ALASKA INTERNATIONAL AIRPORT SYSTEM

Assessment of Existing Operational Controls

DOWL Project Number 64020-01

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EXECUTIVE SUMMARY

The Alaska International Airport System (AIAS) consists of both Ted Stevens Anchorage International Airport (ANC) and Fairbanks International Airport (FAI). As part of the Winter Storm Efficiency Study (WSES or Study), DOWL evaluated the operational controls currently used by the AIAS during winter weather events to determine what is working and where improvements can be made, particularly in relation to airside congestion. The DOWL Team reviewed and evaluated existing documents, reviewed industry standards, benchmarked against peer airports, conducted site visits, met with airport staff, and interviewed airport support staff and contractors.

AIAS operates at an elite level in some of the most severe and extreme winter weather conditions. Recent storm events over the past two years have resulted in adverse weather conditions and reduced holdover times resulting in delays. No operational controls can change or control the weather, and some Federal Aviation Administration (FAA) regulations (e.g., holdover times) could result in zero aircraft being able to depart, creating delays and congestion.

While AIAS has excellent measures in place, the Study resulted in the following key recommendations with the highest anticipated impacts to alleviate impacts from severe winter weather:

- ANC: create additional aircraft parking locations at ANC
- ANC: track data to study, analyze, and compare departure rates between standard FAA holdover time guidelines and SureWx software methods.
- FAI: modify the South Cargo Ramp to allow for deicing at those parking spots

1.0 INTRODUCTION

The Alaska International Airport System (AIAS) commissioned a Winter Storm Efficiency Study (WSES or Study) for Ted Stevens Anchorage International Airport (ANC) and Fairbanks International Airport (FAI) to identify ways to improve efficiency and effectiveness of airport operations during winter storms. DOWL, LLC (DOWL) was awarded the contract with subcontractors Landrum and Brown, Inc. and Ricondo and Associates, Inc. The Study is comprised of eight tasks: (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 (this report), (5) Assessment of Operating Agreement and Terminal Lease Agreement, (6) Cost-Benefit Analysis of Diversion Plans, (7) ANC Landside Snow Removal Study, and (8) Overall Summary Management Plan. Each company was responsible for specific tasks.

Collectively, the eight tasks provide a comprehensive assessment of the many plans, procedures, agreements, equipment, staffing, and operational controls that allow ANC and FAI to operate at an elite level in one of the harshest weather aviation environments in the world. Among the tasks completed by DOWL, this report addresses Task 4, Assessment of Existing Operational Controls.

1.1 Purpose

The purpose of this task, Assessment of Existing Operational Controls, is to assess existing operational controls used airside by AIAS especially relating to winter storm events to determine what controls are functioning well and recommend improvements where needed for the airport to meet operational objectives, comply with regulations, and mitigate risk.

1.2 Background

Recent changes (when compared to historical) in weather patterns affect both ANC and FAI. Based on historical records, an average Anchorage winter receives a maximum of 74.5 inches of snow. Winter 2023-2024 records show some of the largest snow totals in ANC's history with a total of 133 inches. The snowfall total over winter of 2022-2023 was also well above average at 108 inches[1]. Snow, extreme low temperatures, and freezing fog resulted in reduced holdover times (HOT) resulting in delays of aircraft operations. International cargo carriers were most affected by the delays and many had to divert to FAI or other airports.

Alaska's geographic location makes ANC a desirable location for international cargo carriers to perform a "technical stop" (tech stop). Tech stops at ANC are usually for refueling, crew change, or aircraft servicing. By stopping at ANC, carriers support the airport by paying landing fees, parking fees, and fuel flowage fees. It is in ANC's best interest to ensure cargo carriers continue to perform tech stops at ANC. FAI supports these activities as an alternate airport to accept diversions in the event the aircraft cannot land at ANC.

[1] *Snowfall totals from the Alaska Center for Climate Assessment and Policy based on NOAA/NCEI data.*

1.3 Scope of Task 4

DOWL reviewed and evaluated existing operational controls documents, policies, procedures, and common practices; reviewed industry standards, guides, and best practices; benchmarked against peer airports with similar winter weather operating conditions; conducted site visits with ANC and FAI; met with AIAS and Airport staff; and interviewed Airport support staff and contractors. Landside operational controls were not evaluated as part of Task 4.

AIAS operational control documents reviewed for Task 4 include:

- Airport Leases (analysis is included under separate cover)
- ANC Snow and Ice Control Plan
- ANC Contingency Parking Guide
- ANC Letters of Agreement with Air Traffic Control Tower (ATCT)
- ANC Operations Manual
- FAI Snow and Ice Control Plan
- FAI Contingency Parking Plan
- FAI Letters of Agreement with ATCT
- FAI Operational Orders

Both FAI and ANC operational documents were reviewed; however, Task 4 focused on ANC because ANC experiences higher operations and more issues with potential delay than FAI. For example, in 2023 ANC had a total of 278,325 operations, whereas FAI had 102,993.

ANC operational controls are discussed in SECTION 2.0, and FAI operational controls are discussed in SECTION 3.0. Operational controls applicable to both airports are discussed in SECTION 4.0.

2.0 ANC AIRPORT OPERATIONAL CONTROLS

When airports use separate, distinct departments for Operations and Maintenance, such as at AIAS, Maintenance is generally responsible for the upkeep of the airport including snow removal, electrical, maintenance, and repairs. Operations duties typically involve safety, security, and compliance including performing inspections and maintaining the Airport Certification Manual (ACM). Operations specializes in knowing, understanding, and keeping abreast of new Federal Aviation Administration (FAA) and Transportation Security Administration (TSA) rules and regulations, such as 14 CFR Part 139 Certification of Airports. Operations works with FAA during the annual certification inspection in which the FAA determines compliance with Part 139 requirements.

2.1 ANC Snow and Ice Control Plan

2.1.1 Snow and Ice Control Plan Responsibility

The Snow and Ice Control Plan (SICP) is a part of the ACM, which is updated and maintained by Operations and executed by both Maintenance and Operations. Operations is responsible for ensuring the document is kept up to date as part of the ACM and complies with federal regulations, However, Maintenance is responsible for developing and managing the elements of its execution.

Although ANC has expressed satisfaction with the current division of SICP responsibilities, industry best practices recommend placing ultimate responsibility for the SICP with a single division (most appropriately Operations, as responsible for ensuring regulatory compliance). However, no fundamental changes are recommended regarding how the SICP is managed and executed.

2.1.2 Airfield Snow and Ice Clearing Priorities

It is impossible to simultaneously clear snow from all airfield surfaces with a finite number of staff and equipment. All airports must prioritize which surfaces are essential for maintaining flow of aircraft traffic. Currently, ANC has two snow and ice removal priority levels (FIGURE 1).

Priority 1 surfaces must remain open to keep the airport operating at a minimum acceptable level of service (e.g., the key runway, major taxiways). ANC Priority 1 surfaces are accurately represented and are in accordance with Advisory Circular (AC) 150/5200-30D *Airport Field Condition Assessments and Winter Operations Safety*.

Priority 2 surfaces are those necessary for the smooth flow of traffic but can be closed without completely shutting down the airport operations.

The two priority levels do not fully represent current snow removal practices. While Maintenance strives to keep commonly used surfaces open, some surfaces are considered lower priority and are often closed in a winter storm event. For example, Maintenance normally stops snow removal on Runway (RW) 7R before stopping snow removal on RW 33. Distinguishing and defining priorities will accurately reflect real practices and stages of surface closures. ANC should collaborate with the ATCT when developing new and additional airfield clearing priorities. Once finalized, the priorities and associated maps should be shared with affected Airport stakeholders, including the ATCT.

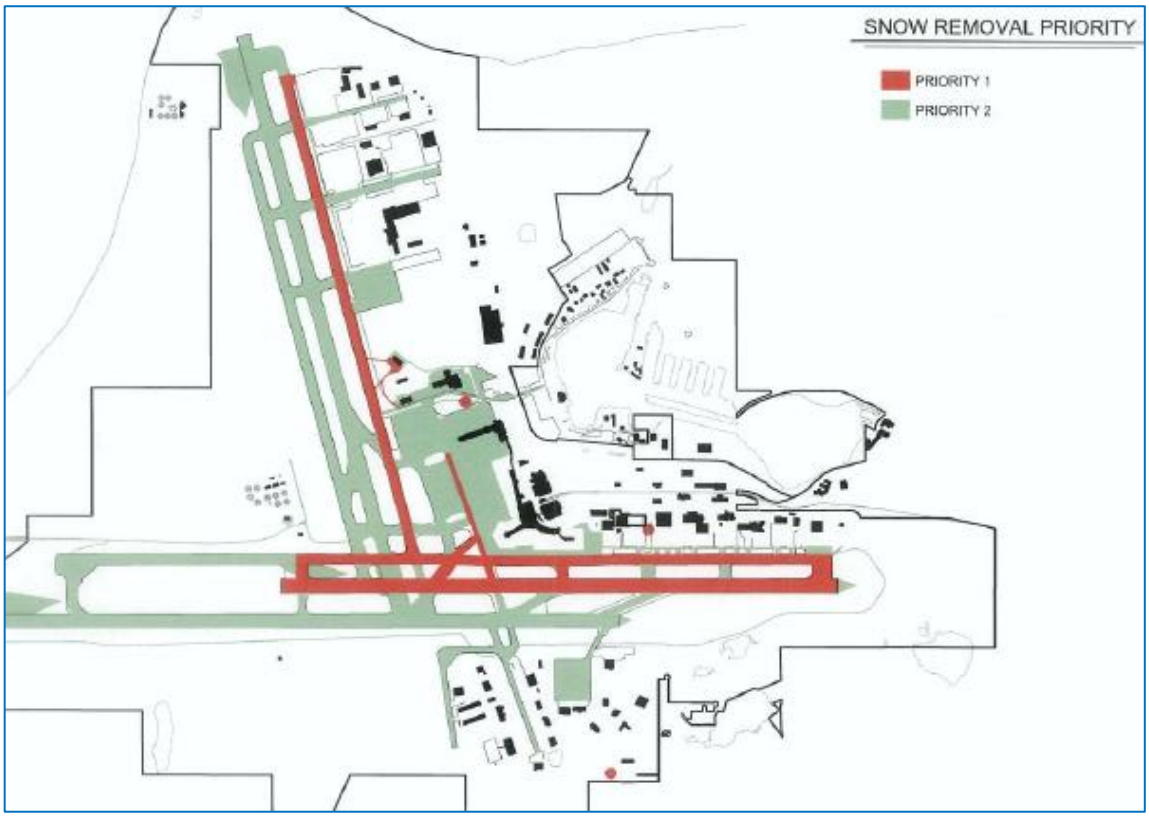


Figure 1. ANC Airfield Snow and Ice Clearing Priorities

Wind conditions considered in establishing the current snow removal priorities occur about 80 percent of the time. However, when wind conditions are outside the 80 percent conditions, assignment of primary runways and taxiways may change. **Recommendation: ANC should develop surface snow removal priorities for alternate wind conditions and share the alternate procedures with relevant stakeholders.** ATCT indicated such a document would be beneficial.

The current snow removal priorities meet FAA guidelines and no changes to the priority levels in the current SICP are required. The alternate snow removal priorities would be developed as informal documents for situational awareness for airport users and should be shared during pre-season Snow and Ice Control Committee (SICC) meetings.

2.1.3 Initiation of Snow Removal

ANC begins snow removal and ice control when trace accumulation is found on the airport surfaces. Snow removal initiation was benchmarked against other airports, and of the five airports evaluated[2], three airports also begin snow removal at trace accumulation and two begin

[2] *Benchmarked airports include Baltimore/Washington International Thurgood Marshall Airport (BWI), Detroit Metropolitan Wayne County Airport (DTW), Minneapolis-Saint Paul International Airport (MSP), Wichita Dwight D. Eisenhower National Airport (ICT), and Denver International Airport (DEN).*

removal at ¼ inch accumulation. It is recommended that ANC continue to initiate snow removal when accumulation begins.

2.1.4 Conditions for Surface Closures

The SICP outlines conditions requiring runway closure. The closure conditions were benchmarked against other comparable airports[2] to ensure ANC is promptly closing surfaces without causing undo restrictions or impacting safety. TABLE 1 lists the current thresholds for conditions requiring runway closure at ANC.

Table 1: ANC Condition Thresholds for Surface Closure

Condition	Closure Threshold
Slush	1 inch
Wet Snow	2 inches
Dry Snow	3 inches
Ice or Freezing Rain	100% coverage
Friction (mu)	Below 20

mu = coefficient of friction

Compared to other benchmarked airports, the closure thresholds at ANC were aligned with thresholds at other airports. Some benchmarked airports also included additional requirements, such as the character of snow/ice accumulation (e.g., patches, drifts). Due to the frequency and amount of snow received in ANC, additional thresholds could generate nuisance runway closures without increasing safety. DOWL determined no benefit to adding similar thresholds to ANC's closure guidance.

