Chapter 3.0 – Airport Facility Requirements

Determining airport facility requirements is the next essential step in the airport master planning process[1]. The purpose of this chapter, "*Airport Facility Requirements"* is to determine the needs of the airport based on the demand identified in *Chapter 2 – Airport Role and Forecasts*.

To the reader the title implies that these are the facilities "required" to maintain a viable and safe airport. It is true that in ideal world providing for the requirements to meet the projected demand is a reasonable expectation. On the other hand, the physical and/or financial resources available may not allow an airport to fully develop under the circumstances. Nonetheless, before the planning can take place to achieve what is "doable" it is important to understand the ultimate facility requirements scenario. To this end the *Facility Requirements* chapter compares the forecasts, to the latest airport industry standards and FAA design guidance[2]. The end result is a list of facility needs.

The assessment of facility requirements includes such major components as:

- Airfield pavement improvements (runway, taxiway and apron)
- Building improvements (terminal, hangar and maintenance)
- Support Equipment improvement (ARFF and snow removal trucks)
- Navigational equipment and lighting improvements
- Access improvements

Airport facility improvements are justified for several reasons:

- To meet the existing or forecasted demand of the facility. The term "demand" can refer to the level of activity (e.g. based aircraft) and type of activity (e.g. general aviation).
- To meet FAA design standards or criteria, including new or recently modified standards. Most relate to enhancing airport safety.
- To insure a well maintained facility.
- To enhance operational efficiency.

This Chapter determines what is required to potentially upgrade, expand, extend, abandon and/or otherwise modify existing facilities. The results of the analysis in this chapter produce the facility requirements which are an integral part of the subsequent evaluation in Chapter 4 – *Alternative Analysis*.

In summary this Chapter introduces a list of needs but it does not produce a plan.

[1] Reference: FAA Advisory Circular 150-5070-6B *Airport Master Plans,* July 29, 2005
[2] Reference: FAA Advisory Circular 150-5300-13C *Airport Design, March 2007*

3.1 Airport Runway and Taxiway System Analysis

In this section, the requirements of the airport runway and taxiway system are analyzed for their ability to meet the needs of users. The main objective is to provide a runway and taxiway system that meets FAA standards, and provides for a safe and efficient airfield. As is the case throughout this segment of the master plan process, facility requirements must be analyzed in detail before they are recommended as airport improvements on the approve Airport Layout Plan (ALP).

3.1.1 Airport Design Aircraft

To reiterate the definition of the Airport Reference Code (ARC); it is a FAA coding system used to relate airport design criteria to the operational and physical characteristics of the aircraft currently using or projected to use the airport. The critical aircraft is that aircraft with the most demanding (i.e. largest) critical dimensions and highest approach speed that consistently (at least 500 operations per year) uses the airport. Examples of aircraft that typically operate at Newport State Airport (UUU) and their ARC were identified in Chapter 2. UUU has an ARC of B-II.

The FAA airport design standards for a B-II category will be applied throughout this facility requirements section. These standards will be compared to the existing infrastructure (runways, taxiways, aircraft parking aprons and approach configurations) to determine where improvements need to be made.

3.1.2 Airport Design Standards

Airport design standards are used to properly size and locate airport facilities. There are three types of standards: Dimensional (e.g. required width and length of runways and taxiways); Clearance (e.g. required clearances between runways, taxiways, and other facilities); and operational (described below). These standards are identified and defined in FAA AC 150/5300-13, *Airport Design*.

3.1.3 Operational Safety Standards

The airport must provide a safe operating environment for aircraft. The FAA AC 150/5300-13, *Airport Design* establishes protection areas around the runways to help ensure such an environment. These areas are:

- Runway Safety Areas (RSA) – The RSA is a prepared surface that surrounds the runway (and extends a specified distance beyond it) that is clear of obstructions. Keeping the RSA clear helps minimize damage to aircraft in the event of an accident.
- Runway Protection Zone (RPZ) – The RPZ is a trapezoidal area located off each runway end. The RPZ should be clear of obstructions to the greatest extent possible, to enhance the protection of people and property on the ground and provide a clear approach surface.
- Object Free Area (OFA) – A ground area surrounding runways, taxiways and taxilanes which is clear of objects except for those whose location is required by function.
- Runway Visual Zone (RVZ) – The RVZ is an area maintained free and clear of obstructions for the purposes of providing an unobstructed view of aircraft arriving to/from the intersection of the two runways at UUU. This area is depicted on the Airport Layout Plan and the size is a function of the distance from the runway threshold to the intersection point of the two runways.

3.1.4 Airport Design Standards

The FAA's AC 150/5300-13, *Airport Design* defines the airfield dimensional standards associated with different aircraft classifications. Tables 1.1 and 1.2 summarize these standards for a B-II ARC. The dimensional and clearance standards for the airside areas are presented in Table 3.1. The operational safety standards are presented in Table 3.2.

