SECTION 2 - PURPOSE AND NEED

2.0 OVERALL PURPOSE AND NEED FOR PROPOSED ACTION

This section discusses the purpose and the unconstrained need for each element or improvement in the Proposed Action.

The purpose and need for the following listed elements of the Proposed Action is to enhance safety through compliance with FAA design standards and compliance with Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace,* and FAA Order 8260.3B, *United States Standard for Terminal Instrument Procedures* (TERPS).

1. Reconstruction of Runway 14-32
2. Reconstruction of parallel taxiway
3. Construction of Runway Safety Areas
4. Separating Runway 14-32 from parallel taxiway by FAA standard of 400 feet
5. Removal of obstructing vegetation to Part 77 surfaces
6. Lighting of obstructions to Part 77 surfaces (where approved by FAA)

The purpose and need for the following listed elements of the Proposed Action is to provide the Airport with a more efficient use of its runway and with additional aircraft accommodations (tie-down spaces and hangar space).

1. Extend the runway's takeoff length capability from 5,500 feet to 6,000 feet
2. Construct 63 T-hangars in nine buildings in the northwest quadrant of the Airport
3. Construct additional aircraft tie-down spaces adjacent to the Main Aircraft Parking Apron (68 spaces are planned).

The need for each element that comprises the Proposed Action differs for each facility or action under review. The highest priority is attending to needs that enhance safety at the Airport which include, among other elements of the Proposed Action, the reconstruction of the runway and taxiways, the reconstruction of the runway's runway safety areas (RSAs), the removal of obstructions to the runway's airspace, and compliance with runway-to-taxiway separation standards. Other elements of the Proposed Action are needed to enhance or improve the Airport's operational efficiency which, among other improvements, includes improvements to the runway's takeoff length, providing additional aircraft parking and hangar space. The purpose and need for these improvements are discussed separately in this section.

The overall purpose and need for the Proposed Action is to enhance safety and operational efficiency at the Airport through compliance with FAA standards and other applicable requirements, while, to the degree practicable, preserving the natural environment around the Airport.

2.1 PURPOSE AND NEED FOR RUNWAY/TAXIWAY IMPROVEMENTS

This section of the study discusses the purpose and need for each individual proposed runway/taxiway related improvement. Overall, the purpose of these proposed improvements is to provide the Airport with a safe runway and taxiway environment. The Airport is obligated, by virtue of its prior acceptance of Federal funds and grant assurances with the FAA, to maintain a safe and efficient operation. This is accomplished primarily through compliance with FAA design standards.

2.1.1 General Discussion on Safety at the Airport

Enhancing safety at public use airports is the highest priority of the FAA and NHDOT/BA. Though achieving a state of "absolute" safety is a noble goal, it is not a realistically achievable one. Therefore, the goal of this Proposed Action is to *enhance* the safety characteristics of the Airport wherever needed and practicable. Safety enhancements may take the form of improved operational practices, regulatory and design changes, implementation of new or improved technologies, or by making improvements to the physical facilities themselves.

In the case of the Airport, the safety enhancements are in the form of upgrading the physical facilities through compliance with FAA design standards by modernizing its physical infrastructure in support of the high performance aircraft traffic the Airport receives.

Compliance with FAA airport design standards is not only a regulatory obligation; it is an important component of the safe operation of an airport. Familiarity with an airport environment and consistency in the application of airport design standards assist a pilot's efforts to operate safely and avoid costly and dangerous mistakes. Therefore, the FAA and NHDOT/BA closely monitor an airport's compliance with standards, and insist on standardization wherever practicable, but most particularly when significant and costly improvements must be made such as the reconstruction of a runway. Currently, the Airport fails to comply with FAA standards with respect to its runway to taxiway separation, its RSA, and with Part 77 and TERPS airspace requirements.

2.1.2 Compliance with FAA Standards

The need to comply with FAA design standards at airports is imperative. When an airport accepts Federal funding assistance, it also accepts certain obligations to the Federal government. Airports that accept these Federal obligations are known as "Federally obligated" airports. Federally obligated airports must, by agreement with the Federal government, comply with all Federal regulations, advisories, and orders. Eligibility to receive Federal funding assistance is directly tied to an airports compliance with these Federal standards.

There exist numerous airport FAA design standards, orders, regulations and other requirements that airports must meet in order to 1) maintain their ability to operate safely, and 2) maintain their eligibility to receive Federal funding assistance.

To determine which FAA design standards apply to a particular airport and runway, a design airplane is first selected which determines the Airport Reference Code (ARC).[1] The ARC is the airport's FAA classification and it determines the appropriate design standards that must be met. The selection of the design airplane and the determination of the ARC were made during the preparation of the Runway Feasibility Study report. Below is a summary of that determination.

