



Wiley Post/Will Rogers Memorial Airport MASTER PLAN UPDATE

Chapter 4 Facility Requirements

DRAFT

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4 Facility Requirements

The next step in the master plan update process is to translate the aviation forecasts into facility requirements. Facility requirements are determined by comparing future facility needs to the airport's existing inventory of facilities, reviewing FAA design criteria to ensure the airport meets safety and operational standards, and considering the need to maintain and improve customer service. Separate requirements analyses were prepared for key elements of the airport.

This chapter consists of:

- Demand-capacity analysis
- Design aircraft selection
- Facility requirements evaluation

4.1 Demand-Capacity Analysis

A demand-capacity analysis is a mathematical method of determining if an airport can handle the current and future aviation activity. It also helps determine the timing and degree to which additional or expanded facilities will be needed.

FAA's standard method for determining airport capacity and delay for long-range planning purposes is presented in AC 150/5060-5, *Airport Capacity and Delay*. This AC and FAA's airport capacity model spreadsheets were used to analyze the airfield requirements by computing:

- Hourly capacity
- Annual service volume
- Average aircraft delays

This approach uses the projections of annual aircraft operations by the anticipated fleet mix as forecast in Chapter 3 in conjunction with a variety of factors that are described in the following sections.

In addition to the updated aviation activity forecasts, the FAA capacity analysis requires knowledge of the airport's airfield characteristics and operational conditions. The elements that affect airfield capacity include:

- Runway configuration
- Aircraft mix index (what types of aircraft are using the airport)
- Taxiway configuration
- Meteorological conditions

When analyzed together, these elements determine the airport's Annual Service Volume (ASV), a generalized estimate of the airport's capacity. The following sections will evaluate each of these capacity characteristics with respect to Barrow.

4.1.1 Runway Configuration

The layout and spacing of runways are important factors in determining airfield capacity. The airfield configuration at BRW consists of a single paved runway, oriented east-west. This corresponds to Runway Use Configuration #1 in Figure 2-1 of AC 150/5060-5 (see also Table 4-2, below).

4.1.2 Aircraft Mix Index

Knowing the mix of the aircraft fleet operating at Barrow is essential to establishing the aircraft fleet mix index. This index is calculated based on the number of operations for the gross weight of the specific aircraft in use:

- **Class A:** Single engine, less than 12,500 lbs.
- **Class B:** Multi-engine, less than 12,500 lbs.
- **Class C:** Multi-engine, 12,500 lbs. to 300,000 lbs.
- **Class D:** Multi-engine, over 300,000 lbs.

The mix index calculation is the percent of Class C aircraft operations plus three times the percent of Class D aircraft operations [$\%(C + 3D)$]. At Barrow, the fleet mix includes only Classes A through C, with Class C aircraft accounting for 20% of the operations, so the mix index is 20.

4.1.3 Taxiway Configuration

Exit taxiways have a considerable impact on airfield capacity since the number and location of exits directly determine the length of time an aircraft occupies the runway. The airfield capacity analysis gives credit to exits located within a prescribed range from a runway's threshold. This range is based upon the mix index of the aircraft that use the runway; at Barrow, the range is 3,000 to 5,000 feet. Exits must be at least 750 feet apart to count as separate exits.

The runway at BRW has three exit taxiways (each more than 750 feet from the other two) that connect to the taxilane along the apron. There are no parallel taxiways at Barrow Airport.

4.1.4 Meteorological Conditions

Meteorological conditions such as wind, fog, and cloud ceiling influence a pilot's decision as to which runway end to choose for an approach. Thus, these conditions can have an effect on the overall capacity for the airfield by dictating the direction of takeoffs and landings. Likewise, weather conditions dictate whether aircraft operate under Visual Flight Rules (VFR) or Instrument Flight Rules (IFR). The distinction between IFR and VFR is important because, assuming all other factors equal, fewer aircraft operations can occur during IFR conditions.

Visual Meteorological Conditions (VMC) occur when visibility is at least three statute miles and the cloud ceiling is 1,000 feet or greater. During VMC, Visual Flight Rules apply. Instrument Meteorological Conditions (IMC) exist when restrictions to visibility are lower than VMC, thereby requiring instruments to provide guidance to aircraft. Thus, during IMC, Instrument Flight Rules apply.

4.1.5 Runway Capacity

The FAA Capacity Model uses the general assumptions in Table 4-1 for the purposes of computing hourly capacity and average delays. All of these assumptions are true for BRW except the presence of a full-length parallel taxiway.

Table 4-1 – FAA Capacity Model Assumptions

Assumption	Valid at BRW?
Arrivals equal departures	✓
Touch-and-go operations less than 20%	✓
Full-length parallel taxiway in place	✗
Ample runway entrance/exit taxiways	✓
Airspace is not constrained	✓
Approximately 80% of the time the airport is operated with the runway-use configuration that produces the greatest hourly capacity	✓
At least one runway is equipped with an ILS	✓

Using the model assumptions and the mix index of 20, Barrow Airport’s base ASV is 230,000 operations per year (Table 4-2).