Table 3.1
B-II Design Standards

Airfield Component		B-II Dimensions
	Runway Width	75'
Runway Centerline to:	Parallel Taxiway Centerline	240'
	Nearest Aircraft Parking Area	250'
	Taxiway Width	35'
Taxiway Centerline to:	Parallel Taxiway	105'
	Fixed or Movable Object	65.5'

Source: FAA AC 150/5300-13 Airport Design

Table 3.2
B-II Operational Safety Standards

Airfield Component		B-II Dimensions
Runway Safety Area (RSA)	Width	150'
	Length Beyond RY End	300'
Runway Protection Zone (RPZ)	Inner Width	500'
	Outer Width	700'
	Length	1,000'
Object Free Area	Width	500'
	Length Beyond RY End	300'

Source: FAA AC 150/5300-13 Airport Design

3.1.5 Airfield Capacity

The capacity analysis determines the potential of the airfield configuration to handle a determined capacity and if not the delays that arise from the absence of adequate capacity. It is defined in terms of "Annual Service Volume (ASV). The level of aircraft activity that can be accommodated at an airport is mainly a function of the runway configuration. The number, length, and orientation of the runways are important factors in determining an airport's operational capacity. The analysis of the runway and taxiway system at UUU was based upon methodologies in FAA AC 150/5060-5 *Airport Capacity and Delay* utilizing the results of the analysis conducted in the last master plan effort and the recently completed Rhode Island State Airport System Plan (RISASP).

Table 3.3 below identifies the Annual Service Volume (ASV) calculations conducted in the aforementioned studies.

Table 3.3
Previous ASV Calculations

Study	ASV Operations
1989 Airport Master Plan Study	200,000
2004 Rhode Island State Airport System Plan	200,000

Since the airport configuration has not changed since either of these studies was completed, this master plan effort will utilize the 200,000 ASV calculations. As a result of the projected demand for this master plan effort not exceeding 44,000 annual aircraft operations in the planning period, UUU demand to capacity ratio for the current and future is calculated in the following table.

Table 3.4
UUU Demand to Capacity Ratio

Year	Actual (2006) Forecasted (2026) Operations	ASV Operations	Demand to Capacity Ratio
2006	21,461	200,000	10.7%
2026	43,703	200,000	21.9%

The FAA utilizes a demand to capacity ratio of an airport's estimated ASV of approximately 60% to determine when an airport may experience operational delays. When an airport approaches this 60% target, plans should be conducted to increase an airport's capacity. As is shown in Table 1.4, UUU ratio is well below the 60% target throughout the planning period and airport capacity improvements such as new runways are not required. The taxiways that are under consideration are recommended to reduce the potential for runway incursions, although they may also improve capacity. The latter option will be a consideration in the facility requirements analysis.

3.1.6 Wind Coverage

FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, states that an airport's runways should be oriented such that aircraft can take-off and land into the prevailing wind with minimal crosswind exposure.

The AC also states that a single runway, or a runway system, should provide 95% wind coverage. Thus, the goal is to achieve 95% coverage or better.

Wind coverage is calculated using a wind rose, which graphically depicts wind data collected from the National Oceanographic and Atmospheric Administration (NOAA). The wind rose is essentially a compass rose with graduated concentric circles representing wind speed. Each box in the wind rose represents a compass direction and, when filled, indicates the percentage of time wind travels in that direction at that speed.

Since prevailing wind patterns do not usually change, this master plan effort will utilize the existing wind data for UUU. The wind roses are computed based on the following three categories:

- Visual Flight Rules (VFR) – (ceiling 1,000' and visibility 3 miles)
- Instrument Flight Rules (IFR) – (ceiling less than 1,000' and visibility less than 3 miles)
- All Weather – VFR and IFR combined

Since aircraft characteristics and performance can vary, wind coverage data is presented for both 10 and 13 knots. The following tables present the percent of wind coverage for each runway and combined.

Table 3.5
10 Knot Wind Analysis – Percent Coverage

Runway Identifier	All Weather	VFR	IFR
04/22	89.7	89.6	92.5
16/34	86.8	88.3	76.0
Combined 04/22 and 16/34	98.4	98.4	97.7

Source: 1986 Master Plan and NOAA

Table 3.6
13 Knot Wind Analysis – Percent Coverage

Runway Identifier	All Weather	VFR	IFR
04/22	95.4	95.0	97.1
16/34	94.6	95.4	89.4
Combined 04/22 and 16/34	99.7	99.8	99.4

Source: 1986 Master Plan and NOAA

Based on this wind data, the current runway configuration at UUU provides enough wind coverage to meet the FAA guideline of 95% all weather wind coverage. For both runways at 10 knots there is 98.4% coverage, and for both runways at 13 knots there is 99.7% coverage. The VFR and IFR wind roses are depicted on the Airport Layout Plan.

3.1.7 Airfield Requirements

This section determines what improvements should be considered for the existing airfield system at UUU. The section first considered the appropriate runway length for UUU based on the existing and future role of the airport, runway and taxiway standard compliance, followed by an analysis of runway safety, protection and obstruction surfaces.

3.1.8 Runway Length Analysis

The runway length required is based on standards presented in FAA AC 150/5300-13, *Airport Design*, Chapter 3 and FAA AC 150/5325-4A, *Runway Length Requirements for Airport Design*. The recommended length for a primary runway at an airport is determined by considering either the family of airplanes having similar performance characteristics, or a specific aircraft requiring the longest runway. This need is based on the aircraft or family of aircraft that use the airport on a regular basis, where regular basis is typically defined as a minimum 500 itinerant operations per year. Additional factors considered include critical aircraft approach speed, its maximum certificated takeoff weight, useful load and length of haul, the airport's field elevation above sea level, the mean daily maximum temperature at the airfield, and typical runway surface conditions, such as wet and slippery.

