airport
William H. Morse State Airport

Prepared for:

The Vermont Agency of Transportation
Maintenance and Aviation Division

Prepared by:

Hartgen Archeological Associates, Inc.
Certified WBE / DBE
PO Box 81
Putney, Vermont 05346
Phone (802)387-6020

November 1999

Hartgen Archeological Associates, Inc.

Cultural Resource Specialists

PO BOX 81 • PUTNEY, VERMONT 05346

Abstract

The Airport Layout Plan (ALP) for the Vermont Agency of Transportation, Maintenence and Aviation Division (VAOT) includes an environmental overview of the following six state airports:

- Caledonia County State Airport
- Franklin County State Airport
- Hartness State Airport (Windsor County)
- John H. Boylan State Airport (Essex County)
- Middlebury State Airport (Addison County)
- William H. Morse State Airport (Bennington County)

This archeological assessment has been prepared as part of the environmental overview for the ALP. The purpose is to identify archeological concerns to be considered when reviewing the needs and potential development plans for the state airports. The airports are located across the state from Franklin County in the north to Bennington County in the south with properties ranging in size from 78 to 348 acres. Site visits to the airports were conducted between mid May and mid June of 1999. The archeological survey was conducted as a walkover and visual inspection without excavation. Each property was assessed in its entirety including terminal areas, tarmac, runway protection zones, and avigation easements. No specific developments are addressed in this report.

This report documents the results of a Phase IA archeological literature review and site visit for each of the six state airports listed above. This study is conducted under the guidelines of Section 106 of the National Historic Preservation Act, Vermont's Historic Preservation Act, and Act 250 and according to the guidelines set forth by the Vermont Division for Historic Preservation or VDHP (Peebles 1989).

The review consisted of the examination of the Vermont Archeological Inventory (VAI) files, town files, and National Register files at the VDHP in Montpelier. Historic maps, atlases, and town histories at the Vermont Historical Society, the Vermont State Library were consulted for relevant historical information. The Springfield Community Library was visited for information relevant to the history of Hartness State Airport A site visit was conducted at each airport to examine the project area for locations sensitive for the presence of archeological deposits, areas of disturbance, excessive wetness, and slope.

Areas of sensitivity were defined based on the VDHP Site Predictive Model and observations during the site visits. Each airport property surveyed contained unique sensitivity areas focused along prominent land forms in proximity to water sources such as rivers, streams, small drainages, and various wetlands. In addition, there were sensitive areas identified at every airport associated with historic settlement and in the cases of the Hartness, William H. Morse, and the Middlebury State Airports structures were identified which could be considered historically and architecturally sensitive in association with early aviation in Vermont. All six properties have experienced varying degrees of disturbance in the 20th century from construction and expansion of airport runways and facilities. Areas of disturbance which affect archeological sensitivity and specific areas of sensitivity which should be examined prior to future development are delineated for each airport property. Recommendations on which areas at each airport should be examined prior to future development are included in this report.

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Appendix I: VDHP "Environmental Predictive Model for Locating Archeological Site"

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Middlebury State Airport

The Middlebury State Airport project area consists of a 156 acre parcel located in East Middlebury 1.1 kilometers (0.7 miles) due north of the main street (Route 125) and east of Route 116 (Figure 76).The project area is linear measuring up to 460 meters (1,500 feet) wide west from Mountain Road and extending in length 1,990 meters (6,520 feet) from just north of Munson Road to approximately 150 meters (500 feet) south of Beaver Creek (Figure 77). A few small portions of the project area, designated as avigation easements and potential acquisition areas, extend beyond the airport property to the south. The property is on a relatively level flat sandy plain at an elevation of 150 meters (480 feet) above mean sea level (amsl). The land drops off slightly in elevation to the north, south, and east of the runway while rising slightly to a high of 152 meters (500 feet) amsl to the west. The lowest area is in the wide drainage gully for the creek which is up to 9 meters (30 feet) below the elevation of the runway. Ground cover is divided between cut grass around the runway and to the south and agricultural fields to the north. The portions of the project north of Munson Road and Beaver Creek are wooded as is a thin hedgerow bordering Mountain Road.

Environmental Background

The Middlebury State Airport is located in the Champlain Lowland physiographic region at the western base of the Green Mountain region. The Champlain Lowlands region is characterized by rolling hills trending north to south composed of former beaches, deltas, and terraces originally formed by Lake Vermont and the Champlain Sea (Meeks 1986:5 and 45-47; Flynn and Joslin 1979:88). The Middlebury area drains to the west into Otter Creek. Beaver Creek is a small stream at the southern boundary of the airport which drains to the southwest into the Middlebury River, a tributary of Otter Creek. The airport is on a wide flat terrace at the base of Ripton Mountain 1,220 meters (4000 feet) due north of the Middlebury River.

The airport property is located on the line of transition between the Lincoln Anticline and the Hogback Anticline which runs north-south through mid-state at the eastern edge of the Champlain Valley and the western edge of the Green Mountains. The underlying bedrock is Cheshire quartzite consisting of "very massive, white to faintly pink or buff vitrious quartzite" (Doll et al. 1961). In this area of Vermont a dolomitic sandstone and conglomorate is found at the base of the formation.

The surficial geology for the area contains a variety of glacial and lake sediments, primarily sand and gravel. The northern portion of the airport property is composed of predominantly sand deposited as littoral sediments at the shore of glacial Lake Vermont and the Champlain Sea. The original lake shoreline abutted a glacial kame gravel terrace at the eastern edge of the property, or more likely, beyond the property east of Mountain Road. The soils along the southern portion of the airport property along Beaver Brook include recent alluvium of fluvial sands and gravels in addition

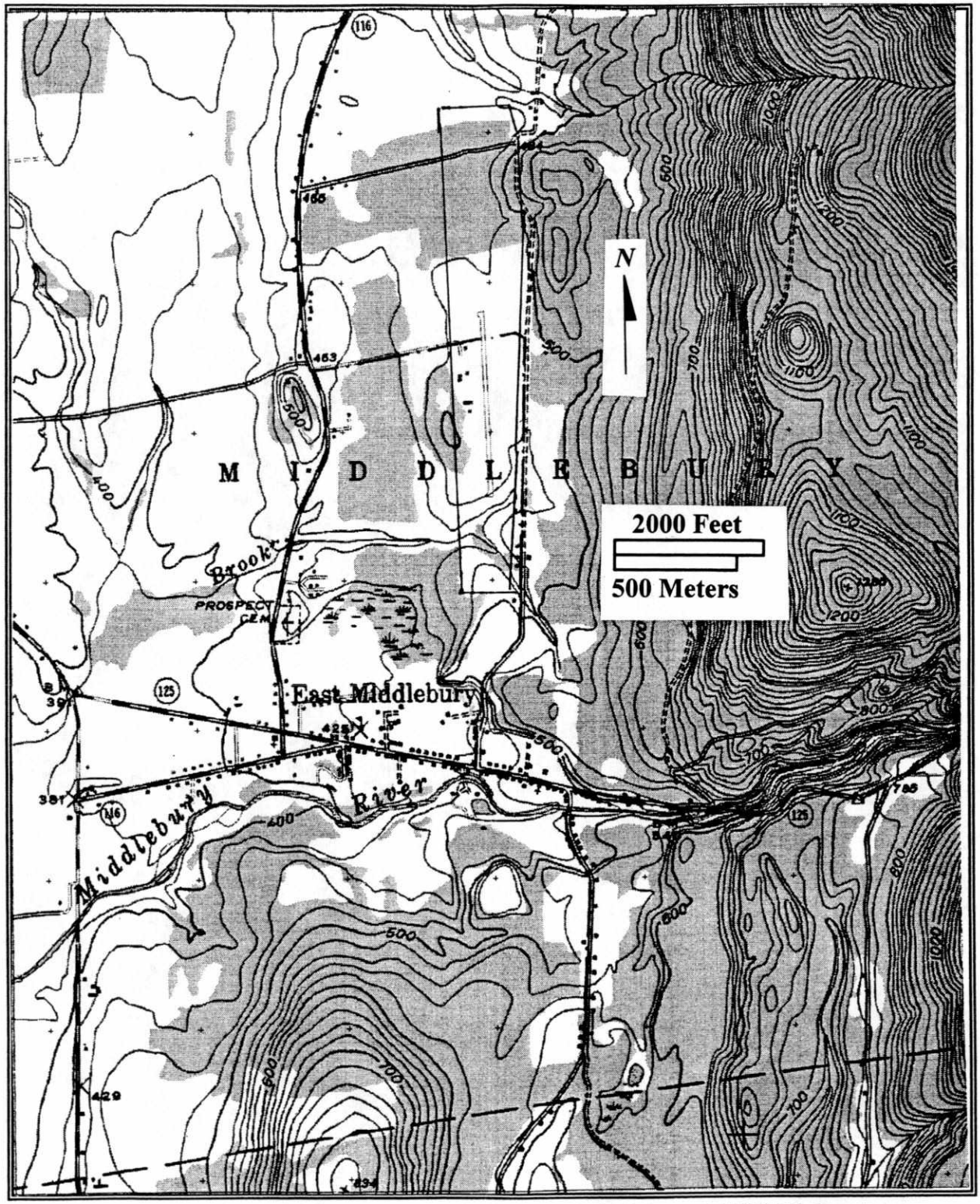

Figure 77. Project Location (1944 / 1983 East Middlebury 7.5' USGS Quad).

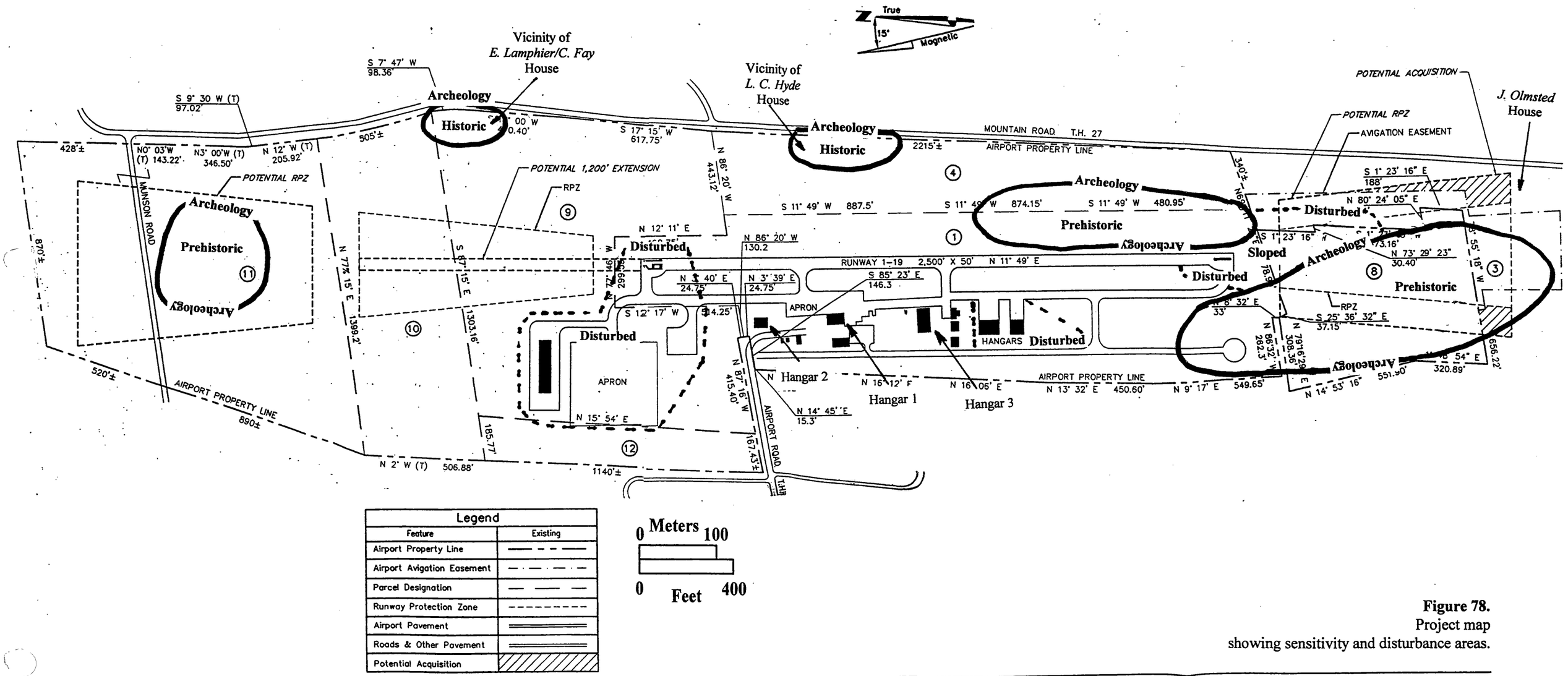

Figure 78.
Project map
showing sensitivity and disturbance areas.