2.1.2.1 Airport Reference Code

The Airport Reference Code (ARC) is an FAA coding system used to relate airport design criteria to the performance and physical characteristics of the aircraft that use or are expected to use a runway. The ARC is not determined by the airport or by the FAA but by a review of the number of operations performed annually by the aircraft with the "most demanding" approach speed and wingspan that regularly uses or is forecasted to use the Airport. Regular use of an airport is defined by the FAA as 500 or more annual aircraft operations. An aircraft operation consists of either a landing or a takeoff. Therefore, an aircraft landing and then taking off has made two aircraft operations.

The ARC has two components. The first component of the ARC, depicted by a letter, is the Aircraft Approach Category and relates to the speed of an aircraft while on approach to land at an airport, which is a performance characteristic. The second component, depicted by a Roman numeral, is the Airplane Design Group and relates to the size of an airplane's wingspan, a physical characteristic. Table 2-1 indicates the various ARC categories.

Table 2-1
Airport Classification Criteria

Aircraft Approach Category		Airplane Design Group	
A	Less than 91 knots	I	Wingspan < 49 feet
B	>91 knots but < 121 knots	II	Wingspan > 49 feet but < 79 feet
C	>121 knots but < 141 knots	III	Wingspan > 79 feet but < 118 feet
D	>141 knots but < 166 knots	IV	Wingspan > 118 feet but < 171 feet
E	> 166 knots	V	Wingspan > 171 feet but < 214 feet
		VI	Wingspan > 214 feet but < 262 feet

Source: FAA Advisory Circular 150/5300-13

The ARC at the Airport has fluctuated over the past decade as the use of business jets has increased and as new aircraft have been introduced to the market. The *Technical Supplement* to the *1989 Master Plan Update* documented the current and future ARC for the Airport as BII based on the Airport users at that time and on a forecast of likely users in the future. This ARC changed in 2004 when the Air Traffic Control Tower's 2003 data indicated that more than 500 annual operations were performed by Approach Category "C" aircraft in 2003. Therefore, the Airport's ARC was changed to CII. This data is presented in Appendix C.

[1] See section 2.1.2.1 of this report for a definition of the ARC.

At the beginning of this study, aircraft operation counts by aircraft type were obtained from the Air Traffic Control Tower and reviewed to determine whether the ARC of CII remained valid. The review indicated that enough aircraft operations were conducted in 2007 by category D aircraft to warrant a further change in the ARC. In addition, a forecast of future operations (20 years) was performed to assure planners that the ARC of DII would remain appropriate over the forecast period.

The forecast used growth rates from the *FAA Aerospace Forecast Fiscal Years 2006-2017*[2] (TAF). Unless a significantly unusual situation is found locally, the TAF growth rates are considered the industry standard. The forecast using 2007 aircraft operations is discussed in the section below. The Airplane Design Group II was found to remain valid through the forecast period. Therefore, the design standards used in the study are based on the Airport's ARC DII.

The forecast indicated that the types of aircraft that will use the Airport in the future are the same aircraft as those currently using the Airport. This was an important finding for the Nashua Airport Authority since their expressed mission is to make improvements to better serve its existing users and not to attract larger aircraft to the Airport. In support of this mission, business jets in the DII or smaller classification constitute the vast majority of business jets in use today and that are expected in the foreseeable future. Though not exhaustive, the FAA in August 2003 published a draft document entitled: *Best Practices: Planning Airports for Business Jets* that contains tables listing business jets with their ARC classification. Only two business jet exceed the classification of DII, the Gulfstream V (DIII) and the Bombardier BD-700 Global Express. The Airport currently has one Gulfstream V based on the airfield and it is not expected that this class of aircraft will meet or exceed 500 annual operations in the 20 year forecast period.

2.1.2.2 Future Aircraft Operations Forecast

A summary aviation demand forecast for a 20-year period is presented below in support of the ARC DII determination. The forecast includes a summary of aircraft operations by aircraft type (jet, single-engine piston, helicopter, etc.).

The most demanding aircraft using the Airport, both in terms of approach speed and wingspan, are jets. The jets using the Airport range in size from small jets classified as BI aircraft (for example: the Beechjet 400) to relatively large jets classified as DIII aircraft (for example: the Gulfstream V).

A summary of the forecast is presented in Table 2-2 "Aviation Demand Forecast Summary". The results of the forecast indicate that Approach Category "D" aircraft performed 426 operations in 2007 and are expected to perform 1,448 annual operations by 2027 (see Table 2-3). Approach Category "D" aircraft are expected to exceed the 500 operations per year threshold before 2012 (the forecast indicated 507 operations by 2009). The forecast results further indicate that Airplane Design Group II will remain valid over the forecast period (at least until 2027). Though

[2] http://www.faa.gov/data_statistics/aviation/aerospace_forecasts/2006-2017/

some Design Group III aircraft currently utilize the Airport, they are not expected to meet or exceed the 500 annual operations threshold by 2027 (see Table 2-4).[3] Therefore, the results of the forecasts indicate that the Airport Reference Code for the Airport during the period from 2007 to 2027 is ARC DII.