2.1.5 Field Condition Reports

ANC Operations is responsible for issuing Field Condition Reports (FICON) using the Notices to Airmen/Air Missions (NOTAM) system according to the SICP. FICONs provide vital information to pilots about current runway conditions, which are used to calculate landing performance. The following steps create a proper runway FICON according to AC 150/5200-30D:

- Inspect the runway and document current conditions (e.g., type and depth of contaminant on runway).
- Use the Runway Condition Assessment Matrix (RCAM) to assign a Runway Condition Code (RwyCC) to the runway conditions.
- Perform a friction assessment to determine if the runway is slipperier or has more traction than the RwyCC would indicate.
- Observe how the vehicle is decelerating and if there are any directional control issues.
- Monitor pilot-reported braking actions.

These actions work in conjunction to correctly determine the runway condition, select a RwyCC, and issue the FICON NOTAM. It is common industry best practice for a single person to perform these duties. Once the FICON is created, it can be entered into the NOTAM system by any authorized person.

ANC does not currently have a single person performing these tasks. Operations performs the runway inspection, but Maintenance performs the friction assessments. Having two separate people perform different tasks could cause an incongruity between observations, producing an incorrect FICON. Based on industry standard best practices for consistency ANC should have Operations perform the friction assessments used to create NOTAMs, ensuring the FICON is created by a single person with all available information. Maintenance should still perform friction assessments as needed to complete their duties.

2.2 ANC Ramp Congestion

Smoothly processing aircraft in and out of any airport requires adequate aircraft parking. During winter weather events aircraft services (e.g., ground handling, deicing) can become delayed and increase the time to move an aircraft through the system. This delay results in aircraft remaining on the ground and occupying parking positions longer than during routine operations. Passenger carriers (e.g., Alaska Airlines) and dedicated cargo carriers with exclusive leases (e.g., FedEx, UPS) manage their own gates (parking locations at the terminals) and hardstands (parking locations away from the terminal) and can generally reduce arrival rates to match departure rates and thereby control their entire system to match conditions.

However, international cargo carriers often launch aircraft from the departing airport many hours before conditions at ANC deteriorate. During severe winter events, ramp congestion at airport-administered gates or remote parking spots becomes an issue.

2.2.1 ANC Winter Contingency Parking Guide

To address ramp congestion, ANC created a Winter Contingency Parking Guide in June 2024 (APPENDIX 3). This guide is a living document and is modified and updated based on experience gained during weather events. The guide should be distributed to stakeholders. DOWL recommends the following changes to the Parking Guide (FIGURE 2):

- Change the icon for a snow pile to distinguish from fuel tanks.
- Show which parking spots are preferential lease and who has the lease
- Ensure clarity between the separate phases and when each should be used.

Figure 2. Recommended changes to the June 2024 ANC Parking Guide

2.2.2 Restrictive Use NOTAM

It is the Airport's responsibility to issue NOTAMs to describe abnormal conditions to all airport users. ANC has historically issued NOTAMs (similar to what is shown in FIGURE 3) when congestion causes all airport-administered parking spots to be occupied, leaving arrivals with no place to park. (The text of the NOTAM reads: the issuing Airport is ANC; the NOTAM applies to the entire aerodrome; the airport is closed to aircraft with a wingspan of more than 210 feet; except for UPS and FedEx.)

ANC AD AP CLSD TO ACFT WINGSPAN MORE THAN 210 FT EXC UPS FEDEX

Figure 3. Example NOTAM Issued by ANC when Airport-Administered Parking has Reached Capacity

In December 2024, the FAA distributed CertAlert 24-10 addressing this type of restrictive-use NOTAM. Although the NOTAM is not *prohibited* by the FAA, it is subject to FAA review. CertAlert 24-10 states that restrictive NOTAMs may "inadvertently introduce unsafe conditions or create safety risks the airport sponsor did not anticipate or consider." Additionally, restrictive use NOTAMs may prevent aircraft from using ANC even after the described condition no longer exists.

Due to preferentially leased spaces, this NOTAM is no longer applicable, and ANC does not anticipate using it in the future. However, most of the tools that the FAA uses to control flow into airports are not effective at ANC because international arrivals are not subject to these flow requirements. As such, ANC must find a way to decrease the numbers of arriving aircraft and manage parking congestion during severe weather events. ANC plans to request that Air Route Traffic Control Center (ARTCC) place aircraft into a holding pattern until a space opens to

accommodate the aircraft. The pilot would then choose to keep holding or divert to another airport. Diversion would be mandatory when the aircraft reached critical fuel levels.

2.2.3 Coordination with FAA Air Traffic

Communications with ATCT personnel indicate they were unfamiliar with some of the procedural documents that ANC uses during winter weather events, including the SICP Priority Levels and Winter Contingency Parking Guide. ANC currently holds meetings with the ATCT, Terminal Radar Approach Control (TRACON), and ARTCC. **Recommendation: To ensure all stakeholders are aware of the procedural documents, priorities, and plans the following should be specifically discussed at the annual SICC meetings: the SICP (including snow removal priority levels), the Winter Contingency Parking Guide, and methods to reduce the rate of arriving aircraft during extreme weather events.**

At the end of each winter season, a meeting is held to review effectiveness of plans and procedures. **Recommendation: The plans should be updated accordingly and presented at the following preseason meeting.**

2.2.4 Allow Deicing on Taxiway

Based on stakeholder interviews, research, and analysis, it was determined that deicing is one of the main bottlenecks. DOWL investigated the option of allowing deicing on taxiways, but this was determined to be impractical. Taxiway widths are designed to allow aircraft movement and provide appropriate safety buffers, but they are not designed to accommodate adjacent vehicles or ground operators. Thus, the width of taxiways prevents deicing trucks circling the aircraft without leaving the pavement. In addition, deicing on taxiways would most likely just move the congestion to the taxiways, causing delays to expand to all airport users.

2.2.5 Additional Parking

DOWL evaluated the Facility Requirements document included in the draft 2024 ANC Airport Master Plan update to determine how the number of current cargo parking spots aligns with the required parking. **It was determined that seven new parking spaces are needed to meet *current* demand. The complete analysis is included in APPENDIX 1. An additional four spaces will be needed to meet the *anticipated* demand by 2027**. There are potential or planned projects that would add additional parking, as noted below and depicted in FIGURE 4.

- NorthLink
    - This is new development in the south airpark area with a possible five to six new cargo parking spots scheduled to be built in the summer of 2025.
    - An additional five to six cargo parking spots are scheduled for construction in 2026.
    - Anticipated ultimate development of the NorthLink complex will add up to 15 new spots in total.
    - In addition to the parking spots, buildings and deicing fluid collection is also part of this development.

- West Campus – there are three developments planned for the area west of RW 33:
    - Atlas Air has submitted application for a lease that is currently set to expire July 2025; ANC aims to execute this lease prior to the expiration.
    - AIAS/ANC plans on developing four hardstands that would be owned and managed by ANC. This project is on the 5-year Capital Improvement Project plan and is scheduled for construction in 2029.
    - Anchorage Airport Partners LLC currently has a lease agreement to build a cargo parking area north of the fuel farm. The project is currently going through legal evaluation with no definitive start date.
- Taxilane Papa
    - Alaska Cargo and Cold Storage has a planned cargo development south of parking spots Papa 1 to Papa 3 with up to eight cargo parking spots.

The NorthLink project would meet the current need of seven additional parking spots in two years. If fully implemented, the NorthLink project would also build sufficient parking to accommodate the four additional spaces needed by 2027.

Atlas Air is currently the most frequent cargo operator at ANC with approximately 6,000 departures per year. Atlas Air wants to eventually increase departures to 10,000 per year[3]. If the Atlas Air lease is successfully executed, they could build up to an additional 13 parking spaces.

[3] *Number of operations provided by ANC in a presentation to the Airport Advisory Board on February 19, 2025.*

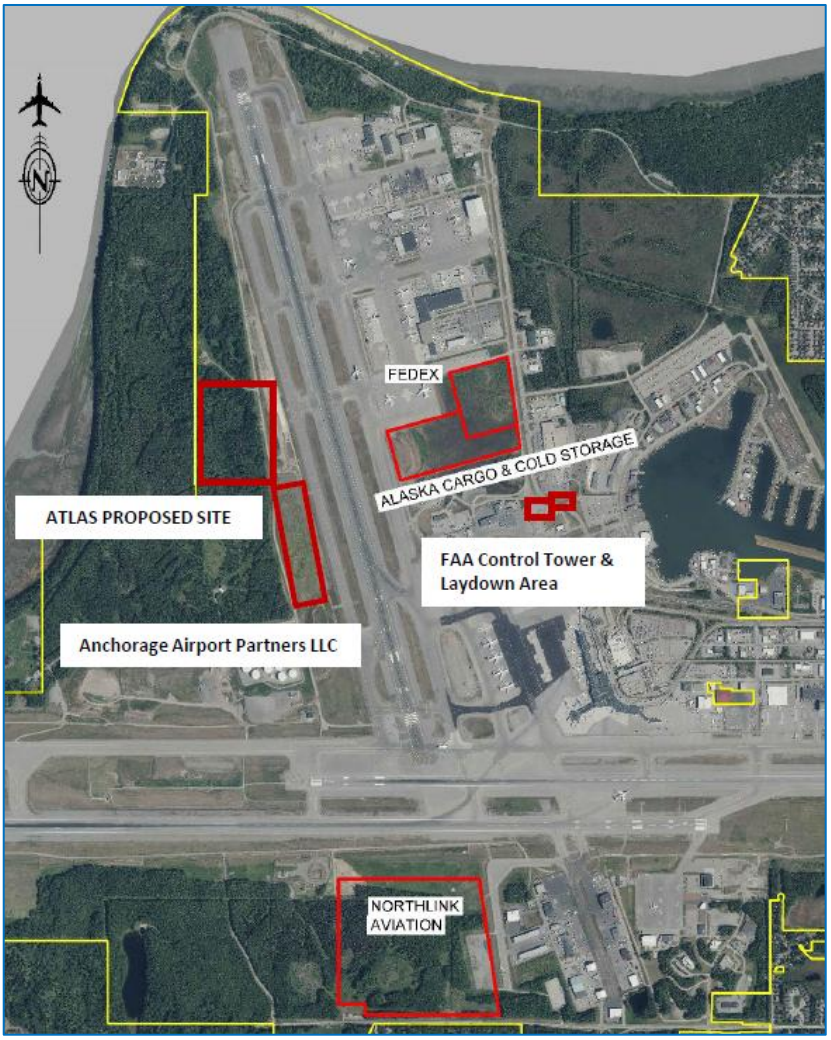


Figure 4. ANC potential and planned additional parking locations

2.2.6 Ground Support Equipment Storage

Storage and staging of Ground Support Equipment (GSE) can impede snow removal. During the Study, it became apparent that procedures and communications are unclear regarding removing GSE from airport-administered parking spots to allow snow removal equipment (SRE) to clear those areas.

ANC Operations has improved coordination between the Gate Management Desk and Airfield Maintenance by using radios for direct communication, with calls to ground handlers to provide status updates. Based on stakeholder interviews, the direct radio communication has improved coordination and conditions. **Recommendation: ANC should document these procedures and establish a framework for continuously improving coordination**.

2.3 ANC Operations Manual

ANC has developed an Operations Manual which includes the general rules of conduct for all airport users. Compliance with the Operations Manual is required by Title 17 Alaska Administrative Code (AAC) 42.020, lease documents, and Business Activity Permits. The ANC Operations Manual was only investigated to the extent the manual applies to the WSES. It was found that the Operations Manual provides clear procedures for airport users. It addresses the following topics:

- Snow disposal procedures
- Aircraft gate and parking management protocols
  - Airport-administered aircraft parking position protocols
  - Ramp parking policies
  - Parking positions
  - Special procedures
- Aircraft deicing

No changes are recommended at this time. However, if preferential leases are expected to be a long-term condition, the Operations Manual should be updated to address those procedures.

2.4 ANC Letters of Agreement with Air Traffic Control Tower

ANC has four Letters of Agreement (LOA) between the airport and the ATCT: Reporting Airport Conditions, Braking Action Reports, Procedures for Opening and Closing Runways/Taxiways, and Continuous Snow Removal Procedures.