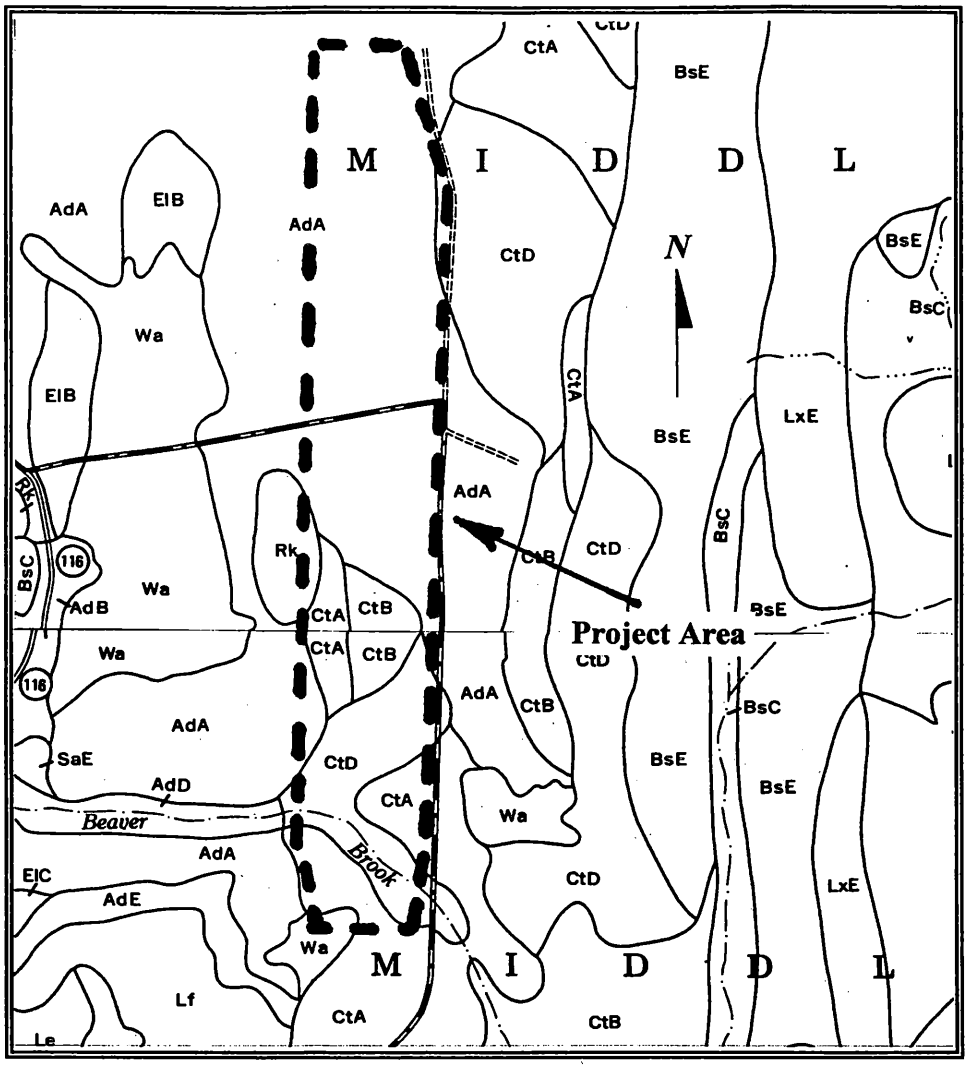

Figure 79. Soils of the Project Area.
Legend. AdA - Adams loamy fine sand 0-5% slopes, CtA - Colton gravelly sandy loam 0-5% slopes, CtB - Colton gravelly sandy loam 5-12% slopes, CtD - Colton gravelly sandy loam 12-30% slopes, Rk - Rock land, Wa - Walpole silt loam.

to horizontally bedded outwash gravels (Doll et al. 1961). The largest component of the glacial sands, comprising the entire northern half of the project area, are the Adams loamy fine sand (Figure 79). The Adams soils are described as "deep, sandy, excessively drained soils" which retain water poorly and are subject to drought (USDA Soil Survey of Addison County). They are commonly found along the eastern edge of the Champlain Valley at the base of the Green Mountains. The soils in the southern portion of the property are recent alluvium and fluvial sands of the Colton Series;

they are gravelly sandy soils with slopes of between 0 and 30 percent. The Colton soils are described as "deep, sandy and very gravelly" (USDA Soil Survey of Addison County). Like the Adams Series, Colton soils are located along the eastern edge of the Champlain Valley; they are excessively drained soils and are subject to drought. These soils are also subject to moderate to severe erosion when cleared and tilled and the surface deposits contain a large amount of gravel or cobblestones. Soils on the western edge of the property in the developed portion of the airport near the hangars are on land described in the county soil survey as rock land. These are areas of 50 to 90 percent bare bedrock or have less than ten inches of soil over the bedrock. No noticeable bedrock outcrops were identified at the airport during the survey.

The general project vicinity is located in the Northern Hardwood zone dominated by maple, birch, beach, and hemlock (Kuchler 1964). The general area west of the mountains was described in 1859 as being composed of considerable tracts of pine and oak. These forests were sought for their value for building and exportation and they were reportedly becoming "scarce and high in price" (Swift 1859:10). Currently the project area is divided between open manicured grasslands around the runways in the south, while the northern half is plowed and planted with corn. The remaining wooded areas in the runway protection zones in the northern and southern extremes of the property have been logged for airport operations and are in the early stages of forest regeneration (10 plus years).

Documentary Research

Middlebury State Airport is located directly north of the village of East Middlebury in Addison County, Vermont. The project areas lies at the western base of the Green Mountains, approximately 4.8 kilometers (3 miles) east of Otter Creek and 1.2 kilometers (3/4 miles) north of the Middlebury River. Beaver Brook, one of the tributaries of the Middlebury River runs through the southern end of the airport. In 1761, John Evarts of Connecticut was sent north to apply for two grants of land from Benning Wentworth (Swift 1859). He found enough land for three towns, two of which were named after Connecticut towns- New Haven to the north and Salisbury to the south. Middlebury was so named because it was situated beween the other two. In 1766, John Chipman and 15 other men from Salisbury, Connecticut, headed to Middlebury to clear and plant land as part of the 1761 town charter.

While the first settlers entered an area of natural beauty, the thick hemlock and pine forests, and the soil was described as "uncommonly forbidding" (Judge Swift in Smith 1886). The soils of the Otter Creek and Middlebury River valleys were considered the best in the town of Middlebury. The rich alluvial soils on predominantly level land were excellent for cultivation. However, the soils elsewhere throughout the town were considered moderate to poor soils and turned to hard dry clay when the trees were cut down (Swift 1859). Early narratives suggest that the establishment of settlements in this area was dictated solely by the great potential for mill locations (Smith 1886, Swift 1859). The settlers were described as poor people who only cleared enough space for their buildings and gardens. (Smith 1886, Child 1882). Despite these grim descriptions, by 1794, the

village of East Middlebury was well established on both sides of the river, with about 30 houses, several mills, a brewery, stores, several mechanics and professionals. In addition, the construction of an academy was nearing completion. By the early nineteenth century, the village also had forges, fulling and flour mills, a saw mill for sawing marble, and a marble quarry. (Swift 1859)

Precontact and Historic Sensitivity

A review of the Vermont Archeological Inventory (VAI) at the Division for Historic Preservation found that there are a number of precontact and historic sites in the area whose presence can partially be attributed to the prodigious and powerful waterways to the south and east of the project area. The following precontact and historic archeological sites have been reported for the general vicinity of the project areas:

VT AD 339 Roger Nobles' Eagle Forge at East Middlebury. Exact date unknown, probably early nineteenth century.

VT AD 299 Forge at East Middlebury (Possibly Williams and Nichols forge as seen on the 1871 Beers map?) 1840-1890

VT AD 465 Late Woodland site situated in a field which slopes down to a tributary of Beaver Brook. A surface collection contained chert and quartzite flakes and tool, and two Levanna projectile points.

VT AD 468 Late Archaic site which overlooks a tributary of the Beaver Brook. A surface collection contained quartzite flakes a biface, and a corner-notched projectile point.

VT AD 469 Late Archaic site situated on a terrace above a tributary of the Beaver Brook. Contained two diagnostic projectile points, a Genessee and a Clarendon Springs point, and quartzite and chert debitage and tools.

VT AD 470 Prehistoric site of unknown time period, situated on a level terrace above the Beaver Brook. Surface collection contained quartzite flakes, tools, and fire-cracked rock.

VT AD 471 Prehistoric site of unknown time period, situated between two tributaries of the Beaver Brook. Surface collection contained quartzite and chert flakes and fire-cracked rock.

The East Middlebury Historic District

The Walling map of 1857 (Figure 80) shows the residence of *Wm. Chapman* and *E. Lamphier* on Mountain Road. The 1871 Beers map indicates ownership of these structures had changed to *L. C. Hyde and C. Fay* respectively by this date. Also a second house, that of *J. Olmstead* had been built in the immediate vicinity of the project area (Figure 81). The home of *J. Olmstead*, located south of Beaver Brook is still standing (Figure 82) while that of *C. Fay* is no longer extant.

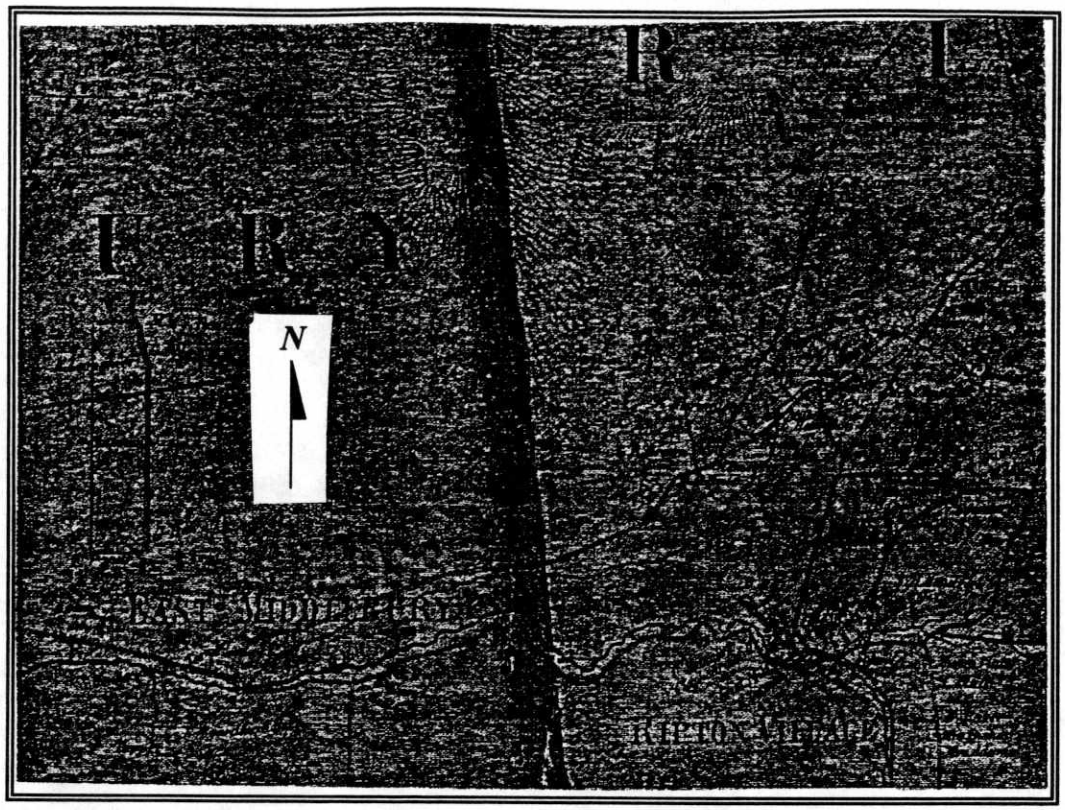

Figure 80. The project vicinity in 1857 (Walling 1857).

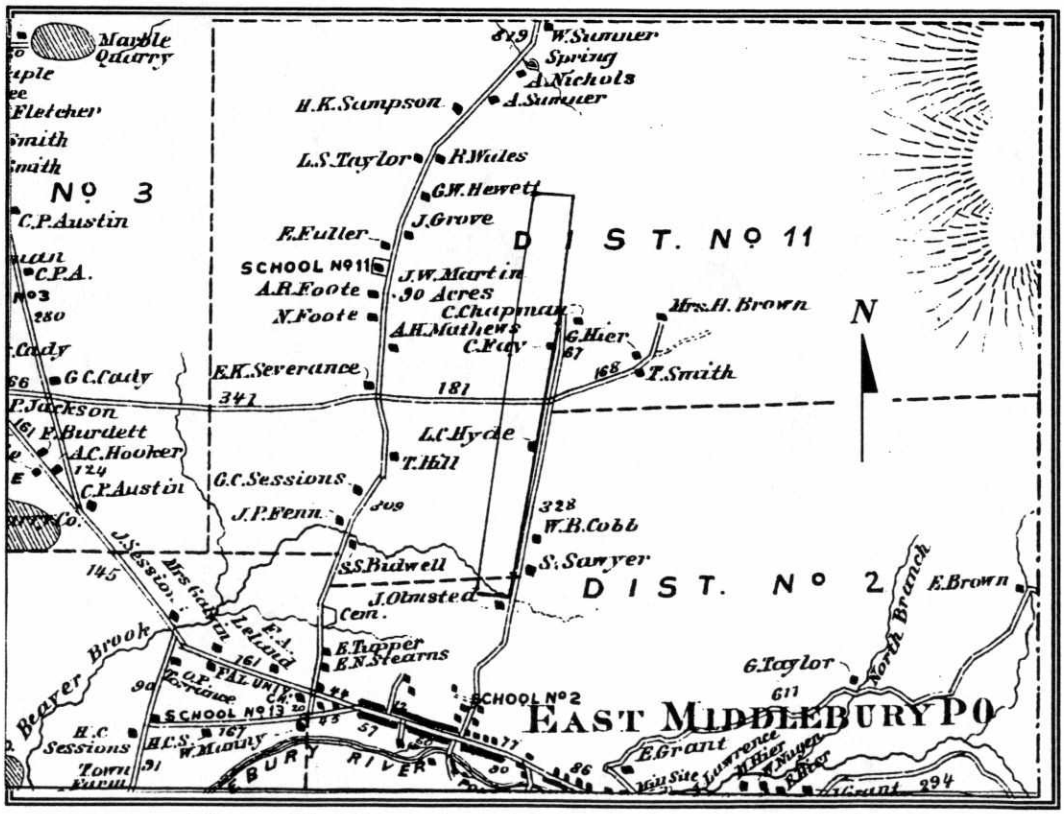

Figure 81. The project vicinity in 1871 (Beers 1871).