Table 4-2 – Capacity and Base Annual Service Volume for Long-Range Planning

Source: FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*

Runway Use Configuration	Mix Index	Hourly Capacity		Annual Service Volume (operations/year)
		VFR	IFR	
1. Single Runway	0 to 20	98	59	230,000
	21 to 50	74	57	195,000
	51 to 80	63	56	205,000
	81 to 120	55	53	210,000
	121 to 180	51	50	240,000

However, the FAA Capacity Model requires adjustments to the hourly capacity calculation factors in order to better model local conditions. These adjusted calculation factors (taken from Figures 3-3 and 3-43 in AC 150/5060-5) are presented in Table 4-3 below.

**Table 4-3 – Hourly Capacity Calculation Factors
for Runway Configuration 1 and Fleet Mix Index of 20**

Factor	Hourly Capacity	
	VFR	IFR
C* (Hourly Capacity Base)	77	58
T (Touch-and-Go Factor)	1.04	1.00
E (Exit Factor)	0.94	0.79

Based on these calculation factors, BRW’s capacity is approximately 75 operations per hour in VFR conditions, dropping to 46 operations per hour during IFR conditions.

Next, an adjusted Annual Service Volume (ASV_{adj}) was calculated based on FAA guidance. The ASV was determined using the formula $ASV = C_w \times D \times H$, where C_w is the weighted capacity, D is the daily demand ratio, and H is the hourly demand ratio. Typical demand ratios depicted in AC 150/5060-5 were used in this formula, and then the weighted hourly capacity was calculated based on the methodology outlined in Chapter 3-6 of AC 150/5060-5. The resulting formula and adjusted ASV are as follows:

$$ASV_{adj} = [(75 \times 0.7) + (46 \times 0.3)] \times 280 \times 8 = 148,512$$

4.1.6 Demand-Capacity Summary

In the most demanding future scenario, the forecast operations level represents 14% of the airfield’s adjusted ASV (21,383 operations under the high growth scenario; see Chapter 3, page 3-23). FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport System (NPIAS)*, indicates that airfield capacity improvements should be considered when operations reach 60% of the ASV. Therefore, the demand-capacity analysis shows no need for major capacity-related airfield improvements at Barrow Airport during the next 20 years. Local opinion about delays and capacity also indicates that BRW’s capacity will remain adequate beyond 2032.

4.2 Facility Requirements

In this section, we use the data collected during the inventory and aviation forecast chapters to determine:

- The condition of the existing airport facilities
- Whether the existing facilities can accommodate existing and potential users
- Whether the existing facilities do meet, or can meet, FAA airport design criteria
- What new facilities may be needed
- When these new facilities may be needed to accommodate forecast demands

Specific determinations of location and timing of future facilities are discussed in the following chapter, *Alternatives Development and Evaluation*.

Requirements for new facilities are expressed for the short-, intermediate-, and long-term planning horizons. These translate to roughly 5-, 10-, and 20-year timeframes.

Airport facilities include both airfield and landside components. Airfield facilities are those related to the arrival, departure, and ground movement of aircraft. These include:

- Runways
- Taxiways
- Navigational aids
- Airfield lighting, markings, and signage

Airside facility needs at BRW were determined by comparing existing facilities with those needed to meet applicable FAA standards and requirements, as well as through discussions with ADOT&PF, airport tenants, and the Barrow aviation community.

Landside facilities, which provide the interface between air and ground transportation modes, include:

- Passenger terminal
- General aviation facilities
- Air cargo facilities
- Support facilities
- Ground access, circulation, and parking

Landside facility requirements were based on existing landside facilities, current and planned utilization of those facilities, and projected aviation demand.

4.2.1 Design Aircraft

Selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft that are currently using or are expected to use the airport. Planning for future aircraft use is of particular importance, since design standards are used to plan airfield dimensions and separation distances between facilities. These standards must be determined now, because relocating these facilities later will likely be extremely expensive.

FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This code, called the airport reference code (ARC), has two components. The first, depicted by a letter, is the aircraft approach speed (operational characteristic, based on an aircraft's stall speed at maximum certificated weight); the second, depicted by a Roman numeral, is the airplane design group wingspan (physical characteristic, determined by the aircraft's wingspan). Generally, aircraft approach speed applies to runways and runway-related facilities, while aircraft wingspan primarily affects separation distances involving taxiways, taxi lanes, and landside facilities.

The five approach categories used in airport planning are:

- **Category A:** Speed less than 91 knots
- **Category B:** Speed 91 knots or more, but less than 121 knots
- **Category C:** Speed 121 knots or more, but less than 141 knots
- **Category D:** Speed 141 knots or more, but less than 166 knots
- **Category E:** Speed greater than 166 knots

The six airplane design groups used in airport planning are:

- **Group I:** Up to but not including 49 feet
- **Group II:** 49 feet up to but not including 79 feet
- **Group III:** 79 feet up to but not including 118 feet
- **Group IV:** 118 feet up to but not including 171 feet
- **Group V:** 171 feet up to but not including 214 feet
- **Group VI:** 214 feet or greater

The FAA recommends designing runways and taxiways to meet the requirements of the most demanding ARC that meets FAA’s “substantial use” threshold of at least 500 annual operations at that airport (AC 150/5325-4B). Barrow Airport currently accommodates a wide variety of aircraft, including small single and multi-engine aircraft (approach categories A and B and airplane design group I) and business turboprop and jet aircraft (approach categories B, C, and D and airplane design groups I, II, and III).

