CHAPTER 6 – Facility Requirements

–FINAL DRAFT–

December 2014

Prepared by:
Jacobs Engineering

Prepared for:
Nantucket Memorial Airport Commission

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6.0 Introduction

The basic objective of this Master Plan is to maintain the Airport's existing facilities, while meeting the FAA's airfield design and operational safety standards. The selected forecast from Chapter 5, "Aviation Activity Forecasts", is the "Status Quo" forecast. That Status Quo forecast is used as the basis for planning the needs of existing and future facilities, and assumes neither significant increases in passenger enplanements nor significant changes in the aircraft fleet over the next 20 years. However, two segments of aviation activity that have exhibited recent growth at ACK are expected to continue. These are the regional service provided by four major airlines (JetBlue, Delta, United, US Airways) to large hub airports in the summer months, and the activity of corporate/private jets. Under the worst-case 'downward trends' assumptions from Chapter 5, there may be added pressures on the C-402 fleet which could reduce their frequency of operations on the ACK-HYA runs, as well as on passenger enplanement levels due to competition from new Fast Ferry service. The implications of each are reflected in the Facility Requirements, as discussed below.

It should be noted that, even with existing activity levels, there are several areas of Nantucket Airport that are regularly congested during the summer months which create passenger inconvenience and operational safety issues:

- Inside the terminal building, including the passenger hold room, TSA security screening area, and airline ticket counters/queuing area;
- The terminal apron parking positions when airline schedules overlap and delays occur due to fog or severe weather at the destination airports; and
- The GA South Apron when private jets with large wingspans require adequate space for safe maneuvering and parking.

The congestion experienced during summer months that results from the Airport's servicing the Island's seasonally based high-end tourism economy is expected to continue throughout the Status Quo forecast period. The Facility Requirements to meet the existing and anticipated Status Quo forecast needs can be grouped into five categories:

1. **Safety and Security Improvements** for Compliance with Existing FAA Design Standards;
2. **Capacity Improvements** to Reduce Congestion and Improve Traffic and Passenger Flow;
3. **Efficiency Improvements** to Improve Operations and Maintenance Facilities;
4. **Revenue Improvements** to Improve Income Streams and Financial Stability; and
5. **Environmental/ Sustainability Improvements** to Improve the Stewardship of Resources.

The following sections are grouped into these five categories of Facility Needs. Alternatives which address each of the needs are presented in **Chapter 7** – **Alternative Improvement Concepts**.

6.1 Safety and Security Improvements

This section describes those facilities or improvements needed to bring the airport into compliance with the standards in FAA's Advisory Circular (AC) 150/5300-13A (Change 1), dated 2/26/2014 as well as to enhance airport security.

The FAA Design Standards which trigger these existing deficiencies are discussed in more detail, below. The time frame for addressing the existing deficiencies generally involves short-term (up-to five years), medium-term (six to ten years), and long-term (eleven to twenty year) periods. Long range planning primarily focuses on a more general assessment of needs, while short-term analysis focuses on immediate action items. Other initiatives, discussed in Chapter 7, may not include facility improvements, but focus instead on short-term revenue and sustainability enhancements. The priorities for addressing these deficiencies will be established by the Airport Commission, in collaboration with the FAA and MassDOT, during the preparation of Chapter 8 – "Facilities Implementation Plan/ACIP".

6.1.1 Design Standard Deficiencies

The runways, taxiways and aircraft parking aprons at ACK were analyzed for compliance with FAA design standards, and the ability to handle existing and forecast levels of demand. Each runway has unique characteristics which serve different operational needs for different aircraft. The individual FAA Runway Design Standards, as applied to ACK's runways, taxiways, and aprons are described in the following sections.

6.1.1.1 Runway Design - Length and Width

FAA Advisory Circular 150/5325-4B *Runway Length Recommendations for Airport Design* provides guidance for determining runway length requirements for planning purposes, although airlines may establish their own Operational Specifications for runway lengths. The recommended runway lengths are calculated using the airport elevation, average maximum daily temperature of the hottest month, with no wind corrections, and the runway gradient, plus aircraft weights.

Table 6-1 below presents the recommended runway lengths using Table 1-1 on Page 3 of AC 150/5325-4B.

Table 6-1 Existing Runway Lengths[1] and Widths	
Airport Elevation	47 ft. Mean Sea Level (MSL)
Mean Daily Maximum Temperature of the Hottest Month	76°F (July)
Maximum Difference in Runway Centerline Elevation	20.2 ft.
Runway 6-24 Length and Width	6,303 ft./150 ft.
Runway 15-33 Length and Width	4,500 ft./100 ft.
Runway 12-30 Length and Width	2,696 ft./50 ft.
Runway Length Recommended for Airport Design	
Small Airplanes with Approach Speeds Less than 30 Knots	301.41 ft.

[1] *Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, Figure 2-1, *Use only 100% of small airplanes with less than 10 passenger seats for airport elevations exceeding 3,000 feet; Figure 3-1 & 3-2.*

Small Airplanes with Approach Speeds between 30 & 50 Knots	803.76 ft.
Small Airplanes with Approach Speeds greater than 50 Knots	
95% of these Small Airplanes	2,950 ft. (Approx.)
100% of these Small Airplanes*	N/A
Large Airplanes with MTOW of 60,000lbs or less	
75% of these Large Airplanes at 60% Useful Load	4,600 ft.
75% of these Large Airplanes at 90% Useful Load	7,600 ft.
100% of these Large Airplanes at 60% Useful Load	4,900 ft.
100% of these Large Airplanes at 90% Useful Load	7,300 ft.

The FAA Runway Length Analysis indicates that at 6,303 feet, Runway 6-24 currently accommodates 100% of large airplanes weighing less than 60,000 pounds at 60% useful load and 75% of large airplanes at 90% useful load.

A more detailed analysis of runway length requirements was conducted based on the typical fleet mix operating at ACK as shown in **Figure 6-1** on the following page. These selected aircraft are expected to make substantial use of the runways through the 5-year short-term planning period. The typical take off performance shown is based on sea level, standard temperature (59°F), and MTOW (maximum take-off weight). The calculations should not be used as a substitute for aircraft manufacturer specifications.

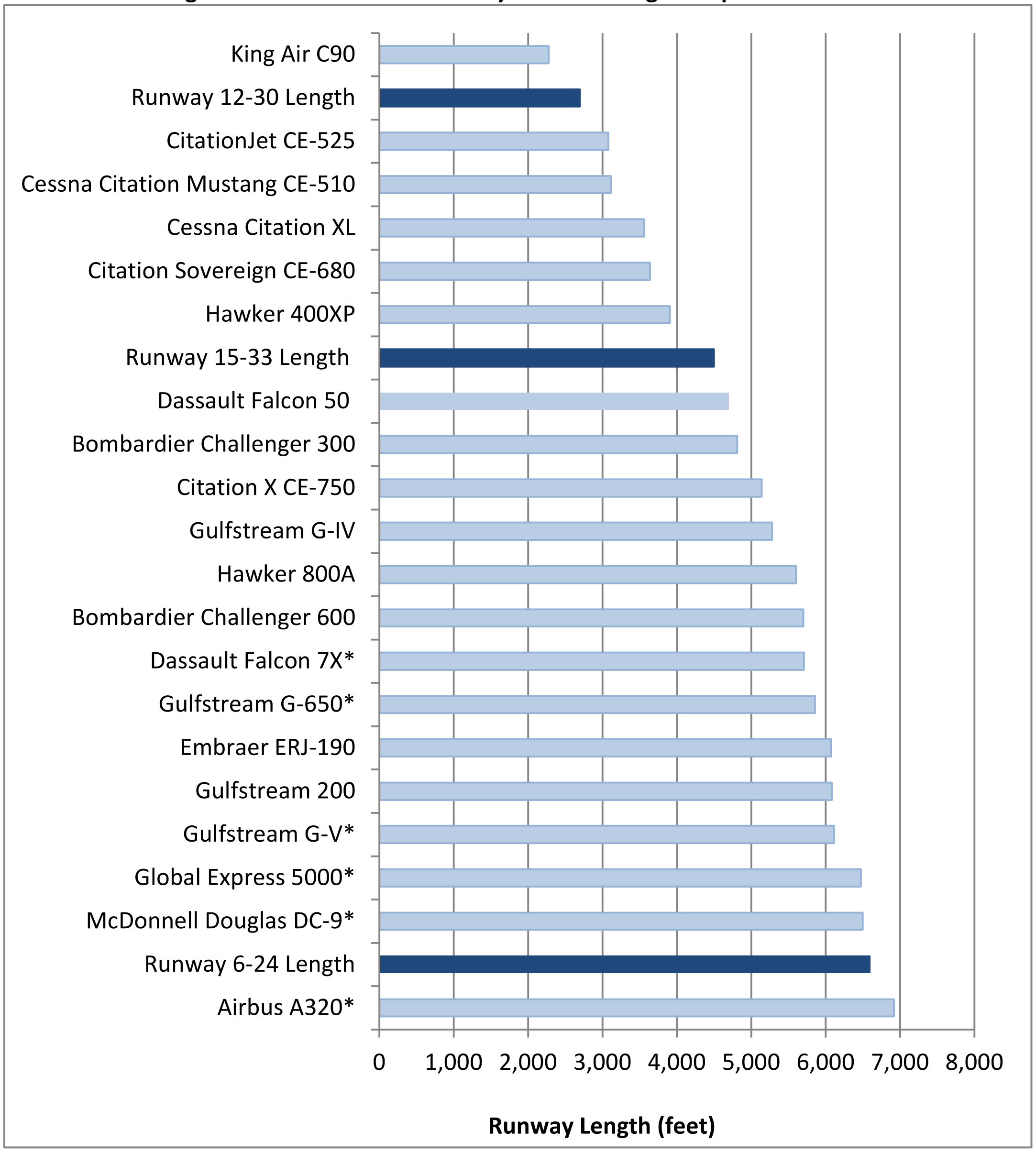
The analysis shows that the runways are able to accommodate 95% of the aircraft without requiring weight penalties under standard atmospheric pressure and temperature.

As mentioned previously in Chapter 2 (section 2.5.3 *Airport Capacity*), a demand-capacity analysis was prepared using AC 150/5060-5, *Airfield Capacity & Delay* to determine runway capacity requirements, as well as hourly capacity under (VFR), and instrument (IFR) conditions and the operational capacity of the runway and taxiway system based on the runway configuration at ACK. The analysis determined that the capacity of the current runway system at ACK is capable of handling an annual service volume of 230,000 operations, 98 hourly operations during (VFR) conditions, and 59 hourly operations during (IFR) conditions. In 2012 ACK recorded almost 133,000 operations, and 121,000 operations in 2013, which equates to between 58% and 53% operational capacity.

Runway 6-24 is 150-feet in width and Runway 12-30 is 50-feet wide, and both meet their respective runway width requirements. Runway 15-33 was approved at its 100-foot width, which is wider than the 75-foot standard, under AIP No. 3-25-0033-19 "Reconstruct Runway 15-33" based upon operational safety concerns created by crosswind conditions, fleet mix and use by aircraft with up to Group III wingspans.

Current and forecasted levels of demand suggest there are no capacity problems in the runway system at ACK. The existing length for Runway 12-30, Runway 15-33, and Runway 6-24 is sufficient to accommodate most large aircraft operating at ACK with minimal weight penalties; therefore no runway extensions are recommended. The existing width for Runway 12-30, Runway 15-33, and Runway 6-24 meet or exceed FAA Safety Standards and are sufficient to accommodate the Runway Design Aircraft operating at ACK; therefore no changes to the width of the runways is recommended.

Figure 6-1 Aircraft Fleet Runway Take Off Length Requirements [2,3,4]



*Indicates aircraft weighing 60,000 lbs. or greater.

Potential RW 24 Relocation to Improve Runway 6 ILS Minimums

While Runway 6-24 is of adequate length and requires no extension to meet forecast fleet needs, it was noted that Runway 6 has a 537-foot Displaced Threshold. This is to accommodate its 1,400-foot Medium Approach Light System with Sequenced Flashers (MALSF). This shortened ALS does not provide full ILS minimums during low-visibility weather conditions. Improving Runway 6 to provide the same ½ mile

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[2] Passur ACK Flight Data April 2013-July 2013;
[3] Aviation Research Group Inc: http://compair.aviationreasearch.com/index.aspx?action=aircraft_comparison
[4] Airplane Manufacturer Websites

visibility minimum as on Runway 24 would require the same 2,400-foot long Simplified Short Approach Light System (SSALR) as used on the Runway 24 end.

Installation of a SSALR on the Runway 6 end would require shifting the existing Displaced Threshold by 850 feet and installing in-pavement approach lights, plus adding 850 feet to the Runway 24 end and adding new SSALR light towers. At the east end of Runway 24, there is approximately 1,550 feet of open airport land between the last SSALR approach light and new South Road. So there is adequate room on-airport to accommodate a theoretical shift of Runway 6-24 up to 1,500 feet on the Runway 24 end.