Figure 82. The historic *J. Olmstead* house, view is to the northwest.

None of the prehistoric archeological sites are located within or adjacent to the project area. However, the southern portion of the project area has characteristics similar to the reported precontact site locations. In particular, the level terrace edge at the southern end of the runway overlooking Beaver Brook and a wide wetland associated with a beaver dam and pond are characteristic of areas of high archeological sensitivity.

Filling out the VDHP model for the project area yields a score of 24, with 20 being archeologically sensitive (Appendix 1). The major variables creating this score are Beaver Brook and the associated wide wetland south of the runway. Although there are areas of disturbance from apparent sand and gravel quarrying near the brook and wetlands, there are other intact trerraces overlooking the water on the airport property and in the avigation easements. These portions of the project should be considered sensitive for prehistoric archeological sites.

The project area was covered by the Champlain Sea during much of the time, during the Paleoindian Period portions of the project area may have been exposed and close to the Champlain Sea shore line for some time. According to Meeks (1986:51), the sea level was at approximately the present 91 to 107 meter (300 to 350 feet) contour at Burlington and at lower contours to the south. The difference is due to differential uplift after glacial retreat. These contours indicate the wide terrace

crossing through the project area may have been a beach exposed and surrounded by the marine waters of the Champlain Sea during the end of the Paleoindian Period. Such proximity would have encouraged occupation of the area, if the sea was gradually subsiding. However, if the sea drained rapidly there may have been little opportunity to exploit the proximity to the shore line (VDHP 1991:3-5 to 3-6).

Within the project area similar types of sites would be expected for all prehistoric time periods. Utilization of the project area may have been prompted by various factors during different periods of prehistory. The streams would encourage small residential or hunting camps. As is found today, there may have been extensive wetlands associated with Beaver Brook that would have attracted people to exploit the varied vegetative and animal resources. Terraces overlooking the wetland may have served as a hunting stand or overlook site for spotting game traversing in the lower drainages to the east and west. The water washed area of Beaver Brook has exposed underlying rocks and cobbles that could have served as sources of quartz and quartzite. Thus, lithic resources for stone tool production also may have attracted Native American people to the area.

With the advent of horticulture and agriculture during the Woodland Period, the water lain soils of the project area (Covington silty clay, Livingston clay, and Vergennes clay), due to their high natural fertility, high water retention and the drainages running through the area, would have been suitable for limited utilization. However, the distance from probable base camp locations along the Middlebury River and Otter Creek may have precluded such utilization.

Thus, there is potential for the presence of prehistoric sites of any time period. The frequency of reported sites in general suggests that Late Archaic and Late Woodland sites are the most likely to be found in the vicinity. The reported sites support this tendency.

Historic settlement in the area, has been sparse, a trend that continues to this day. The project area was likely utilized in historic times first for its timber resources and later for crops. The two historic sites portrayed on the Beers 1871 map may have been farm houses. Other sites recorded in the site files were both mills emphisizing water power from the Middlebury River to the southeast. It is unlikely any mills were in operation within the project area due to a lack of water power offered by the small Beaver Brook. Based on the historic research, aside from the two 19th century sites noted above and elements of particular airport structures discussed below, the project area has a low sensitivity for additional historic archeological resources.

Middlebury Airport, established in 1951, has not been in operation as long as some of the other airports surveyed such as the Hartness and William H. Morse State Airports. The Middlebury County Airport was originally equipped with a grass runway and two hangars, the main hangar erected in 1951 the second was added a year or two later (Figures 83, and 84). Both hangars appear to retain there integrity and are still used. The earlier main hangar houses the local flight school, cozy lounge, library, and repair facilities. Based on the age and fine condition of these hangars and their

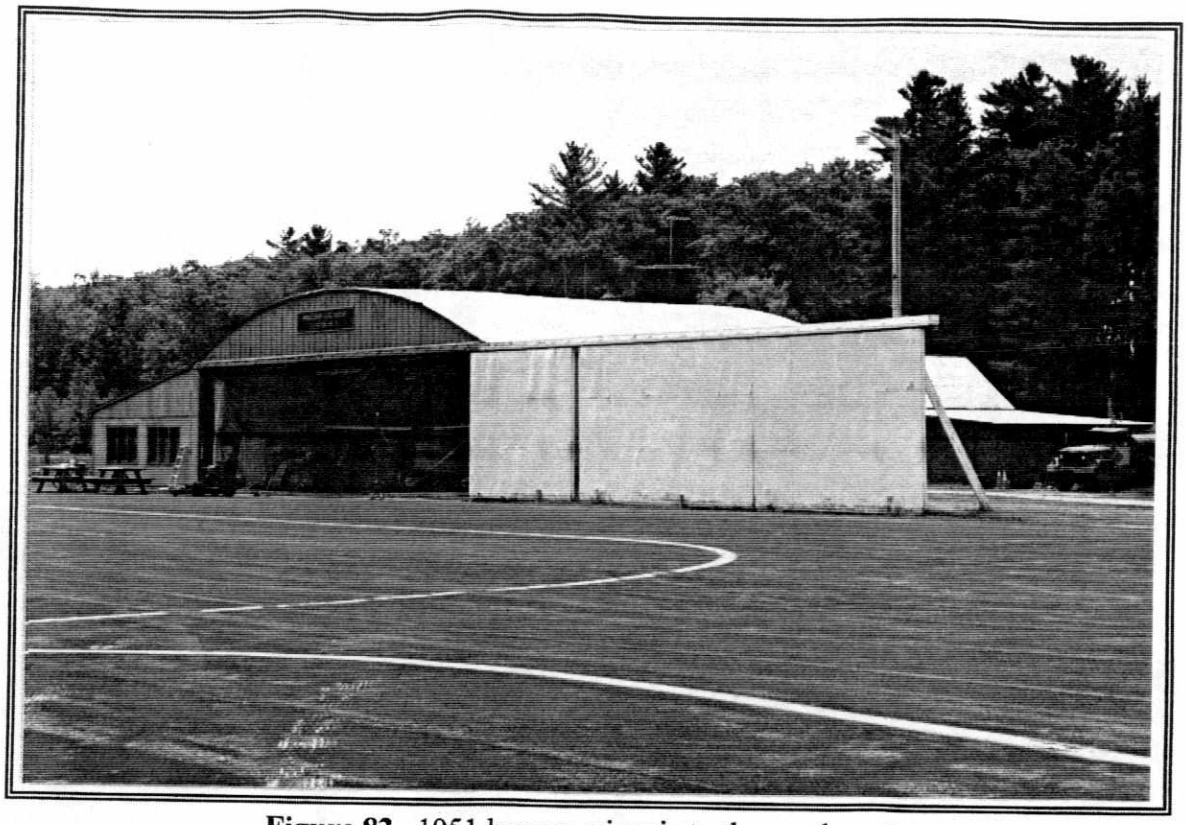

Figure 83. 1951 hangar, view is to the southwest.

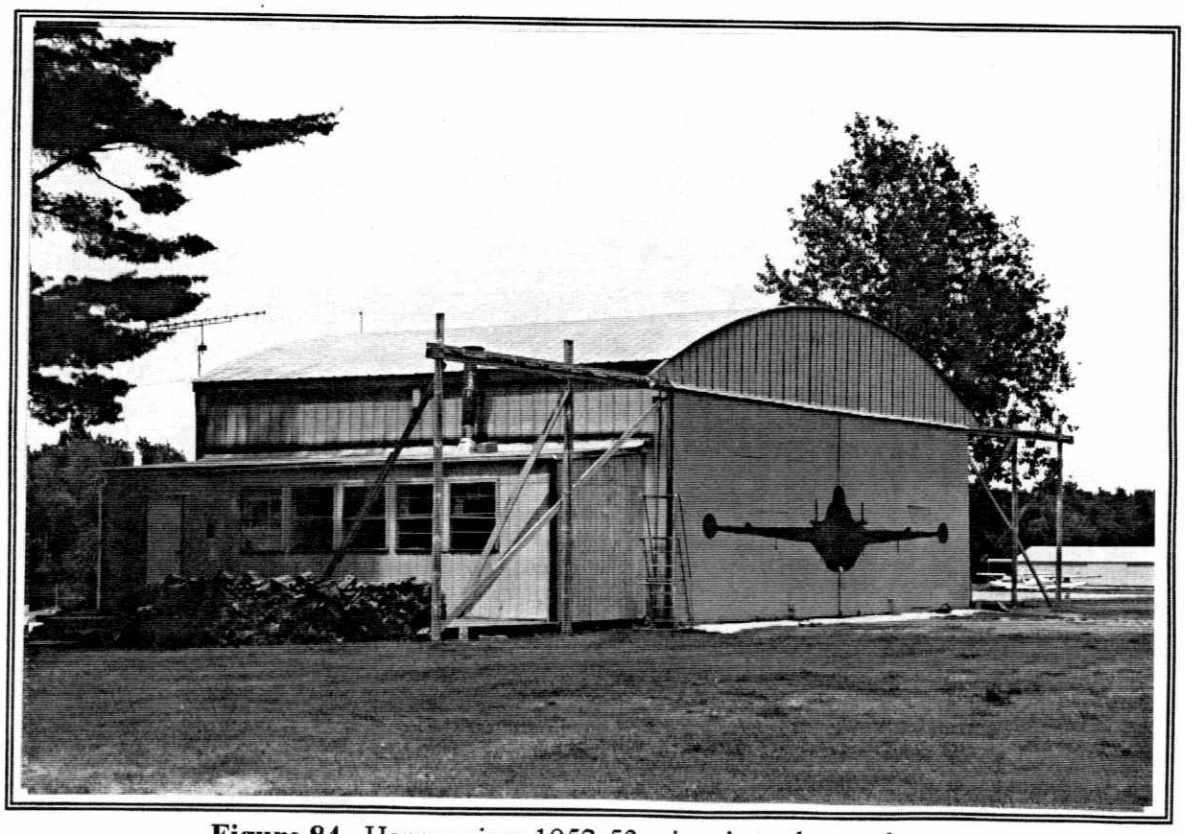

Figure 84. Hangar circa 1952-53, view is to the northwest.

association with the history of aviation in Vermont, these structures may be significant and may be eligible for the National Register of Historic Places. A third hangar of the same era is located on the property and may also be considered significant (Figure 85). An architectural historian should be consulted to assess the significance of these hangars prior to any future development that may impact these structures.

Additional structures on the property include a utility shed constructed in 1955 and various storage and maintenance facilities added in the decades that followed. None of these structures appears historically significant (though they may be considered contributing elements to the early hangars noted above).

The State upgraded, paved, and extended the runway in 1969 and a paved apron was added in 1991. Construction and development on the Middlebury Airport property appears to have been done with marginal disturbance or landscape modifications compared with the other airports surveyed for this report.

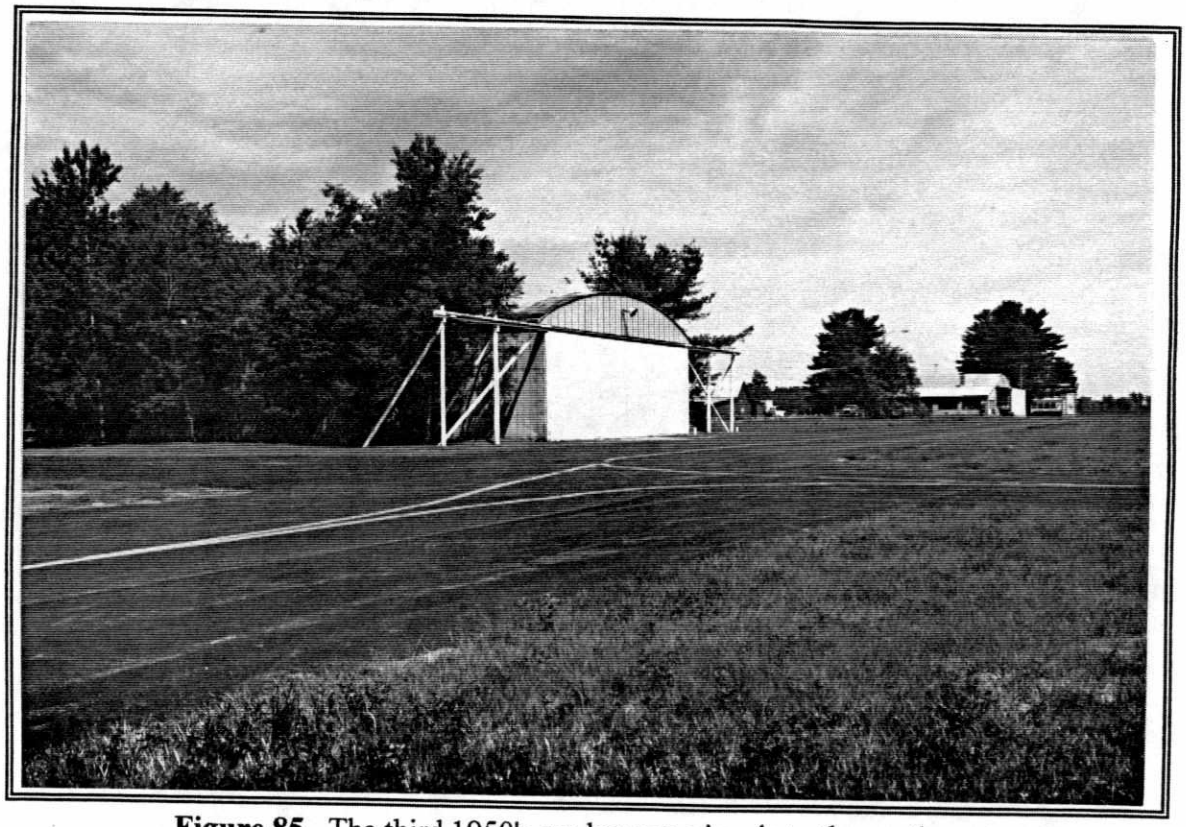

Figure 85. The third 1950's era hangar, view is to the northwest.