The runway length analysis for UUU was performed using FAA Airport Design Computer Program 4.2D and procedures outlined in FAA AC 150/5300-13. The program includes an aircraft fleet profile designed to be representative of the small and large aircraft that comprise the general aviation aircraft fleet in the United States.

For UUU the program identified a recommended <u>maximum</u> runway length for the major aircraft (i.e., 100% of the aircraft fleet) as follows:

- 3,570 feet for small aircraft (less than 10 passenger seats)
- 4,120 feet for small aircraft (10 or more passenger seats).
- 5,330 feet will accommodate 100 percent of large aircraft (60,000 pounds or less) at 60 percent useful load. There are occasions however, when the payload of a specific aircraft may be higher than 60 percent, and may even approach the maximum practical payload of 90 percent.

The term *useful load* for this planning purpose refers to the difference between the maximum allowable structural gross weight and the operating empty weight of the aircraft in question. FAA guidelines require the selection of 60 percent or 90 percent useful load to be based on the length of haul and service needs of the critical design aircrafts, and note that the 60 percent useful load table is to be used for those airplanes operating with no more than a 60 percent useful load factor. This planning effort assumed that most aircraft will be operating at or near the 60 percent useful load factor.

Table 3.7 defines the runway length requirements developed using the FAA program and reflects runway lengths for small airplanes and large airplanes (with both 60 percent and 90 percent useful loads).

Using the "Airport Input Data" noted in Table 3.7 the runway length requirements produced by the FAA computer program, shows that the existing 2,999 feet length of the primary Runway 4-22 was adequate to accommodate up to 95% of the small aircraft fleet.

Table 3.7
Aircraft Runway Length Requirements

Airport Input Data	
Airport Elevation (MSL)	172 feet
Mean daily temperature of the hottest month	80.0 F degrees
Maximum difference in runway centerline elevation	24 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles
Runway Length Recommended for Airport Design	
Small airplanes with less than 10 passenger seats:	
75% of these small airplanes	2,460 feet
95% of these small airplanes	**3,000 feet**
100% of these small airplanes	3,570 feet
Small airplanes with 10 or more passenger seats	4,120 feet
Large airplanes of 60,000 pounds or less:	
75% of these large airplanes at 60 percent useful load	4,840 feet
75% of these large airplanes at 90 percent useful load	6,270 feet
100% of these large airplanes at 60 percent useful load	5,330 feet
100% of these large airplanes at 90 percent useful load	7,760 feet
Airplanes of more than 60,000 pounds	5,070 feet

Source: FAA Airport Design Computer Program 4.2D.

As a result of the above findings, the runway length calculation from the FAA program for small aircraft was checked against the runway requirements for the Airport's family of critical aircraft (ARC B-II), as defined in Chapter 2, to determine if special circumstances would require additional runway length. The critical families of aircraft for runway length are piston aircraft including the Cessna 172 and Piper Navajo to the turboprop class including the Beech King Air. As discussed in Chapter 2, new small jet aircraft (i.e., micro-jet) are currently being developed by several manufacturers and are designed to operate at airports with capabilities less than typical air carrier airports. The Eclipse 500 micro jet will be used as a representative of this new type of aircraft for this runway length analysis.

Table 3.8
Runway Length Requirements – UUU Representative Aircraft

Aircraft	Approximate Runway Required[1]
Cessna 172Q Cutlass	1,690 feet
Piper PA-31-300 Navajo	1,950 feet
Piper PA-23 F Turbo Aztec	1,980 feet
Beechcraft 58 Baron	2,101 feet
Raytheon King Air C-90	2,261 feet
Eclipse 500 Micro Jet	2,342 feet
Cessna Caravan 208B	2,840 feet
[1] Runway length assumes clearing a 50 foot obstacle in standard weather conditions.	

Source: Manufacturer Data and
Rising Up Aviation Performance Database www.risingup.com/planespecs/

As Table 3.8 indicates all representative aircraft operating under standard conditions (sea level, 59.0°F, and barometric pressure of 29.92) can operate in and out of UUU with the current runway length. Poor weather and hotter temperatures will increase the runway length required and keep some of these aircraft from operating at the airport during these conditions.

In addition, the 2004 RI/ASP study completed a primary runway length objective analysis stating a runway length objective for UUU of 3,500 to 5,000 feet. Based on all of the facility requirements analysis, the alternatives analysis should consider the feasibility of lengthening Runway 4/22 to 3,570 feet to serve 100 percent of the small aircraft fleet. This will accommodate 100% of the small airplanes identified in FAA's program and shown in Table 3.7, and provide existing aircraft additional length on poor weather and hot days. The analysis should take into account that any lengthening would only accommodate a small amount of users. As a reminder of our introductory remarks to this chapter, this is an assessment of ideal needs not a plan of improvements. The alternative analysis needs to consider all the factors that would introduce the feasibility of such a plan and then make a recommendation to fully extend, partially extend or not extend.

The secondary, or crosswind, runway is intended to complement a primary runway where less than the recommended 95 percent wind coverage is provided for the airplanes forecast to use the airport on a regular basis. Based on the wind analysis for UUU, the existing secondary Runway 16-34 provides for the small aircraft that routinely operate at the Airport. The B-II category classification for the primary runway also applies to the crosswind runway. Based on FAA's guideline that a cross-wind runway length should be at least 80% of the primary runway, a minimum length of 2,460 feet should be provided. Runway 16/34 is currently 2,623 feet and meets the crosswind runway requirements.

