Fairbanks International Airport

# Winter Storm Efficiency Study: Airport Landside and Airside Snow Removal Study

Prepared for:

Alaska International Airport System

Planning Department

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DOWL

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# TABLE OF CONTENTS

Stu	Study Overview										
Exe	Executive Summary										
Stud	Study Goals 4										
1.	FAI	Landsic	le and Airside Snow Removal Study	5							
	1.1	Existing	g Landside and Airside Facilities Subject to Snow Removal	. 5							
	1.2	Existing	g Snow Storage Locations	. 6							
		1.2.1	Landside Snow Storage	. 6							
		1.2.2	Airside Snow Storage	. 6							
	1.3	Curren	t Equipment Used for Snow Removal/Storage	. 7							
		1.3.1	Existing Snow Removal and Storage Issues	. 9							
	1.4	4 Benchmarking Study Results									
	1.5	Landside and Airside Proposed Improvements1									
		1.5.1	Terminal Area Improvement Recommendations	11							
		1.5.2	Airport Wide Snow Storage Improvement Recommendations	17							
		1.5.3	Airfield Snow Clearing Equipment Access Improvement	20							
	1.6	Conclu	sion	24							

# **STUDY OVERVIEW**

As part of the Winter Storm Efficiency Study the Alaska International Airport System (AIAS) has asked Ricondo & Associates, Inc. (R&A or Ricondo), as part of the DOWL Team (Team or Study Team), to perform the Fairbanks International Airport (FAI or the Airport) Landside and Airside Snow Removal Study. The purpose of the Landside and Airside Snow Removal Study (the Study) is to review the Airport's existing snow removal operational plans, identify strengths and weaknesses/shortfalls, to develop and evaluate alternatives, and provide recommendations to improve the Airport's existing snow removal and storage procedures and plans. As part of the Study, the Ricondo Team visited FAI, met with AIAS and Airport staff, and conducted a site visit, including a tour of the Airport's landside and airside facilities where staff identified areas of concern related to winter weather and snow removal operations. In addition, the Study Team participated in multiple online meetings with AIAS staff, including senior members of the Airport Field and Equipment Maintenance Department, and the Airport Operations Department.

The FAI Landside and Airside Snow Removal Study is part of the larger Winter Storm Efficiency Study performed for AIAS. The Winter Storm Efficiency Study is comprised of the following nine (9) separate studies: (1) AIAS Winter Storm Emergency Plan, (2) Cost/Benefit Analysis of Aircraft Control Mechanisms, (3) Inventory Assessment and Analysis, (4) Assessment of Existing Operational Controls, (5) Assessment of Operating Agreement and Terminal Lease Agreement, (6) Cost-Benefit Analysis of Diversion Plans, (7) Ted Stevens Anchorage International Airport (ANC) Landside Snow Removal Study, (8) ANC Ramp Management Plan, and (9) FAI Landside and Airside Snow Removal Study. The collection of these nine individual studies comprised the Winter Storm Efficiency Study which provides a comprehensive assessment of many of the critical winter weather plans and agreements which allow ANC and FAI to continue operating at an elite level through some of the harshest cold weather aviation environments anywhere in the world.

# **EXECUTIVE SUMMARY**

The FAI Landside and Airside Snow Removal Study provides an assessment and a series of recommendations to help the Airport improve what is already an excellent winter weather Airport snow removal plan. The AIAS and FAI staff have developed and actively refined the current landside and airside area snow removal plans. While the Airport's airside snow removal plans have been formalized in the *Snow and Ice Control Plan*<sup>1</sup>, much of the landside plan has not. The *Snow and Ice Control Plan*, updated in May 2024, is an excellent resource for both new and experienced staff as they perform Airside snow removal and ice control activities at the Airport.

With respect to landside, ANC has developed the *Landside Winter Operations Manual*, which serves as an excellent reference for landside snow removal operations, providing a detailed overview of their responsibilities, guidelines, and procedures for snow and ice removal. While the scope of landside snow removal study for FAI is less than the study previously performed for ANC, and other factors differ between airports, the *ANC Landside Winter Operations Manual* would serve as an excellent starting point should FAI decide to undertake the formal development of a similar manual.

<sup>&</sup>lt;sup>1</sup> Fairbanks International Airport Certification Manual, Section 313 – Snow and Ice Control, May 29, 2024.

The Study presents several challenges which FAI's Winter Operations Team are faced with each winter, including:

- Safety concerns related to customers falling in the surface parking lots due to the challenges of removing snow between and behind parked vehicles before it becomes hard packed and turns to ice.
- Hiring and maintaining staff, often entry level, who are assigned to more manually intense landside snow removal tasks such as shoveling, snow blowing, and salting sidewalks and curbside pedestrian areas.
- Timely removal of snow on various landside facilities before it becomes hard packed and turns to ice.
- Operational and physical constraints which hinder the efficient removal of snow before it can turn to ice.
- Limited landside snow dump capacity on both the east and west sides of the Airport.
- Operational delays for Airside Broom Trucks quickly accessing the secure airside area.

While FAI has a robust and refined snow removal and storage plan for addressing winter weather on its landside and airside facilities, the Study has identified several recommendations for consideration including facility and operational improvements to help improve snow removal and ice control at the Airport. These include a series of progressive Terminal area landside improvements, landside and airside snow storage and snow dump capacity enhancements, and a proposed realignment of the SIDA fence to improve operational efficiency and response times to winter weather events. **Exhibit 1** identifies the location of all the recommended improvements listed below. Finally, these are high-level recommendations, and as noted throughout the document, the Airport should consider undertaking further study.

The proposed Terminal area landside improvements range from minimal effort and cost to major infrastructure development and investment to help better address the Airport's Terminal area snow and ice removal concerns. The recommendations are,

- 1. Consider additional research into the potential use and testing of ice melt products in either a liquid or brine solutions as another strategy for addressing snow and ice removal challenges on the Terminal area landside facilities.
- 2. Consider implementing some response time and performance required minimums related to snow and ice removal in the next Parking Operators concession agreement, which would flow down to the third-party snow removal contractor hired by the Parking Operator.
- 3. Undertake additional study to assess the cost to install a snow melt system along the Terminal's pedestrian curbside, the curbside pedestrian crosswalks, and the sidewalk adjacent to the public parking lot. This would have the potential to significantly improve the snow and ice removal issues along the Terminal curbside area and reduce the amount of debris tracked into the Terminal building by passengers.
- 4. Consider the construction of a new Terminal area public parking structure using an alternative construction method, specifically a prefabricated construction system. Additional study would be required to better understand the costs and revenue potential associated with a new parking structure at FAI, but based on high-level estimates, the cost savings may be as high as 40 percent compared to previous estimates for traditional construction methods.