Site Visit and Interpretation

The site visit provides an opportunity to assess archeological sensitivity for the airport property location and effects. The archeological sensitivity assessment was limited to visual inspection with emphasis on landforms, distance to water, and land modifications and disturbances associated with airport construction. The site visit included examination of the airport property, avigation easements, and potential acquisition lands. Most of the project area was closely examined, although some locations due to the size and density of certain wooded areas were assessed with a cursory walk through.

The Middlebury Airport property is considered sensitive to prehistoric archeological resources based on the VDHP predictive model mainly due to its proximity to on Beaver Brook and associated wetlands. However, much of the broader airport property, although located on fairly level ground, is distant from known water sources and other resources and, thus, has a low to marginal sensitivity.

Many of the disturbances noted at the airport were associated with the most recent developments. A portion of the area near the western boundary north of the original airport hangars and northwest of the runway has been developed for a modern hangar, paved apron, and fuel island with buried tanks (Figure 86). This portion of the property originally sloped to the west. However, construction appears to have included adding approximately 1 to 1.5 meters (3 - 5 feet) of gravel fill to level the runway. The tanks at the fuel island were buried beneath the level of the original ground surface.

Construction in the southern portion of the airport includes two modern maintenance hangars and paved taxiway construction which included the cutting back of a natural hill to the west (Figure 87). Similar grading probably occurred along the unpaved access road on the hill rising west of the hangars. A short section of the southern end of the runway was raised on fill to compensate for the natural slope descending to the south towards Beaver Brook and its associated beaver pond and wetlands.

The location of the potential 366 meter (1,200 foot) extension for the runway in the northern runway protection zone appears to include a long linear zone of fill elevated a few feet above the grade of the surrounding fields (Figure 88). This raised strip may be a remnant of the airport's original grass runway or possibly an emergency safety extension for the runway. Based on the lack of obvious signs of disturbance and sudden grade changes on the property along the runway, it appears that any grading and filling which may have occurred as a result of runway construction was kept to a minimum. The only evidence of disturbance noted was the graded fill at both ends of the runway (Figure 89). The addition of fill at the ends of the runway may have capped and preserved rather than disturbed the natural stratigraphy in these areas.

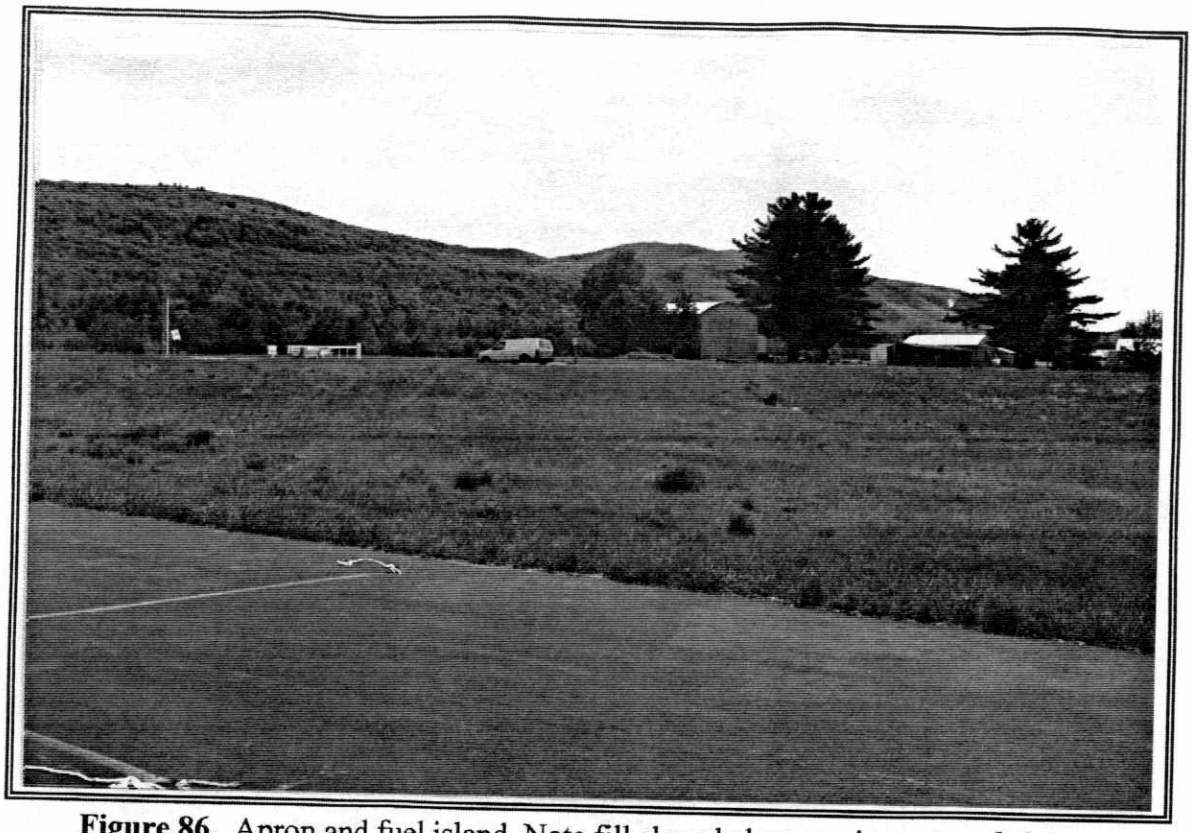

Figure 86. Apron and fuel island. Note fill slope below van in center of photo. View is to the southeast.

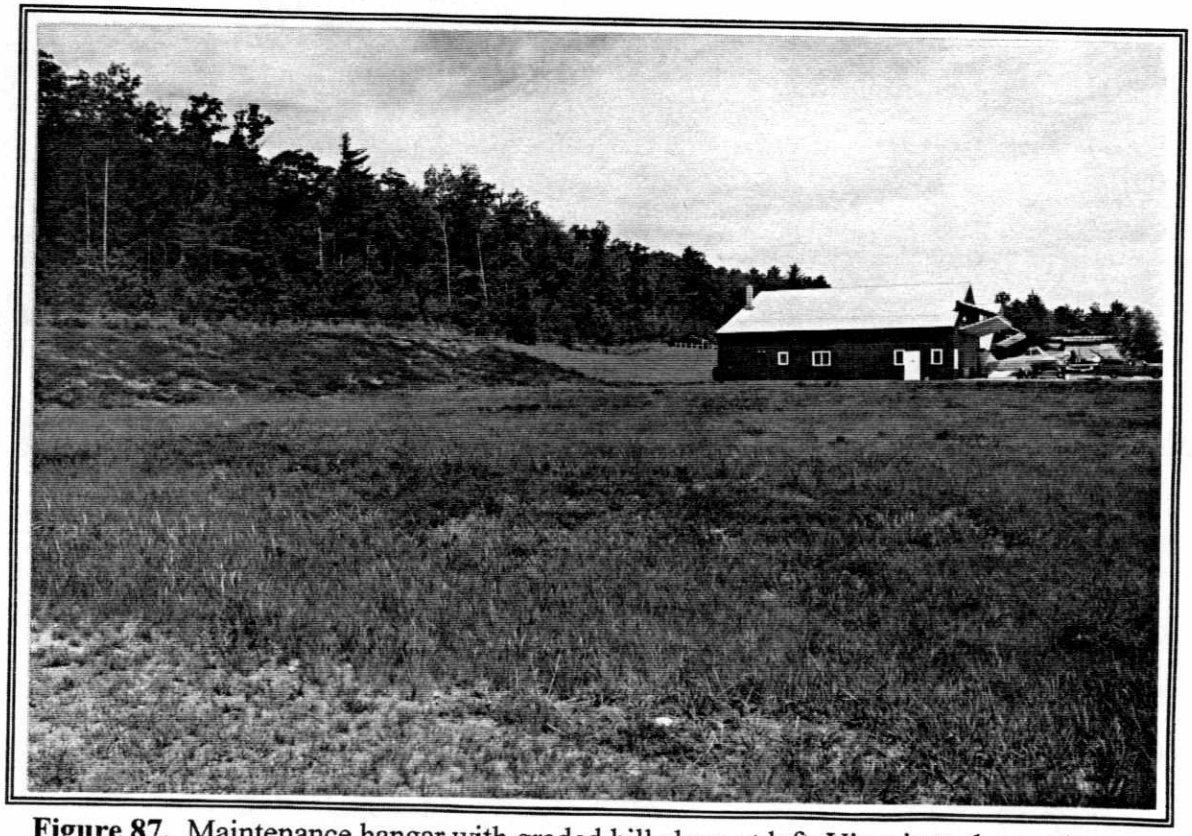

Figure 87. Maintenance hangar with graded hill slope at left. View is to the northwest.

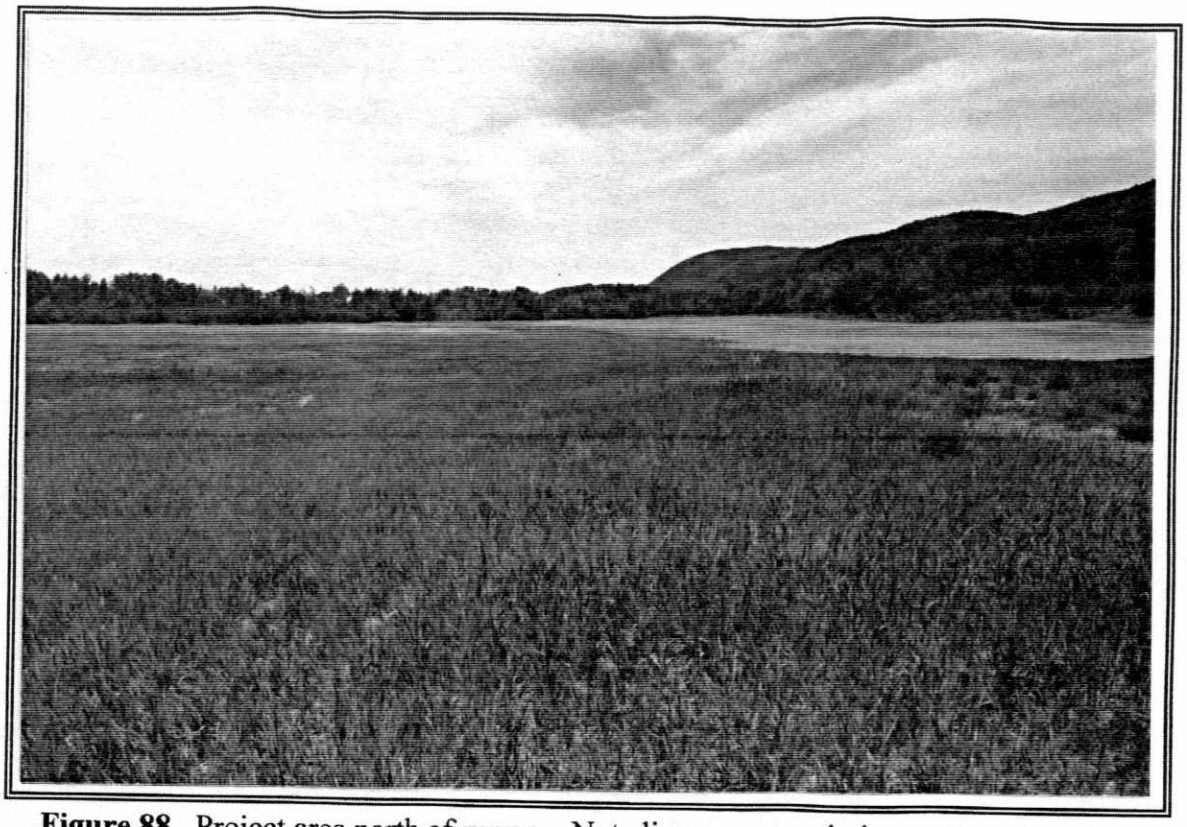

Figure 88. Project area north of runway. Note linear grass strip in center to the left of plowed field. View is to the north.