3.1.9 Runway / Taxiway Width and Separation Standards

The Airport was designated a B-II in prior planning so much of the infrastructure has been designed and constructed to meet B-II standards. The existing runway and taxiway infrastructure and separation requirements meet or exceed the required standards. Future pavement rehabilitation projects and/or new construction will be built to the required standards.

Table 3.9
UUU Runway Design Standard Compliance

Airfield Component	B-II Dimensional Standards	Existing Condition	Meets Standard
Runway Width			
- 16/34	75'	75'	Yes
- 04/22	75'	75'	Yes
Runway Centerline to:			
- 04/22 to Taxiway A	240'	250'	Yes
- 04/22 to Taxiway C	240'	250'	Yes
- 16/34 to Aircraft Parking Apron	250'	250'	Yes
Taxiway Width			
- Taxiway A	35'	40'	Yes
- Taxiway B	35'	40'	Yes
- Taxiway C	35'	40'	Yes

Source: FAA AC 150/5300-13 Airport Design and Consultant Calculations

3.1.10 Runway / Taxiway Pavement Conditions

Table 3.10
UUU Runway / Taxiway Pavement Condition

Airfield Component	Rehabilitated	Comments
Runway 4/22	1990	Good Condition except for intersection of runways[3]
Runway 16/34	NA	Fair Condition – Frost Heaves on R/W 16 winter 2006
Runway Intersection	NA	Fair Condition – When rebuilding consideration must be given to minimize the airport closure time.
Taxiway A	2000	Good Condition – Consider realignment
Taxiway B	NA	Good Condition
Taxiway C	2007	Good Condition (Project under construction)

Additional Taxiway Needs – Runway 16/34 does not have a parallel taxiway. It is recommended that the alternatives analysis look at providing a full length parallel taxiway to Runway 16/34 and a stub taxiway to the aircraft parking apron. The primary objective of the additional taxiway is to reduce the amount of time aircraft "back taxiing" on the runway. The result is to reduce the potential for runway incursions and improve airport safety.

[3] Based on joint FAA and RIAC inspection July 2006

3.1.11 Runway Safety Areas (RSA)

The RSA is a prepared surface that is clear of obstructions, structures, roads, and parking areas. FAA equipment, if required by function is permitted on frangible mounts. All the RSA except for Runway 4 at UUU meet the 150 feet wide by 300 feet beyond the runway end standard required by the FAA.

Based on reports from Landmark, it has been observed that the Runway 4 RSA has a drainage issue. The concern is the water does not perk into the ground, thereby leaving standing water in the RSA. The concerns are:

- Standing water is a wildlife attractant in the runway approach path
- FAA access to maintain the Localizer equipment is restricted
- It does not meet the requirements of a properly graded RSA

The alternatives analysis will look at grading and drainage improvements necessary to eliminate the standing water in the Runway 4 RSA.

3.1.12 Object Free Area (OFA)

The Object Free Area (OFA) should be clear of objects except for whose location is required by function. The OFA for both runways is 500 feet wide and centered along runway the centerline. The OFA also extends 300 feet beyond the runway end. The OFA at UUU is free of objects and therefore meets FAA standards. The impact of any changes to the OFA as a result of airfield improvements will be considered in the alternatives analysis.

3.1.13 Runway Protection Zones (RPZ)

The RPZ should be clear of obstructions to the greatest extent possible, to enhance the approaches to runways as well as protect the people and property on the ground. The FAA Grant Assurances requires that the airport sponsor do all that is feasible and prudent to maintain a clear RPZ by purchasing the property or by acquiring avigation easements.

Runway 04 RPZ – This RPZ extends just to the south of the existing airport property line and includes approximately 10 residential homes within the RPZ.

Runway 22 RPZ – The Runway 22 RPZ is wholly contained within the existing airport property. This RPZ extends across Oliphant Lane and a tree obstruction removal project was completed in 2006.

Runway 16 RPZ – Except for a small northern portion of this RPZ, it is wholly contained within the existing airport property. The northwestern corner of the RPZ contains a commercial building and property.

Runway 34 RPZ – The Runway 34 RPZ is about 50 percent on airport property, with the remaining 50 percent over farmland to the southeast.

The alternatives analysis will consider the practicality of making improvement to the RPZ to meet the FAA requirements.

3.1.14 Part 77 Surfaces

The Part 77 surfaces are an integral part of maintaining a clear RPZ. An updated study is being completed by the Stantec Consulting Co. In addition to providing more current data on the obstruction conditions it will provide a report of recommendations to FAA asking them to make an Aeronautical Determination on the RIAC recommendations. The final documents will be incorporated in the AMP when they are complete. The report recommendations will be very cognizant of the neighborhood concerns that were expressed to RIAC during the last tree clearing program in 2005.

