BARNSTABLE MUNICIPAL AIRPORT (HYA)

Airport Layout Plan Update (ALPU)

November 2008

Prepared for:
Barnstable Municipal Airport Commission
480 Barnstable Road
Hyannis, MA 02601

Prepared by:
Jacobs Edwards and Kelcey
Aviation Division
343 Congress Street
Boston, MA 02210

JACOBS

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1.0 INTRODUCTION AND BACKGROUND

Barnstable Municipal Airport (HYA) is located in Hyannis, Massachusetts, and provides scheduled airline service and general aviation services as well as other aviation related activities (**Figure 1-1**). The Airport is owned by the Town of Barnstable and is operated through the Barnstable Municipal Airport Commission (BMAC) under MGL Chapter 91, and regulations promulgated by the Massachusetts Aeronautics Commission (MAC) and the Federal Aviation Administration (FAA). The Airport began as a private airport consisting of a single grass runway before the US Navy expanded the facility to three paved runways during WWII. In 1946, the Airport was returned to the Town of Barnstable, which closed the third runway for commercial development of the Kmart Plaza. BMAC currently operates HYA as a two-runway municipal airport (RW15-33 and RW6-24). The previous Master Plan focused on improvements to the Terminal Building, Parking Lot, and Access Road. This Airport Layout Plan (ALP) Update focuses on the Airfield Facilities and future General Aviation needs.

1.1 Existing Conditions

The Airport is located on 623 acres of land, with approximately 140 acres that are impervious (e.g. paved areas such as parking lots, runway, walkways, and building rooftops). The Airport's structures include the main terminal and the Air Traffic Control Tower (ATCT), which are located south of the runways and taxiways, as well as several hangars to the east and west of the runways. The hangars are used to support general aviation and airline maintenance services. The terminal is approximately 22,930 square feet and currently includes office space for Airport employees, ticketing counters for the airlines, service counters for auto rental agencies, a restaurant, a retail store, space for the TSA, and general lobby and passenger queuing area. The Airport is located in an area of Hyannis zoned for Business and Industrial uses.

1.1.1 General Facilities

Daily operations typically include a variety of activities from private aircraft flights and charter services, flight school operations, aircraft maintenance and storage, refueling of aircraft, and other aviation activity including scheduled airline passenger service. The general aviation facilities are managed primarily by private companies who lease portions of the Airport property. Several automobile rental companies also operate at the Airport. They maintain service counters within the current terminal and several operate auto-washing, minor maintenance, and refueling stations. These stations are located across from the main parking lot. The Airport also leases the land for the facilities located at the Kmart plaza to the west of the Barnstable Road extension.

The Airport provides vehicle parking at a main lot located directly in front of the terminal. The main entrance to the Airport, located off of the Airport Rotary, provides access to the paved portion of the lot. There is also a large unpaved parking area that is frequently used depending on the volume of airport traffic. The airport also uses a gravel parking area

referred to as the Sullivan lot, which is located on the Barnstable Road extension across from Gate F and connecting to Route 132, across from Nightingale Lane.

The Airport is currently served by electric power, telephone, natural gas, municipal sewer and private septic systems (for several hangars on the north end of the East Ramp area), a stormwater conveyance system including several leaching catchbasins, and municipal drinking water. The stormwater conveyance systems generally run along the runways, taxiways, and parking areas and direct stormwater to several outfall pipes and infiltration basins. Installed when the runways were built, the 6- to 18-inch reinforced concrete pipe storm drains were deliberately constructed with open joints to promote infiltration. Therefore, several of the outfall pipes on the site discharge little to no flow except in large storm events. An undeveloped, heavily wooded area and Lewis and Upper Gate Ponds are located to the north of the runways, but within the Airport boundary. These ponds have historically and will continue to receive stormwater from the stormwater outfall pipes. Aided by the generally flat topography and porous soils, precipitation at the Airport infiltrates directly into the ground. None of the natural ponds that receive stormwater flow from the site have surface outlets. Surface flow to the ponds is lost through evapotransporation and recharge to the groundwater beneath the site.

1.1.2 Environmental Setting

The Airport is located in an area of Cape Cod which is designated as Sole Source Aquifer under the Federal Safe Drinking Water Act. The Airport is also located within the zones of contribution to several municipal drinking water supply wells, or Zone II's. For this reason, the Town of Barnstable has designated the Airport area as a Groundwater Protection Overlay District and a Wellhead Protection District. The purpose of the overlay district is to protect public health by encouraging non-hazardous land uses within groundwater recharge areas. The significance of this district to the Airport is the limitation of the use and/ or storage of oil and/or other hazardous materials (OHM). The Airport is constructed on soils that are well-drained, glacial outwash soils.

1.1.3 Ongoing Remedial Actions

Soil and groundwater remedial systems have been installed at strategic locations at the Airport. Air sparging and soil vapor extraction treatment systems were installed at three source areas (Griffin and Cape Air leaching pits, and Operations UST). Two additional BioSparging treatment systems were installed in two downgradient locations to stop the migration of groundwater contamination. The treatment systems are designed to reduce the concentrations of both groundwater and source area soil contamination. Groundwater sampling and laboratory analysis are performed on a regular basis to monitor the effectiveness of the remediation. Results are summarized in status reports that are submitted to DEP, the Airport, the Town of Yarmouth Water Department, and the Barnstable Water Company. The reports are public records and can be reviewed at the DEP office in Lakeville. These treatment systems have been effective in significantly reducing concentrations of contaminants.

1.2 Proposed Terminal Building and Access Improvements

The improvements requested in the Airport's Development of Regional Impact (DRI), April 2006, are consistent with the previously approved 2004 Executive Office of Environmental Affairs (EOEA) Final Environmental Impact Report (FEIR) for the Barnstable Airport Improvement Project. The environmental assessment study was funded by the MAC and the FAA, and was based upon the Airport's previous Master Plan. The recommended alternative from the Master Plan and FEIR included the construction of the new passenger terminal facility, access road, parking facilities, fuel farm and taxiway relocation. This was adopted by the BMAC and formed the framework for the terminal planning and programming for the DRI application that is currently under review by the CCC (**Figure 1-2**).

Consistent with the findings and accepted recommendations of the FEIR, the passenger terminal building will be located immediately southwest of the existing facilities. To comply with FAA Part-77 airspace protection requirements, the building will be situated further back from Runway 15-33 and will provide parking for aircraft that does not conflict with runway airspace protection zones, while maintaining adequate safety clearances for passenger and ground service vehicle circulation. The location of the new passenger terminal will allow the existing terminal to remain in operation during construction of the new building.

Additional access road and parking improvements are also proposed as part of the terminal project. A new access road is proposed to connect with Rt. 132 at the intersection of Attucks Lane to encourage Airport Traffic from Exit 6 on Route 6 to enter the airport via this access road. Remote parking lots are proposed along the access road, for which parcels of land are being acquired by the airport. One of the key parcels is Blackburn's Auto Salvage lot, the clean-up and acquisition of which is being funded by FAA and is a major mitigation element of the project. The new access road will also act as a traffic mitigation measure by alleviating traffic congestion at the Airport Rotary. The new parking lots will incorporate additional green space, landscape screening, and planted bioretention swales for storm water management. All new entrances to the airport will have masses of layered plantings with mixtures of evergreen and deciduous trees that are native Cape Cod species (**Figure 1-3**).

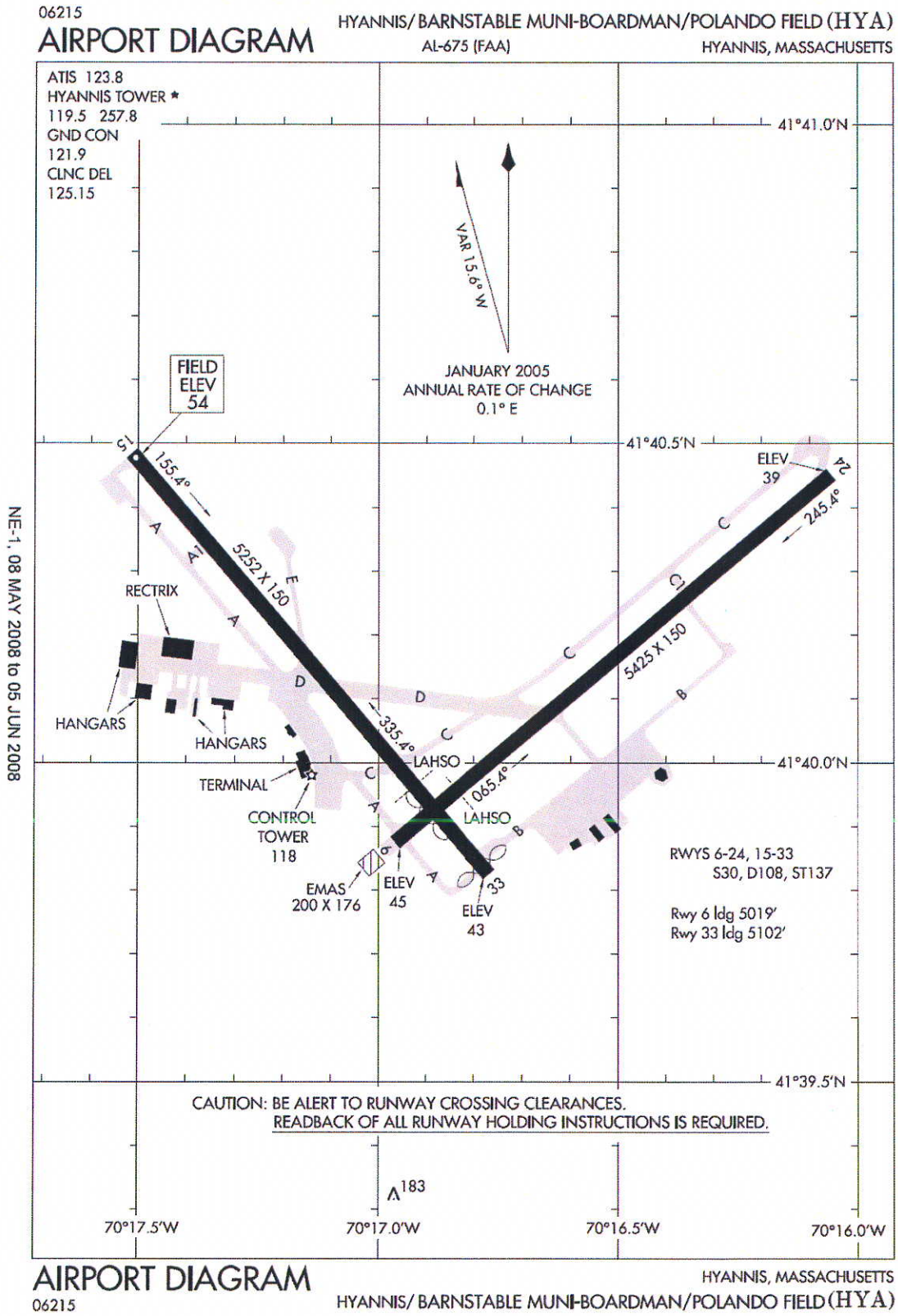
1.3 Airport Layout Plan Update

The master planning and DRI permitting to date has focused on the new Terminal Building, access road, and associated parking lots, as well as airside improvements to the taxiways and commercial aircraft aprons. No improvements to General Aviation (GA) or corporate aviation facilities were included, nor was the proposed Air Traffic Control Tower (ATCT).

The purpose of this Airport Layout Plan (ALP) Update is to identify future GA facility improvements that may be required once the proposed terminal building and Access Road projects are completed. Since the previous work focused on the permitting of the passenger

terminal building, this update will focus on corporate and general aviation facility needs, as well as the adequacy of the current runways to meet new FAA safety criteria. The siting of the airport's new ATCT control tower is being pursued separately by the FAA's Airway Facilities Tower Integration Laboratory (AFTIL) based in Atlantic City, NJ. The draft ALP had considered a potential location for a new ATCT in the northwest quadrant of the airport at the site of the abandoned microwave tower. However, the AFTIL group is considering alternative, lower-cost sites on the East Ramp of the airport, between the ARFF/SRE garage and the hex-hangar (see ALP drawings, **Appx. B**). Once AFTIL has identified their preferred location, the DRI permitting process will be reopened with the CCC for that new ATCT site.

The following sections include an overview of FAA's New England Regional Airport System Plan (NERASP) and InterVISTAS' analysis of Cape Cod's regional market for air passenger travel. The corresponding forecasts for commercial, corporate and general aviation activity at HYA are included. The forecasts are followed by a review of facility improvements to meet the airside needs of regional air service and corporate jet activity at the Airport. Finally, an estimate of the approximate costs for the short-term and long-term improvements is presented as an updated Capital Improvement Program (CIP) for HYA.



HYA Airport Diagram

BARNSTABLE MUNICIPAL AIRPORT
ALP Update

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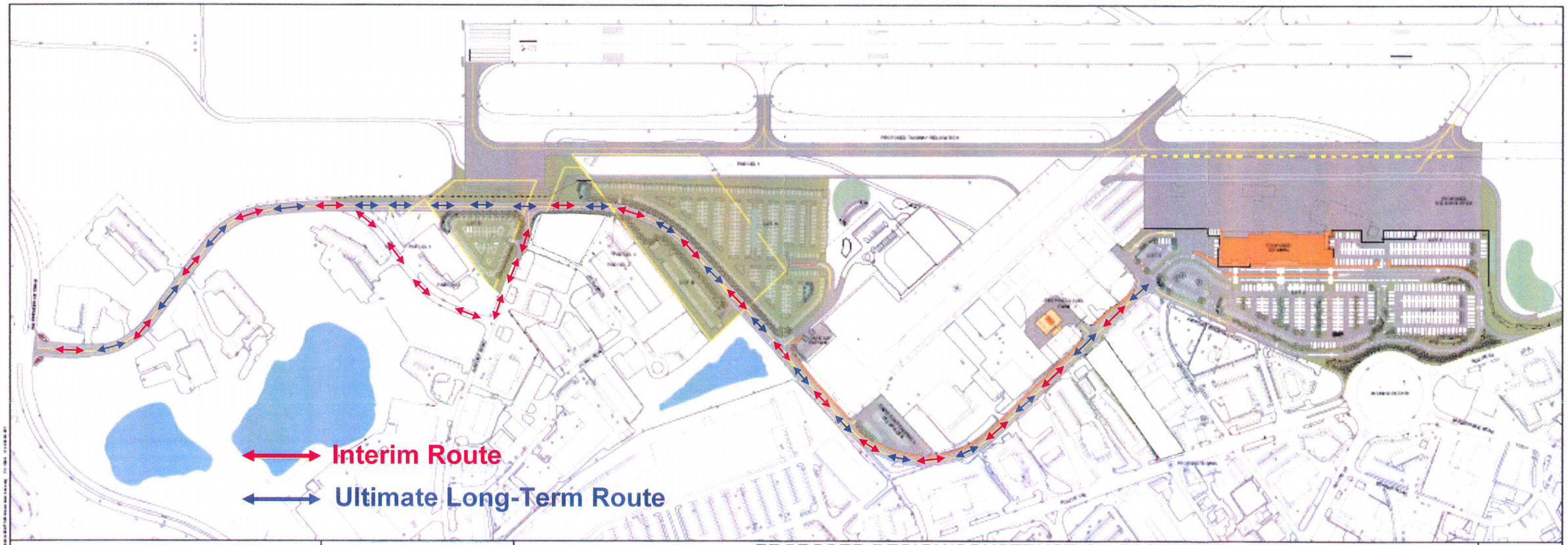
Figure 1-1



BARNSTABLE MUNICIPAL AIRPORT

NOT TO SCALE

PROPOSED DESIGN/CONSTRUCTION PACKAGES
CONSTRUCTION OF BARNSTABLE MUNICIPAL AIRPORT TERMINAL BUILDING
AND ATTUCKS LANE EXTENSION
HYANNIS, MASSACHUSETTS

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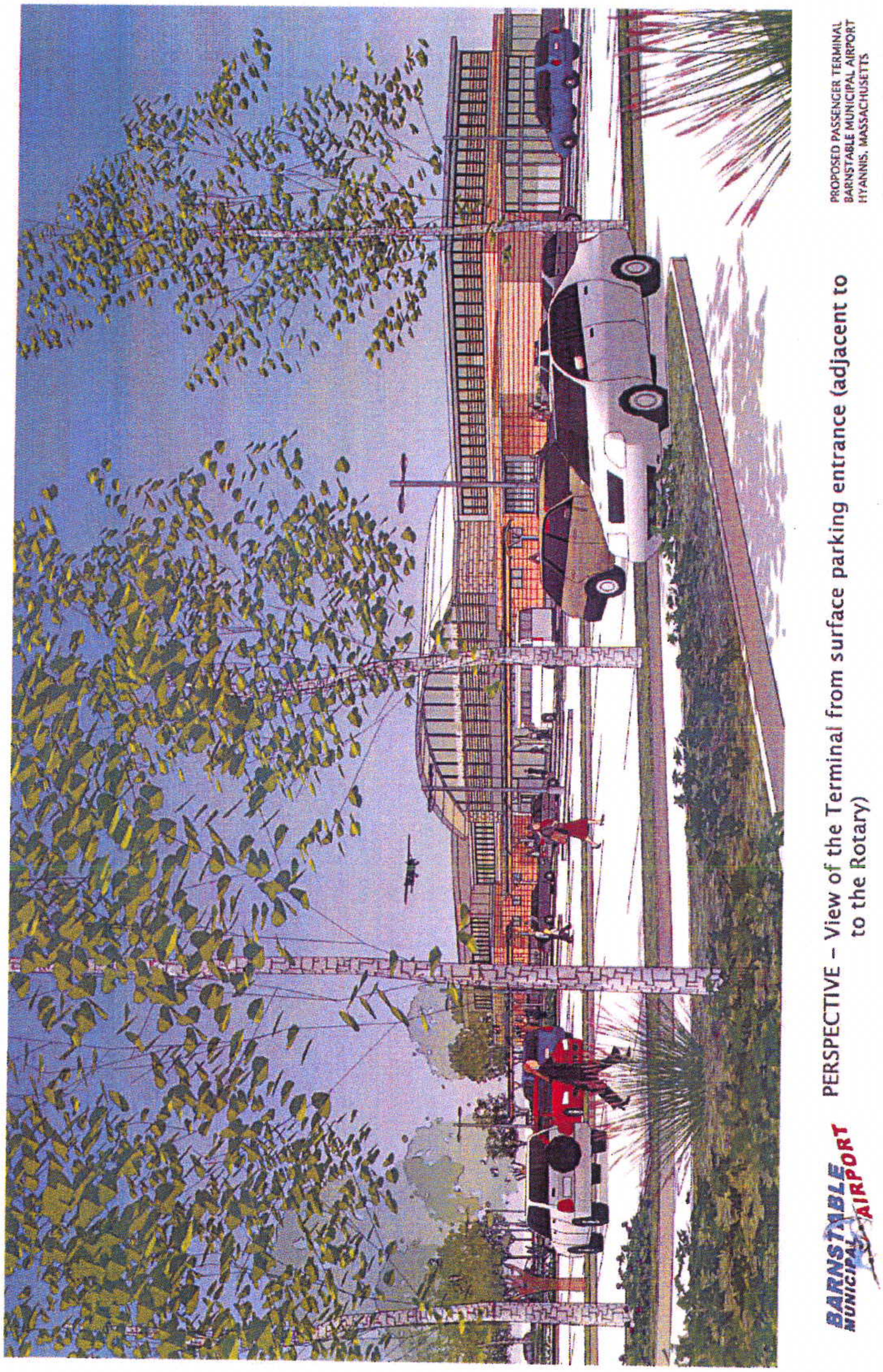
BARNSTABLE MUNICIPAL AIRPORT
ALP Update

Proposed Terminal & Terminal Area Access Road

Figure 1-2



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BARNSTABLE MUNICIPAL AIRPORT
ALP Update

Perspective View of Proposed Terminal Building

Figure 1-3

2.0 THE NEW ENGLAND REGIONAL AIRPORT SYSTEM PLAN (NERASP) - CAPE COD AIR SERVICE FINDINGS

2.1 Introduction

In the early nineties, the New England Region was faced with a dilemma that threatened its future economic development and vitality. In a world that was increasingly dependent upon air transportation, New England's primary airport, Boston Logan International Airport, was running out of capacity and efforts to land bank a site for a new major airport had failed.

In the best Yankee tradition, the region began to examine how to make the best use of the resources they had – a system of under-utilized regional airports. By the end of the decade a unique collaborative effort involving all six state aviation agencies and eleven passenger service airports had positioned the regional airports to benefit from the entry of low fare carriers and had improved access to airline services for passengers throughout New England. However, the question remained, "Will this be enough to provide for the needs of the next generation of air passengers?"

To answer this question this coalition sponsored the New England Region Airport System Study (NERASP). This study discovered some very interesting answers to this central question. First, the region has an unusually high reliance on air transportation. Second, the system does have the ability to meet passenger demand through 2020. But to do so requires continued efforts to enhance the performance of each airport in the system. This is essential to achieve the level of efficiency and resiliency the system must have for a region so dependant on the services of a constantly evolving airline industry.

A majority of the regions passengers will continue to fly through Boston Logan International Airport. Therefore, the system will rely upon Logan to continue to improve its efficiency in handling aircraft operations and passengers. This study also identifies several airports that could improve the performance of the regional system if they can overcome the challenges they face in developing the services required by their communities. Worcester and New Haven have the potential to serve a total of 3.8 million passengers; drawing almost one million of these passengers away form congested airports in New England and New York. The forecast models also reveal an emerging market for jet service from Cape Cod to major domestic markets, which could grow to two million passengers by 2020.

2.2 Aviation "Helps New England *Be* New England"

2.2.1 Geography

New England's location in the northeast corner of the country tends to turn New Englanders toward air travel. While high-speed rail offers a good alternative to New York, Philadelphia, and Washington, business travelers have few alternatives to air beyond this

range. For most trips to other parts of the country, the convenience and speed of air travel is compelling. And with the emergence of low fare service, an increasing percentage of New England-based leisure travelers have come to prefer air travel as well.

2.2.2 Economy

Some economists believe that economic growth will flow toward areas with a critical mass of people who are creative, enterprising, and collaborative. This "creative class" scientists, engineers, academics, doctors, and media professional, seek to locate in places that exhibit certain qualities. These include an appreciation of individual merit, a tolerant social environment, an academic atmosphere, and opportunities to participate in active, outdoor recreational pursuits. New England fits this profile in a number of ways: the number of educational institutions, the culturally and ethnically diverse cities, the heritage of independent thinking, and easy access to a wide range of recreational experiences. As just one example of the existence of this type of economy in New England, the percentage of New England's Jobs in the medical, educational, and "informational" fields is nearly 20 percent – as compared to just under 15 percent for the country as a whole.

While advances in the telecommunications and information technology have substituted to some degree for face-to-face communication, there is still a tremendous reliance on travel among participants in the knowledge industries. And the region's acknowledged national leadership in education and medicine also tend to support the use of air travel. Researchers, medical professionals, patients, faculty, students, and conference participants travel to and from New England in great numbers and they do it by air.

2.2.3 Population

Income and education levels that are well above the national average characterize the region's popularity. The 2000 U.S. Census indicates that two of the 5 most affluent states are Massachusetts and Connecticut. These higher incomes support higher levels of leisure air travel. This has been further stimulated by the expansion of low fare airlines throughout the New England Market. And it is yet to be determined the extent to which leisure travel will grow, as baby boomers enter retirement with higher levels of disposable income and greater inclinations to travel than previous generations.

2.2.4 Scenic and Cultural Resources

It has been said that had the United States been settled from West to East, all of New England would today be a national park. The New England landscape is alive with spectacle, variety, and compelling natural beauty. A natural magnet for tourism, the New England landscape is a human-scale panorama. It extends from the hilly sanctuaries of the Berkshires; to the salt marshes of Cape Cod; to the majestic Presidential Range of New Hampshire. There are few geographic brands as successful as "made in New England," whether the product being sold is fall foliage, ski vacations, striper fishing, or maple syrup. Of course, the ultimate New England "product" is much of our national heritage, this includes, for example, pilgrims' landings, sea trading, whaling, ship building, and the first shots fired in the war for independence. These qualities make New England a popular

destination for travelers from throughout the country and abroad, and they travel here overwhelmingly by air.

2.2.5 Summary

The special attributes discussed above – involving geography, economy, population and resources – are essential ingredients in the formation of the New England identity. And these attributes tend to support one another. For example, the cultural and scenic qualities of the region are one of the "qualities" that attract "creative class" industries; and the existence of these industries produces a population with higher levels of income and education. And the factor that weaves these attributes together is air transportation. It provides the ready two-way access between New England and the national and international markets essential for the function of the region's economy and the lifestyle of its population.

It was the recognition of this reliance of New England on air transportation services that forged the alliance of the region's state aviation agencies and major airports, and motivated them to undertake the NEARSP study. Given this understanding of why New Englanders fly 80 percent more frequently than the national rate, it is essential to have a strategy for developing an airport system that supports the aspirations of the region's population and industries. The NEARSP report describes the specific actions comprising such a strategy for ensuring the vitality of the regional airport system through the next twenty years.

2.3 Challenge for a Regional System

2.3.1 Industry-Wide Challenges

The price of flying has until recently been in a long-term decline. Reasons for this include improved aircraft technology, airline business practices, and economies of scale associated with a rapid expanding market. While these forces are predicted to continue to bring reductions in airline yields (fares changed per seat mile), several near-term developments could reverse this trend:

- The volatility of and current high cost of jet fuel has already altered airlines' decisions on fares and services, especially on longer routes.
- Environmental fees, such as taxes on air quality emissions or the need to purchase emission reduction credits could have dramatic financial implications for air carriers.
- There is an ongoing discussion of the need to re-structure the user fee system as part of the upcoming Re-authorization of the Federal Aviation Trust Fund. This could create changes in airlines service and pricing strategies as well several components of general aviation activity.

Social and Global Issues can have a major impact in a variety of ways:

- The retirement of the baby boomer generation may expand air travel markets. This would include leisure travel and travel generated by a growing trend to retire in countries with a lower cost of living.
- Growth in tourism could significantly dampen passenger activity, perhaps producing severe financial hardship with in the airline industry.
- Globalization, especially involving the more populous under-developed nations, could expand international travel with New England.
- Immigration patterns may eventually lead to greater air travel demand to new overseas markets.

Advances in Aviation Technology usually produce new opportunities for expansion of air travel services.
These could include:

- The reliability and safety of air travel can be enhanced through improvements in navigation and surveillance technology, especially by exploiting satellite-based systems and in-cockpit avionics.
- "Micro-jet" technology and other breakthroughs in small aircraft technology may expand the market for point-to-point, on-demand flying. This could erode the ability of scheduled airlines to sell premium fares for first class passengers. It could also require significant enhancements to the air traffic system to expand airspace capacity at second tier airports throughout the region.

Changes in airline business models to pursue greater efficiencies could include:

- Reduction in operational overhead through greater use of common vendors for terminal services, including ticket processing, baggage handling, and ramp services. This business model would make it easier for airlines to enter smaller markets.
- Expanded use of information technology for "e-ticketing", reservations, dynamic pricing to achieve higher load factors, re-routing passengers, from cancelled flights, integrating reservations for ground transportation services, remote check-in, etc.

2.3.2 Challenges to New England's Regional Airport System

The results of the forecasts, along with our growing understanding of the dynamics of the airport system, suggest a variety of challenges to be addressed in order to secure high quality air transportation across New England. These challenges are described below under headings that represent the objectives for addressing them.

Provide Airline Services Close to Centers of Passenger Demand

The forecasts from the airport choice model identify services can be enhanced to reduce "leakage: from airport catchment areas.

- Even with continuing expansion of regional airport services, the majority of New England passenger will fly through Boston Logan International Airport.

Maintaining reliable and efficient airline service at Logan will be critical to how well the system meets the region's needs for air transportation.

- New Have has the largest under-served passenger base. Improving service there could reduce the number of travelers on congestion highway corridors. Complicated decisions in that direction is the fact that New Haven has the region's most challenging site problems for airfield and landslide facilities.
- Worcester's catchment area is comparable to Portland's, yet it has lost service due to general financial problems of the airlines and direct competition from adjacent catchment areas, primarily Providence and Logan. Where New Haven is constrained by facilities, Worcester is constrained by airline industry practices.
- Southeast Massachusetts and Cape Cod have a large base of passengers traveling on domestic routes outside of New England. This study estimates that by 2020 the cape Cod region will generate approximately two million air passenger trips per year. Further analysis can determine the most beneficial way to meet the needs of the growing population and diversifying economy of the Cape Cod region (see chapter 3.0 below).