The current ARC assigned to BRW is C-III, and this is projected to apply through the near-term. The transition to the Boeing 737-800 as the design aircraft will require designation as D-III.

Currently, the most demanding aircraft with over 500 operations at BRW is the Boeing 737-700. However, Alaska Airlines plans to begin phasing in the 737-800 over the longer term (Shaw, 2013). Thus, for the near term the 737-700 will be the most demanding aircraft and is selected as the design aircraft, and the 737-800 is the design aircraft for the long term.

4.2.2 Airside

Runways

The runway lengths recommended for Barrow Airport are based on the length required by the most critical aircraft making “substantial use” (i.e., over 500 annual operations) of the airport’s runways.

The critical aircraft for the existing runways is based on the Alaska Airlines current and projected fleet. Runway length requirements were evaluated for all Alaska Airlines passenger and cargo jets presently flying into Barrow—the B737-400, B737-700, and B737-800—first to determine which aircraft would be the most demanding, and second to compare length requirements of other potential critical aircraft if their use increases to 500 annual operations. In the near term, the critical aircraft is the Boeing 737-700, whose recommended runway length is 6,200 feet. When the 737-800 replaces the 737-700 and reaches the substantial use threshold, the recommended runway length will increase to 6,700 feet. Achieving these lengths at BRW poses a challenge which will be considered in the alternatives section of this master plan.

Methodology for Determining Recommended Runway Length

Following the method for determining runway length outlined in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, the required runway length for an aircraft is the longer of the distances required for takeoff and for landing (see Appendix B). There is currently a draft version of AC 150/5325-4C in review. This draft AC does not change the runway length requirements for BRW.

For Barrow, where the design aircraft are the Boeing 737-700 (near term) and 737-800 (long term), the minimum runway length was determined using Boeing's Airport Planning Manuals (APM) for 737 aircraft in conjunction with AC 150/3525-4B.

According to the AC, the design inputs for determining the runway length are:

- ➔ Critical design airplanes under evaluation and their manufacturer's APM
- ➔ Maximum certificated takeoff weight or takeoff operating weight for short-haul routes
- ➔ Maximum certificated landing weight
- ➔ Airport elevation above mean sea level
- ➔ Effective runway gradient
- ➔ The mean daily maximum temperature of the hottest month at the airport

Using these inputs, both the takeoff and landing length requirements can be determined for each aircraft. The appendix contains relevant portions of the Boeing 737 APMs, including landing length, payload-range, and takeoff length charts.

Takeoff

Takeoff length is based on a takeoff weight corresponding to the length of haul that is flown by the planes on a substantial use basis. For Barrow, this is the distance from Anchorage to Barrow, a distance of 630 nautical miles. Maximum operating takeoff weight is determined from the Payload-Range Chart and appropriate haul length. Takeoff length is determined from the takeoff length chart and operating takeoff weight and then increased by 10 feet per foot of elevation difference between the high and low points of the runway.

Landing

The landing length requirement is calculated using the APM landing length chart for the highest landing flap setting on a dry runway. This landing length is then increased by 15% to account for wet runways. The APM landing length charts for the Boeing Aircraft include wet runway conditions, allowing the wet landing length to be obtained directly.

In response to the FAA SAFO (see sidebar), the FAA established a Takeoff and Landing Performance Assessment (TALPA) Aviation Rulemaking Committee to review regulations affecting certification and operation of airplanes and airports for airplane takeoff and landing operations on runways contaminated by snow, slush, ice, or standing water and provide advice and recommendations to:

- ➔ Establish airplane certification and operational requirements (including training for takeoff and landing operations on contaminated runways)
- ➔ Establish landing distance assessment requirements, including minimum landing distance safety margins, to be performed at the time of arrival
- ➔ Establish standards for runway surface condition reporting and minimum surface conditions for continued operations

FAA AND INDUSTRY HELP PILOTS PLAY IT SAFE

Following the 2005 Chicago Midway Airport (MDW) accident, in August 2006 the FAA released a Safety Alert for Operators (SAFO), "Landing Performance Assessments at Time of Arrival (Turbojets)" (SAFO 06012), that requires operators to assess runway braking action and runway contaminants (e.g., snow, slush, and ice) prior to landing to ensure that sufficient runway length is available for a "full stop landing, with at least a 15% safety margin beyond the actual landing distance." Air carriers like Alaska Airlines have developed runway length requirements for various aircraft in their fleets to enable them to comply with these new requirements.

Comparison of Takeoff and Landing Lengths

Using the Boeing APM charts, Table 4-4 shows the preliminary runway lengths calculated for each of the Boeing 737 jet aircraft in use at Barrow.