#### EXHIBIT 1: LOCATIONS OF PROPOSED RECOMMENDED IMPROVEMENTS



Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025

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The Airport's snow storage capacity improvements provide a series of options which, depending on the improvement selected, may void the need to implement another recommended improvement. The Study's snow storage improvement recommendations are,

- 5. Reconfigure the SIDA fence on the vacant lot currently designated for snow storage located on the west side of the airfield between Lots B4 L1 and B4 L2 to expand the Airport's airside snow storage capacity by approximately 76,000 sq. ft., making this one of the largest snow storage sites on the Airport. Additionally, add a new SIDA gate and access from Old Airport Road to provide Airport Maintenance the flexibility to use this area as an alternate or overflow snow storage site for Landside snow as necessary, and help avoid the potential need to expand the existing Landside Snow Dump site.
- 6. Reserve Block 10 Lots 1 and 1A, which are currently vacant, for possible future expansion of the existing Landside Snow Dump Site located along Airport Industrial Road. If possible, the Airport should avoid leasing these lots to maintain the ability to expand the existing Landside Snow Dump if needed. Should Recommendation #5 be implemented, the Airport may wish to abandon this recommendation.
- Develop a new east side Landside Snow Dump location to replace the previous Landside Snow Dump located in the East Ramp Public Parking lot along University Avenue, which was identified for an alternative use in 2024. The Study identified a potential undeveloped site located on the East side of University Avenue, opposite Levanevsky Access Road.

Finally, two operational improvements were identified to help improve maintenance vehicle access and response time to the airfield during winter storm events. The Study recommends,

- 8. Consider additional analysis to evaluate the potential improvements in response time for the Broom Trucks accessing the airside operations area and determine the potential benefits of relocating the SIDA fence near the Maintenance Building to allow the vehicle storage bays on the west side of the building, where the Broom Trucks are stored, to be located within the secure area.
- 9. Consider consolidating all maintenance equipment within one maintenance site, most likely at the current Airfield Maintenance Facility (AMF), as a long-term goal. A one-facility approach would create efficiencies within equipment and field maintenance, locating all critical airfield maintenance equipment on the airside of the SIDA fence, allowing for improved response times to the airfield.

# STUDY GOALS

The goal of the Study was to assess the Airport's existing landside and airside snow removal operational plans, and to identify potential opportunities to improve on FAI's current plan to make it more efficient and cost effective, and create safer and more reliable conditions for landside users and customers during winter months.

# 1. FAI LANDSIDE AND AIRSIDE SNOW REMOVAL STUDY

# 1.1 EXISTING LANDSIDE AND AIRSIDE FACILITIES SUBJECT TO SNOW REMOVAL

The Airport has established a plan to prioritize the clearing of the airside and landside facilities which they are responsible for during a snow event. **Exhibit 2** illustrates the areas the Airport is responsible for clearing and the order of priority in which they are cleared. Generally, Priorities 1 through 3 focus on airside facilities while Priority 4 is mainly focused on landside facilities, with some exceptions. The Priority 1 areas include the main runway; Taxiways A, B, H, and M; the terminal ramp (gates 1, 2, and 3); the cargo apron; the Aircraft Rescue and Fire Fighting (ARFF) ramp; and the north and south deicing ramps. These areas total about 6,000,000 square feet. Instrument Landing System (ILS) critical areas are considered Priority 1 as well, on request from the Federal Aviation Administration (FAA) – specifically the glide slope areas and the areas in front of the north and south localizers.



#### EXHIBIT 2: AIRSIDE AND LANDSIDE SNOW REMOVAL PRIORITIES

Source: Fairbanks International Airport Certification Manual, Section 313 – Snow and Ice Control, May 29, 2024

On the landside, the Airport is responsible for clearing the majority of the Priority 4 areas illustrated in Exhibit 2 during a snow event. These areas include the southern portion of Airport Way, the terminal area roadways (Old Airport Road, Wien Lake Road, Road N), Airport Industrial Road, Mail Road, Mail Trail, Aerofuel Place, Airport Perimeter Road, and University Avenue South to the intersection with Route 3.

# 1.2 EXISTING SNOW STORAGE LOCATIONS

# 1.2.1 LANDSIDE SNOW STORAGE

The Landside Snow Dump, located along Airport Industrial Road, immediately north of the Airport's old fuel farm as shown in **Exhibit 3**, is used to store snow from the landside facilities. This site is approximately 47,000 sq. ft. and the Airport is required to maintain access along the northern side of the site to an existing lift station. Snow from the Terminal area curbsides and roadways, and the Cell Phone Lot is cleared and moved to the Landside Snow Dump by the Airport. Snow from the Bus Plaza, Employee Lot, Rental Car, and Public Parking Lots is cleared by a contractor who is also responsible for moving snow from these lots to the Landside Snow Dump. During a snow event, the snow from each lot is initially stored in temporary piles within that lot, as illustrated in Exhibit 3, and later moved to the Landside Snow Dump. Similarly, during a snow event, lease holders on the Airport are responsible for clearing and storing snow within their lease limits. As snow accumulates on each lease site, it is the tenant's responsibility to move their snow piles to the Landside Snow Dump. Currently the Airport does not have a designated Snow Dump on the east side of the airport.



#### EXHIBIT 3: LANDSIDE SNOW STORAGE AND SNOW DUMP LOCATIONS

Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025.

# 1.2.2 AIRSIDE SNOW STORAGE

On the airside, much of the snow from the runways and taxiways can be blown into adjacent islands, while the snow cleared from many of the other areas for which the Airport is responsible for, such as the Terminal Area ramp, deicing pads, cargo apron and Airport facilities such as the Maintenance and ARFF Building is stored either in one of the Temporary Snow Storage sites or in one of the Airside Snow Storage Sites/Dumps as illustrated in **Exhibit 4**.