ANC ATCT has expressed concern regarding the Continuous Snow Removal Procedures LOA. ANC ATCT requests the “snow removal train” (term used for the entire group of SRE) yield to aircraft exiting active runways. Holding an aircraft on an active runway is not ideal as it forces incoming, landing aircraft to remain airborne and circle while the runway traffic clears. By requiring the snow removal train to yield to aircraft, landing procedures can continue unimpeded. **Recommendation: ANC should evaluate the feasibility of holding the snow removal train to allow for aircraft to exit the active runway.**

Additionally, the Continuous Snow Removal Procedures LOA section 6(a)(1) states: “Hold all ground movements, except for aircraft already cleared for takeoff and arriving aircraft within 15 miles of the affected runway.” The way this is currently worded, it requires all ground movements to stop, thereby halting aircraft from being able to get to and from runways that are still active. During the next routine update of the LOA, **it is recommended this LOA be modified to clarify that ground movements should be stopped only for the closed/affected runway**, thus making it clear that aircraft can still move to/from available runways.

2.5 ANC Gate and Parking Management

ANC has two types of parking: leased and ad hoc. Ad hoc spaces are controlled by the airport (airport-administered). Leased spaces are leased to a carrier under either a preferential or exclusive lease. Preferential leases give the leaseholder (the carrier) priority use of the gate or remote parking spot; and exclusive leases give complete control to the leaseholder.

There are two parking location designations: adjacent and remote. “Adjacent” location means adjacent to the terminal and “remote” refers to specific spots on the ramp (e.g., Romeo spots, Papa spots). Section 4 of the ANC Airport Operations Manual provides a clear description, location, and prioritization of adjacent or remote ad hoc parking positions. No changes are recommended to the Airport Operations Manual regarding ramp parking policies.

2.5.1 Exclusive Leases

An exclusive lease allows only the designated airline to use the facilities. The parking spaces are not available for use by other airlines nor under control of the Airport.

2.5.2 Preferential Lease

Preferential leasing of airport-administered parking spots was recently allowed at ANC. Under a preferential lease an airline has priority use of a gate or remote parking spot, but the airport can still allocate the space to another airline under specific conditions. ANC can assign these spots to other airlines with the advance coordination of the leaseholder when the spot has no scheduled activity for at least a four-hour window. The preferential use agreement requires the airline leasing the spot to perform snow removal.

Atlas Air signed a preferential use agreement for October 1, 2024, through March 31, 2025 for parking locations R7, R8, and R9. Cathay also signed a preferential use agreement for spot R10. **Recommendation: Updates should be made to the ANC Operations Manual to reflect preferential use of remote parking spots if these agreements continue long-term.**

DOWL recommends that at the end of the snow season, ANC should evaluate the advantages and disadvantages of the recently created preferential use agreements, both for the carrier and the airport. **Recommendation: After the extensions have expired, senior leadership should evaluate if a new preferential use agreement should be created, if any terms should be altered, and necessary updates.** For example, provisions that allow ANC to reclaim use of the preferentially leased spot for extreme conditions or extended times of non-use should also be included in the lease agreement.

2.5.3 Additional Closed-Circuit Television Cameras

While observing the Gate Management desk during the October 2024 winter storm event, DOWL recognized a benefit of installing additional, closer pan/tilt/zoom (PTZ) closed-circuit television cameras focused on the remote parking spots. PTZ closed-circuit monitoring would provide Gate Management improved situational awareness of activities at remote parking spots

such as whether the remote parking spot is occupied, status of deicing, and status of GSE located on the remote parking spot.

Installing additional PTZ cameras would require acceptable mounting locations which are not currently available. The absence of new mounting locations was based on the *Illumination Study for Remain Overnight (RON) Apron Parking Area* performed by CRW Engineering Group and Mead and Hunt in 2021. The 2021 study found there were no acceptable locations to install additional lighting, which was then extrapolated to closed-circuit cameras, as it was determined that mounting requirements were similar for both lighting and cameras.

2.5.4 Clearing Ramp Parking Spots

Coordinating snow removal on remote parking spots also creates a bottleneck for aircraft traffic. The aircraft and all GSE must be removed from the parking space to allow snow removal equipment to clear the snow. Maneuvering GSE around an aircraft becomes more difficult once snow depth exceeds three inches. In addition, the deice fluid mixes with the ground snow to creates a slush mixture. These conditions slow the GSE movement, thus delaying aircraft movement off the parking spot.

To coordinate snow removal on remote parking spots, the following must occur:

- Aircraft departs
- GSE Removed
    - Allow adequate time to remove GSE: ground handlers have requested 30 minutes notice in advance of arrival of the snow removal crew to remove GSE
    - Ensure all GSE has been removed.
- Snow removal:
    - Inform maintenance the area is available for snow removal and coordinate with their current operations
    - Perform snow removal
- Place the spot back in use before next arriving aircraft

ANC has been working on improving this complicated process. This past year, a dedicated radio was added for direct communication between the Gate Management Desk and Maintenance (see SECTION 2.2.6). Direct radio communication appears to have improved the process.

2.6 ANC Aircraft Deicing Operations

Section 7 of the ANC Operations Manual establishes the operational controls for aircraft deicing. There are two types of deicing fluid used at ANC: Type I and Type IV. Type I fluid is typically heated and sprayed at high pressure to remove snow and ice. Type I fluid is not thickened and has a relatively short HOT (i.e., the time allowed between deicing and departure). After snow and ice have been removed, a Type IV deicing fluid is applied to prevent snow, frost, or ice from adhering to the aircraft. Type IV fluid has a longer HOT.

2.6.1 Holdover Times

HOT is the time allowed, per the FAA, from the start of the final round of deicing (typically the Type IV application) until the aircraft departs. HOTs differ depending on brand of fluid used, temperature, and precipitation. A sample 2024 HOT table[4] is shown in **ERROR! REFERENCE SOURCE NOT FOUND.** If an aircraft exceeds the allowed HOT, it must be deiced again.

TABLE ADJ-18: ADJUSTED GENERIC HOLDOVER TIMES FOR SAE TYPE IV FLUIDS[1]

Outside Air Temperature[2]	Fluid Concentration Fluid/Water By % Volume	Freezing Fog, Freezing Mist[3], or Ice Crystals[4]	Snow mixed with Freezing Fog[5]	Very Light Snow, Snow Grains or Snow Pellets[6,7,8]	Light Snow, Snow Grains or Snow Pellets[6,7,8]	Moderate Snow, Snow Grains or Snow Pellets[6,8]	Freezing Drizzle[9]	Light Freezing Rain	Rain on Cold-Soaked Wing[10]	Other[11]
-3 °C and above (27 °F and above)	100/0	0:57 - 1:43	0:19 - 0:34	1:27 - 1:46	0:46 - 1:27	0:23 - 0:46	0:30 - 0:53	0:15 - 0:27	0:06 - 0:49	
	75/25	1:05 - 2:02	0:23 - 0:42	1:35 - 1:50	0:57 - 1:35	0:30 - 0:57	0:46 - 1:01	0:23 - 0:38	0:07 - 1:01	
	50/50	0:23 - 0:42	0:05 - 0:15	0:46 - 0:53	0:19 - 0:46	0:08 - 0:19	0:11 - 0:30	0:07 - 0:15		
below -3 to -8 °C (below 27 to 18 °F)	100/0	0:11 - 0:27	0:15 - 0:30	1:20 - 1:35	0:42 - 1:20	0:19 - 0:42	0:19 - 0:53	0:15 - 0:19		
	75/25	0:30 - 1:01	0:19 - 0:38	1:24 - 1:39	0:49 - 1:24	0:23 - 0:49	0:15 - 0:49	0:11 - 0:19		
below -8 to -14 °C (below 18 to 7 °F)	100/0	0:11 - 0:27	0:11 - 0:27	1:08 - 1:24	0:34 - 1:08	0:15 - 0:34	0:19 - 0:53[12]	0:15 - 0:19[12]		
	75/25	0:30 - 1:01	0:15 - 0:34	1:20 - 1:31	0:42 - 1:20	0:19 - 0:42	0:15 - 0:49[12]	0:11 - 0:19[12]	CAUTION: No holdover time guidelines exist	
below -14 to -18 °C (below 7 to 0 °F)	100/0	0:11 - 0:23	0:01 - 0:05	0:23 - 0:34	0:07 - 0:23	0:02 - 0:07				
below -18 to -25 °C (below 0 to -13 °F)	100/0	0:11 - 0:23	0:00 - 0:02	0:08 - 0:15	0:02 - 0:08	0:01 - 0:02				
below -25 °C to LOUT[13] (below -13 °F to LOUT)	100/0	0:11 - 0:23	0:00 - 0:01	0:05 - 0:08	0:02 - 0:05	0:00 - 0:02				

Figure 5. Typical Holdover Timetable from FAA Holdover Time Guidelines Winter 2024-2025

When HOTs are less than the time needed to deice, startup, taxi, and depart (which can take between 20 minutes to over one hour), all aircraft are essentially grounded until conditions improve. Referring to the table illustrated in FIGURE 5, when snow is mixed with freezing fog the HOTs vary between zero (0) minutes and 42 minutes, depending on the ambient temperature. In these conditions very few, if any, aircraft can depart. However, the inability for aircraft to depart does not prevent enroute aircraft from arriving and creating severe ramp congestion.

In the winter storm event of January 2024 at ANC, no amount of deicing, coordination, or snow clearing could accommodate a HOT of zero minutes. However, methods to increase HOT or decrease the time it takes to deice or taxi could reduce overall congestion except during the most extreme weather events. These options are described in subsequent sections of this report.

2.6.2 Alternate Holdover Time Methods

HOT tables are created and maintained by the FAA. However, as an alternate to predefined tables, the FAA allows for a Liquid Water Equivalent System (LWES). A LWES is an automated weather measurement system that determines the Liquid Water Equivalent (LWE) rate in conditions of frozen or freezing precipitation. The LWES takes those measurements and applies

[4] *Excerpt from FAA Holdover Time Guidelines, Winter 2024-2025, dated August 6, 2024.*

calculations to determine the HOT[5]. SureWx software determines HOTs based on liquid water equivalency as opposed to standard FAA HOT guidelines. SureWx uses exact atmospheric conditions to derive HOTs specific to the current weather conditions and has equipment at ANC to perform the necessary measurements. However, the decision to use the software is made by the individual airline, who must purchase the license.

ANC is aware of the critical importance of HOTs and has already taken the action to purchase access to the SureWx software for situational awareness. Since this was recently purchased, there is insufficient data at this time to determine if SureWx has improved HOTs and allowed for more aircraft departures than standard FAA HOT tables. **Recommendation: ANC track the data to study, analyze, and compare departure rates between the two methods of determining HOTs.**

2.6.3 Aircraft Deicing Locations

Aircraft parked at the remote spots are permitted to deice at their parking location. Passenger aircraft are pushed back from the terminal into the adjacent taxilanes (e.g., Taxilane Echo 1,

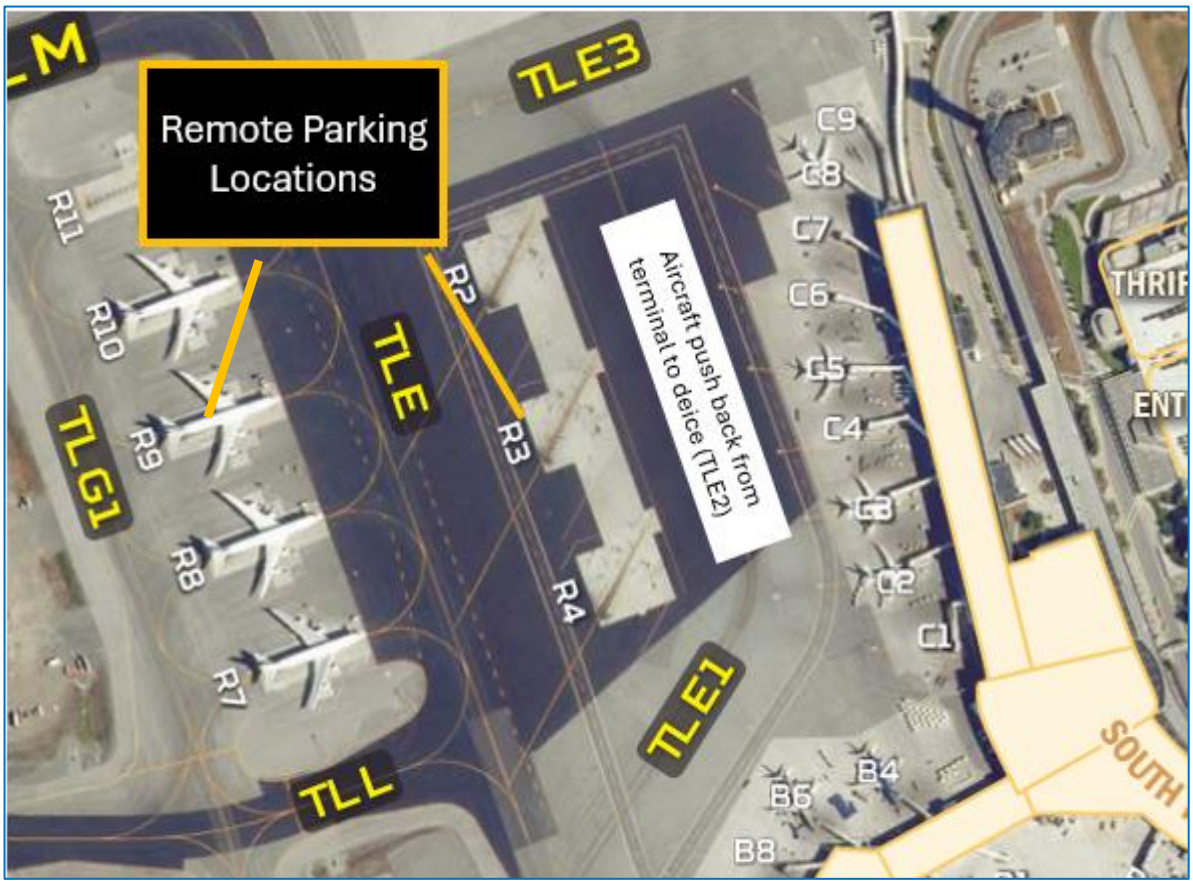


Figure 6. ANC Deicing Locations

[5] *FAA Advisory Circular, 120-112, Use of Liquid Water Equivalent System to Determine Holdover Times or Check Times for Anti-Icing Fluids.*

Echo 2) for deicing. FIGURE 6 depicts remote parking spots and the taxilane areas near the ANC terminal where deicing occurs.