Table 4-4 – Barrow Airport Runway Length at Maximum Landing Weight

Aircraft	Wet Landing Length	Takeoff Length ¹	Required Runway Length (APM charts)
B737-200	5,300'	5,300'	5,300'
B737-300	5,300'	5,700'	5,700'
B737-400	5,800'	6,300'	6,300'
B737-700²	5,700'	6,200'	6,200'
B737-800³	6,700'	6,000'	6,700'

The operators of the Boeing 737s into Barrow were also contacted for their assessment of the current runway length and the optimal runway length for their operations over the next 20 years. Northern Air Cargo is currently using the 737-200 and 737-300 aircraft for cargo operations, but neither exceeds the substantial use threshold of 500 annual operations. Alaska Airlines’ Manager of Air Traffic and Airfield Operations described operations and procedures for a “contaminated runway.”⁴ Alaska Airlines’ Director of Flight Operations Engineering provided landing length requirements using degraded braking action data.

Degraded braking action is determined in part by the runway surface condition report. “Medium” includes the following conditions:

- ➔ Slippery when wet—used to indicate excess rubber deposits in touchdown zones
- ➔ Wet snow or dry snow greater than 1/8 inch
- ➔ Compacted snow with outside air temperature warmer than -15°C
- ➔ Dry or wet snow over compacted snow

**Table 4-5 – Runway Landing Length for Degraded Braking Action⁵—
 Alaska Airlines Operations based on ARC⁶**

Aircraft	Good/Medium	Medium	Medium/Poor	Poor
B737-400	5,200'	5,900'	6,600'	7,500'
B737-700	5,400'	6,200'	7,000'	8,100'
B737-800	5,700'	6,600'	7,500'	8,700'

Ice results in “Poor” braking action, and wet ice is “Nil,” but both can be upgraded to “Medium” if the braking action report indicates a mu value of 40 or greater.

¹ Determined using the Boeing APM charts, plus an additional 100 feet per the AC 150/5325-4B due to 10 feet of elevation difference between runway ends; see also page 89 of Technical Appendix

² B737-700 is the design aircraft for 0- to 5-year planning period

³ B737-800 is the design aircraft for the 6- to 20-year planning period

⁴ Defined in SAFO 06012 as a runway surface on which any substance such as snow, slush, ice, sand, or standing water is present (see Technical Appendix for complete SAFO)

⁵ Basis: Flaps 40, airport elevation 100' MSL, OAT 5°C, 0.5% downward slope, maximum landing weight

⁶ Aviation Rulemaking Committee

Recommendations

For Barrow Airport, the minimum runway length determined using the manufacturer’s APMs forms the basis of the runway length recommendations. This will provide a runway that meets or exceeds the contaminated runway length requirements for medium braking action for the critical aircraft.

Using the medium/poor braking action requirements adds to the required runway length; it is not recommended unless constructing a longer runway is shown to be more cost-effective than implementing operational measures to enable aircraft to operate safely on a shorter runway. Such measures typically include improving braking action by application of heated sand, snow plowing, and other surface preparation methods or limiting payloads so that aircraft can safely take off on the length of runway available.

The runway lengths recommended for Barrow Airport are summarized in Table 4-6 below.

Table 4-6 – Barrow Airport Recommended Runway Lengths

Phasing	Design Aircraft	APM Length ⁷	ARC Length
0-5 Years	B737-700	6,200'	6,200'
6-10 Years	B737-800	6,700'	6,600'
11-20 Years	B737-800	6,700'	6,600'

Runway Standards and Deficiencies

The appropriate design standards by ARC are specified in FAA AC 150/5300-13A, Airport Design. Table 4-7 outlines the key dimensional standards for Barrow. Airside facility needs are based upon comparing the FAA standards with the existing conditions at Barrow; Table 4-8 summarizes this comparison and documents the runway deficiencies (or needs).

Table 4-7 – Runway Standards

Runway Element	(C-III / D-IV)
Width	150'
Shoulder Width	25'
Blast Pad Width	200'
Blast Pad Length	200'
Safety Area Width	500'
Safety Area Length: Prior to Landing Threshold / Beyond Runway End	600' / 1,000'
Object Free Area Width	800'
Object Free Area Length Beyond Runway End	1,000'

⁷ Runway lengths recommended by this study

Table 4-8 lists four measurements of runway length: the Takeoff Distance Available (TODA), Takeoff Run Available (TORA), Accelerate-Stop Distance Available (ASDA), and Landing Distance Available (LDA). Of these, the LDA is the critical distance for Barrow. The reason that these distances are different is because the runway at BRW has displaced thresholds. The displaced thresholds are in place because they allow the airport to meet the required amount of safety area at each end of the runway. During takeoff, an airplane is allowed to use the safety area as part of its takeoff run, thus allowing the pilot access to a “longer” runway.

Table 4-8 – Runway Characteristics

Runway Element (R/W 7/25)	Existing	737-700 Need	737-800 Need	Deficiency (737-700/737-800)
Width	150'	150'	150'	--/--
Length (TODA/TORA/ASDA/LDA)	7,100'/7,100'/6,500'/5,900'	6,200'	6,700'	LDA: 300'/800'
Safety Area Width	500'	500'	500'	--/--
Safety Area Length with Displaced Thresholds	1,000'/800'	1,000'	1,000'	200'/200'
Object Free Area (OFA) Width	800'	800'	800'	--/--
OFA Length Beyond Runway End	1,000'	1,000'	1,000'	--/--

Taxiways

Taxiways provide for safe and efficient aircraft movement between runways and aprons. As air traffic increases, the taxiway system can become the limiting operational factor. By reducing runway occupancy time, efficient location of exit taxiways can increase runway capacity. A parallel taxiway allows aircraft to taxi to the end of the runway for takeoff without crossing or taxiing down the active runway. Separation standards for runways and parallel taxiways are designed to protect various airport imaginary surfaces and instrument approach operations.