The National Climatic Center weather data and IFR wind rose for Nantucket show that, during low-visibility IFR conditions, the wind direction and speeds favor the use of Runway 6 more often than Runway 24. If Runway 6 were provided with a standard SSALR ILS Approach Light System, it would enhance operational safety and benefit airline access during the low-visibility, east wind conditions which occur most often when Runway 6 is in use.

While a shift of Runway 6-24 is theoretically possible, the potential costs (in excess of $25 million for an 850-foot shift) to construct such a shift during the near-term or mid-term planning period would make it impracticable. Airlines and GA airport users have not identified a need for improved minimums to the Runway 6 ILS. This may be due to the weather conditions that require use of the Runway 6 ILS occur more often during the winter off-peak season of lowest demand. A runway shift, therefore, is not considered a practical or viable need at this time.

6.1.1.2 Runway Design - Runway Line of Sight

There are two areas where Line of Sight (LOS) is considered: 1) the Runway Visibility Zone (RVZ); and 2) the visibility from the ATC tower to aircraft movement areas. Having a clear line of sight between the intersecting runways allows for departing and arriving aircraft to verify the location and actions of other aircraft and vehicles on the ground that could create conflict. FAA Design standards require a clear line of sight between intersecting runways from any point 5 feet above runway centerline within the Runway Visibility Zone (RVZ) to any other point 5 feet above the centerline of the crossing runway. Runways 6-24 and 15-33 are intersecting runways at ACK, while Runway 12-30 does not intersect either of the other two runways. The RVZ is defined as an area formed by imaginary lines connecting the intersecting runways' line of sight points[5]. **Figure 6-2** below shows an image of the existing intersecting Runway Visibility Zone at ACK. All vegetation and potential visual obstructions have been removed from the RVZ between Nantucket's runways.

[5] FAA AC 150/5300-13A, *Airport Design.*

Figure 6-2 Runway Visual Zone at ACK

Source: Jacobs, 2014

All runway line of sight standards are met between Nantucket's intersecting runways.

The air traffic controllers at ACK have indicated that there is poor visibility from the ATCT (Air Traffic Control Tower) to the Runway 33 threshold. They also stated that the terminal building roof partially blocks their view of an aircraft parked on the secure side of the North Ramp. The FAA has completed a separate Control Tower siting process which determined that the ATCT will remain in its present location and at its present height.

6.1.1.3 Runway Design - Pavement Condition & Strength

The runway pavement is arguably the most critical pavement on the airport. Airport pavement surfaces must be maintained, repaired, or rehabilitated as necessary to reduce the risk of foreign object debris damage to aircraft or gaps in the pavement which could be detrimental to the operation of an aircraft. The runway pavement was analyzed for its ability to meet existing and forecast operations by the design aircraft.

As shown on **Table 6-2**, below, Runway 6-24 can accommodate up to a 757-sized aircraft with dual tandem landing gear and a gross weight of up to 280,000 pounds. Runway 15-33 is designed to accommodate an aircraft of up to 155,000 pounds with dual tandem wheels and Runway 12-30 is rated at no more than 12,000 pounds, which is suitable only for small GA aircraft and C-402s.

Table 6-2 – Runway Pavement Strengths/Conditions								
Runway	**Airplane Landing Gear Configuration**[5]	**Aircraft Weight/lbs**	**Aircraft Type/class**[6]	**Runway Pavement Segment**[6]	**PCI**[7]	**Year Last Improved**[8]	**Rating**[7]	**Next Rehab Year***
RW 6-24	Single Wheel	75,000	GA/Corp Jets	RW 06	70-85	2004	Excel-lent	2024
	Dual Wheel	170,000	Narrow Body RJ's E-190/737					
	Dual Wheel Tandem	280,000	Large Narrow Body 757	RW 24 (end)	85-100	2012	Excel-lent	2032
RW 15-33	Single Wheel	60,000	GA/Corp Jets	RW 33	70-85	1996	Good	**2016****
	Dual Wheel	85,000	Large GA/Corp Jets	RW 33 Ext.	85-100	2012	Excel-lent	2032
	Dual Wheel Tandem	155,000	Narrow Body Military	RW 15 (end)	85-100	2012	Excel-lent	2032
RW 12-30	Single Wheel	12,000	N/A	RW 12-30	85-100	2010	Excel-lent	2030

*Assumes 20-year Design Life (FAA Standard) –

Does NOT include 2014 MassDOT Crack Seal improvements, which **extends pavement life by 5-7 years.

The pavement strengths of each of Nantucket's runways can accommodate the critical design aircraft for each runway, as well as use by the occasionally larger aircraft. No additional strengthening is required. All pavement conditions are rated "Good" to "Excellent". The earliest potential runway rehabilitation requirement would be for Runway 33 in 2016, based upon FAA's 20-year pavement design life. However, the pavement for Runway 33 is in good condition and should continue to be monitored for any signs of distress. It should also be noted that the MassDOT Aeronautics Division funded a crack-sealing project on all of Nantucket's runways that was completed during June of 2014. That crack sealing is expected to extend the pavement life for at least another 5 years, thereby deferring any rehabilitation to beyond 2021.

[6] Existing Airport Layout Plan – Runway Data Table
[7] 2013 MassDOT/PCI Plan (see Fig 2-26)
[8] 2013 FAA Pavement Plan (see Fig 2-25)

6.1.1.4 Runway Design - Runway Safety Area (RSA)

Runway safety areas are designed to protect arriving and departing aircraft and persons and property on the ground in the event an aircraft exits the runway unexpectedly. FAA Order 5200.8 *Runway Safety Program* states "All Runway Safety Areas (RSA) at federally obligated airports shall conform to the standards in AC 150/5300-13A, to the extent practicable." The RSA is defined by the FAA as, "a defined surface that is prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot or excursion from the runway".

The main purpose of the Runway Safety Area Program is to establish the operational needs of each runway based on existing as well as future demand, and then determine feasible alternatives to satisfy these needs while addressing areas of non-compliance and to bring them into conformance with minimum FAA RSA requirements. **Table 6-3** Runway Safety Area Design Standards depicts the dimensions of RSA for each runway.

Table 6-3 Runway Safety Area Design Standards

Runway	RDC	Standard (Width x Length)	Existing (Width x Length)	Discrepancy
6-24	C-III	500'x1000'	500'x787'	213' short on south side of RSA
15-33	B-II	150'x300'	150'x300'	Meets Standard
12-30	A-I (small)	120'x240'	120'x240'	Meets Standard

Source: AC 150/5300-13A, *Airport Design*

Shown in **Figure 6-3** below is an image of the existing RSAs at ACK, depicted in green. Note that all RSA's are within the airfield property, with the exception of the Runway 6 RSA, which extends out over Nobadeer Beach. The Runway 6 RSA centerline length is 950 feet. However the RSA's southerly side has a length of 787 feet from the end of the runway to the airport security fence, located on the backside of the coastal dune. Since the FAA Safety Standard is a full 1,000 feet, the south edge of the RSA has a deficiency of 213 feet. This creates a non-standard safety condition for an aircraft overrun or undershoot on the Runway 6 end.

Figure 6-3 Runway Safety Areas at ACK

Source: Jacobs, 2014

The Runway 6 RSA does not meet the full FAA standard for RSA dimensions. However, the FAA issued a Runway Safety Area Determination, dated 9/31/2000 (see Appendix B, attached), which found that extending the RSA was impractical and the costs of shifting or shortening the runway, or adding EMAS, were not justified for the small deficiency that exists. The Airport completed an RSA Study dated January 31, 2002, which verified that the existing irregularly-shaped RSA was of the maximum practicable area, per FAA Order 5200.8 and confirmed the FAA's previous determination. Recent concerns have focused on the increased erosion of Nobadeer Beach and its potential effect on the RSA's southerly edge. Coastal Management concepts were discussed in Chapter 3 "Environmental Overview" and are reviewed in Chapter 7. All other runways at ACK meet their associated RSA design requirements.

Located adjacent to the Runway 6 RSA is an FAA Equipment Shelter for the Localizer and DME which supplies the signal for ILS landings on Runway 24. This shelter is sited within the Coastal Flood Zone and is prone to flooding during Category 3 Hurricane tidal surges.

There is a need during the short-term 5-Year planning period for the FAA Tech/Ops to plan for flood-proofing the FAA Localizer and DME Equipment Shelter at the Runway 6 end.

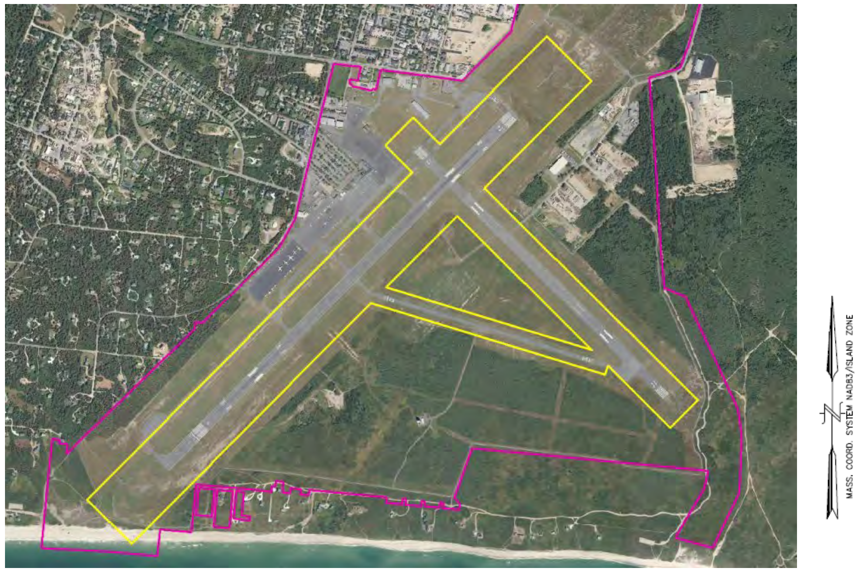
6.1.1.5 Runway Design - Runway Object Free Area (ROFA)

The ROFA is a two-dimensional area surrounding the runway which must be clear of parked aircraft and objects greater than 3" in height, unless frangible, and required for air navigation, or aircraft ground maneuvering purposes. **Table 6-4** Runway Object Free Area Design Standards depicts the dimensions of ROFA for each runway. **Figure 6-4** on the following page depicts the existing ROFAs at ACK in yellow. The Runway 6 ROFA extends through the dunes to Nobadeer Beach. However, because Runway 6 is provided with vertical landing guidance and has a Displaced Threshold, the OFA length prior to the Threshold is reduced from 1000 feet to a shorter 600-foot distance (AC 150/5300-13A, Table A7-9, Footnote 11). This avoids penetrations of the ROFA Standard for the Runway 6 end.

Table 6-4 Runway Object Free Area Standards				
Runway	**RDC**	**Standard (Width x Length)**	**Existing (Width x Length)**	**Discrepancy**
6-24	C-III	800'x1000'	800'x1000'	Meets Standard
15-33	B-II	500'x300'	500'x300'	Meets Standard
12-30	A-I (small)	250'x240'	250'x240'	Meets Standard

Source: AC 150/5300-13A, *Airport Design*

Figure 6-4 Runway Object Free Areas at ACK



Source: Jacobs 2014

All runway ROFA FAA design requirements are met.

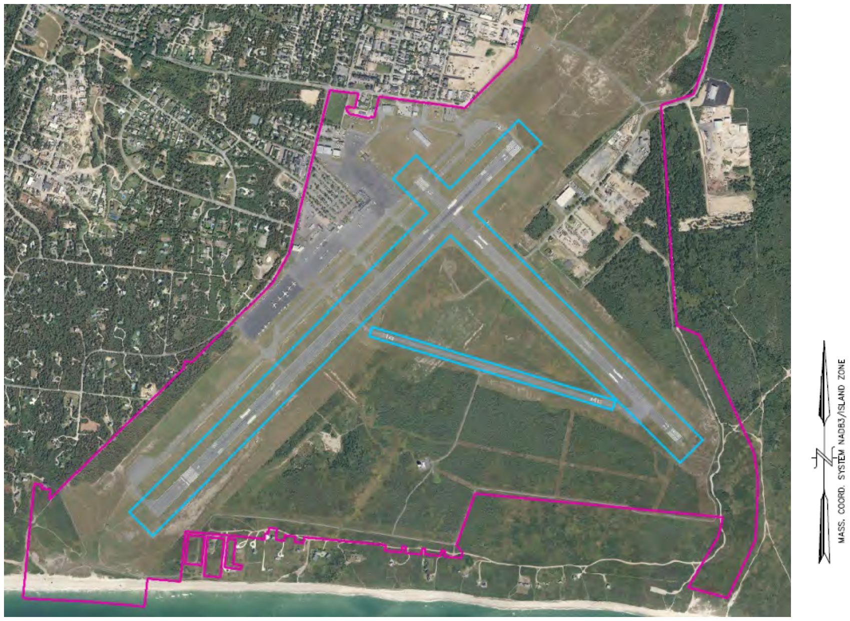
6.1.1.6 Runway Design - Runway Obstacle Free Zone (ROFZ)

The ROFZ is a defined volume of airspace centered above the runway which supports the transition between ground and airborne operations. All ROFZs extend 200 feet beyond each end of the runway and the size of the ROFZ is based on aircraft approach speed and the visibility minimums to the runway end. **Table 6-5** lists the ROFZ standards vs. existing conditions. **Figure 6-5** on the following page provides an image of the existing ROFZs at ACK, delineated in blue.