Following snow events and as the Temporary Snow Storage piles increase in size, the snow from these sites is moved to one of the nearby Airside Snow Storage Sites.





Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025.

# 1.3 CURRENT EQUIPMENT USED FOR SNOW REMOVAL/STORAGE

The Airport's Airfield Maintenance Department is one of the best trained and equipped snow and ice control operations in the world due to the critical role FAI plays in the AIAS as a primary diversion airport in circumstances where ANC is unable to accommodate additional aircraft operations typically due to weather conditions. The Airport is committed to providing, maintaining, and upgrading critical snow and ice control equipment on a constant basis to ensure FAI's aviation operation remains open through all weather conditions. While the airside snow and ice control operations are the Airport's priority, maintaining landside facilities during and after a winter weather event are also critical to FAI's operations. While the Airport's Airfield Maintenance Department does not specifically identify equipment for landside operations, they do however designate specific equipment for airside operations such as cradling brooms, plow trucks, blowers, deicers, cupping plows, etc. The Airport Field and Equipment Maintenance Department's equipment is listed in **Table 1**. The table provides the Airport's current snow removal equipment inventory as of May 2024.

#### TABLE 1: EXISTING SNOW REMOVAL EQUIPMENT LIST

Primary Equipment				Secondary Equipment								
Type	Year	Make	Model	Asset	AIP	Type	Year	Make	Model	Asset	AIP	
Broom 35	2015	MB	MB3	39753	Yes	Broom 36	2013	MB	MB5	38623		
Broom 37	2020	Oshkosh	XE	40751	Ves	Broom 47	2008	MB		36932	No	
Broom 38	2020	Oshkosh	XE	40750	Ves		2000			50552		
Broom 39	2020	Oshkosh	XE	40828	Yes							
Broom 371	2020	Oshkosh	н	37189	No							
Broom 391	2005	Oshkosh	н	37100	No							
5100111351	2005	Control		57150								
Primary Equipment						Secondary Equipment						
Type	Vear	Make	Model	Asset	AIP	Type	Vear	Make	Model	Asset	AIP	
Deice 67	2015	Mack/Tyler	AD4000	39508	Yes	Deice 71	1994	Batts	mouch	31047	No	
Deice 68	2013	Mack/Tyler	AD4000	40187	Yes	Delec / I	1551	Ducto		51017		
Delee 00	2010	widely ryler	1000	10107	105							
	F	Primary Equipm	ent				Sec	ondary Equip	ment			
Type	Vear	Make	Model	Asset	AIP	Type	Vear	Make	Model	Asset	ΔΙΡ	
Dozer 73	1996	Cat	D6	31644	No	N/A	- Cui	make	model	Abbet		
0020175	1550	cut	00	510++								
	F	Primary Equipm	ent				Sec	ondary Equip	ment			
Type	Vear	Make	Model	Asset	ΔIP	Type	Vear	Make	Model	Asset		
Tractor 66	2015	Freightliner	114SD	30034	Ves	N/A	Teal	WINKE	Woder	Asset		
	2013	reigneiner	11450	33334	103							
	F	Primary Equipm	ent	I	I		Sec	ondary Equin	ment	I		
Type	Vear	Make	Model	Asset	AIP	Type	Vear	Make	Model	Asset	AIP	
Grader 30	2016	Cat	12M	39960	Yes	081-5 Light Cleaner	i cui	mane	mouch	710000	/ 11	
Grader 31	2010	Cat	14M3	40435	Yes	085-1 Light Cleaner	2019	Team Fagle	CK-001		No	
Grader 32	2015	Cat	14M3	40435	Yes	005 I Light cleaner	2015	Team Lagie	CK 001		NO	
Grader 34	2013	Cat	1/14	35384	No							
	2004	Cat	1411	33304	NO							
	F	Primary Equipm	ent				Sec	ondary Equip	ment			
Type	Vear	Make	Model	Accet	AID	Type	Vear	Make	Model	Asset		
Loader 60	2008	Volvo	1220F	36915	No	Loader 59	2016	Case	621E XR	30855	Vec	
Loader 61	2000	Volvo	11506	38665	No	Loader 74	2010	Volvo	1330F	34820	No	
Loader 62	2012	Volvo	11506	38667	No	Loddel 74	2003	0100	LUUUL	34620	NO	
	2012	10110	1300	50007								
	F	Primary Equipm	ent				Sec	ondary Equip	ment			
Type	Year	Make	Model	Asset	AIP	Type	Year	Make	Model	Asset	AIP	
Plow Truck 84	2007	Oshkosh	H	36532	No	Plow Truck 47	2007	Oshkosh	нт	36530	No	
						Plow Truck 83	2006	Oshkosh	Н	36034	No	
							2000	Control				
	F	rimary Equipm	ent			Secondary Equipment						
Type	Year	Make	Model	Asset	AIP	Type	Year	Make	Model	Asset	AIP	
Sand Truck 63	2009	International	8 Yd	37631	No	Hook Lift 54	2018	Westernstar	4700	40418	No	
Sand Truck 64	2009	International	8 Yd	37630	No	nook Lite of	2010	resternstar		10110		
Sand Truck 65	2005	Freightliner	8 Yd	33687	No							
Sand Truck 69	2001	Freightliner	8 Yd	33688	No							
	F	rimary Equipm	ent	I	1		Sec	ondary Equip	ment	1		
Type	Year	Make	Model	Asset	AIP	Type	Year	Make	Model	Asset	AIP	
Blower 85	2017	MB	MB4	39999	Yes	Blower 86	2006	Oshkosh	Н	36533	No	
Blower 87	2021	Larue	T95	40829	Yes							
Primary Equipment						Sec	ondary Equip	ment				
Туре	Year	Make	Model	Asset	AIP	Type	Year	Make	Model	Asset	AIP	
Cupping Plow 60-2	2012	MB	33	11496								
Cupping Plow 61-4	2015	MB	27	11660								
Cupping Plow 62-4	2015	MB	27	11661					1			
Primary Equipment					Secondary Equipment							
Туре	Year	Make	Model	Asset	AIP	Туре	Year	Make	Model	Asset	AIP	
Skidsteer 99	2012	Bobcat	S650	38677	No					l		
Skidsteer 101	2013	Bobcat	T650	39149	No							
					•			•				
	Prim	ary Equipment	To Add			Primary Equipment To Add						

L		Primary Equipment To Add										
Ī	Туре	Year	Make	Model	Asset	AIP	Туре	Year	Make	Model	Asset	AIP
ſ	Hook Lift Sander						Cupping Plow			27		
ſ	Hook Lift Sander						Cupping Plow			27		
	Side Dump			20Yd			Cupping Plow			35		

Source: Fairbanks International Airport Certification Manual, Section 313 – Snow and Ice Control, May 29, 2024

Equipment is kept in several locations around the airport and their typical storage location is listed below.