Taxiway Design Group

The design aircraft for Barrow are the Boeing 737-700 (near-term) and the Boeing 737-800 (mid-term and beyond). The Taxiway Design Group (TDG) for both aircraft is TDG 3. The TDG specifies different criteria than the Aircraft Design Group. BRW’s existing taxiways meet the design aircraft TDG 3 criteria from AC 150/5300-13A with one exception – Taxiway B enters the runway within the middle third of the runway.

Parallel Taxiways

Under the requirements for a precision instrument approach, Barrow Airport should have a full-length parallel taxiway, which it does not. Per Table 3-4 of the AC, a parallel taxiway at BRW should be offset from the runway centerline by at least 400 feet.

Taxiway Geometry

AC 150/5300-13A has new recommendations for taxiway intersection geometry, which include:

- ➔ Avoid “high energy” intersections. These are intersections in the middle third of the runway, an area where a pilot can least maneuver to avoid a collision.
- ➔ Design turns should be 90 degrees whenever possible. For intersections, standard angles of 30, 45, 60, 90, 120, 135, or 150 degrees are preferred.
- ➔ Limit runway crossings.
- ➔ Do not design taxiways that lead directly from an apron to a runway.

Table 4-5 of the AC outlines the dimensional requirements of TDG 3 taxiway geometry. This table and other relevant portions of the AC are annotated and included in the Appendix of this report. Existing conditions and any deficiencies of the Barrow airport taxiways are summarized in Table 4-9.

Table 4-9 – Taxiway Characteristics and Standards

Taxiway Element	Existing	Standard (TDG 3)	Deficiency
Taxiway A			
Width	75'	50'	—
Safety Area Width	171'	79'	—
Object Free Area Width	259'	186'	—
Wing Tip Clearance	44'	34'	—
Located on Outer Thirds of Runway	Yes	Yes	—
Taxiway B			
Width	75'	50'	—
Safety Area Width	171'	79'	—
Object Free Area Width	259'	186'	—
Wing Tip Clearance	44'	34'	—
Located on Outer Thirds of Runway	No	Yes	“high energy area” ⁸
Taxiway C			
Width	75'	50'	—
Safety Area Width	171'	79'	—
Object Free Area Width	259'	186'	—
Wing Tip Clearance	44'	34'	—
Located on Outer Thirds of Runway	Yes	Yes	—
Taxilane			
Width	75'	50'	—
Wing Tip Clearance ⁹	27'	23'	see footnote
Taxilane Centerline to Runway Centerline	510'	400'	—
Taxilane Centerline to Fixed or Movable Object	120'	81'	—
Object Free Area Width	225'	162'	—
Parallel Taxiway			
Width	N/A	50'	50'
Taxiway Centerline to Runway Centerline	N/A	400'	400'
Taxiway Centerline to Fixed or Movable Object	N/A	93'	93'

⁸ The FAA defines the middle third of the runway as a “high energy area” because it is the portion of the runway where a pilot can least maneuver to avoid a collision during landing or takeoff

⁹ While the apron is wide enough to provide adequate wingtip clearance, the location of the Alaska Airlines hardstand reduces wingtip clearances in that section of the apron to sub-standard conditions

Pavement

The ADOT&PF Statewide Materials section last inspected the BRW pavement in July 2012. The results of that inspection indicate that two-thirds of the runway needs rehabilitation and the apron needs corrective maintenance. ADOT&PF evaluated the pavement condition at BRW during the summer of 2013 and will make recommendations for any corrective maintenance, rehabilitation, or reconstruction needed.

Navigational Aids

The navigational aids at Barrow Airport include an Instrument Landing System (ILS) that supports a Category I instrument approach for Runway 7. The ILS includes a localizer, glide slope equipment, and distance measuring equipment (see Chapter 2, pages 2-18 and 2-21). The ILS is adequate to support precision instrument approaches at Barrow. An Air Traffic Control Tower would be required to support a Category II instrument approach.

Visual approach nav aids at BRW include high-intensity runway lighting, four-light precision approach path indicators (PAPI) on both runway ends, and runway end identifier lights (REIL) on Runway 25. These nav aids are adequate to support visual approaches at Barrow.

Airfield Lighting, Marking, and Signage

Airfield lights, markings, and signs were recently installed or upgraded as part of the runway paving project, and meet FAA standards.

4.2.3 Landside

Since the master plan update in 2000, changes have occurred in the aviation industry and at the Barrow Airport. The terrorist attacks on September 11, 2001, changed the security requirements and procedures for terminal facilities, including passenger screening, baggage handling, and airport access controls.

Apron Requirements

Air carrier and air taxi gates and apron space requirements were assessed based on FAA AC 150/5360-9, FAA AC 150/5360-13, and FAA AC 150/5300-13A, and through discussions with airport tenants.