Table 6-5 Runway Obstacle Free Zone Standards				
Runway	**RDC**	**Standard (Width x Beyond RW End)**	**Existing (Width x Beyond RW End)**	**Discrepancy**
6-24	C-III	400’ x 200’	400’ x 200’	Meets Standard
15-33	B-II	400’ x 200’	400’ x 200’	Meets Standard
12-30	A-I (small)	120’ x 200’	120’ x 200’	Meets Standard

Source: AC 150/5300-13A, *Airport Design*

Figure 6-5 Runway Obstacle Free Zones at ACK



Source: Jacobs, 2014

Based upon examination of the FAA standards, all ROFZ requirements are met.

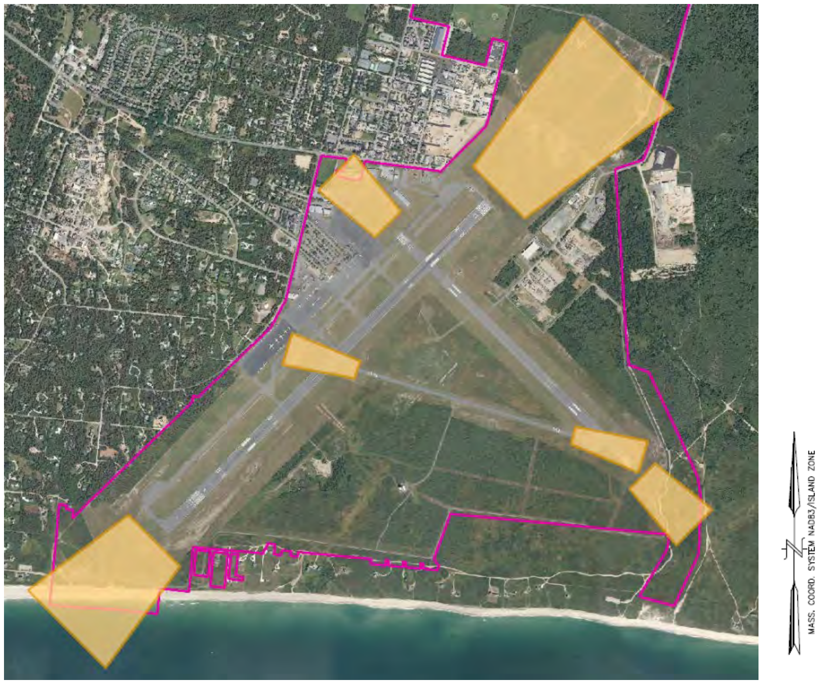
6.1.1.7 Runway Design - Runway Protection Zone (RPZ)

The RPZ is an area on the ground used to enhance the protection of people and property near the runway approach. In order to ensure that the RPZ's are kept clear of incompatible objects and activities, the land included in the RPZ should be owned by the airport or protected through an avigation easement. **Table 6-6** provides a comparison of RPZ design standards to existing conditions. **Figure 6-6** on the following page illustrates the existing RPZs at ACK, as light yellow trapezoids.

Table 6-6 Runway Protection Zone Design Standards				
Runway	**RDC**	**Standard (Inner W x Outer W x Length)**	**Existing (Inner W x Outer W x Length)**	**Discrepancy**
6	C-III (Visibility ¾ mi)	1000'x1510'x1700'	1000'x1510'x1700'	Meets Standard
24	C-III (Visibility ½ mi)	1000'1750'x2500'	1000'1750'x2500'	Meets Standard
15-33	B-II	500'x700'x1000'	500'x700'x1000'	RW 33 Meets Standard. RW 15 has hangars and small non-standard area within the NE corner.
12-30	A-I (small)	250'x450'x1000'	250'x450'x1000'	Meets Standard

Source: AC 150/5300-13A, *Airport Design*

Figure 6-6 Runway Protection Zones at ACK



Source: Jacobs, 2014

AC 150/5300-13A recommends that RPZs be maintained clear of residences and places of public assembly, including churches, schools, hospitals, office buildings, shopping centers and other uses with similar concentrations of persons. Details of parcels requiring avigation easements or rezoning options will be discussed in Chapter 7.

There are currently 1.7 acres within the RW 15 RPZ that are not fully owned by the airport. This can be corrected by the airport obtaining an avigation easement or enacting a zoning overlay district to control land uses within the RPZ parcels.

6.1.2 Taxiway Design

Like runways, taxiways are designed to meet specific criteria to ensure the safe passage of aircraft traveling to and from the terminal while accessing the airports runways. Although the overall design group for the airport is based on the E-190/ Gulfstream 650, not all taxiways at ACK have adequate separation to allow simultaneous operations by an aircraft with such large wingspans. Some taxiways have operational restrictions placed on them to limit the size of aircraft using them. This limits the ability of Air Traffic Control Tower (ATCT) personnel to manage the flow of taxiway traffic in the most efficient manner. FAA AC 150/5300A, *Airport Design*, provides the criteria for determining the Taxiway Design Group (TDG). The TDG is a design classification based on an airplane's wingspan, plus the outer to outer Main Gear Width (MGW) and Cockpit to Main Gear distance (CMG), which refers to the undercarriage dimensions of the aircraft. Generally, the taxiways should allow aircraft enter or exit the runways in the most direct method without having to cross active runways or change their speed.

The taxiway design standards are shown in **Table 6-7**, "Taxiway Design Standards", below. There are 9 taxiways at ACK; Taxiway 'A'; 'B'; 'C'; 'D'; 'E'; 'F'; 'G'; 'H';'J'.

Table 6-7 Taxiway Design Standards		
TDG Criteria	**Existing**	**Standard**
Taxiway Width (based on TDG III)	50'	50'
Taxiway Safety Area	118'	118'
Taxiway Object Free Area	186'	186'
Taxiway Centerline to Fixed or Movable Object	93'	93'
Wingtip Clearance	34'	34'
Taxiway Centerline to Parallel Taxiway Centerline	Taxiway 'E' and 'F'; Taxiway 'E' and 'G' **Separation is 125'**. All other taxiways meet separation standards.	**152'**
Precision RW Full-Length Parallel TW	RW 6-24 TW-E Separation is 400'	400'
Non-Precision Full-Length	RW 15-33/**None**	**240'***

***Table A7-4, Appendix 7, Page 270, AC 150-5300-13A**

6.1.2.1 Taxiway Design - Separation Deficiencies

As noted in the above FAA Taxiway Design Standards table (**Table 6-7**), there is an existing deficiency between the separation of Taxiways E and F, as well as Taxiways E and G, each of which are currently at 125 feet and should be at 152 feet to meet the standard. Runway 15-33 presently lacks a parallel taxiway, as recommended by FAA design standards for a runway with a non-precision approach.

The current taxiway system meets TDG criteria, with the exceptions noted above. The separation for Taxiways 'E' and 'F' and 'E' and 'G' do not meet the Standard for 152 feet. Options for mitigating FAA design deficiencies will be discussed in Chapter 7.

6.1.2.2 Taxiway Design - RW 24 Exit Taxiway Needs

Air Traffic Control staff indicated that Runway 24 would benefit from an additional stub taxiway to enable arriving aircraft to exit the runway sooner, with shorter taxi distances to the South Apron. This would alleviate congestion hotspots in the taxiway system, reduce fuel burn and noise from taxiing aircraft. Reduced taxi times serve to reduce noise and emissions, as well as fuel burn, but also reduce the time it takes to reach the parking aprons. This could potentially cause the aprons to fill more quickly. Therefore, it may be advantageous to prioritize apron improvements to precede taxiway projects.

Nantucket's existing ALP shows an exit stub taxiway, located approximately 1,000 feet from the Runway 6 end, to better serve jet arrivals on Runway 24. ACK has suggested that this might be more efficient if laid out as an angled, high-speed exit taxiway. Options will be further evaluated in Chapter 7, Alternative Improvement Concepts.

6.1.2.3 Taxiway Design - Pavement Conditions

The Pavement Condition Index (PCI) for Nantucket's taxiway system are rated 'Good' to 'Excellent' as shown in **Table 6-8**. While Taxiway 'E' has a PCI rating in the 55 to 70 range and is slightly beyond its 20-

year design life, MassDOT's 2014 crack sealing project has improved its condition and extended its life (as well as all of Nantucket's taxiways) by another 5 years.

Table 6-8 Taxiway Pavement Condition				
Taxiway Segment[9]	Pavement Condition Index[10]	Year Last Improved[11]	Condition Rating[11]	Next Rehab Year*
TW/E (East) and D	55-70	1985	Good	2005
TW/E (West) and B	55-70	1986	Good	2006
TW/F	85-100	2002	Good	2022
TW/C (RW 12-30)	85-100	2010	Excellent	2030
TW/G	85-100	2002	Good	2022
TW/H (North Ramp)	55-70	1992	Good	2012
TW/J	85-100	2013	Excellent	2033

*Assumes FAA 20-year Design Life (FAA Standard) – Does NOT include 2014 MassDOT Crack Seal improvements which extend pavement life by 5-7 years.

The reconstruction of Taxiway 'E' should be considered as a short to mid-term improvement project. A mill and overlay improvement for Taxiway 'E' was listed on Nantucket's 2013 ACIP as a 2019 project. Taxiway 'H' would be included as part of the commercial ramp reconstruction phasing. However, MassDOT Aeronautics Division's pavement crack seal project in June 2014 has added a significant 5 to 7 year design life to all pavements at ACK. Therefore, the "Rehab Year" noted above should be verified and updated with FAA and MassDOT staff. Options will be further evaluated in Chapter 7, Alternative Improvement Concepts.

6.1.2.4 Taxiway Design - RW33 Parallel Taxiway

FAA Design Standards recommend a parallel taxiway as a safety feature for Non-Precision Instrument Runways. According to FAA AC 150/5300-13A, Table 3-4, page 90, *Standards for Instrument Approach Procedures*, it is *recommended* that runways with less than or equal to 1 mile visibility have a full-length parallel taxiway. As mentioned in Chapter 2, *Inventory*, Runway 15-33 is a Non-Precision Instrument Runway and does not have a full-length parallel taxiway. The FAA and the ATCT convened a Safety Risk Management Panel (SRMP) in February 2012 to consider alternatives layouts for a full parallel taxiway to serve Runway 33. Several full-length concepts were considered, including those with mid-field crossings of Runway 6-24. It was noted that the ATCT often utilizes Runway 12-30 as an extended Taxiway C between the South Apron and Runway for departures on Runway 33 during northwest winds. Since Runway 12-30 serves as an effective taxiway route for Runway 33 departures, the need for a full-length parallel taxiway is less critical. However, there is a need to consider aircraft arriving on Runway 33, which need an exit taxiway and an opportunity to consider a shorter exit taxiway version of the full-length FAA SRMP taxiway concepts. Such a shorter, angled-exit stub taxiway would provide an exit prior to the Runway 6-24 intersection and enable direct access to the Terminal Ramp with a crossing of Runway 6-24 opposite existing Taxiway A. Such an option would minimize costs, environmental impacts, and runway delays.

Simplified, shorter and lower-cost versions of the FAA SRMP full-length taxiway alternatives, reduced to provide only an exit taxiway from Runway 33 are considered in Chapter 7.

[9] 2013 FAA Pavement Plan
[10] 2013 MassDOT PCI Plan

6.1.3 Aircraft Apron Design

FAA's AC 150/5300-13A, Chapter 404.a.(4), Table 4-1, as well as Chapter 504.d. (1) and (2) give the basic apron design standards for safe and efficient aircraft parking. Chapter 504.d. notes that "The primary design consideration is to provide adequate wingtip clearance for the aircraft positions and the associated taxilanes." This section reviews the existing deficiencies with the South Apron, as noted previously, as well as the pavement condition of the various sections of aircraft parking aprons.

6.1.3.1 Aircraft Parking Apron Design - Taxilane Deficiencies

Taxilane clearance and separation standards are based upon the wingspans of the Airplane Design Groups (ADGs), as specified in AC 150-5300-13A, Section 404.a.(4), and Table 4-1. The standards set minimum Taxilane Object Free Area (TOFA) widths based upon safe wingtip clearances for each ADG. Section 404.b.(1) states that Taxilane OFA clearing standards prohibit parked aircraft or other objects within the OFA. The wingtip clearances on the South Apron are very constrained and create operational safety hazards, as shown below in **Figure 6-7**. Nantucket's South Apron was originally designed for smaller aircraft with 54' wingspans. That size wingspan falls into ADG II, which requires a wingtip clearance of 18 feet. The increase in size of corporate aircraft, particularly new modern jets with larger wingspans, has impacted the limited apron space at ACK. The increasing wingspan of modern jet aircraft has reached 99 feet, which places them in ADG III, which require a 27-foot wingtip clearance. The two Taxilanes on the South Apron, while designed to ADG II Standards, are now used by ADG III aircraft, creating a safety hazard. The existing Taxilane OFA's are of insufficient width to safely accommodate these larger aircraft and need to be upgraded to meet the FAA Taxilane Design Standard.