3.1.15 NAVAID, Visual Aids, and Instrument Approaches

A NAVAID is a communication or electronic facility providing either enroute information or approach guidance information to the airport during both good and poor weather conditions. As the name implies a visual aids provide a pilot with visual guidance to and from the airport. In conjunction with each other they provide the approach procedure defined by FAA in procedure charts. The NAVAID and Visual Aid equipment at UUU were discussed in Chapter 1 as a part of the inventory analysis. Instrument approaches are discussed to determine if any improvements can be made, such as a precision approach, lowering minimums, etc. These facilities are typically, but not always, constructed and maintained by FAA. To qualify for these facilities FAA has established standards.

3.1.15.1 NAVAID and Visual Aid

The NAVAID equipment at UUU includes the Automated Surface Observation System (ASOS) and Localizer (LOC). Both of which are maintained by the FAA. Visual Aids include Visual Approach Slope Indicators (VASI) and Runway End Identifier Lights (REIL). Runways 4, 16, and 22 have VASI, while Runway 22 also has REIL. These visual aids should be assessed when improvements are made to the corresponding runway they are serving.

3.1.15.2 Instrument Approaches

The advent of technology has been one of the most important contributing factors to the growth of the aviation industry. Much of the available civil aviation and aerospace technology has been derived and enhanced from the initial development of technological improvements for military purposes. As a result, many technologies are available to assist an airport operator in increasing the aircraft arrival rate during poor weather conditions.

Instrument approaches are generally designed such that an aircraft, in poor weather conditions, by means of a radio, Global Position System (GPS), or an internal navigation system and with no assistance from air traffic control, can navigate to and land safely at an airport. Approach procedures are classified into various categories to include a precision approach, precision Approach Procedure with Vertical guidance (APV) and non-precision approaches. A precision approach is an instrument approach that provides the pilot with both lateral and vertical guidance information. An APV approach is an instrument approach that provides the pilot both course and vertical path guidance information, but does not conform to ILS system performance standards. A non-precision approach provides the pilot with course information only. By moving towards greater levels of precision and approach lighting an airport can improve the margin of safety for the pilot under adverse weather conditions.

Several types of precision instrument approach technologies are available to airports. They include systems such as an Instrument Landing System (ILS), Microwave Landing System (MLS), GPS (with vertical navigation via Wide Area Augmentation System (WAAS)/Local Area Augmentation System (LAAS)). APV approach technologies include the WAAS based Localizer Performance with Vertical Guidance (LPV), Lateral Navigation/Vertical Navigation (LNAV/VNAV) and Barometric Vertical Navigation (Baro-VNAV) approaches. Non-precision approach technologies include the VHF Omni-directional Radio Range (VOR), Non-Directional Beacon (NDB), Localizer (LOC), LDA Simplified Directional Facility (SDF) or Radio Navigation (RNAV). All of these types of technologies have allowed the Federal Aviation Administration (FAA) to design a variety of approach procedures to help ensure the safety of aircraft during various phases of flight and poor weather conditions.

FAA funding for a new navaid and approach procedure is based upon demonstrating the associated need, practicality, safety benefits, and expected aviation activity at the airport. In developing a new approach procedure, the FAA considers the accuracy of the navigational aid, penetrations to the Part 77/TERPS airspace surfaces, an airport's landing surface (runway length, lighting, markings, design criteria, etc.), and other factors as outlined in the FAA's Advisory Circular 150/5300-13, *Airport Design*. It is important to note that the FAA indicates a significant reduction in minima (i.e. ¼ mile reduction in visibility and/or 50 foot reduction in decision altitude or minimum descent altitude) would constitute a new approach procedure.

Table 3.11 identifies UUU's instrument approaches, as well as the visibility minimums required for each approach.

Table 3.11
UUU Instrument Approaches

Runway	Instrument Approach	Visibility Minimums
16	Non-Precision (VOR/DME or GPS)	Category A or B Aircraft: 1 mile Category C Aircraft: 1 ½ miles
22	Non-Precision (Localizer)	Category A or B Aircraft: 1 mile Category C Aircraft: 1 ½ miles

Source: RIAC and Landmark Aviation

GPS and other GPS augmented technology (WAAS/LAAS) can ultimately provide the airport with the capability of establishing new instrument approaches at minimal cost since there is not a requirement for the installation and maintenance of costly ground-based transmission equipment. To accommodate these type approaches, the airport landing surface must meet specific standards as outlined in FAA AC 150/5300-13, *Airport Design*. The FAA requires that the airport must have a minimum runway length of 3,200 feet, but states that airports having runways as short as 2,400 feet could support an instrument approach if the lowest HAT is based on clearing a 200-foot obstacle within the final approach segment. The following tables indicate the necessary HAT, runway length, runway markings, approach lighting, and design criteria required to implement a new instrument approach.

Table 3.12
Approach Procedure with Vertical Guidance – Approach Requirements

Visibility Minimums	<3/4-statute mile	<1-statute mile	1-statute mile	>1-statute mile
Height Above Touchdown	250	300	350	400
TERPS Paragraph 251	34:1 clear	20:1 clear	20:1 clear or penetrations lighted for night minimums (see AC 70/7460-1)	
Precision Object Free Zone	Required	Recommended		
Airport Layout Plan	Must be on approved ALP			
Minimum Runway Length	4,200 ft. paved	3,200 ft. paved	3,200 ft.	
Runway Marking	Non-precision		Non-precision	
Runway Edge Lights	HIRL/MIRL		MIRL/LIRL	
Parallel Taxiway	Required		Required	
Approach Lights	Required – ODALS/MALS,SSALS		Recommended	
Runway Design Standard	APV OFZ Required			

Source: Federal Aviation Administration, Advisory Circular 150/5300-13, Chg 10, Airport Design, 9/29/06.