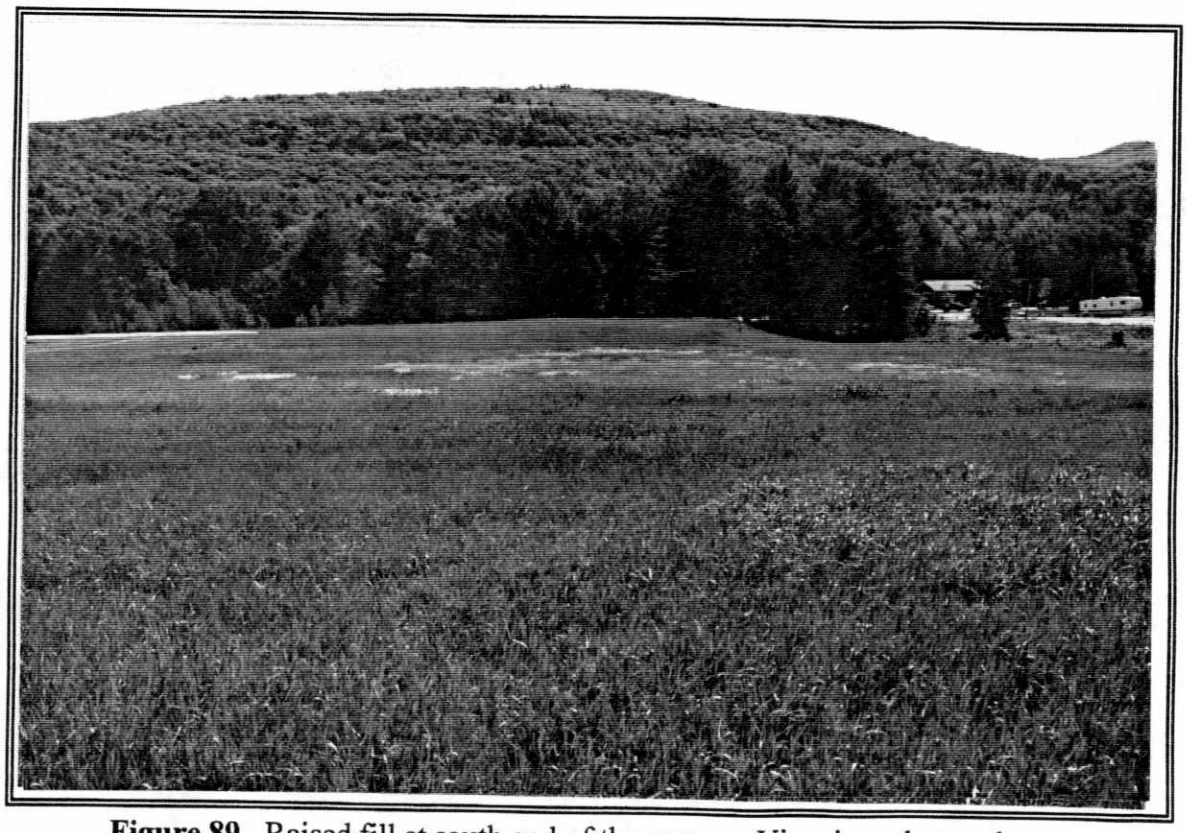

Figure 89. Raised fill at south end of the runway. View is to the southeast.

The southern runway protection zone and avigational easement contains the highest sensitivity for prehistoric sites identified on the airport property. However, the archeological sensitivity is greatly reduced by disturbances noted both to the north and south of Beaver Brook. Much of this area has previously been quarried for sand and gravel. The wetlands immediately south of the runway may be the result of quarrying near the brook. Extensive disturbance from a quarry was noted adjacent to the existing beaver pond south of the brook (Figure 90). In addition, to the east and southeast of the runway protection zone portions of the project area have been extensively graded for modern buildings and lots, including Airport Auto (Figure 91). However, the western portion of the runway protection zone and airport property is presently wooded and appears to have been left relatively undisturbed. Any disturbances are restricted to past logging activities. The level high ground and terraces surrounding the wetlands and brook suggest a sensitivity to both Archaic and Woodland era procurement sites.

To the north of Beaver Brook the level terrace at the south end of the runway offers a prominent view of the Beaver Brook drainage and wetlands which suggests a high sensitivity for prehistoric deposits. To the south, between the terrace edge and the wetlands, the slope is steep enough to have a low archeological sensitivity. To the east of the runway the level terrace continues north parallel with the runway (Figure 92). The low area east of the terrace is presently dry, though the topography suggests a small stream paralleling Mountain Road may have flowed through the low land. However, clearing and plowing the sandy erosional soils reduced the water retention properties of the soil while silting in the drainage. Ira Allen observed that deforestation and cultivation caused many small streams to dry up altogether (Cronon 1983:125). A small stream in this area may have provided water and other resources for prehistoric inhabitants to exploit from the terraced overlook above.

The remainder of the airport property, specifically the northern half, though on fairly level ground is distant from water sources or any other known resources, suggesting a low sensitivity for prehistoric sites. There was one small low-lying seasonal wetland in the field at the northern end of the airport and adjacent to Munson Road (Figure 93). This wetland may only retain water during the spring and is unlikely to have been a substantial exploitable resource for local prehistoric inhabitants. A cursory surface inspection in the recently plowed field surrounding the wet area revealed no artifacts. To the east and south of Munson Road was a wooded area which contained large earthen push piles with rocks and cobbles (Figure 94). These piles were apparently created within the past decade when the area north of the runway was logged and the land converted to cultivation. The displaced stones suggest the land was cleared of these cumbersome obstructions by heavy machinery for easier tillage. This recent clearing suggests disturbances may be more severe than simple plowing. Archeological remains would still be present, but disturbance may have effected sub-plow zone deposits and the site,s overall integrity.

Of the three historic structures portrayed on the 1871 Beers map, near the airport, the home of J. Olmstead is still standing on Mountain Road south of Beaver Brook (Figure 82). The Olmstead home appears to be just outside the project area southeast of the avigation

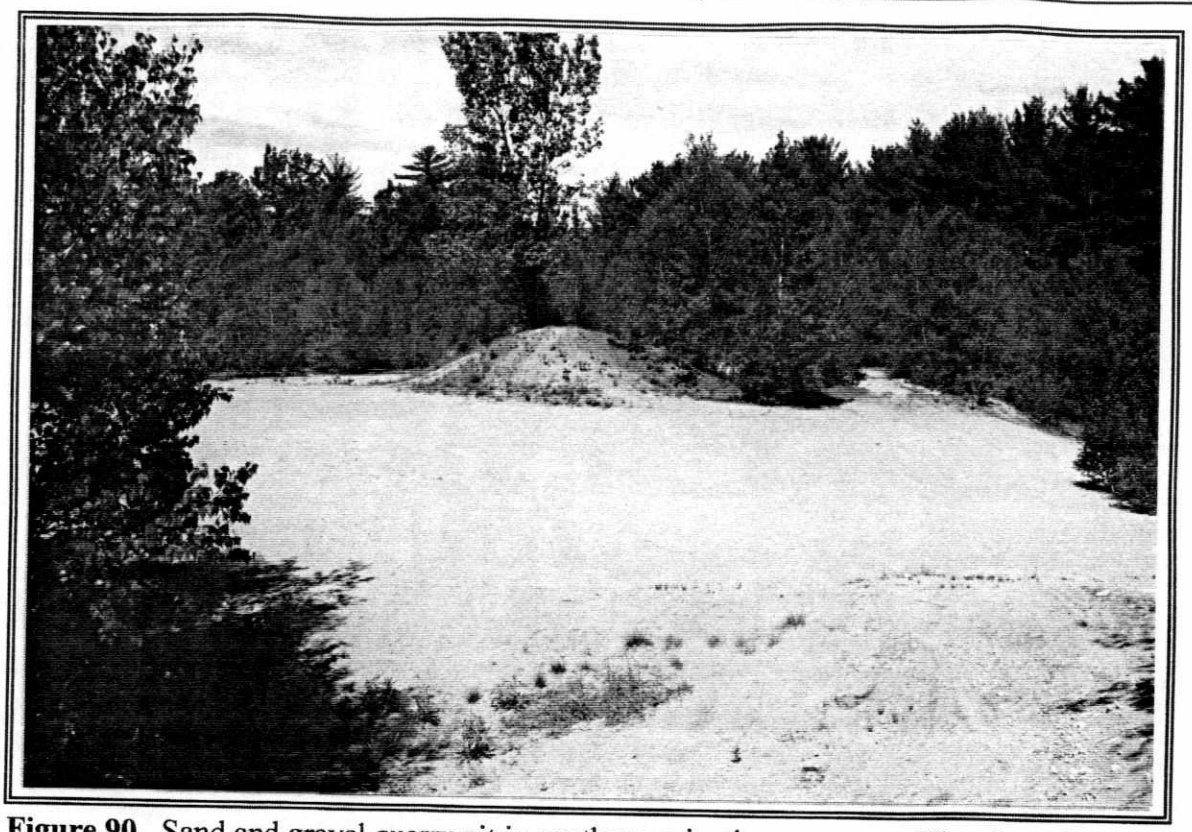

Figure 90. Sand and gravel quarry pit in southern avigation easement. View is to the west.

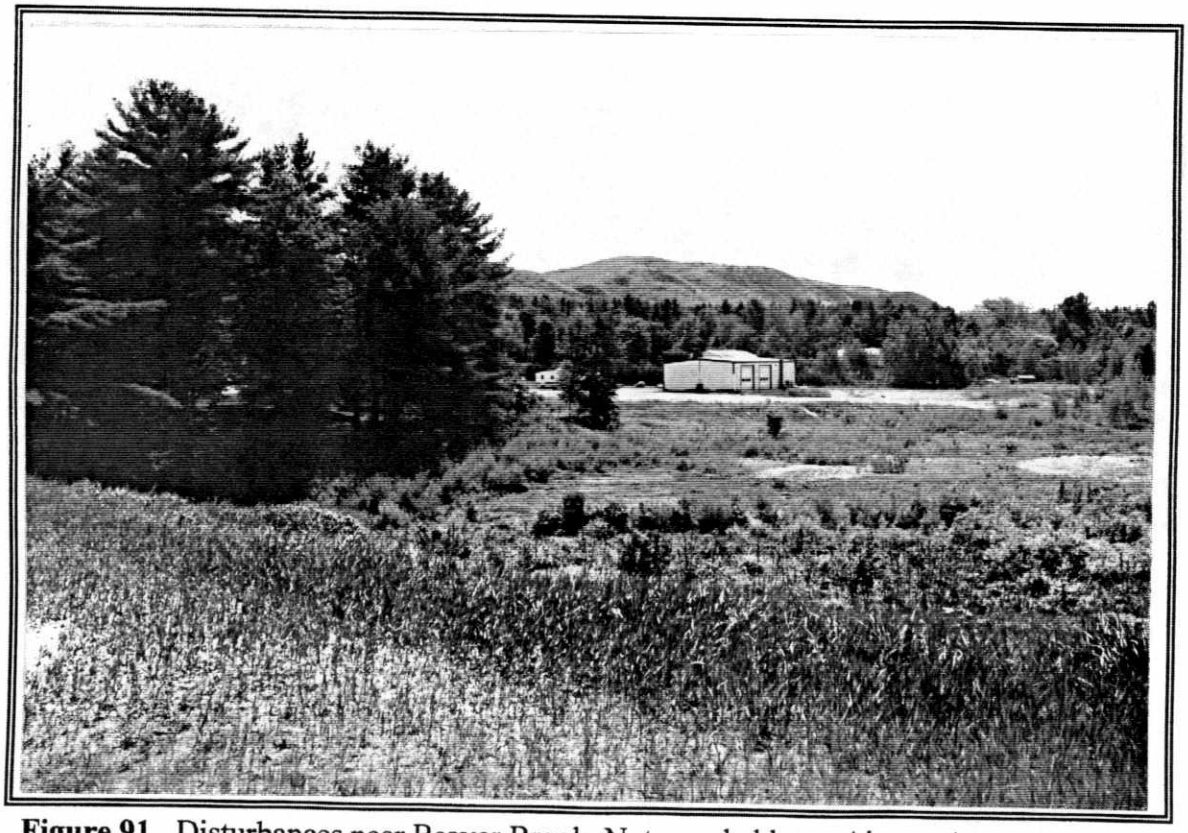

Figure 91. Disturbances near Beaver Brook. Note graded lot at Airport Auto near center of frame. View is to the south.

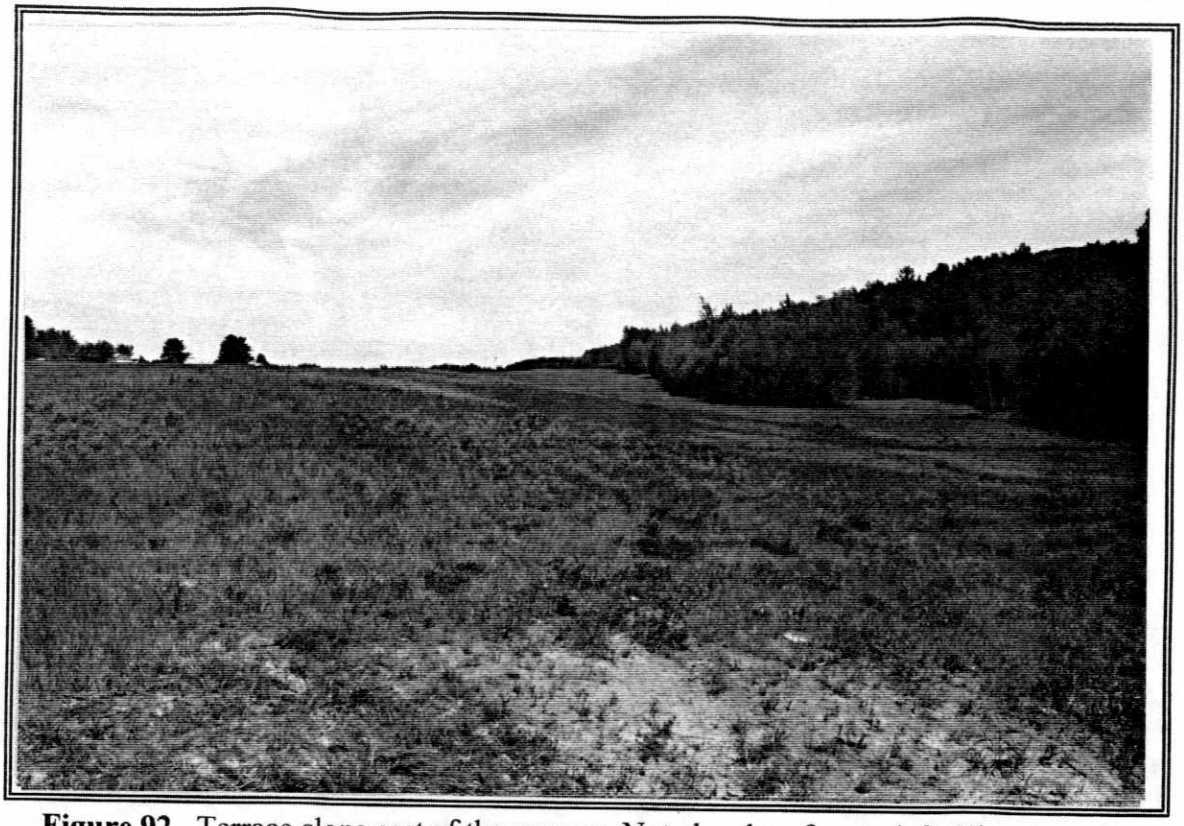

Figure 92. Terrace slope east of the runway. Note level surface to left. View is to the north.