Options for addressing the Taxilane Design Deficiencies on the South Apron will be discussed in Chapter 7. The phasing of this project should be considered in Chapter 8 in conjunction with other airside improvements, such as taxiways, which could improve the arrival rate of aircraft needing to utilize the apron.

Figure 6-7 Existing South Apron Taxilane Wingspan Constraints for Current GA Jet Fleet

Source: Jacobs 2014

6.1.3.2 Aircraft Parking Apron Design - Pavement Condition

The pavement conditions of the various sections of Nantucket's aircraft parking aprons are depicted on **Figure 6-9** on the following page and **Table 6-9**, below. These terminal apron sections are identified as Areas A through G and most areas are close to, or beyond the end of their 20-year design life. The MassDOT PCI index puts most in conditions requiring "major rehabilitation". Based upon the age and condition of each area, a Rehabilitation Priority number has been assigned to assist in considering future options. MassDOT's 2014 Apron Crack Seal project has improved the pavement condition of all of Nantucket's aprons and extended their life five years beyond the 20 Year FAA Design Life listed under the Rehab Year. The revised Rehab Year should be reviewed with FAA and MassDOT Aeronautics staff.

Table 6-9 Apron Pavement Condition

Apron Pavement Area[11]	Pavement Condition Index[12]	Year Last Improved[13]	Condition Rating[13]	Next Rehab Year*	Rehab Priority Number
Area A	25-40	1982	Poor	2002	1
Area B	55-70	1993	Good	2013	2
Area C	55-70	1993	Good	2013	5
Area D	55-70	1992	Good	2012	4
Area E	40-55	1979	Fair	1999	6
Area F	40-55	1979	Fair	1999	3
Area G	85-100	1998	Good	2018	7

*Assumes FAA 20-year Design Life (FAA Standard) – Does NOT include 2014 MassDOT Crack Seal improvements which extends pavement life by 5-7 years.

Apron Reconstruction Options will be further evaluated in Chapter 7, Alternative Improvement Concepts, and upon further consultation with MassDOT Aeronautics and FAA staff on potential phasing and sequencing with the South Apron redesign and extension alternative, noted above.

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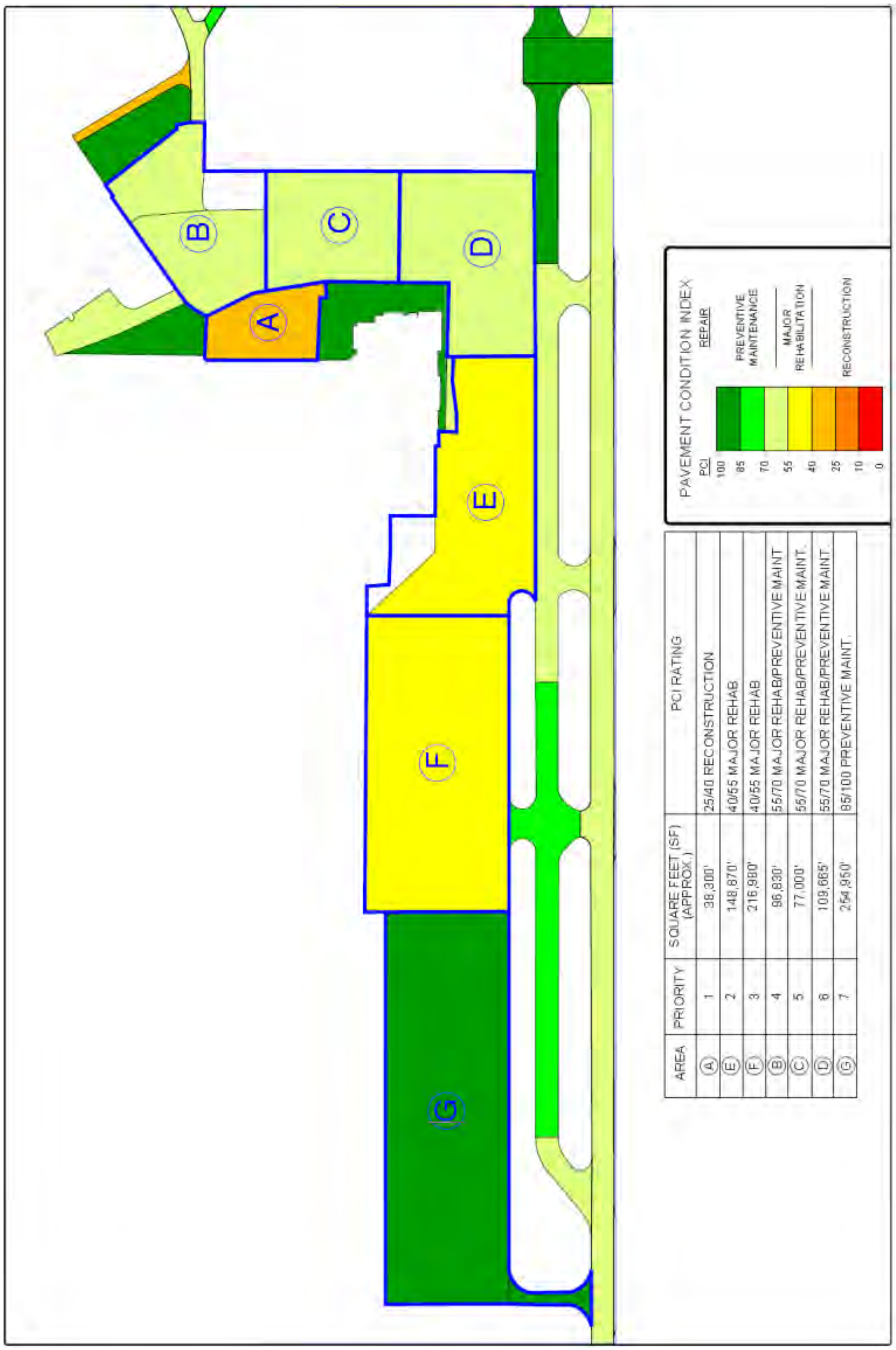
[11] 2013 FAA Pavement Plan
[12] 2013 MassDOT PCI Plan

Figure 6-9 Apron Pavement Condition Index [13]



[13] Graphic modified from Hoyler,Tanner & Associates, Inc. *Pavement Condition Index Map* for Massachusetts Department of Transportation-Aeronautics Division, January 2013. This does NOT include 2014 MassDOT Crack Seal improvements which extend pavement life 5-7 years.

6.1.4 Protected Airspace Requirements

Title 14, Code of Federal Regulations (CFR), Part 77*, Safe, Efficient Use, and Preservation of the Navigable Airspace,* sets forth the standards for determining obstructions to air navigation or navigational facilities and their effect on the safe and efficient use of navigable airspace, air navigation facilities or equipment within the vicinity of the airport, as described in Chapter 2. Any object which penetrates these surfaces is considered an obstruction and may affect the safe and efficient use of navigable airspace, unless further aeronautical study concludes that the object is not a hazard to air navigation[14]. Obstructions are any object manmade or vegetative, permanent or temporary that penetrates a 14 CFR Part 77 imaginary surface. Hangars 5 and 6 are located within the Runway 15 Part 77 Approach Surface. As required by the FAA Part 77 design standards, an obstruction study recommended placing red obstruction lights on the hangars to mitigate any hazards to safety.

Aircraft that are parked at the gates on the secure area of the north apron are located under the Runway 6-24 and Runway 15-33 transitional surfaces. The transitional surface extends outward and upward from the primary and approach surfaces at right angles to each of the runway centerlines at a slope of 7 feet horizontally for each foot vertically (7:1), up to an elevation 150 feet above the airport.

The tail heights of larger jets parked on the north ramp could penetrate the 7:1 Transitional Surface. For example, the Embraer E190 tail height penetrates the Part 77 transitional surface height by approximately 10 feet. However, the more critical Non-Precision Approach Surface to Runway 15 is not affected and the aircraft are not parked in their locations for longer than an hour. When Part 77 surfaces are penetrated, FAA regulations require that an Aeronautical Study be performed to determine the risk or hazard to Navigable Airspace. The determination can propose appropriate mitigation, such as obstruction lighting, marking, charting and Notices to Airmen (NOTAM). A study done during this Master Plan verified that the tail heights of the aircraft can be positioned in a way not to penetrate the transitional surface. Other alternatives include those noted above (lighting, marking, charting, NOTAM's).

Alternatives to address the transitional surface penetrations, including lighting, marking, charting, NOTAM's and a reconfiguration of the large aircraft parking positions, will be discussed in Chapter 7.

6.1.5 Security & IT Improvement Needs

Airport security involves a series of barriers and systems that combine to enhance physical security of the airfield and its users, and consist of fencing, gates and secure doors, as well as electronic and informational technologies that monitor and control access. The needed improvements to these systems are examined in greater detail in the following sections.

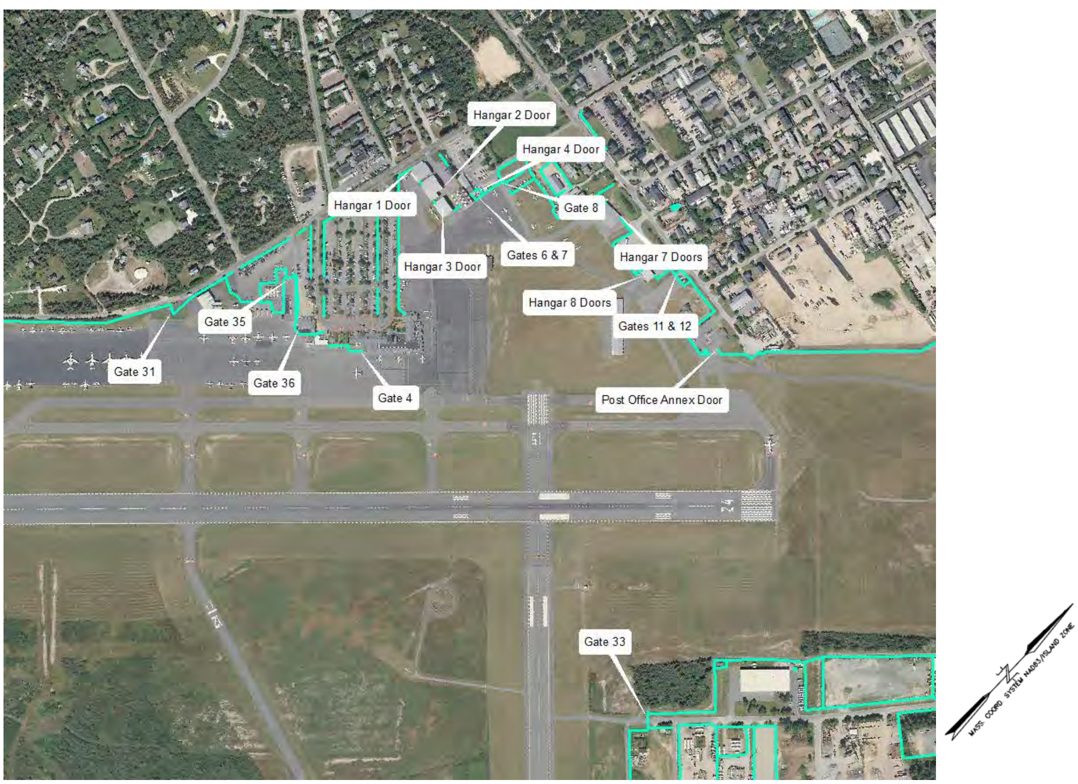
6.1.5.1 Security & IT - Perimeter Security, Electronic Security Systems

Vehicular and pedestrian access to the flight line is controlled by physical security fencing, gates and building doors. Existing gates are either manually locked and opened or actuated by gate openers. Building doors are key locked.

[14] Title 14, Code of Federal Regulations Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*

Actuated vehicular gates are controlled by means of a simple control system and reader interface. This interface consists of a security card reader and local control panel connected to a mechanical gate opener. While this system provides basic functionality from a security standpoint, it lacks most of the important elements of an effective electronic security system. Security transactions are only stored locally, at the controller, and alarm events and alert conditions have no means of transmission to the central security office. Further, these local systems are not compatible with the central security system installed in the main terminal, Administration Building and ARFF. This requires security personnel to manually update system parameters by traveling to each actuated gate with a laptop and connection cable. Card holder information, access rights and authentication conditions, among other critical security criteria, are duplicated at each gate rather than stored and backed up in a central database and instantaneous updates to the security databases are impossible. Users and tenants also need to carry multiple access cards for each system. This coupled with the gates and doors that are physically key locked, provide a continuing challenge to maintain positive key and access control. **Figure 6-10** below, shows the most frequently utilized airfield access points.