The practical effect of the forecast indicates that the types of aircraft expected to use the Airport in the future are the same as those currently using the Airport (DII Design Group).

2.1.2.3 Design Airplane and Runway Length

To maintain a safe and operable facility, airports must periodically review whether their facilities are adequate to handle the air traffic they are experiencing or that they expect to experience. The change in the Airport's ARC from BII to DII raised the question of the adequacy of the operational length of the Airport's runway. A change in the approach category of an airport's ARC provides an indication that it is being used more frequently than previously expected by faster approaching aircraft which typically have more demanding take-off and landing requirements. Therefore an analysis or review of the runway length requirements is warranted.

Airport ARC = DII

Table 2-2
Nashua Municipal Airport
Aviation Demand Forecast Summary

Aircraft Type	TAF Growth Rate	Aircraft Operations				
		2007	2012	2017	2022	2027
Single-Engine Piston	0.6%	85,175	105,131	129,764	160,167	197,695
Multi-Engine Piston	0.1%	9,033	9,078	9,124	9,169	9,215
Turbo-Prop	2.2%	8,458	9,430	10,514	11,723	13,070
Jet (Turbine)	6.0%	1,723	2,305	3,085	4,128	5,524
Helicopter (Piston)	6.7%	3,650	5,048	6,982	9,656	13,354

[3] Aircraft in the Airplane Design Group III conducted 46 operations in 2007 and are forecasted to conduct 156 operations in 2027.

Table 2-3
Total Jet Operations by Approach Category

Approach Category	2007 Total Operations	2027 Total Operations
B	681	2312
C	518	1761
D	426	1448

Table 2-4
Total Jet Operations by Design Group

Design Group	2007 Total Operations	2027 Total Operations
I	909	3087
II	670	1496
III	46	156

The FAA does not publish "standards" for runway lengths. Instead the FAA recommends methodologies to calculate runway length. This is due to the many factors that must be considered when determining a runway's length requirement. Such variables as the elevation of the airfield above sea level, air temperature, aircraft takeoff weight, aircraft stage length, type of aircraft engine, and engine performance among other factors must be considered when calculating require runway length for takeoff and for landing. To standardize the process, the FAA recommends the use of Advisory Circular, AC 150/5325-4B,[4] commonly called "The Runway Length AC," to determine a runway's recommended length.

Providing adequate runway length is important to maintaining an adequate margin of safety on a runway for all aircraft, but most critically for fast approaching, heavy, high-performance aircraft used in long-distance operations, particularly where meteorological conditions are less than desirable, or aircraft performance is hindered. In some respects runway length can be equated to the travel lane width on a highway. Highway travel lanes are typically much wider (12 feet) than the typical automobile (6 feet or less). Drivers are capable of driving on narrower travel lanes but as speeds increase narrower travel lanes reduce a driver's comfort level, particularly where there are driver distractions, medical problems, or poor road or weather conditions. The additional width in a highway travel lane provides the driver with a margin of safety in case conditions are not ideal. In much the same way, aircraft and pilots require a reasonable margin for error to provide for less than optimal conditions.

[4] AC No. 150/5325-4B, *Runway Length Requirements for Airport Design*, 7/1/2005

In addition, an aircraft's operational cost and fuel efficiency can be negatively affected when required to operate on a runway with deficient length. Relatively large jets operate at the Airport. Without adequate runway length these aircraft must take-off less than fully loaded with fuel or payload (usually fuel). This situation results in a loss of efficiency for the aircraft in fuel consumption (by requiring an otherwise unnecessary fueling stop), and unnecessary cycling of the aircraft, particularly jet aircraft. Many parts on jet aircraft must be replaced after a specified number of cycles regardless of the number of hours in operation (a cycle is either a takeoff or a landing). The requirement to refuel adds at least two additional cycles to the jet which ultimately results in otherwise premature and expensive maintenance, increasing the aircraft's operational costs. These jets represent a significant revenue stream for airports. Requiring them to operate in a less than optimal and inefficient environment could result in significant financial consequences for an airport.