- Airport Response Center (heated): 5 runway brooms, 4 road graders, 1 snow blower, 1 plow truck, 3 loaders, and 2 bobcats
- Sand Storage Facility (heated): 3 sand trucks, 2 liquid deice trucks, 1 dedicated sand shed loader
- Storage Building 50 (heated): 2 runway brooms, 1 snow blower, 1 plow truck
- Pole Barn (unheated): 1 side dump, 1 end dump, 1 landside sand truck

## 1.3.1 EXISTING SNOW REMOVAL AND STORAGE ISSUES

As part of this Study, the following snow removal and storage related issues were identified. Recommendations related to each will be addressed later in this document.

#### 1.3.1.1 NEED FOR ADDITIONAL LANDSIDE AND AIRSIDE SNOW STORAGE CAPACITY.

#### Landside

On the landside, two separate needs for additional snow storage capacity exist. First, as noted earlier, there is no current landside Snow Dump located along the east side of the Airport. Prior to the 2024 – 2025 winter season, the East Ramp Public Parking Lot shown in **Exhibit 5** was designated as a Snow Dump location; in 2024, this site was identified for an alternative use. Second, the Airport has reported that the existing Landside Snow Dump, located along Airport Industrial Road, immediately north of the Airport's old fuel farm as shown earlier in Exhibit 2, occasionally experiences some capacity issues during heavy snow fall seasons. To alleviate this issue, the Airport must move snow previously dumped and pile it higher near the back of the site, effectively moving it at least twice. Additional landside snow dump storage could help resolve this problem.

#### Airside

Generally, the airfield has sufficient temporary and long-term snow storage capacity under normal winter weather conditions. However, during heavy snow fall years, the airfield snow storage capacity is stressed. The availability of additional airside snow storage capacity would be helpful for future heavy snow fall years.

#### 1.3.1.2 CHANGING WEATHER PATTERNS

Over the past decade, the Airport noted that the Fairbanks area has experienced a noticeable change in local weather patterns. Specifically, the area has been experiencing an increase in the frequency of Chinook winds. These are warm, dry and powerful wind events which come off the Pacific Ocean and cross the Rocky Mountain range, bringing warm winds down the eastern side of mountains. As the winds descend the leeward side of the mountain, they bring warm air which causes a rapid and significant increase in air temperatures for hours to days before temperatures quickly return to their previous low level. This sudden increase in air temperature causes snow to melt, which is then followed by rapid cooling, causing a flash freeze and leaving hard packed snow and ice. The increase in the frequency of Chinook winds has resulted in additional challenges for the Airport as they try to minimize the presence of hard packed snow and ice which can lead to increased pedestrian slip and fall events.

Additionally, warm weather and precipitation can come from the south and west depending on weather patterns. Higher precipitation storms come from the west where they originate in the Bering Sea, gathering moisture, crossing open water, before dropping heavy snow and warm conditions throughout the interior of Alaska.



#### EXHIBIT 5: AERIAL IMAGERY OF PRIOR EAST AIRPORT SNOW DUMP SITE

Source: Google Earth Imagery from March 3, 2025, Fairbanks International Airport, Ricondo & Associates, Inc, Image Captured April 23, 2025.

## 1.3.1.3 IMPROVED ACCESS FOR SOME AIRSIDE SNOW CLEARING EQUIPMENT

Currently the Airport stores their Broom Trucks in the Airfield Maintenance and ARFF Building located on the west side of the airfield. This shared facility acts as part of the Security Identification Display Area (SIDA) infrastructure, with the west side of the building accessible from the non-secure side, and the east side of the building accessible only from the secure area. While the Airport's Broom Trucks are within the building, access and egress to and from their storage bays is on the west, or non-secure, side of the building. When multiple Broom Trucks are dispatched to perform snow clearing on the airfield, getting all the vehicles through the SIDA gate adds additional time to their response as each vehicle must pass through the gate individually, allowing the gate to close completely behind them before the gate can be reopened to allow the next vehicle to pass through it. Shortening or eliminating these delays would improve response time to vehicles which must pass through the SIDA gate.

# 1.4 BENCHMARKING STUDY RESULTS

TBD – At the time of writing this document, outreach to Denver International Airport and Calgary International Airport have not resulted in a response. We will continue to try to speak with the Airports prior to finalizing the study.

## 1.5 LANDSIDE AND AIRSIDE PROPOSED IMPROVEMENTS

The study developed several potential improvements intended to address the landside and airside snow storage issues identified in this document. Generally, most of these proposed improvements can be addressed with modest investment on the part of the Airport and achieved in less than a year. The most challenging issue to address relates to the removal of snow and ice on the Terminal landside area. The following subsections present the proposed improvements developed for this study.

## 1.5.1 TERMINAL AREA IMPROVEMENT RECOMMENDATIONS

There are multiple issues which the Airport would like to address related to snow removal in the Terminal area. The most challenging issue to address relates to the removal of snow and ice on the Terminal landside area, which includes the curbside sidewalks and crosswalks, and the public parking and rental car surface lots. The extreme cold temperatures common during the winter months in Fairbanks, coupled with increased frequency in Chinook winds resulting in higher winter precipitation including rain events and quick thaw/freeze cycles, and the limited thermal gain due to the sun's lower angle during the winter months all contribute to the challenge of snow and ice control on the Terminal landside facilities. This hard packed snow and ice throughout the Airport's landside facilities is the primary contributor to pedestrian slips and falls which can lead to injuries. The following recommendations are intended to help alleviate some of the snow and ice issues on the Terminal area landside facilities.