Figure 6-10 Most Frequently Utilized Airfield Access Points



Source: Jacobs, 2014

In 2014, the Airport received an FAA Grant to improve security systems in the main terminal and along the flight line. As part of this project, Gate 6 (a pedestrian gate) and Gate 8 (a vehicular gate) will be upgraded to include new card readers, controls and wireless communications systems to link them with the central security system in the main terminal. This will give ACK security personnel the ability to monitor, change and log the status of these two gates, just as they would with SIDA and other secure doors in the terminal. System users will only need to use their existing security badges for authentication and access.

Remaining existing access points, including all gates and building doors, should be upgraded and integrated into the existing central security system. This would provide a much more advanced and accurate security posture as well as provide positive control on access to the airfield. Airport security personnel would be able to actively monitor alarms and events and be instantly alerted to potential threat conditions. New communications systems should be installed to link all access points to the central system to enhance command and control, and the existing video surveillance camera systems should be augmented for situational awareness at all flight line entry points.

Active intrusion detection and protection measures should be considered for physical security infrastructure as well. These could include fiber optic intrusion detection devices along the fence line. These would have the added benefit of providing fiber optic communications to remote sites as well as physical security warnings.

Other security systems, such as parking security, should be improved and supplemented with central control and surveillance to bring the entire Airport security system under single central management and control.

6.1.5.2 Security & IT - Information Technology Pathways

Basic backbone data communications exist in the form of fiber optic communications networks between the main terminal, the Administration Building and the ARFF. Horizontal cabling infrastructure adheres to a minimum of CAT5 standards within buildings, and wired data paths are sound. Communications to more remote facilities, such as the SRE building, are by means of aging wireless data infrastructure. The wireless data link connecting the SRE building is based on a Motorola multipoint wireless access point with a maximum data throughput rate of 2 Mbps, which is a very low rate by current standards. Modern computer systems and applications have become increasingly difficult to implement and as such, this slow communications link is becoming saturated to its maximum output at the SRE building.

The communications pathways to the SRE building and other remote facilities on the Airport property should be upgraded and the Terminal provided with an upgraded fiber backbone or modern wireless system. While new fiber optic infrastructure comes at a high cost, recent advances in wireless communications protocols have given rise to inexpensive wireless communications systems at near-fiber optic speeds. Additional benefits of upgraded communications networks will also enhance transmission of security data to and from these locations.

6.1.5.3 Security & IT - Information Technology Facilities

Most of the Airport technology systems run on servers and computers located in several computer rooms in the main terminal, the Administration Building and the ARFF building. The main terminal has two such rooms on the basement level. Room 008 is the Security Control Room which houses IT cabinets, racks, switches, servers, and security control panels in an environmentally controlled space. The Computer/Data room, Room 006, is directly adjacent to the Security Control Room and houses computer systems for the Flight Information Display Systems (FIDS), public address head end equipment, telephone equipment, network switches, and Internet access equipment. This room is also multi-purposed as a maintenance closet, office, and storage space. It is unconditioned air space and prone to dust, humidity and clutter. The systems in the Computer/Data room do not meet the standard for modern communications datacenters and telecommunications rooms.

The Administration Building's Telcom room is located in the basement of that facility and contains equipment cabinets, racks, switches and servers. The Telcom room is at approximately 30 percent capacity for space and electrical load. The Administration Building was constructed in 2013, and its facilities are within current standards for a building of its size and purpose.

The ARFF building communications rooms are also modern, clean, and meet current standards for a structure designated for its use. There are two rooms on the second floor of the ARFF building that contain cabinets, racks, servers, switches and Building Automation Systems (BAS).

The communications facilities in the main terminal should be consolidated to the Security Control Room. Systems should be replaced and upgraded during the move to make the transition as effortless as possible with a minimum of interruption in service. The Security Control Room is far more conducive for a telecommunications room and would ensure that sensitive equipment is maintained in the cleanest and safest space available. The Telcom room of the Administration Building should be considered for a backup site for critical systems located in the main terminal and ARFF building.

6.1.5.4 Security & IT - Information Technology Systems

The FIDS systems are located in the main terminal Computer/Data Room and all run on separate desktop computers that are placed loose on a single open-frame rack. Many computers are running Microsoft Windows XP operating systems, which reached their end of life as of April 2014. The Microsoft Corporation has marked the Windows XP platform for obsolescence.

The public address system is a simple outdated Valcom system with telephone interface. This system lacks many of the requirements set forth by FAA and TSA for security-based announcements and operations in elevated threat levels. Zoned announcements for particular gates or areas of the Airport are difficult, which requires that all pages being played building-wide.

The existing telephone system is an archaic key system utilizing approximately 160 Centrex lines from a Verizon CO on the mainland. These lines are transmitted to the island via a microwave communications network that is predisposed to outages and interference. The telephone systems at the Airport do not provide the Airport administrative staff or tenants all the functionality that they require, hindering their ability to work effectively and efficiently due to the inability to transfer and route calls and other basic functions such as voicemail to email integration and call forwarding.

There is a Building Automation System (BAS) in the main terminal, Administration Building and ARFF that has the ability to communicate building systems status to a central location. However, the installed HVAC systems lack the proper equipment, sensors, and feedback mechanisms to make this system effective for environmental control.

FIDS systems should be consolidated on a single, powerful server with a current operating system that is backed up regularly. Server space could be virtualized to run in independent environments while the physical hardware could be duplicated for redundancy and fail-over. Upgrades to the FIDS could also interface with new public address and paging systems to automate flight arrival and departure announcements, as well as gate changes and delays.

The public address and paging system should be upgraded to a new digital and IP addressable system with central control. This upgrade would give the Airport operations and airline staff the ability to make local announcements, automatically manage, record, store and playback TSA required messages, interface with FIDS for flight information announcements and provide programmed emergency response announcements for situations and events. A new paging system should also be tied into fire alarm and mass notification systems for operator-free public safety responses.

The telephone system, Airport-wide, should be completely upgraded and replaced with a modern, digital Voice over IP (VoIP) system – similar to the system installed at the new police station. A new and current phone system with unified communications capabilities will allow the Airport to consolidate the existing numerous voice telephone lines to a series of high–availability, digital communications with redundant and backup networks. Critical communications could be augmented with advanced features such as email and mobile phone integration. This will reduce the number of missed or unanswered calls and increase response times for Airport operations. Contemporary voice communications systems can also integrate across platforms and provide a single point for inter-connection of all voice traffic including phones, radios, pagers, and computers for a truly comprehensive, secure, and reliable communications transport network.

The existing BAS has communications capabilities for monitoring of control points only. The HVAC system should be upgraded to include two-way communicating mechanical devices and control for all critical systems. This will provide Airport maintenance staff the flexibility to work and service these systems from multiple locations while maintaining central control of the overall systems. Maintenance crews should be able to receive instant alerts and status conditions of systems and equipment while remaining mobile to respond to operational needs.

6.2 Capacity Driven Improvements

The capacity of the runways is more than adequate to meet Nantucket's needs through the long-term forecast period. The taxiways or aprons, however, may have FAA Design related deficiencies, some of which create operational safety or capacity-related issues (such as with Taxiway Separation or wingtip clearance on the South Apron, for example), but those are safety issues related to meeting FAA Design Standards. Capacity issues relate to overuse of an existing facility, which creates overcrowding or an exceedance of the original design's intended capacity. At Nantucket, the Terminal Building, the Air Carrier Ramp and GA South Ramp can exceed their design capacity during peak summer weekends.

6.2.1 Terminal Building - Hold Room Deficiencies

Chapter 2.6.2.4 noted that the 2009 Terminal Building renovation included an 18,000 SF expansion to keep pace with then current passenger enplanements, as well as new TSA requirements and airline needs. Adequate space, however, was not provided to accommodate any increases in passenger enplanements through the secure terminal facilities, such as the passenger Hold Room. The current

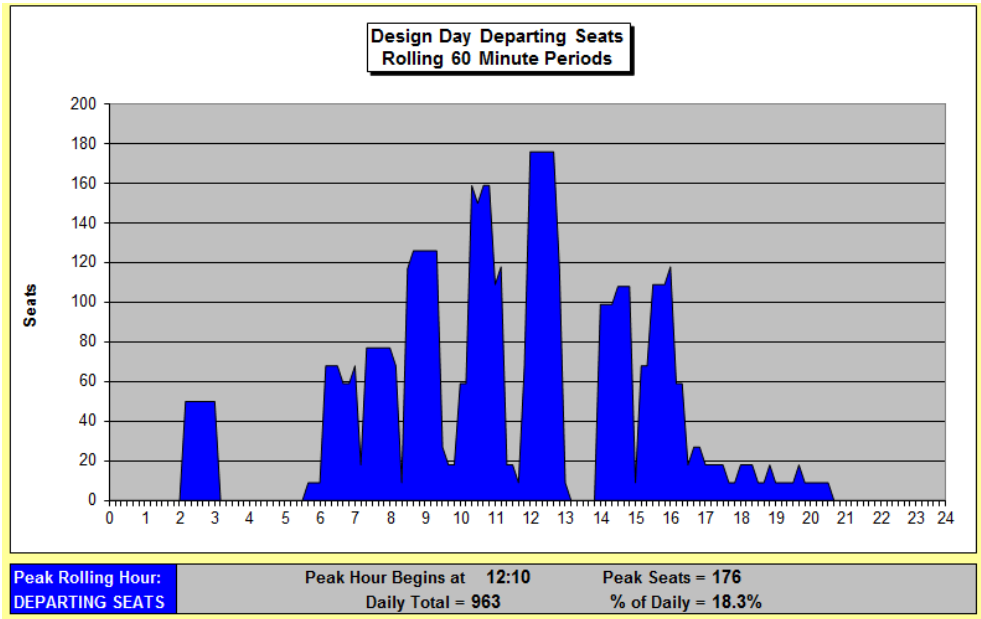
Secure Hold Room is sized at 1,937 SF and rated, per Code, for occupancy by 126 passengers. If the airport is experiencing any delays in service due to inclement weather, or from Air Traffic ground stops on departures, a delay of just 30 minutes has the potential to queue up passengers undergoing TSA screening and overload the secure passenger Hold Room (see **Figure 6-11**, Terminal Hold Room "Hot Spots"), and **Appendix A –** Terminal Building LOS Study.

Figure 6-11 Terminal Hold Room "Hot Spots"

Source: Jacobs, 2014

Even without flight delays, during the peak daily period from 10AM to 1PM the airlines' normal flight schedules can overtax the seating capacity of the current Hold Room. **Figure 6-12** illustrates the number of airline departure seats during a typical Design Day, based upon Nantucket's current airline schedule.

Figure 6-12 – Peak Hour Departing Enplanements



Source: Jacobs, 2014

During the peak hour from Noon to 1PM there are 176 departing passengers, assuming 90% load factors on the current fleet during that peak hour (Two ERJ-135's and one E-190). As noted above, the rated capacity of the Hold Room is 126 passengers. Assuming a Level of Service (LOS) "C", with 80% sitting (at 15 SF) and 20% standing (at 10 SF), there is a need for 2,464 SF in the Hold Room, versus the 1,937 SF available. At LOS 'C', this yields a deficit of 527 SF. To provide LOS 'A' service requires 17 SF per sitting passenger and 12 SF per standing, requiring a total of 2,816 SF, or an additional 879 SF (see **Table 6-10**). The existing 1,937 SF Hold Room currently provides LOS "F".

Table 6-10 Departing Passengers/Existing Hold Room SF Requirements[15]			
Level of Service	LOS "F"	LOS "C"	LOS "A"
SF Requirements	1,937 SF (existing)	2,464 SF	2,816 SF
Current Deficiency	(N/A)	-527 SF	-879 SF

Options for addressing the Terminal Hold Room Deficiencies will be discussed in Chapter 7.

6.2.2 Air Carrier Apron Improvements

Nantucket's secure Air Carrier Apron (North Ramp) is made up of approximately 6,910 square yards of pavement and was designed to accommodate a mix of three regional airline turboprops and one small regional jet. ACK's current scheduled air service is provided by four major airlines during the summer

[15] Per ACRP Terminal Planning Spreadsheet Model; Jacobs, Inc.

season: Jet Blue, Delta, US Airways, and United. During the summer of 2013, on a peak day (Sunday, August 11), three Embraer ERJ-190's, three ERJ-135's, three CRJ-200's, three Dash 8/Q-300's and 24 Cessna 402's were scheduled to arrive (per Flight Aware, 8/11/13). That equates to 72 daily operations on the North Ramp. During the peak hour, all four parking positions for the larger aircraft were occupied. During FAA Air Traffic ground stops due to weather at New York, Newark or Washington, DC, there can be instances where two or more aircraft can be delayed at Nantucket, causing overcrowding on the apron and congestion in the Passenger Terminal. FAA's recent "Three-Hour Tarmac Rule", per FAA Order JO 7110.65 – Flightcrew Duty Rules, FAR 117, January 2014, could exacerbate these situations with more frequent instances of overcrowding during periods of flight delays.