Enhance the Reliability of Scheduled Airline Service for All Airports in New England

While periodic delays are tolerable, especially when traveling significant distances, lengthy delays and cancellations can be extremely costly to passengers. If service due to congestion at Logan erodes to the point where passengers frequently experience missed connections or delays, then the "true cost" of air travel from New England may become too high to sustain the region's competitiveness. Likewise, the ability of smaller airports to support low-weather minimum operations is essential in order to maintain airline services.

This was borne out by the experience of airlines operating out of Worcester in the 1980's when the inability to land and depart in low ceilings and visibility led to frequent schedule disruptions. Although significant investments have been made to reduce this problem, a perception remains among a segment of airlines and passengers that the airport is unreliable. To achieve and maintain a reputation of reliable service weather patterns New England airports must:

- Assess the capability of Boston Logan's airside and landside facilities in light of these forecasts as well as changes in aircraft fleet mix and airline service strategies.
- Support implementation across the system of the next generation (NexGen) navigation and surveillance technology systems currently being developed by FAA.
- Minimize leakage into Logan from the catchment areas for providence, Manchester, Worcester, and Portland, as well as Cape Cod.

Secure the Stability of Regional Airports

- Encourage a diversity of airlines at all airports in order to minimize risks associated with heavy reliance upon the fortunes of a single airline.

- In weaker markets, identify ways to reduce risks for new entrants and provide incentives for maintaining service over the long term.

In order to secure and maintain services at smaller regional and rural markets, assure that such airports have facilities that allow airlines to operate efficiently and with reasonable user fees.

Develop "niche" market airports (e.g., Bedford and Portsmouth) to enhance passenger services in specialized areas. If these facilities became unavailable for any reason, it would be almost impossible in the future to develop runways with the same proximity to the Boston market. It is therefore essential to the long-term interests of the entire system to preserve these runways.

Improve Ground Access to the New England Airports

The portion of air travel that occurs with in an aircraft's cabin is obviously only one component of the trip from the passenger's point of view. Increasingly, the ease of getting to the door of the airport terminal and the cost of parking or alternative transportation services may be just as influential in planning the trip as the price of the ticket and flight times.

- Airport ground access times have recently changed for Boston with the Third Harbor tunnel dramatically reducing travel times to downtown Boston and communities served by the Massachusetts Turnpike.
- The planned access improvements to Barnstable Municipal Airport, currently under review by the Cape Cod Commission, will enhance airport access and reduce congestion on local arteries.
- The city of Worcester is working with its regional planning agency to address the need to improve access to Worcester Airport as part of the project to improve east-west transportation for this area. The NERASP airport choice model indicates that, in the Best Case Forecast, improvements equivalent to a ten-minute reduction in access time from I290 could increase Worcester Airport passengers by 110,000 or 39 percent.
- T.F. Green Airport has commenced the development of an airport Rail Station with an associated parking garage. But in order to be of value to airport passengers, rail service must provide sufficient frequency and hours of service for air traveler requirements.

Improve the Environmental Review Process

Airports are obviously a conspicuous component of a community's landscape. In addition to the travel benefits they create, they can also generate off-site impacts such as traffic, noise, and air quality. Conflicts arising from the proximity of airports to communities has in the past given rise to complex and lengthy environmental review processes. This had occurred even when off-site impacts are relatively modest. Sometimes environmental reviews are so lengthy that the original impacts under investigation are reduced by virtue anf the inevitable advances in aviation technology and operating practices. This can affect

the original objectives concerning purpose and need as well as the accuracy of projected impacts under conditions of altered fleet mix and activity levels.

Emerging Market

By 2020, the Cape Cod market will have grown to almost two million passengers flying to destinations beyond New England and the NYC area. This reflects the Cape's evolution from primarily a seasonal vacation/retirement community to a more balanced year round economy. Because the closest airport for long trips is Logan, most of these passengers will be driving along the congested Route 3 corridor or traveling west to Providence.

The primary airport serving Cape Cod is Barnstable Municipal Airport (HYA) with intra-regional service to the islands, Boston, and the NYC area. Its longest runway is 5,425 feet, and its expansion is constrained by major arterial roads, substantial development, and natural resources. It should be evaluated for providing services beyond the Boston and New York City markets.

3.0 THE FEASIBILITY OF RESTORING JET SERVICE TO BARNSTABLE MUNICIPAL AIRPORT – INTERVISTAS STUDY (2007)

3.1 Executive Summary

Based upon the NERASP findings and the results of the InterVISTAS feasibility study, Barnstable Municipal Airport could play a new and dynamic role in the economic development of Cape Cod. Residents and visitors to the Cape have growing needs for access to cities throughout the United States and the world. Through meeting their transportation needs more effectively, and reducing the necessity for long drives to the Boston Logan and Providence T.F. Green airports, the Airport can further contribute to the Cape's prosperity. This expanded role would essentially restore jet service that had existed during the 1970's, and will not undermine the overarching need to protect and enhance its sensitive environment.

As part of the research for the NERASP, the FAA compiled detailed information from passenger surveys. The surveys include the true origin and destination of the trip, and various demographic data. Barnstable County generates between 522,000 and 779,000 airline passengers per year. These passengers include both outbound residents and inbound visitors. Their destinations range throughout the United States and to international markets, beyond. There is no single city that dominates the region's travel patterns sufficiently to dictate the choice of carrier or route. They would be best served by flights that operate to an intermediate hub, with onward connections to cities throughout the nation and the world.

This level of traffic, even after considering "leakage" to other regional airports, is fully sufficient to support a restoration of scheduled service from Barnstable to a major hub. The flights could be operated by aircraft ranging from 40-seat turboprops to 90-seat regional jets. The flights would serve primarily Cape Cod residents and visitors. Their clientele would be distinctly different from most of the Airport's current passenger traffic, which visits the Cape only to access the final destinations of Nantucket or Martha's Vineyard.

The need restore expanded service is partly the product of socioeconomics changes occurring on the Cape. The influx of wealthy "baby boomers", many with existing home-based businesses, second homes, and executive retired or semi-retired persons with high incomes is increasing the need for better air access. However, the service would also address structural weaknesses in the regional economy, including the out-migration of young persons, the limited commercial base, large seasonal employment variations, and the Cape's difficulties attracting high value visitors in the off-peak season.

Both Cape Air and Island Airlines employ Cape Cod residents and generate revenue for the Airport. However, they do not, by themselves, meet the Cape's growing regional needs for accessibility to national and international destinations. They primarily carry tradesman and non-Cape visitors to Nantucket and Marthas Vineyard. Cape Air offers connections at Logan to national and international routes and US Airways Express links the Cape to New York and other destinations. However, the high fares and the high cost of flying 19-seat aircraft create an uncertain future for US Airways operation of these flights.

Several carriers could operate the proposed routes through their respective hubs. Prospects include:

- Continental to Newark
- US Airways to Philadelphia
- JetBlue to New York-Kennedy
- United to Washington-Dulles
- Delta to Atlanta or Cincinnati

The proposed service could be operated by several types of aircraft, including 30-40 seat turboprop aircraft, and regional jets of up to 90 seats. The turboprop Q400 is a further prospect. With such a wide range of feasible aircraft, the Airport must emphasize flexibility in its airside and terminal area planning. The Airport should consider flexible provisions to accommodate a broad range of aircraft types and traffic volumes, from the status quo up to 90-seat jet aircraft.

The hub-oriented service would be an important departure from the Nantucket/Marthas Vineyard shuttles that have served as the Airport's mainstay. It would serve a different clientele, whose reasons for travel are directly attributable to the Cape. Through seeking and obtaining such a service, the Airport would occupy a higher profile in the development of the Cape. The Airport's goals would then address issues of widespread importance to the Cape and the prosperity of its residents. Should the Airport seek to restore such service, it should ensure that all stakeholders are aware of its goals. Furthermore, the Airport's facility and business development strategies should reflect its stronger role in the community and a more proactive relationship between the Airport and its stakeholders.

3.2 Historical Data

The InterVISTAS analysis of historical traffic uses 1979 as a base year. This year reflects the limits of the available databases. The United States deregulated its domestic air markets in 1978; therefore 1979 marks the beginning of the current era of air service. However, information from even earlier periods is relevant. In the 1970's, the Airport accommodated DC-9 jet aircraft of Northeast and Delta Air Lines. The jet services examined in this Report do not form a complete departure from the past; there are ample precedents for jet services to the Barnstable Municipal Airport.

This analysis, therefore, is not so much an assessment of the feasibility of establishing jet services to the Cape, but of restoring them. Historically, Barnstable enjoyed DC-9 service to New York and other cities by Northeast Airlines. **Figure 3-1** shows a Northeast Airlines DC-9 at the Airport in 1972. The Cape's need for transportation has increased significantly over the intervening 35 years, and the absence of a service such as Northeast once offered suggests that Barnstable County's demand are not being satisfied.

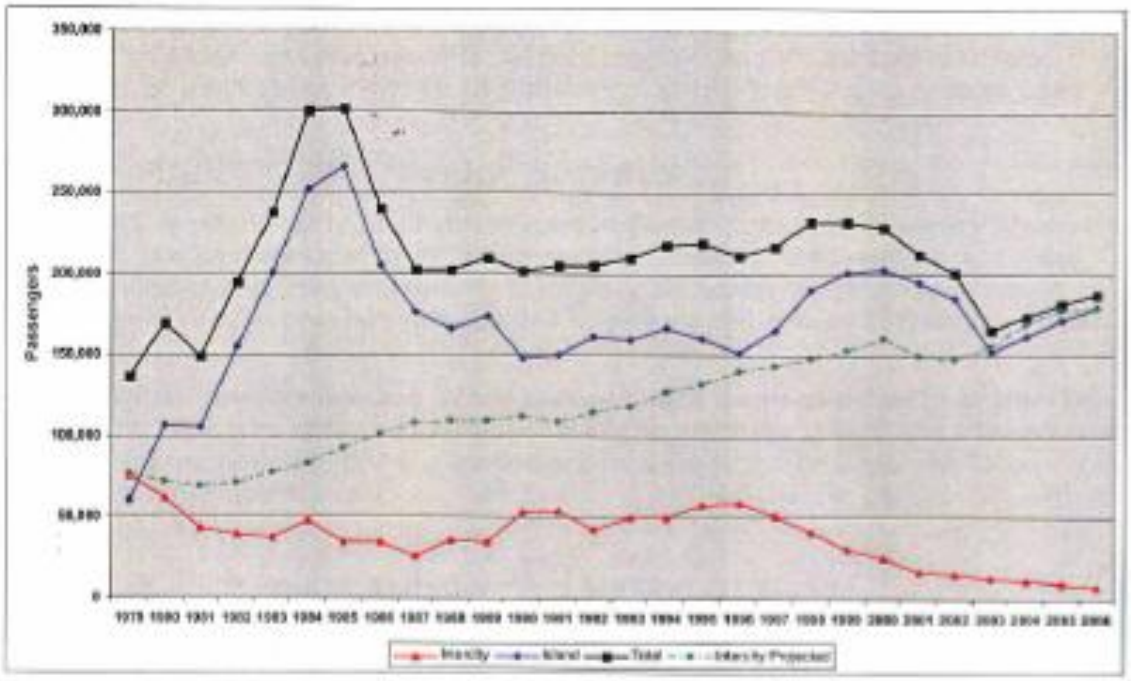
Figure 3-1: Northeast DC-9 Jet Service at Barnstable, 1972 **Source: W. Richardson**

Barnstable's origin-destination air traffic data of 2006 reflects the heavy preponderance of Island traffic. The high fares of US Airways Express' La Guardia service and the limited connection options have caused most Cape passengers to use Boston Logan and Providence T.F. Green airports. The growth of low cost carrier services at both competing airports has accelerated this trend.

Earlier periods can provide information on the true underlying traffic flows. **Figure 3-2** shows trends for the period 1979-2006. The reported intercity traffic using the Airport declined from 1979 through to 1987, with the loss of services by large aircraft. It recovered modestly to 1990, but remained relatively constant over a period of 1990-1995. The recession of 1992 caused a temporary dip. After 1995, this traffic started a steep decline. Contributing factors include the withdrawal of Continental Express and Business Express. Southwest Airlines inaugurated services to Providence T.F. Green in the fall of 1996. The airline's low costs and aggressive schedule captured traffic from areas throughout southern New England, including Cape Cod.

The dotted green line shows a projection of intercity traffic. The value for 1979 is grown at the same rate as total domestic traffic. The points on the line show Barnstable's intercity traffic, assuming that the local market grows at the same rate as total domestic revenue passenger-miles, and that there are no changes in traffic leakage patterns. By 2006, the projection indicates that Barnstable's intercity traffic would have reached 179,000

passengers yearly. In 1979, it is very likely that the Airport sustained considerable traffic leakage to Boston and Providence, but no estimates of leakage rates were available. Projecting the 1979 value forward to 2000 resulted in a value of 160,218 passengers per year. The Federal Aviation Administration's NERASP Study estimated that the Cape's traffic was 650,425 in 2000, implying a leakage rate of 75.4 percent. Applying this rate to the 179,000 passengers of 2006 generates an estimate of **727,009** passengers per year. The estimates of this Analysis and the NERASP Study are consistent and mutually validating.



Source: United States Department of Transportation Databases 1B and C298, Air Transport Association

Figure 3-2: Traffic Trends at the Barnstable Municipal Airport, 1979-2006

3.3 Bus Passenger Survey

The Plymouth and Brockton Street Railway and the Peter Pan bus companies offer schedule services from several towns on Cape Cod to Boston Logan and Providence T.F. Green airports. Discussions with the FAA indicate that 168,000 passengers yearly traveled between Logan and Cape.

The July, 2007, MASSPORT survey of airport users interviewed 561 passengers traveling between Boston Logan airport and the Cape. Of these, 100 used the scheduled bus transport. The New England Regional Aviation System Plan (NERASP) considers Cape Cod as part of Boston Logan's catchment area. Their research has shown that Barnstable County residents overwhelmingly choose to fly from Boston Logan to domestic and international destinations. While Boston Logan serves 88 percent of the passengers generated by its own catchment area, the research for the NERASP Study has shown that 6 percent of this traffic uses Providence T.F. Green. The combined total ridership, airport

capture, and model spilt statistics generate an estimated **778,800** air passengers per year traveling to or from Cape Cod.

3.4 MASSPORT Travelers Survey

MASSPORT regularly surveys air passengers at Boston Logan. The survey is very thorough, and captures the "true" origin and destination of each respondent, how they traveled to and from the airport, their place of residence, purpose of travel, and other details. The Authority kindly agreed to provide the results of their July, 2007 survey. Of the 19,000 travelers covered by the Survey, 434 involved travel to or from the Cape. The 2006 domestic and international traffic totals for Logan, the leakage rates provided by the NERASP, and the questionnaire survey, estimated that the Cape's "true" traffic is 384,311 outbound and 247,473 inbound, or a total off **631,784** passengers, from Cape Cod alone.

3.5 Barnstable County Survey – Origins and Destinations

The Cape Cod Chamber of Commerce and the Cape Cod Economic Development Council kindly volunteered to assist with the data collection for the InterVISTAS project. The project team quickly accepted these offers, and prepared a questionnaire survey that was distributed throughout the Cape regarding frequency of travel, destination, and choice of airport. The questionnaire considered both outbound and inbound travelers. Because of the manner in which the questionnaire was distributed, a careful control of response rates was neither possible nor planned. However, its responses are highly informative on destination and other aspects of travel behavior.

The questionnaire was distributed to all members of the Cape Cod Chamber. The limited returns substantiated that most Cape Business (and personal) travel is conducted through Logan. Business interest frequently cited major hubs such as Chicago, Las Vegas, Denver, San Francisco, Los Angeles, Atlanta and Washington as destinations. Personal travel destinations most quoted were to Florida, usually via Boston. The major business hotels responded that visitors for conventions, meetings and executive retreats come from Atlanta, California and Texas. Outgoing destinations for such visitors were Europe (especially England) and major U.S. cities such as Las Vegas, Chicago, Washington, Houston, and San Diego.

3.6 Traffic of Extended Service Area

The traffic estimates considered only Cape Cod proper. West and north of Plymouth County, the larger selection of flights and shorter distances to Boston Logan and T.F. Green cause Barnstable Municipal Airport's attractiveness to decline rapidly.

This section examines the potential market size of an Extended Service Area. Specifically, this area includes all of Barnstable County (Cape Cod). It also encompasses the southeastern portion of Plymouth County, enclosed by a line connecting Plymouth Rock and Mattapoisett. The extended zone excludes Bristol County because of its proximity to Providence T.F. Green. While the frequent mainland –island air shuttles would allow both

Nantucket and Dukes Counties to feed an Intercity service from Barnstable, both the Vineyard and Nantucket have been excluded from HYA's Extended Service Area. **Figure 3-3** depicts the Primary and Extended Service Areas.

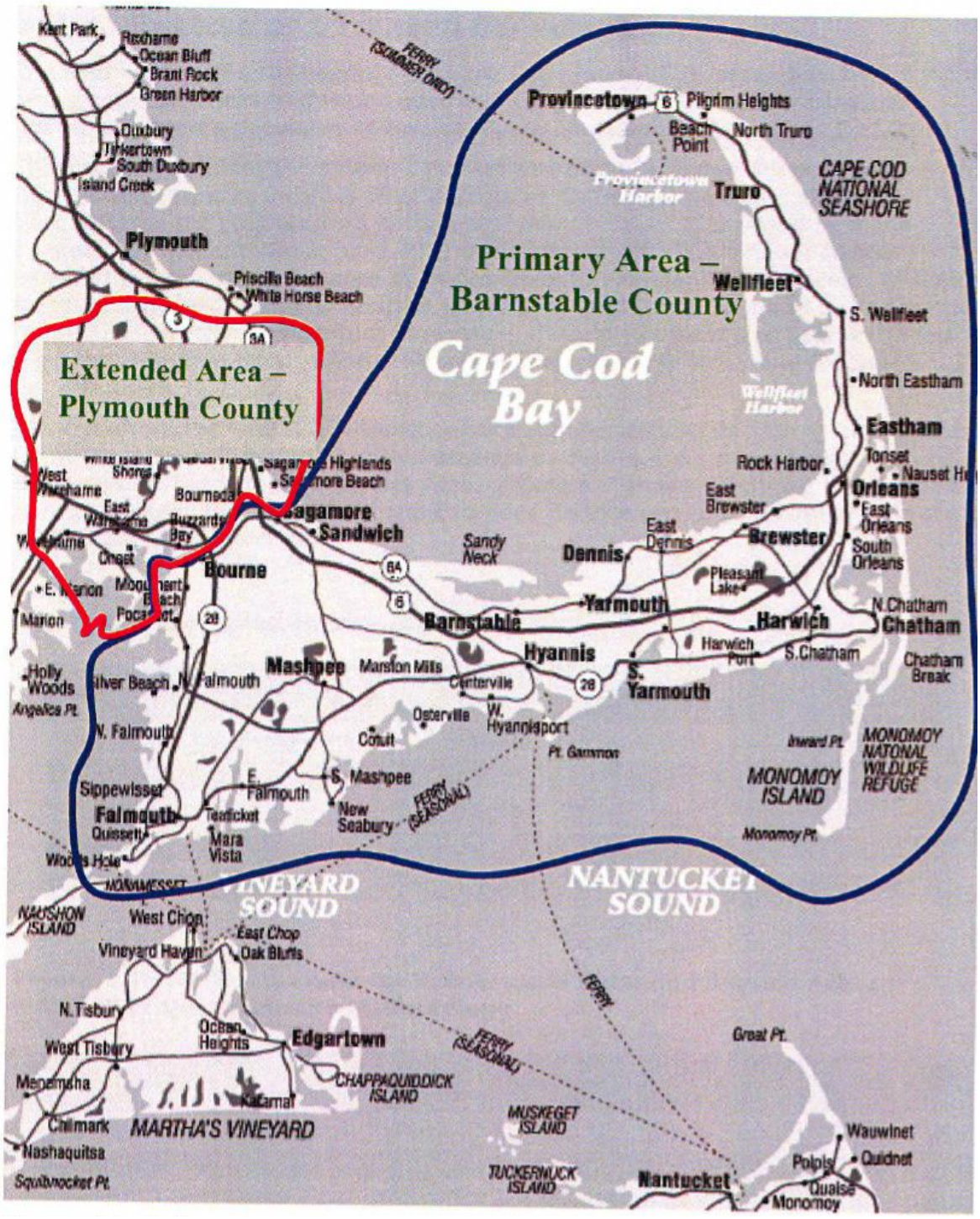


Figure 3-3: Extended Service Area

The data from MASSPORT questionnaire summarized in Section 3.3 also provided worthwhile information from Plymouth County passengers. Figure 3-4 summarizes the traffic estimates for the Extended Service Area. Figure 3-5 shows estimates of inbound and outbound traffic for the Primary and Extended Service Areas, as estimate from the MASSPORT questionnaire.

ESTIMATION METHOD	PRIMARY DEMAND	PLYMOUTH COUNTY	EXTENDED DEMAND
New England Reg. System Plan	>650,425	>243,361	>893,786
Historical Data	727,009	n/a	n/a
Bus Survey	778,800	n/a	n/a
MASSPORT Questionnaire	631,784	301,334	933,118
Cross-sectional Regression	522,000	165,284	688,182

Figure 3-4: Extended Service Areas Estimates

	Cape Cod	Plymouth County	Total
Residents Traveling Outbound or Returning Home	384,311	151,395	535,706
Visitors Flying to Mass. or Returning	247,473	149,939	397,412
Total	**631,784**	**301,334**	**933,118**

Figure 3-5: Traffic Estimate for Primary and Extended Service Areas – MASSPORT Questionnaire Methodology

The cross-sectional model generated an estimate of 165,824 passengers yearly for Plymouth County alone. It used estimates of population by postal code. The calculations represented the applicable portion of Plymouth County as being 38.23 miles from Boston Logan, the distance between the town of Plymouth and Logan. The estimate for Plymouth County, and the 522,358 estimate for Barnstable County, together comprises a demand of **688,182** passengers per year in 2006.

The NERASP Study estimated that Plymouth County generated 1,062,703 passengers in 2000, and that traffic will reach 1,319,768 in 2010 and 1,586,543 in 2020. Those areas of Plymouth County that are sufficiently close to Cape Cod to use Barnstable Airport comprised 22.9 percent of its population in 2005. If the propensity to travel is uniform among all Plymouth County residents, then the demand in the Extended Service Area of relevance to the Airport was 243,361 in 2005. The NERASP forecasts demand to reach 302,230 in 2010 and 363,322 in 2020. The Plymouth County traffic plus Barnstable passengers gives a "Total Demand" for the Airport that comprised **893,786** passengers in 2005. The NERASP Study forecast traffic to reach 1,206,090 in 2010 and 1,547,207 in 2020.

The analysis of the extended region did not consider a proposed casino in Southeast Massachusetts. The casino, if one were to be built, would be located outside Barnstable's

extended service area, roughly equidistant from Barnstable, Boston Logan and Providence T.F. Green Airports, and within the New Bedford Regional Airport's service area. Travel to a casino could be combined with tours of the Cape and might generate inbound charter flights which could be pursued by the Airport. However, to link any proposed casino to potential future activity at Barnstable Municipal Airport would be unduly speculative, and was not a factor in InterVISTAS analysis.

3.7 Estimates of Intercity Market

The analysis of the Intercity Market used four independent means to estimate the true demand for Barnstable County. **Figure 3-6** lists the estimates produced.

ESTIMATION METHOD	PRIMARY DEMAND	PLYMOUTH COUNTY	EXTENDED DEMAND
New England Reg. System Plan	>650,425	>243,361	>893,786
Historical Data	727,009	n/a	n/a
Bus Survey	778,800	n/a	n/a
MASSPORT Questionnaire	631,784	301,334	933,118
Cross-sectional Regression	522,000	165,284	688,182

Figure 3-6: Estimates of Intercity Traffic Demand

The passengers shown above fly on the "Intercity" route – specifically, between the Cape and points throughout the United States and the world. Like most U.S. communities, the demand is fragmented among literally hundreds of destinations. While major cities and recreational centers such as Orlando, Las Vegas, Chicago, Houston, and Los Angeles are among the largest destinations, no single point dominates traffic flows. The diversity of destinations, and the absence of any dominant traffic flows, is an important characteristic of most U.S. cities.

Even the smallest estimate, produced by the cross-section regression, is well in excess of the quantity needed for a high quality air service. It implies 715 inbound and 715 outbound passengers daily. If only one-third of the Intercity demands uses the proposed service, with the remainder patronizing Boston Logan and Providence T.F. Green, the traffic could still support 4 daily departures with a 70-seat regional jet, operating with an 85 percent load factor. The large range of estimates is the result of several different methodologies. While the "true" size of the market remains somewhat speculative, it would increase quickly if an airline at Boston or Providence inaugurated a new service or reduced its fare.

> **All estimates uniformly support the view that an Intercity-type service, possibly using 50-90 seat jet aircraft, would be commercially feasible at Barnstable Municipal Airport.**

3.8 Potential Intercity Service

Intercity passenger jet service would be feasible for Barnstable Municipal Airport. The flight would link the Airport to a hub, and would provide residents and visitors of the Cape with high quality, one-stop access throughout the United States and to major international destinations.

The service would operate with modern turboprop or jet aircraft of between 40 and 90 seats. Several services and destinations would be feasible:

- **Continental Airlines to Newark Liberty Airport**
- **JetBlue to New York John F Kennedy International Airport**
- **US Airways to Philadelphia**
- **United to Washington-Dulles**
- **Delta Air Lines to Atlanta and/or Cincinnati**

The analysis of traffic flows showed that passengers are widely distributed among many origins and destinations. No single destination is dominant. This means that no one carrier is decisively superior to any other to operate the service. One complication is the relatively modest selection of hubs. For example, US Airways' reduction of its Pittsburgh hub eliminated that as a potential candidate for service.

A hub relatively close to the Cape would provide reasonably direct one-stop routings to the largest number of destinations. Continental's Newark hub is close to the Cape, has an excellent selection of onward destinations, and could serve the important New York point-to-point market. JetBlue at Kennedy has an alliance with Cape Air that might facilitate a link to New York. It has a smaller range of onward destinations, however, than does Continental.

The proposed route could use several types of jet or propeller aircraft. The choice of equipment will depend on traffic volumes, profitability, the choice of downline hub and, especially, the airline's internal product standards. **Figure 3-7** shows some of the aircraft that could operate the intercity service.

Many types of aircraft could operate the proposed route. Their capacities, weight, and apron footprints vary widely. Because of this wide variation in types of aircraft, the apron and terminal ramp facilities should be planned accordingly, incorporating the flexibility to accommodate a range in aircraft types.

Type	Manufacturer	Seats	Length (Feet)	Wingspan (Feet)	Gross Takeoff Weight (Pounds)
717	Boeing	117	124	93	121,000
ERJ-195	Embraer	98	119	94	108,003
Q400	De Havilland	78	108	93	63,250
ERJ-170	Embraer	70	98	85	78,153
CRJ-700	Bombardier	70	106	76	75,000
S200	Saab	58	90	81	50,265
CRJ-200	Bombardier	50	88	70	53,000
S340	Saab	37	70	65	29,000

Source: Airliners.net

Figure 3-7: Specifications of Aircraft for Intercity Service

3.9 Conclusion And Recommendations

The Cape Cod regional service area of Barnstable Municipal Airport is fully capable of supporting intercity passenger jet service. This flight should connect the Airport to a hub that has extensive connections throughout the United States and to other international destinations. An intercity service would initially be operated by a turboprop or jet aircraft in the 40-90 seat range. The terminal apron layout should retain the flexibility to respond to a range of regional air carrier aircraft types.

Enough traffic is present to support a service, even if a majority of the Cape's passengers still patronize Boston Logan or Providence T.F. Green. The service would benefit from, but not depend upon traffic feed from southeastern Plymouth County, Nantucket, and Martha's Vineyard.

It is very unlikely that airlines would enter the Barnstable market spontaneously. The low profile of the Airport, the fact that DOT origin-destination statistics greatly understate its traffic, and the presence of low cost carriers at competing airports, all mitigate against a rapid inauguration of services.

Merely having the traffic and the facilities is no guarantee that the service would begin. Should the Cape Cod region elect to pursue the service, the Airport should plan a lengthy process of marketing to prospective airlines.

4.0 AIRLINE PASSENGER FORECASTS

4.1 Executive Summary/Key Findings

Long-range aviation forecasts were developed for Barnstable Municipal Airport (HYA) in 2006 of commercial passengers and aircraft operations, as well as peak hour passenger activity. The forecast was developed by SH&E as input to a financial feasibility review of the new terminal facility for the Airport.

The 20 year forecast was prepared prior to the NERASP Study and the InterVISTAS feasibility study which were reported on in the previous chapter. The SH&E forecast therefore, provided a more conservative base for future terminal planning and financial programming. The forecasts examined historical air service patterns and aircraft operations over the last decade at HYA, analyzed industry wide short and long conditions, as well the seasonal nature of air travel specific to this market. Outside factors are also taken into consideration such as economic influences, social changes, and demographic shifts. Barnstable's modal substitution with the ferry service to its principal market, Nantucket ("ACK"), required a unique and specific analysis.