Table 3.13
Non-Precision Approach Requirements

Visibility Minimums	<3/4-statute mile	<1-statute mile	1-statute mile	>1-statute mile	Circling
Height Above Touchdown	300	340	400	450	Varies
TERPS Paragraph 251	34:1 clear	20:1 clear	20:1 clear or penetrations lighted for night minimums (see AC 70/7460-1)		
Airport Layout Plan	Required				Recommended
Minimum Runway Length	4,200 ft. paved	3,200 ft. paved	3,200 ft.		
Runway Marking	Precision	Non-precision			Visual (Basic)
Runway Edge Lights	HIRL/MIRL		MIRL/LIRL		MIRL/LIRL (Required only for night minima)
Parallel Taxiway	Required		Recommended		
Approach Lights	MALSR, SSALR, or ALSF Required	Required – ODALS/MALS ,SSALS, SALS	Recommended – ODALS/MALS,SSALS, SALS		Not Required
Runway Design Standard	< ¾-statute mile approach visibility	≥ ¾-statute mile approach visibility minimums			Not Required

Source: Federal Aviation Administration, Advisory Circular 150/5300-13, Chg 10, Airport Design, 9/29/06.

Table 3.14
UUU Approach Requirement Comparison

	APV	Standard Non-Precision Approach	Runway 16	Runway 22
Height Above Touchdown	350	400	518	528
Minimum Runway Length	3,200 ft. paved (2,400 ft. potential)	3,200 ft. paved (2,400 ft. potential)	2,623 ft. paved	2,999 ft. paved
TERPS Paragraph 251	20:1 clear or penetrations lighted for night minimums (see AC 70/7460-1)		20:1 existing	20:1 existing
Parallel Taxiway	Required	Recommended	No Parallel	Existing Parallel
Airport Layout Plan	Required		Pending Master Plan Approval	
Runway Marking	Non-precision	Non-precision	Non-precision	Non-precision
Runway Edge Lights	MIRL/LIRL	MIRL/LIRL	MIRL	MIRL/REIL
Approach Lights	Required – ODALS/MALS, SSALS	Recommended – ODALS/MALS, SSALS, SALS	None	None
Runway Design Standard	OFZ Required	≥ ¾-statute mile approach visibility minimums	Criteria Satisfied	Criteria Satisfied

Note: Table compares 1-statute mile visibility minimums for APV, NPA and Runways 16 and 22.

The more precise an approach system is the smaller the area in which obstacles must be considered and usually lower operating minimums can be established. Essentially, lower operating minimums are achieved by increasing precision of the navigational system.

In order for UUU to establish new approach procedures to either Runways 16 or 22, and achieve a reduction to the existing minima, the airport must enable a reduction of the existing HAT on Runway 16 from 518 feet to 350 feet and Runway 22 from 528 feet to 350 feet respectively to keep the same visibility minimum (1-statute mile). This can be achieved through the removal of controlling obstacles or the installation of navigational aids that offer greater precision. The airport also needs to ensure an approach slope of 20:1, have a total runway length of 3,200 feet or determine that the lowest achievable HAT is based on clearing a 200-foot obstacle within the final approach segment, upgrade the approach lighting system and ensure all runway design standards are met as outlined in FAA AC 150/5300-13, *Airport Design*. If the lowest HAT achievable is the currently published procedure and if it is not likely to remove any new obstructions then it is improbable that UUU can realize a reduction in minima through a new approach procedure. It is unknown at this time what the achievable minima for the airport would be by satisfying the criteria depicted in Tables 3.12 and 3.13. To make that determination, UUU would need to do the following:

- Obtain an accurate obstruction survey of the appropriate FAR Part 77/TERPS surfaces;
- Coordinate with the FAA Flight Procedures Office;
- Conduct appropriate obstruction removal;
- Upgrade the appropriate runway to meet indicated design standards and approach lighting; and
- Publish the new instrument approach.

The final determination for the feasibility of implementing any new instrument approach procedure resides with the FAA Flight Procedures Office. The airport must coordinate with the FAA at the onset and the FAA will ultimately certify the new procedure.

3.2 General Aviation (GA) and Support Facilities Analysis

This analysis examines GA Support components such as; aircraft parking (apron), terminal/administrative, and hangar space. It will estimate the facility demand and compare it with existing facilities to determine future needs for:

- GA Terminal Building
- Apron and Hangar Space Requirements
- Fuel Storage Facilities
- Maintenance Equipment
- Airport Utilities

3.2.1 GA Terminal Building

The GA Terminal Building is attached to the north side of the conventional hangar. The terminal area encompasses approximately 3,500 square feet. This area houses Landmark Aviation and office space of all other businesses located at UUU. While the condition of the terminal facility was reported in fair to poor condition in the inventory section, there is no pressing demand to build a new terminal facility or increase the size of the facility in the near term. A new facility will be needed at some point later in the planning period. The space for potential development/redevelopment will be identified in the alternatives analysis.

The FAA has developed methods of estimating general aviation terminal requirements. The method, found in FAA A/C 150/5300-13, *Airport Design*, relates peak period activity to the size of functional areas within the building. Table 3.14 sets forth the recommended square footage requirements per pilot/passenger.