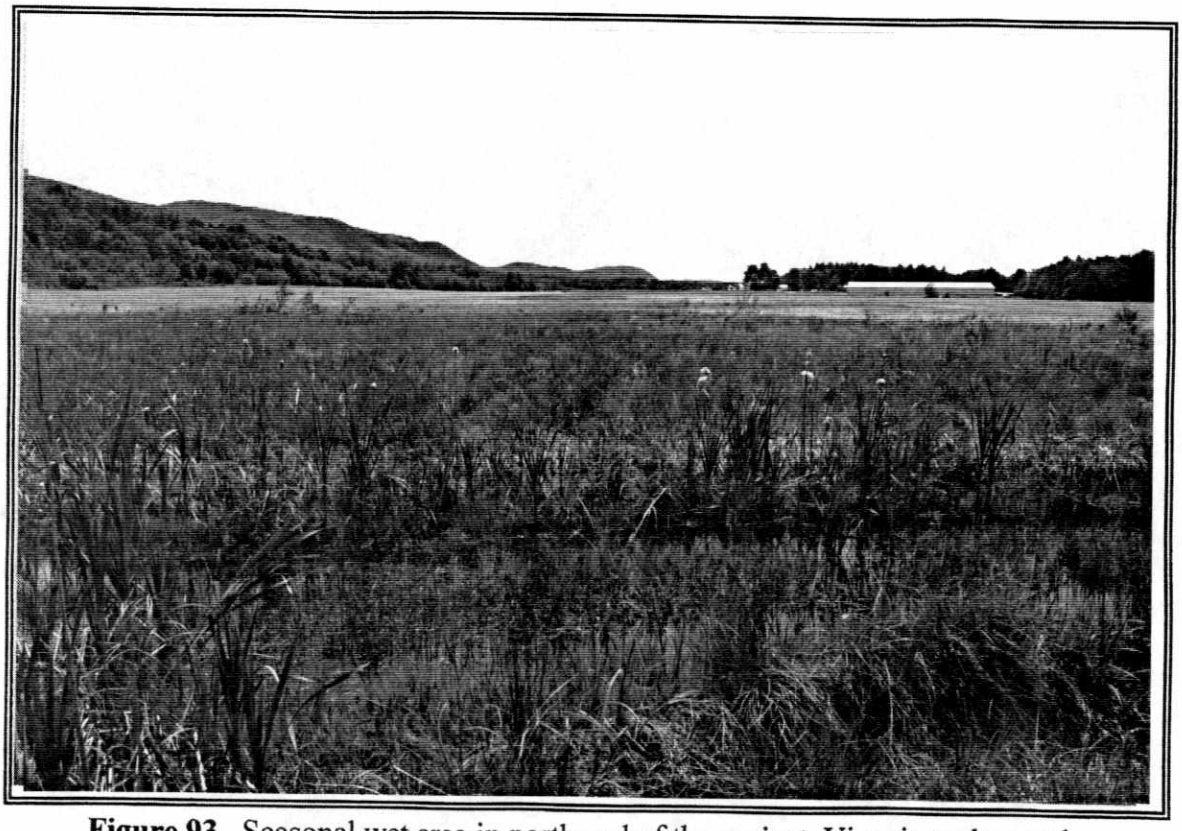

Figure 93. Seasonal wet area in north end of the project. View is to the south.

Figure 94. Land clearing push piles with rocks and cobbles. View is to the northeast.

easement. This historic structure is unlikely to be affected by future airport improvements unless the runway facilities are substantially expanded and the extent of the runway protection zone is extended to the south.

The 19th century L. C. Hyde residence was located within the airport property west of Mountain Road approximately 244 meters (800 feet) south of the original extent of the Airport Access Road. Visual inspection of the thickly wooded area revealed no evidence of a historic structure, foundation imprint, or surface scatter of historic materials indicating the presence of the Hyde site. The failure to locate evidence of the structure location is not unusual considering the inaccuracy of the historic maps and the possibility that past agricultural use of the land may have buried the site. However, the historic site is potentially significant and future development in the project area west of Mountain Road to the east of the main airport facilities should include plans for archeological investigations to locate and assess the Hyde site.

Conclusions and Recommendations

Since the scope of work for the VAOT airport layout plan encompasses six large project areas located across the state, final evaluations can only be made separately for each property. The size and diversity of each project indicates that certain areas are more sensitive for archeological resources than others. Some locations are distant from active drainages and with no apparent features to suggest archeological sensitivity. Other areas located away from drainages may be sensitive for specific reasons. The VDHP predictive model identifies locations within 61 meters (200 feet) of water to be sensitive for prehistoric occupation. In contrast, areas of steep slope, very poorly drained soils, excessive disturbance, and distant from drainages have a low sensitivity. The physical high point of an area may be sensitive, and used as a hunting stand or camp. Therefore, based on the model, the predicted motivations for prehistoric use, and the many varied project effects, only selected areas within each airport project are proposed for testing.

Historic archeological deposits may occur along historic roadways where farms and other structures are present. Historic maps aid in identifying general locations of structures no longer present. However, due to the limited number of local maps produced throughout the historic period, not all historic sites can be identified through map research alone. Visual inspection and subsurface testing can best identify historic sites.

Since the scope of work for this project did not include specific development plans for any of the airport properties, archeological sensitivity assessments were made as a general overview of each airport. Recommendations are based on identifying high sensitivity areas within each property which have the potential for prehistoric and historic archeological resources, and thus warrant further investigations if future plans are to affect these areas. The following assessments include recommendations for historic structures within the properties which have potential eligibility for inclusion on the National Register of Historic Places.

Areas designated as disturbed lack any archeological sensitivity and do not need to be considered in future development plans. Portions of the properties located outside the designated sensitivity and disturbance areas are considered low to marginally sensitive for archeological resources. Due to the broad scope of the present assessment low sensitivity areas are broadly defined without consideration for any specific future impacts. In general these low sensitivity areas are unlikely to contain significant archeological deposits and therefore development in these areas should not require archeological testing. However, due to the large size of these areas, any future development plans may require additional assessments of specific impacts to satisfy state requirements for Section 106 compliance. Any additional work in these portions of the airport properties may be restricted to minimal sampling of impact areas.

The following areas of each airport have been defined as sensitive for prehistoric or historic archeological deposits as shown on the individual project maps. A brief outline of low sensitivity areas based mainly on disturbances is included in the following overview.

Middlebury State Airport (Figure 78).

- The terrace overlooking Beaver Brook in the northern portion of the project area due to its access to water and view of the surrounding territory is sensitive to precontact occupation. The sensitivity of this area is highest to the north of the brook near the runway, while disturbance from sand and gravel quarrying has reduced the sensitivity of portions of the northern terrace in the runway protection zone.
- The northern terrace extends to the north off the east side of the runway along what appears to be a relict stream bed. This portion of the project area is also sensitive to prehistoric deposits.
- An area of potential historic sensitivity, the 19th century residence of *L. C. Hyde*, may be located on Mountain Road opposite the main hangar on the eastern boundary of the project area.
- Three hangars in use at the airport date to the early avigational development of the property in the 1950s. If any impacts are planned for these structures further review by an architectural historian is recommended to determine possible National Register eligibility.
- A marginal area of prehistoric sensitivity is on the high ground surrounding a small seasonal wetland depression in the southern end of the project area near Munson Road.
- In general, disturbances to the Middlebury Airport due to construction are minimal indicating the high sensitivity area near the southern portion of the runway will require testing if future development is planned.

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1858 **Map of Caledonia County, Vermont,** Baker and Tilden, New York.
1859 **Map of Essex County, Vermont,** Baker and Tilden, New York.
1857 **Map of Franklin County, Vermont,** Baker and Tilden, New York.

APPENDIX I

*** Environmental Predictive Model for Locating Archaeological Site ***

Project Vermont Airports - Middlebury State Airport Design Plans _____

USGS East Middlebury, VT Date June 3, 1999 Staff B. Sterling

	Environmental Variable	Proximity	Value	Assigned Score
1)	Distance to Existing or Relict River or Permanent Stream	0-60 M	12	12
		60-120 M	8	
		120-180 M	4	
2)	Distance to Pond or Lake	0-60 M	12	
		60-120 M	8	
		120-180 M	4	
3)	Distance to Intermittent Stream	0-60 M	12	
		60-120 M	8	
		120-180 M	4	
4)	Distance to Wetland (wetlands > one acre in size)	0-60 M	12	12
		60-120 M	8	
		120-180 M	4	
5)	Confluence of River / River or River / Brook	0-60 M	12	
		60-120 M	8	
		120-180 M	4	
6)	Confluence of Intermittent Streams	0-60 M	8	
		60-120 M	4	
		120-180 M	2	
7)	Falls or Rapids	0-60 M	8	
		60-120 M	4	
		120-180 M	2	
8)	Restricted Access / Drainage Divide	0-60 M	8	
		60-120 M	4	
9)	Head of Draw	0-60 M	8	
10)	Isolated Spring	0-60 M	8	
		60-120 M	4	
11)	Major Floodplain / Alluvial Terrace	0-60 M	8	
		60-120 M	4	
12)	Lithic Outcrop	0-180 M	20	
13)	Knoll Top / Ridge Crest / Promontory	0-60 M	8	
14)	Kame / Outwash Terrace (valley edge features)	0-60 M	8	
15)	Other Major Topographic Break	0-60 M	8	
16)	Relict Beach or Shore Line	0-60 M	12	
17)	Caves / Rockshelters	0-60 M	12	
18)	Excessive Slope (>15%) or Steep Erosional Slope (>20%)		-8	
19)	Very Poorly Drained Soils		-8	
20)	Excessively Disturbed		-24	
			Total Score:	24

20+ = Archaeologically Sensitive 0-18 = Archaeologically Non-Sensitive

APPENDIX C

Dufresne-Henry, Inc.
Consulting Engineers

22 Free Street . Portland, Maine 04101-3900 . Tel: 207.775.3211 . Fax: 207.775.6434 . E-mail: dhmaine@agate.net

March 8, 2000

Mr. Keith D. Hartline
District Conservationist
NRCS-Addison County
1950 Route 7 South, Suite 1
Middlebury, VT 05753-8997

Re: Airport Master Plan Update
Middlebury State Airport

Dear Mr. Hartline:

The Vermont Agency of Transportation is currently preparing an Airport Master Plan Update for the Middlebury State Airport in Middlebury, Vermont. In order to augment the planning process for future airport improvement projects, we are interested in obtaining information regarding any prime or important farmland soils located within airport property or the immediate vicinity.

I have enclosed a location map of the airport and vicinity to assist you with your determination. If you have any questions or require further information, please do not hesitate to call me. Your time and effort in this matter are greatly appreciated.

Sincerely yours,

DUFRESNE-HENRY, INC.

Gregg A. Cohen

Gregg A. Cohen
Environmental Analyst

c: Michael Churchill, Sr. Project Manager, D-H
Chris Spaulding, Sr. Environmental Analyst, D-H

3/28/00

Greg Cohen
Dufresne-Henry, Inc.
22 Free Street
Portland, Maine 04101-3900

RECEIVED
MAR 31 2000
DUFRESNE-HENRY INC
PORTLAND, ME

Regarding: Middlebury Airport Soils

Mr. Cohen,

I've included with this letter 2 maps of the Middlebury Airport property. One is an overlay of the soil boundaries and soil names. The other is the same overlay over a digital orthophoto of the area. I transferred the boundary from the parcel map layer provided by our local Regional Planning office, I believe it is fairly accurate. Based on this boundary I have highlighted the Prime farmland soil in pink (Wa), the statewide important soils in yellow (AdA, CtA) and the locally important soil in green (CtB). The Rk and CtD are not important farmland soils.

Soil names are as follows:

AdA – Adams loamy fine sand (0 to 5% slope)
CtA - Colton gravelly sandy loam (0 to 5% slope)
CtB - Colton gravelly sandy loam (5 to 12% slope)
CtD - Colton gravelly sandy loam (12 to 30% slope)
Rk - Rockland
Wa - Walpole silt loam (prime rating assumes that it is feasible to install the needed drainage measures to overcome the wetness limitations of this soil)

Please call or email if you need further information.

Sincerely,

Keith Hartline
NRCS Middlebury FO
Middlebury, Vt.