This forecast assumed no future physical limitations at the Airport, such as airport access, capacity to park cars or other facilities. In addition, a key assumption of this forecast was that the relationship between air and ferry service would remain close to the existing relationship; no change in the current ferry service, no expansion of the current ferry fleet, and the relative price differential between air and ferry travel would remain comparable to the existing ratio. At present, the Steamship Authority has no formal plans for increasing ferry service, and no plans for increasing the fleet size.

Several key findings emerged from the forecast of future airline passenger levels at Barnstable Municipal Airport:

- The forecast projects a Low, Medium, and a High case scenario. The medium scenario forecasts passenger enplanements over the next twenty years, with an average annual growth of 2.4 percent.
- Air Operations will also grow at a steady but smaller amount than past operations growth. Commercial Operations are estimated to grow at 2.2%.
- The Nantucket market has become even more predominant as Barnstable's main market with 94% of all passenger enplanements flying to ACK.
- HYA markets other than Nantucket have lost air service, with a resulting decline in passenger volumes. This is the result of difficult financial conditions experienced within the U.S. aviation industry over the past decade. Under the High Case Scenario, this trend could change over the medium term and HYA, similar to other non-hub U.S. airports, could experience growth in non-ACK markets over the second decade.

§ The Median Case Scenario results in an increase from the 2005 base year enplanements of 177,699 to 287,000 passengers by 2025, while the High Case Scenario (representative of the subsequent NERASP and InterVISTAS findings) would result in **323,013** passengers by 2025.

4.2. HYA's Current Air Service Market

The principle role of Barnstable Municipal Airport is to link Cape Cod to the island of Nantucket. More than 90% of the passenger activity handled at HYA originates at or is destined for Nantucket. One of the most important segments of this market is tourists and visitors who have summer residences on the island. Nantucket and Martha's Vineyard residents and workers use the Airport as a connector to the mainland. Residents take advantage of the air service throughout the year, especially in the winter months when the Airport becomes a key transportation lifeline to the island.

The Airport faces the unique condition of having to compete with ferry service to Nantucket and Martha's Vineyard. Few other markets in the U.S. have similar issues of modal substitution (including the balance of seat capacity, travel time, and price differential between air and ferry service) which affect the volume of passengers at the Airport. Ferry service between Cape Cod and the Islands is managed by the Woods Hole, Martha's Vineyard, and Nantucket Steamship Authority ("Steamship Authority"). Ferry Service is provided directly by the Steamship Authority, as well as through a subcontract with Hy-Line Cruises, to Nantucket Island and Martha's Vineyard.

The Airport also offers a limited service for Cape Cod residents and tourist to access the national and international aviation system, allowing passengers to connect to/from a multitude of destinations (see Chapter 3.0, above). The non-stop service from HYA both Boston and LaGuardia provides residents a more convenient alternative to driving to Boston and Providence. As reported in previous chapters, both the NERASP Study and the InterVISTAS Analysis reveal a significant market on the Cape by 2020 for this national and international market (see Chapters 2.0 and 3.0, above).

Currently, the Airport serves five markets including Nantucket, Boston, New York City, Martha's Vineyard and Providence. The largest market segment is Nantucket, which represents 94% of all enplaned passengers at the Airport. The percentage of passengers traveling to Nantucket has increased steadily over the past decade. In 2000, 88% percent of passengers at the Airport were destined for Nantucket; however, by 2005 that number had increased to 94%.

In addition to being highly concentrated, the HYA market has strong seasonal flow, emphasizing the leisure nature of airport traffic. August is the peak activity month with July following closely behind. The busiest period, June-August, comprised 32% of all 2005 traffic. January and February represent the lowest activity months enplaning 4.7% and 5.5% respectively, representing year round resident demand and the limited tourism during the winter months.

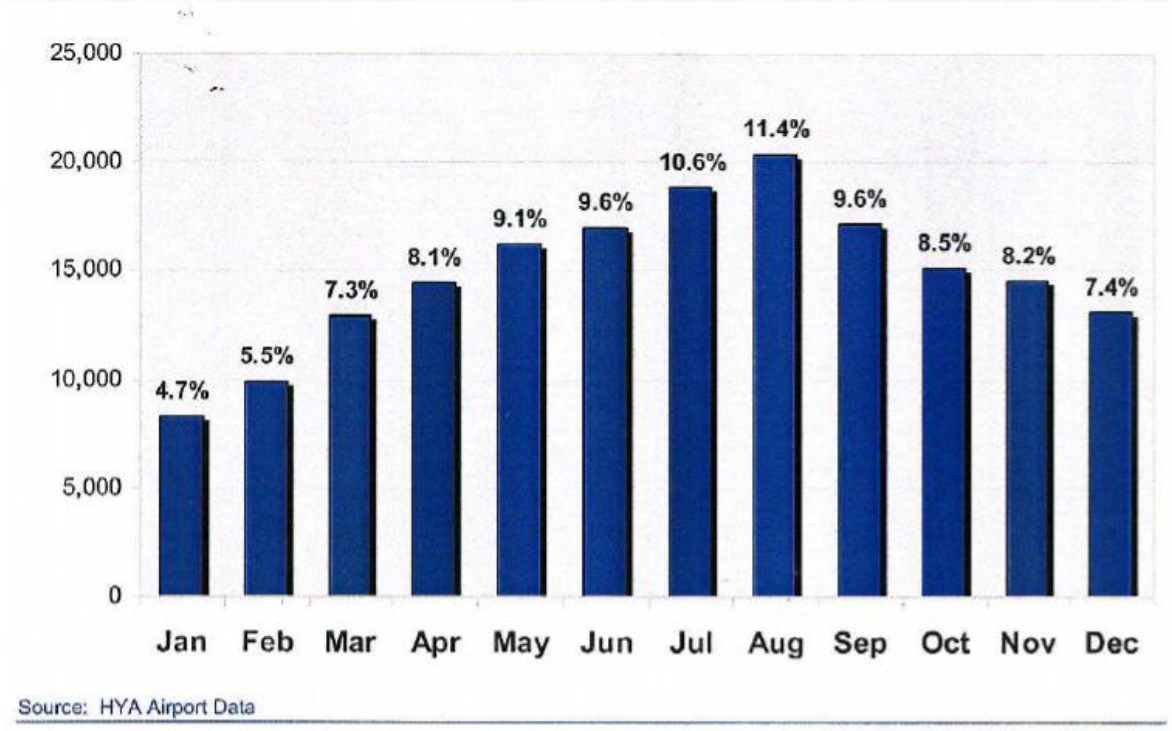


Figure 4.1 Seasonal Travel Patterns: Monthly Enplanements and the Percentage of Total Enplanements for 2005

Four carriers serve the Airport: Cape Air (also operating under the name Nantucket Air), Island Air, Nantucket Shuttle, and Colgan Air (a US Airways affiliate). The landscape of carriers has changed over the years at Barnstable with nine different airlines serving HYA at one point or another over the last twenty years.

In 2006, Cape Air provided the most departures out of HYA with 26 daily flights. Cape Air serves Nantucket, Boston, and Martha's Vineyard. Colgan/US Airways serves Nantucket, LaGuardia, Martha's Vineyard, and Providence, while Island Air and Nantucket Shuttle only serve Nantucket. Cape Air, Nantucket Shuttle, and Island Air employ similar operating strategies on their Nantucket route. All three carriers operate 7- or 9-seat Cessna 402 piston aircraft on the short flight, which average 15 minutes. Service to Nantucket and Martha's Vineyard is classified as "Air Taxi" meaning that the carriers can add frequencies at will (referred to as "extra sections") to meet peak period summer demand. This ability to add capacity is an efficient feature, offering a shuttle-like operation during the summer months. In addition, the Air Taxi designation means that the passengers do not have to clear security in order to embark on their flights.

Given the overwhelming majority of service to Nantucket, it is no surprise that Cape Air and Island Air made up 87% of all departures from HYA during the 2005 peak season. Of the Airports total passenger traffic, Island Air and Cape Air each carried 49% of all HYA passengers (according to HYA 2005 enplanements data) demonstrating the dominance of the Nantucket market. In March 2006, a new air taxi carrier, Nantucket Shuttle, began

service between Hyannis and Nantucket with pricing slightly below Cape Air and Island Airlines.

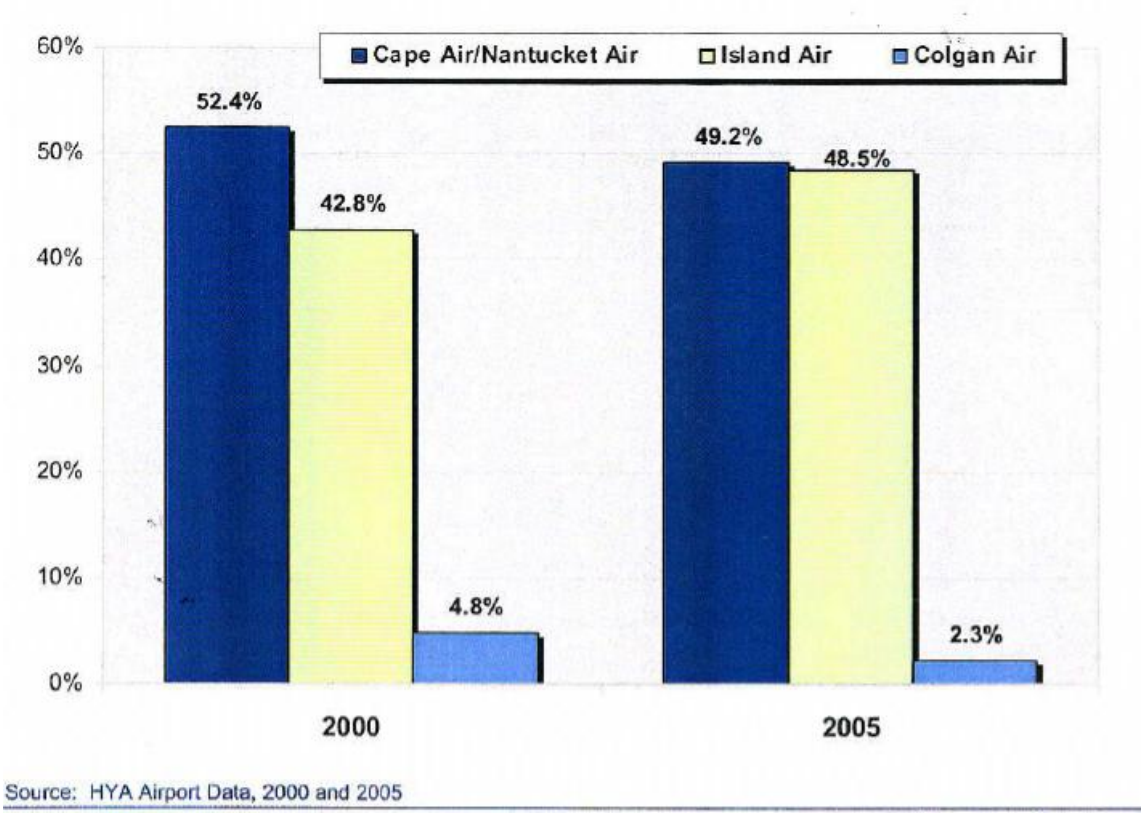


Figure 4-2 Carrier Share of HYA Passengers (2000 vs. 2005)

Three different types of aircraft (Cessna 402, Beech 1900, and Saab 340) operate at the Airport. The small Cessna 402's are the most heavily-used at the airport with 86.5% of all departures. Colgan Air, operating as US Airways Express uses Saab 340's for service to LaGuardia and Beech 1900's on their Boston-Nantucket-Hyannis route. The Saabs account for 9.6% of all departures and the Beech 1900's comprise the remaining 3.8%.

4.3 Economic Overview of Region

4.3.1 Cape Cod Overview

A number of economic, demographic, and social factors in the Cape Cod region impact the traffic flow through the Airport. In general, two factors-income and population- have the strongest correlation to the level of air travel and serve as predictors of future travel demand. Furthermore, in the case of the Airport, the concentration of tourism and leisure travel has a major impact on air traffic. Barnstable County comprises all of Cape Cod, from the Sagamore and Bourne bridges to Provincetown. This area is home to a vibrant tourist economy, with visitors from all over New England, the northeast, and the nation, coming to the region for vacation throughout the year and especially during the summer.

The Cape Cod Commission estimates that the Cape's population increases to three times year-round levels during the peak summer months.

Historically, Barnstable County's population has grown at a steady pace over the last few decades and has consistently outpaced Massachusetts on an annual level, as shown in **Figure 4-3**. Barnstable County population growth has slowed in the past decade; however, growth rates still remain above Massachusetts and U.S. levels.

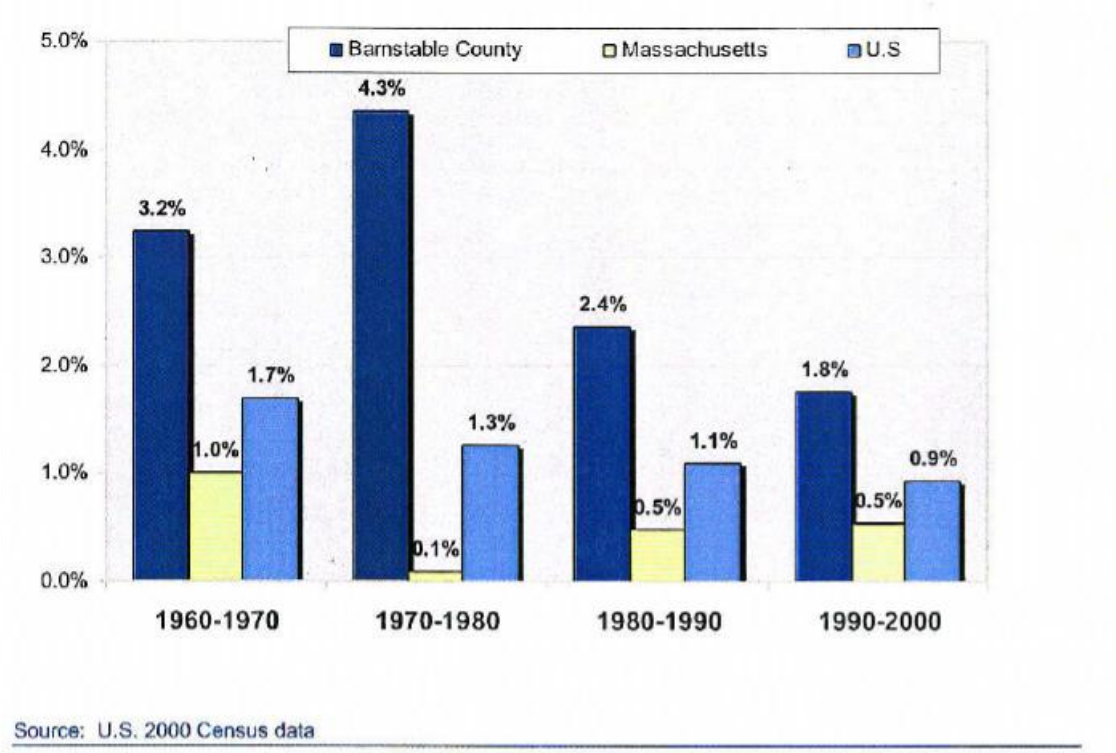


Figure 4-3: Average Annual Population Growth by Decade for Barnstable County, Massachusetts and the U.S.

An examination of the age distribution among Barnstable County residents indicates a higher concentration of older residents as a percentage of the overall population than either Nantucket or Massachusetts. Almost 35% of the county's population is 55 and older, compared to Nantucket and the State as a whole, with only 20% and 22% respectively, of the population over 55. Cape Cod's age distribution reflects the region's attractiveness as a desirable place to retire.

Another influential factor that affects demand for air service demand revolves around income levels. The Personal Income per Capita of Barnstable County increased steadily from 1990 to 2000 with an annual average growth of 1.9% which is consistent with the U.S. national average. As shown in **Figure 4-4** estimated income growth in Barnstable County will continue to outpace Massachusetts and U.S. from 2000 to 2010. Between

2010 and 2030, Barnstable County is forecast to have an income growth rate similar to Massachusetts and the U.S.

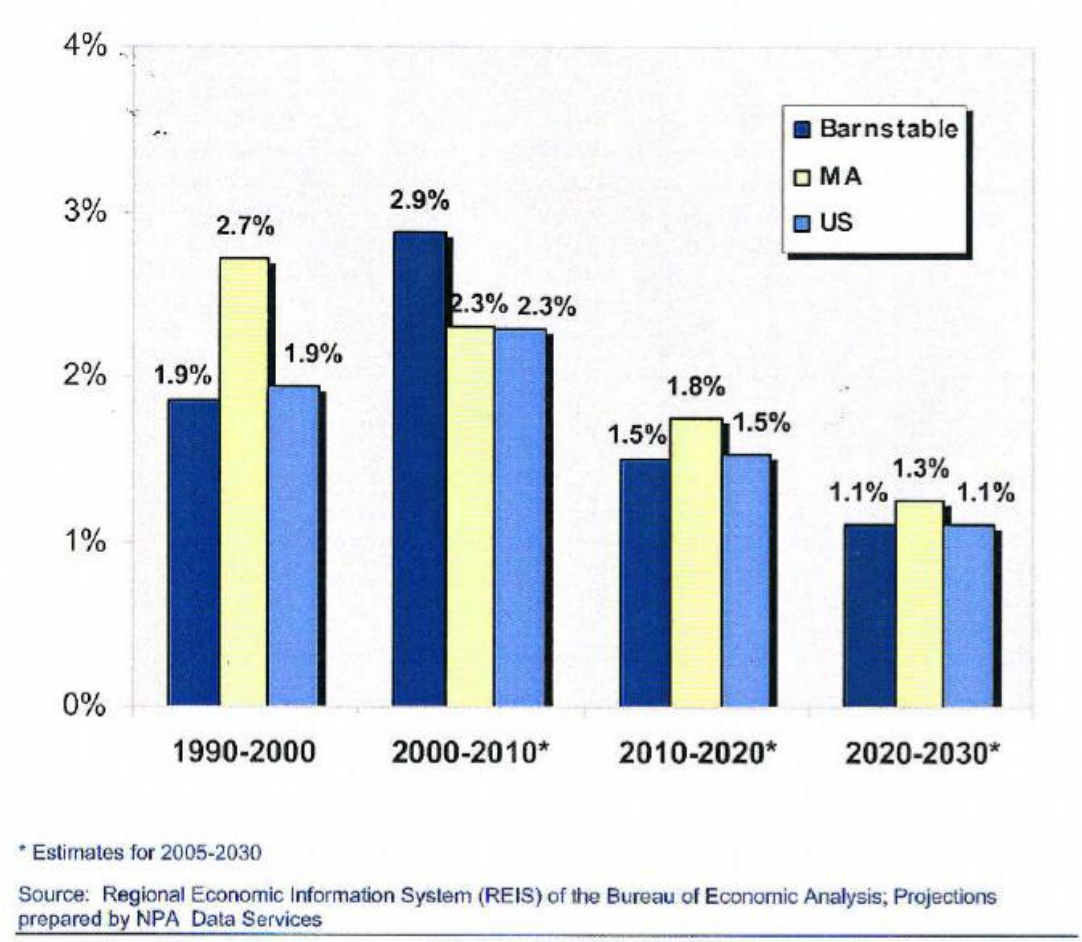


Figure 4-4: Average Annual Increases in Personal Income Per Capita for 1995 to 2030

A review of Cape Cod's existing population trends, income growth history of future socio-demographics, suggests that the region will continue to grow at a similar pace as the state of Massachusetts and at a slightly faster rate than the U.S. national average. Although no major spikes in population or income are expected, the Airport will likely experience modest, yet consistent, growth of airline service.

4.3.2 Nantucket Overview

Similar to Cape Cod, Nantucket has also experienced population and income growth over the last several years, demonstrating the continuing allure of the Island. Nantucket's population growth rate lagged behind Barnstable's growth rate until 1990, however, over the last decade, full-time resident growth on Nantucket has surged to on average 4.7% each year. Furthermore, Nantucket has an estimated four times the number of summer residents as it does during the rest of the year, showing the highly seasonal nature of the Island. Income growth in Nantucket is estimated to grow significantly this decade at 3.6%

outpacing the 2.9% estimated increase in Barnstable. However, the Personal Income per Capita for Nantucket will slow in later years to a level similar to Barnstable, the state of Massachusetts and the U.S national average.

4.4 Twenty-Year Passenger Forecasts

4.4.1 Introduction

The Nantucket market accounts for 80 to 90 percent of travel for HYA passengers. The Airport competes directly with the Steamship Authority to capture the Nantucket market. Over the last ten years, passengers traveling by air have comprised between 20% to 30% of the total Hyannis and Nantucket travel market, which has grown one percent annually since 1995. Total ferry traffic has increased only marginally over the last ten years, at a rate of growth of only 0.4% each year. However, the mix of ferry use has changed over this period. The Steamship Authority's share of the market has declined while Hy-line has increased.

Historically the Nantucket market grew at an annual rate of 2.2% from 1990 to 2005, illustrating a robust market. During the five-year period from 1995 to 2000, the Nantucket market grew even faster at 2.5%. During 2005 and 2006, the market grew by 4.3%. Based on these positive trends, an average annual rate of 3.5% growth is forecast for enplanements between 2005 to 2010. After 2010, the forecast is for the market to taper off to 2.2% average growth rate for 2010 to 2025. These assumptions result in overall growth rate of 2.5% each year for 2005 to 2025 for the Nantucket market.

Barnstable's secondary market currently consists of traffic to Boston, LaGuardia, Martha's Vineyard, and Providence. Currently the Airport's only service comes from turbo props to LaGuardia and Boston rather that by regional jets. Although there is no guarantee of continued service given recent changes in the essential air service provisions, it is assumed that Hyannis will continue to have flights to these secondary markets.

4.4.2 Low Scenario

Low, High and Medium Growth Scenarios have been prepared to create a range of forecasts that should bracket future variables in regional market conditions. A "Low" scenario could occur if an additional high speed ferry was added between Hyannis and Nantucket, or if an existing carrier stopped servicing Barnstable. Under the Low Growth scenario, below, the secondary market segment is assumed to experience only limited growth. Therefore, enplanements are forecast to grow by an average of one percent annually over the forecast period. Over the next two decades, under the Low Growth Scenario service at the Airport will become even more concentrated towards HYA-ACK. The assumptions used in the "Low" scenario are as follows:

- The overall Nantucket market, both air and ferry, would grow at one percent and enplanements from HYA to ACK would increase on average 1.5% each year for the next five years and one percent from 2010 to 2025.
- The secondary market from HYA is estimated to grow at 0.5%.

- Commercial operations would grow at two percent for the HYA-ACK market for five years and one percent from 2010 to 2025. For the HYA – secondary markets, the estimate would be 0.5% on average for the next twenty years.
- GA growth would be reduced to zero percent and all other operations would remain at zero percent growth.

Airport	Code	Annual Percentage Change in Enplanements 1995-2000	2000-2005
Groton	GON	-8.1%	-55.1%
New Haven	HVN	-19.3%	1.3%
Worcester	ORH	4.1%	-51.6%
Portsmouth	PSM	24.5%	-18.8%
Provincetown	PVC	5.2%	-7.5%
New Bedford	EWB	3.1%	-7.0%
Barnstable	HYA	4.7%	-3.4%

Source: FAA – Terminal Area Forecast

FIGURE 4-5: Low Case Scenario – HYA Operations Forecast (2005-2025)

4.4.3 High Scenario

A "High" Scenario could occur if a new additional carrier began servicing Barnstable, such as identified in the NERASP report or in the InterVISTAS Study, as reported in Chapters 2.0 and 3.0, above. The assumption is that HYA would not capture all of the Cape Cod traffic, but could service an increasing share of the domestic demand. The "High" Scenario has the following assumptions:

- Enplanements from HYA to ACK would increase 4.3% each year until 2010 and then the growth rate would be 2.7% each year, for an overall growth rate of 3.1% from 2005 to 2025.
- The secondary market from HYA is estimated to grow at a modest two percent, as more of the Cape Cod domestic traffic is attracted by new service from HYA.
- Commercial operations would grow at 3.5% for the HYA-ACK market from 2005 to 2010 and 3.0% thereafter until 2025. The non-ACK market would increase 1.5% on average for the next twenty years, which is a conservative capture rate for Cape Cod's total domestic air service demand.
- GA Growth would average three percent over the forecast periods, with and all other operations remaining with no growth.

	Total Enplanements	HYA-ACK Comm Ops	Non-ACK Comm Ops	Commercial Operations	Load Factor	GA Operations	All Other	Total Operations
1995	167,952	45,573	23,477	69,050	4.9	35,155	12,795	117,000
2000	211,557	75,143	23,083	98,226	4.3	28,074	9,700	136,000
2005	177,699	69,381	16,275	85,656	4.1	24,384	7,960	118,000
2006	185,076	71,810	16,519	88,328	4.2	25,116	7,960	121,404
2007	192,765	74,323	16,767	91,090	4.2	25,869	7,960	124,919
2008	200,779	76,924	17,018	93,942	4.3	26,645	7,960	128,547
2009	209,132	79,617	17,273	96,890	4.3	27,444	7,960	132,294
2010	217,839	82,403	17,532	99,936	4.4	28,268	7,960	136,163
2011	223,632	84,875	17,795	102,671	4.4	29,116	7,960	139,747
2012	229,579	87,422	18,062	105,484	4.4	29,989	7,960	143,433
2013	235,686	90,044	18,333	108,378	4.3	30,889	7,960	147,226
2014	241,955	92,746	18,608	111,354	4.3	31,816	7,960	151,129
2015	248,392	95,528	18,887	114,415	4.3	32,770	7,960	155,145
2016	255,000	98,394	19,171	117,565	4.3	33,753	7,960	159,278
2017	261,785	101,346	19,458	120,804	4.3	34,766	7,960	163,530
2018	268,751	104,386	19,750	124,136	4.3	35,809	7,960	167,905
2019	275,904	107,518	20,046	127,564	4.3	36,883	7,960	172,407
2020	283,247	110,743	20,347	131,090	4.3	37,989	7,960	177,040
2021	290,787	114,065	20,652	134,718	4.3	39,129	7,960	181,807
2022	298,527	117,487	20,962	138,449	4.3	40,303	7,960	186,712
2023	306,475	121,012	21,276	142,289	4.3	41,512	7,960	191,761
2024	314,635	124,642	21,596	146,238	4.3	42,757	7,960	196,956
2025	323,013	128,382	21,920	150,301	4.3	44,040	7,960	202,301
Average Annual Growth Rates								
1995-2005	0.6%	4.3%	-3.6%	2.2%	-1.6%	-3.6%	-4.6%	0.1%
2005-2015	3.4%	3.2%	1.5%	2.9%	0.5%	3.0%	0.0%	2.8%
2015-2025	2.7%	3.0%	1.5%	2.8%	-0.1%	3.0%	0.0%	2.7%
2005-2025	3.0%	3.1%	1.5%	2.9%	0.2%	3.0%	0.0%	2.7%

Source: SH&E Forecast

FIGURE 4-6: High Case Scenario – HYA Operations (2005-2025)

4.4.4 Medium Growth Scenario

A "Medium" Growth scenario was developed to split the low and high scenarios, assuming a mix of factors that balance the ACK growth and assume a more modest increase in other markets, as predicted in the NERASP Report. This medium scenario assumes continued model split with the ferry service in the ACK market, based upon the historical trends of the Steamship Authority and Hy-Line Cruise ferries form Hyannis to Nantucket. The ferry data was used to size the total transportation market and also the mix between air service and ferry service. The assumptions affecting the Nantucket market are:

- The Hyannis – Nantucket (both air and ferry) market have increased an average 1.0% per year for the last ten years. However, over the last five years a decline of 0.5% occurred.
- The portion of the total market handled by air was 23% in 1995 and reached a peak of 29% in 2000, which is the same year the new high-speed ferries were introduced. After declining in 2001, the 2002 share became 27% and has slowly been increasing since 2003.

- The total Hyannis to Nantucket travel market is projected to increase 2.0% each year over the next twenty years given the Island's strong socioeconomic trends and continued attractiveness as a tourist and summer home destination.
- The air portion of this market is forecast to grow at an average annual rate of 3.5% for the period from 2005 to 2010, based on historic aviation trends for HYA, and projected socioeconomic trends over the next five years.
- Long-term growth rate is forecast to grow at 2.2% from 2010 to 2025, as Nantucket's population and income growth slows to match Barnstable's and Massachusetts'.
- The air portion of the Nantucket travel market is assumed to stay within a range of between 27% and 30% over the forecast period.