Runway 14-32 is currently 5,500 feet in length and is adequate to accommodate the landing and takeoff requirements of virtually all B and C class aircraft. The Runway Length AC provides guidelines for airport designers and planners to determine recommended runway lengths for new runways or extensions to existing runways. The AC states in its introduction:

> *"Airport authorities working with airport designers and planners should validate future runway demand by identifying the critical design airplanes. In particular, it is recommended that the evaluation process area assess and verify the airport's ultimate development plan for realistic changes that could result in future operational limitations to customers. In summary, the goal is to construct an available runway length for new runways or extensions to existing runways that is suitable for the forecasted critical design airplanes."*

In the case of the Airport, the forecast identified the Gulfstream IV (G-IV) as representative of the most demanding aircraft regularly using the Airport. Therefore, the Gulfstream IV is the Airport's "Design Airplane".

Design Airplane = Gulfstream IV (G-IV)

The G-IV has a maximum takeoff weight of 71,780 lbs[5]. For airplanes with a maximum takeoff weight over 60,000 pounds, the AC requires planners to use the specific airplane's Airplane Performance Manual or operating manual. For the G-IV, the manual may be found on-line at www.generaldynamics.com. Other data required to calculate runway length is the elevation of the Airport above mean sea level (200 feet), and the mean daily maximum temperature of the hottest month 83.6°F (rounded to 84°F or 28°C).

The chart taken from the G-IV operating manual indicating the required runway length is shown on the following page. The chart indicates a runway length

[5] Regional Guidance Letter, Airports Division, FAA Southern Region, RGL 01-2, August 10, 2001 "Runway Length and Strength Requirements for Business Jet Aircraft

requirement of 6,800 feet. However, due to the impacts to wetlands that would occur at the Airport from implementing such a length, the Airport Authority, FAA and NHDOT/BA agreed that a length of 6,000 feet would lessen the runway's environmental impact and would constitute an improvement over existing conditions.

Further, 6,000 feet of runway length is expected to efficiently accommodate virtually all the business jets currently in production with the possible exception of the Gulfstream V (Maximum Takeoff Weight of 89,000 pounds) which potentially could be accommodated under ideal takeoff conditions. The Gulfstream V is a current user of the Airport. All other business jets currently[6] in the business jet fleet with minor exceptions are expected to be safely accommodated with an available takeoff distance of 6,000 feet. Therefore, the types and character of the aircraft currently using the Airport are not expected to change in the forecasted future.

Proposed Action: During runway reconstruction, add an additional 500 feet of runway length to achieve a total runway length of 6,000 feet to accommodate high performance jet takeoff operations.

Purpose and Need: The purpose of this action is to provide the required runway length to safely accommodate the aircraft using and forecasted to use Runway 14-32. The need for the additional runway length is to enhance aircraft operational safety and efficiency by providing sufficient runway length, particularly for take-off, for all aircraft currently using and forecasted to use the Airport, but particularly for the long-range jets [for example: Gulfstream II (DII); Gulfstream IV (DII); Challenger 600 (CII)].

These aircraft are used for their long-range capabilities (over 3,500 nautical miles). With Runway 14-32 at a length of 5,500 feet, these aircraft, during warm or hot weather, cannot utilize their full capabilities without incurring significant weight penalties (either fewer payloads or less fuel – usually less fuel). These penalties are costly in that they typically require the aircraft to make an otherwise unnecessary fueling stop as discussed earlier.

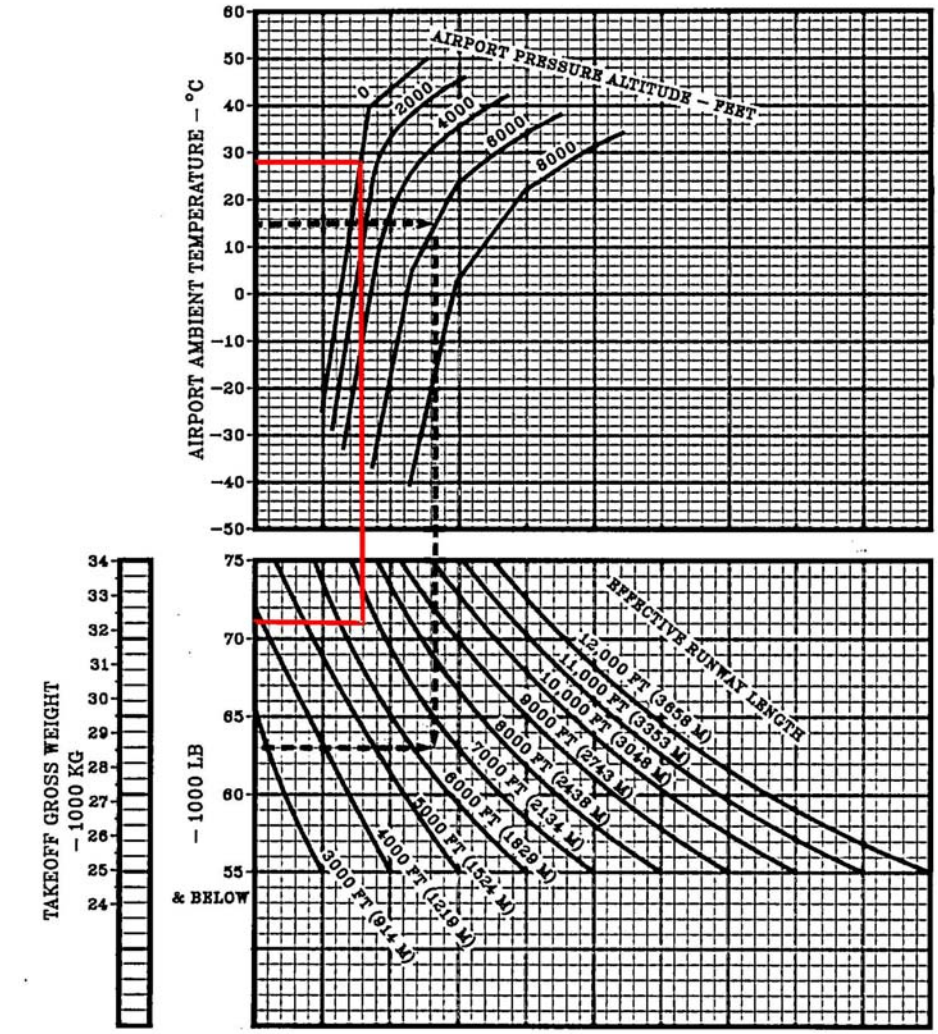
Therefore, the Airport has a need to extend the runway by an additional 500 feet.