Table 3.14
General Aviation Terminal Building Area Requirements

Terminal Functional Areas	Area Per Peak Hour Pilot/Passenger
Waiting Lounge	15.0 sq. ft.
Management/Operations	3.0 sq. ft.
Public Conveniences	1.5 sq. ft.
Concession Area	5.0 sq. ft.
Circulation, Storage, HVAC	24.5 sq. ft.
Total	49.0 sq. ft.

Using the standards in the table above, the recommended terminal building size was determined and presented in Table 3.15. The peak hour was determined by taking the average of the peak month total, dividing it by 31 days, and using the generally accepted level of peak hour operations of 15% of the design day operations. The peak hour pilot/passengers were derived by assuming 1.5 passengers and pilots per peak period operation, which is a reasonable assumption for airports such as UUU.

Table 3.15
Recommended Terminal Building Area Requirements

Year	Peak Hour Operations	Peak Hour Pilot and Passengers	Terminal Building Area
2011	4	4	294 sq. ft.
2016	5	8	392 sq. ft.
2026	6	9	441 sq. ft.

As can be seen, the current terminal facility meets the facility objectives set forth by the FAA. However, during the development of the RIASP, community members noted that improvements were needed to the condition of the existing facility to provide a more positive "gateway" image to the airport. Upgrades were made to the facility by RIAC including new paint, carpet, and furniture.

3.2.2 Apron and Hangar Space Requirements

This section looks to define the future based and itinerant aircraft apron requirements for UUU. Since there is no hangar space that is currently used to store based and itinerant aircraft, this analysis will first assume that no new hangar space or t-hangar space will be built. This will allow the calculation of the total aircraft apron space required.

Apron and tie-down area requirements were developed for both based and itinerant aircraft at UUU. Currently, the aprons are divided into two areas:

- Apron A: This apron is primarily used by transient aircraft with 6 aircraft and 2 helicopter parking positions; and

- Apron B: This apron with 36 aircraft parking positions primarily used by based aircraft.

These aircraft parking aprons total approximately 12,888 square yards. As previously noted, the design aircraft for the airport terminal and apron areas correspond to Airplane Design Group II. Other assumptions to estimate general aviation facility requirements are:

- For planning purposes airplanes using tie-down (apron) spaces are assumed to require 2,700 square feet (300 sy) per based aircraft and 3,240 sq. ft. (360 sy) per itinerant aircraft. These estimates include area for taxiing.

- Using the results of the user survey, combined with the estimated waiting list for aircraft parking provided by Landmark and experience at other airports, the number of based aircraft that would use T-hangars was estimated.

3.2.3 Aircraft Apron Parking Requirements

The aircraft apron parking requirements for based and itinerant aircraft are calculated in the tables below. These numbers assume the high growth scenario in order to maximize the potential facilities required to meet this projected demand.

Table 3.16
Based Aircraft Apron Parking Requirements

Based Aircraft	2006	2011	2016	2026
Single-Engine	32	42	51	70
Requirements @ 300 sq. yds.	9,600	12,600	15,300	21,000
Multi-Engine	6	8	9	13
Requirements @ 300 sq. yds.	1,800	2,400	2,700	3,900
Helicopter	2	2	3	4
Requirements @ 360 sq. yds.	720	720	1,080	1,440
Total SY	12,120[1]	15,720	19,080	26,340

[1] In 2006, there is a based aircraft shortage of 3,232 sq. yds. (12,120-8,888 existing)

Source: The Louis Berger Group, Inc. Calculations

To derive the itinerant aircraft apron parking requirements, the Average Day of the Peak Month was used. The forecast section determined the month to be August, averaging 14.28% of the annual operations over a ten year period. This percentage was applied to the existing and annual operations numbers and then divided by 31 to represent a Peak Day. Itinerant Peak Day operations were then assumed to be 20% of the operations, based on historical records. It was then assumed that approximately 50% of the Peak Day Itinerant traffic will need a parking space. The results are shown in the following table.

Table 3.17
Itinerant Aircraft Apron Parking Requirements

Year	Average Peak Day Itinerant Operations	Average Peak Day Itinerant Aircraft	Required Itinerant Apron
2006	20	10	3,600[1]
2011	24	12	4,320
2016	30	15	5,400
2026	39	20	7,200

[1] In 2006, there is an itinerant aircraft surplus of 400 sq. yds. (4,000 – 3,600 existing). The surplus is misleading because existing itinerant parking is being used for based aircraft.

Source: The Louis Berger Group, Inc. Calculations

Table 3.18
Based and Itinerant Aircraft Apron Parking Requirements

	2006	2011	2016	2026
Based Aircraft Apron	40	15,720	19,080	26,340
Itinerant Aircraft Apron	10	4,320	5,400	7,200
Sub-total	50	20,040	24,480	33,540
Existing Area	12,888	12,888	12,888	12,888
Surplus (Deficiency)	(2,832)	(7,152)	(11,592)	(20,652)

Source: The Louis Berger Group, Inc. Calculations

These aircraft apron requirements will be considered with aircraft hangar and t-hangar assumptions in the next section. In addition, the rehabilitation of Apron B will be needed in the near term.