Aircraft pushed back on Taxilanes E1 and E2 can block other passenger or cargo aircraft from taxiing or departing from their gate or remote parking spot (e.g., Romeo 2 to Romeo 4). **Recommendation: ANC should continue to explore methods to reduce conflicts between deicing and taxiing on Taxilanes Echo 1 and Echo 2.** Past efforts to reduce conflicts, such as requiring passenger aircraft to deice behind Gate C9, have inadvertently slowed passenger operations by allowing only a single deicing location. If additional remote cargo spots are constructed, Romeo 2 through 4 could become temporary snow storage areas or be used for passenger deicing locations.

2.6.4 Centralized Deicing Facility

There are benefits and disadvantages to deicing on a remote parking spot versus a centralized deicing facility (CDF). Generally, CDFs are placed close to the departure end of the runway to decrease taxiing time after deicing.

Appendix C of the 2014 Airport Master Plan Update by RS&H, in association with HDR, DOWL, HKM, RIM Architects, and ATAC addressed "Aircraft Deicing Fluid Management Strategies." Most of the strategies in the report address how deicing fluid is managed; however, one diagram calls out potential future deicing locations (FIGURE 7). The future CDFs identified in the report are not feasible. Two locations have been or will be leased, and the third is between the North Terminal and South Terminal and likely will create undo congestion. None of these locations provide the benefit of being close to the departure end of a runway (thus decreasing taxi times).

APPENDIX 2 provides more detail about the strengths, weaknesses, opportunities, and challenges (SWOC) analysis of a centralized deicing facility. A summary of findings is provided in FIGURE 8.

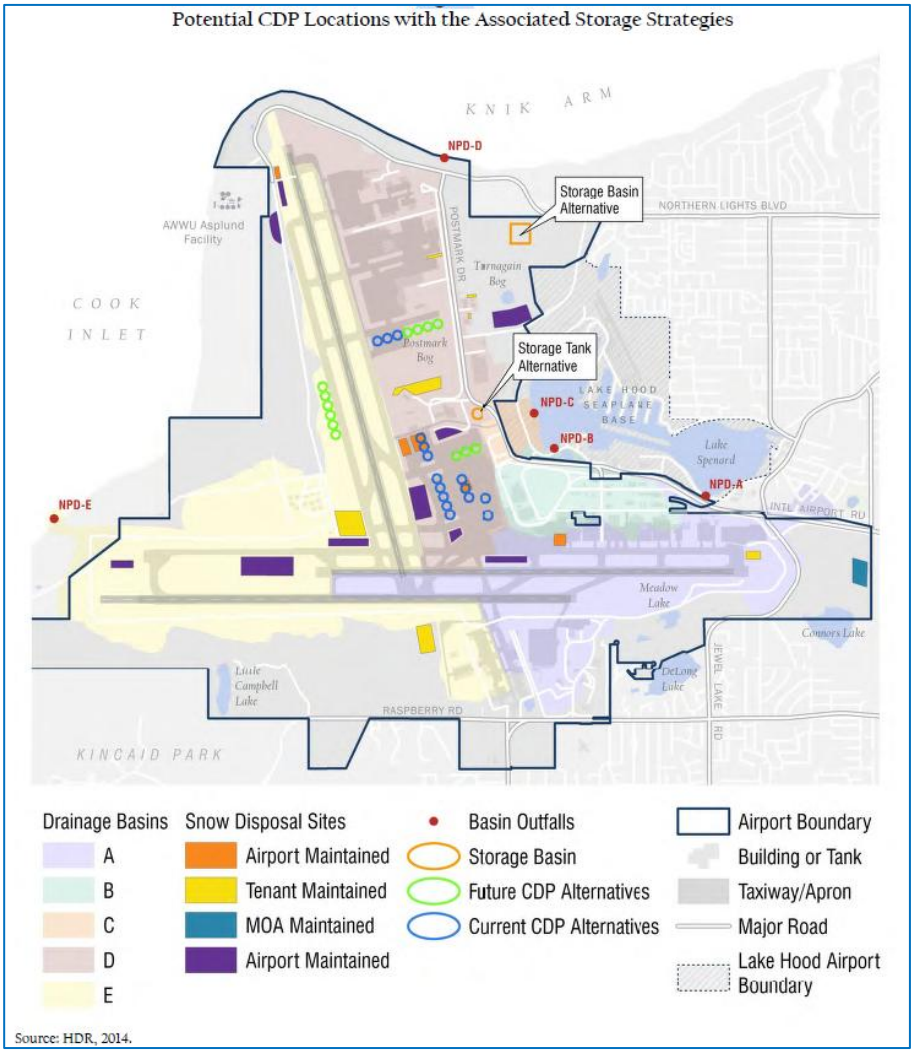


Figure 7. 2014 ANC Master Plan Excerpt Depicting Future Potential CDP Locations

SWOC Analysis – Centralized Deicing Facility (CDF) at ANC	
Strengths *The strengths are the positive attributes of a CDF and how the CDF would benefit both carriers and ANC.* ➢ Reduced delay during operations in snow/ice conditions by freeing up space at the gates and remote parking spots. ➢ Reduced taxi time from parking to runway, thus using less holdover time for taxiing. ➢ Potential to avoid aircraft diversions by freeing up parking spots. ➢ Reduced airline operating costs and losses due to delays & diversions. ➢ Centralized spent glycol collection, storage, & processing. ➢ Separation of deicing trucks and glycol from other ground services (catering, lavatories, baggage tugs, etc.).	**Weaknesses** *The weaknesses are adverse attributes of a CDF – elements that may be detrimental or may not be desirable.* ➢ Does not eliminate the need for additional parking space at ANC. ➢ A CDF, inclusive of glycol containment system, would be expensive to construct. ➢ Creates additional square footage to clear and maintain during storm events. ➢ Displaces current snow storage locations. ➢ CDF would introduce the new element of glycol collection, storage, and processing to ANC operations. ➢ Potential taxiway congestion to access the CDF. ➢ Operators may not desire an additional "node" in the ground movement pattern. ➢ An additional "node" in the ground movement pattern would likely require investment in new technologies to safely and efficiently manage CDF traffic. ➢ Moving aircraft with contaminated surfaces, (significant amount of snow and/or ice buildup on the wings/tail) from parking space to CDF is unacceptable for some aircraft operators.
Opportunities *An opportunity – for this analysis – is a potential benefit that could be realized by a CDF that falls outside the stated objectives.* ➢ Could act as additional parking when not being used for deicing activities. ➢ Provides a dedicated training space for deicing operations and potentially for other activities. ➢ Provides environmental benefits with the centralized collection, storage, and processing of spent glycol.	**Challenges** *A challenge is a constraint or obstacle, and may include the potential for regulatory action, lack of funding, or other lack of resources.* ➢ A CDF is not included in the existing ALP ➢ There are no current suitable locations for a CDF. Space currently occupied by other facilities would need to be repurposed. ➢ Construction could defer other, potentially more beneficial improvements.

Figure 8. Centralized Deicing Facility SWOC Analysis

2.6.5 Aircraft Deicing Prioritization

Ground handlers have discretion prioritizing aircraft deicing. Customers contracted with the ground handler are generally deiced first; followed by first-come-first-served. Ground handlers may prioritize aircraft with a time sensitivity (such as a crew at risk of timing out) or adjust priority based on HOT times; however, there is no requirement to do so.

2.7 ANC Staffing during Winter Weather

The AIAS Winter Storm Emergency Plan (separate cover) provides recommendations for staffing during winter weather events. FIGURE 9 is an excerpt from the AIAS Winter Storm Emergency Plan addressing ANC staffing during an adverse weather event.

Ted Stevens Anchorage International Airport (ANC)

- Maintenance Staffing – where feasible, ensuring adequate rest, and in compliance with union contracts, extend staff duty day as needed to meet additional maintenance demands.
- Operations Staffing – where feasible and ensuring adequate rest:
  - Add one additional person to support gate management and one additional person to support Airside Operations for a total staffing of four.
  - Airport 10 – monitor conditions, perform mu readings, and provide NOTAM information to Airport 11 for issuance.
  - Airport 11 – issue NOTAMS, assist gate management, and conduct overall coordination of the weather event.
  - Airport 11 or 12 – perform “follow-me” duties, respond to non-snow related calls, coordinate and execute Contingency Parking Plan.
  - Designate a single point of contact that will communicate with ATCT. Verify if on-duty ATCT staff prefer communications via radio or telephone. If ATCT prefers communications via radio, verify which frequency (e.g., ground).

Figure 9. Staffing Recommendations from the AIAS Winter Storm Emergency Plan

3.0 FAI OPERATIONAL CONTROLS

3.1 FAI Snow and Ice Control Plan

3.1.1 Snow and Ice Control Plan Responsibility

The SICP is part of the ACM, which is updated and maintained by Operations and executed by both Operations and Maintenance. FAI Operations retains the ultimate responsibility for maintenance and FAA approval of the SICP. There are no recommended changes to the FAI SICP responsibility.

3.1.2 Airfield Clearing Priorities

It is impossible to simultaneously clear snow from all airfield surfaces and airports must prioritize which surfaces are essential for keeping aircraft moving smoothly through the system. Currently, FAI has four priority levels (FIGURE 10) that accurately portray current snow removal procedures in accordance with FAA guidance. No changes are recommended to FAI's Snow Removal Priority Diagram.