[6] *Best Practices: Planning Airports For Business Jets,* FAA, Draft 8/01/03.

GULFSTREAM AEROSPACE
GIV AIRPLANE FLIGHT MANUAL

SECTION 6
PERFORMANCE

LIMITATION
MAXIMUM ALLOWABLE TAKEOFF GROSS WEIGHT
PERMITTED BY FIELD LENGTH REQUIREMENTS
FLAPS 20°



FAA APPROVED

Gulfstream IV - Nashua

6.2-5

2.1.2.4 Runway Safety Area Compliance

Based on the runway's ARC of DII and its approach minimum criteria, Runway 14-32 requires a Runway Safety Area (RSA) that is 500 feet wide centered on the runway centerline running along the entire length of the runway, and extending 1,000 feet beyond each runway end. The RSA must be suitably graded and, under normally dry conditions, be able to support errant aircraft, and rescue and firefighting vehicles in an emergency.

Nearly half (42%) of the existing Runway 14 end RSA does not comply with this standard due to poor or unstable soil conditions, and uneven grading. RSAs are an issue of critical importance for the safety of a runway environment and to preserve an airport's eligibility to receive Federal funding assistance for runway improvements. FAA design standards require that each runway have an RSA that complies, to the maximum extent practicable, with FAA minimum dimensional and construction standards. The Design AC states, "*RSA standards cannot be modified or waived like other airport design standards. A continuous evaluation of all practicable alternatives for improving each sub-standard RSA is required until it meets all standards for grade, compaction, and object frangibility*." The purpose of the RSA is to enhance safety in the event that an airplane may undershoot, overrun, or veer off the runway, and to provide greater accessibility for firefighting and rescue operations.

The Airport is home to five flight schools and the Daniel Webster College Aviation Division, and many operations at the Airport are training operations. For that reason alone, it is particularly important that the RSAs meet FAA standards, enhancing the margin of safety for all aircraft, but particularly for less experienced pilots.

Therefore, the Airport has a need to reconstruct the Runway 14 end safety area in compliance with FAA standards.

Proposed Action: During the runway reconstruction, reconstruct RSAs at each runway end to comply with FAA design standards.

Purpose and Need: The purpose of this action is to enhance safety at the Airport through compliance with FAA design standards for RSAs. The need for this action is to provide the maximum reasonable margin of safety for the runway environment, and to preserve the Airport's eligibility to receive Federal funding assistance by complying with FAA design standards and Federal obligations.

2.1.2.5 Compliance with Separation Standards

Maintaining adequate separation standards between certain facilities (runways, taxiways, taxilanes, parking areas, etc) is critical to safety at an airport. Unlike automobiles, even a minor collision can present major operational problems for aircraft. Adequate separation minimizes the opportunity for aircraft to collide. It is especially critical at times when visibility is low. The FAA requires that all

separation standards be met as a condition of maintaining eligibility to receive Federal funding assistance.

The existing runway to taxiway separation (from the runway centerline to the parallel taxiway centerline) is 250 feet. The FAA standard for runways with visibility minimums ¾ mile or lower and serving DII class aircraft is 400 feet. Therefore, the runway to taxiway separation at the Airport does not conform to FAA standards. The runway must be relocated a minimum of 150 feet to the north of its current location in order to meet FAA separation standards.

