CHAPTER 3 AIRPORT FACILITY REQUIREMENTS

3.1 Introduction

In terms of annual and peak hour operational capacity, the existing runway and taxiway system is adequate to accommodate both existing and future aircraft operations, even under the growth predicted in Scenario A, described previously. The theoretical annual service volume and the theoretical hourly capacity of the runway/taxiway system exceed the level of operations anticipated in Forecast Scenario A.

Additional airport facilities are required to accommodate both existing and future activity. The facilities identified in this chapter would accommodate unconstrained needs. Other factors such as cost, funding availability, and environmental issues, may affect the ultimate facility requirements.

A survey was conducted as part of this 2008 AMPU with the SAOC and airport tenants who identified a number of improvements and facilities they felt were needed at Skyhaven Airport. The following recommendations were based, in part, on this survey, as well as projected aviation activity and operational needs.

3.2 Skyhaven Airport Facility Improvements and Needs

Runway 15-33: The 2001 AMPU recommended extending Runway 15-33 by 1,000 feet if aircraft operations increased at the High Growth rate presented in that study. Although it does not appear that actual operations met that forecast, it is possible that corporate activity could increase in the future if certain improvements are made. Under certain scenarios, turbine powered aircraft activity could increase to the level of 500 operations per year by 2028 at Skyhaven Airport. A runway length analysis was prepared and is presented below.

Based on current FAA criteria, a 200 foot extension (to a total length of 4,200 feet) would allow for the possible lowering of instrument approach minimums to ½ mile visibility in the future. Given the fact that there is room to extend the runway even further, any additional runway length could provide operational benefits such as increased payload on takeoff for certain aircraft.

Based on its age and current condition, Runway 15-33 should be reconstructed within the next five years. The runway edge lighting system needs replacing at the same time, and may require improvements to the electrical vault.

T-Hangars: The NHDOT has a waiting list of 31 aircraft owners for hangar space at Skyhaven Airport. Some aircraft owners on the waiting list presently have a tiedown on the airport. Because aircraft owners are price sensitive, it would be prudent to construct one row of 10 T-hangars at a time, rent each unit, and then reconfirm demand for the next set of 10 T-hangars before beginning construction. Such a process would minimize the risk of over-building, particularly since there are T-hangars currently available at other

area airports. If the existing T-hangars are available at a lower price than new ones at Skyhaven Airport, demand for new hangars may be less than anticipated.

Itinerant Aircraft Parking: There is a need for additional itinerant aircraft parking, particularly for turbine- and jet-powered aircraft, as well as for itinerant piston-engine aircraft. Itinerant aircraft pilots and passengers generally want convenient access to the terminal building and ground transportation as well as aviation fuel. Accommodating itinerant aircraft parking close to the terminal building would require adjusting the way existing parked aircraft (based and itinerant) are configured. A paved itinerant apron should be sized to accommodate 2 to 3 aircraft as large as the Beech King Air 200, as well as 3 or 4 single or multi-engine piston aircraft, and also allow for power-in, power-out parking.

Aviation Fuel Pumps: The existing aviation fuel pumps could be relocated to facilitate ease of access by aircraft that use Skyhaven Airport.

Based Aircraft Parking Apron: Airport users recommended that electrical power be provided to the paved aircraft tiedowns so that the power could be used to heat aircraft engines in the winter and this would be an additional revenue source for the airport.

Improved Instrument Approach to Runway 33: According to data compiled by a FlightAware, there were 306 instrument aircraft arrivals and departures at Skyhaven Airport between July 1, 2007 and June 30, 2008. There is a need for lower instrument approach minimums to serve those aircraft and others who, but for the lack of lower approach minimums, would otherwise be utilizing Skyhaven Airport. The FAA is working to publish a new GPS instrument approach to Runway 33, known as an LPV approach (localizer performance with vertical guidance). An LPV approach would provide additional guidance and lower minimums than the current published instrument approaches.