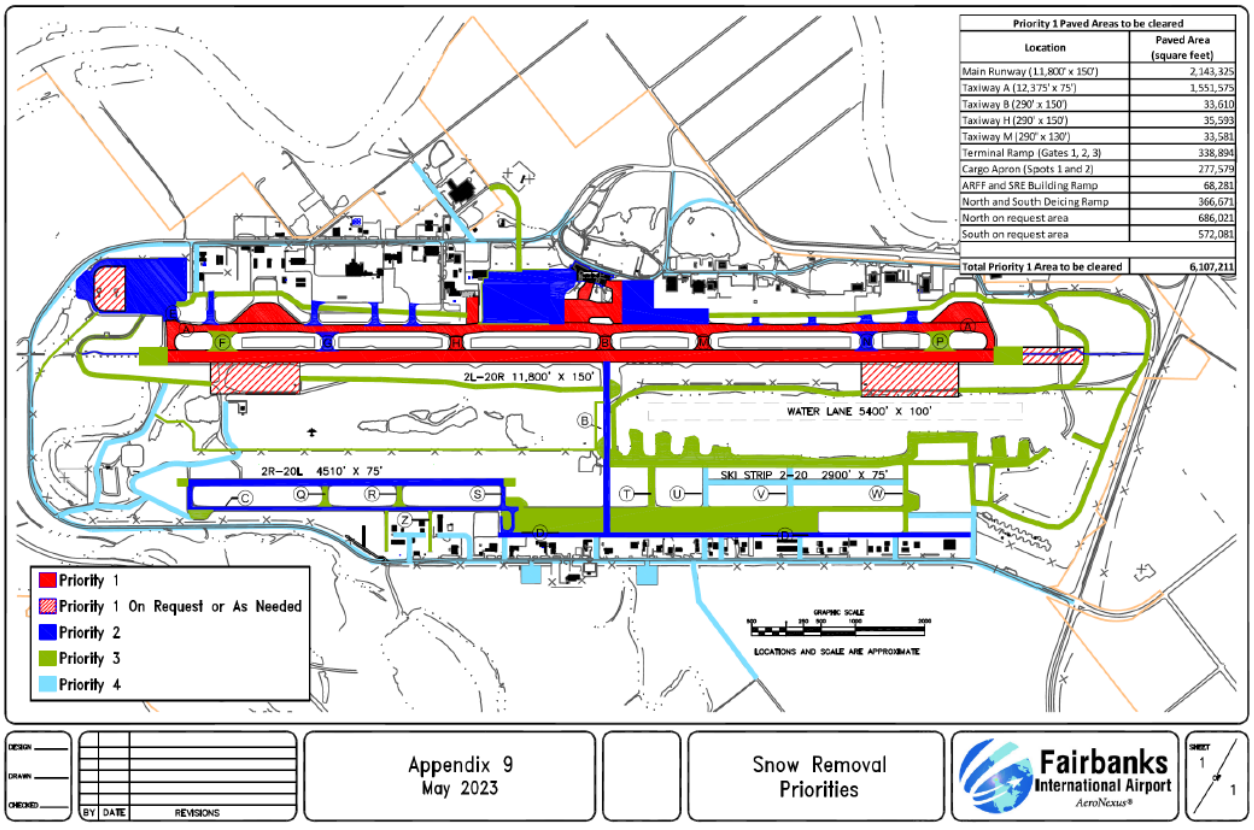


Figure 10. FAI Snow Removal Priority Diagram

3.1.3 Initiation of Snow Removal

Per the FAI SICP, snow and ice control is required to begin when ¼ inch of snow or ice accumulates on the Part 139 movement areas. FAI Maintenance does not work 24 hours per day or 7 days per week therefore sufficient time must be allocated for calling in maintenance staff, travel to the airport, and initiating snow removal to prevent noncompliance with the SICP.

3.1.4 Conditions for Required Surface Closure

The SICP outlines conditions that require a surface closure. These conditions were benchmarked against other comparable airports[6] to ensure FAI is closing deteriorating surfaces promptly without causing undo restrictions or impacting safety. TABLE 2 lists the current thresholds for runway closures at FAI.

Table 2: FAI Condition Thresholds for Surface Closure

Condition	Closure Threshold
Slush	1 inch
Wet Snow	2 inches
Dry Snow	3 inches
Ice or Freezing Rain	Over 25% coverage and does not meet upgrade conditions
Friction (mu)	Below 20

Compared to other benchmarked airports, the closure thresholds at FAI were aligned with thresholds at other airports. Some benchmarked airports also included additional requirements based on the character of snow/ice accumulation (e.g., patches, drifts). Due to the frequency and amount of snow received at FAI, additional thresholds could generate nuisance runway closures. DOWL determined there is no benefit to adding similar thresholds to FAI's closure guidance.

3.1.5 Issuing Field Condition Reports

FAI Operations has the responsibility to issue Field Condition Reports (FICONs) using the NOTAM system according to the SICP. FAI Operations issues timely FICONs in accordance with FAA requirements and industry best practices. No changes are recommended.

3.2 FAI Ramp Congestion

3.2.1 FAI Diversion Parking Plan

At any airport winter weather events can create delays and congestion for aircraft moving through the system. As the primary diversion airport for ANC, FAI can experience a large influx

[6] *Benchmarked airports include BWI, DTW, MSP, ICT and DEN*

of diverted flights during extreme weather events in Anchorage, as occurred during the January 2024 storm event. FAI updated their Diversion Parking Plan in 2024 to accommodate up to 23 aircraft during winter months (APPENDIX 3). The Diversion Parking Plan is a living document and is modified and updated based on experience gained during weather events. The Diversion Parking Plan should be distributed to stakeholders.

3.3 FAI Operational Orders

FAI Operational Orders are the general rules of conduct at the airport for all airport users. Compliance with the Operational Orders is required by 17 AAC 42.020, lease documents, and Business Activity Permits. FAI Operational Orders were only investigated to the extent they apply to the WSES. Operational Order 2.4 addresses Snow Removal and Disposal, and Operational Order 8.3 addresses Aircraft Deicing on the West Ramp. No deficiencies were noted with FAI Operational Orders.

3.4 FAI Letters of Agreement with Air Traffic Control Tower

FAI has one LOA with the ATCT relating to winter operations: Reporting Airport Conditions. The LOA is aligned with the FAI SICP. Neither FAI nor FAI ATCT staff expressed concerns with the current LOA; there are no recommended changes to the LOA.

3.5 FAI Maintenance Facilities

The FAI Maintenance airfield sand shed is located outside of the Air Operations Area (AOA). **Recommendation: For planning future projects, FAI should consider moving the sand shed inside the fence line.** Bringing the shed inside the AOA would reduce travel time, as trucks would not be required to travel through controlled access points.

3.6 FAI Aircraft Deicing Operations

3.6.1 Additional Deicing Location

FAI has two centralized deicing pads (FIGURE 11). Large cargo aircraft or aircraft with a considerable buildup of snow or ice require significant time to deice, potentially occupying the deicing pad for 45 minutes to an hour. Should an incident occur that prohibits use of a deicing pad, FAI users would be significantly delayed in aircraft deicing and departure.

With prior Airport approval, FAI does allow deicing at the end of Taxiway Alpha, adjacent to the deicing pads. Because there are no collection basins in this area, maintenance must push the collected effluent into basins at the deicing pad. Deicing at the end of Taxiway Alpha provides alternate deicing locations; however, the process is time-consuming and inconvenient. **Recommendation: FAI should investigate requirements to allow deicing on the South Cargo Ramp and start the planning process.** Using the South Cargo Ramp as an additional deicing area is also supported by the ground handlers and the Airport.

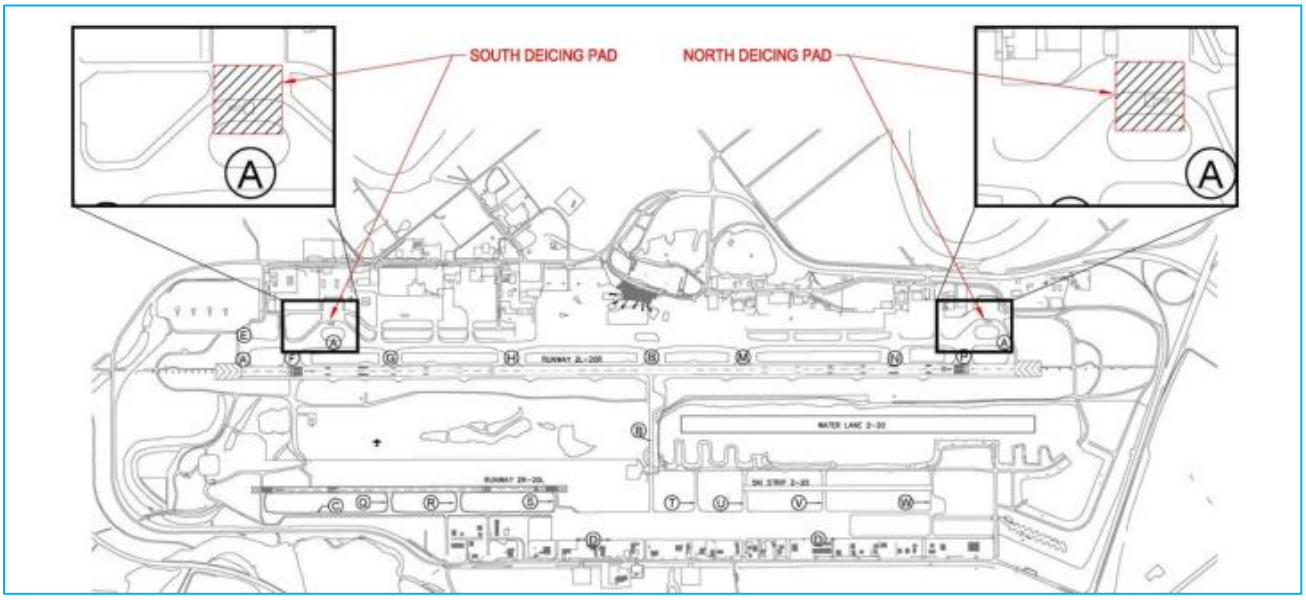


Figure 11. FAI Deicing Locations

3.7 FAI Staffing During Winter Weather

The draft AIAS Winter Storm Emergency Plan developed as part of this Study provides recommended changes in staffing during winter weather events. FIGURE 12 is an excerpt from the AIAS Winter Storm Emergency Plan addressing FAI staffing during a significant weather event.

Fairbanks International (FAI)
• Maintenance Staffing – where feasible and ensuring adequate rest: ▪ Starting at the beginning of the event, switch to 12 hours on and 12 hours off until end of storm, OR ▪ If a third shift has been added, extend duty day as needed to meet additional maintenance demands, including weekend coverage. • Operations Staffing ▪ Airfield Operations 1 – monitor current conditions, perform mu readings, issue NOTAMs. ▪ Airfield Operations 2 – perform “follow-me” duties, respond to non-snow related calls, implement and execute Diversion Parking Plan.

Figure 12. AIAS Winter Storm Emergency Plan – FAI Staffing Recommendations

4.0 AIAS OPERATIONAL CONTROLS (ANC AND FAI)

4.1 AIAS Winter Storm Emergency Plan

DOWL created a recommended AIAS Winter Storm Emergency Plan as part of the scope of this Study. The plan establishes storm event levels and associated recommended operational changes during various weather events. **Recommendation: The Winter Storm Emergency Plan should be validated and implemented by both ANC and FAI.**

4.2 AIAS Accomplishment Tracking and Performance Goals

Both ANC and FAI already track certain performance aspects. **Recommendation: AIAS should standardize accomplishment tracking and metrics in a manner that is easy to reference**, such as a databases, spreadsheets, or graphs. This information will be derived from a combination of software, ground handlers, the airlines, and publicly available information. Consideration should be given to balance the time to collect information with the potential benefits. Potential metrics that may be collected are listed below.

- Snow alert level
- Forecast weather prior to storm
- Actual snow and ice accumulated during the event
- Start and end time of continuous snow removal operations
- Hourly METAR (Meteorological Aerodrome Report) observations for the duration of the event
- Airport-administered parking spot occupancy times
- Crew time-outs
- Aircraft deicing times
- Archive pavement temperatures
- Total diversions and to what location
- Number of aircraft parked on taxiways
- Number of additional personnel called in for Maintenance and Operations
- Classification of staffing level during event:
    - Normal staffing
    - Additional staff called in/held over
    - Understaffed

Recommendation: AIAS should develop goals and objectives relating to winter weather operations and events. The Airport Cooperative Research Program (ACRP) Guidebook for Airport Winter Operations[7] recommends airports establish these goal and objectives.

4.3 AIAS Ground Handler Access to Water and Deice Fluid

Ground handlers currently fill their equipment at their leased location. For Pegasus at ANC, their leased location is outside the fence. Time required for a deicing truck to refill can take between 20 to 40 minutes. If deice materials are closer to the operational areas, deice truck turn-around time would be reduced and the ground handlers could service more aircraft. This is especially important during heavy snow or icing conditions when deicing takes longer, and deicing trucks require more refill trips to obtain more deice agent. **Recommendation: Have a secondary water source and supply of deice fluid available closer to the ramp at both ANC and FAI**. A potential ANC location for storage of deice material is behind remote parking spots R12 through R14. This space is not currently leased and is being used to store miscellaneous and potentially inoperable GSE for various airlines. An alternate location for FAI would be adjacent to the South Cargo Ramp.

4.4 AIAS Length of Time to Deice Aircraft

Time required to deice an aircraft depends on the amount of snow and ice and size of the aircraft. The HOT starts at the beginning of the final round of deice fluid application. It is beneficial to deice the aircraft as quickly as possible.

Both ground handler companies interviewed for ANC stated they use multiple deicing trucks when necessary to reduce the deicing time to promote a prompt departure. IDS indicated they can use up to six deicing trucks and Pegasus Airlines uses up to four trucks. However, using multiple deicing trucks may not be feasible at some remote parking spots due to space constraints. FAI ground handler OMNI stated the winter of 2024/2025 is the first year sufficient equipment is available to use multiple deicing trucks. FAI Operations will need to verify whether the Storm Water Pollution Prevention Plan (SWPPP) allows multiple deice trucks to conduct simultaneous operations on the deicing pad.