In the case of Boire Field, simply relocating the runway 150 to the north so that it is at the minimum 400 feet from the parallel taxiway centerline was not adequate because this option did not provide sufficient distance between the existing runway and the new runway while under construction. FAA standards for safe construction on airports are enumerated in AC 150/5370-2E, *Operational Safety on Airports During Construction* (the Safety AC). The Safety AC requires that *"No construction may occur closer than 200 feet from the runway centerline unless the runway is closed or restricted to aircraft operations, requiring an RSA that is equal to the RSA width available during construction, or 400 feet, whichever is less."* To overcome this limitation, it is necessary that the centerline of the runway be constructed a minimum of 250 feet from the centerline of the existing runway. This distance allows for the required runway safety area for the existing runway to be maintained during construction in conformity with the Safety AC requirement. However, even though the 250-foot option allows the existing runway to remain partially operational during construction, it does not allow sufficient room for construction equipment to operate without necessitating frequent closures of the existing runway. To compensate for this, the Proposed Action provides for a 300-foot separation between the runways. This distance creates a 50 foot construction buffer between the existing runway's runway safety area and the edge of pavement for the new runway (see Figure 2-1). The result is that the existing (old) runway can be fully utilized without frequent disruption while the new runway is being built and, when it is time to remove the existing runway, the new runway can be fully utilized while the old runway is being removed. The 50 foot construction buffer is minimal when considering that the new runway will require the installation of runway lights (typically 10 feet from the runway pavement edge), drainage and underground utility infrastructure, and construction vehicles and personnel will need space to operate outside of the new runway's pavement area. Locating the new runway any closer to the existing runway would result in either frequent operational disruptions or closing the Airport entirely for the duration of the proposed construction. Closure of the runway during construction would be financially disastrous for the Airport.

Construction duration is dependent on many factors, availability of funds, weather, length of workday, etc. Assuming that all the funds needed for the project are immediately available to construct the new runway and install all the required NAVAIDS, and assuming that construction is conducted every day, 24 hours per day, it is estimated that the Airport would be closed for business for approximately 16 weeks or four months. Using more conventional construction assumptions (10 hour workdays, etc.), it is estimated that construction duration would be anywhere

between six to 12 months. If the Airport is closed or operations are frequently disrupted, either of these time frames could produce disastrous results for the approximately 40 businesses that rely directly on Airport operations for their revenue. For these businesses that rely directly on Airport operations as their primary revenue source (pilot training, aircraft repair and maintenance, fuel suppliers, etc.) could be permanently disabled. Constructing the new runway 300 feet from the existing runway allows the Airport operations to continue with minimal disruptions and with little or no effect on the businesses that rely on the airfield for revenue.

The Airport is a major employer in the southern New Hampshire region. It is home to over 400 aircraft, many of which are owned by corporations located in and around the City of Nashua. The Airport conducted an economic impact study in 1999 which indicated that, at that time, the Airport and its constituent businesses contributed $5,590,000 in direct spending and $21,530,000 indirectly to the local and regional economies. Adjusted for a conservative 3% per year of inflation, it is estimated that the Airport contributed nearly $7,100,000 in direct spending and $27,300,000 indirectly to the local and regional economy in 2007. The Airport is home to over 20 corporate jets, the largest of which is a Gulfstream V with a wingspan of 105 feet capable of transcontinental and transatlantic flights.

At the time of the economic impact study in 1999, the assessment of taxable property at the Airport exceeded $390,000. The Airport property is home to sizable companies such as Quality Insulation, Rapid Sheet Metal, and Perimeter Day. There are also approximately 25 companies operating on the industrial side of the Airport (along Perimeter Road). There are also numerous businesses, as well as Daniel Webster College, that are directly dependent on the use of the Airport's runway for their survival. Activities such as aircraft fueling, aircraft repair, aircraft electronics repair, flight lessons, and similar activities are tied directly to the Airport's ability to maintain its operability. It is likely that many of these businesses would be forced to close or permanently relocate to other Airports should the Airport lose the use of the existing runway for several weeks or months while the new runway is in construction.

Proposed Action: To construct the new runway 300 feet to the east of the existing runway centerline in order to meet FAA standards for runway to taxiway separation and safety during construction.

Purpose and Need: The purpose of this action is to maintain aircraft operational safety, maintain the operability of the existing runway during construction of the new runway, provide an adequate level of safety during construction, and preserve the Airport's eligibility for Federal funding assistance to construct the relocated runway. Therefore, the Airport has a need to maintain the safe use of its existing runway during the construction of its relocated runway.