Other markets from HYA will continue to include Boston, New York City, Martha's Vineyard and Providence, and additional markets will be added as regional demand grows.

- Other markets encompass 6% of Barnstable's 2005 enplanements. Under the Medium Growth Scenario, this is assumed to grow more modestly over the 20-year period
- The share of passengers traveling to HYA's second market segment had been consistently declining as a percentage of Barnstable's total enplanements.
- Passengers from HYA to all other markets had dropped an average of 11.7% each year for the previous decade, however, enplanements have shown some increase over the past two years, indicating the stabilization of this market segment.
- The FAA's Terminal Area Forecast predicts a one percent enplanement growth at the airport over the next twenty years.
- Based on the slowing decline in enplaned passengers to secondary markets and the overall trend of enplanements at HYA, growth in the secondary regional market is assumed to be consistent with FAA projections over the forecast period.

Given these assumptions the Medium Growth Scenario for enplaned passengers at HYA is forecast to be an average of 2.4% for the next twenty years (**Figure 4-7**).

The combined High-Low Scenarios have been charted with HYA's historic enplanements on **Figure 4-8**, below, to provide a comparison of the historic trends and the modest growth assumptions reflected in these forecasts.

	Total Enplanements	HYA-ACK Comm Ops	Non-ACK Comm Ops	Commercial Operations	GA Operations	All Other	Total Operations
1995	167,952	45,573	23,477	69,050	35,155	12,795	117,000
2000	211,557	75,143	23,083	98,226	28,074	9,700	136,000
2005	177,699	69,381	16,275	85,656	24,384	7,960	118,000
2006	183,631	71,463	16,437	87,900	24,628	7,960	120,488
2007	189,768	73,607	16,602	90,208	24,874	7,960	123,043
2008	196,118	75,815	16,768	92,583	25,123	7,960	125,666
2009	202,686	78,089	16,935	95,025	25,374	7,960	128,359
2010	209,481	80,432	17,105	97,537	25,628	7,960	131,125
2011	213,945	82,202	17,276	99,477	25,884	7,960	133,321
2012	218,505	84,010	17,449	101,459	26,143	7,960	135,562
2013	223,165	85,858	17,623	103,481	26,404	7,960	137,846
2014	227,925	87,747	17,799	105,546	26,668	7,960	140,175
2015	232,789	89,677	17,977	107,655	26,935	7,960	142,550
2016	237,758	91,650	18,157	109,807	27,204	7,960	144,972
2017	242,835	93,667	18,339	112,005	27,477	7,960	147,442
2018	248,022	95,727	18,522	114,249	27,751	7,960	149,961
2019	253,321	97,833	18,707	116,541	28,029	7,960	152,529
2020	258,736	99,986	18,894	118,880	28,309	7,960	155,149
2021	264,268	102,185	19,083	121,269	28,592	7,960	157,821
2022	269,921	104,433	19,274	123,708	28,878	7,960	160,546
2023	275,696	106,731	19,467	126,198	29,167	7,960	163,325
2024	281,596	109,079	19,662	128,741	29,459	7,960	166,159
2025	287,625	111,479	19,858	131,337	29,753	7,960	169,050
Average Annual Growth Rates							
1995-2005	0.6%	4.3%	-3.6%	2.2%	-3.6%	-4.6%	0.1%
2005-2015	2.7%	2.6%	1.0%	2.3%	1.0%	0.0%	1.9%
2015-2025	2.1%	2.2%	1.0%	2.0%	1.0%	0.0%	1.7%
2005-2025	2.4%	2.4%	1.0%	2.2%	1.0%	0.0%	1.8%

Source: SH&E Forecast

FIGURE 4-7: Forecasts for HYA Operations (2005-2025)

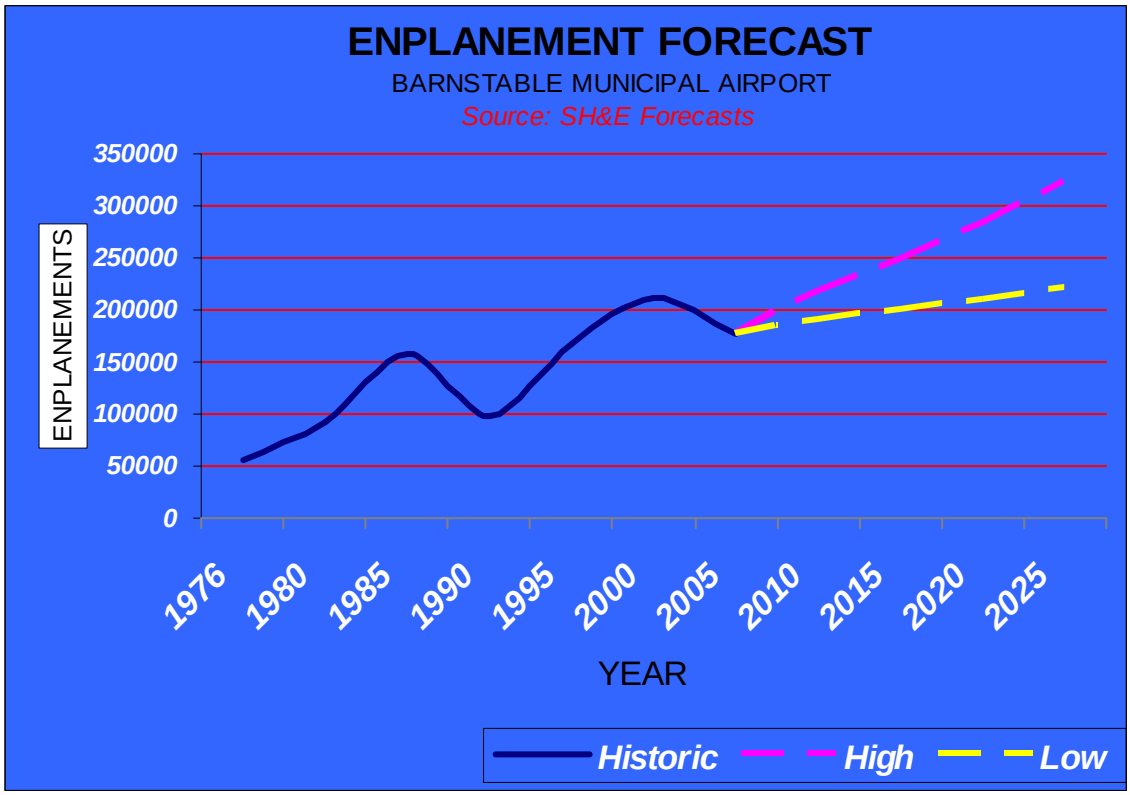


FIGURE 4-8: HYA Historic Enplanements with High-Low Scenarios (1976-2025)

5.0 GENERAL AVIATION FORECASTS

5.1 Introduction

The last in-depth analysis of general aviation (GA) activity, including corporate aviation, at Barnstable Municipal Airport (HYA) was undertaken in the 1980 Airport Master Plan Update. Since that time, forecasts of commercial passenger activity have been conducted as part of the ongoing passenger terminal building spatial needs studies, as well as financial programming efforts for the terminal. However, the GA activity forecast is now more than 27 years old, and is being reexamined for recent growth patterns and revised facility needs. The fleet of corporate jets has changed over time with newer, quieter and more efficient jets flying to more destinations, many overseas (see **Figure 5-1**).

Barnstable Airport currently supports over 30,000 annual GA operations. This level of GA activity is one third of the GA operations that the Airport had serviced in the past. This trend is typical for New England airports, and has implications for how GA operations have evolved at HYA since the 1970's. Previously, GA operations had consisted primarily of flight training and recreational use, whereas now they have shifted to primarily corporate and business use. This is similar to changes that have been occurring in the GA industry on the regional, statewide, and national levels. This pattern is reflected in an increase in the percentage of GA itinerant operations, as recorded in Barnstable Airport's Master Records (FAA Form 5010).

Figure 5-1 – Corporate Jets, HYA East Ramp

A large share of GA traffic, particularly during the peak season, is generated by corporate jets. Operations data recorded by the airport during the month of August 2007 tallied 966 corporate aircraft at HYA, which generated 1,932 operations. Of those, 116 jets (12%)

were classified as large aircraft, including Gulfstream G-4, G-5, G-550, Canadair Global Challenger and CL-600s, Falcons, and Cessna Citation X, which generated 232 operations. All of the corporate aircraft combined generated an estimated 28% of all G.A. itinerant operations at HYA.

In addition, there were a number of operations by mid-sized corporate jets, such as the Citation II/III/V/XL, Lear 31/36/45/60, Beech Jets, Westwind, Astra, and Hawkers. Turboprops included Beech King Air 200/300/350, Cessna Caravans, Pilatus PC-12, Piper Meridian, TBM-700, Mitsubishi MU-2, etc. Such aircraft require a significant amount of ramp space for transient parking, and typically park from one hour or less, to a weekend or longer. Such aircraft power-in and power-out of parking positions, which requires adequate separation between parking positions and taxilanes in order to maintain operational safety margins.

Annual GA operations at HYA, as a percentage of total aircraft operations, have been increasing each year over the past 26 years. Since 1981, when GA dipped to 60% of total activity, GA has steadily climbed to become more than 80% of HYA's total activity (see **Figure 5-2**). Therefore, both the number and size of GA traffic is increasing which have important implications for facility planning at Barnstable.

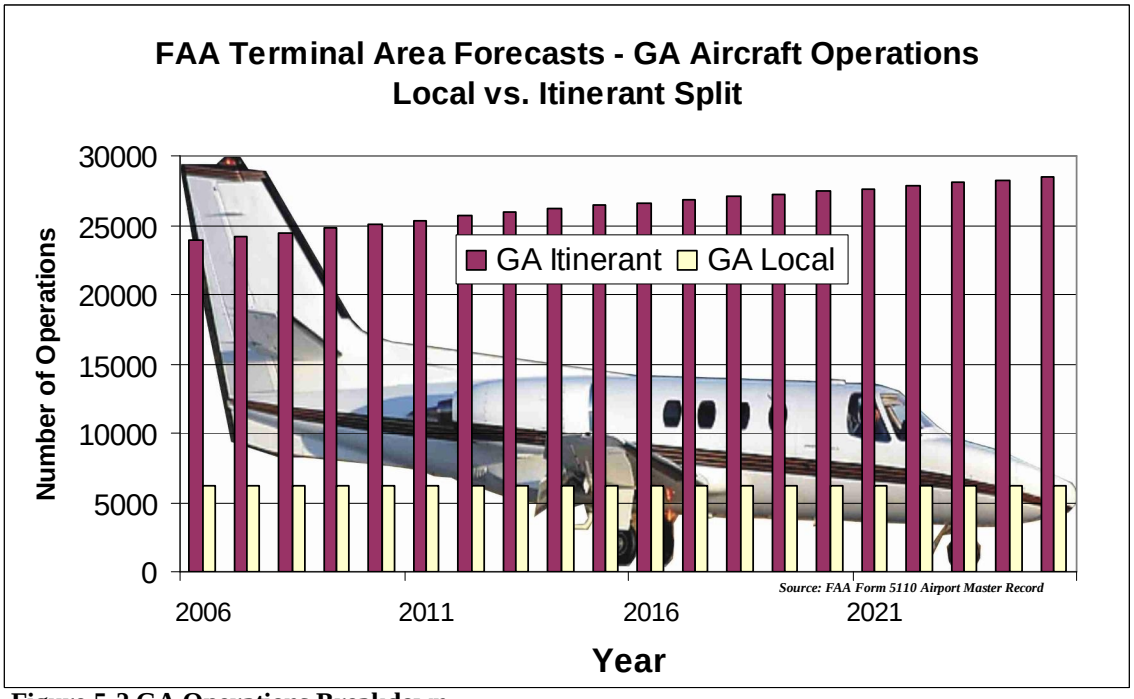


Figure 5-2 GA Operations Breakdown

5.2 Industry Trends

The G.A. industry is a combination of many different sectors, most of which respond to different economic and demand factors. For example, corporate aircraft encompass primarily (although not exclusively) turbine powered aircraft that are used for both business and discretionary travel, and that are privately owned (operated under FAR Part 91), as well as those that are owned and operated by fractional companies, and those that are chartered commercially by air taxi companies under FAR Part 135. Corporate aircraft activity nationally, regionally, and locally has been growing rapidly in the last 10 years, even as Jet A fuel retail prices have risen to almost record levels.

The economic indicators that show the closest correlation to corporate jet activity are the stock market and corporate profits, which until late 2007 were rising steadily. Since the summer of 2007, however, the stock market has been increasingly volatile, corporate profits have been declining, lending institutions have greatly tightened credit requirements, overall consumer spending has been declining, and the economy showed no growth in the 4Q 2007. If those trends continue through 2008, combined with rising fuel prices, it is possible that corporate aviation activity could decline both nationally and locally.

The Federal Reserve is predicting that the economy will turn around and experience growth in 2009, indicating that the current slowdown will be of relatively short duration. If that is the case, corporate aircraft activity will likely increase as the economy, specifically the stock market and corporate profits, resume their growth mode. Strong economic indicators over the last several years have indicated that corporate traffic can grow in spite of rising fuel prices.

The General Aviation Manufacturer's Association (GAMA) is an industry trade association comprised of the manufacturers of GA aircraft and equipment. GAMA reports and tracks the shipments and billings of GA aircraft from member companies, which provides a gauge as to the health of the industry. The latest report by GAMA showed a marked increase in the shipments and billings of GA aircraft over 2005. Total shipments for 2006 were more than 12 percent over the 2005 total. Total billings increased by over 24 percent for the same period.

It is clear from the information provided through the GA aircraft shipment and billing reports that the demand for general aviation products is strong and is once again on the rise. This provides strength to the argument that GA operations will increase nationally, especially in markets such as the northeastern region where aviation remains a strong form of alternative transportation.

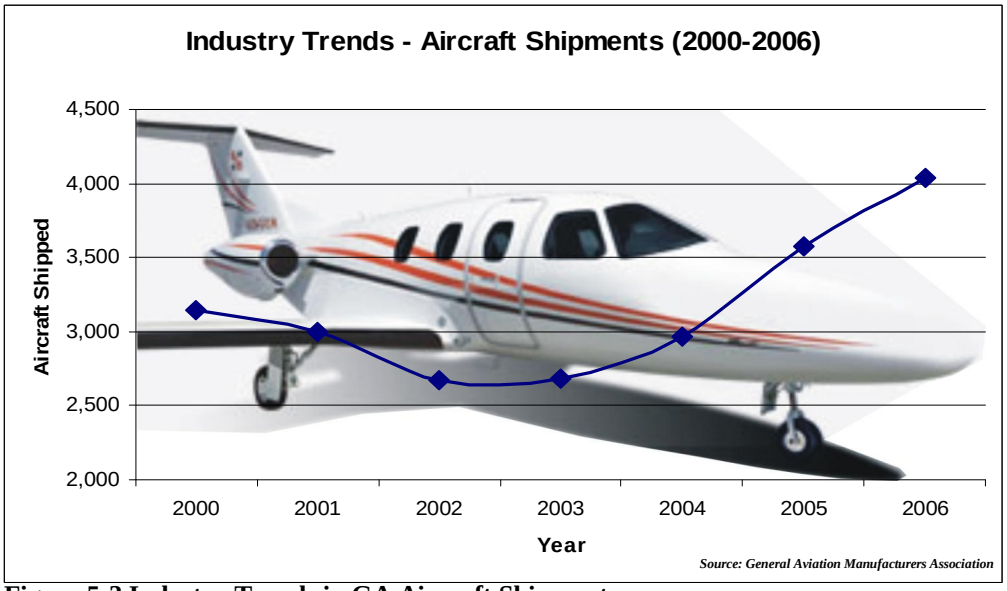


Figure 5-3 Industry Trends in GA Aircraft Shipments

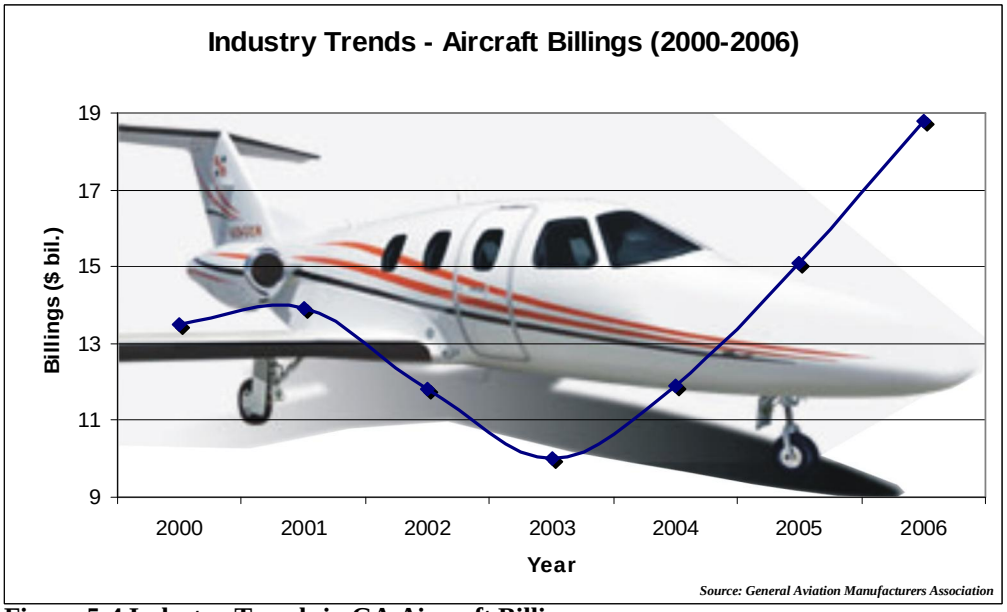


Figure 5-4 Industry Trends in GA Aircraft Billings

Smaller piston-engine GA aircraft owners, on the other hand, are much more price sensitive, and piston-engine activity has declined as fuel prices have risen. In addition, the rising cost of new GA aircraft and equipment has significantly outpaced inflation, further dampening activity by piston-engine airplanes. Analysts predict that fuel prices will continue to rise for the foreseeable future, and it is likely that the cost of new aircraft and equipment will continue to rise rapidly as well. For example, a new 2008 Cessna 172, a four-seat, single piston engine aircraft, presently retails at approximately $270,000. The average age of a GA airplane in the U.S. is almost 30 years old, and fewer owners are

able to afford the cost of replacing their airplane, at the same time maintenance and fuel costs are rising.

Other factors that could significantly impact GA piston-engine activity in the future include:

- Loss of 100LL avgas. It is one of the last leaded fuels allowed by EPA in the U.S., and oil companies have indicated they want to stop producing 100LL. They produce and sell 100LL in relatively small volumes (i.e. it is a 'boutique' fuel), it is expensive to produce, and they have high liability exposure. Oil companies have been urging aircraft and engine manufacturers to switch to engines that use Jet A, and Cessna just announced that the C-172 will be offered with a new engine that runs on Jet A. If the oil companies stop producing 100LL (as they have done with 130 and 80 octane fuel in years past), then approximately 200,000 GA airplanes will be grounded unless they can be re-engined. However, new engines are expensive, and new engines have not been certified for all GA airplanes yet. Some smaller GA airplanes have used high-octane auto fuel, however, the widespread and growing use of ethanol in auto fuel prevents its use in GA aircraft.

- Increased airport and airspace security restrictions. The implementation of the ADIZ and the subsequent access restrictions around Washington DC after 9/11 effectively closed three general aviation airports, stopped all GA flights into Washington Regan National Airport, and severely curtailed GA activity throughout the region. Congress has regularly called for greater oversight and regulation of GA activity, including corporate aircraft, and TSA has examined new airport security regulations for GA airports. According to US Today in March 2008, Michael Chertoff, Director of the Department of Homeland Security, announced that TSA is actively examining new regulations for corporate aircraft:

> Chertoff's department is about to issue requirements for crews and passengers of private jets to provide their names, birth dates and other information an hour before takeoff, so they can be checked against terrorist watch lists.
>
> The next step could be requiring that private jets be scanned and passengers screened by U.S. Customs agents overseas, Chertoff said. The procedures might be "a little inconvenient," he said, but if a bomb got into the USA on a private jet, there would be calls to "shut all private aviation off."

If new airspace access restrictions are imposed, as well as additional airport security procedures, it is likely that GA activity will decline, although it is difficult to quantify the specific impact. A major factor in the popularity of GA, particularly corporate aviation, is convenience, and if that is compromised by new security regulations then demand will decline.

Changes to current airspace and airport security procedures for GA aircraft will likely be incremental, unless another threat or terrorist attack occurs, in which case new security

procedures could be significant, imposed suddenly, be widespread, and long lasting. Of course there is historical precedence for such actions; immediately after the attack on Pearl Harbor in December 1941, all GA activity in the U.S. was grounded for months. Under a worst-case scenario, therefore, GA activity could be significantly curtailed in the future.

5.3 Low Growth Projections

The FAA's Terminal Area Forecast (TAF) provides an annual update to historic aircraft operations and provides a forecast to flight operations data. The TAF segregates these operations by local and itinerant operations, as well as by general aviation, air taxi, commuter, air carrier and military operations. Instrument operations and based aircraft counts are also provided for each airport. The TAF projections can be found in the following FAA website address; *http://www.apo.data.faa.gov/faatafall.htm*. The latest TAF runs from 2006 (estimated) through the year 2025. Airport management, airport operations, and Air Traffic Control (ATC) personnel usually provide the operations data to the FAA annually, by supplying data through FAA Airport Master Record - Form 5010. The data is then input into the FAA's national database for public query at the above website address. The FAA has issued the Terminal Area Forecasts through 2025, and therefore, one must extrapolate the final year 2026 for projection comparison purposes in this document.

Historically, the TAF projections of GA operations have leaned toward the very conservative side of projections. TAF projections are performed on a national basis, and therefore, local factors are not included in their projection database. FAA policy requires an airport justify their projections if they are ten percent higher than the TAF projections over a ten year projection period, or fifteen percent higher than the TAF projections over the twenty-year planning period.

The TAF reflects the historical decline in GA operations and therefore projects that Barnstable Airport would continue with its current small percentage of local GA operations. The TAF projects an average annual growth rate in non-military GA operations of 0.75% through the year 2025. This projection assumes that GA itinerant operations will increase at an average annual rate of 0.93%. GA itinerant operations are projected to increase at an annual rate of 1.17% through the year 2014, followed by a 0.74% annual rate increase for the remaining eleven projected years. GA local operations are not anticipated to increase during the twenty-year planning period. These annual growth rates are depicted in **Figure 5-5**.

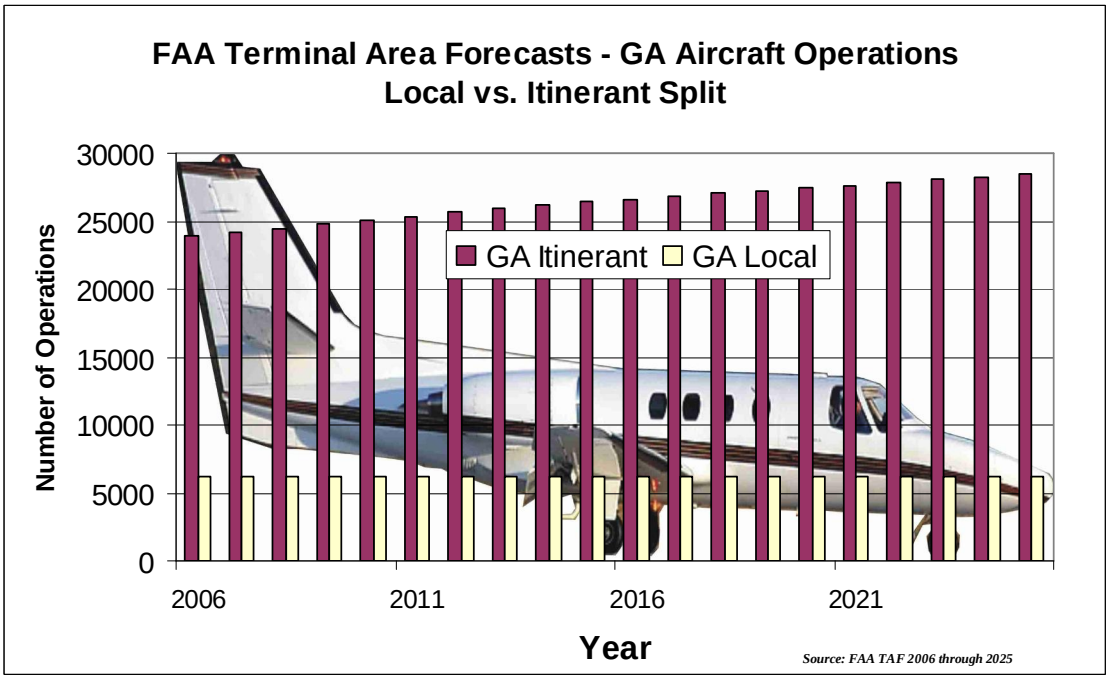


Figure 5-5 TAF Projected Low-Growth Rates for GA Activity at HYA

The most recent TAF lists the annual non-military GA aircraft operations for the Airport at 30,079. The TAF predicts that GA operations will increase from 30,079 to 34,863, an increase of 4,784 operations over the twenty-year planning period. This includes itinerant GA operations, which would increase from 23,900 to 28,684, while local operations would remain at a constant 6,179 throughout the twenty-year planning period.

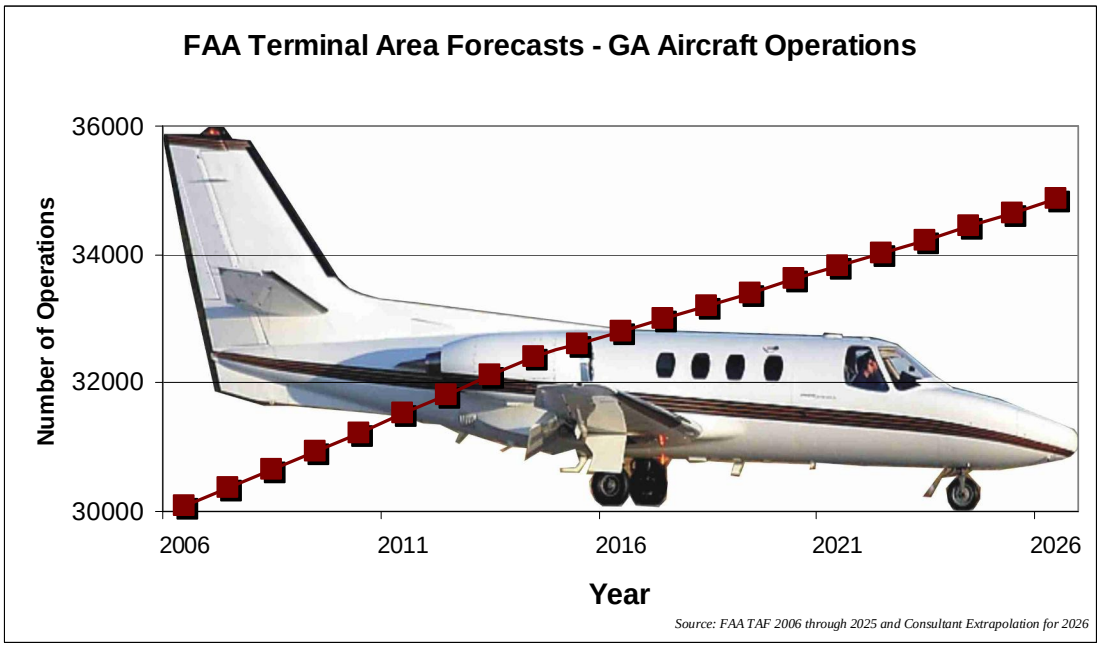


Figure 5-6 TAF Low-Growth Projections of GA Operations at HYA

The TAF does not identify changes in the types aircraft operating within the GA community. Barnstable Airport has seen a substantial increase in larger corporate aircraft, rather than in smaller recreational aircraft. A significant number of GA itinerant operations include the business and corporate aviation sector. Therefore, although the number of GA operations has increased only slightly, the relative percentage of operations by larger corporate aircraft has grown significantly. This has important implications for the facility needs to house these aircraft. The size of hangars and the types of service required for between a small, single-engine piston differs greatly from those needed to support a twin-turbofan corporate jet. This factor is reflected in the recent construction of a jet aviation support facility at HYA by Rectrix aviation, and is considered in the Facility Needs chapter.

There are 72 aircraft currently based at HYA. The FAA TAF projects based aircraft to increase at an average annual rate of 1.42% through the year 2025. The TAF shows the existing 72 based aircraft increasing to 96 aircraft during the twenty-year planning period. This Low-Growth forecast results in an increase of 23 additional aircraft based at the Airport within the twenty year planning period, as shown in **Figure 5-7**.