## 1.5.1.1 RECOMMENDATION #1: CONSIDER THE USE OF SNOW MELT PRODUCTS

The Airport limits the use of rock salt (Sodium Chloride) on landside facilities due to the low temperatures common throughout the winter months in Fairbanks and its corrosiveness. The effectiveness of rock salt diminishes significantly when temperatures fall below 20°F. The Airport does occasionally use rock salt on the Terminal pedestrian curbside and crosswalks, but this is typically limited to manual spreading on warmer days. The Airport does not use any forms of liquid deicers, including salt brines on the landside facilities. In place of rock salt, the Airport prefers to use E-chip aggregate on the Terminal area landside facilities including the surface parking lots, sidewalks, and curbside facilities. After multiple applications and temperature fluctuations, the E-chip material (typically a 3/8-inch crushed rock without fine materials) becomes embedded in the hard packed snow and ice, providing additional traction for pedestrians and vehicles. While this helps alleviate the traction issue for pedestrians are still faced with often treacherous walks on uneven surfaces with limited traction. Another drawback to the use of rock salt and/or E-chips is that these materials are tracked into the terminal by passengers. This debris often results in the need for additional effort to clean the terminal building floors to reduce the likelihood of these materials being tracked onto the building's escalators, resulting in the need for additional maintenance.

While ice melt products (typically Calcium Chloride) are commercially available, the Airport has expressed a reluctance to use these on the Airport's landside facilities. For context, ice melter products are efficient at melting ice immediately after application while also preventing additional ice from forming and remain effective to temperatures as low as -10°F (solid) and -25°F (brine). The solid ice melter is easier to apply and is more effective following a snow event. By comparison, the ice melter brine works faster and can be applied pre-emptively before a storm and will generally last longer than a solid ice melter. Another advantage of ice melter products is they are considered gentler on concrete compared to rock salt. In general, a solid ice melter would be used following a snow event, or to melt existing ice when the temperatures are typically above -10°F. An ice melter brine is best used prior to a snow event and to prevent ice formation in temperatures as low as -25°F.

# While the Airport has expressed some reluctance to use ice melt products in either a solid or brine solution, some additional research and testing of these products should be considered as it may be helpful in identifying specific use cases for this product.

Traditionally the Airport has opted to use mechanical means for the removal of packed snow and ice, specifically along the concourse in front of the terminal. This is to minimize water entering the storm drains which lead to natural ponds for storing water. The more liquid that is added to this area, the more freezing the Airport experiences in its underground infrastructure. As a result, additional time is required in the spring, when break up occurs, to steam the drains, potentially resulting in water backing up into the concourse. Staff currently spend approximately two (2) days every spring thawing the concourse drains to ensure flow. If additional liquid is added to this area, the time to thaw these drains could increase. During the melt period of the spring, additional days thawing drains would be detrimental to concourse users and traffic. Additional study should be considered to identify ways to improve winter water runoff and storage alternatives.

#### 1.5.1.2 RECOMMENDATION #2: CONTRACTOR MINIMUM ON-SITE RESPONSE TIME

The Airport uses a contractor to manage and operate the public parking facility. As part of the parking operator's concession agreement with FAI, the parking operator is responsible for snow and ice removal operations, including moving the snow from the surface lots to the Landside Snow Dump. Currently, the parking operator contracts a third-party provider to perform the snow and ice removal. The parking operator's concession contract outlines the snow and ice remove requirements, including areas to be cleared within the perimeter of the parking lot and states the operator will apply sand to, or chemically treat sidewalks, stairs, and islands as necessary. The contract also allows the operator (with approval from the Chief of Airport Maintenance) to use signs and cones to vacate parking rows progressively to facilitate additional snow clearing.

FAI may wish to consider implementing a similar provision which was recently added to the ANC parking operator's snow and ice removal contract. The provision requires the contractor to maintain and store some equipment on site and maintain a constant presence of at least one equipment operator (24 hours/day, 7 days/week) on-site between November 1<sup>st</sup> and March 31<sup>st</sup>. This requirement to maintain a minimum of one operator on-site 24-7 was added as part of the current contract, and has proven to be a valuable addition, helping to ensure the Contractor's staff are called out promptly as winter weather events occur. Due to the cost associated with 24-7 staffing, and the typical weather patterns at FAI, the Airport may wish to consider reviewing their snow removal activation protocol for a forecasted winter weather event to assess the benefit of early call-in of contractor staff prior to the start of the event to ensure a prompt response.

While requiring the same level of service for the FAI snow and ice removal contractor may be cost prohibitive, **the study recommends the Airport give some consideration to implementing some response and performance required minimums in the next contract.** 

#### 1.5.1.3 RECOMMENDATION #3: STRATEGIC INSTALLATION OF SNOW MELTING SYSTEM

There are two types of snow melt systems which are embedded in concrete/pavement. The first is an electric system which uses electricity to heat coils, and the second is a hydronic system which includes a dedicated boiler and control system to heat a liquid (typically a mixture of water and glycol) that circulates through a series of pipes. Typically, the electrical systems can operate at a higher temperature and can transfer more heat compared to a hydronic system, however heating costs are typically higher, especially for larger systems. Hydronic snow melt systems are typically more energy efficient compared to an electrical system but may be more complex to install.

APRIL 2025

To help alleviate the Airport's reliance on the use of manual labor to clear, treat and maintain the Airport Terminal Area sidewalks and walkways for snow removal and ice control, the Study **recommends that the Airport install a snow melt system along the Terminal's pedestrian curbside, the curbside pedestrian crosswalks and the sidewalk adjacent to the public parking lot.** Implementation of a snow melt network could be done incrementally over several years to help defer costs and minimize impacts to the Terminal curbsides and walkways. Installing a snow melting system would reduce the number of pedestrian slip and fall incidents, improving safety while reducing overall liabilities for the Airport. Additional study should be conducted to evaluate the appropriate snow melt technology for FAI. **Exhibit 6** identifies the proposed in-concrete/pavement snow melt network.

#### EXHIBIT 6: IN-CONCRETE/PAVEMENT SNOW MELT SYSTEM



Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025.