2.1.2.6 Airspace Compliance

Part 77 was promulgated by the FAA and defines areas, sometimes referred to as "imaginary surfaces", around airports that must be kept clear of penetrating objects,

called "obstructions". The dimensions of the imaginary surfaces at individual airports are identified based on the type and size of the aircraft using the facility, the runway surface treatment, as well as the type of navigation and approach aids available to pilots. Five imaginary surfaces are identified and defined under Part 77:

- Primary Surface
- Approach Surface
- Transitional Surface
- Horizontal Surface
- Conical Surface

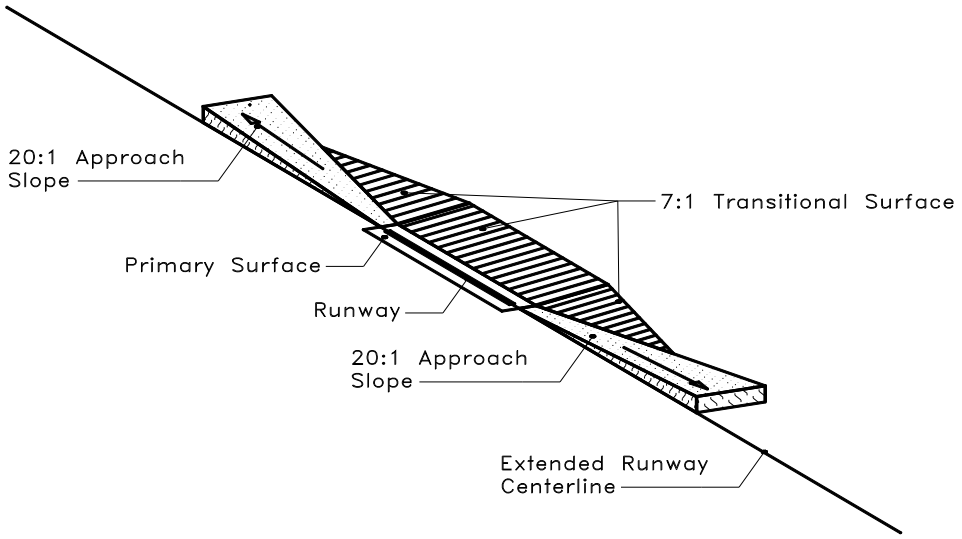


Illustration of Part 77 Surfaces Immediately Adjacent to the Runway

Dimensions for each of these surfaces are stipulated in Part 77. Depending on applicable criteria, surface dimensions differ from runway to runway. The surfaces at the Airport are defined as follows:

- Primary Surface – A rectangular shaped surface longitudinally centered on the runway centerline with the same elevation as the nearest corresponding point on the runway centerline. The primary surface at the Airport is 1,000 feet wide, centered on the runway centerline, and extends 200 feet beyond each runway end.

- Approach Surface – A trapezoidal shaped surface centered on the runway centerline, and extending outward and upward from each end of the primary surface as a prescribed angle. The approach surface at the Runway 14 end is 1,000 feet wide at its inner edge, and expands uniformly to a width of 16,000 feet at its outer edge. The Runway 14 approach surface extends for a horizontal distance of 10,000 feet at a slope of 50:1, with an additional 40,000 feet at a slope of 40:1. The

approach surface at the Runway 32 end is 1,000 feet wide at its inner edge, and expands uniformly to a width of 3,500 feet at its outer edge. The Runway 32 approach surface extends for a horizontal distance of 10,000 feet at a slope of 34:1.

- Transitional Surface – This surface is an inclined plane running parallel to the runway centerline beginning at the edges of the primary and approach surfaces. It then extends upward and outward at a slope of 7:1 from the sides of the primary and approach surfaces to the horizontal surface (150 feet above the Airport elevation).

- Horizontal Surface – This surface is an oval shaped, horizontal plane established by Part 77 to be 150 feet above the Airport elevation. It is established by swinging arcs from the intersection of the extended runway centerline and primary surface at each end of the runway and then closing each area with tangent lines. In areas where the primary, approach and transitional surfaces may overlap, the surface with the lowest elevation is the controlling surface.

- Conical Surface – This surface extends upward and outward from the edge of the horizontal surface at a slope of 20:1 for 4,000 horizontal feet from the edge of the horizontal surface.

To most observers, the need to maintain these unobstructed surfaces around an airport is intuitive. Aircraft operate in a variety of meteorological conditions; for example, fair weather – low winds, fair weather – high winds, stormy-daytime weather, stormy-nighttime weather, and so-on. These conditions can change rapidly while flying locally or slowly over long distances. In any case, aircraft require large unobstructed spaces that can provide them with a substantial margin for error, particularly during inclement weather. Part 77 surfaces provide aircraft with unobstructed airspace in the local airport environment. Keeping these surfaces clear of obstructions is not only a regulatory requirement; it is a basic safety measure.