An LPV is considered by FAA to be a non-precision instrument approach, although it can provide approach minimums similar to a Category 1 instrument landing system (ILS), 200 feet above the runway threshold and ½ mile visibility if site conditions allow. FAA design criteria changes as instrument approach minimums are lowered, as shown in **Table3-1** and **Table 3-2**. Certain criteria, particularly for imaginary surfaces, increase significantly in order to achieve lower visibility minimums.

The lowest existing instrument approach minimums at Skyhaven Airport are 438 feet above the runway threshold and 1 mile visibility (see **Appendix B**). According to meteorological data compiled at the former Pease Air Force Base (source: 2001 AMPU – Hoyle Tanner), weather conditions are below those minimums more than 13.5% of the time. During those periods, aircraft that would otherwise land at Skyhaven Airport must land at another airport.

An LPV approach could potentially reduce the minimums to 296 feet above the runway threshold and 3/4 mile visibility, which would increase the opportunity for aircraft to land

at Skyhaven Airport in poor weather conditions, and also improve the airport's ability to be available for aircraft operations.

Table 3-1

New Instrument Approaches – FAA Criteria			
	Visibility Minimums		
Criteria	**1 mile (existing)**	**¾ Mile**	**½ Mile**
Height Above Touchdown (HAT)	400 ft.	340 ft.	300 ft.
TERPS para. 251	20:1 clear	20:1 clear	34:1 clear
Minimum Runway Length	3,200 ft.	3,200 ft.	4,200 ft.
Airport Layout Plan	Recommend	Required	Required
Runway Markings	Non-precision	Non-precision	Precision
Parallel Taxiway	Recommend	Required	Required
Runway Edge Lights	Medium or Low	Medium or High	Medium or High
Approach Lights	Recommend	Required	Required

Source: FAA AC 150/5300-23, Airport Design, Appendix 16, Table A16-1C, Nonprecision Approach Requirements
Notes:
HAT elevations for planning purposes only – actual HAT determined by TERPS.
Approach lights for 1 mile or ¾ mile: ODALS, MALS, SSALS, or SALS acceptable. For ½ mile MALSR required.

Table 3-2

FAA Airport Design Criteria			
	Visibility Minimums		
Criteria	**1 mile (existing)**	**¾ Mile**	**½ Mile**
Primary Surface Width	500 ft.	500 ft.	1,000 ft.
Runway Protection Zone (area – acres)	8.035	48.978	78.914
Part 77 Approach Surface & Slope	500' x 5,000' x 2,000' @ 20:1	500' x 5,000' x 2,000' @ 20:1	1,000' x 50,000' x 16,000' @ 50:1
Runway Safety Areas	120 ft. x 240 ft.	120 ft. x 240 ft.	300 ft. x 600 ft.

Sources: FAR Part 77, Objects Affecting Navigable Airspace and FAA AC 150/5300-13, Airport Design

One of the criteria considered by the FAA in terms of publishing a new instrument approach is the amount and location of the penetrations to the imaginary surfaces described in the Terminal Instrument Procedures (TERPS) Handbook, FAA Order 8260.3. An analysis prepared as part of this AMPU indicates that the glidepath qualification surface (GQS) to the existing Runway 33 end is clear, and therefore an LPV approach could be published.

However, there are penetrations to other imaginary surfaces, which could impact the potential approach minimums (Table 3-3). Three figures are attached (Drawing No. 2, 5, 11) that show penetrations to some of the imaginary surfaces. Figures have been prepared

for each imaginary surface required by FAA for an LPV approach, however, a number of them have very few or no penetrations, and are not included here.