Apron space at BRW is summarized in Table 4-10. Overall, BRW has adequate apron space throughout the planning period. However, localized areas receive heavy usage, leading to congestion in these areas and underutilization elsewhere. Cargo staging and vehicular traffic on the apron, along with the proximity of the major support buildings to the apron and to each other, all contribute to the congestion. Additionally, the location of the Alaska Airlines hardstand is such that the wingtip clearances between parked 737 aircraft and taxiing 737 aircraft do not meet requirements.

Table 4-10 – BRW Apron Area

Airport Area	Square Yards (approximate)
GA Tie-Downs	5,600
Transient Tie-Downs	2,400
Block 700	22,000
Block 100	19,000
Block 300	15,500
Search & Rescue	10,000
Total Apron Area	74,500

Alaska Airlines is the only Part 121¹⁰ operator at Barrow. FAA guidance recommends two aircraft parking positions for Part 121 carriers. Alaska Airlines has only one hardstand at BRW, which they are upgrading in August 2013. As Alaska Airlines has no plans to fly more than one jet to BRW at a time, this single hardstand should be sufficient for the planning period.

All air taxis and cargo carriers currently serving BRW operate from the Era Alaska facilities on Block 100, Lot 7A, where there is approximately 4,300 SY of apron space. This apron can become congested during peak periods, particularly when the larger cargo aircraft, such as Everts' DC-9 and NAC's 737-200, are being unloaded.

Based on discussions with FSS staff, the largest transient aircraft are DHC Twin Otters, which have a wingspan of 65 feet. There can be as many as three transient Twin Otters at BRW during the summer. Based on Appendix 5 in AC 150/5300-13A, aircraft with dimensions similar to the Twin Otter require approximately 520 SY of apron space. The paved transient apron by the Flight Service Station is approximately 2,400 SY, with tie-downs for four aircraft. Transient aircraft can also park in the 5,600 SY GA tie-down area. Thus, the apron space available for transient fixed-wing aircraft is adequate through the planning period.

The two BRW-based helicopters operate from the Borough's SAR hangar. The 10,000 SY of apron space is adequate through the planning period.

As many as six helicopters operate at BRW seasonally. One operates from Block 700, Lot 2, which has ample apron space. In recent years, three helicopters have operated from Block 100, Lot 4A. Based on guidance of 300 SY of apron space per helicopter, they should require 900 SY of apron space. Two USCG helicopters operated from Block 100, Lot 2A. The amount of apron space for these operations is adequate through the planning period. However, the seasonal helicopter operations at BRW are intermingled with fixed-wing operations, which is undesirable.

With only two based GA aircraft and forecast addition of one more GA aircraft during the planning period, the current apron area will remain sufficient for these aircraft.

During Summer 2012, a 737-400 operated by Miami Air carried offshore oil workers to BRW. Miami Air requested permission to park the aircraft on the apron while personnel were shuttled between the airport and the offshore oil platforms. ADOT&PF denied this request due to inadequate wingtip clearances between the parked Miami Air 737-400 and taxiing Alaska Airlines 737-400 and 737-700 aircraft. The Miami Air jet was then required to fly to Anchorage and wait for the offshore personnel to assemble at the Barrow Shell terminal before returning to pick them up.

As noted in Chapter 2, several airport tenants have indicated that the apron has dips and swales that need to be corrected.

Passenger Terminal Building

Passenger terminal functions at Barrow Airport are decentralized, with each lessee operating out of a separate facility. The two primary terminal buildings are operated by Alaska Airlines and Era Alaska. During the summer of 2012, Royal Dutch Shell utilized the facilities on Block 300, Lot 4, for passenger screening and holding.

¹⁰ FAR Part 121 applies to scheduled passenger flights with over 30 passenger seats

Public comments indicated a desire for larger passenger terminal facilities to accommodate passenger holding, security screening, and baggage handling. Alaska Administrative Code (AAC) Title 17 does not dictate passenger terminal requirements; thus, it is up to each tenant to develop a facility that accommodates passenger demand. Alaska Airlines’ Corporate Real Estate manager indicated that they are considering a remodel of their Barrow terminal facility to allow more room for passenger handling and screening.

The Building Restriction Line (BRL) limits how far south tenants can construct buildings on lease lots north of the runway. At present, the BRL is 960 feet from the runway centerline. There were comments on the placement of the BRL during the investigation phase of the master plan. The Primary Surface and Transitional Surface from Part 77 are the most restrictive on the BRL. The BRL must be at least 745 feet from the runway centerline.

Cargo

Cargo operations are currently conducted within each carrier’s respective facility. The primary cargo carriers are Alaska Airlines, Northern Air Cargo, Hageland Aviation, and Everts Air. As discussed in Chapter 2, Hageland, NAC, and Everts share cargo facilities. There is approximately 10,000 square feet of enclosed cargo processing facilities in use at BRW today between the cargo carriers (Table 4-11).