Adding an in-concrete/pavement snow melting system would:

- Provide a passive, proactive response to winter weather conditions instead of the reactive approach currently used to mitigate the impacts of snow and ice accumulation on most of the landside pedestrian surfaces,
- Help alleviate the issue of hiring and retaining staff, primarily entry level laborers, who are assigned to more manually intense landside snow removal tasks such as shoveling, snow blowing, and salting sidewalks and curbside pedestrian areas,
- Reduce the Airport's reliance on manual labor to maintain safe snow and ice-free walking surface for customers and employees,
- Reduce the use of salt, E-chip and other snow melt chemicals on these pedestrian surfaces, reducing the amount of material tracked into the terminal building and decreasing maintenance and efforts to keep indoor facilities clean, and reduce the corrosion associated with the use of salt for ice control

#### 1.5.1.4 RECOMMENDATION #4: CONSTRUCT TERMINAL AREA PARKING STRUCTURE

The Airport's Terminal Area surface parking lot has approximately 667 uncovered public parking spaces and one of the primary challenges to snow removal and ice control is the removal of snow from the parking lot, specifically between and sometimes behind parked vehicles. Outside of adding a snow melt system to the surface parking lots, **the most effective way to remove snow in these facilities is to build a parking deck** as illustrated in **Exhibit 7**. This would be a two-level parking structure built within the constraints of the existing lot (entry/exit plazas, perimeter roadways) and could have a maximum footprint of approximately 157,000 sq. ft. (240 ft. x 654 ft.) and accommodate 570 -590 vehicles per level.

The proposed construction of a new public parking garage is consistent with one of the Public Parking expansion options provided in the 2020 *Fairbanks International Airport Terminal Gound Access Study* (TGAS). While the TGAS option was limited to 350 structured spaces, the concept presented in this document is only intended to illustrate the largest footprint practical with the constraints of the existing surface parking lot.

We recognize that the cost associated with the construction of a new two-story parking structure is a significant financial undertaking for FAI and the 2020 TGAS noted that the proposed 350 space structure would cost more than \$20 million to build (assuming typical cast-in-place construction methods) and was not expected to generate sufficient revenue alone to finance the structure. Understanding this financial constraint, **the study recommends the Airport consider an alternative construction method for a new parking structure- a prefabricated construction system. Additional study would be required to better understand the costs and revenue potential associated with a new parking structure at FAI.** 



#### EXHIBIT 7: PROPOSED TERMINAL AREA PARKING STRUCTURE (MAXIMUM FOOTPRINT)

Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025.

The Kiwi Newton Group headquartered in Canada, manufactures prefabricated parking structures which are shipped to the and assembled on site. The system was originally developed in Germany as "Gobocar" system, which now claims more than 800 structures across Europe. They manufacture two types of systems, Temporary and Demountable. Temporary structures prioritize rapid installation for short-term use, often sacrificing long-term durability and adaptability for convenience. Demountable structures are built with structural elements designed for disassembly, often using bolted connections to allow for reuse and are designed for longer durability. Ronald Reagan International Airport (DCA) is currently in the process of constructing a 1,500 space, 3-level parking structure, designed and manufactured by Kiwi Newton Group. When complete, this is will be the first Airport application using this prefabricated construction method in the United States.

The prefabricated design and construction method uses a modular building system consisting of galvanized steel columns and beams, and precast floor slabs, stairs and foundations. The design builder claims that compared to traditional construction methods, using this prefabricated system results in reduced construction and operating

costs, and can be built on an accelerated schedule. **Exhibit 8** provides some renderings illustrating this prefabricated construction system. **Exhibit 9** provides an image inside of a completed parking structure using this system.



#### EXHIBIT 8: RENDERINGS ILLUSTRATING THE PREFABRICATED PARKING STRUCTURE

Source: Kiwi Newton Group, April 2025, Ricondo & Associates, Inc., April 2025



#### EXHIBIT 9: IMAGE INSIDE PREFABRICATED PARKING STRUCTURE

Source: Kiwi Newton Group, April 2025, Ricondo & Associates, Inc., April 2025

SOURCE	PARKING STRUCTURE	COST PER SF.	COST PER STALL	COST FOR 350 SPACES
2020 FAI TGAS	Cast in Place Concrete	\$150 - \$180	\$48,000 - \$57,600	\$16.8M - 20.16M
	Cast in Place Concrete	\$120 - \$180	\$42,000 - \$65,000	\$13.44M – 20.16M
Kiwi Newton (2024)	Precast Double Tee	\$110 - \$150	\$38,500 - \$53,000	\$12.32M - 16.8M
	Prefabricated Panel and Beam	\$80 - \$100	\$28,000 - \$35,000	\$9.8M – 12.25M

#### TABLE 2: COMPARISON OF PARKING STRUCTURES COST BY CONSTRUCTION METHOD

Note:

1/Kiwi Newton's design-build cost is turn-key. It includes the design, engineering, fabrication, shipping, construction on site, commissioning of the building. It would include earthworks and siteworks within the footprint of the building, assuming that services are brought to within 4 feet of the footprint. It includes the foundations. It does not include costs associated with site plan application, permit fees, or development charges. These can be managed by the Design-Builder, however they vary from city to city.

2/Cost shown for the FAI TGAS are based on 2019 estimates.

Source: Fairbanks International Airport Terminal Gound Access Study, Final Report, 2020, Fairbanks International Airport, 2020, Kiwi Newton Group, 2024, Ricondo & Associates, Inc., April 2025.

Based on the costs shown in Table 2, a prefabricated parking structure with 350 spaces per level is expected to cost approximately 40-percent less than the same garage built using cast in place construction. It is important to note that this cost comparison is for illustrative purposes only, and further evaluation and study are recommended to better understand the actual cost associated with each option. Also, the Kiwi Newton information is presented for informational purposes only and should not be considered an endorsement of the Kiwi Newton Group by Ricondo.

## 1.5.2 AIRPORT WIDE SNOW STORAGE IMPROVEMENT RECOMMENDATIONS

Based on normal annual snowfall levels, FAI has indicated that sufficient landside and airside temporary and longterm snow storage/dump site capacities are generally adequate to meet demand. Higher than normal annual or consecutive large snowfalls can stress the Airport's snow storage capacity. Additionally, closures of snow storage locations on the Airport within the last year are also placing some additional stress on the Airports overall snow storage capacity. The recommendations in this section are intended to identify options for the Airport to add additional snow storage when needed.