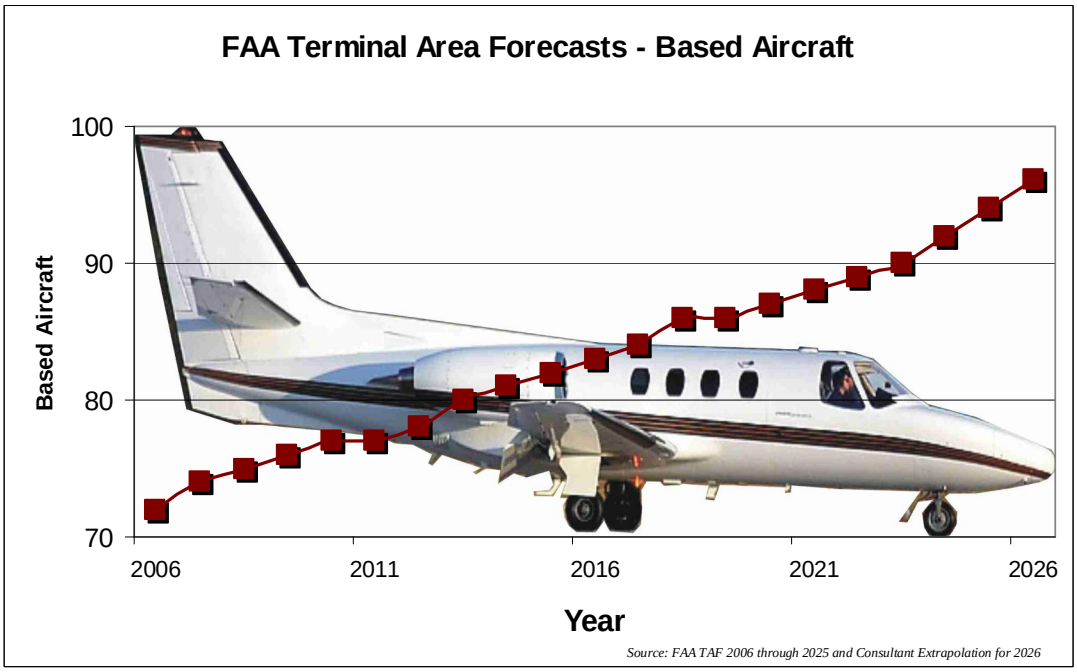


Figure 5-7 TAF Low-Growth Projections of Based Aircraft at HYA

The FAA TAF projections are considered a baseline for all other projections of airport operations. As stated earlier in this section, alternative projections developed to account for local conditions should either be within fifteen percent of the TAF projections for the twenty-year planning period, or the Airport should clearly state why the TAF projections are inadequate for the Master planning purposes. The following two sections postulate a

Mid-Growth and a High-Growth scenario as alternatives to the FAA TAF Low-Growth forecast described above.

5.4 Mid-Growth Projections

Numerous studies have been commissioned by various sectors of the aviation industry to examine socioeconomic trends and their causes which influence aviation activity. Of specific interest to airport master plan forecasting are the local and regional trends in population and employment. They illustrate an area's propensity to demand various types of aviation services, such as scheduled passenger service, business aircraft activity, or private aviation. National, regional, and local trends are discussed below with regard to these socioeconomic forecasting elements within the Cape Cod region.

The University of Massachusetts prepares a program for the State of Massachusetts called the Massachusetts Institute for Social and Economic Research (MISER) program. This program runs multiple scenarios of the area demographic trends and prepares projections of socioeconomic data for the state. Analysis of the Barnstable area shows projections that the median age of the population will lower through attrition. A decrease in age would provide a more suitable population for air travel and recreational flying.

In 2004, the national labor force participation rate shows 66 percent of the workforce population. In 2004, the Massachusetts Department of Workforce Development shows Massachusetts as ranked 18th in nation, with a 67.5% labor force participation rate. Nationally, unemployment had *increased* 0.3% from 4.4% to 4.7% during the calendar year from October 2006 to October 2007. During the same period, Barnstable County unemployment *decreased* 0.5% from 4.1% to 3.6%, counter to national trends.

The U.S. Census Bureau projects national employment to increase at an annual rate of 0.85 percent, which is down from the previous decade's annual increase of 1.1%. Statewide employment is projected to increase at a lower average annual rate of 0.74% annually. The employment trend is showing a shift from the manufacturing sector to the service sector, which is susceptible to seasonal fluctuations.

A unique local service sector employment opportunity is created by the Cape and Island's strong second home construction and renovation activity, which has been supported primarily by investments from outside the region. This high-end construction and renovation activity has been sustained through swings in the national economy and cycles in the stock market, as evidenced in continued issuance of building permits by Cape and Island towns. This summer resort tradition of high-end second home use by more affluent members of society generates, in turn, the need for efficient aviation access by owners and guests. This is reflected in the increasing mix of private and corporate jets, as well as more sophisticated Technologically Advanced Aircraft (TAA), in the transient and based fleet at HYA.

Cape Cod is unique both in terms of its population base and employment trends. In the spring of 2006, the Cape Cod Commission (CCC) prepared a research document, *Cape Trends*, illustrating the socioeconomic trends that have occurred on Cape Cod. During the fourteen years between 1990 and 2004, the population on Cape Cod has increased by 23%, surpassing both Massachusetts and the national growth rates. Economically, Cape Cod has benefited by employment growth rates which surpass even the unusually high population growth:

- 29% job growth rate
- 31% employer establishment growth rate
- 27% growth in employed Cape Cod residents
- 21% growth in job wages in Barnstable County

In addition to these positive trends occurring on Cape Cod, the document also notes that 12.5% of workers are self-employed, more than twice the share found statewide and nationally. The Cape has seen a decrease in unemployment and an increase in the work force. Job concentration is predominantly retail, accommodation and food service, and health care/social assistance, consistent with tourism and retirement communities. Cape residents enjoy higher incomes per capita than both the state and nation.

The Cape's 4.6% housing growth rate between 2000 and 2005 was higher than all twelve Massachusetts mainland county growth rates, and almost twice the state's 2.5% growth rate. Barnstable County was the only county in Massachusetts with an increase in single-family home sales for the first half of 2007. During this period, the median price of homes in Barnstable County remained among the top third in Massachusetts, at $350,000.

Approximately 15% of the Cape's working residents traveled off-Cape to work, according to town level data from the US Census 2000. Almost 90% of these off-Cape workers were traveling to other locations within Massachusetts. Nearly 20% of these workers were traveling to Boston. A significant portion of Barnstable Airport's year-round enplanements are driven by local tradesmen who make the daily commute to Nantucket Island on HYA's Cessna 402 regional airlines. The Island employs many Cape Cod residents in the building trades who work in new construction and residential renovation on a year-round basis.

Cape Cod's lack of transportation alternatives, with high demands on the only primary access State highway (Route 6), and the lack of rail transportation, and limited access from the ferry system, puts unique requirements for aviation services. As more and more people opt for rural living, pushing further and further from service centers, the result is longer travel times and higher dependency on the transportation system. Reports by the U.S. Census Bureau indicate positive growth for the U.S. and the State of Massachusetts through 2020. Nationwide growth is expected to occur at .97 percent annually, while population in Massachusetts should increase by .42 percent annually, and Barnstable County is expected to increase at 1.6 percent annually. As population increases, so does

the demand on the transportation system. **Figure 5-8** shows the anticipated annual growth rates for population nationally, statewide, and countywide.

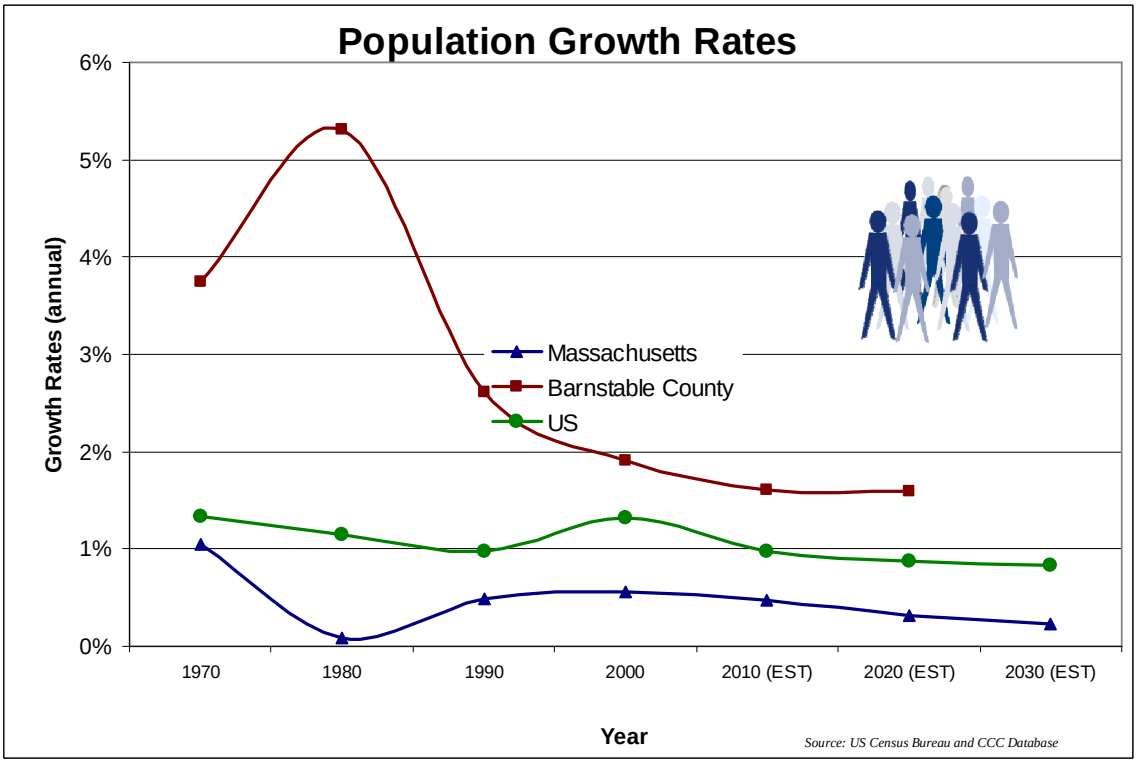


Figure 5-8 Population Growth Rates

Given the historical socioeconomic trends and the projections in population and employment, one could conclude that increased general aviation demand at the local level would support modest growth, somewhat higher than the TAF forecast of flat growth in local GA operations.

For purposes of socioeconomic forecast, a trend line developed from the range of employment projections will represent the GA aircraft Mid-Growth operations forecast. This ranges from the statewide employment growth forecast of a 0.74 percent annual rate to the national 0.85% annual rate, to a composite 1.74% rate that represents the Cape Cod region's population growth, positive employment rate, as well as continued strength in the Cape Cod housing market.

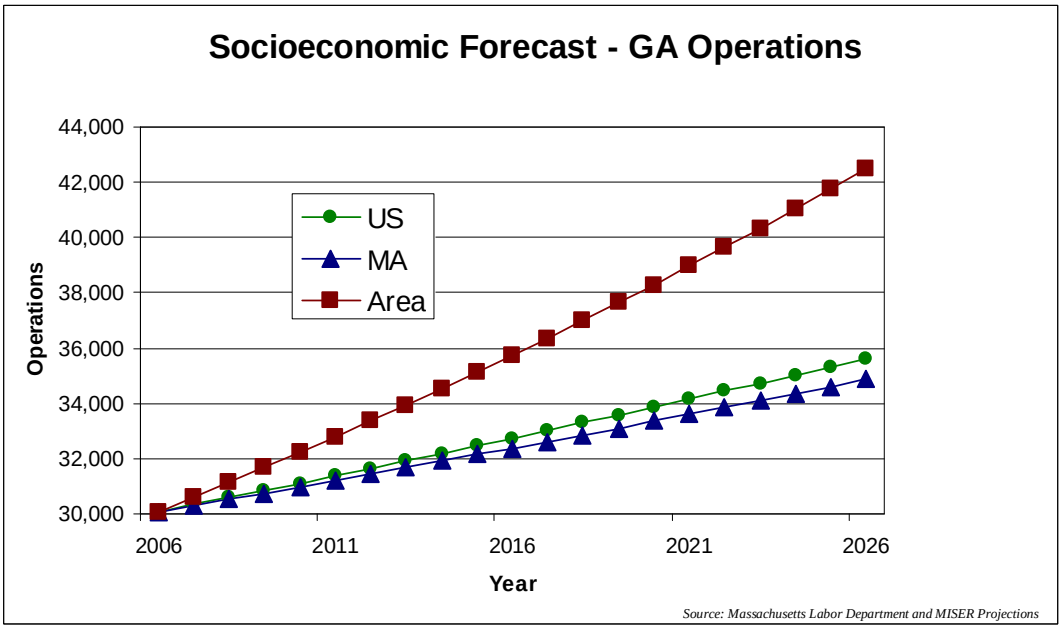


Figure 5-9 - Mid-Growth Projections of GA Operations at HYA

Typically, based aircraft vary with the area's population. Therefore, the based aircraft projections are based upon the projected 1.6 percent annual increase in population in Barnstable County. The Mid-Growth projections for based aircraft at HYA are shown in **Figure 5-10** on the following page. The projections of based aircraft are fairly consistent with the demand for hangar space occurring at the Airport. Recently, the Airport has seen the erection of three new hangars on the airfield, including Rectrix Aviation's major new corporate and private jet support center, as well as larger sized T-hangars.

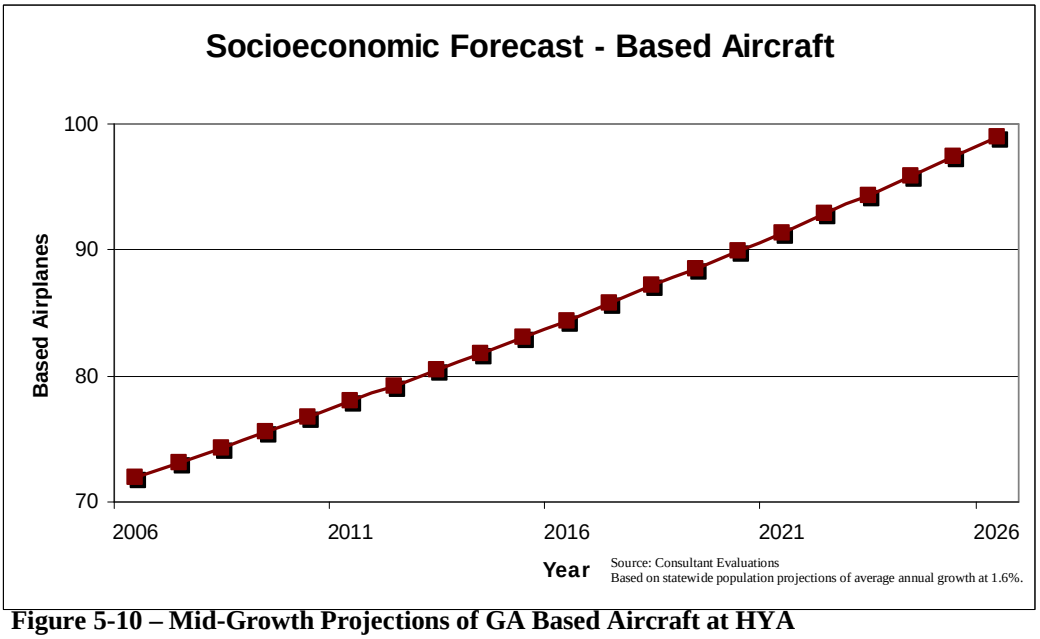


Figure 5-10 – Mid-Growth Projections of GA Based Aircraft at HYA

These socioeconomic based projections show the airport could expect an increase of more than 12,000 GA operations over the twenty-year planning period. Based aircraft could increase by 27, from 72 to 99, over the same time period. However, Barnstable County's primary aviation demand comes less from local activity, than from transient activity. That is, second-home summer residents, visitors, tourists and business people traveling in-and-out of the Cape Cod area. It is this type of activity that is expected to continue to account for the bulk of GA operations at Barnstable Airport. This type of transient activity has been historically increasing, and is better reflected in the FAA's National Aerospace Forecast, described below.

5.5 High Growth Projections

The FAA prepares an annual report on the metrics, trends and state of the aviation industry in their National Aerospace Forecasts. Included is a forecast of general aviation (GA) demand in terms of aircraft fleet size and hours flown. The forecast considers global and national economic indicators within the analysis of the aviation industry.

Projections for the general aviation segment of the industry are very favorable. The FAA points to a strong worldwide economy coupled with the expansion of business use of general aviation aircraft, the extension of bonus depreciation, the entry of Very Light Jets (VLJs) and an increase in shipments of GA aircraft as positive indicators of the future of general aviation. On the flip side, high fuel prices and the threat of terrorism pose substantial risk to the projected growth of GA.

The FAA projects the total active GA and air taxi fleet to grow at 1.4 percent annually from 2006 through 2020, with corporate jet aircraft experiencing the highest growth rate at 6.0 percent. Single-engine piston aircraft are expected to decrease at 0.2 percent annually. A portion of the high growth rate in the corporate jet segment can be attributed to the anticipated entry of the VLJ and increased use of business aircraft, such as the Cessna Citation II.

The FAA growth rates were applied to GA aircraft operations at the Barnstable Municipal Airport. GA aircraft operations were projected to increase at the annual growth rate relating to the active GA and air taxi hours flown FAA national projected rates. The results are shown below in **Figure 5-11**.

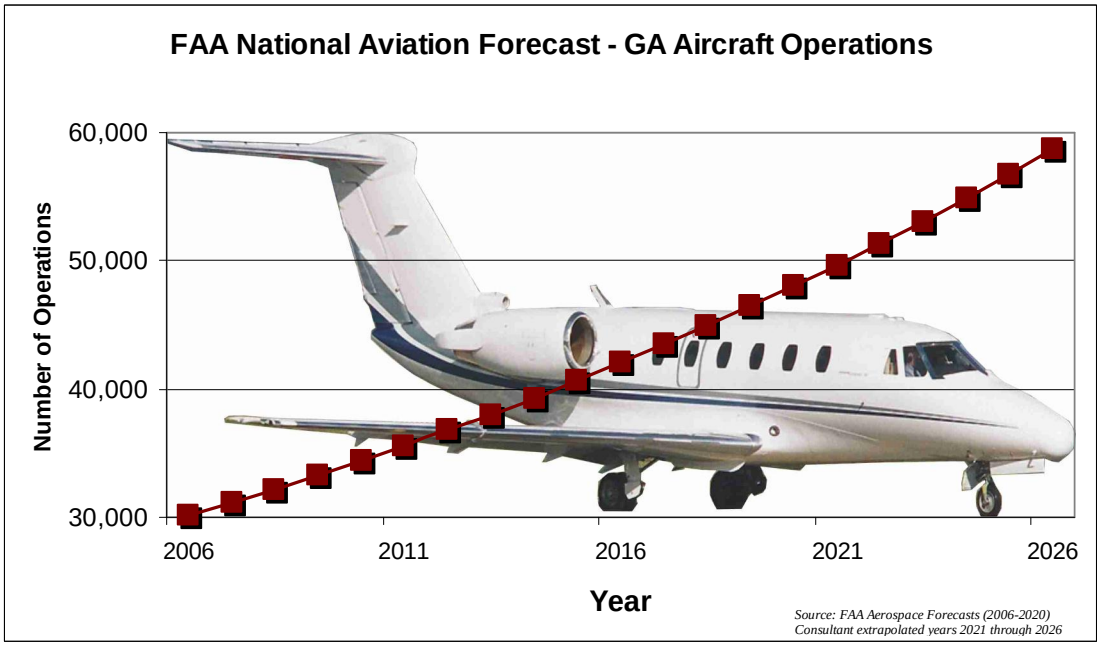


Figure 5-11 FAA High-Growth Projections of GA Aircraft Operations at HYA

In terms of hours flown, or operations, turbojet activity is expected to see growth near ten percent at 9.4 percent. Single-engine piston activity is forecast to grow at 1.1 percent annually, while the FAA expects total hours flown for the active general aviation fleet to increase by 3.4 percent annually over the fourteen-year forecast period.

Applying the FAA forecast average annual growth rate of 3.4 percent to the current recorded level of GA aircraft activity at the Airport, GA operations would increase from 30,079 to 58,075, an increase of 27,996 operations over the twenty-year planning period. Therefore, GA operations are expected to increase by 93 percent over the twenty-year planning period.

The FAA growth rates were also applied to the based aircraft at the Airport. The existing 72 based aircraft were projected to increase at the annual growth rate relating to the active GA and air taxi aircraft FAA national projected rates. The total active fleet is projected to increase nationwide at 1.4 percent annually. Applying this to the demand for based aircraft and the demand for aircraft parking at Barnstable, the number would increase by 23, from 72 to 95 based aircraft. The results are shown on the following **Figure 5-12**.

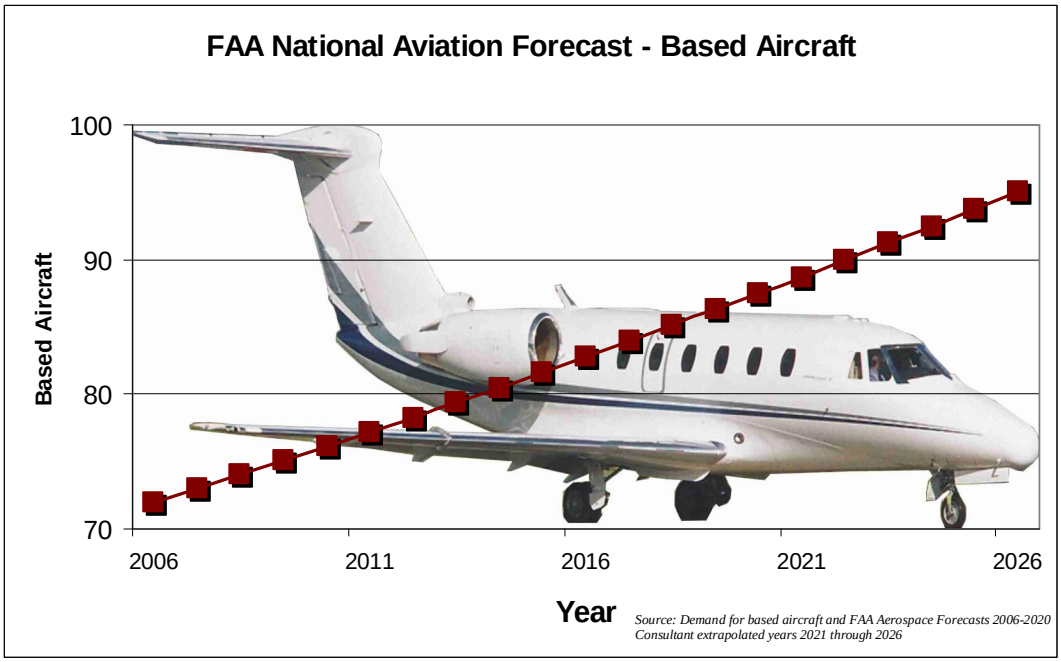


Figure 5-12 FAA High-Growth Projections of GA Based Aircraft at HYA

5.6 Preferred Forecast (FAA National Aviation Forecast)

The selection of a preferred growth rate for operations and based aircraft is derived from an analysis of the above forecast methodologies to determine which scenario most closely models the potential future national, regional and local trends that are likely to occur. It is important to note that, while every effort has been taken to accurately portray historic, current and potential trends, it is impossible to predict the future. While national economic and stock market trends create strong influences, aviation fuel costs and unforeseen security issues can also affect GA aviation activity. Aviation forecasts are therefore the most accurate, generally speaking, within the first three to five years, with each successive year declining in accuracy. These forecasts are meant to provide a range of activity with the expectation that actual activity will occur within close proximity to the forecast range. Therefore, airport facility needs can reasonably be based upon the short-term scenarios developed in the aviation forecasts.

The scenario that provides the most likely account of probable aviation activity at the Barnstable Municipal Airport is the one based on the FAA National Aerospace Forecasts. Applying the trends and metrics of this forecast to current and expected activity in the Barnstable area yields an additional 27,996 annual aircraft operations and 23 additional based aircraft over the twenty-year planning period. A discussion of the design aircraft at the airport, as well as the expected overall fleet mix by the year 2026 is presented below.

5.7 Peak Operations

Over the past fifteen years, peak month operations averaged approximately 13% of annual operations. The peak month is typically July or August, although the peak season runs between May-September. Over that five-month period, G.A. operations averaged close to 60% of total annual operations.

Itinerant (transient) operations generated higher peak month and peak season activity than did local operations. Itinerant operations in the peak month averaged 13.2% of annual itinerant operations, while peak month local operations averaged 12.8% of total annual local activity.

It is anticipated that peak month itinerant operations might flatten slightly in the future, for several reasons. There is an increasing volume of visitors in the 'shoulder' seasons (Spring & Fall), in part to avoid the crowds and higher prices during peak summer months. Shoulder season travel is being actively promoted by local businesses, as well as trade organizations. The percentage of year-round homes being constructed on the Cape is increasing in relation to summer homes. Because the peaking characteristics are used to evaluate aircraft parking needs, the average peak month 13.2% of total GA operations should be considered characteristic of the summer season months.

Table 5.1 shows the distribution of GA aircraft operations during the peak month periods. This distribution is further segregated into peak hour periods for facility needs purposes in **Table 5.2**.

Table 5.1 Preferred Forecast of Peak Month G.A. Operations 2006-2026 at HYA

Year	G.A. Operations	Peak Month GA Operations	Peak Month GA Itinerant Operations	Peak Month GA Local Operations
2006	30079	3970	3176	794
2011	35552	4693	3754	939
2016	42021	5547	4438	1109
2026	58705	7749	6199	1550

Source: Consultant Calculations and Analysis

Table 5.2 Preferred Forecast of Peak Hour G.A. Operations at HYA

Year	Total Peak Month Ops.	Avg. Day / Peak Month	Avg. Day / Peak Hour
2006	3970	132	22
2011	4693	156	26
2016	5547	185	31
2026	7749	258	43

Source: Consultant Calculations and Analysis

5.8 Fleet Mix/ Based Aircraft

While the fleet mix of based aircraft at HYA has been fairly constant over the previous five years, this trend is expected to change over the course of the twenty-year planning period. There is a trend in the general aviation community toward more sophisticated, higher-performing and more demanding aircraft. This trend will impact the types of facilities required at HYA. Barnstable Airport records show that in 2006 there were 72 based aircraft, of which 56 were single-engine (78%), 15 multi-engine (21%), and 1 jet (1%). The Airport has had a demand for fifteen additional aircraft waiting for hangars to be built on the airfield, for a total current demand of 87.

The FAA's National Aviation Forecast predicts that the number of active G.A. aircraft will increase at an average rate of 1.4% annually throughout the forecast period. Using this growth rate, based aircraft at Barnstable Airport will increase by 32% by the year 2026, from the 2006 demand of 87 to a total of 115 based aircraft.

It is anticipated that much of that growth will be split between existing single and multi-engine piston aircraft such as Beech Bonanzas, Cessna 182, Piper Archer, Cirrus 22, Beech Barons, etc., new VLJs (Eclipse, Cessna Mustang, etc.), as well as larger existing corporate aircraft (such as the Cessna Citations, Beechjet 400, Canadair Challenger, Falcon 900, Hawker 800, etc.). However, it is anticipated that most LSA will be based at airports such as Marstons Mills, Chatham, and Falmouth, as opposed to Barnstable, because those airports have less activity, their existing based aircraft are similar in size and operating characteristics, and Barnstable has a high volume of larger high-performance traffic (i.e. corporate jets and commuter aircraft). On the other hand, most of the new very light jets (VLJ) that will be based on the Cape will likely be at Barnstable Airport because of the full service facilities, instrument approaches, and ATC services. This anticipated fleet mix is provided in **Table 5.3**.

Table 5.3 Projected Fleet Mix for Based Aircraft at HYA – (2006-2026)

Aircraft	2006 (Recorded)	2006 (Demand)	2011	2016	2026
Piston	**71**	**81**	**87**	**93**	**107**
Single-engine	56	58	62	67	77
Multi-engine	15	23	24	26	30
Turbine	**1**	**6**	**7**	**7**	**8**
Turboprop	0	2	2	2	3
Turbojet	1	4	4	5	5
TOTAL	***72***	***87***	***93***	***100***	***115***

Source: Growth rates based on FAA National Aerospace Forecast (2006-2020) projections.
Consultant extrapolated years 2021 through 2026, and added recorded demand for hangar spaces per Airport Management

The GA fleet mix for future flight operations at HYA is also expected to follow the FAA National Forecasts. During the planning period, more business jets and air taxis are expected, smaller corporate and air taxis using Very Light Jets (VLJ's) will enter the fleet. The expected fleet mix for GA Flight Operations during the 2006 through 2026 period is presented in **Table 5.4** below.