Recommendation: ANC should evaluate mandating the use of multiple deicing trucks in certain conditions, such as during periods of severe ramp congestion, and if appropriate, determine how to implement such a change. Potential methods for implementation would be updates to the ANC Operating Manual or adding the requirement to future leases.

4.5 AIAS Preseason Action

Preseason meetings with each airport's SICC are adequately defined in the SICPs. **Recommendation: The minimum cleared runway width acceptable to air carriers should be specified and established at the preseason meeting.** This is especially important for new

[7] *National Academies of Sciences, Engineering, and Medicine. 2015. A guidebook for Winter Operations. Washington, DC: The National Academies Press. https://doi.org/10.17226/22221*

carriers that may have specific requirements. For example, when Horizon started operating at FAI in 2014, their requirements for runway cleared width (100 feet) was larger than Alaska Airlines (60 feet). This created a situation where Alaska Airlines was able to operate on a partially cleared runway, but Horizon was not. Both ANC and FAI should share this information to allow for advance situational awareness in case of diversions. It is beneficial to address these types of issues well ahead of the winter season.

5.0 RECOMMENDATION SUMMARY

This report of Assessment of Existing Operational Controls presents numerous recommendations for ANC, FAI, and the AIAS. The primary recommendations are summarized in this section.

5.1 Summary of Recommendations for ANC

Recommendations of Highest Anticipated Impact:

- Create additional aircraft parking locations at ANC. (Section 2.2.5)
    - Add seven new standard size parking positions as soon as possible – this is anticipated to be accomplished with the NorthLink development.
    - Add four additional standard size parking spots by 2027 – this is also anticipated to be accomplished with the NorthLink development.
- Track data to study, analyze, and compare departure rates between standard FAA HOT guidelines and SureWx software methods. (Section 2.6.2)

Secondary Recommendations:

- Develop snow removal priorities for alternate wind conditions. (Section 2.1.2)
- Have operations perform the friction assessments used to create NOTAMs to ensure consistency. (Section 2.1.5)
- FAA ATCT is unfamiliar with the snow removal priority levels and the Winter Contingency Parking Guide. Therefore, DOWL recommends these topics be included in the annual meeting agenda. (Section 2.2.3)
- Document coordination procedures between Gate Management, Airfield Maintenance, and ground handlers and establish a framework for continuously improving coordination. (Section 2.2.6)
- Update LOA to hold the snow removal train for aircraft exiting the runway. (Section 2.4)
- Evaluate if Preferential Leases for remote parking spots should be continued and, if so, update the ANC Operations Manual. (Section 2.5.1)
- Continue to explore methods to deconflict deicing and taxiing on Taxilanes Echo 1 and Echo 2. (Section 2.6.3)

5.2 Summary of Recommendations for FAI

Recommendation of Highest Anticipated Impact:

- Modify the South Cargo Ramp to allow for deicing at those parking spots. (Section 3.6)

Secondary Recommendation:

- Consider moving the sand shed inside the fence line. (Section 3.5)

5.3 Summary of Recommendations for Both ANC and FAI

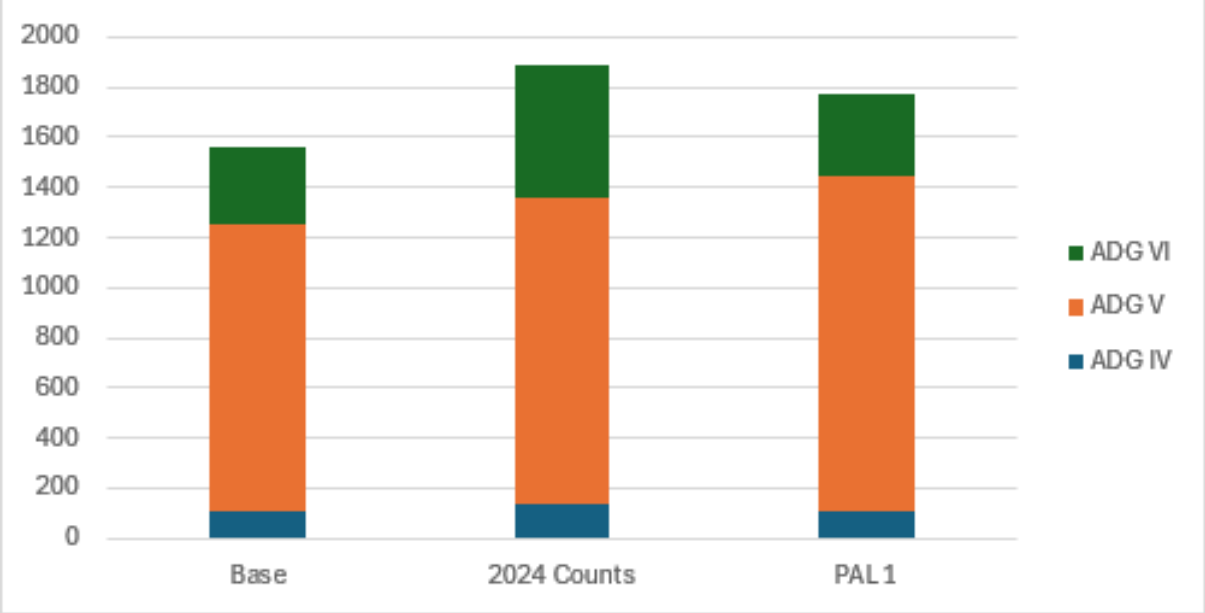
- Validate and implement the AIAS Winter Storm Emergency Plan created by DOWL. (Section 4.1)
- Standardize accomplishment tracking and metrics in a manner that is easy to reference and develop winter weather goals. (Section 4.2)
- Establish a water supply and deice fluid fill source closer to the airport ramp. (Section 4.3)
- Evaluate mandating multiple deicing trucks in certain conditions, such as during severe ramp congestion and, if appropriate, how to implement such a change. (Section 4.4)
- Establish and specify the minimum cleared runway width acceptable to air carriers in each airport's SICP. (Section 4.5)

APPENDIX 1:
EVALUATION OF CARGO RAMP SPACE

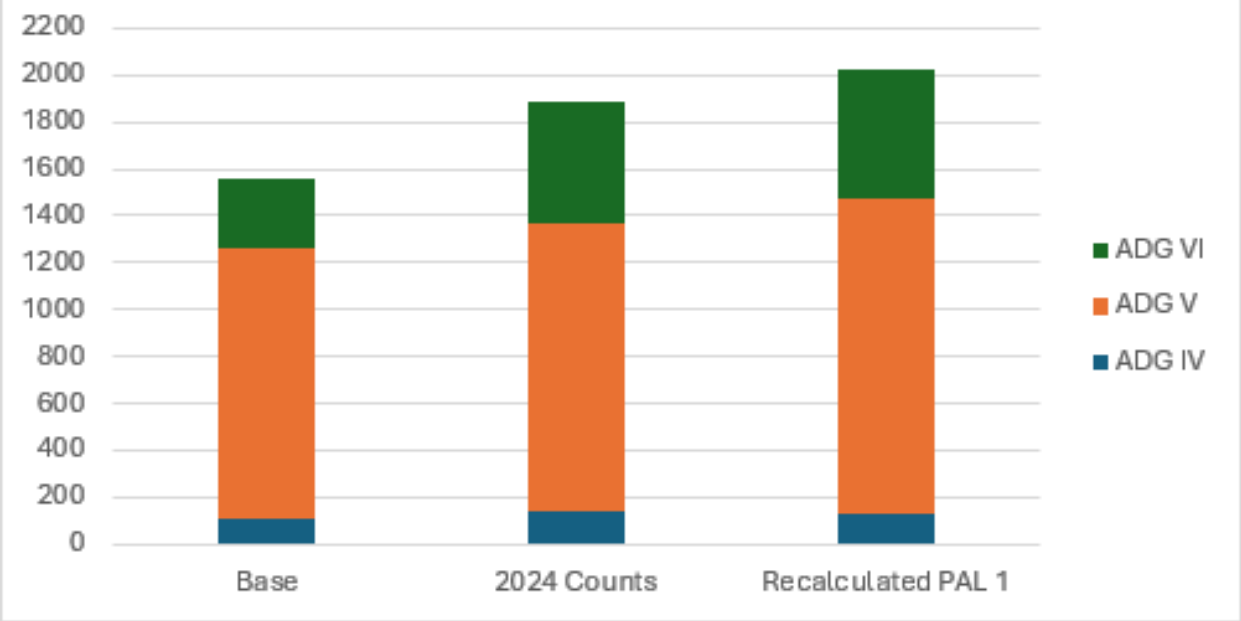
Using data from the Facility Requirements report of the 2024 ANC Master Plan Update and recent flight data, DOWL evaluated the number of airport-administered remote parking spots needed to accommodate current and future cargo activity.

The Facility Requirements report used operational data from 2022 for the base year. The future anticipated demand evaluated was Passenger Activity Level (PAL) 1, which is the demand anticipated to occur in 2027.

Actual 2024 operations showed an increase in cargo operations in comparison to the base demand. This rate of increase was 1.14 times higher than forecast in the Facility Requirements. After evaluating actual operations in 2024, DOWL determined that October had the most cargo activity. October was then designated as the peak month. APPENDIX 1, FIGURE 1 below shows the 2022 base activity level, the 2024 actual activity level, and the Facility Requirements PAL 1 (2027) for the peak month cargo. APPENDIX 1, FIGURE 2 shows the 2022 base activity level, the 2024 actual activity level, and the revised PAL 1 (using the actual growth rate predictions experienced between 2022 and 2024) for the peak month of cargo operations.



Appendix 1, Figure 1. Monthly Ramp Landings by Aircraft Design Group and Original PAL 1



Appendix 1, Figure 2 Monthly Ramp Landings by Aircraft Design Group and Recalculated PAL 1

The Facility Requirements document estimated the square yards of aircraft parking required for the Base and PAL 1 activity levels as well as the current level of existing parking. This includes both actual parking spots and the space needed for circulation (the movement of both aircraft and ground vehicles). As shown in APPENDIX TABLE 1, existing capacity is well below the current needs.

Part of this discrepancy is that current parking positions are significantly smaller than recommended by the ACRP Report 143, Guidebook for Air Cargo Facilities Planning and Development[8]. The total calculated available space of the existing 14 remote parking spots (Romeo and Papa spots) is 100,000 square yards. This is significantly less than the ACRP Report 143 recommended space of 142,225 square yards needed to accommodate the current nine Airplane Design Group (ADG) VI and five ADG V positions.

Appendix Table 1 Existing cargo apron area capacity and anticipated demand from Table 4-29, Facility Requirements document.

		Existing	Demand			
		Capacity	BASE	PAL 1	PAL 2	PAL 3
Airport Managed	Parking (SY)		200,000	218,000	226,000	226,000
Parking	Circulation (SY)		329,000	358,000	372,000	372,000
	Total	**322,000**	**529,000**	**576,000**	**598,000**	**598,000**

[8] *National Academies of Sciences, Engineering, and Medicine. 2015. Guidebook for Air Cargo Facility Planning and Development. Washington, DC: The National Academies Press. https://doi.org/10.17226/21906.*

The next step was to determine how much space is needed for each ADG category. According to ACRP Report 143 the size needed for a single aircraft of ADGs commonly utilizing remote parking spots are listed below:

- ADG IV (MD-11) – 7,220 square yards
- ADG V (B747-4) – 9,440 square yards
- ADG VI (B747-8) – 10,550 square yards

The activity and forecast depicted in APPENDIX 1, FIGURE 1 and APPENDIX 1, FIGURE 2 were used to determine how many parking spots for each of the ADGs were needed for the Base year and the Recalculated PAL 1 and are shown in APPENDIX TABLE 2.

Appendix Table 2. Total Positions Needed based on ACRP Report 143 Recommended Size

	Current Spots	Base	Recalculated PAL 1
Total Space in sq yd	100,000	200,000	248,520
ADG IV spots	0	2	2
ADG V spots	5	14	18
ADG VI spots	9	5	5
Total Positions	14*	21	25

**ANC current parking spots are smaller than recommended*

However, existing ANC parking spots are smaller than the recommended area, resulting in an overall larger spot count but with smaller overall area; there are more spots per total square yards then recommended in ACRP Report 143.

DOWL recommends adding seven new, standard size (as described by the ACRP Report) parking positions to bring current capacity (14 spaces) in line with the base level activity (21 spaces needed). Four additional standard size spots should be added before 2027 to align with PAL 1 (25 spaces needed). However, there is the possibility that if new capacity is added, demand would continue to increase until it matches the available parking, thus requiring a re-evaluation of parking capacity should this occur.