As discussed in Chapter 2, *Airfield Inventory,* Nantucket experiences one of the highest seasonal peaks in flight operations of any airport in the U.S., handling nearly 50% of all operations within a four month period and making ACK second only to Boston-Logan in the State of Massachusetts. The Inventory also highlights that within that four month peak period, ACK can see 66,000 operations which equates to an average day/peak hour demand level of 633 average day/95 peak hour operations. Due to competitive airline scheduling, increased demand occurs during the hours of 10:30AM and 2:00PM, which results in a limited amount of ramp and secure hold room space due to the increased amount of aircraft that arrive/depart in close proximity throughout that time frame.

The "Status Quo" forecast in Chapter 5 noted that Nantucket's **summer season enplanements in the NYC/Newark/Washington markets were likely to continue to grow**. The August peak month screened totals have increased over the last three years from 16,915 (August 2011), to 19,573 (August 2012) to 21,573 (August 2013). While there has been a 12.5% increase in total August enplanements over those 3 years, the **screened passengers have increased by 25.6% during the same period.** This has implications should airlines potentially add flights, or use larger aircraft. Either outcome will affect the number or size of aircraft using the North Apron (as well as screened passengers in the Hold Room), which are undersized to meet current needs.

The peak hour activity levels can exceed the North Ramp's operational capacity during peak summer weekends in good weather conditions. When weather conditions deteriorate and operational capacity is exceeded, backups on the taxiway system, parking aprons, and terminal areas experience delays. At least one additional air carrier parking position should be considered for the North Apron. Alternatives such as a reconfigured commercial apron parking, by-pass taxiway and/or enlarged runup pads will be addressed in Chapter 7.

6.3 Airfield Efficiency Improvements

The efficiency of the airfield's Maintenance, Operations, ARFF and Management activities is key to sustaining safe, effective airport services that meet the needs of Nantucket's air travelers, FAA standards and the community's expectations. Adequate facilities that meet current needs to effectively house airport personnel and equipment contribute to more efficient productivity, as well as the preservation of long-term investments in staff, equipment and vehicles. This section examines the deficiencies and potential needs to improve facilities that impact on Airport efficiency.

6.3.1 Snow Removal Equipment (SRE) and Storage

ACK's current Snow Removal Equipment (SRE) and airport maintenance equipment is listed in Chapter 2, Table 2.7. As discussed in Section 2.6.2.3, the airport constructed the existing SRE storage and maintenance building within the "Bunker Area" located to the east of Runway 15-33 in 2000. The 25,200 SF building is co-occupied with the NRTA (Nantucket Regional Transportation Authority) and while the Airport's side of the SRE building (17,325 SF) has adequate repair shop, maintenance and staff facilities, it does not provide enough storage space for all of the Airport's SRE equipment. FAA AC 150/5220-18A, Table 3-1, sets storage space standards for SRE buildings. The FAA uses an Equipment Safety Zone (ESZ) allocation standard which is added to vehicle dimensions to ensure safe operating conditions inside the storage area portion of the building. Nantucket's existing SRE Garage has 5,000 SF of ESZ storage space. Based upon the number and type of ACK's SRE vehicles and airfield maintenance equipment, the FAA standard requires more than 11,300 SF of ESZ area. That results in a deficiency of 6,300 SF of ESZ, which requires an added building area of approximately 9,660 SF to yield the needed ESZ storage area. Adding four 24'x105' bays would yield 10,080 SF, which would provide for future SRE needs. During the warmer months, ACK utilizes a separate Quonset hut type tent structure to store the winter season airport SRE equipment. A 22' and 19' plow, two 11' plows, and three 8' pickup truck plows, along with two 6 yard sanders and one 3 yard sander are stored within this temporary Quonset style tent structure.

The FAA's 2014 Part 139 Safety Inspection states, "After a review of the existing fleet of snow and ice control equipment, the FAA inspector recommends the acquisition of one additional snow blower with broom/blower/plow capabilities to enhance airfield snow removal operations and improve the effectiveness of airfield maintenance staff during snow removal events." Other equipment due to be phased out include a 1988 John Deere 644E Loader. During July 2014, the Airport received MassDOT Grants to purchase a new John Deere utility tractor and brush hog, a John Deere skid steer, and an F-350 pick-up truck with a skid mounted tank for vegetation control.

Two additional pieces of SRE equipment are expected to be added in the coming years. Based on the FAA inspector's recommendation, an additional blower will be needed within the planning period. Due to the existing inadequate storage space for the current equipment, it would be advantageous for the SRE storage facility to be expanded by four additional bays to store all equipment. Concepts will be explored in Chapter 7.

6.3.2 Ground Service Equipment (GSE) and Storage

As discussed in Section 2.6.2.1, the Ground Service Equipment (GSE) storage area at ACK is inadequate and storage of the equipment is fragmented. During the summer months, the Airport's FBO passenger shuttle carts, auxiliary power units (auxiliary power units) and ramp equipment are partially housed in an open, 542 SF two-bay wooden shelter, adjacent the South Apron (see **Fig. 2-26**, Chapter 2). This shelter is open to the weather and is of insufficient size to properly store the Airport's increasingly expensive APU equipment and shuttle carts, which total 2,444 SF of area (see **Table 2-10**, Chapter 2).

The airlines at ACK that provide seasonal air carrier service provide their own GSE which is generally stored outdoors on the North Apron pavement. The airlines' GSE equipment includes aircraft tugs, deicers, ground power units, baggage carts, and belt loaders. During the winter months, the airline GSE equipment is stored along with summer airfield maintenance and the Airport FBO/Operations equipment in the temporary Quonset style storage tent located northeast of the North Ramp off the Runway 24 end (see **Fig. 2-25**, Chapter 2).

Consideration should be given to replacing the existing 542 SF Airport FBO GSE Shelter with an adequately-sized facility which protects the Airport's GSE investment from deterioration in Nantucket's coastal weather environment. Options will be considered in Chapter 7.

6.3.3 Airport Rescue and Fire Fighting (ARFF) Building and Storage

As discussed in Section 2.6.2.2 the Airport Rescue and Fire Fighting (ARFF) Building opened in 2012. The building is sized to meet ARFF Index B (based on the function of the largest passenger aircraft that operates at ACK). In June 2014, the Airport received an FAA Grant to purchase a new Oshkosh 'Striker' 4x4 ARFF vehicle with a 1500 gallon water and 450 pound dry chemical fire suppression system to replace an older ARFF truck. Recent HVAC leakage problems have created interior water damage issues which, in the event of a recurrence, could adversely affect ARFF functions, training activities, and airfield Operations which are co-located in the ARFF building.

No additional storage needs or replacement ARFF equipment is required, however a review and upgrade to the building's HVAC plumbing and IT Control systems are recommended for the short term planning period.

6.3.4 Seasonal Employee and Manager's Housing

As reported in Section 2.8, an increasing concern has been the availability of seasonal housing for summer employees. With summer season Operations staff increasing by 11, the FBO staff doubling from 3 to 6, and Security adding 3 personnel in 2014, the overall staff increases by nearly 60% to a total of 52 seasonal employees. The Airport currently maintains a three-bedroom bungalow (the "Thompson house") which sleeps 8 and is in need of major upgrades. With 19 incoming staff each summer, and given the prices of summer rental properties in Nantucket's premium market, seasonal housing is a critical concern. Seasonal housing needs also beset the Island's Public Security and Public Services sectors, including the Town's summer Police and lifeguard hires, as well as US Coast Guard and TSA summer safety staff, all requiring temporary housing. There have been previous proposals to develop town-sponsored dormitory-style housing for seasonal employees, some of which included participation by the Airport. In addition, all previous ACK Airport Layout Plans have identified a proposed Airport Manager's House. The lack of permanent housing for the Airport Manager can be a deterrent in attracting and sustaining qualified senior airport management candidates to the Island. The problem is exacerbated by Nantucket's real estate market, where 12-month leases are at risk of not being extended by property owners in favor of more lucrative 4-month summer leases that generate equivalent or higher returns over shorter periods. This has become an increasingly critical issue, which when combined with the need for seasonal employee housing, has become acute in recent years. Rehabbing and/or relocating the existing Thompson House as the Airport Manager's House and providing a dormitory location on Airport property for seasonal Airport and Town safety/security employees should be considered.

There is a need to plan for seasonal dormitory-style housing and an Airport Manager's House within the next 5-Year planning period. Alternatives will be considered in Chapter 7.

6.3.5 Air Traffic Control Tower Rehabilitation (Phase 2)

Section 2.5.2.4 reported on the need for rehabilitating the Air Traffic Control Tower (ATCT) and the separate FAA-funded effort that initiated a rehab of the Tower in its present location and at its existing height. The available FAA funds, however, were insufficient to complete all the necessary upgrades. This has required the project to be subdivided into two phases, with the Airport absorbing the approximately $1 million costs of Phase 2.

There is a need to anticipate the funding of Phase 2 of the ATCT rehabilitation project within the next 5-Year planning period.

6.3.6 Automobile Parking

Section 2.6.2.6 reported on the 292 parking spaces in the main parking lot, which is divided into two sections. There are 66 spaces in the front section, intended for one-hour, short-term drop-offs and pick-ups, and 226 spaces in the rear long-term lot, which is frequently less than half-full. Parking tokens are dispensed at the single entrance access control gate, with two auto-pay exit control gates. Due to equipment maintenance issues, a need has been identified to install a second entrance control gate to provide redundancy. In addition, it has been noted that there is a lack of available long-term parking for contractor vehicles and storage areas for equipment. A separate facility, more remotely located, should be considered to meet contractor needs. While excess space is often available at the rear of the long-term parking lot, parking needs for airport users are anticipated to increase over the short to mid-term planning period (see **Table 6-11**).

Table 6-11 Terminal Parking Demand

	2013	2018	2023	2028
Annual Enplanements	178,303	196,996	215,326	233,656
Short-Term/Long-Term Parking Spaces Requirement	292	322	352	382
Parking Spaces Surplus/(Deficit)	0	(30)	(60)	(90)

Consideration should be given during the 5 Year planning period to providing one additional access control gate and a separate long-term parking facility for contractor vehicles. Options are considered in Chapter 7. Since the long-term portion of the parking lot frequently has more than 80 spaces available, there is no apparent need to consider additional parking capacity until the 15 Year planning period.

6.4 Revenue Improvements

Nantucket's passenger enplanements had dropped from a high of 302,161 in 2000 down to a total of 178,303 in 2013 (as shown in Table 4.3.2 and Chart 4.3 in Chapter 4), which is roughly equivalent to the 1993 level of enplanements. This 40% drop in enplanements resulted in reduced revenues while operational costs remained the same or increased. The reduction in enplanements has been reflected in the FAA's annual apportionment of Federal Aviation Trust Funds provided to Nantucket Airport. This annual apportionment is based upon local and national passenger ticket tax revenues. As enplanements decline, income from ticket sales declines. On a national basis, this has been exacerbated by airlines switching to fee-based surcharges (such as fees for checked bags or carry-ons, etc.) which divert money directly to the airlines without supporting the FAA or airports via the ticket tax. These losses in ticket income have caused FAA to reduce Nantucket's entitlement by $600,000 since 2007. This creates constraints on the size of ACK's capital repair projects for taxiways or aircraft parking aprons, for example. Chapter 4 notes similar reductions in the number of aircraft landings and takeoffs, which cause another loss of income to the Airport due to reduced landing fees and fuel sales. Recent concern has been raised over proposed increases in Fast Ferry service between Nantucket and Hyannis. The Fast Ferry is seen as direct competition with the airport's shuttle market to HYA, which has suffered major reductions coinciding with prior Fast Ferry service. As a result of these reductions in income, there is a need to create alternate revenue sources and enhanced efficiencies to improve the airport's financial sustainability.

Options should be considered for alternate revenue sources and increased efficiencies. These may include: Restructuring Rates and Charges; Revised GA Jet Parking Fees; GA/Commercial Combo Hangar Space; Terminal and GA Building Flex-Space Rental Options; Surplus Parcels disposal (swap-sell-lease); Expanded Bunker Area leasing; Reuse of Surplus Airport FBO Building; Solar and Alternative Energy Development Concepts; Apron Lighting Controls; Ramp Electrification and Alternate APU Power Systems; Propane and/or Electric Airport Vehicles; and Airport GIS Mapping for more efficient systems management, among others. Chapter 7 will consider these and other practicable alternatives for revenue enhancement.

6.5 Environmental / Sustainability Improvements

As an island with an international tourist-based destination economy, Nantucket is challenged to maintain its unique environmental resources, while balancing tourism demands with quality of life and sustainability goals. Energy costs and compliance with MEPA/NEPA and local environmental regulations are on-going concerns at ACK. The airport faces increased electric costs over the mid to long-term planning period, as well as an increasingly restrictive set existing and future permit requirements for habitat management on airport property.