Table 5.4 Projected Fleet Mix for GA Operations – (2006-2026)

Aircraft	2006	2011	2016	2026
Piston	**21958**	**25953**	**30675**	**42855**
Single-engine	21299	25174	29755	41569
Multi-engine	659	779	920	1286
Turbine	**8127**	**9599**	**11346**	**15850**
Turboprop	3573	4224	4992	6974
Turbojet	4548	5375	6354	8876
TOTAL	***30079***	***35552***	***42021***	***58705***

Note: Growth rates based on FAA National Aerospace Forecast (2006-2020) projections. Average annual growth rate for aircraft operations is projected at 3.4 percent from 2006 through 2026.
Source: Consultant Calculations and Analysis

5.9 Design Aircraft/ ARC

The FAA provides a coding system, called the Airport Reference Code (ARC), which relates the FAA's airport design criteria to the operational and physical characteristics of the largest-size, or category, airplane that typically operates at the airport. The ARC is comprised of two components relating to aircraft approach speed, wingspan, and tail height. The aircraft approach speed category (depicted by a letter in the alphabet) is

based upon the design aircraft's airspeed when approaching the runway for landing. The aircraft design group (depicted by a Roman numeral) is based upon the design aircraft's wingspan and tail height. The FAA Airport Design Advisory Circular defines these classifications as follows:

Aircraft Approach Categories
(1.3 times aircraft stall speed at maximum landing weight)
- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more but less than 121 knots.
- Category C: Speed 121 knots or more but less than 141 knots.
- Category D: Speed 141 knots or more but less than 166 knots.
- Category E: Speed 166 knots or more.

Airplane Design Group (wingspan and tail height)
- Group I: Wingspan up to but not including 49 feet or tail height up to but not including 20 feet.
- Group II: Wingspan 49 feet up to but not including 79 feet or tail height from 20 feet up to but not including 30 feet.
- Group III: Wingspan 79 feet up to but not including 118 feet or tail height from 30 feet up to but not including 45 feet.
- Group IV: Wingspan 118 feet up to but not including 171 feet or tail height from 45 feet up to but not including 60 feet.
- Group V: Wingspan 171 feet up to but not including 214 feet or tail height from 60 feet up to but not including 66 feet.
- Group VI: Wingspan 214 feet up to but not including 262 feet or tail height from 66 feet up to but not including 80 feet.

The design aircraft/ARC is based upon the most demanding, or critical, aircraft that typically uses the airport on a regular basis. FAA Order 5090.3B, Field Formation of the NPIAS, defines substantial use as 500 or more annual itinerant aircraft operations or scheduled commercial service. Itinerant operations are all operations that are not local. (Local operations are those operations performed within a 10-mile radius of the airport, such as some flight school operations or touch-and-goes).

Operations at HYA consist mainly of transient aircraft conducting business in the area, or tourist drop-offs. The airport has seen an increase in business activity with Retrix[b] based on the airfield. The airport has tenants that are equipped to repair airframes, engines, and avionics. Business aircraft growth has been a key element in the airfield's operations in the recent past. The business operations range from a Cessna 172 to the larger and more typical Cessna Citation Jet, Gulfstreams, and Canadair Regional Jets (CRJs).

The FAA defines the design aircraft as the most-demanding type that generates 500 or more operations (takeoffs and landings) annually. With the popularity of business jets on the rise and the entry of Very Light Jets (VLJs), enough operations are expected during

the planning period by small turbine aircraft to warrant a business jet being designated as the critical design aircraft, although these aircraft are well within the C-II standards.

The design aircraft may also be a mix or hybrid of aircraft, such as several types from one specific design group. Based upon 2006 operational data, HYA's 1998 Airport Layout Plan (ALP) Update Study, and the 2000 Runway Safety Area Study, the design aircraft types are the Gulfstream III, Learjet, Hawker, and Citations, which are typical of ARC/Design Group C-II. Barnstable Airport's Design Group will continue to be C-II.

6.0 GA FACILITY REQUIREMENTS

6.1 Introduction

This Section addresses the Airport's capacity to meet the projected corporate and General Aviation (GA) demand identified in the previous Section. Facilities that are unable to meet the projected demand levels have been identified. Improvements are recommended to provide alternative designs to help the Airport to function safely and efficiently.

Airport facilities can be divided into airside and landside facilities. For the purposes of this Master Plan, airside facilities are defined to include the runways, runway safety areas, EMAS, airfield lighting, taxiways, aircraft parking aprons (both paved and turf), aircraft fuel farms, and conventional and T-hangars. Groundside facilities are therefore, security fencing, the terminal building, access roads, and auto parking. The passenger terminal building, its associated parking lots and access roads are defined as landside facilities, but were studied in the previous Master Plan and were the subject of a separate EIR and Development of Regional Impact (DRI) permit process.

6.2 Airside Requirements

6.2.1 Airport Capacity

The capacity of an airport is directly related to the airfield's infrastructure (i.e., runways, taxiways, and aprons), and the layout of the infrastructure. The FAA has issued the Airport Capacity and Delay Advisory Circular (AC 150/5060-5), showing a methodology to calculate the hourly capacity of an airfield and its Annual Service Volume (ASV). Airport capacity is defined by the Annual Service Volume (ASV), which is dependent upon the weather conditions, number of runways, as well as the physical layout of the runways and taxiways. The Airport is currently operating at 56% of the airfield's operational capacity, and is not expected to reach capacity in the twenty-year long range projections, as shown in **Table 6.1**.

Table 6.1 Airfield Operational Capacity Analysis

	Capacity (In Operations)	Long-Range Demand	Percent Capacity
ASV	220,000	161,436	74%
Hourly VFR Capacity	77	55	72%
Hourly IFR Capacity	57	43	76%

Source: Consultant Evaluation per FAA Airport Capacity and Delay Advisory Circular, AC 150/5360-5

Recommendation: FAA guidelines suggest that capacity enhancements should be considered when annual operations reach 60 percent of the ASV. Capacity enhancements are currently being reviewed at the Airport and should be continued.

6.2.2 Runways

The Airport is comprised of two asphalt-grooved lighted runways. Runway 15-33 is a 5,252 foot long, and 150 foot wide precision instrument runway with a CAT 1 ILS approach to the Runway 15 end. Although Runway 15-33 is shorter than Runway 6-24, Runway 15 is the designated instrument runway. Runway 15 CAT 1 ILS approach minimums are 255 feet (200 feet above the threshold) and one-half mile visibility. Runway 33 has non-precision and visual approach capabilities. Runway 6-24 is slightly longer, at 5,425 feet and is also 150 feet wide, but the Runway 6 landing distance is only 5,019 feet long. Runway 6-24 is the primary runway, also with CAT 1 precision instrument approach capabilities to the Runway 24 end. Runway 24 ILS approach minimums are 293 feet (250 feet above the threshold) and one-mile visibility, which are slightly higher than the Runway 15 ILS minimums.

The relatively short lengths of the two runways limit the takeoff weights of departing corporate and air passenger aircraft. By way of comparison, Nantucket has a 6,303 foot runway. This longer runway offers increased safety margins and enhanced efficiency for aeronautical use.

6.2.3 Runway Use

The Approach Procedures, runway lengths, and runway usage patterns can be used to evaluate whether there might be any reason to consider modifying or extending a runway. A key factor in this assessment is the seasonally predominant wind and weather patterns, which may cause the primarily seasonal flight operations by large corporate or regional jets to focus more on Runway 6-24 or 15-33.

Weather conditions are often turbulent at the Airport due to the cold dry air coming from the north and warm wet air coming from the south. Because of the Airport's location on the Cape Cod peninsula, the Airport receives a large amount of precipitation. Annual snow accumulation is thirty inches, with an annual average of ten days of snowfall. Heavy coastal fog frequently occurs at the Airport in the morning, with an average of thirty full days per year of fog. The Airport experiences an average of 90 to 130 clear days per year.

The weather conditions and runway use data has been obtained from the HYA Air Traffic Control Tower, as well as the Part 150 Noise Study Update performed by HMMH in 1999. The Instrument Flight Rules (IFR) operations as a percentage of Visual Flight Rules (VFR) operations show an indication of the conditions at HYA.

Approximately 20 to 25 percent of the year, aircraft follow the instrument approach procedures to operate safely at the Airport. Although Runway 15 is the designated precision instrument runway, per the approach plates and the 1998 ALP, aircraft may use any one of several instrument approach procedures. Many of the approaches are performed according to the direction that the wind is blowing from, or the aircraft is arriving from, as well to maintain voluntary compliance with the Airport's noise abatement procedures. It should also be noted that visual approach patterns and flight tracks differ from these precision instrument approach procedures.

The following runway use percentages, shown in **Table 6.2**, indicate that Runway 6-24 is utilized approximately 50 percent of the year, while Runway 15-33 is utilized the other 50 percent of the year. Runway 15 is primarily used during southeast winds, when there is an increased chance for low ceilings and fog. That is the reason for the CAT 1 ILS system.

TABLE 6.2 Runway Use Characteristics

Runway	Operation	Percent Use	Percent Use	Runway	Operation	Percent Use	Percent Use
6	Departures	10.2	19.6	24	Departures	14.9	29.9
	Arrivals	9.4			Arrivals	15.0	
15	Departures	14.9	28.9	33	Departures	10.0	21.6
	Arrivals	14.0			Arrivals	11.6	

Source: 1999 HYA Part 150 Noise Study Update, as validated by HYA ATCT staff

Recommendation: The Airport currently has a noise department that interacts with the public on a daily basis. The noise department also works with Air Traffic Control Tower (ATCT) personnel to distribute noise fairly, and direct noise to non-residential areas when feasible. This public outreach should continue and the Airport should continue to work with the aviation community to avoid overflying residential neighborhoods to the extent reasonable.

6.2.4 Runway Length

Large corporate aircraft such as the Canadair Challenger, which is the corporate version of the Bombadier-Canadair Regional Jet, and the Gulfstream V are currently operated at HYA. Rectrix has been supplying the high end corporate users with FBO services for their corporate, charter, or fractional aircraft. Rectrix is also the first customer to take ownership of the Challenger 605 corporate aircraft. Rectrix provides services to approximately 20 percent of corporate operations at the Airport. This service is offered to high-income and corporate passengers, although the introduction of lower-cast scheduled service for the typical regional passenger might be a successful endeavor.

Due to the Airport's relatively short runways, both the Challenger and the Gulfstream V require a weight penalty when operating at gross takeoff weight. Corporate flight loading requirements generally do not dictate the large passenger load factor that regional airlines

require. Corporate flights do not have the same financial demands as the regional airlines to obtain a specific passenger load factor, which allow airlines to remain profitable. These larger corporate jets are flown within specific operational limits and insurance clauses, many of which are tied to procedures developed and approved by their corporate flight departments, or by companies that specialize in safe aircraft operating procedures, such as Aviation Safety International®.

These operational specifications (ops specs) may be more conservative than the FAA's certified performance capabilities for the aircraft. A case point is the difference between the FAA-certified takeoff runway (field) length and the corporate ops specs used in the field.

The FAA's certified takeoff distance is based upon flight test data obtained by manufacturers' test pilots. The takeoff distance was established by the airplane manufacturer's test pilots' ability to obtain minimum takeoff distances, with maximum power and at maximum weights, under optimum conditions. The FAA then certifies that the airplane is "capable" of taking off within that distance. The takeoff field length (or balanced field length) is based upon accelerate-stop test distances. This is the distance that the test pilots achieved during maximum performance acceleration to takeoff speed, then reversing thrust and applying brakes to get the aircraft to stop in the minimum distance, again under optimum conditions (and with no passengers in the back).

Table 6.3 (below) lists the FAA takeoff field length requirements for the ten larger GA corporate aircraft currently operating at HYA. The takeoff runway dry field lengths for Barnstable's corporate fleet range from a low of 4,970 feet to a high of 6,190 feet under dry, standard day conditions. FAA Advisory Circular AC 91-79, dated 11/06/07, however, has imposed increased safety margins that add fifteen percent to the required landing and takeoff distances when there is rain or snow on the runway. This FAA A/C increases the "contaminated runway" takeoff distance for the HYA fleet to lengths between up to a maximum of 7,119 feet. The average new "contaminated runway" takeoff distance is 6,325 feet for Barnstable's corporate fleet. The current runway departure length on Runway 15-33 is 5,252 feet, or some 1,073 feet less than the FAA requirement. Consideration should be given to increasing the runway departure length to meet FAA's improved safety standard for the current corporate fleet at HYA.

TABLE 6.3 Ten Largest Corporate Aircraft Operations at HYA
(July – 2007)

Aircraft Type	Peak Month Operations[1]	Aircraft Design Code	Manufacturer's Takeoff Length[2]	Contaminated Runway Takeoff Length[3]
Hawker	110	C-I	5,620 ft.	6,463 ft.
Challenger	84	C-II	5,840 ft.	6,716 ft.
Gulfstream II/III	80	C-II	5,110 ft.	5,877 ft.
Citation X	70	C-II	5,140 ft.	5,911 ft.
Falcon 900/2000	64	C-II	5,525 ft.	6,354 ft.
Gulfstream IV	60	D-II	5,450 ft.	6,268 ft.
Lear 31/35/36	26	D-I	4,970 ft.	5,716 ft.
Lear thru 45XR	50	C-I	5,040 ft	5,796 ft.
Gulfstream V	20	D-III	6,110 ft.	7,027 ft.
Global Express	18	D-III	6,190 ft.	7,119 ft.

Source: Consultant Compilation of landing fee records
Notes: 1. Estimated from 2007 peak July landing records
2) Business and Commercial Aviation, May 2008, "2008 Purchase Planning Handbook" (Sea Level, Standard Day Temperature).
3) FAA Contaminated Runway Calculations for Runway Length equals fifteen percent increase to dry runway length.

6.2.5 Potential Air Service

Four airlines currently offer scheduled passenger service from HYA to Boston, Martha's Vineyard, Nantucket, Providence, and New York. These airlines operate Cessna 402s, Saab SF340s, and Beech 1900s. The summer tourist season is the peak season for these airlines. The majority of passengers (approximately 75%) are traveling to Nantucket on Cessna 402s, operated by Cape Air. Cape Air remains the Airport's busiest operator, and in 2007 more than 75% of its flights carried over 6,000 pounds. Cape Air bases its fleet of nine-passenger Cessna 402s at HYA for shuttle service to Nantucket, Martha's Vineyard, Boston, Providence and New Bedford. Because of these relatively short stage-lengths and the current lack of any more suitable aircraft, Cape Air has no immediate plans to replace, or supplement, its current fleet.

Regional airlines, however, such as Jet Blue, Comair, and Continental Express, had announced their intentions to start Regional Jet (RJ) service to certain airports in Southeastern New England. Coinciding with this Master Plan Update, a study was conducted by InterVISTAS® to analyze the passenger demand on Cape Cod to determine the feasibility of restoring intercity airline service at HYA. The Cape remains a highly seasonal market. However, there is a potential passenger market on Cape Cod based upon regional business demand, and the number of people driving to Boston-Logan and T.F. Green for domestic and international airline service. The passenger demand analysis concluded there is a demand for passenger service by larger regional jet or turboprop aircraft such as the Bombardier Q400.

Nantucket has RJ service that conducts operations from its 6,303 foot runway to a major New York hub airport. Because Regional Airlines could operate aircraft from Barnstable in the future, it is important to include representative regional aircraft in this design aircraft review, so as not to preclude that future option.

The manner in which regional aircraft are operated by the airlines has a critical affect on runway length needs. Therefore, telephone interviews with various regional airline officials were made to request information on aircraft operational requirements, likely frequency of service, potential stage lengths, and operating specifications for the aircraft on those routes.

Jet Blue has approached HYA Airport management to discuss potential opportunities for the airline and the Airport. Jet Blue currently flies the ERJ-190 to Nantucket. Delta Express operates the CRJ-200 from PVD to LGA. Continental Express operates the ERJ from MVY to LGA, and Bombardier Q400 service from ALB to various regional airports. ComAir operates the CRJ between BOS and JFK and American had flown its MD-80's (larger version of the new B-717) to Nantucket, although they have announced no plans to fly into HYA. USAir Express currently flies the Saab 340 from HYA to LGA.

There is a potential for added regional airline service at HYA in the future. The recent InterVISTAS® study researched the operational requirements for the most likely regional aircraft to operate at HYA. The Boeing 717, the Bombardier Q400, and CRJ, ERJ and Saab series regional jets and turboprops were identified as the types of regional jets and turboprops considered as the most likely to operate at HYA. In fact, the Canadair Challenger corporate jet, which is the aircraft that was modified into the CRJ regional jet, already flies into HYA. The Challenger/ CRJ is a very frequent visitor, with 84 operations logged during July 2007. **Table 6.4** shows the aircraft characteristics for these regional aircraft.

TABLE 6.4 Potential Air Service Market Regional Jet Aircraft

Aircraft	ARC	Gross Takeoff Weight	Manufacturer's Takeoff Length[1]	Contaminated Runway Takeoff Length[2]
Boeing 717	C-III	121,000 lbs.	5,750 ft.	6,613 ft.
Bombadier Q400	C-III	65,200 lbs.	4,819 ft.	5,542 ft.
CRJ200	C-II	53,000 lbs.	6,290 ft.	7,234 ft.
CRJ700	C-II	72,750 lbs.	5,130 ft.	5,900 ft.
CRJ900	C-II	80,500 lbs.	6,160 ft.	7,084 ft.
ERJ 190	C-III	114,199 lbs.	5,583 ft.	6,421 ft.
ERJ 195	C-III	115,280 lbs.	7,149 ft.	8,222 ft.
SAAB 340	B-II	28,500 lbs.	4,315 ft.	4,963 ft.
SAAB 2000	C-II	50,265 lbs.	4,005 ft.	4,606 ft.

Source: Consultant Evaluation and InterVISTAS Jet Service Market Analysis
Notes: 1) Business and Commercial Aviation, May 2008, "2008 Purchase Planning Handbook" (Sea Level, Standard Day Temperature).
2) FAA Contaminated Runway Calculations for Runway Length equals fifteen percent increase to dry runway length.

Due to the Airport's current runway lengths (which would impose weight restrictions of more than one-third the useful loads), it is unlikely that the Canadair CRJ200 or the ERJ 195 would be assigned to HYA unless operating on very short routes requiring half-fuel. However, the Boeing 717, Q400, CRJ700, CRJ900 ERJ190, Saab 340 and Saab 2000 could be operated on shorter routes more profitably, and therefore would be compatible

with regional service requirements at HYA. The most likely regional aircraft to operate at the Airport, as noted in the InterVISTAS Feasibility of Regional Service study is the Bombadier Q400. A shorter increase in runway length would significantly enhance takeoff safety margins for operations of regional jets, as well as for the corporate jet fleet that currently operates from HYA. Therefore, runway length becomes a key factor in preserving the current functional role of the airport in meeting regional aviation needs.

The takeoff lengths, as noted, represent the manufacturer's "best case" accelerate-stop distances for these aircraft, not necessarily the "ops specs" distances established by airline or corporate flight departments. The manufacturer's takeoff lengths were also attained by company test pilots during the most optimum weather conditions. For example, the pavements were dry and the takeoff temperatures were cool, with a standard day temperature of 59°F, which is very conservative for the Airport where summer temperatures can reach 80°to 90°F.

Table 6.4 shows runway lengths needed by typical aircraft used by regional carriers. The runway length requirements, especially with contaminated conditions, exceed existing runway lengths the HYA. The average runway length needed by these regional carriers during contaminated conditions is 6,287 feet. The longest runway at HYA is Runway 6-24, with a 5,425 foot length. However, it is constrained by Route 28 and the railroad. Only the Runway 15 end could be lengthened within the Airport boundary to meet the takeoff length needs. Runway 15-33 is currently 5,252 feet long, or some 1,035 feet shorter than optimum.

It is also important to note that the larger corporate aircraft using HYA require FAA takeoff lengths greater than 5,252 feet. These corporate jets comprise more than half of HYA's corporate operations. The new FAA safety standard for HYA's corporate fleet requires runway lengths ranging from 5,796 feet to 7,119 feet when the runway is wet or snow covered. The average takeoff length for the corporate fleet is 6,325 feet, or 1,073 longer than provided on Runway 15-33.

Consideration should be given to an optimum runway length that ranges between 6,287 feet and 6,325 feet in order to meet FAA safety standards for regional jet and turboprop aircraft. Runway 15-33 could be increased inside-the-fence at the Runway 15 end by some 900 to 1,000 feet. This would significantly enhance the takeoff length safety margins, and meet 80 to 90 percent of the fleet's takeoff length needs. The opportunity to create added safety margins for takeoff lengths at the Runway 15 end should be considered as a long-term goal at HYA.

> *Recommendation: Consider an increase in takeoff length for Runway 15 to enhance the operational safety margins of the existing large corporate jets, as well as potential regional jet and turboprop operations at HYA.*

6.2.6 Runway Approach Minimums

Because the airlines and corporate aircraft operate during poor weather and low ceiling conditions, it is important to maintain the best possible precision approach procedures on the primary instrument runway. The Airport has recently been working with FAA's Air

Traffic Operating Team (ATOT), the railroad owners, and the ATCT personnel to improve the approach procedure "minimums" for Runway 24. Currently, Runway 24 has a one-mile visibility minimum for the approach to Runway 24. This is because of the height of trains that occasionally cross under the landing approach. The Airport is working with the appropriate parties to improve the minimum to ¾ mile visibility. The precision instrument approach would be restricted during periods when the train is passing the end of the runway under the approach path.

By increasing accessibility during inclement weather conditions, the Airport increases its utility to the airlines, as well as corporate users. Improving the minimums where possible should be considered as a critical facility need, and is discussed further in the improvements section of this Master Plan Update.

> *Recommendation: The Airport should continue to work with FAA ATOT and ATCT to lower minimums for all approaches. It is important to enhance the utility of aeronautical access to the Airport for airlines that operate at HYA, as well as corporate and potential regional aircraft.*

6.2.7 Runway Design Standards

There are specific runway design standards which the FAA has set forth in the *Airport Design* Advisory Circular, (AC 150/5300-13). Because HYA accepts federal funding, these standards are mandatory for all new improvement projects. These runway design dimensional criteria are addressed in **Table 6.5**. FAA dimensional design standards that have not yet been met have been highlighted. These non-compliant design criteria should be addressed and brought into compliance to the extent feasible.

The Runway Safety Area (RSA) must provide a clear and safe operating area for aircraft that overrun, undershoot, or veer off the runway. The RSA design standard is to provide a clear and object free area, "and have no potentially hazardous ruts, humps, depressions, or other surface variations". The Airport conducted an RSA Study in 2001, and FAA agreed with recommended improvements and RSA dimensions defined in the study to obtain an equivalent level of safety. The recommendations were as follows:

- Runway 6 end is equipped with an Engineered Materials Arresting System (EMAS) to prevent runway overruns from passing through to Route 28. The EMAS was installed in 2004 as an equivalent level of safety for the limited Runway Safety Area (RSA) length. The EMAS was approved by FAA as an equivalent level of safety as a full length safety area.
- The Runway 33 RSA was cleared and graded to partially comply with FAA dimensions, with the exception of an auto gas station located in the southwestern portion of the RSA. The Airport Commission has given high priority to acquiring this gas station in the Airport's current CIP. This gas station and two adjacent oil storage facilities within the RPZ are incompatible uses that pose hazards to airport operations. The Airport Commission gives high priority to their acquisition.
- Train tracks traverse the Runway 24 RSA, although FAA has approved this irregular shaped RSA based upon the full length being available along the runway centerline. Radio communications between the ATCT staff and the train crew will enable lower approach minimums to be developed for Runway 24.

- The Runway 15 end RSA fully complies with the 500-foot by 1000-foot dimensional standards required by FAA.

TABLE 6.5 Compliance with Runway Design Standards

Standard	Design Criteria (in feet)	Compliance (Yes/No)
Runway Width	100	Yes
Runway Shoulder Width	10	Yes
Runway Centerline to Hold Line	240	Yes
Runway Centerline to Parallel Taxiway		
Runway 6-24	300	Yes
Runway 15-33	**400**	**No**
Runway Centerline to Edge of Aircraft Parking		
Runway 6-24	400	Yes
Runway 15-33	**500**	**No**
Runway Protection Zone (inner width / outer width / length)		
Runway 6 end	500/1,010/1,700	Yes
Runway 24 end	500/1,010/1,700	Yes
Runway 15 end	1,000/1,750/2,500	Yes
Runway 33 end	**Incompatible Uses**	**No**
Runway Safety Area (width / length beyond Rwy end)	500/1,000	Yes (RW6, 24 & 15)
Runway 33 end	**Incompatible Uses**	**No**
Runway Object Free Area (width / length beyond Rwy end)	**800/1,000**	**No**
Precision Instrument Object Free Zone (width / length beyond Rwy end)	800/200	Yes
Runway Lighting	HIRLS	Yes
Runway Marking	Precision	Yes
Runway Visibility Zone	**Clear**	**No**

Source: Airport Design Advisory Circular (AC 150/5300-13) and Consultant Evaluation

In addition to the Airport Design Advisory Circular, Airports are mandated to comply with regulations in 14CFR Part 77, Objects to Navigable Airspace. These regulations ensure that the surrounding airspace and the respective approach surfaces are clear of penetrations, or the penetrations are marked or lighted. The current Airport Layout Plan shows a non-conforming condition that is caused by the slightly uneven ground elevation in the vicinity of Taxiway Charlie, adjacent to Runway 6-24. The ground elevations rise slightly higher (more than 3 inches) than the runway elevation in certain spots along the length of Taxiway Charlie, which is within the Runway's primary surface.

Taxiway Alpha is proposed to be relocated outside the FAA standard 400 foot offset from Runway 15-33 to parallel taxiway centerline (see discussion under Taxiway Standards). The aircraft parking in the north ramp and in the terminal ramp is also proposed to be relocated outside the FAA design standard Runway 15-33 to parking areas. The Runway Object Free Area (ROFA) was modified to show the maximum ROFA with some modifications in shape, due to the relatively close location of perimeter fencing (to protect public roadways) and the safety factors added when the Airport installed the Engineered Materials Arresting System (EMAS).

It is desirable to clear incompatible uses from the Runway Protection Zone (RPZ), especially uses that are incompatible and pose risks to aircraft operations. Activities with high public concentrations such as churches, shopping centers and hospitals, and

incompatible uses such as fuel storage facilities are land uses that are prohibited within the RPZ. Although it is impractical to acquire all land within the RPZ, priorities are given to those portions of the RPZ within or adjacent to Airport boundaries. Although an airport may not own all land within the RPZ, all land within the Airport boundaries must comply with land uses permitted by FAA. Runway Visibility Zones (RVZ) should also be cleared of obstructions to enhance safety. Because of the wetland buffer zones surrounding the Upper Gate Pond and Lewis Pond, tree clearing along the north side of the RVZ has been environmentally constrained, although efforts should be pursued to obtain permits to enable the clearing, as an aviation safety enhancement.

Recommendation: High priority should be given to acquiring the incompatible land uses that remain within the Runway 33 RSA and RPZ. The gas station and two adjacent oil storage parcels pose hazards to aircraft operations and should be acquired to enhance public safety. Taxiway Alpha should be relocated outside of the Runway 15 OFA and Taxiway Charlie should be reconstructed to ensure that spot elevations along the length of the taxiway and the Taxiway Safety Area (TSA) do not penetrate the Airport's Primary surface for Runway 6-24. The RVZ should be cleared to enhance aviation safety.

6.2.8 Taxiway Standards

Table 6.6 shows whether the Airport is currently compliant with FAA taxiway design standards. As noted in the previous runway standards section, Taxiway Alpha is non-compliant with FAA design standards. The standard runway centerline to parallel taxiway centerline offset for Runway 15-33 is 400 feet. The existing offset is 300 feet, which is 100 feet less than minimum standards for an ILS runway with approach minimums lower than ¾ miles. Since this is a compliance issue, the Airport has purchased the auto salvage yard that was causing the non-compliance issue and has submitted an FEIR and DRI application for the relocation of this parallel taxiway. The purchase of the auto salvage parcel has allowed the Airport to bring the taxiway-to-runway offset criteria into compliance with the FAA standards.

TABLE 6.6 Compliance with Taxiway Design Standards

Standard	Design Criteria (in feet)	Compliance (Yes/No)
Taxiway Width	35	Yes
Runway Shoulder Width	10	Yes
Taxiway Safety Area (width)	79	
Taxiway Object Free Area (width)	131	
Holding Bay, Turnaround, or Bypass Taxiway		
Runway 24 end	**No**	**No**
Runway 6 end	Yes	Yes
Runway 15 end	Yes	Yes
Runway 33 end	Yes	Yes

Source: Airport Design Advisory Circular (AC 150/5300-13) and Consultant Evaluation

Taxiway Echo leads from the terminal area/north ramp to an engine run-up pit located in the north central portion of the Airport. Taxiway Echo is not configured in the desired FAA 90 degree angle to the runway and a pilot at the hold-short line cannot see the

Runway 33 end. The elevation change between the runway and the run-up pad is such that this would require a slope that would exceed FAA gradient standards for taxiways. A 90-dgree taxiway, therefore, has been deemed unfeasible.