## 1.5.2.1 RECOMMENDATION #5: EXPAND SNOW STORAGE SITE – BLOCK 4 LOT 1

Currently the Airport uses the airside portion of lot the designated "Snow Storage" on the Fairbanks International Airport 2025 Information Map. This lot is located on the west side of the airfield between Lot B4 L1, and B4 L2. Currently Lot B4 L1 is vacant, and B4 L2 is leased to LifeMed Alaska, LLC. The western portion of this lot located outside of the SIDA fence is currently reserved for snow storage and is unused. **The Study recommends extending the SIDA fence to the west along the boundaries of this site, allowing the existing Airside Snow Storage site to be expanded by approximately 76,000 sq. ft. to a total of 117,500 sq. ft. as shown in Exhibit 10 This additional airside snow storage capacity would allow the Airfield Maintenance team the flexibility to move snow from the Temporary Snow Storage site located on the north side of the Terminal Ramp to this new expanded snow storage area. In addition, adding a SIDA gate to this newly expanded Airside Snow Storage site from Old Airport Road, this storage area could also provide the Airport Maintenance team with the flexibility to use this area as an alternate or overflow snow storage site for Landside snow if necessary. This would avoid a future need to expand the existing Landside Snow Dump site located north of the old fuel farm on the west side of Airport Industrial Road.** 



#### EXHIBIT 10: PROPOSED SNOW STORAGE - BLOCK 4 LOT 1

Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025.

#### 1.5.2.2 RECOMMENDATION #6: EXPAND LANDSIDE SNOW DUMP SITE

As noted in the previous section, the Airport's primary Landside Snow Dump is located south of the airport terminal along Airport Industrial Rd, north of the old fuel farm in Block 10, Lots 4A and 4B. Access to a lift station in the northwest corner of this site is provided along the northern perimeter of lot and must be maintained throughout the winter season. Snow Dump operations must avoid blocking this access. In the past, demand for snow storage in this site has required the snow to be moved and stacked higher in the back of the site to increase overall storage capacity. Should the Airside Snow Storage Site not be expanded as described in Recommendation #5, and the new SIDA gate not be included, it is anticipated that the existing Landside Snow Dump site would require some expansion in the future. **The Study recommends that Block 10 Lots 1 and 1A**, which are currently vacant be reserved for future expansion of the existing Snow Dump Site located along Airport Industrial Road. The Airport should avoid leasing these lots, if possible, to maintain the ability to expand the Landside Snow Dump if needed. Exhibit 11 provides an illustration of the proposed recommendation #6



#### EXHIBIT 11: PROPOSED SNOW STORAGE - BLOCK 10 LOTS 1 & 1A

Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025.

#### 1.5.2.3 RECOMMENDATION #7: NEW EAST SIDE LANDSIDE SNOW DUMP LOCATIONS

Following the closure of the Landside Snow Dump located in the East Ramp Public Parking lot in 2024, there are currently no designated snow dump locations on that side of the Airport. The Study has identified a potential location on the southeast side of the airport, shown in **Exhibit 12** for a new snow dump that the tenants can use to haul snow from their leased sites. The identified site is undeveloped and located on the East side of University Avenue, opposite Levanevsky Access Road. **The Study recommends that should the Airport choose to develop this location into a new Landside Snow Dump, the site should be developed to a similar size and layout as the existing East Ramp Public Parking Site located to the north along University Avenue.** 





Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025.

## 1.5.3 AIRFIELD SNOW CLEARING EQUIPMENT ACCESS IMPROVEMENT

# 1.5.3.1 RECOMMENDATION #8: RECONFIGURATION OF SIDA FENCE AT MAINTENANCE BUILDING

Winter weather events in the Fairbanks area can start unexpectedly and rapidly intensify, resulting in snow accumulation on the airfield which must be addressed quickly. One operational improvement the Airport has expressed an interest in exploring ways to improve the response time of the airside snow clearing equipment stored on the landside during a snow event. Section 1.3.1.3 describes the issue which can arise when multiple Broom Trucks stored in the Landside portion of the Maintenance Garage are dispatched simultaneously to support airfield snow clearing operations. To resolve the issue of Broom Trucks and other vehicles stacking up as they wait their turn to pass through the SIDA gate from the landside to the airfield, **the Study recommends that the Airport consider additional analysis to evaluate the potential improvements in response time for the Broom Trucks accessing the airside operations area and determine the potential benefits of relocating the SIDA fence near the Maintenance Building to allow the vehicle storage bays on the west side of the building, where the Broom Trucks are stored, to be located within the secure area. This would eliminate the delays the Broom Trucks experience as they wait to pass through the SIDA gate.** 

The Study considered multiple options to reconfigure the SIDA fence to include the vehicle storage bays on the west side of the Maintenance Building within the Airport secure area while still providing landside access to the Airport's Badge and ID office located on the west side of the building. **Exhibit 13** shows the current SIDA fence

# configuration, and the proposed realignment. Multiple options were considered using a vehicle tracking analysis to account for the turn radii of the brooms.



#### EXHIBIT 13: EXISTING AND PROPOSED SIDA FENCE RECONFIGURATION

Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025

In the Proposed Improvement reconfiguration, the SIDA Fence and gate are relocated approximately 150 ft. to the west of the Maintenance/ARFF building and the new SIDA fence would extend to the north approximately 200 feet, before turning east towards the northwest corner of the building. This new fence line passes through the Airport's existing E-Chip storage shed which would be relocated to the west and rotated 90 degrees. As this shed has a similar structure to a carport, relocating this structure should be less complex and costly compared to an enclosed structure. Additionally, the curbs and islands that are in place would also need to be modified or removed to make space for the Broom Trucks and other vehicles to turn.

The proposed new SIDA fence line alignment was determined by evaluating the Broom Trucks' ability to maneuver in to and out of their assigned storage bays using a vehicle tracking software. To accurately evaluate a Broom Truck's ability to maneuver in and out of their storage bay, the MB3 Front Mount Broom Truck was selected as the design vehicle and vehicle specific information and specifications were used to identify the vehicle's key characteristics. For this analysis, the design vehicle was assumed to have only two-wheel steering with a maximum turn angle of 35 degrees, a wheelbase of 13 ft.-8 in., and an 18 ft. wide broom front mounted broom. The MB3 Broom Truck dimensions used in this analysis are provided in **Exhibit 14**.