6.5.1 Environmental - Solar Array

The Airport could consider the installation of solar photovoltaic panels as sustainable power source and revenue generator, similar to the solar installation at HYA. This would have the benefit of providing sustainable power while avoiding future increases in electric power costs. If the power provider were set up as a community non-profit corporation, similar to the Cape and Vineyard Electric Corporation (CVEC) at Hyannis Airport, any power reserves could be sold back to the grid and the installation would provide a long-term revenue source for the Airport. FAA Approvals and an FAA glint and glare review would be required, as well as a MESA habitat mitigation program.

6.5.2 Environmental - Airport Vehicle Fleet Conversion

The Airport should consider a phase-in of new alternative-fuel maintenance vehicles to replace vehicles operating on diesel.

6.5.3 Environmental - Transportation Initiatives

The Airport could negotiate to increase the frequency of the NRTA's Ferry/Airport Route from the current 20-minute headway during the peak seasonal period. Other initiatives would be to promote available shuttles, rental cars, cabs, and courtesy vans at the airport through a variety of venues, publications and media. Locate dedicated parking spaces for cars powered by alternative fuels in parking lot close to the terminal. Provide free or low-cost charging station for EV vehicle(s) in short-term parking area. Provide loaner bicycles or bike-share station for pilots and/or visitors to use for short-term (see Chatham Airport or BWI Thurgood Marshall Airport). Or partner with hotel(s) or Town for multiple-station Town-wide bike share program. Provide free or discounted space for vendor for bike rental desk. Provide additional modern bike parking with protection from the elements and higher security, such as a card-key-access bike cage. Extend existing bike paths closer to the airport.

6.5.4 Rare Species Master Plan

As discussed in Chapter 3, the airport is host to numerous plant, invertebrate and bird species of concern. Most of the airport property is mapped as habitat for these species, and the airport actively maintains portions of the airfield as habitat for grassland plants. Each project that the airport undertakes requires a state level review process to determine its potential effect on these species, and determine appropriate mitigation in the form of new or protected habitat. The creation of an Endangered Species Master Plan would allow the airport and the state to take a longer look at where the best habitat is now, where all foreseeable airfield improvements will likely occur, and where the best areas for mitigation are. This would allow for the habitat mitigation areas to be created up front, in advance of any projects and would require coordination with NHESP once, for the Master Plan, rather coordination for each individual project. This reduces construction delays and number of fees for individual projects. The ratios of required mitigation acreages to impact acreages may also be more favorable with this approach due to the value of habitat creation and management up front. Currently only one airport in the state (Westfield-Barnes Municipal Airport in Westfield, MA), has created an airport Rare Species Master Plan.

6.6 Summary Table

A summary of the facility improvements that currently need to be addressed at ACK during the 20 year planning period is provided below in **Table 6-12**. Certain improvements will be further examined in Chapter 7, Alternatives Analysis to evaluate options that accommodate the facility requirements.

Table 6-12 Existing Facility Requirements Summary[16]

Section	Item	Issue	Trigger
6.1.1.4	Runway Protection Zone	• RW 15 RPZ has non-compatible land use area within the NE corner. • Hangars 5&6 are located within the RW 15 Part 77 RPZ.	• Non-compliance per AC 150/5300-13A CHG 1, *Airport Design*, Section 310, B.
6.1.1.4	DME Shelter	• Flood proofing should be considered for the DME Shelter.	• Located within CAT 4 Hurricane Tidal Surge Zone.
6.1.2.1	Taxiway Separation	• FAA Taxiway Design Criteria require 152' separation. Taxiways 'E', 'F'/'E' and 'G' have 125' separation.	• Non-compliance per AC 150/5300-13A CHG 1, *Airport Design*, section 404, Table 4-1.
6.1.2.2	Exit Taxiway	• RW 24 would benefit from an additional exit taxiway to relieve congestion hotspots in the taxiway system.	• Recommended per AC 150/5060-5; 25.491-1; AC 150-5020-1; and ATCT recommendation.
6.1.2.3	Taxiway Pavement	• The MassDOT PCI indicates that Taxiway 'E' is beyond the 20-year design life	• MassDOT PCI Plan, as extended per MassDOT 2014 Crack Seal Program.
6.1.2.4	Parallel Taxiway	• FAA Design Standards recommend a Parallel Taxiway for Non-Precision Instrument Runway 33.	• Recommended per AC 150/5300-13A CHG 1, *Airport Design,* Section 405.
6.1.3.1	Taxilane Width	• Taxilanes in the South Apron do not meet design standards for spacing due to an increase in aircraft size	• Non-compliance per AC 150/5300-13A CHG 1, *Airport Design*, section 404, Table 4-1.
6.1.3.2	Apron Pavement	• The MassDOT PCI indicates the majority of apron pavement is beyond or close to their 20-year design life	• MassDOT PCI conditions have been extended per MassDOT's June 2014 Crack Seal Project
6.1.4	Part 77 Transitional Surfaces	• Tail heights of aircraft parked on north apron can penetrate the Transitional Surface for RW15-33 and RW6-24	• Non-Compliance per CFR Part 77, *Safe and Efficient Use of Navigable Airspace*, Subpart C, Section 77.17
6.1.5.1	Perimeter Security Improvements	• Airfield access points should be upgraded and integrated into existing central security system to provide positive airfield access control and intrusion detection capabilities • Upgrade command/control systems and	• AC 150/5360-13 CHG1, Section 804; FAA AR-00-52; RTCA DO-230A; TSR Part 1542

[16] Jacobs, 2014

		video surveillance for increased situational awareness	
6.1.5.2	Communication Systems	• Upgrade to fiber optic or more modern wireless system.	• (as above)
6.1.5.3	Telcom Facilities	• Consolidate communications to security control room	• (as above)
6.1.5.4	IT Systems	• Consolidate FIDS (Flight Information Data System). • Upgrade public address and paging system • Upgrade and replace airport wide telephone system.	• (as above)
6.2.1	Secure Hold Room Capacity	• The secure hold room is often at or exceeding its rated occupancy, per Code requirements	• International Building Code, Table 1004.1; NFPA Fire Code and ACRP Report 25*, Airport Passenger Terminal Planning and Design*, Volume 1; FAA AC 150/5360-13
6.2.2	Air Carrier Apron	• Need for one additional air carrier aircraft parking position	• FAA AC 150/5300-13A; FAA Order JO 7110.65
6.3.1	SRE Storage Needs	• SRE equipment is due to be phased out and new equipment is expected in the short term. • Currently the SRE equipment is stored in various locations on the airfield. All equipment should be in one location.	• Guidelines for SRE storage needs can be located in AC 150/5220-18A, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials.* • Guidelines for SRE equipment listed in AC 150/5200-30C, *Airport Winter Safety and Operations.*
6.3.2	GSE Storage Needs	• Currently the GSE equipment is stored in various locations on the airfield. All equipment should be in one location.	• Guidelines for GSE Storage listed per AC 150/5360-13 CHG1
6.3.3	ARFF HVAC Upgrades	• ARFF building has history of plumbing leaks that threaten airport Ops and Management functions	• 248 CMR 10.00 Uniform State Plumbing Code
6.3.4	Seasonal Employee and Manager's Housing	• Need for additional housing to accommodate seasonal employees as well as Airport Manager's dwelling	• AC 150/5070-6B. Sections 809 & 812
6.3.5	ATCT Phase 2 Rehab	• Need for Phase 2 of ATCT Rehab	• Per FAA Lease with ACK
6.4	Revenue and Efficiency Needs	• Consider additional revenue sources and enhanced efficiencies	• AC 150/5070-6B. Sections 608, and 1202-1204
6.5	Environmental and Sustainability Needs	• Environmental Permit compliance and sustainability objectives	• MEPA and NEPA Regulations • MESA Permit conditions

APPENDIX A

Terminal Building LOS Study

Terminal Building Level of Service Study

Introduction

This report provides a broad Level of Service (LOS) analysis of Nantucket's passenger terminal building using the FAA Airport Cooperative Research Program (ACRP) Terminal Planning Spreadsheet Model. LOS calculations compare the passenger demand in each functional area (ticketing, baggage, airline office space, holdrooms, concessions, and circulation, TSA, and maintenance areas, during the peak hour to the capacity metrics outlined in this report in the following section. The following factors were used to model the ACK LOS:

- 90% load factor was applied to each aircraft operation and used as an integer number of passengers in the model, based on aircraft equipment currently in use.
- The terminal program was based upon "Peak Month Peak Day". A gated schedule was not available. In order to accurately determine the peak hour during a peak day, a schedule was created using the second Sunday in August as the "peak day", as suggested by prior analyses. The schedule was created based on current available information from all commercial airlines that serve ACK.
- The "Status Quo" Forecast of Aviation Demand served as the basis for enplanements and commercial operations were used as the basis for terminal programming for ACK. Annual demand forecasts were analyzed to interpolate the number of Peak Hour Originating Passengers (PHOP), Peak Hour Terminating Passengers (PHTP), Annual Enplanements (ANNEP), and Peak Hour Passengers (PHP).
- TSA equipment throughput capacity was determined based on industry standards and per the equipment shown on floor plans.
- Weather delays and ground holds are known to occur sporadically at ACK, however for the purposes of this study and forecasting these were not factored into the sizing of the individual program functions.

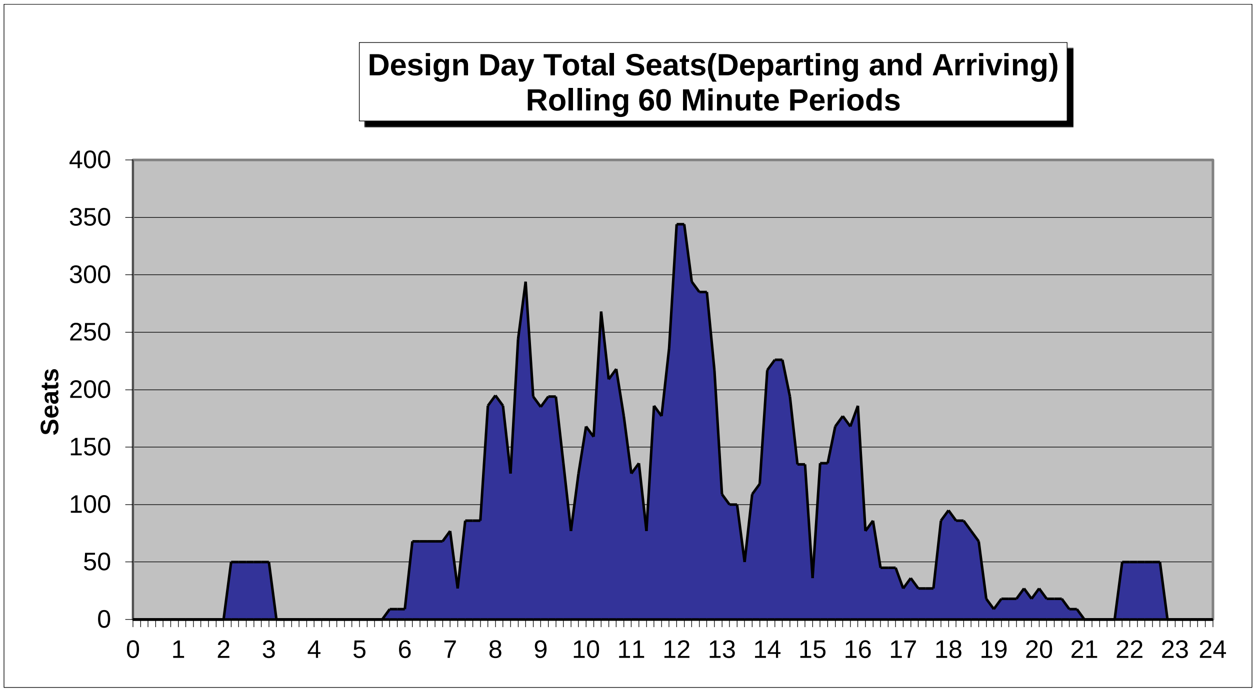
Design Hour Determination

The peak hour was determined by compiling published ACK flight schedules for August 10, 2014. These flight schedules only include commercial aircraft and passengers that will pass through TSA security. This study analyzes only the passengers for the secure/air carrier portion of the building. Air taxi (IE: Island Airlines and Nantucket Airlines) passenger counts were not analyzed or factored into the forecast.

The analysis determined that the peak hour was from 12:10pm until 1:10pm, with a total of 176 departing passengers and 168 arriving passengers. Since the layout of ACK separates the departing holdroom from the arriving passengers our analysis for these areas was also separated.

During the peak hour it was determined that there are 5 departing flights, one E-190 (100 passengers) flight to JFK, one ERJ-135 (50 passengers) flight to DCA, and three C-402 (9 passengers) flights to BOS. There are also 4 arriving flights, one E-190 (100 passengers) flight from JFK, one ERJ-135 (50 passengers) flight from DCA, one C-402 (9 passengers) flight from BOS, and one C-402 (9 passengers) flight from PVD.