The run-up pad at the end of Taxiway Charlie has also been proposed to be realigned because the holding bay is located within the instrument approach to Runway. Taxiway Charlie is also in non-compliance because the taxiway elevations create minor penetrations to the 14CFR Part 77 primary surface clearance standards for Runway 6-24.

Taxiway Bravo is a partial parallel taxiway for Runway 6-24 located on the southeast quadrant of the Airport. A majority of large corporate aircraft park at the East Ramp area. Runway 24 consists of the majority of departing aircraft at HYA. Aircraft departing Runway 24 from the East Ramp must cross the active Runway 6-24 at Taxiway Bravo to Charlie 1, which is at approximately mid-field, and is adverse to FAA safety recommendations. FAA recommends all active runway crossovers occur as close to the runway ends as feasible.

> *Recommendation: Taxiway Alpha is proposed to be relocated outside the FAA standard 400 foot offset from Runway 15-33 to parallel taxiway centerline (see discussion under Taxiway Standards). The Runway 24 holding bay should be redesigned to allow holding aircraft to be bypassed when necessary, while remaining outside the instrument approach surface. Taxiway Bravo should be relocated to a 400 foot offset from Runway 6-24 and extended to enable a full parallel taxiway to the Runway 24 end without crossing the active runway.*

6.2.9 GA Aircraft Parking Aprons, Based and Itinerant

Barnstable Airport has two apron areas that are used to store and park aircraft, the North Apron and the East Apron.

The North Apron consists of approximately 390,000 square feet of tenant leased and Airport apron space. The apron areas are used to park both based and itinerant GA aircraft. A portion of the apron space available is frontage to hangar facilities, and therefore, only short-term parking is available in these areas. Currently, twenty-six based aircraft and twenty-seven to thirty-one itinerant aircraft parking spaces are available on the north apron. Apron space use is shown in **Table 6.7**, as well as an inventory of typical aircraft parking use in the North Apron.

Table 6.7 North Apron – Base Year 2006 Inventory

	Aircraft Type	Paved Spaces	Turf Spaces	Based/Itinerant
Public Apron 1	SE Piston	8		Based
Public Apron 2	SE Piston	7	5	Based
Public Apron 3	SE Piston	6		Based
Rectrix	SE Piston	4		Itinerant
	Jets	5-6		
Cape Air	Twin Engine	3-6 Cessna 402		Itinerant
Griffin Avionics	SE Piston	9-12		Itinerant
Hangar II Apron	Twin Engine	3 Beech 1900		Itinerant
Public Apron 4	Twin Engine	2 King Air		Itinerant
	Jets	1 Hawker		
TOTAL APRON PARKING AREA		***21 27-34***	***5***	***BASED ITINERANT***

Source: Field Inventory and Airport Staff Interview

Recently, the Airport has reconfigured a portion of the north apron to include the much needed expansion of the fuel facility. This expansion will entail the demolition of the Airport's 7 bay T-hangar building.

Rectrix is a national FBO facility that supports fractional, air taxi, and large corporate aviation needs. Rectrix built a 22,000 square foot hangar and 60,000 square feet of apron parking to fulfill the needs the additional large corporate turbojet aircraft that are expected to need servicing. The typical aircraft types that use the Rectrix apron parking and hangar facility are the Gulfstream III, Cessna Citations, Hawkers, and other large charter and business jets.

The Airport is currently in the process of reconfiguring the north ramp area to obtain the largest number of parking spaces possible, while maintaining a safe operating area. The north apron is constrained by the opening into the taxiway system. This opening is already congested by the design of a single point of entry for all aircraft parking in the north ramp area. To exacerbate the problem, passenger carrying aircraft also operate in this area, as well as traverse the area when departing Runway 15 and Runway 24 from the terminal ramp.

In addition to this constraint, the Airport has plans to relocate Taxiway Alpha to the standard 400-foot offset from Runway 15-33, to bring the design standards within requirements. In conjunction with this project is the relocation of the vehicle service road, which will basically remove the aircraft parking along the north side of the north

ramp entrance area. There is no additional space left on the north ramp, and therefore, no aircraft development is recommended for the planning period.

The effects of the planning improvements scheduled for the north ramp area will remove approximately six aircraft parking spaces and one T-hangar. The T-hangar was relocated to the east ramp. The aircraft parking will be addressed in the section on redeveloping the east ramp.

The East Apron consists of approximately 420,000 square feet of tenant leased and Airport apron space. The apron areas are used to park both based and itinerant GA aircraft. The East Apron is more open and caters to the large corporate and private jet itinerant aircraft, with access to Gate A1. A majority of the apron space is used for itinerant aircraft parking. The East Apron is adjacent to Taxiway Bravo, and is marked with hold line markings to establish boundaries between the apron and the taxiway. Taxiway Bravo is a partial parallel taxiway to Runway 6-24, and currently has a 620-foot taxiway to runway centerline offset. A taxilane divides the public aircraft apron parking areas leading to the hangar area on the east ramp.

The medflight helipad is located adjacent to the ARFF building in the first apron space. The majority of large transient corporate aircraft utilize the east ramp for temporary parking. As one might expect, the east ramp area is full in the peak summer periods. During peak periods on the east ramp, more than twenty large corporate jets park on the East Ramp during holiday weekends. A majority of the large corporate, charter, and fractional turbojets are transient flights. Therefore, apron parking close to airport access would best satisfy the parking needs.

Currently, ten based aircraft and forty itinerant aircraft parking spaces are available on the east apron. Typical apron use is shown in **Table 6.8**, as well as an inventory of typical aircraft parking use in the East Apron.

The existing aircraft parking facilities at HYA support between 67 to 74 itinerant aircraft parking spaces and as many as 36 based aircraft. The apron space available fluctuates, especially during peak season periods when the larger corporate aircraft take up two spaces because of the wingspan constraints. Since the Airport is seasonal in nature, the Airport must accommodate these demands.

The previous Forecast Chapter shows the corporate trends at HYA, and projects that turbine aircraft will nearly double operations over the twenty-year planning period. This change in fleet has been an on-going issue with itinerant aircraft parking at HYA.

Table 6.8 East Apron – Base Year 2006 Inventory

	Aircraft Type	Paved Spaces	Turf Spaces	Based/Itinerant
Air Cape Cod Apron	SE Piston	4	6	Based
Public Apron 5	SE Piston	10		Itinerant
	Jets	6		
Public Apron 6	SE Piston	10		Itinerant
	Twin Engine	8		
	Jets	6		
TOTAL APRON PARKING AREA		***4*** ***40***	***6***	***BASED*** ***ITINERANT***

Source: Field Inventory and Airport Staff Interview

Recommendation: The east ramp has much potential to expand to support the needs of the local and transient aircraft at the Airport. By relocating Taxiway Bravo to a 400-foot offset, approximately 300,000 square feet of apron may be available for aircraft parking. This parking is important because there is an existing need for more transient large corporate aircraft parking space during the peak season. The Airport might construct this apron in phases, as needed.

6.2.10 GA Aircraft Hangars, Corporate and T-Hangars

Ten Conventional and five T-hangars currently provide aircraft storage for as many as 67 aircraft, depending upon the fleet mix. **Table 6.9** shows an inventory of the hangars and typical usage by tenants.

One of the ten corporate hangars is primarily used as a combination of office space and administrative and maintenance type storage units. Although all five of the T-hangars are not completely full, a major constraint is the marketing cost of the units. The Airport currently holds a waiting list that fluctuates between 25 and 27 aircraft owners waiting for space in a T-hangar.

Summary and Recommendation: Additional hangar space should be considered for the forecasted increase in based aircraft, increase in turbine operations in the fleet mix, and the existing unmet demand for 27 T-hangar spaces. Because the Airport has no control over the market price set for aircraft storage, the amount of hangar storage units recommended should be anticipated in phases. It is recommended that the Airport plan on as many additional hangars as feasible within the Airport's boundaries to be constructed on an as needed basis by the private sector.

Table 6.9: Existing Airside Hangar Buildings

	Building No. on ALP	Tenant	Building Dimensions (Square Feet)	Building Use (No. and Type Aircraft)
CONVENTIONAL HANGAR BUILDINGS	1	Cape Air / Nantucket Air	150' x 260' (40,275 SF)	Aircraft Storage (4 - Cessna 402)
	3a	Griffin Avionics	145' x 145' (19,725 SF)	Aircraft Storage (6 - Small SE Piston)
	3b	Griffin Avionics	35' x 120' (4,080 SF)	Office / Storage (No Aircraft)
	4	Hangar II (Airport Owned)	100' x 120 (12,225 SF)	Aircraft Storage (Beech 1900)
	7a	51 LLC Hangar	52' x 97' (5,005 SF)	Aircraft Storage
	7b	Island Air Hangar	107' x 101' (10,736 SF)	Aircraft Storage (6-10 - Cessna 402)
	9	Continental Airlines Building	48' x 40' (2,200 SF)	Nantucket Shuttle & TSA
	15	Air Cape Cod FBO	85' x 88' (7,138 SF)	Aircraft Storage & Maintenance (5 - Small SE Piston)
T-HANGARS	2	Rectrix® Hangar	130' x 150' (19,500 SF)	Aircraft Storage (2-3 - Large Corp. Jet)
	5	Airport T-Hangar No. 1	35' x 195' (6,770 SF)	Aircraft Storage (6 - Small SE Piston)
	4	Airport T-Hangar No. 2	66' x 158' (9,596 SF)	Aircraft Storage (6 - Small SE Piston)
	18	Aero Management Hangar	62' x 181' (11,216 SF)	Aircraft Storage (2 - King Air)
	19	Cape Flight Instruction Hangar	62’ x 113’ (7,000 SF)	Aircraft Storage (5 – Cessna 402)
	20	Hyannis Hangar	65' x 150' (9,750 SF)	Aircraft Storage (6 – Small SE Piston)
	21	Hexagon Hangar	(6,596 SF)	Aircraft Storage (6 - Small SE Piston)
	22	S&S I T-Hangar	80' x 120' (9,600 SF)	Aircraft Storage (4 - Twin Engine)
	23	S&S II T-Hangar	65' x 150' (9,750 SF)	Aircraft Storage (7 - Small SE Piston)

6.2.11 Air Traffic Control Tower (ATCT) and NAVAIDS

In 2005 the Airport prepared an ATCT Siting study to construct a new tower. The existing ATCT is a 118 foot tall structure with inadequate visual depth perception. The

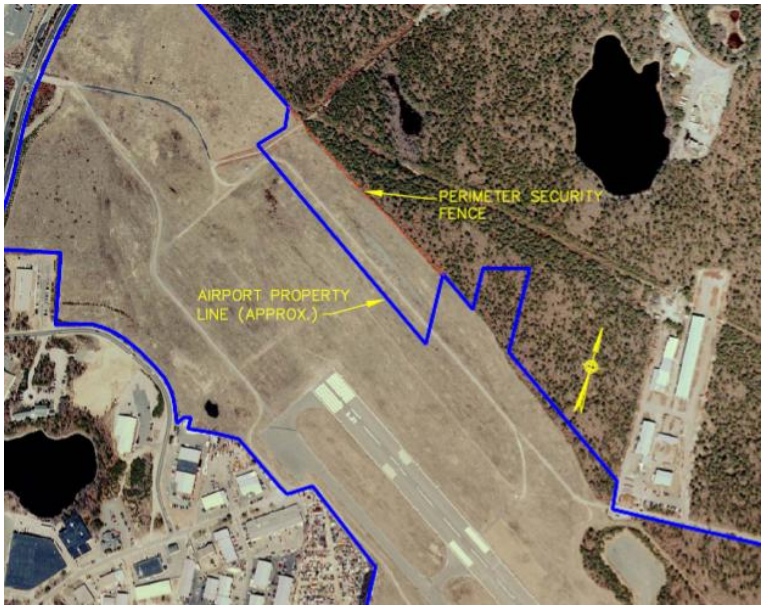
tower is programmed to receive federal appropriations to permit and construct a new tower in accordance with FAA Order 6480.4, *Air Traffic Control Tower Siting Criteria*.

Summary and Recommendation: Continue to pursue federal appropriations for the construction and upgrade of an ATCT that conforms to the latest federal regulations and requirements.

6.3 Landside Requirements

6.3.1 Security Fencing

The Airport has a fully-enclosed perimeter fence surrounding the Aircraft Operating Area (AOA). The Airport is in full compliance with FAR Part 139 security regulations because the airport has passenger service requirements. All property inside the security fence is considered secure area, and is monitored by Airport personnel, local law enforcement officers (LEOs), and Transportation Security Administration (TSA) staff.



There is a portion of land within the Airport perimeter fence that is not owned by the Airport. This land is located northeast of Runway 15 and is owned by the Barnstable Fire District. The vehicle perimeter road traverses this land parcel and the Airport proactively maintains the vegetation in this area.

Recommendation: The Airport should maintain the fully-enclosed perimeter security fence. The Airport should purchase the Barnstable Fire District land parcel or acquire an easement to maintain vegetation and retain the perimeter road and security fence.

6.3.2 Aircraft Fuel Farms

The GA aircraft are fueled at various locations on the Airport, including the north ramp and the east ramp area. Piston aircraft fuel, also known as AVGAS, is sold and stored by individual tenants. Mobile fuel trucks transport fuel from the fuel tank farms to the aircraft parking area, where the aircraft are stationed on the airfield. The Airport stores both AVGAS and Jet A fuel, as described below. Two tenants have AVGAS storage tanks and distribute fuel via mobile trucks to piston aircraft. A commercial tanker truck makes periodic deliveries to the airport's fuel farm to refill the AVGAS and Jet A storage tanks.

Griffin Avionics owns and operates two 10,000 gallon Underground Storage Tanks USTs located on the east ramp of the Griffin Avionics hangar building. The underground tanks are single wall steel tanks, which were installed in 1985. The tanks have an over-fill protection system, as well as cathodic protected steel containment. These tanks do not include a secondary containment system.

Air Cape Cod (formerly Cape Flight) owns and operates two 10,000 gallon Aboveground Storage Tanks (ASTs), which are located to the east of the Air Cape Cod hangar building. One is for AvGas storage and one is for Jet A fuel storage. The tanks are manufactured with double wall steel and were installed in 1998. The Air Cape Cod fuel farm is equipped with over-fill protection with a secondary containment system. The system does not include a spill monitoring component.

Airport personnel and tenants who receive and dispense fuel are required to annually update their fueling certification through a program that is approved for the Airport's FAR Part 139 Airport Certification Manual. This program prepares personnel for fuel management procedures, emergency spill actions, and a spill response program.

Jet fueling is distributed by the Airport personnel. The Airport typically sells nearly one million gallons of fuel annually. Fuel sales have increased recently as more large corporate aircraft have passed through HYA. The Airport is in the process of constructing a fuel facility that will store four times the amount of fuel. This project is expected to fill the needs of aircraft refueling for the twenty-year planning period.

Jet fuel is owned and sold by Airport personnel. The Airport owns the only jet fuel farm, consisting of one 20,000-gallon jet fuel (UST). The tank is located adjacent to the vehicle access gate Foxtrot and Airport T-hangar No. 1. The jet fuel is also distributed to the aircraft via mobile fuel trucks. A tanker truck periodically makes deliveries at the concrete pad, through Gate F, to refill the Airport's storage tanks.

The Airport jet fuel farm is equipped with an overfill protection, secondary containment, and interstitial monitoring system. Tanks are manufactured double wall fiberglass tanks. There is an oil/water separator attached to the catch basin in case of spills. All tanks are equipped with emergency shut off valves.

Annual jet fuel sales have been in the range of nearly 1,000,000 gallons, with a peak month usage of approximately 200,000 gallons. It is recommended that GA airports have

the capacity to store between 8 and 14 days reserve fuel, or approximately 25 to 50 percent of monthly sales. Therefore, the unmet demand for aviation jet fuel storage capacity at HYA could be met by increasing the Airport's jet fuel storage capacity to 60,000 gallons.

Recommendation: Storage capacity of AVGAS should be determined by market demands for each retailer.

The 2004 FEIR presented two jet fuel 20,000-gallon AST's to be located in close proximity to what is now the Rectrix Apron, while removing the current 20,000-gallon UST. The Airport requested that the jet fuel storage facility be moved back to the Gate Foxtrot area, and a third 20,000-gallon AST be approved by the CCC, as part of the regional permitting effort. This recommendation is consistent with the facility needs review for the fuel storage needs at HYA. The proposed ASTs would incorporate an advanced leak protection system in conjunction with the latest spill containment systems.

6.3.3 Auto Access

The north apron area is currently accessed via Barnstable Road by Route 132 or Route 28. This access point merges with traffic entering the Airport's terminal area. Peak demand periods may be congested due to the lack of access alternatives that are available.

The east ramp is accessed via Mary Dunn Way, which intersects Route 28 west of Yarmouth Road and east of the rotary at Route 132 and Route 28. The Steamship Authority's overflow parking lot is located on Mary Dunn Way. This intersection is typically not congested, although longer waiting periods may occur when traveling on Route 28 south and trying to crossover to Mary Dunn Way.

Recommendation: An alternative access road (Attucks Lane Extension) is being designed to allow access to the Airport from Independence Drive from the north and from Rt 132 to the west. This would alleviate congestion points along Route 132 for travelers to the Airport.

The Town of Barnstable has long been proposing a bypass access road off Yarmouth Road to Mary Dunn Way, behind the GA hangars. This bypass would provide direct access to the Airport via Route 28, and would avoid congestion at the Yarmouth Road intersection. These plans have been tabled for the short-term planning period.

6.3.4 Auto Parking

GA and corporate parking is provided by the Airport tenants, typically landside of the leased hangar and apron areas. Tenants and support staff typically possess access cards to allow automobiles to enter the airside and park adjacent to the leased hangars.

Transient aircraft passengers are transported from their aircraft by either private autos or by Airport operations to awaiting transportation. Operations personnel will either

transport passengers via shuttle service to awaiting limousine service or to the terminal rental counters.

> *Recommendation: Auto parking for GA and corporate passengers should be maintained at the leased facility areas or through shuttle service operated by the Airport. Separate auto parking facilities are not anticipated to be necessary for GA and corporate flights because the majority of the increased operations are anticipated to be itinerant flights, which are accommodated by rental car services, taxis, or other private transportation services. Tenants will park in auto lots adjacent to facilities or will use the Airport parking areas and contact operations for shuttle services.*

6.4 Summary of Facility Needs

The following is a summary of anticipated facility needs at HYA:

Short-term needs

- Construct jet fuel farm (60,000 gallons total)
- Improve ILS minimums to Runway 24 (250 and ¾ miles)
- Reconstruct run-up pad at Taxiway Charlie (Runway 24 approach end)
- Realign Taxiway Alpha to 400' offset to Runway 15
- Acquire land in Runway 33 RSA and RPZ (gas station and oil storage parcels)
- Relocate and Construct new ATCT

Long-term needs

- Realign Taxiway Bravo and extend to Runway 24 end
- Expand East Apron and construct Hangars, as needed
- Extend Runway 15-33 (Runway 15 approach end) and Taxiway A run-up pad

The following Capital Improvements Plan represents the priorities for the facilities improvements that were established by the Barnstable Airport Commission as a result of this ALP Update planning process. Appendix A provides the minutes of the Airport Commission's planning workshop at which the CIP priorities were established.

Following the list of CIP priorities is a compilation of preliminary cost estimates for the recommended improvements. These are organized into short-term and long-term groupings, based upon the priorities set by the Commission.

The subsequent Ultimate Airport Layout Plan (ALP) provides a recommended design layout to satisfy these projected facility needs at HYA. Together, the CIP and the ALP Update provide a framework for future improvements which the Barnstable Airport Commission can use as guidance, as they continue to meet the changing air service needs of Cape Cod.

7.0 CAPITAL IMPROVEMENT PROGRAM (CIP)

Summary

As noted above, the NERASP findings and the results of the InterVISTAS feasibility study confirm that Barnstable Municipal Airport could play a new and dynamic role in the economic development of Cape Cod. This expanded role would essentially restore jet service that had existed during the 1970's, and will not undermine the overarching need to protect and enhance its sensitive environment. Enough traffic is present to support a service, even if a majority of the Cape's passengers still patronize Boston Logan or Providence T.F. Green.

The Cape Cod regional service area is fully capable of supporting intercity passenger jet service. This intercity service could initially be operated by a turboprop or regional jet aircraft in the 40-90 seat range. Many types of aircraft could operate the proposed route. Their capacities, weight, and apron footprints vary widely. Because of this wide variation in types of aircraft, the apron and terminal ramp facilities should be planned with flexibility to accommodate a range in aircraft types.

The runway length needs of regional jet aircraft, combined with the takeoff distances of the corporate jets that currently operate at HYA, reveal the need for up to 1,000 feet of added takeoff distance. An analysis of each runway end reveals that the only inside-the-fence space available is approximately 925+ feet at the north end of Runway 15. This would meet approximately 80 to 90 percent of the increased takeoff distance required by Barnstable's aviation fleet. While this is a long-term need, it is also an important safety enhancement, and the BMAC should consider initiating steps to plan for this long-range safety enhancement. The HYA 5-Year Capital Improvement Program (CIP) has assumed that the estimated costs for such a long-range improvement would not occur until other, short-term and mid-term improvements have been completed.

The CIP is based upon priorities set by the Airport Commission, which emphasize safety improvements as the highest priority, followed by revenue-generating projects that enhance the airport's financial self-sufficiency (such as the new fuel farm). Other taxiway reconstruction and corporate apron improvements would be completed during the five to eight years after the Terminal Building and Access Road projects have been built. At this time, it is anticipated that the future improvements would include the reconstruction and realignment of Taxiway Alpha, the realignment of the runup pad for Taxiway Charlie, the realignment and extension of Taxiway Bravo, and extension of the East Ramp apron for corporate jets. The Commission also attaches high priority to the acquisition of incompatible land uses within the runway 33 RPZ and clearing the RVZ (see **Appendix A**).

It should be noted that the 5-Year CIP represents a flexible outline of anticipated airfield improvements. It is refined and updated on a yearly basis during annual CIP review meetings with the FAA and MAC. Airfield improvements are subject to change from year to year based upon the availability of funding and priorities set by the FAA.

INSERT: HYA FIVE YEAR CIP –November 2008

APPENDICES

A. Airport Commission CIP Priorities Workshop
Meeting Minutes – July 23, 2008

B. Airport Layout Plan Drawings

Appendix A. Airport Commission CIP Priorities Workshop
Meeting Minutes – July 23, 2008

Meeting Location	Barnstable Municipal Airport	**Client**	Barnstable Municipal Airport
Meeting Date/Time	July 23, 2008 6:00 PM	**Project**	ALP Update
Subject	ALP Update Workshop	**Project No.**	Y8B04200
Participants	Listed Below	**Notes Prepared By**	Michael Garrity Bill Richardson

Quincy "Doc" Mosby, Airport Manager
Frank Sanchez, Assistant Airport Manager
Dan Santos, Barnstable Airport Commission, Chairman
Art Kimber, Barnstable Airport Commission
Michael Dunning, Barnstable Airport Commission
John Griffin, Barnstable Airport Commission
Don Megathlin, Barnstable Airport Commission
Bob O'Brien, Barnstable Airport Commission
Ron Persuitte, Barnstable Airport Commission
Bill Richardson, Jacobs Engineering
Mike Garrity, Jacobs Engineering

Notes	**Action**
Chairman Dan Santos opened the ALP Update workshop explaining that he asked the Commissioners to review the ALP Update Draft Report and be prepared to discuss the content and CIP recommendations for future improvements. The intent of the workshop was to review the recommended improvements and establish the Airport Commission's priorities for the future CIP improvements. This establishes the Commission's goals for future airport improvements which are planned to follow the completion of the Terminal Building and Access Road projects. Mr. Santos had asked Patty Daley, an agent of the Town's Growth Management department, to attend. The Airport also has five Airport liaisons that were not in attendance. Mr. Santos noted that the ALP Update should be consistent with the Town's Comprehensive Master Plan, and vice-versa. The ALP illustrates the future priorities of the Airport Commission for improvements beyond the terminal building's multi-year	

program. The ALP Update provides a planning tool to show long term improvements (through the twenty-year planning period). The Airport has a 5-year Capital Improvement Program (CIP), which is a federal funding agenda that extends through the year 2013. The ALP Update prioritizes future improvements beyond the CIP's five year program.

The ALP Update sequences projects into short-to-mid-term projects (within ten years) and long-term projects (eleven to twenty years). The proposed projects were prioritized in descending order. Highest priority was given to safety projects that correct non-standard conditions and potential hazards. Lesser priority was given to capacity enhancement projects that support corporate and passenger operations. CIP projects are also coordinated with Airport staff, MAC and FAA to ensure consistency with future funding programming.

The Airport Commission noted that the CIP does not directly compare to the Town's Pro Forma funding request plan, which runs through 2013. The Town's Pro Forma includes Taxiway A reconstruction. The new ALP and CIP envisions improvements that extend beyond 2013 to include reconstruction of Taxiways C, B, and a future "inside-the-fence" extension of Runway 15.

The CIP is a flexible list. Projects and priorities can be shifted from short-term to long-term time frames, without getting too specific. Projects beyond the 5-Year CIP must be shown on the Ultimate ALP drawing because this is the Airport "wish list" for the next twenty year planning period. If funding becomes available sooner, and the Airport has an improvement noted on the ALP drawing, the FAA may allow the project to move up and get developed prior to the scheduled planned period. This review and update occurs during an annual CIP review and coordination meeting between the Airport, the MAC and the FAA.

The CIP list was modified to reflect the priorities set by the Commission at the Workshop. The revised CIP is as follows:

1. Taxiway A (Phase I)
2. Taxiway A (Phase II)
3. Taxiway A (Phase III)
4. RW33 RSA/RPZ Land Acquisition
5. Fuel Farm (ASMP or Private $)
6. Taxiway C Reconstruction
7. Taxiway B (Phase I)
8. Taxiway B (Phase II)

9. Taxiway B (Phase III)
10. RW15 Extension

Discussion of each CIP project is included in the following paragraphs. CIP improvements are phased, either due to funding issues (FAA and Local shares), construction timing, or to maintain operational flexibility during the development process.

1. Taxiway A (Phase I)
2. Taxiway A (Phase II)
3. Taxiway A (Phase III)

Taxiway A will be relocated in conjunction with the new terminal building. This improvement includes repaving the commercial aircraft ramp, relocating the taxiway 400 feet from Runway 15-33, and the development of a holding bay at the Runway 15 end. This improvement eliminates multiple non-conforming FAA design standards (parallel taxiway centerline to runway centerline and FAR Part 77 standards). This improvement will be built in three phases to maintain operational flexibility and comply with FAA funding availability.

It was noted that the acquisition of the Bakery parcel would be AIP eligible because of the Part 77 non-conforming conditions, and the Airport could ensure compatible land use by acquiring this property. It appeared that this purchase was excluded because of funding issues.

4. RW33 RSA/RPZ Land Acquisition
5. Fuel Farm (ASMP or Private $)
6. Taxiway C Reconstruction

The Commission attaches very high priority to removing the incompatible gas station and fuel oil storage uses from within the Runway 33 RSA and RPZ. These are hazards to aviation safety and should be removed from the RSA and RPZ areas. Land Acquisition should occur immediately after Taxiway A improvements. These acquisitions are prioritized as (1. Volta, 2. Exxon, and 3. Nelson Oil). Acquisition of these parcels should be eligible for discretionary moneys from FAA because they are within the RSA, ROFA, and RPZ (extended ROFA).

The fuel farm is not eligible as an AIP federally funded project. The commission wishes to give priority to this project as a potential joint Airport-ASMP project, or as a potential privately-

funded project. The Fuel Farm was moved up in the CIP pending the availability of MAC funding (80% MAC – 20% Airport), or as a potential private source of funding. Aviation fuel suppliers have built tank farms at Airports with stipulations such as the purchase of fuel from them over the next ten year time period.

Reconstruction of Taxiway C is a replacement project that addresses an aging pavement condition problem and RSA grading issue that have been identified by the FAA. The taxiway is more than 20 years old, which is beyond the FAA's programmed life for airfield pavement.

7. Taxiway B (Phase I)
8. Taxiway B (Phase II)
9. Taxiway B (Phase III)

Taxiway B is to be relocated to the FAA standard 400-foot offset from Runway 6-24 and extended to the end of Runway 24. Currently, corporate jets departing Runway 24 from the east ramp must cross the Runway 24 to taxi to takeoff position. FAA has stated that runway crossings should be located at the runway ends. The tower also has stated there are visual anomalies preventing clear line-of-sight conditions along the Runway closer to the Runway 24 end. The construction of Taxiway B eliminates issues related to the large number of corporate jets crossing an active runway more than necessary and the unclear ATCT visual condition.