Table 3-3

Drawing Number	FAA Imaginary Surface	Number of Penetrations	Number of Parcels
1	TERPS Glidepath Qualification Surface	0	0
2	TERPS Precision Final Approach Segment	125	9
3	AC 5300-13 Appendix 2 Row 4 Criteria – Approach end of runways expected to support instrument night circling	0	0
4	AC 5300-13 Appendix 2 Row 8 Criteria – Approach end of runways expected to accommodate instrument approaches having visibility minimums ≥ ¾ but < 1 statute mile, day or night.	45	6
5	AC 5300-13 Appendix 2 Row 11 Criteria – Departure Surface	1,452	40
6	TERPS Visual Portion of the Final Approach Segment – Standard	0	0
7	TERPS Visual Portion of the Final Approach Segment – Straight-in 20:1	0	0
8	TERPS Visual Portion of the Final Approach Segment – Straight-in 34:1	17	1
9	TERPS Missed Approach	0	0
10	FAR Part 77	175	30

If the Runway 33 threshold were extended to the south, there would be penetrations to the GQS surface – primarily trees located off-airport property. The FAA will not publish a new instrument approach procedure if there are penetrations to the GQS surface. As a result, if the Runway 33 threshold were moved, easements would need to acquired, the trees removed, and the approach re-surveyed in order for the FAA to publish an LPV approach to a new Runway 33 threshold located to the south of the existing Runway 33.

Paved Aircraft Run-Up Areas: Airport users identified a need on either end of Taxiway A for paved aircraft run-up areas, near the thresholds of Runway 15 and 33, to prevent bottlenecks for departing aircraft.

FAA Advisory Circular 150/5300-13, Airport Design, notes that "a holding bay (i.e., aircraft run-up area) should be provided when runway operations reach 30 operations per hour."[9] Because Skyhaven Airport is not projected to have that level of activity by 2028, the holding bays may not be eligible for FAA funding, although they would offer operational benefits, particularly if one were constructed adjacent to the Runway 33 threshold, which is the primary use runway.

[9] Source: FAA AC 150/5300-13, Airport Design, Chapter 4, Taxiway & Taxilane Design, para. 409, Holding Bays

Airport Perimeter Fencing: Additional perimeter fencing is needed, particularly along the north and east side of the airport to prevent intrusions by people and wildlife into the active airport operation area

Auto Parking Lot: The terminal building's automobile parking lot has numerous pavement cracks and loose pavement material that has become hazardous to both automobiles and pedestrians using the parking lot. This pavement should be reconstructed and remarked.

Aircraft Wash Rack: Airport users noted that an aircraft wash rack would be useful. This is a paved area with proper drainage and water treatment where an aircraft can be washed. This could be a source of revenue generation for Skyhaven Airport as well.

Tree Obstructions: Trees penetrate a number of imaginary surfaces and should be removed or mitigated with obstruction lighting or marking, particularly to the north of the airport. An obstruction analysis was prepared as part of this AMPU using aerial photogrammetry taken by Eastern Topographics in the summer of 2008.

Self-Serve Fuel Pump: Airport tenants noted that the self-serve fuel pumps for both 100LL and Jet-A fuels should be upgraded to provide more modern and efficient equipment. In order to enhance capacity of the aircraft parking apron adjacent to the terminal building, it is possible that the fuel pumps could be relocated, at which time they could be replaced with modern pumps.

3.3 Runway Length Requirements

One recommendation made in the 2001 Airport Master Plan Update (AMPU) was to extend Runway 15-33 by 1,000 feet to a total length of 5,000 feet. That recommendation was based on the anticipated need to accommodate corporate aircraft on a regular basis at Skyhaven Airport, although that specific type of traffic has not materialized at levels needed to trigger the runway extension (see **Chart 3-1**).