#### EXHIBIT 14: SWEPT PATH ANALYSIS DESIGN VEHICLE - MB3 BROOM TRUCK WITH 2-WHEEL STEERING



Source: M-B Companies, Inc., April 2025, Ricondo & Associates, Inc., April 2025

Seven vehicle swept path analyses were conducted to determine if the design vehicle had sufficient space to maneuver the truck and broom into and out of the three storage bays in the Maintenance Building capable of accommodating them. The Broom Trucks drive into their storage bays, and back out of them. **Exhibit 15** shows that of the three storage bays the MB3 Broom Trucks are stored in, with the realignment of the SIDA fence, and the removal of the island, the MB3 Broom Trucks would be able to drive forward into the north and middle bays without backing up to realign the vehicle. To access the southern bay, the MB3 Broom Truck would need to back up and realign the vehicle to enter their storage bay. It is important to remember that the design vehicle selected was conservative as it was assumed to only have two-wheel (front axle) steering. Other Broom Trucks equipped with four-wheel (front and back axle) steering have a tighter turning radius and should be capable of driving directly into each of the storage bays without needing to back up and realign the vehicle.

#### EXHIBIT 15: MB3 BROOM TRUCK SWEPT PATH ANALYSIS



Source, Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025

By relocating the SIDA fence and gate as shown above, all the vehicles stored in the Maintenance Building would be within the secure area and would no longer be delayed accessing the airfield. Additionally, the relocated SIDA fence would still provide landside access to the west side of the Maintenance and ARFF Building for the Pass and ID Office as well as employee parking and deliveries.

# 1.5.3.2 RECOMMENDATION #9: CO-LOCATING ALL MAINTENANCE EQUIPMENT AT THE AIRFIELD MAINTENANCE FACILITY

As a long-term goal, consider consolidating all maintenance equipment within one site, most likely at the current AMF. A one-facility approach would create efficiencies within equipment and field maintenance, locating all critical airfield maintenance equipment on the airside of the SIDA fence, allowing for improved response times to the airfield. Additional study would be required to assess the cost-benefit between implementing Recommendation #8 in the near-term versus delaying until Recommendation #9 can be implemented.

# 1.6 CONCLUSION

While FAI has a robust and refined snow removal and storage plan for addressing winter weather on its landside and airside facilities, the Study has identified several recommendations for consideration including facility and operational improvements to help improve snow removal and ice control at the Airport. These include a series of progressive Terminal area landside improvements, landside and airside snow storage and snow dump capacity enhancements, and a proposed realignment of the SIDA fence to improve operational efficiency and response times to winter weather events. **Exhibit 16** identifies the location of all the recommended improvements listed below.

The proposed Terminal area landside improvements range from minimal effort and cost to major infrastructure development and investment to help better address the Airports Terminal area snow and ice removal concerns. The recommendations are,

- 1. Consider additional research into the potential use and testing of ice melt products in either a liquid or brine solutions as another strategy for addressing snow and ice removal challenges on the Terminal area landside facilities.
- 2. Consider implementing some response time and performance required minimums related to snow and ice removal in the next Parking Operators concession agreement which would flow down to the third-party snow removal contractor hired by the Parking Operator.
- 3. Undertake additional study to assess the cost to install a snow melt system along the Terminal's pedestrian curbside, the curbside pedestrian crosswalks, and the sidewalk adjacent to the public parking lot. This would have the potential to significantly improve the snow and ice removal issues along the Terminal curbside area and the debris tracked into the Terminal building by passengers.
- 4. Consider the construction of a new Terminal area public parking structure using an alternative construction method, specifically a prefabricated construction system. Additional study would be required to better understand the costs and revenue potential associated with a new parking structure at FAI, but based on high-level estimates, the cost savings may be as high as 40 percent compared to previous estimates for traditional construction methods.

#### EXHIBIT 16: LOCATIONS OF PROPOSED RECOMMENDED IMPROVEMENTS



Source: Fairbanks International Airport, April 2025, Ricondo & Associates, Inc., April 2025

The Airport's snow storage capacity improvements provide a series of options which, depending on the improvement selected, may avoid the need to implement another recommended improvement. The Study's snow storage improvement recommendations are,

- 5. Reconfigure the SIDA fence on the vacant lot currently designated for snow storage located on the west side of the airfield between Lot B4 L1, and B4 L2 to expand the Airport's airside snow storage capacity by approximately 76,000 sq. ft., making this one of the largest snow storage sites on the Airport. Additionally, add a new SIDA gate and access from Old Airport Road, to provide Airport Maintenance the flexibility to use this area as an alternate or overflow snow storage site for Landside snow as necessary, and help avoid the potential need to expand the existing Landside Snow Dump site.
- 6. Reserve Block 10 Lots 1 and 1A, which are currently vacant for possible future expansion of the existing Snow Dump Site located along Airport Industrial Road. The Airport should avoid leasing these lots, if possible, to maintain the ability to expand the Landside Snow Dump if needed. Should Recommendation #5 be implemented, the Airport may wish to abandon this recommendation.
- Develop a new east side Landside Snow Dump location to replace the previous Landside Snow Dump located in the East Ramp Public Parking lot along University Avenue which was identified for an alternative use in 2024. The study identified a potential location, an undeveloped site located on the East side of University Avenue, opposite Levanevsky Access Road.

Finally, one operational improvement was identified to help improve maintenance vehicle access and response time to the airfield during winter storm events. The Study recommends,

- 8. Consider additional analysis to evaluate the potential improvements in response time for the Broom Trucks accessing the airside operations area and determine the potential benefits of relocating the SIDA fence near the Maintenance Building to allow the vehicle storage bays on the west side of the building, where the Broom Trucks are stored, to be located within the secure area.
- 9. Consider consolidating all maintenance equipment within one maintenance site, most likely at the current Airfield Maintenance Facility (AMF), as a long-term goal. A one-facility approach would create efficiencies within equipment and field maintenance, locating all critical airfield maintenance equipment on the airside of the SIDA fence, allowing for improved response times to the airfield.