802-388-6746, ext. 27
Keith.Hartline@vt.usda.gov

Middlebury Airport Soils

0 1000 2000 3000 4000 5000 6000 7000 Feet

N
W E
S

Airport property (approx.shp
Soil Name
Soil Boundary

Middlebury Airport Soils

0 1000 2000 3000 4000 5000 6000 7000 Feet

N
W E
S

Airport property (approx.shp
Soil Name
Soil Boundary

fresne-Henry, Inc.
nsulting Engineers

22 Free Street . Portland, Maine 04101-3900 . Tel: 207.775.3211 . Fax: 207.775.6434 . E-mail: dhmaine@agate.net

March 8, 2000

Vermont Division for Historic Preservation
Department of Housing and Community Affairs
Agency of Commerce and Community Development
National Life Building, Drawer 20
Montpelier, VT 05620-0501

Re: Airport Master Plan Updates for Six Vermont State Airports

Dear Sir or Madam:

The Vermont Agency of Transportation is currently preparing Airport Master Plan Updates for the following six airports:

- W.H. Morse State Airport (Bennington)
- Middlebury State Airport (Middlebury)
- Franklin County State Airport (Highgate)
- Caledonia County State Airport (Lyndon)
- John H. Boylan State Airport (Brighton)
- Hartness State Airport (Springfield)

In order to augment the planning process for future airport improvement projects, we are interested in obtaining information regarding any location of historic, cultural, or archaeological significance within any of the airports' property or within the immediate vicinity of each facility. We have completed a Phase IA Archaeological Investigation for each of the airports and can provide a copy of this report if you so desire.

I have enclosed location maps for each of the airports to assist you with your determination. If you have any questions or require any further information, please do not hesitate to call me. Your time and effort in this matter are greatly appreciated.

Sincerely yours,

DUFRESNE-HENRY, Inc.

Gregg A. Cohen

Gregg A. Cohen
Environmental Analyst

c: Michael Churchill, Sr. Project Manager, D-H
Christopher S. Spaulding, Sr. Environmental Analyst, D-H

STATE OF VERMONT

AGENCY OF COMMERCE AND COMMUNITY DEVELOPMENT

RECEIVED MAR 15 2000

March 13, 2000

Gregg A. Cohen
Dufresne-Henry, Inc.
22 Free Street
Portland, Maine 04101

Re: Six State Airport Master Plans. AOT.

Dear Mr. Cohen:

Thank you for your letter on the above-referenced project.

Comments on Vermont Agency of Transportation (VAOT) projects should be provided by Scott Newman, the historic preservation specialist within the VAOT. His telephone number is (802) 828-3964. One of his responsibilities is to assist the VAOT in ensuring that historic buildings and structures are fully considered during VAOT project planning and protected wherever possible. He is also responsible for coordinating the Section 106 review with Duncan Wilkie, the VAOT archeologist. His number is 828-3965. The Division recommends you contact these individuals for review of your proposed master plan updates.

Sincerely,

Suzanne C. Jamele

Suzanne C. Jamele
Historic Preservation Review Coordinator

DEPARTMENT OF HOUSING & COMMUNITY AFFAIRS

Divisions for:

* Community Development
* Historic Preservation
* Housing

National Life Office Building Drawer 20 Montpelier, VT 05620-0501

Telephone:
802-828-3211
800-622-4553
Fax:
802-828-2928

Historic Preservation Fax:
802-828-3206

fresne-Henry, Inc.
nsulting Engineers

22 Free Street . Portland, Maine 04101-3900 . Tel: 207.775.3211 . Fax: 207.775.6434 . E-mail: dhmaine@agate.net

March 17, 2000

Mr. Scott Newman
Historic Preservation Coordinator
Vermont Agency of Transportation
National Life Building, Drawer 33
Montpelier, VT 05620-0501

Re: Airport Layout Plan Updates for Six Vermont State Airports

Dear Mr. Newman:

As you may know, the Vermont Agency of Transportation is currently preparing Airport Layout Plan Updates for the following six airports:

- W.H. Morse State Airport (Bennington)
- Middlebury State Airport (Middlebury)
- Franklin County State Airport (Highgate)
- Caledonia County State Airport (Lyndonville)
- John H. Boylan State Airport (Brighton)
- Hartness State Airport (Springfield)

In order to augment the planning process for future airport improvement projects, we are interested in obtaining information regarding any location of historic, cultural, or archaeological significance within any of the airports' property or within the immediate vicinity of each facility. Hartgen Archeological Associates has completed Phase IA archaeological investigations for each of the airports and copies of these reports have been included with this letter for your review. I have also enclosed location maps for each of the airports to assist you with your determination. If you have any questions or require any further information, please do not hesitate to call me. Your time and effort in this matter are greatly appreciated.

Sincerely yours,

DUFRESNE-HENRY, Inc.

Gregg A. Cohen
Environmental Analyst

c: Andrew Toms, Sr. Project Manager, D-H
Christopher S. Spaulding, Sr. Environmental Analyst, D-H

STATE OF VERMONT
AGENCY OF TRANSPORTATION
133 State Street, Administration Building
Montpelier, Vermont 05633-5001

May 9, 2000

Gregg A. Cohen
Environmental Analyst
Dufresne-Henry
22 Free Street
Portland, ME 04101-3900

Dear Gregg,

We have reviewed the Phase 1A Archeological Reports for the following airports in an effort to identify potential historic resources. The following comments summarize our findings for each airport. Please note that these comments are preliminary and that a site visit has not been conducted for most of the properties discussed below. A site inspection is needed before a final determination can be made on the historic significance of these structures.

W.H. Morse State Airport, Bennington – There are no historic resources on the airport property but 2 houses were identified near the airport limits. Those properties are referred to in the Archeology Report as the J. Hellen house on Vail Road, and the R. Crawford house at the Walloomsac/Airport Road intersection. The photographs and maps in the report indicate that both properties probably date from the middle of the 19th century. A site visit is needed to determine the historic integrity of each building, however, they are both potentially eligible for the National Register of Historic Places.

Middlebury State Airport, Middlebury - Three hangars at the airport date from the early 1950s. These buildings are not yet eligible for the National Register (NR) because they are less than 50 years of age. However, when these structures turn 50 during the next few years they will most likely become eligible for the NR. They are important examples of their type and relatively uncommon in Vermont.

The report also references a house near the limits of the airport property. This house is referred to as the J. Olmstead property and it dates from the 19th century. There are several properties listed on the State Register of Historic Places near the airport, but it is uncertain from the maps if this house is one of those properties. A site inspection is needed to determine whether or not the house is eligible for the National Register. The photo in the Archeology Report is very difficult to interpret.

Hartness State Airport, Springfield - The metal hangar at Hartness Airport dates from 1928. It was determined eligible for the National Register several years ago but it has since been altered. The building will need to be reevaluated to determine if it is still eligible for the NR. No other structures at the airport appear historic.

John H. Boylan State Airport, Brighton - There do not appear to be any potential historic resources at this facility.

Caledonia County State Airport, Lyndonville - The schoolhouse at the airport appears eligible for the National Register, pending a field inspection. In addition, the Ray/Estarbrook House near the limits of the airport appears eligible for the National Register.

There is also an early hangar at the airport that dates from c. 1928. The archeology report says that all the hangars at the site appear less than 30 years old, which suggests this building has been altered. A site visit is needed to determine its historic significance.

Franklin County State Airport, Highgate - Several older hangars are located at this facility, but photographs suggest they have been altered. A site visit is needed to determine if these hangars are historic.

Please let me know if you have additional questions concerning this project.

Sincerely,

Scott Gurley
Historic Preservation Specialist
Vermont Agency of Transportation

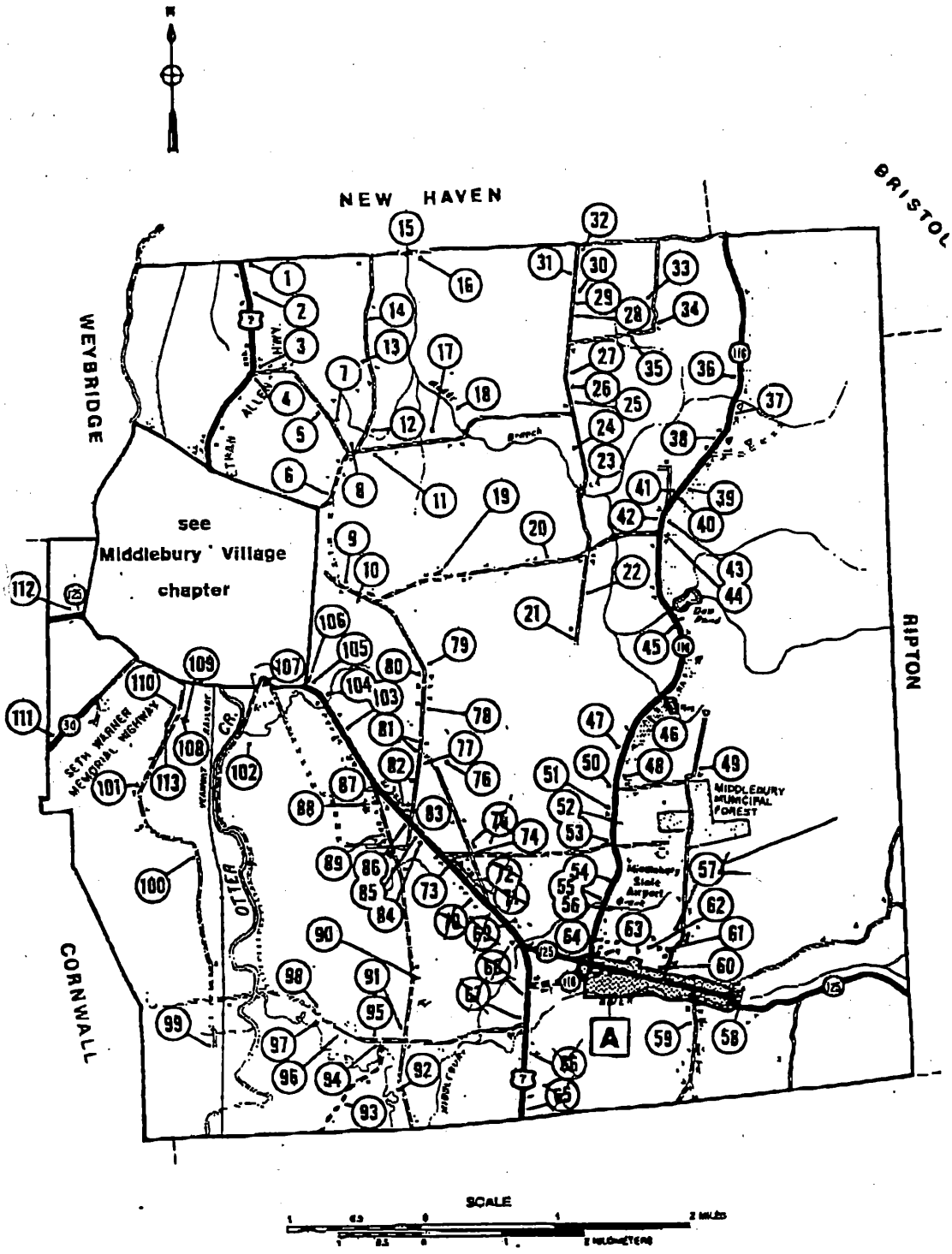
SCG: hs

Attachments: State Register nomination form for Hartness Hangar
State Register map for Middlebury

c: central files via John Narowski
Jason Owen, VAOT Project Manager

TOWN OF MIDDLEBURY MAP

s listed in the State Register of Historic Places
(Numbers correspond to Register listings that follow.
For **A** see historic district map.)



SOURCE: VT. AGENCY OF TRANSPORTATION GENERAL HIGHWAY MAP, 1979.

29 House, c.1787/c.1825
Vernacular-Federal style, Georgian plan.
Related carriage barn, barn.
Features: cupola, hay door, hoist.

30 House, c.1850
Vernacular-Greek Revival style, Classic Cottage.
Related granary.

31 (Farm)
a. House, c.1845
Greek Revival style, sidehall plan, 1½ stories.
Features: entry entablature, full entablature, sidelights, paneled entry pilasters.
b. Carriage Barn, c.1860
Board and batten.
Features: hay door, post and beam.
c. Granary, c.1850
d. Shed, c.1890

32 School, 1878
Architect/builder: Clinton Smith
Queen Anne style, gable roof, 1½ stories.
Features: gablescreen, cornice brackets, corner-blocks, applied woodwork.
Related barn.
Features: hay door.

33 (Farm)
a. House, c.1860
Classic Cottage.
Features: paneled corner pilasters, sidelights, kneewall window, entry entablature, paneled entry pilasters, fencing.
b. Carriage Barn, c.1920
c. Bank Barn, c.1870
Board and batten.
Features: rafter tails.
d. Milkhouse, c.1930
Features: rafter tails.

34 House, c.1825
Cape Cod.
Features: distinctive interior, kneewall window, sidelights, fencing.

35 House, c.1925
Wood shingle, gable roof, 1½ stories.
Related garage, chicken barn, shed.
Features: wood shingle, board and batten.

36 House, c.1845
Sidehall plan, 1½ stories.
Features: kneewall window, porch.
Related bank barn, shed, carriage barn.
Features: hoist, weathervane, hay door, rafter tails, transom, hoist.

37 House, c.1800
Architect/builder: James Crane
Cape Cod.
Features: Queen Anne porch, sidelights, distinctive door.
Related garage.
Features: rafter tails.

38 House, c.1810
Cape Cod.

39 House, c.1860
Classic Cottage.
Features: bay window, porch.

40 House, c.1820/c.1865
Vernacular-Greek Revival style, gable roof, 1½ stories.
Features: Gothic Revival porch, enriched entablature, distinctive door, continuous architecture.