An *Obstruction Analysis for Runway Relocation Feasibility Study* was completed in November 2005. This obstruction analysis indicated that approximately 129.7± acres of trees are obstructions to the Part 77 surfaces of the Airport and require removal. In order to comply with Part 77 requirements, it is necessary that the identified obstructions be removed or lighted where removal is not practicable. As a result of the analysis, the Airport removed many of the obstructing trees from the Runway 14 approach surface. However, since the Proposed Action relocates the runway 300 feet to the north, new obstructions have been identified and require removal. Wherever possible and approvable by the FAA, the Airport will propose the lighting of obstructions in an effort to minimize impacts to the environment and its neighbors.

Proposed Action: To remove, lower or light all penetrating obstructions to the Airport's Part 77 surfaces, and to maintain these surfaces clear of obstructing vegetation into the future.

Purpose and Need: To enhance the safety of aircraft and persons in the air and on the ground and preserve the Airport's eligibility for Federal funding assistance by providing obstruction free approaches for all weather conditions. The Airport has a demonstrated need to remove vegetative obstructions to its Part 77 surfaces to maintain safe operations at the Airport and protect public safety.

2.1.2.7 Easement Acquisition

To keep Part 77 surfaces clear of man-made or vegetative obstructions, airports must exercise some form of control over the land underlying the airspace surfaces. This becomes more critical as the airspace gets nearer to the immediate runway environment. Control over the airspace can be obtained through ownership of the land by the Airport, or through the provision of so-called "avigation easements" over land owned by others.

Proposed Action: The 2005 Obstruction Removal Study identified 41 parcels having man-made or vegetative obstructions to the Airport's protected surfaces. Of the 41 parcels, it was decided by the Airport and funding agencies to seek avigation easements over 20 parcels. The obstructions in the remaining 21 parcels appear to be capable of being mitigated with several obstruction lights located on Airport property, pending an official FAA Aeronautical Study and approval.

Purpose and Need: In order to maintain safe operations and protect the public safety, the Airport has a demonstrated need to acquire property rights within its runway approaches and to install obstruction lights (on properties abutting the Airport property along the railroad track) in order to mitigate obstructions to its protected surfaces and airspace.

2.2 NEED FOR AIRCRAFT ACCOMODATION

This section of the report reviews the purpose and need for accommodating the Airport's aircraft on parking aprons and storage facilities. Improvement to these facilities is important because they are necessary support facilities for aircraft, pilots and passengers.

2.2.1 Expand Aircraft Parking Apron

This action consists of expanding the existing aircraft parking apron. The apron is proposed to be expanded by approximately 65 feet to the east along its entire length, providing approximately 100 additional aircraft tie-down spaces. Construction of the apron expansion will likely occur concurrently with the relocation and reconstruction of the parallel taxiway (currently scheduled for construction during the summer of 2015. It is possible, that no expansion to the main aircraft parking apron will occur. A cost/benefit analysis will need to be reviewed to determine whether the cost of the additional apron would yield a sufficient number of parking

spaces to warrant the cost. Further, the relocation of the ILS Glideslope to the infield between the runway and taxiway could eliminate the feasibility of adding more aircraft parking spaces to several hundred feet of the apron's northeast end.

Proposed Action: Subject to further study, expand the existing apron by 65 feet to the east, an expansion of approximately 7.8 acres of apron space or approximately 100 additional tie-down spaces.

Purpose and Need: The purpose and need of this action is to provide additional, properly spaced, tie-down parking spaces for aircraft. Provision of these tie-down spaces will promote safety by lessening the likelihood of wingtip collisions while parking aircraft, and the additional tie-downs are expected to have a positive effect on the Airport's annual operating revenues by generating approximately $48,000 in tie-down and aircraft registration fees.

2.2.2 Construction of "India" Apron T-Hangars and Taxilanes

This project consists of constructing T-hangars and their associated taxilanes northwest of the existing "India" Apron. The nine proposed T-hangar buildings will have a capacity to house up to 63 aircraft. Several private companies have approached the Airport and with the desire to address the market need for additional T-hangars which is expected to increase over the next 20 years. The purpose of the hangars is to protect aircraft from the effects of weather, and to protect them from potential vandalism. Placing an aircraft in a hangar is also an environmentally sound practice. Storage of an aircraft in a hangar reduces the potential exposure of pollutants (fuel, grease, etc) to stormwater, and also eliminates the need for deicing in the winter months.

Proposed Action: Construct nine T-hangar buildings with a total capacity for approximately 63 aircraft.

Purpose and Need: The purpose and need for this action is to house small aircraft and provide them with suitable, paved access protecting them from the effects of weather and potential vandalism.