These calculations did not take into account the preferential leasing of four remote parking spots during the winter, starting in 2024. There is insufficient data at this time to determine how preferential leases impact overall capacity.

By only building enough parking to accommodate current demand, ANC has no capacity to accommodate congestion caused by winter weather. Additional contingency parking should be developed over and above what is needed for current demand.

APPENDIX 2:
CENTRALIZED DEICING FACILITY ANALYSIS

Evaluating Costs & Benefits of a Centralized Deicing Facility at ANC

DOWL was requested to conduct a Cost-Benefit Analysis (CBA) for a centralized deicing facility (CDF) at Ted Stevens Anchorage International Airport (ANC) as part of the Winter Storm Efficiency Study. A full, in-depth CBA would require more data collection/analysis and time than the current scope accommodates. To provide an initial analysis of the costs and benefits of a CDF, a Strengths, Weaknesses, Opportunities, and Challenges (SWOC) analysis was conducted. Identifying the strengths, weaknesses, opportunities, and challenges of a CDF may help ANC determine whether a more detailed CBA and further consideration of a CDF would be merited.

Problem Statement

The current configuration and limitations of deicing space and procedures at ANC are causing cargo and passenger flight departure delays, apron congestion, and ultimately diverted flights during winter storm events. When deicing is conducted at gates and remote parking spots, those spaces are unavailable for other aircraft until deicing is complete. Incoming aircraft must be accommodated elsewhere until the space is free. Ultimately, ANC runs out of parking spots and if temporary contingency spaces are also occupied, aircraft will be diverted. The objective of this analysis is to determine whether construction and implementation of a centralized deicing facility with modified deicing procedures would reduce delays and congestion and prevent diverted flights during winter storm events.

Objectives

- Preserve ANC capacity during winter storm events.
- Reduce delay and congestion associated with deicing operations during winter storm events.
- Prevent the diversion of scheduled flights.
- Free up gate and remote parking spots earlier.
- Reduce time to taxi to runway, thus using less holdover time for taxiing.
- Improve efficiency of deicing operations.
- Maintain airport operational safety during winter storm events.
- Improve resilience of the airport to severe weather conditions.
- Improve passenger and cargo experience.
- Improve activity in the National Airspace System by reducing delays and diversions at ANC.

Assumptions

- Carriers would prefer to wait on the ground at ANC for extended periods rather than be diverted.
- Cargo activity will continue to increase over the Master Plan horizon.

- Winter storm (and other severe weather) events are becoming more common.
- ANC can accommodate current cargo traffic during routing weather conditions within an acceptable level of delay.
- The ability to sustain capacity and accommodate growth at ANC during increasingly common severe weather events could influence carriers' and cargo operators' decisions about operating at and investing in ANC.

At this level of investigation, the SWOC analysis (included in Section 2.6.4 of the main Study report) indicates that, while there are many potential benefits of a CDF, the CDF is not a clear solution to the delay and diversion issues encountered during winter storm events. Key considerations:

- The cost to construct and operate a CDF may not outweigh the losses due to delays and diversions.
- There are no current suitable locations for a CDF. Space currently occupied by other facilities would need to be repurposed.
- The CDF would present new operational changes for carriers and ANC.
- The CDF would not fully resolve the delay and backlog experienced during winter storm events as additional parking spots would still be needed. ANC and private entities are already planning to add additional aircraft parking spots.
- At this point, it may be more beneficial to pursue construction of additional parking spots and consider a CDF in further planning work.

If a full CBA is desired, the value of reduced delay/diversion would need to be evaluated against the cost to construct and operate the CDF over a specified evaluation period. Information needed to complete this level of analysis would include:

- Identification of the "base case" conditions and actions ANC would employ to address delay during winter storms without construction of a CDF (i.e., the operational, procedural, and infrastructure changes ANC would take in absence of CDF).
- Determination of how the CDF would be funded (e.g., PFCs, AIP).
- Total planning, design, and construction costs of the CDF (inclusive of glycol collection system, any glycol storage on CDF, lighting, and other components).
- Annual operating and maintenance costs of the CDF (inclusive of any investments in technology required to operate the CDF).
- Determination of the evaluation period. FAA generally uses an economic life span of 20 years beyond the completion of construction for major airport infrastructure projects.
- Establish how many times per year a winter storm event could be expected.
- The results of the CBA of Diversion Plans, conducted by Ricondo.

- Total aircraft, passenger, and cargo delay experienced during historical winter storm events (likely could be estimated through use of BTS T-100 statistics in combination with FAA's Aviation System Performance Metrics [ASPM] data but may need additional input from ANC).
- Current aircraft traffic throughput capacity of ANC during winter storm events.
- Expected aircraft traffic throughput capacity at ANC with construction of CDF.
- Current and forecast winter activity levels.
- Total existing and planned constructed parking spots and on-demand parking created during storm events (e.g., closure of a runway to create parking).

APPENDIX 3:

ANC WINTER CONTINGENCY PARKING GUIDE & FAI CONTINGENCY PARKING PLAN

Note: This is a sample document. Please refer to the master document for the most current version of parking guides

ANC Winter Contingency Parking Guide – key things to consider and know:

- Maintaining a 3-runway configuration is the most efficient and effective way to operate during inclement weather.
- Normal winter operations are arrivals on Runway (RW) 7L/7R and departures on RW 33.
    - RW 7R is the most capable Instrument Flight Rules (IFR)-landing runway.
    - Arrivals on RW 25R/L or RW 33 are not viable during snow events as they are Visual Flight Rules (VFR)-only approaches.
    - A RW 15 straight (arrivals and departures) configuration is likely to have significant air traffic control (ATC) and runway snow clearing delays such that the departure rate during a snow event is likely to match the arrival rate and not result in the need for contingency parking.
    - With RW 15 arrivals and RW 25L/R departures, the arrival rate may be slow enough to match the departure rate during all but the most severe storms.
    - RW 25L or 25R departures remove the practicality of holding aircraft even for short durations on Taxiway (TW) Kilo East.
- Parked aircraft:
    - Aircraft can move on/off of parking space
- Holding aircraft on the ground:
    - Crew can move aircraft and coordinate in real time with air traffic control tower (ATCT).
    - Engines are running (or able to restart without assistance).
- Shutdown aircraft:
    - Engines are shutdown with no intent for current crew to restart.
    - Aircraft have crews on-board who need extracting, wheels need chocked, etc.
- TWs Uniform and Yankee must be open to the extent practical to support bi-directional traffic on TW Romeo.
- TW Kilo East should remain clear of holding or parked aircraft to the maximum extent possible to allow aircraft to exit 7L and East Airpark tenants to access their leaseholds.
- Taxiways are not wide enough to maneuver around the wingtip of wide body aircraft during snow events. Aircraft parked nose-to-tail along a taxiway are not accessible by Ground Support Equipment (GSE) or emergency vehicles.

When parking aircraft on the new Zulu taxiway between TWs Echo and Romeo, it is preferable to keep Romeo between 7R and 7L cleared of snow so aircraft exiting South Airpark at Romeo can cross the parallels (7R/7L) directly without having to back taxi on 7R.

Phase 0 Storm Event (no delays, no alternate parking needed)

- Normal arrival/departures (arrive on 7L/7R and depart on 33).
- Airfield maintenance teams can maintain all surfaces.
- R4, B10 and portion of N2 reserved for temporary snow piles.
- N6 reserved for international passenger flight divert or regularly scheduled passenger charter operations.
- N1 reserved for narrow body aircraft and business jet Customs clearance operations.

Phase 1 (delays are occurring, alternate parking required)

- Normal arrivals/departures: arrive on 7R/7L and depart on 33.
- Airfield maintenance teams can maintain all runways.
- R4 and portion of N2 reserved for temporary snow pile.
- N6 reserved for international passenger flight divert or regularly scheduled passenger charter operations.
- N1 reserved for narrow-body aircraft and business jet US Customs clearance operations.
- Utilize TW Y for temporary holding of aircraft in a north-to-south configuration.
- Move aircraft from TW Y to Airport-administered parking spots as parked aircraft depart.
- Temporarily close secondary taxiways (TW J, TW W, TW Y south of K, and TW R between Kilo and 7R).

Phase 2 (increased delays, additional alternate parking required, ATC increases arrival rate)

- Normal arrivals/departures; airfield maintenance teams can maintain all runways.
- R4 and portion of N2 reserved for temporary snow pile.
- Secondary taxiways closed; primary taxiways can be maintained if parked aircraft are moved or as required to extract crew.
- Utilize TL P, TL G1 (between TL M and TL V), and TW Z for additional parking.
- Utilize TW K, beginning east of TW D for additional temporary parking once TW Y is full.
    - *Note: If aircraft are held east of TW B, this will eventually result in closure of RW 7L due to lack of taxiway space for aircraft existing 7L at TW A.*
- Move aircraft to airport-administered parking spots as parked aircraft depart.
    - *Note: TW Y could have a mixture of holding and shutdown aircraft that may require towing to move.*
- R2 or R3 becomes temporary snow storage as aircraft depart.

Phase 3 (possible diversions, arrival restrictions)

- Normal arrivals/departures; airfield maintenance teams can maintain all runways.
- R2, R3, R4, and N2 reserved for temporary snow piles.
- Secondary taxiways closed; primary taxiways can be maintained if parked aircraft are moved or as required to extract crew.
- Consider not maintaining N1, N3, and N5.
- Some parked aircraft can move in/out of spaces.
- Move aircraft to airport-administered parking spots as parked aircraft depart.
- Utilize space along TW Y, TW K, TL P, TL G1 (between TL M and TL V), and TW Z as it becomes available.
- Utilize TW M and TL G1 (beginning south of TL M) for aircraft parking.
- Begin to consider diversions and/or arrival restrictions.

Phase 4 of a Storm Event (diversions and/or runway closures)

- Operations restricted; arrival restrictions in effect and diversions likely.
- RW 7L closed by Notice to Airmen/Air Missions (NOTAM) only, as no X can be placed due to weather conditions and airfield maintenance concentration on snow/ice removal. Operations confirm with FAA ATC that approach aides to 7L (especially approach lights and ILS) are turned off.
- R2, R3, R4, and N2 reserved for temporary snow piles.
- Secondary taxiways and spots N1 – N5 not maintained; primary taxiways can be maintained if parked aircraft are moved.
- Utilize space along Y, K, P, G1, M, and Z as they become available; move aircraft to airport-administered spots as parked aircraft depart.
- While Airfield Maintenance is performing snow removal:
  - *RW 7R (~30 minutes), all arrivals must hold in-air (e.g., circle in a holding pattern or divert if low on gas).*
  - *RW 33 (~30 minutes), all departures are held.*
  - Utilize 7L, beginning east to west, for additional parking.
  - *Note: As aircraft are parked further west on 7L, do not interfere with aircraft exiting from 7R.*

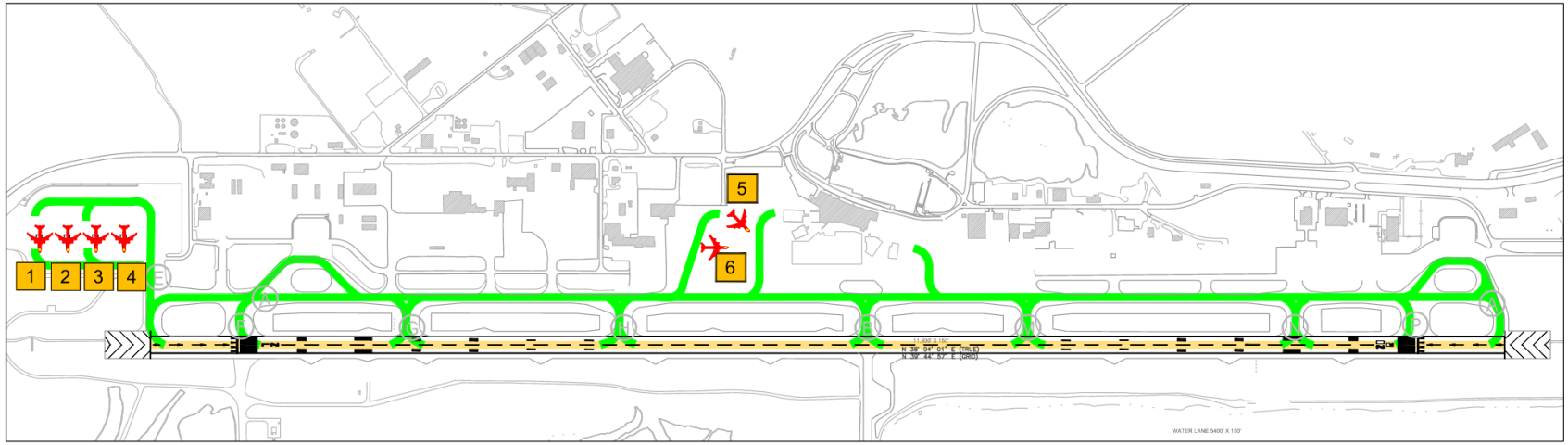
Note: This is a sample document. Please refer to the master document for the most current version of parking guides

FAI Diversion Parking Plan

FAI Diversion Parking Plan

Phase 0 (no delays or alternate parking needed)

- Normal arrivals/departures.
- Airfield maintenance can maintain all runways and taxiways.
- Parked aircraft can move in/out of spaces.