41 House, c.1795/c.1850
Gable roof, 1½ stories.
Features: Gothic wall dormer, distinctive chimney, porch.
Related shed.

42 House, c.1840/c.1865
Gable roof, 1½ stories.
Features: Gothic Revival porch, entry pilasters.

43 (Farm)
a. House, c.1865
Gothic Revival style, Classic Cottage.
Features: Gothic wall dormer, bargeboard, sidelights, transom.
b. Pighouse, c.1870
Board and batten, gable roof, 1½ stories.
c. Chicken Coop, c.1900
d. Granary, c.1860
e. Carriage Barn, c.1860
f. Early Barn, c.1840/c.1860
g. Warehouse, 1946

44 School, c.1880
Gable roof, 1 story.
Features: belfry, bank of windows, shinglework, finials, cupola, peaked entry lintel, peaked lintelboards, recessed porch.

45 (Farm)
a. House, c.1860/c.1880

Queen Anne style, gable roof, 2½ stories.
Features: bay window, shinglework, cornice brackets, paneled entry pilasters, kneewall window, distinctive door, keystones, enriched entablature, stained glass, distinctive chimney.
Related garage, shed.
b. Granary, c.1880
c. Chicken Coop, c.1900
d. Barn, 1928/1955
Features: hoist, hay door.
e. Shed, c.1940

46 (Farm)
a. House, c.1845
Greek Revival style, sidehall plan, 1½ stories.
Features: sidelights, enriched entablature, paneled entry pilasters, paneled corner pilasters.
b. Shed, c.1880
c. Ground Stable Barn, c.1925
Gambrel roof.
Features: transom, hoist, cupola, hay door.
d. Shed, c.1940

47 House, c.1850
Sidehall plan, 1½ stories.
Features: entry entablature, sidelights, kneewall window, raking window.
Related carriage barn.

48 House, c.1875
Gable roof, 2 stories.
Features: distinctive door, Gothic Revival porch.
Related ground stable barn, shed.
Features: hay door, hoist, board and batten.

49 House, c.1875
Classic Cottage.
Features: kneewall window.

50 House, c.1840
Greek Revival style, Georgian plan.
Features: corner pilasters, sidelights, entry entablature, entry pilasters.
Related carriage barn, ground stable barn.
Features: tiled silo, hay door.

51 House, c.1845
Vernacular-Greek Revival style, sidehall plan, 1½ stories.
Features: entry entablature, distinctive interior, recessed porch, Italianate door.
Related shed.

52 House, c.1870
Classic Cottage.
Features: kneewall window, Gothic Revival porch.
Related garage.

53 Ground Stable Barn, c.1935
Gambrel roof.
Features: hay door, ventilators, tiled silo.

54 Late Bank Barn, c.1885

Features: peaked lintelboards, hay door.
Related house, chicken coop, granary.
Features: Gothic Revival porch, kneewall window, board and batten.

55 (Farm)
a. House, 1854
Classic Cottage.
Features: entry entablature, round window, distinctive chimney, distinctive door.
b. Garage, c.1920
Features: rafter tails.
c. Granary, c.1860
d. Privy, c.1890
e. Pighouse, c.1880
f. Carriage Barn, c.1870
Features: hay door.
g. Chicken Coop, c.1980
h. Chicken Coop, c.1980
i. Late Bank Barn, c.1910/c.1945
j. Silo, 1963
k. Silo, 1982

56 House, c.1840/1938
Vernacular-Greek Revival style, wood shingle, Classic Cottage.
Features: continuous architecture, sidelights, Gothic Revival porch.

57 House, c.1860/1985
Gable roof, 1½ stories.
Related barn, gazebo.
Features: hay door, historic move.

58 House, c.1867
Gable roof, 1½ stories.
Features: historic move, Queen Anne porch, Colonial Revival porch.

59 Carriage Barn, c.1870
Gable roof, 1½ stories.
Features: hay door.
Related house.
Features: kneewall window, porch.

60 Chicken Barn, c.1920
Gable roof, 2 stories.
Features: monitor, rafter tails.
Related chicken coop.

61 House, c.1860/c.1920
Gable roof, 1½ stories.
Features: recessed porch.

62 House, c.1880
Gable roof, 1½ stories.

63 House, c.1860
Classic Cottage.
Features: door hood.

64 House, c.1880
Classic Cottage.

65 (Farm)
a. House, c.1885
Queen Anne-Eastlake style, Tri-Gable Ell, 2½ stories.
Features: distinctive lintelboards, round window, peaked lintelboards, cornice brackets, Italianate porch, enriched frieze, distinctive door, gablescreen.
b. Barn, c.1885
Features: belvidere, hoist, hay door, round arch window, peaked lintelboards, peaked entry lintel.
c. Barn, c.1890
Features: bank barn, hay door.
d. Carriage Barn, c.1890
e. Shed, c.1880
f. Barn, c.1890
g. Shed, c.1910

ATE OF VERMONT
ivision of Historic Sites
ontpelier, VT 05602

STORIC SITES & STRUCTURES SURVEY
ndividual Structure Survey Form

SURVEY NUMBER: 1418-66
NEGATIVE FILE NUMBER: 73-A-90

LATITUDE	LONGITUDE

U.S.G.S. QUAD. MAP: Ludlow

OUNTY: Windsor
OWN: Springfield
OCATION: Springfield State Airport
Kendrick's Corners

PRESENT FORMAL NAME: Springfield State Airport
ORIGINAL FORMAL NAME: Hartness Municipal Airport
PRESENT USE: Airplane hanger
ORIGINAL USE: Airplane hanger

UNCTIONAL TYPE: Airplane Hanger
OMMON NAME: Hartness Airport-Hanger
WNER: State of Vermont
DDRESS:

ARCHITECT/ENGINEER:
BUILDER/CONTRACTOR:

CCESSIBILITY TO PUBLIC:
es ☐ No ☐ Restricted ■

PHYSICAL CONDITION OF STRUCTURE:
Excellent ☐ Good ■
Fair ☐ Deteriorated ☐

EVEL OF SIGNIFICANCE:
ocal ☐ State ■ National ☐

THEME:
STYLE:

GE BUILT: Circa 1928

AL DESCRIPTION:
uctural System
1. Foundation: Brick ☐ Stone ☐ Concrete ■ Concrete Block ☐
2. Wall Structure
   a. Wood Frame: Balloon ☐ Western Platform ☐ Post & Beam ☐
   b. Load Bearing Masonry: Brick ☐ Stone ☐ Concrete ☐
      Concrete Block ☐
   c. Iron ☐
   d. Steel ■
   e. Other:
3. Wall Covering: Clapboard ☐ Wood Shingle ☐ Board & Batten ☐
   Shiplap ☐ Novelty ☐ Stucco ☐ Tile ☐ Brick ☐ Stone ☐
   Slate ☐ Sheet Metal ■ Asphalt Shingle ☐ Aluminum ☐
4. Roof Structure
   a. Truss: Wood ☐ Iron ☐ Steel ■ Concrete ☐
   b. Vault: Brick ☐ Stone ☐ Concrete ☐
   c. Other:
5. Roof Covering: Wood Shingle ☐ Asphalt Shingle ☐ Tile ☐
   Slate ☐ Sheet Metal ■ Paper ☐ Built Up ☐ Rolled ☐
6. Engineering Structure: Airplane Hanger
7. Other:

ppendages: Porches ☐ Towers ☐ Dormers ☐ Bay Windows ☐ Ells ☐
Chimneys ☐ Cupolas ☐ Wings ☐ Sheds ☐ Other:
umber of Stories:
pproximate Dimensions: 55' x 55'
f Style: Gable ☐ Gambrel ☐ Flat ☐ Shed ☐ Hip ☐ Mansard ☐
erkinhead ☐ Monitor ☐ Saw Tooth ☐ Other: Round
With Belcast ☐ With Parapet ☐ With False Front ☐

REAT TO STRUCTURE:
o Threat ■ Zoning ☐ Roads ☐
evelopment ☐ Deterioration ☐
ther:

LOCAL ATTITUDES:
Positive ■ Negative ☐ Mixed ☐
Other:

ufresne-Henry, Inc.
onsulting Engineers

22 Free Street . Portland, Maine 04101-3900 . Tel: 207.775.3211 . Fax: 207.775.6434 . E-mail: dhmaine@agate.net

March 8, 2000

Mr. Michael Amaral
Senior Biologist
United States Fish & Wildlife Service
New England Field Office
22 Bridge Street, Unit 1
Concord, New Hampshire 03301

Re: Airport Master Plan Updates for Six Vermont State Airports

Dear Mr. Amaral:

The Vermont Agency of Transportation is currently preparing Airport Master Plan Updates for the following six airports:

- W.H. Morse State Airport (Bennington)
- Middlebury State Airport (Middlebury)
- Franklin County State Airport (Highgate)
- Caledonia County State Airport (Lyndon)
- John H. Boylan State Airport (Brighton)
- Hartness State Airport (Springfield)

In order to augment the planning process for future airport improvement projects, we are interested in obtaining information regarding any rare, threatened or endangered species, and exemplary natural communities located within any of the airports' property or within the immediate vicinity of each facility.

I have enclosed location maps for each of the airports to assist you with your determination. If you have any questions or require any further information, please do not hesitate to call me. Your time and effort in this matter are greatly appreciated.

Sincerely yours,

DUFRESNE-HENRY, Inc.

Gregg A. Cohen

Gregg A. Cohen
Environmental Analyst

c: Michael Churchill, Sr. Project Manager, D-H
Christopher S. Spaulding, Sr. Environmental Analyst, D-H

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
22 Bridge Street, Unit #1
Concord, New Hampshire 03301-4986

RE: Proposed Airport Master Plan Updates for Six Vermont State Airports

April 12, 2000

Gregg Cohen
Dufresne-Henry, Inc.
22 Free Street
Portland, ME 04101-3900

Dear Mr. Cohen:

This responds to your March 8, 2000 letter requesting information on the presence of federally-listed and proposed, endangered or threatened species in relation to the following six airports:

W.H. Morse State Airport	Bennington, VT
Middlebury State Airport	Middlebury, VT
Franklin County State Airport	Highgate, VT
Caledonia County State Airport	Lyndon, VT
John H. Boyland State Airport	Brighton, VT
Hartness State Airport	Springfield, VT

Our comments are provided in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

Based on information currently available to us, no federally-listed or proposed threatened or endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in these project areas.

Thank you for your cooperation and please call Susi von Oettingen at 603-225-1411 if we can be of further assistance.

Sincerely yours,

Sylvia T. Schmelzer

for Susanna L. von Oettingen
Endangered Species Specialist
New England Field Office

Dufresne-Henry, Inc.
Consulting Engineers

22 Free Street . Portland, Maine 04101-3900 . Tel: 207.775.3211 . Fax: 207.775.6434 . E-mail: dhmaine@agate.net

March 8, 2000

Mr. Everett Marshall
Information Manager/Biologist
Vermont Nongame and Natural Heritage Program
Department of Fish and Wildlife
103 So. Main Street
Waterbury, VT 05671-0501

Re: Airport Master Plan Updates for Six Vermont State Airports

Dear Mr. Marshall:

The Vermont Agency of Transportation is currently preparing Airport Master Plan Updates for the following six airports:

- W.H. Morse State Airport (Bennington)
- Middlebury State Airport (Middlebury)
- Franklin County State Airport (Highgate)
- Caledonia County State Airport (Lyndon)
- John H. Boylan State Airport (Brighton)
- Hartness State Airport (Springfield)

In order to augment the planning process for future airport improvement projects, we are interested in obtaining information regarding any rare, threatened or endangered species, and exemplary natural communities located within any of the airports' property or within the immediate vicinity of each facility. We would like this information by March 31, 2000, if possible.

I have enclosed location maps for each of the airports to assist you with your determination. If you have any questions or require any further information, please do not hesitate to call me. Your time and effort in this matter are greatly appreciated.

Sincerely yours,

DUFRESNE-HENRY, Inc.

Gregg A. Cohen

Gregg A. Cohen
Environmental Analyst

c: Michael Churchill, Sr. Project Manager, D-H
Christopher S. Spaulding, Sr. Environmental Analyst, D-H

ufresne-Henry, Inc.
onsulting Engineers

22 Free Street . Portland, Maine 04101-3900 . Tel: 207.775.3211 . Fax: 207.775.6434 . E-mail: dhmaine@agate.net

March 8, 2000

Mr. Rod Wentworth
Department of Fish & Wildlife
103 So. Main Street
Waterbury, VT 05671-0501

Re: Airport Master Plan Updates for Six Vermont State Airports

Dear Mr. Wentworth:

The Vermont Agency of Transportation is currently preparing Airport Master Plan Updates for the following six airports:

- W.H. Morse State Airport (Bennington)
- Middlebury State Airport (Middlebury)
- Franklin County State Airport (Highgate)
- Caledonia County State Airport (Lyndon)
- John H. Boylan State Airport (Brighton)
- Hartness State Airport (Springfield)

In order to augment the planning process for future airport improvement projects, we are interested in obtaining information regarding any rare, threatened or endangered species, and exemplary natural communities located within any of the airports' property or within the immediate vicinity of each facility. We have sent a similar request to the Vermont Nongame and Natural Heritage Program.

I have enclosed location maps for each of the airports to assist you with your determination. If you have any questions or require any further information, please do not hesitate to call me. Your time and effort in this matter are greatly appreciated.

Sincerely yours,

DUFRESNE-HENRY, Inc.

Gregg A. Cohen

Gregg A. Cohen
Environmental Analyst

c: Michael Churchill, Sr. Project Manager, D-H
Christopher S. Spaulding, Sr. Environmental Analyst, D-H