Preliminary sizing of BRW cargo facilities was calculated using the Total Area Ratio (TAR) method developed by the International Air Transport Association (IATA). The TAR method is a rule-of-thumb based on industry standards utilizing a ratio factor of 1.1 square feet of building space per ton of cargo per year. Based on forecast cargo volumes, Barrow Airport is going to need over 20,000 square feet of cargo facilities by the end of the planning period.

Table 4-11 – Space Requirements for Cargo Processing

	Existing	Need		
		Short-Term	Intermediate	Long-Term
Building Space¹¹ (sf)	10,000	15,900	17,300	20,400

Aircraft Hangars

All hangars at BRW are owned and operated by lessees and sub-lessees.

The State of Alaska Department of Military and Veterans Affairs (DMVA) indicated that they would like to develop a hangar and associated support facilities at Barrow Airport. The USCG, Alaska Air Guard, and Army National Guard have all expressed an interest in developing facilities at BRW. In the past, these entities have subleased facilities seasonally; however, there are no facilities in Barrow that meet their long-term needs. To accommodate their aircraft, they need a hangar facility large enough to house two HH-60 helicopters and one HC-130 aircraft. Additionally, the DMVA needs 10,000 square feet for response equipment storage and 5,000 square feet of vehicle storage. Overall, the facility would require 2.5 acres of land, including 45,000 square feet of apron. The facility must be within the airfield security zone per USCG requirements, and accessed through a secure man-gate. Vehicle parking should accommodate at least two vehicles outside the secure perimeter. All utilities, including electricity, gas, water, telephone, data, and sewer would be required.

¹¹ Estimated building space available for cargo handling

A contractor to Shell enquired about the availability of lease lots for developing helicopter hangar facilities. There were no other stakeholder comments that indicated a need for additional hangar space. However, because all existing lease lots are currently leased, future development of hangars is limited to those lessees or their sublessees.

There are no GA hangar facilities available. General aviation activity at BRW is light and not expected to increase during the planning period. Thus, no GA hangar space is recommended.

Lease Lots

There has been considerable interest in developing new lease lots at Barrow Airport in recent years (see Chapter 2, page 2-14). However, there are no developed lease lots with apron frontage. Although there are several undeveloped lots under lease, developing a gravel pad on an undeveloped lease lot will be expensive due to the limited availability of gravel and the cost of compensatory mitigation for destroying wetlands.

ADOT&PF recommends that lease lots for commercial light aircraft operations have a minimum lot area of 22,500 square feet and a minimum depth ahead of the BRL of 75 feet. Larger aircraft (20,000 to 105,000 pounds) operations should have a minimum lot area of 45,000 square feet and a minimum depth in front of the BRL of 125 feet. However, ADOT&PF is moving towards offering even larger lease lots, as experience has shown that tenants can quickly outgrow the 45,000 square feet. Therefore, ADOT&PF is recommending 90,000 square feet for airports with high aviation activity and tenants operating large commercial aircraft.

Based on the five inquiries to ADOT&PF leasing and the USCG/DMVA's interest in developing facilities, Barrow Airport should have six additional 90,000 sf lease lots for commercial or military development.

Support Facilities

ARFF/SREB

The Aircraft Rescue and Firefighting facilities at Barrow Airport are adequate for the current Index B ARFF designation. The ARFF Index is determined from the length of the largest commercial aircraft making more than five daily departures on average; Index B indicates the index aircraft is between 90 feet and 126 feet long. The Boeing 737-400 and 737-700 are both less than 126 feet long. Although the Boeing 737-800 is 129 feet long, it is not expected to reach the five or more daily departures threshold during the planning period. Therefore, the ARFF index is not anticipated to change during the planning period.

However, the ARFF/SREB facilities are located such that they cannot be expanded if the need arises—there is not enough room on the lot. As discussed below, new chemical and sand storage facilities are needed. Locating these facilities at some distance from the ARFF/SREB is not an efficient arrangement.

Airport Maintenance

Sand storage facilities at BRW are inadequate. The small area within the ARFF/SREB dedicated to sand storage is not large enough for the amount of sand required to achieve the friction needed by the design aircraft (B737-800). The quantity of sand needed to increase the runway's friction factor is directly related to the length of the runway—the longer the runway, the more sand is needed to cover it.

Based on sand storage facilities at the Bethel, Nome, and Kotzebue airports, Barrow Airport should have a facility of approximately 5,000 sf for storage of heated sand and dispensing trucks. This facility could be combined with the chemical deicing facility described below. Together, these facilities would require 50,000 square feet of apron space. However, ADOT&PF should allocate 150,000 square feet of apron space to allow relocation of the ARFF building adjacent to the new storage facilities.

Deicing

The U.S. Environmental Protection Agency (EPA) issued guidelines in May 2012 for handling aircraft and runway deicing effluent. These guidelines state that airports with over 1,000 annual jet departures need to use a non-urea-based runway deicing agent (EPA, 2012). Barrow Airport meets this criterion and therefore must switch to a non-urea-based runway deicing agent. This new deicing agent requires storage space for the chemicals and for a dedicated dispensing vehicle. ADOT&PF's ARFF/SREB does not have enough space to house these items. (ADOT&PF also does not own a vehicle capable of dispensing the new deicing chemical.) Approximately 1,200 square feet of building space is needed to house 10,000 gallons of deicing agent, associated chemical handling equipment, and the dispensing vehicle.