3.2.4 Hangar Space Requirements

Hangar space requirements are mainly dictated by the aircraft owner's preference to store their aircraft. Additional requirements are based on the type of aircraft and number of based aircraft. Usually larger, more expensive aircraft are hangar stored. Currently, UUU has only two conventional type hangars. There are currently no t-hangars. The hangars are:


Conventional Hangar


Temporary Hangar

- A conventional hangar (approximately 8,500 square feet) located in the western quadrant of the airport; and
- A temporary hangar (approximately 1,400 square feet) just to the south of the conventional hangar.

Based on discussions with RIAC, Landmark, and based aircraft owner surveys conducted during the forecast effort of this master plan, the highest demand for aircraft storage is T-hangars. RIAC and Landmark have indicated that demand for conventional hangar space is lower and would be a second priority to t-hangar development.

With no current T-hangars at UUU, estimating demand for the T-hangars must be based on assumptions. As a result, the facility requirements will initially look at the requirements to develop two, 10-unit t-hangar complexes. Ultimately, development of t-hangars on the airport will reduce the amount of aircraft parking apron required. The reduction in apron space is shown below:

- 10 T-hangar Units – Reduce Based Aircraft Apron Space by 3,000 square yards.
- 20 T-hangar Units – Reduce Based Aircraft Apron Space by 6,000 square yards.

The alternatives analysis should look at the placement and development of both new aircraft apron space, along with the development of a T-hangar complex to meet existing demand levels. In addition, alternatives should also look at where additional conventional hangars could be built should the need arise during the planning period or RIAC is presented a proposal from an outside interest looking to develop a parcel on the airport.

3.2.5 Fuel Storage Facility

Fuel storage of 100LL aviation gasoline is maintained in a self-fueling 12,000 gallon tank centrally located between Apron A and Apron B. This tank is operated by Landmark Aviation. The fuel storage requirements for UUU are identified in the table below:

Table 3.19
Fuel Storage Requirements for UUU

	2006	2011	2016	2026
Operations	21,461	27,126	32,431	43,703
ADPM Operations	99	125	149	201
ADPM Fuel in gallons[1]	347	437	521	703

[1] A 3.5 gallon per operation figure was assumed.
ADPM = Average Day, Peak Month (Assumes 14.28% for Peak Month, divided by 31 days for August: See Forecast Chapter)

Source: The Louis Berger Group, Inc. Calculations

The existing tank capacity should be more than capable of accommodating future demand.

3.2.5 Maintenance Equipment and Storage

A Snow Removal Equipment (SRE) Building was constructed in 2004. This building is approximately 240 square feet and houses snow removal equipment and other maintenance equipment that is used to maintain the airport grounds. This building does not have restroom facilities or running water. The alternatives will look at bringing running water to this building in addition to the replacement or addition of any airport equipment needs.

3.2.6 Airport Utilities

As stated in Chapter 1, UUU has access to all appropriate utility services provided by National Grid. Currently, backup electrical power is only provided to the airfield lighting system and not the terminal and hangar facility. The alternatives chapter will look at what is needed to hook in to the backup generator for the terminal facilities.

3.2.7 Access Road and Automobile Parking Analysis

As noted in Chapter 1, UUU can be accessed via the Airport Access Road off of Forest Avenue. While the airport access is fairly direct from Routes 114 and 138, discussions with airport staff and users indicate that the signage could be enhanced. In addition, several airport users noted that cosmetic improvements to the access road are needed. The existing parking areas appear to be ample for current demand. Any future improvements to the terminal area should allow for the proper number of parking spaces to meet building code and provide enough spaces for the type of operation being conducted.

3.3 Summary of Airport Facility Requirements

The following table and bulleted list summarizes the requirements to be addressed as part of the Alternatives Analysis section of this master plan effort.

Table 3.16
Summary of Airport Facility Requirements

	2011	2016	2026
Based Aircraft Apron (Sq. Yds.)	15,720	19,080	26,340
Itinerant Aircraft Apron (Sq. Yds.)	4,320	5,400	7,200
Sub-total	20,040	24,480	33,540
Existing Area	12,888	12,888	12,888
Surplus (Deficiency)	(7,152)	(11,592)	(20,652)
With 10 T-hangars (reduction in based aircraft apron space)	3,000	3,000	3,000
Surplus (Deficiency) after 10 T-hangars	(4,152)	(8,592)	(17,652)
With 20 T-hangars (reduction in based aircraft apron space)	6,000	6,000	6,000
Surplus (Deficiency) after 20 T-hangars	(1,152)	(5,592)	(14,652)

Source: The Louis Berger Group, Inc. Calculations

Additional items to be analyzed in the Alternatives Analysis include (in no particular order):

- Lengthening of Runway 04/22
- Existing Runway and Taxiway Infrastructure Rehabilitation
    - Runway 04/22 Rehabilitation
    - Runway 16/34 Reconstruction
    - Runway Intersection
- Taxiway A Realignment
- Parallel Taxiway to Runway 16/34
- Runway 4 Runway Safety Area Drainage
- Runway Protection Zone Issues – All Runway Ends
- Obstruction Clearing as determined by independent Obstruction Study
- GA Terminal Building Facility
- Apron B Rehabilitation
- Expansion of Based Aircraft Apron
- Expansion of Itinerant Aircraft Apron
- T-Hangar Development
- Conventional Hangar Development
- Perimeter Fencing Improvements
- Airport Signage