Phase 0: #1-6 Airport Administered Parking Pads

LEGEND

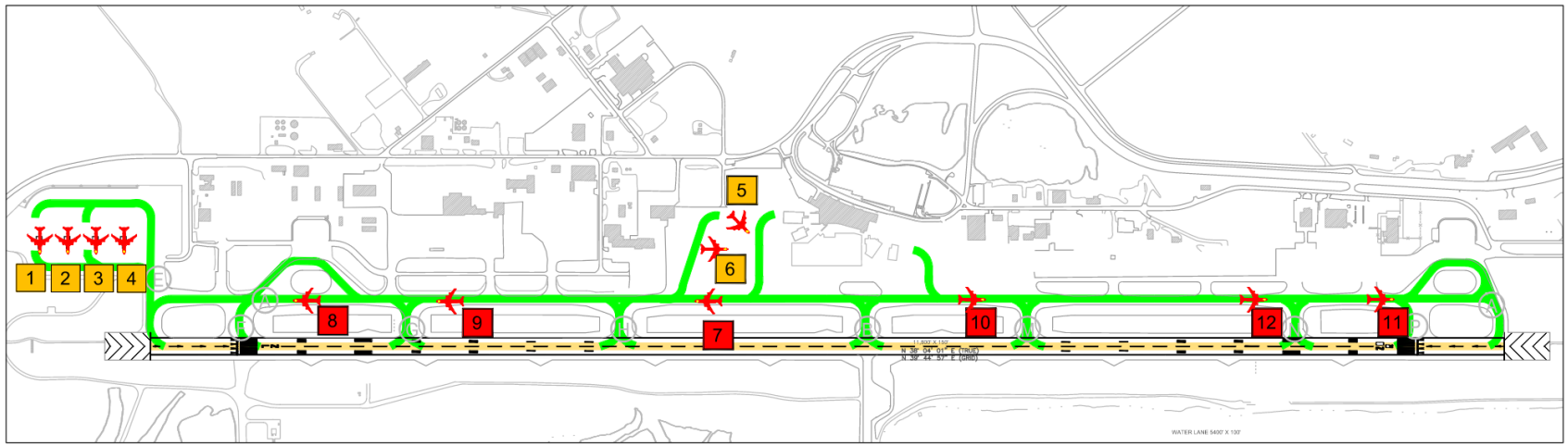
Aircraft Group VI Taxi Routes

Runway 2L–20R

FAI Diversion Parking Plan

Phase 1 (delays are occurring, alternate parking required)

- Normal arrivals/departures.
- Airfield maintenance teams can maintain all runways.
- Parked aircraft can move in/out of spaces.
- Primary taxiways can be maintained if parked aircraft are moved or as required to extract crew.
- Utilize TW A between cross taxiways for temporary parking (as indicated in #s 7 – 12 below).



Phase 0: #1-6 Airport Administered Parking Pads

Phase 1: #7-12 TWY Alpha Parking. Everyone Can Get Out.

LEGEND

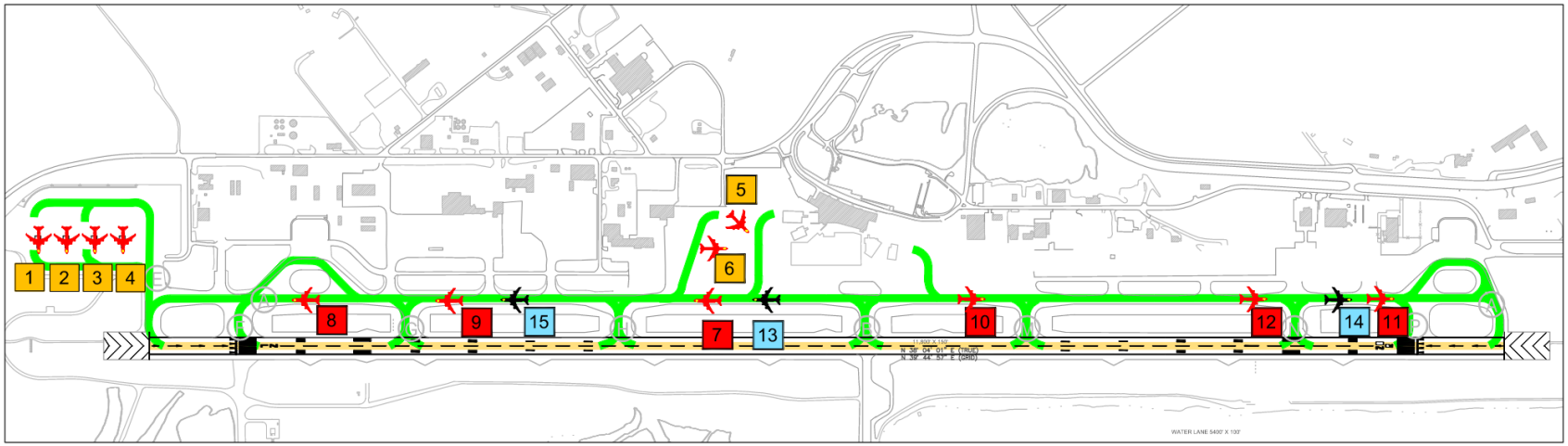
Aircraft Group VI Taxi Routes

Runway 2L–20R

FAI Diversion Parking Plan

Phase 2 (additional alternate parking required)

- Normal arrivals/departures.
- Airfield maintenance teams can maintain all runways.
- Utilize TW A between cross taxiways for temporary parking.
- Some parked aircraft can move in/out of spaces.
- Primary taxiways can be maintained if parked aircraft are moved or as required to extract crew.
- Utilize additional space along TW A (#s13 – 15 below).
    - *Note: This will block these aircraft movements.*



Phase 0: #1-6 Airport Administered Parking Pads

Phase 1: #7-12 TWY Alpha Parking. Everyone Can Get Out.

Phase 2: #13-15 TWY Alpha Parking. Blocked In By Aircraft.

LEGEND

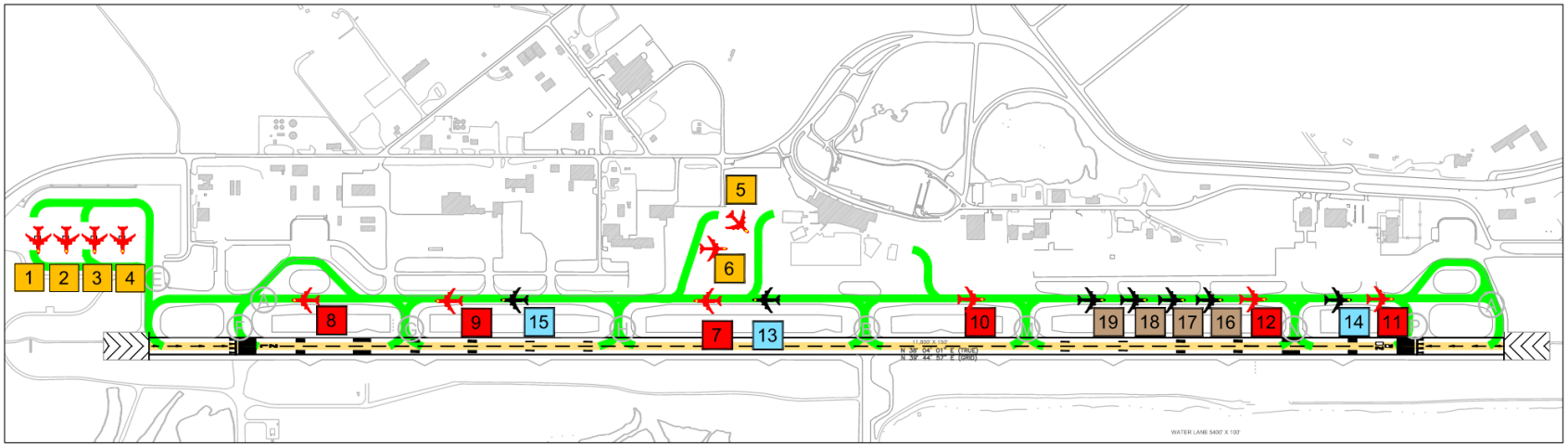
Aircraft Group VI Taxi Routes

Runway 2L–20R

FAI Diversion Parking Plan

Phase 3 (additional alternate parking required)

- Airfield maintenance teams can maintain all runways; primary taxiways can be maintained if parked aircraft are moved or as required to extract crew.
- Some parked aircraft can move in/out of spaces.
- Utilize TW A between cross taxiways for temporary parking.
- Utilize additional space along TW A (#s16 – 19 below).
    - *Note: This will block these aircraft movements.*



Phase 0: #1-6 Airport Administered Parking Pads

Phase 1: #7-12 TWY Alpha Parking. Everyone Can Get Out.

Phase 2: #13-15 TWY Alpha Parking. Blocked In By Aircraft.

Phase 3: #16-19 TWY Alpha Parking. Blocked In By Aircraft.

LEGEND

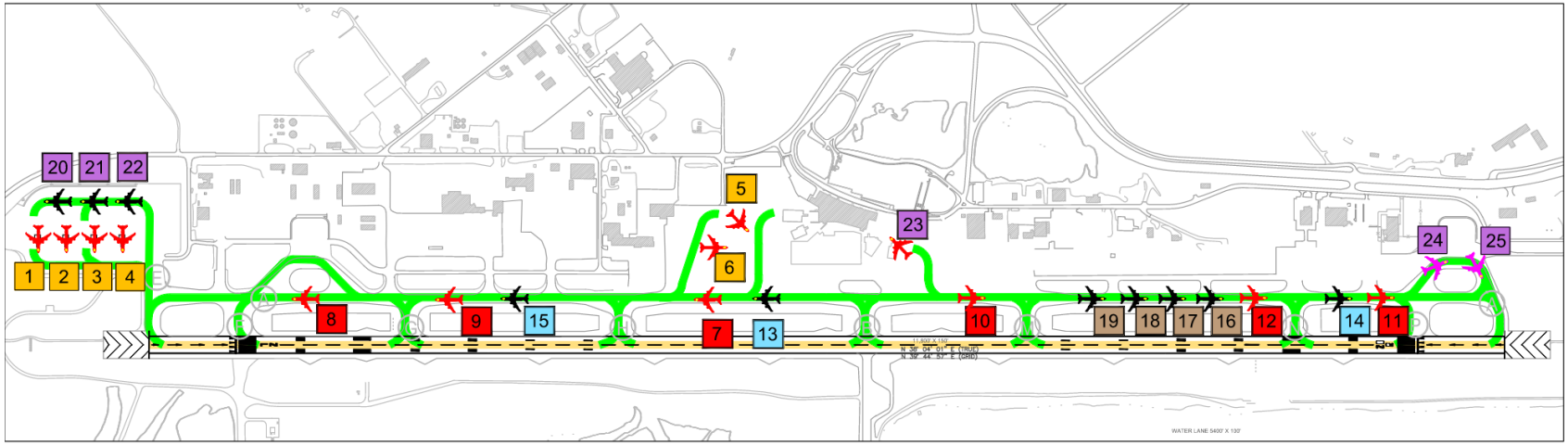
Aircraft Group VI Taxi Routes

Runway 2L–20R

FAI Diversion Parking Plan

Phase 4 (additional alternate parking required – *only available during summer*)

- Airfield maintenance teams can maintain all runways; primary taxiways can be maintained if parked aircraft are moved or as required to extract crew.
- Some parked aircraft can move in/out of spaces.
- Utilize TW A between cross taxiways for temporary parking.
- Utilize additional space along TW A (#s 20 – 25 below).
    - *Note: These spaces are only available for temporary, additional parking in the summer.*



Phase 0: #1-6 Airport Administered Parking Pads

Phase 1: #7-12 TWY Alpha Parking. Everyone Can Get Out.

Phase 2: #13-15 TWY Alpha Parking. Blocked In By Aircraft.

Phase 3: #16-19 TWY Alpha Parking. Blocked In By Aircraft.

Phase 4: #20-23 & 24-25 *Summer Only* Additional Airport Parking

LEGEND

Aircraft Group VI Taxi Routes

Runway 2L–20R

24 & 25 Summer use only