Taxiway B has been included in the DRI permitting process and was included in the previous MEPA EIR and FAA EA. The additional pavement required to relocate and extend Taxiway B is in the current DRI. It was noted that Nantucket has recharge galleries located under pavements to provide additional groundwater recharge capacity where retention ponds are unfeasible.

The layout of hangars along the East Ramp and Taxiway B apron was designed to maximize efficiency within the spatial constraints of the site. The layout is shown as a reference tool to ensure that hangar developers understand what the Airport is planning as ultimate conditions.

Private funds are expected to be used in the development of each hangar site. The Airport researched building its own hangars, but found it more costly because of the long and costly

state process involved. The hangars will provide an additional source of revenue with little capital expenditure. Taxiway B apron will also create additional maneuvering space for parking corporate jets.

The status on the ATCT project was discussed. The relocation of the ATCT had not been included in the DRI process with CCC. Funding was recently awarded by Congress in the amount of $3.1M. The FAA AFTIL group will model the Airport in 3D to simulate the view from a new tower, with sun angles, procedure clearance areas, and depth perceptions at various tower locations. They determine the final location in a process that could take approximately eleven months. The Airport has an agreement with PBS&J to design and construct the new ATCT in the location that is identified by FAA's AFTIL group. Once that site is identified, the Airport will have to complete the DRI process with the CCC staff.

10. Extend Runway 15-33 (and Taxiway A)

The Commission agreed there are many positives and few negatives to the Runway extension. The extension would send a positive message to airlines that the Airport is willing to accommodate increased safety with Runway lengths.

A discussion of the lesser noise impacts was noted in the ALP Update under the discussion of the Runway 15-33 extension. Landings will still occur at the displaced threshold on Runway 15 (where they currently land). Takeoffs will start 926 feet back, giving aircraft more time to climb before they are above residential areas. This will result in a smaller noise footprint. Because the extension is constrained by the existing property line, the environmental permitting is reasonable.

It was also noted that HYA (with its proposed runway extension) is more strategically located to service the Cape's service area, compared to Otis. Otis has a 9,500 foot runway used by the military, which restricts its use. If Otis were opened to civilian use, the types and sizes that use the airport would unrestricted. Therefore, if the community is concerned about large aircraft flying over their houses, they should prefer HYA over Otis. HYA also fits the local feel of a Cape Cod airport serving Cape Cod passengers.

It was noted that the demand for air travel is stronger on Cape Cod than at Portland, Bangor, or Burlington. This should send a

message to potential regional carriers who might service this growing Cape Cod market. The new terminal will help the Airport to market itself to potential carriers.

Other discussion:

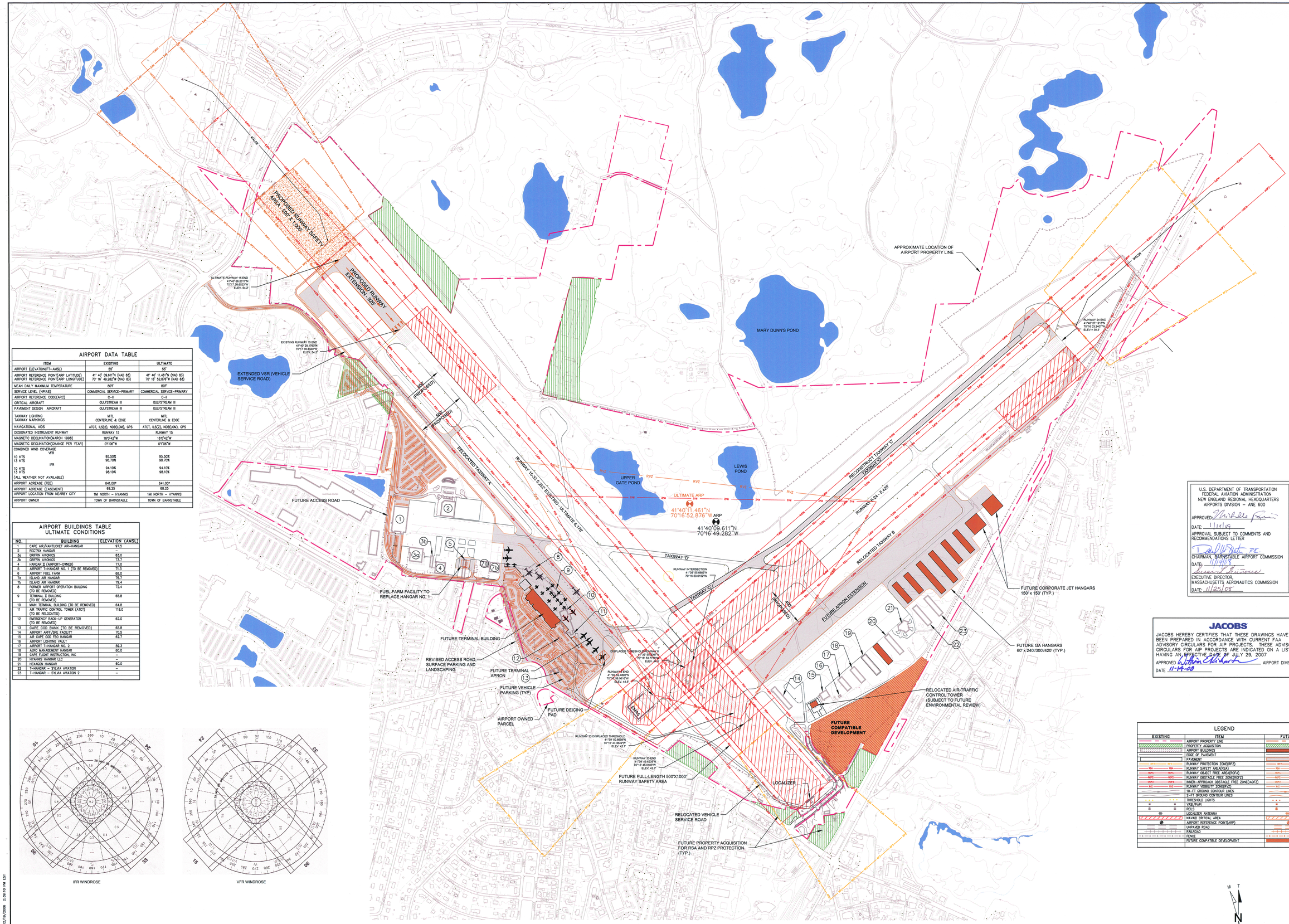
The Commission noted the lack of the K-Mart plaza and Cape Steel being identified for future acquisition. The ALP shows K-Mart Plaza as Airport property. The Commission agreed to postpone any initiative regarding the use or acquisition of the Cape steel parcel.

The Commission noted that before an information meeting is scheduled with the Town, more analysis should be developed for the following topics:

- Noise Impacts
- Load Factors
- Increase in Jet Fuel Sales

JEK will reword the passenger mix paragraph regarding seasonal demand vs. year round passengers. JEK will also show the interim access road on Figure 1-2 in Section 1. JEK will make the changes requested and submit ten copies (without the ALP sets) to the Airport Commission for final review.

Appendix B. Airport Layout Plan Drawings



AIRPORT DATA TABLE

ITEM	EXISTING	ULTIMATE
AIRPORT ELEVATION(FT-AMSL)	55'	55'
AIRPORT REFERENCE POINT(ARP LATITUDE) AIRPORT REFERENCE POINT(ARP LONGITUDE)	41° 40' 09.611"N (NAD 83) 70° 16' 49.282"W (NAD 83)	41° 40' 11.461"N (NAD 83) 70° 16' 52.876"W (NAD 83)
MEAN DAILY MAXIMUM TEMPERATURE	80°F	80°F
SERVICE LEVEL (NPIAS)	COMMERCIAL SERVICE-PRIMARY	COMMERCIAL SERVICE-PRIMARY
AIRPORT REFERENCE CODE(ARC)	C-II	C-II
CRITICAL AIRCRAFT	GULFSTREAM III	GULFSTREAM III
PAVEMENT DESIGN AIRCRAFT	GULFSTREAM III	GULFSTREAM III
TAXIWAY LIGHTING TAXIWAY MARKINGS	MITL CENTERLINE & EDGE	MITL CENTERLINE & EDGE
NAVIGATIONAL AIDS	ATCT, ILS(2), NDB(LOM), GPS	ATCT, ILS(2), NDB(LOM), GPS
DESIGNATED INSTRUMENT RUNWAY	RUNWAY 15	RUNWAY 15
MAGNETIC DECLINATION(MARCH 1998)	16°0'42"W	16°0'42"W
MAGNETIC DECLINATION(CHANGE PER YEAR)	0°1'06"W	0°1'06"W
COMBINED WIND COVERAGE VFR 10 KTS 13 KTS IFR 10 KTS 13 KTS (ALL WEATHER NOT AVAILABLE)	 95.50% 98.70% 94.10% 98.10%	 95.50% 98.70% 94.10% 98.10%
AIRPORT ACREAGE (FEE)	641.00*	641.00*
AIRPORT ACREAGE (EASEMENT)	68.25	68.25
AIRPORT LOCATION FROM NEARBY CITY	1MI NORTH – HYANNIS	1MI NORTH – HYANNIS
AIRPORT OWNER	TOWN OF BARNSTABLE	TOWN OF BARNSTABLE

AIRPORT BUILDINGS TABLE ULTIMATE CONDITIONS

NO.	BUILDING	ELEVATION (AMSL)
1	CAPE AIR/NANTUCKET AIR–HANGAR	97.5
2	RECTRIX HANGAR	–
3a	GRIFFIN AVIONICS	83.0
3b	GRIFFIN AVIONICS	73.7
4	HANGAR II (AIRPORT–OWNED)	77.0
5	AIRPORT T–HANGAR NO. 1 (TO BE REMOVED)	71.3
6	AIRPORT FUEL FARM	68.0
7a	ISLAND AIR HANGAR	76.7
7b	ISLAND AIR HANGAR	79.4
8	FORMER AIRPORT OPERATION BUILDING (TO BE REMOVED)	72.4
9	TERMINAL B BUILDING (TO BE REMOVED)	65.8
10	MAIN TERMINAL BUILDING (TO BE REMOVED)	64.8
11	AIR TRAFFIC CONTROL TOWER (ATCT) (TO BE RELOCATED)	116.0
12	EMERGENCY BACK–UP GENERATOR (TO BE REMOVED)	62.0
13	CAPE COD BANK (TO BE REMOVED)	65.8
14	AIRPORT ARFF/SRE FACILITY	70.5
15	AIR CAPE COD FBO HANGAR	62.7
16	AIRPORT LIGHTING VAULT	–
17	AIRPORT T–HANGAR NO. 2	59.3
18	AERO MANAGEMENT HANGAR	60.0
19	CAPE FLIGHT INSTRUCTION, INC	–
20	HYANNIS HANGAR LLC	–
21	HEXAGON HANGAR	60.0
22	T–HANGAR – SYLVIA AVIATION	–
23	T–HANGAR – SYLVIA AVIATION 2	–

RUNWAY DATA TABLE

ITEM	RUNWAY 6		RUNWAY 24		RUNWAY 15		RUNWAY 33	
	EXISTING	ULTIMATE	EXISTING	ULTIMATE	EXISTING	ULTIMATE	EXISTING	ULTIMATE
EFFECTIVE GRADIENT (%)	–0.11	–0.11	+0.11	+0.11	–0.21	–0.21	0.21	0.21
APPROACH VISIBILITY MINIMUMS	NP GPS (2?'–1M)	NP GPS (2?'–1M)	ILS CAT I (250'–1M)	ILS CAT I (250'–¾ MI)	ILS CAT I (200–¾ MI)	ILS CAT I (200–¾ MI)	VISUAL	GPS/RNAV/LPV (2?'–1/2 MI)
RUNWAY LENGTH & WIDTH (FT)	5,425' x 150'	5,425' x 150'	5,425' x 150'	5,425' x 150'	5,252' x 150'	6,178' x 150'	5252 x 150	6,178' x 150'
DISPLACED THRESHOLDS	406'	406'	NONE	NONE	NONE	926'	150'	150'
PAVEMENT DESIGN STRENGTH (LBS) GROSS	S–30,000, D–108,000	S–30,000, D–108,000	S–30,000, D–60,000	S–30,000, D–108,000	S–30,000, D–60,000	S–30,000, D–60,000	S–30,000, D–60,000	S–30,000, D–60,000
PAVEMENT TYPE AND CONDITION	ASPHALT, GRVD, GOOD	ASPHALT, GRVD, GOOD	ASPHALT, GRVD, GOOD	ASPHALT, GRVD, GOOD	ASPHALT, GRVD, GOOD	ASPHALT, GRVD, GOOD	ASPHALT, GRVD, GOOD	ASPHALT, GRVD, GOOD
LIGHTING	HIRL	HIRL	HIRL	HIRL	HIRL	HIRL	HIRL	HIRL
MARKING	P	P	P	P	P	P	P	P
VISUAL APPROACH AIDS	REIL, P4L	REIL, P4L	MALSR/REIL, V4L	MALSR/REIL, V4L	MALSR	MALSR	MALSR/REIL, V4L	MALSR/REIL, V4L
OFA WIDTH REQUIRED (AVAILABLE)–FT	800'	800'	800'	800'	800'	800'	800'	800'
OFA LENGTH BEYOND STOP END OF RUNWAY (AVAILABLE)–FT	1,000'	1,000'	1,000'	1,000'	1,000'	1,000'	1,000'	1,000'
RSA WIDTH REQUIRED (AVAILABLE)–FT	500'	500'	500'	500'	500'	500'	500'	500'
RSA LENGTH BEYOND STOP END OF RUNWAY (AVAILABLE)–FT	1,000'	1,000'	400'	400'	1,000'	1,000'	1,000'	1,000'
TAKE OFF RUN AVAILABLITY (TORA)–FT	5,425'	5,425'	5,425'	5,425'	5,252'	6,178'	5,252'	6,178'
TAKE OFF DISTANCE AVAILABILITY (TODA)–FT	5,425'	5,425'	5,425'	5,425'	5,252'	6,178'	5,252'	6,178'
ACCELERATE–STOP DISTANCE AVAILABLE(ASDA)–FT	5,425'	5,425'	5,425'	5,425'	5,252'	5,252'	5,252'	6,028'
LANDING DISTANCE AVAILABLE (LDA) – FT	5,019'	5,019'	5,425'	5,425'	5,252'	5,252'	5,252'	6,028'

NOTE: DATA ABOVE DISTANCE INFORMATION ONLY PER FAA APPROVED RSA STUDY, MAY 2003

OBSTACLE FREE ZONE ELEVATIONS (AMSL)

	ROFZ	ITOFZ	IAOFZ
RUNWAY 06/24	205	N/A	92
RUNWAY 15/33	108	205	99

PERMITTING STATUS

PROJECT	NEPA	MEPA	CCC
TERMINAL BUILDING, APRON, AUTO PARKING, NEW ACCESS ROAD	DONE	DONE	DONE
TAXIWAY 'A'	DONE	DONE	DONE
TAXIWAYS 'B' & 'C'	DONE	DONE	TO BE DONE
EAST RAMP	DONE	DONE	TO BE DONE
FUEL FARM	DONE	DONE	TO BE DONE
CONTROL TOWER	DONE	DONE	TO BE DONE
RUNWAY EXTENSION	TO BE DONE	TO BE DONE	TO BE DONE
LAND ACQUISITION	N/A	N/A	N/A

NON CONFORMING CONDITIONS

DESCRIPTION	EXISTING/ PLANNED	STANDARD	REMARKS	DATE APPROVED
A 1,500' SECTION OF T/W C EAST OF T/W D IS 1.0' HIGHER THAN PRIMARY SURFACE	EXISTING	AC 150/5300–13 REQUIRES 500' WIDE SAFETY AREA FOR R/W 24, MTS VALID UNTIL T/W C IS RECONSTRUCTED	APPROVED MTS NO. 101. MTS FOR T/W C ELEVATION ABOVE RUNWAY ELEVATION VALID UNTIL T/W C RECONSTRUCTED.	07–16–93
TREES OBSTRUCT RVZ NORTH OF RUNWAY INTERSECTION	PLANNED	AC 150/5300–13, PAR.503B., A CLEAR UNOBSTRUCTED LINE OF SITE FROM ANY POINT FIVE FEET ABOVE RUNWAY CENTERLINE TO ANY POINT FIVE FEET ABOVE AN INTERSECTION CENTERLINE WITHIN THE RVZ	REMOVE OBSTRUCTION TREES AND POLE CLEAR TREES AS NECESSARY TO ACQUIRE CLEAR RVZ LINE–OF–SITE	

CERTIFIES THAT ALL AIRPORT ELEMENTS SHOWN ON THIS ALP ARE IN ACCORDANCE WITH CRITERIA CONTAINED IN THE CURRENT EDITION OF THE FAA ADVISORY CIRCULAR 150/5300–13, CHANGE 8, EXCEPT AS NOTED IN THE ABOVE TABLE ENTITLED " NON CONFORMING CONDITIONS".

CERTIFICATION: Barnstable Municipal Airport (NAME OF SPONSOR)

NAME: Frank Gardner Jr.

11/14/08 DATE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
NEW ENGLAND REGIONAL HEADQUARTERS
AIRPORTS DIVISION – ANE 600

APPROVED: [signature]

DATE: 11/14/08

APPROVAL SUBJECT TO COMMENTS AND RECOMMENDATIONS LETTER

[signature] P.E.
CHAIRMAN, BARNSTABLE AIRPORT COMMISSION

DATE: 11/14/08

[signature]
EXECUTIVE DIRECTOR,
MASSACHUSETTS AERONAUTICS COMMISSION

DATE: 11/25/08

JACOBS

JACOBS HEREBY CERTIFIES THAT THESE DRAWINGS HAVE BEEN PREPARED IN ACCORDANCE WITH CURRENT FAA ADVISORY CIRCULARS FOR AIP PROJECTS. THESE ADVISORY CIRCULARS FOR AIP PROJECTS ARE INDICATED ON A LISTING HAVING AN EFFECTIVE DATE OF JULY 29, 2007

APPROVED [signature] AIRPORT DIVISION

DATE 11-14-08

LEGEND

EXISTING	ITEM	FUTURE
	AIRPORT PROPERTY LINE	
	PROPERTY ACQUISITION	
	AIRPORT BUILDINGS	
	EDGE OF PAVEMENT	
	PAVEMENT	
RPZ	RUNWAY PROTECTION ZONE(RPZ)	RPZ
RSA	RUNWAY SAFETY AREA(RSA)	RSA
ROFA	RUNWAY OBJECT FREE AREA(ROFA)	ROFA
ROFZ	RUNWAY OBSTACLE FREE ZONE(ROFZ)	ROFZ
AOFZ	RUNWAY APPROACH OBSTACLE FREE ZONE(AOFZ)	AOFZ
RVZ	RUNWAY VISIBILITY ZONE(RVZ)	RVZ
	10–FT GROUND CONTOUR LINES	
	2–FT GROUND CONTOUR LINES	
	THRESHOLD LIGHTS	
	VASI/PAPI	
	REILS	
	LOCALIZER ANTENNA	
	NAVAID CRITICAL AREA	
	AIRPORT REFERENCE POINT(ARP)	
	UNPAVED ROAD	
	RAILROAD	
	FENCE	
	FUTURE COMPATIBLE DEVELOPMENT	

M T
N

MAG. VAR. 16°00'42" W
3/10/98
ANNUAL RATE OF CHANGE
00°01'06" W

GRAPHIC SCALE
300 0 150 300 600
(IN FEET)
1 inch = 300 ft.

ENGINEER/ARCHITECT

REV.	DESCRIPTION	AIP NO. 3–25–0025–33	DR. BY	JOB APPD BY	DATE
1					

PROJECT NO. Y8B04200
FILE NAME ULTIMATE

JACOBS
343 CONGRESS STREET
BOSTON, MA 02210

DES. BY WER | DR. BY HHM | CHKD. BY WER

DATE: NOVEMBER 2008

SCALE: 1" = 300'

BARNSTABLE MUNICIPAL AIRPORT
BARNSTABLE, MASSACHUSETTS

ULTIMATE AIRPORT LAYOUT PLAN

DRAWING NO. 3
3 OF 11

J:\Non Projects\Airports\GA_AIRPORTS\YYV\ALP\DGN\C-03REV.dwg 12/19/2008 2:39:10 PM EST

FUEL FARM FACILITY TO
REPLACE HANGAR NO. 1

FUTURE
TERMINAL
BUILDING

REVISED ACCESS ROAD,
SURFACE PARKING AND
LANDSCAPING

NEW AFTIL - APPROVED ATCT SITE

FUTURE TERMINAL
APRON

FUTURE VEHICLE
PARKING (TYP)

AIRPORT OWNED
PARCEL

FUTURE DEICING
PAD

TAXIWAY 'D'

RUNWAY 6 END
41°39' 52.4892"N
70°16' 58.0616"W
ELEV. 44.5'

EMAS

AIRPORT BUILDINGS TABLE
ULTIMATE CONDITIONS

NO.	BUILDING	ELEVATION (AMSL)
1	CAPE AIR/NANTUCKET AIR-HANGAR	97.5
2	RECTRIX HANGAR	–
3a	GRIFFIN AVONICS	83.0
3b	GRIFFIN AVONICS	73.7
4	HANGAR II (AIRPORT-OWNED)	77.0
5	AIRPORT T-HANGAR NO. 1 (TO BE REMOVED)	71.3
6	AIRPORT FUEL FARM	68.0
7a	ISLAND AIR HANGAR	76.7
7b	ISLAND AIR HANGAR	79.4
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9	TERMINAL II BUILDING (TO BE REMOVED)	65.8
10	MAIN TERMINAL BUILDING (TO BE REMOVED)	64.8
11	AIR TRAFFIC CONTROL TOWER (ATCT) (TO BE RELOCATED)	118.0
12	EMERGENCY BACK-UP GENERATOR (TO BE REMOVED)	62.0
13	CAPE COD BANK (TO BE REMOVED)	65.8
14	AIRPORT ARFF/SRE FACILITY	70.5
15	AIR CAPE COD FBO HANGAR	62.7
16	AIRPORT LIGHTING VAULT	–
17	AIRPORT T-HANGAR NO. 2	59.3
18	AERO MANAGEMENT HANGAR	60.0
19	CAPE FLIGHT INSTRUCTION INC.	–
20	HYANNIS HANGAR LLC	–
21	HEXAGON HANGAR	60.0
22	T-HANGAR – SYLVIA AVIATION	–
23	T-HANGAR – SYLVIA AVIATION 2	–

LEGEND

ITEM
AIRPORT PROPERTY LINE
ULTIMATE AIRPORT BUILDINGS
EDGE OF PAVEMENT
NEW/RECONSTRUCTED PAVEMENT
RUNWAY PROTECTION ZONE(RPZ)
RUNWAY SAFETY AREA(RSA)
RUNWAY OBJECT FREE AREA(ROFA)
RUNWAY OBSTACLE FREE ZONE(ROFZ)
INNER-APPROACH OBSTACLE FREE ZONE(IAOFZ)
RUNWAY VISIBILITY ZONE(RVZ)
10-FT GROUND CONTOUR LINES
2-FT GROUND CONTOUR LINES
THRESHOLD LIGHTS
VASI/PAPI
REILS
TRANSMISSOMETER
LOCALIZER ANTENNA
NAVAID CRITICAL AREA
AIRPORT REFERENCE POINT(ARP)
FENCE
UNPAVED ROAD
RAILROAD
EXISTING FENCE
EXISTING BUILDINGS

MAG. VAR. 16°00'42" W
3/10/98
ANNUAL RATE OF CHANGE
00°01'06" W

GRAPHIC SCALE
60 0 30 60 120
(IN FEET)
1 inch = 60 ft.

ENGINEER/ARCHITECT

REV.	DESCRIPTION	DR. BY	CKD APPD. BY	DATE
2	RELOCATED ATCT SITE PER AFTIL-1	ZB	HM WR	4.23.10
1	AIP NO. 3-25-0025-33			

PROJECT NO.
Y8B04200

FILE NAME
TERMINAL PLAN

DES. BY WER
DR. BY HHM
CHKD. BY WER

JACOBS™
343 CONGRESS STREET
BOSTON, MA 02210

DATE: NOVEMBER 2008

SCALE: 1"= 60'

BARNSTABLE MUNICIPAL AIRPORT
BARNSTABLE, MASSACHUSETTS

TERMINAL LAYOUT PLAN

DRAWING NO.
4
4 OF 11

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FUEL FARM FACILITY TO
REPLACE HANGAR NO. 1

FUTURE
TERMINAL
BUILDING

REVISED ACCESS ROAD,
SURFACE PARKING AND
LANDSCAPING

FUTURE TERMINAL
APRON

FUTURE VEHICLE
PARKING (TYP)

FUTURE DEICING
PAD

AIRPORT OWNED
PARCEL

TAXIWAY 'D'

RUNWAY 6 END
41°39' 52.4892"N
70°16' 58.0616"W
ELEV. 44.5'

EMAS

AIRPORT BUILDINGS TABLE
ULTIMATE CONDITIONS

NO.	BUILDING	ELEVATION (AMSL)
1	CAPE AIR/NANTUCKET AIR-HANGAR	97.5
2	RECTRIX HANGAR	–
3a	GRIFFIN AVIONICS	83.0
3b	GRIFFIN AVIONICS	73.7
4	HANGAR II (AIRPORT-OWNED)	77.0
5	AIRPORT T-HANGAR NO. 1 (TO BE REMOVED)	71.3
6	AIRPORT FUEL FARM	68.0
7a	ISLAND AIR HANGAR	76.7
7b	ISLAND AIR HANGAR	79.4
8	FORMER AIRPORT OPERATION BUILDING (TO BE REMOVED)	72.4
9	TERMINAL II BUILDING (TO BE REMOVED)	65.8
10	MAIN TERMINAL BUILDING (TO BE REMOVED)	64.8
11	AIR TRAFFIC CONTROL TOWER (ATCT) (TO BE RELOCATED)	118.0
12	EMERGENCY BACK-UP GENERATOR (TO BE REMOVED)	62.0
13	CAPE COD BANK (TO BE REMOVED)	65.8
14	AIRPORT ARFF/SRE FACILITY	70.5
15	AIR CAPE COD FBO HANGAR	62.7
16	AIRPORT LIGHTING VAULT	–
17	AIRPORT T-HANGAR NO. 2	59.3
18	AERO MANAGEMENT HANGAR	60.0
19	CAPE FLIGHT INSTRUCTION INC.	–
20	HYANNIS HANGAR LLC	–
21	HEXAGON HANGAR	60.0
22	T-HANGAR – SYLVIA AVIATION	–
23	T-HANGAR – SYLVIA AVIATION 2	–

LEGEND

ITEM	
AIRPORT PROPERTY LINE	
ULTIMATE AIRPORT BUILDINGS	
EDGE OF PAVEMENT	
NEW/RECONSTRUCTED PAVEMENT	
RUNWAY PROTECTION ZONE(RPZ)	RPZ RPZ
RUNWAY SAFETY AREA(RSA)	RSA RSA
RUNWAY OBJECT FREE AREA(ROFA)	ROFA ROFA
RUNWAY OBSTACLE FREE ZONE(ROFZ)	ROFZ ROFZ
INNER-APPROACH OBSTACLE FREE ZONE(IAOFZ)	IAOFZ IAOFZ
RUNWAY VISIBILITY ZONE(RVZ)	RVZ RVZ
10-FT GROUND CONTOUR LINES	
2-FT GROUND CONTOUR LINES	
THRESHOLD LIGHTS	
VASI/PAPI	
REILS	
TRANSMISSOMETER	
LOCALIZER ANTENNA	
NAVAID CRITICAL AREA	
AIRPORT REFERENCE POINT(ARP)	
FENCE	
UNPAVED ROAD	
RAILROAD	
EXISTING FENCE	
EXISTING BUILDINGS	

M T
N

MAG. VAR. 16°00'42" W
3/10/98
ANNUAL RATE OF CHANGE
00°01'06" W

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REV.	DESCRIPTION	AIP NO. 3-25-0025-33	DATE	APPD. BY	CKD. BY	DR. BY
1						

PROJECT NO. Y8B04200
FILE NAME TERMINAL PLAN

JACOBS
343 CONGRESS STREET
BOSTON, MA 02210

DES. BY	DR. BY	CHKD. BY
WER	HHM	WER

DATE: NOVEMBER 2008
SCALE: 1"= 60'

BARNSTABLE MUNICIPAL AIRPORT
BARNSTABLE, MASSACHUSETTS

TERMINAL LAYOUT PLAN

DRAWING NO.
4
4 OF 11

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