The EPA guidelines do not currently set any requirements for existing airports to collect or dispose of aircraft deicing agents after application. However, the trend has been towards regulations aimed at reducing pollutant loads and the adverse effects on surrounding habitat and drinking water supplies. For Barrow this is especially important as the community's drinking water supply is adjacent to the airport. It is therefore prudent to recommend that ADOT&PF consider future water quality requirements and develop a stormwater management plan.

Aircraft Maintenance

There are no aircraft maintenance shops at BRW that provide services outside their own company. Air taxis operating from Barrow have mechanics that work on their aircraft. Likewise, the NSB SAR has in-house aircraft mechanics for their fleet. Due to the very small GA presence in Barrow, a fixed base operator offering aircraft maintenance services is not likely financially feasible.

Utilities

Utilities currently serving the airport are adequate (see Chapter 2). Any development on the south side of the runway would require the extension of utilities to this area.

Airport Security and Fencing

For Part 139 certificated airports, the operator (ADOT&PF) must have an Airport Security Program. For the Barrow Airport, the security program and updates are authored by the ADOT&PF Airport Security Manager and submitted to TSA for approval.

There are three required levels of security at the Barrow Airport:

- **Air Operations Areas:** Require basic access controls meeting the 49 CFR 1542.
- **Security Identification and Display Areas (SIDA):** Require the display of badges above the waist. If anyone enters the SIDA without the badge, the persons working within the SIDA must immediately challenge them.
- **Secure Areas:** Include all the requirements of the SIDA, plus access controls.

Barrow Airport has two SIDAs, on the Alaska Airlines apron and the ERA Alaska apron. Both of these SIDAs are adequate for the planning period.

Some portions of the Barrow Airport are fenced, primarily along the north and west sides. The September 12, 2012 Certification Inspection Report indicated a need to provide fencing across the access road on the south side of the runway 7 approach end. This fencing is now in place. Fencing along the south side of the airport property is recommended.

Ground Access, Circulation, and Parking

Vehicle Parking

Three designated parking reserves on the north side of Ahkovak Street (see Figure 2-8) provide a total of approximately 40,000 square feet of parking space. Also, Alaska Airlines leases a 7,000-square-foot parking area across from their terminal; however, this lot may eventually be developed for uses other than automobile parking. There is also limited vehicle parking in front of the Alaska Airlines terminal (Block 300, Lot 3A) and the Era Alaska terminal (Block 100, Lot 7A). All parking areas at BRW are unpaved and unstriped, which results in inefficient spacing of parked vehicles. Several public comments indicated that vehicle parking is inadequate.

AC 150/5360-9 indicates that an airport with 43,000 enplanements should have approximately 75 public parking spaces. For the forecast 61,000 enplanements, the AC recommends 125 parking spaces. The AC further recommends that 15% to 25% of the total parking spaces be reserved for short-term parking, with the remainder allotted for long-term parking.

Because of the close proximity of the airport to the community, Barrow Airport does not require any long-term parking. Therefore it is reasonable to suggest that BRW requires fewer parking spaces than suggested by the AC. For short-term parking, BRW should need only 20 parking spaces now (25% of recommended 75 spaces) and 35 (25% of recommended 125 spaces) by the end of the planning period.

Based on 20'x10' parking spaces with 20-foot-wide access lanes, there is enough room for approximately 130 vehicles within the current parking areas, which satisfies current and forecast parking demand. However, while the square footage of total parking area is adequate, the locations of the parking lots are inconvenient, as the demand for parking spaces is centered on the Alaska Airlines and Era Alaska terminals.

Land Requirements

The Barrow Airport encompasses over 700 acres of ADOT&PF land. This acreage can accommodate all facilities needed through the 20-year planning period. However, access to the south side is required in order for this area to be developed.

4.2.4 Other Items of Concern

The airport manager and the FAA Lead Airport Certification Safety Inspector identified ponding water around airport property, particularly between the apron and runway, as an attractant to waterfowl. This represents a potential wildlife hazard. A wildlife hazard assessment is needed to address these conditions.

The airport manager also indicated that the Runway Safety Areas were experiencing considerable erosion from late summer rains.

4.3 Findings

Barrow Airport does not require any capacity-related improvements during the planning period. However, there are some facility improvements needed in order to support forecast growth.

Facility deficiencies include:

- Insufficient runway length to accommodate the design aircraft at its maximum landing weight
- Taxiway geometry concerns
- Lack of a building to store chemical de-icing agent and associated equipment
- Undersized sand storage facilities
- No lease lots available for development
- Existing lease lots undersized for current usage
- No dedicated military facilities
- Vehicle parking areas underutilized due to distance from terminal
- Gaps in security fencing around the airport perimeter
- No access road or lease lots on the south side of the runway
- No parallel taxiway(s)
- Insufficient cargo processing facilities
- Pavement conditions

The next chapter of the master plan will outline and evaluate potential alternative development scenarios.

Primary elements of the alternatives analysis will include:

- Runway options to meet length requirements
 - Physical solutions
 - Operational solutions
- Land reserves for M&O facilities
- Additional land area with direct runway access for development