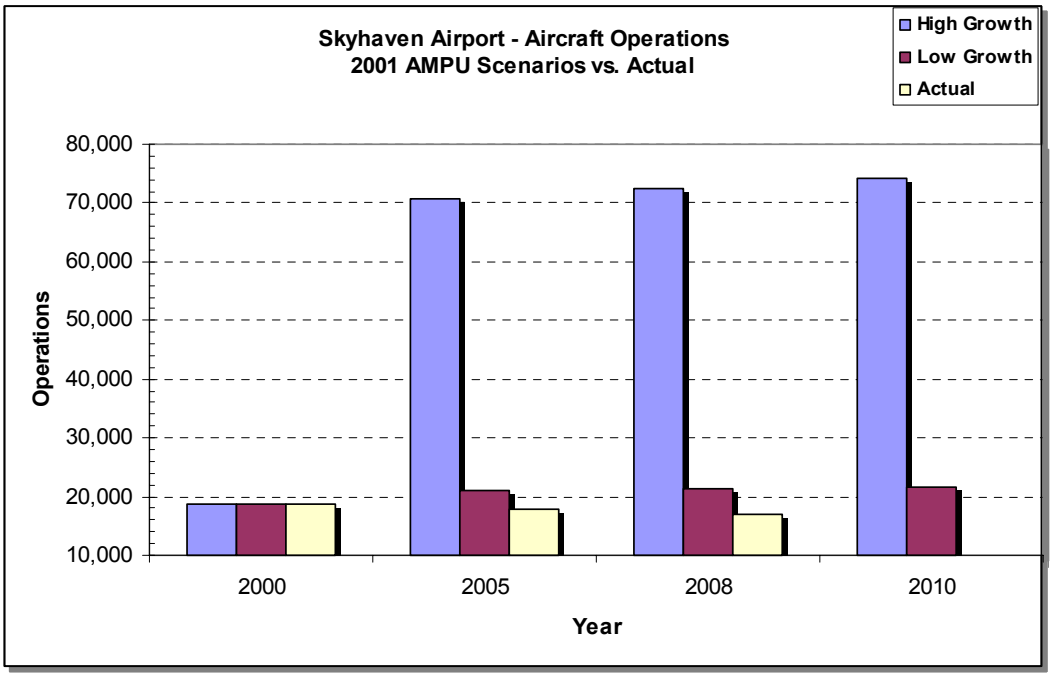
An analysis of the runway length requirements was prepared for this 2008 AMPU based on existing corporate jet performance data compiled by Business & Commercial Aviation Magazine (BCA), a publication of McGraw Hill[10] (see **Appendix H** for an excerpt of the aircraft data table). The analysis identified numerous corporate turboprops and jets that could takeoff on 4,000 feet or less at maximum gross weight, at sea level and in standard atmospheric conditions (**Appendix G**).

Skyhaven Airport is 322 feet above sea level, and the mean maximum temperature in the summer is 83^0 F, which would have some impact on aircraft takeoff performance compared to operating at sea level under standard conditions. The analysis also identified the number of each type of jet registered with the FAA.

[10] BCA Magazine publishes the Purchase Planning Handbook in May of each year. The Handbook provides detailed data on aircraft size and performance characteristics. See Appendix G for a sample of the data.

A total of 16 corporate jets and nine turboprops currently in production can takeoff on a 4,000 foot runway at maximum gross weight. They include aircraft such as the Beech King Air 90 and 200, Pilatus PC-12, Cessna Citation CJ1, CJ2, CJ3, Hawker 400XP, Embraer Phenom 100 and 300, Beech Premier 1A, and Cessna Mustang, among others.

Chart 3-1



Ten corporate jets were identified that could takeoff at maximum gross weight on runways between 4,000 feet – 5,000 feet long. They include the Lear 40XR and 45XR, Hawker 750 and 850XP, 900XP, Gulfstream G-350, Falcon 900DX, Challenger 300, among others.

It is important to note that corporate (and airline) jets frequently do not takeoff at maximum gross weight. Surveys prepared for the National Business Aircraft Association (NBAA) indicate that the typical passenger load for corporate jets and turboprops is three to four passengers, and their typical stage length is approximately 600 miles, significantly less than most jets maximum range.

As a result, corporate jets and turboprops typically carry less than their maximum capacity in terms of passengers, baggage, and fuel, and as a result, frequently need less than maximum runway distance for takeoff. That means that a number of corporate aircraft can takeoff and land on a 4,000 foot runway because they are operating at less than maximum gross weight.