The PHOP, PHTP, and PHP were derived by analyzing the total number of passengers that would arrive and depart on these 9 flights during the peak hour, with the given 90% load factor. Since ACK is unique in that the departing Holdroom and arrival Holdroom are separate and these passengers will not mix, the analysis of the individual program spaces reflects this unique arrangement.



Ticketing

Using the ACRP model of spatial needs, the current ticketing area is adequate for ACK. However, certain assumptions were made to determine this condition. Further study may be warranted based on real world observations and verified projected growth. Currently ACK has 26 counter positions. Roughly 12 of these positions have direct access to the outbound baggage screening belt. The terminal programming analysis only considered these 12 positions, and assumed a standard Level of Service C for this specific operation. General rule of thumb indicates that 50% of the passengers will arrive during the peak 30 minute period for check-in and 60 minutes prior to departure, and we have assumed that 70% of those passengers will use the ticketing counters. The remaining 30% will use self-service kiosks and print their tickets at home. Refer to the ACRP model for further analysis.

Based upon the "Status Quo" forecast, the recommended needs for ticketing space are indicated on the following page.

Type of Occupancy	Existing SF	Conceptual Planning Factor		REQUIRED SQUARE-FOOTAGE PER FORECAST YEARS 2014	2018	2020	2025	2030
Ticketing								
Ticket Counter Area	**1226**	3.15	SF/PHOP	567	611	633	687	742
Ticker Counter Length	**118**	*0.3*	*LF/PHOP*	54	58	60	65	71
Ticket counter Queuing	**1,188**	6	SF/PHOP	1,080	1,163	1,206	1,309	1,413
Airline Office Space	**1,070**	7.5	SF/PHOP	**1,349**	**1,454**	**1,507**	**1,636**	**1,766**

Currently each air carrier has designated office space, currently this space is adequate. However, our analysis indicates that the current space is smaller than industry standards dictate. Furthermore, as operations increase additional square-footage may be necessary. The current arrangement does not have adequate space to accommodate a new air carrier if one is added and analysis of the seasonal air carrier(s) office space needs should be completed to understand the most efficient use of the current office spaces.

Security

Using the ACRP model, the current peak hour needs are met with two (2) operating security lanes. However, a more accurate approach for an airport the size of ACK is to consider security screening in 3 parts: TSA security queuing; TSA security screening; and TSA reconciliation area. Queuing and reconciliation area is determined based on Peak Hour Originating Passengers (PHOP), whereas screening area is determined by a flat number based on size of machine in use. Currently ACK does not use a full body scanner in their screening process. Additional square-footage will be required should TSA decide to add this equipment.

The recommended needs for screening are indicated below. Square footages in red indicate a deficiency.

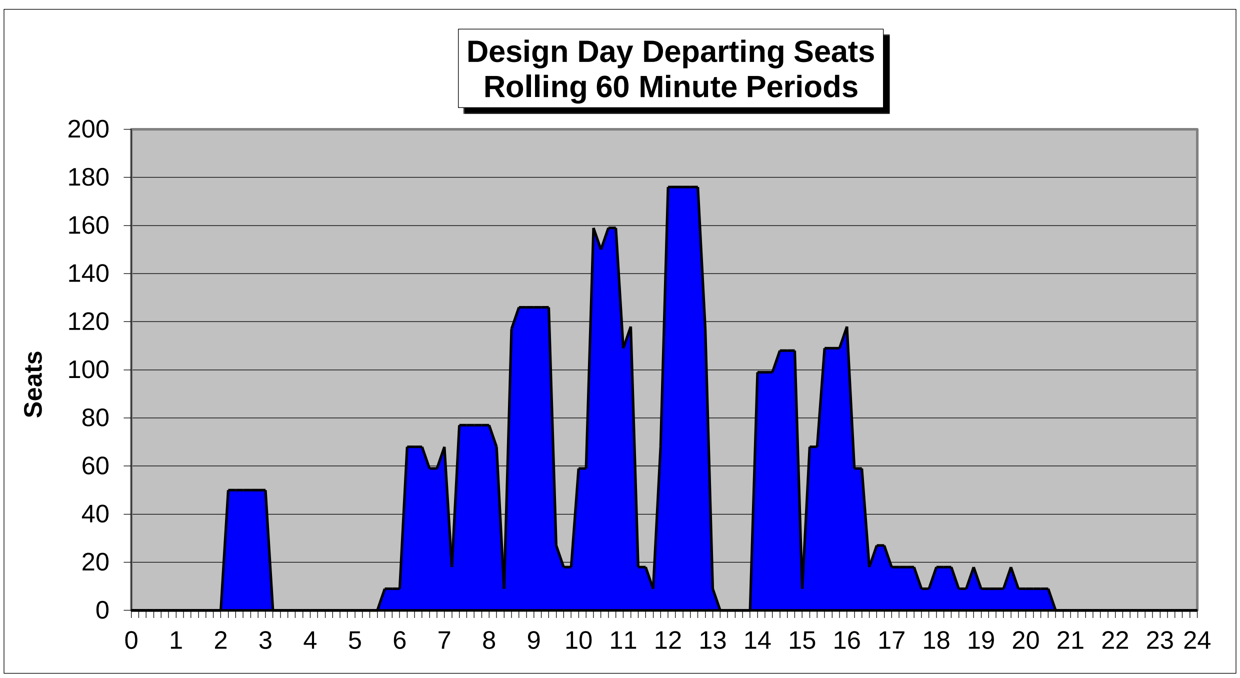
Type of Occupancy	Existing SF	Conceptual Planning Factor		REQUIRED SQUARE-FOOTAGE PER FORECAST YEARS 2014	2018	2020	2025	2030
TSA Security Screening	**1332**	1200	SF/Lane	**2,400**	**2,400**	**2,400**	**2,400**	**2,400**
TSA Security Queuing	**423**	2	SF/PHOP	360	388	402	**436**	**471**
TSA Baggage Screening Area (Bag Make-Up)	**2112**	850	SF/Machine	850	850	850	850	850
TSA Offices	**333**	4.34	SF/PHOP	**781**	**841**	**872**	**947**	**1,022**
TSA Reconciliation Area	**276**	2	SF/PHOP	**360**	**388**	**402**	**436**	**471**
TSA Security Areas Subtotal				4,751	4,867	4,926	5,070	5,214

Holdroom

Holdroom capacity analysis in the ACRP model considers the number of seats on the design aircraft. For the purpose of this study, and due to the likelihood of multiple planes being parked during a peak hour, the largest plane that services ACK was chosen. The largest plane currently in service at ACK is an E190 aircraft at 100 seats, at an assumed 90% load factor. IATA/ACRP standards estimate that 80% of the Holdroom passengers will sit and 20% will remain standing. In order to yield an LOS of C, the seated passengers require 15 square-feet and standing passengers will occupy 10 square-feet.

Seated and standing square-footage for a 100 passenger plane at 90% load will require 1,260 SF. This number does not currently take into consideration space for podiums, boarding corridor width, or passenger amenities. Once all items are considered in the ACRP model the estimated size required for the Holdroom equals 2,519 square-feet.

Unlike the ACRP model, this analysis considers the peak hour originating passengers which are more indicative of the expected number of passengers that will occupy the arrival holdroom and departure holdrooms. The PHOP was derived from the ACRP peak hour model, which analyzed the number of schedule seats during the peak hour. For the purpose of this analysis, the PHOP was increased based on the percentage increase in annual enplanements from the “Status Quo” forecasts. This analysis used the same breakout of seated versus standing passengers and required square footages as the ACRP model. Again, existing and forecast spatial deficiencies are indicated in red.



			REQUIRED SQUARE-FOOTAGE PER FORECAST YEARS				
Type of Occupancy	**Existing SF**	Conceptual Planning Factor	**2014**	**2018**	**2020**	**2025**	**2030**

Holdrooms (Secure)	**1,937**						
Space for Sitting Passengers		15	SF/PHOP	2,159	2,326	2,411	2,618	2,825
Space for Standing Passengers		10	SF/PHOP	360	388	402	436	471
Subtotal				**2,519**	**2,714**	**2,813**	**3,054**	**3,296**

The current Holdroom at ACK has 1,937 SF and is limited to 126 persons per fire code. On a typical peak day in August, ACK can expect to have 176 passengers occupying the holdroom during the peak hour, requiring 2,519 SF. This is 582 SF above the available SF and 50 passengers over the existing capacity. During weather delays or FAA Ground Stops, this overcrowded condition can reportedly increase. This is a potential code issue and should be further studied to verify and resolve this condition.

Concessions

The ACRP model does not include the spatial needs for "Concessions" in its study factors.

Therefore, industry standard conceptual planning factors were applied to arrive at forecast estimates for Concession space. Square footages in red indicate a deficiency in Concession space.

All concession space is currently located on the non-secure side of the airport, with no concession space on the secure side. Future planning should provide more concession space on the secure side.

				REQUIRED SQUARE-FOOTAGE PER FORECAST YEARS				
Type of Occupancy	**Existing SF**	Conceptual Planning Factor		**2014**	**2018**	**2020**	**2025**	**2030**
Concessions Food/Beverage)	**2,657**	0.0055	SF/ANNEP	1,003	1,083	1,124	1,225	1,325
Concessions (News/Gifts)	**475**	0.0023	SF/ANNEP	419	453	470	**512**	**554**
Concessions Storage	**84**	0.0005	SF/ANNEP	**91**	**102**	**102**	**111**	**120**

Rental Car Counter Area

The ACRP model does not include rental car counter area in its factors.

Therefore, this study applied industry standard conceptual planning factors to arrive at forecast estimates. Square footages in red indicate a deficiency.

				REQUIRED SQUARE-FOOTAGE PER FORECAST YEARS				
Type of Occupancy	**Existing SF**	Conceptual Planning Factor		**2014**	**2018**	**2020**	**2025**	**2030**
Rental Car Counter Area	**550**	0.0025	SF/ANNEP	456	492	511	**557**	**602**

Outbound Baggage + Screening

The ACRP model considers the PHOP for the analysis of the outbound baggage and screening.

This study applied the ACRP factors and assumptions in this analysis as follows:

- 60% of passengers will check luggage
- 1.5 bags per passenger – this number skews towards the higher end of the estimate based on the fact ACK is a leisure destination.
- Level 1 and 2 EDS screening rate is assumed to be 120 bags per hour.
- Level 3 EDT screening rate is assumed to be 24 pages per hour per screener.
- ACRP indicates that Level 1 area per EDS is 800 SF per unit.
- ACRP indicates that Level 2 area per EDS is 40 SF per unit.

The ACRP model indicates that 1,619 SF is needed for outgoing baggage screening, which implies a 496 SF surplus of current space. Existing Bag Screen space is adequate through the 2030 planning period.

Forecasted spatial needs for Bag Claim Frontage are indicated below. Square footages in red indicate a deficiency.

				REQUIRED SQUARE-FOOTAGE PER FORECAST YEARS				
Type of Occupancy	**Existing SF**	Conceptual Planning Factor		**2014**	**2018**	**2020**	**2025**	**2030**
Outbound Baggage	**2112**	9	SF/PHOP	1,619	1,745	1,808	1,964	2,119
Baggage Claim Area	**1783**	9.5	SF/PHTP	1,632	1,758	**1,822**	**1,978**	**2,135**
Baggage Claim Frontage	**54**	1.5	LF/PHTP	**258**	**278**	**288**	**312**	**337**
Baggage Claim Service Office	**0**	1.5	SF/PHTP	**258**	**278**	**288**	**312**	**337**

APPENDIX B

FAA RSA Determination Letter

9/13/2000

Runway Safety Area Determination
Nantucket Memorial Airport
Nantucket, Massachusetts

Based upon a physical inventory of objects in the runway safety areas, the results of which are attached, as well as review of other documents available, the following determinations are made:

Runway 6-24 - The existing RSA in the approach end of Runway 6 is 950' on centerline tapering to 920' and 790' left and right of centerline, respectively. In the area beyond these limits lies a fence and environmentally sensitive sand dunes which ultimately connect to the ocean. Extending the RSA in this direction appears impracticable as does shifting and shortening the runway given that the centerline dimension is only 50 feet short of standard. Shifting or shortening the runway would require relocation of approach lighting systems, numerous other NAVAIDS and centerline/touchdown zone lights. EMAS might provide limited benefit but given the small deficiency and given the installation and maintenance cost, is not justified. In addition, grading of terrain is required of various areas within the safety area of the runway and some objects need to be made frangible.

It is practicable to meet standards in the approach end of Runway 24. Two approach light stations need to be frangibly mounted.

Runway 12-30 - Runway 12-30 is not under Part 139. The Runway 12 safety area end is within the RSA for Runway 6-24 creating an operational concern. To eliminate this concern, the Runway should be shortened such that the safety areas do not overlap. Also, to meet standard it appears that filling to grade would be required on both sides of the runway for a distance of 1400'.

Runway 15-33 – The safety areas for Runway 15-33 currently meet standard.

These determinations are made based upon the information currently available and are subject to planning and environmental review and change if additional information is received.

Vincent A. Scarano
Division Manager

Date: 9/13/00