According to BCA, 44 different models of corporate jets can takeoff on a 4,000 foot runway and fly a 1,000-nm mission non-stop with four passengers and crew. 1,000 nm was the longest non-stop mission analyzed by BCA, and it corresponds with the longest non-stop flight into Skyhaven Airport tracked by FlightAware. These corporate jets

ranged in size from Cessna Citations to the Challenger 605, Challenger 850, and Global Express XRS, the Gulfstream G-450 and G-500, the Falcon 7X and 2000, etc. The landing distance for each jet was 3,000 feet or less.

Conclusion: Runway 15-33 does not meet the criteria to be extended by 1,000 feet at this time or during the 20-year planning period, for the following reasons:

- The existing length of Runway 15-33 (4,001 feet) does not constrain corporate jets from taking off and landing at Skyhaven Airport.
- The number of operations by corporate jets large enough to require 5,000 feet for takeoff will not increase sufficiently to meet FAA's threshold of 500 takeoffs and landings per year to be classified as critical design aircraft.
- Portsmouth International Airport at Pease is 18 road miles, or 32-minute drive time, from Skyhaven Airport, and can accommodate all sizes of corporate jets.

However, in order for the FAA to publish a new instrument approach with minimums as low as 200 feet above the runway and ½ mile visibility, the minimum runway length must be 4,200 feet[11].

If a new LPV approach is published by the FAA at Skyhaven Airport with a visibility minimum of ¾ mile, the minimums could be reduced in the future by the FAA once the criteria for lower minimums at the airport are met, such as installation of a medium intensity approach light system, and larger imaginary surface are clear of penetrations, etc.

Therefore, it is recommended that Runway 15-33 be extended by at least 200 feet to a total distance of 4,200 feet when it is reconstructed in order to maintain the option for instrument approach minimums to be lowered to 200 feet and ½ mile visibility in the future.

If a higher growth rate scenario is realized, the following chapter will also look at the constraints associated with extending the runway to 5,000 feet and what the maximum runway length can be practicably implemented at a future date.

As noted previously, the facilities identified in this chapter are based on unconstrained needs. Other factors such as cost, funding availability, environmental issues, may affect the ultimate facility requirements and will be evaluated in the next chapter of this AMPU. The lack of transient parking space, Jet-A fuel, and FBO services are much more significant constraints to corporate aircraft, and lower instrument approach minimums would provide additional opportunities to land during poor weather conditions.

The facilities in this chapter were identified in order to accommodate unconstrained needs. Other factors such as cost, funding availability, environmental issues, etc., may affect the ultimate facility requirements and configuration.

[11] Source: FAA Advisory Circular 150/5300-13, *Airport Design*, Appendix 16, New Instrument Approaches

3.4 Summary of Facility Recommendations

- Construct a new paved itinerant aircraft parking apron. It should accommodate at least 2 to 3 Beech King Air 200 sized aircraft, as well as 3 to 4 single and multi-engine piston sized aircraft, and also allow for power-in and power-out parking.
- Construct 31 additional T-hangars to accommodate existing demand.
- Reconstruct Runway 15-33, and replace the lighting and electrical system to the runway.
- In terms of the penetrations to the imaginary surfaces, either remove, light, or mark the penetrations, as determined by FAA.
- Extend Runway 15-33 by a minimum of 200 feet to a length of 4,200 feet. Any additional extension of the runway would provide operational benefits in terms of increased payload for certain aircraft on takeoff.
- Reconstruct the existing based aircraft tiedown and parking apron.
- Construct aircraft run-up pads (holding areas) on either end of Taxiway A near the runway thresholds.
- Reconstruct the auto parking lot.
- Install security fencing around the remainder of airport property.
- Work closely with FAA in analyzing and publishing a new LPV instrument approach procedure.
- In terms of additional services, continue the process of looking for an FBO to locate at Skyhaven Airport, and also offer Jet-A fuel for sale.
- Explore the possibility of attracting additional businesses such as avionics repair, aircraft interior installation, on-field restaurant, etc. Modifications or enhancements to some facilities may be required to accommodate the additional businesses.
- Upgrade the existing 100LL and Jet-A self-fuel pumps.
- Upgrade the terminal building to resolve on-going maintenance issues.
- Construct an aircraft wash rack.