Ted Stevens
Anchorage International Airport

AIRFIELD MAINTENANCE

LANDSIDE

WINTER OPERATIONS

Manual

TABLE OF CONTENTS

Section 1 Overview & Priorities

1.1 Areas/Dimensions in Need of Service

- Roads & Road Miles
- Parking Lot Sq. Ft. & No. of Spaces
- Walkway Dimensions

1.2 Priorities

1.3 Maps of Landside Areas

Section 2 Safety

- Personnel Safety
- Vehicle safety
- Public Safety

Section 3 Principles of Snow & Ice Control

3.1 Principles of Snow Removal

3.2 Principles of Ice Control

3.3 Surface Treatment Options and Considerations

- Liquid vs. Solid Treatment
- Traction Sand
- Cost
- Environmental Considerations
- Calibration

Figure 1. Guidance on various surface treatment options/application rates

Figure 2. Surface treatment quantities needed to cover ANC parking lot aisles
Figure 3 Quantities of solid deicer recommended for various walkways/sidewalks
Figure 4. Flow chart for anti-icing

Section 4 Equipment

- Hand tool and Small Equipt. Inventory List
- Vehicle and Heavy Equipt. Inventory List

Section 5 Observation & Documentation

Section 6 Barricades and Traffic Control

Section 7 Snow Hauling Operations

- Landside Snow Dump Locations
- Preferred Haul Routes/Access in Parking Lots (North and South Terminal)

Section 8 Conclusion

1. Overview

Effective snow and ice control within an airport environment goes beyond keeping runways, taxiways, and ramp surfaces clear. Equally critical is maintaining safe and reliable winter conditions on the surrounding roads, walkways, and parking areas—commonly known as "Landside" spaces which lie outside the Airport Operations Area (AOA). Proper maintenance of these areas ensures the safe and efficient movement of passengers, employees, cargo, supplies, and emergency services to and from the airport.

The purpose of this manual is to establish best practices and guidelines for snow and ice control on Anchorage International Airport (ANC) Landside surfaces which fall under the responsibility of ANC's Airfield Maintenance Section (AFM). These areas include:

- Public Roads (Over 40 lane miles)
- Vehicle Parking Lots (Over 1 million square feet of pavement with over 2,500 uncovered parking spaces)
- Sidewalks, Walkways, and Bike Paths (Over 3 miles)

Some of the public roads leading to and surrounding the airfield are maintained by the Municipality of Anchorage and/or the Alaska Department of Transportation. See Sections 1.2

and 1.3 which outline AFM responsibilities.

Many car parking areas located on airport property are maintained by airport tenants rather than AFM personnel. See Section 1.3 for clarification.

This manual considers various roads, paths, and lots surrounding the Lake Hood Seaplane Base (LHD), but snow and ice control on the Lake Hood Strip (Runway 14/32), small aircraft parking surfaces, and Lake Hood surfaces will not be covered in the following text.

The general principles within this manual apply to the following entities: AFM employees, contractors directly commissioned by AFM, or a combination of the two. Contractors/contracted employees will be supplied with additional guidelines beyond this publication to address the expectations within contractual agreements.

The overriding goal of Landside winter operations is to ensure surfaces are snow/ice free, safe for vehicle and pedestrian travel, and, whenever possible, “no worse than wet”.

This publication supersedes all previous AFM manuals related to Landside snow and ice control.

1.1 Areas/Dimension in Need of Service

The charts below show approximate dimensions of Landside areas the Airfield Maintenance Section (AFM) is responsible for maintaining.

- Roads/Road Miles
- Parking Lot Dimensions & Spaces
- Sidewalk/Walkway Dimensions

ANC Lansdise Road Miles (Approximate)

	Miles in Need of Service	Approx. # Lanes	Lane Miles
General			
Postmark 1 (N. end)	2.29	3	6.87
Post Mark 2 (S. end)	0.5	3	1.5
Boeing Ave.	0.1	2	0.2
North Term. Rd. Loop 1	0.25	3	0.75
North Term. Rd. Loop 2	0.16	2	0.32
W. Intl' Airport Rd. 1	1.34	2	2.68
W. Intl' Airport Rd. 2	1	2	2
W. Intl' Airport Rd. 3	0.1	2	0.2
W. 50th. Ave.	0.7	2	1.4
DeHavilland Ave.	0.3	2	0.6
North Tug Rd. 1	1.2	2	2.4
North Tug Rd. 2	0.21	2	0.42
Old Intl' Airport Rd.	1.15	2	2.3
S. Aircraft Dr. 1	0.27	2	0.54
S. Aircraft Dr. 2	0.01	2	0.02
Tower Rd. & C Plaza	0.35	2	0.7
Terminal Connector Rd.	0.1	2	0.2
Rockwell Ave.	0.1	2	0.2
N17 Gate Rd.	0.1	2	0.2
Cab Overflow Rd. 1	0.18	2	0.36
Cab Overflow Rd. 2	0.1	2	0.2
Lake Hood Complex			
Lake Hood Dr.	1	2	2
Aircraft Dr.	1	2	2
Lakeshore Dr.	1	2	2
Helio Pl.	0.14	2	0.28
Lockheed Ave.	0.3	2	0.6
Tom Wardleigh Ave.	0.17	2	0.34
Lear Ct.	0.23	2	0.46
Rutan Pl.	0.1	2	0.2
Heliport Pl.	0.01	2	0.02
Aviation Ave.	0.67	2	1.34
Vought Cir.	0.01	2	0.02
Kulis/South Airpark			
Malone St.	0.43	2	0.86
Cicardo Ave.	0.14	2	0.28
Carl Brady Dr.	0.5	2	1
Test Dr.	0.22	2	0.44
Denali View Wy. 1	0.11	2	0.22
Denali View Wy. 2	0.1	2	0.2
Fox Run Wy.	0.18	2	0.36
Kulis Dr. 1	0.47	2	0.94
Kulis Dr. 2	0.1	2	0.2
Captain Hill Ct.	0.14	2	0.28
S. Airpark Pl.	0.52	2	1.04
Totals	**18.05**		**39.14**

ANC Parking Lot Dimensions/Spaces

Lot Designation	Lot Name	*Number of Parking Spaces	Approx. TOTAL Pavement Square Footage
A	Lot A/ N. Term. Employee	186	92,556
B	Lot B/ N. Term. Public	184	97,517
C	Lot C/Projects Lot	N/A	37,418
D	Lot D/ S. Term. Employee Parking	888	328,948
E	Lot E/ S. Term. Long Term Parking (North)	887	227,265
F	Lot F/ S. Term. Long Term Parking (South)		125,139
G	Lot G/ Garage Roof	332	109,079
H	Lot H/ S. Term. Overflow	83	28,154
N/A	AFM Employee Parking Lot	73	29,160
		2633	**1,075,236**

* During Summer Months

ANC Sidewalk/Walkway Dimensions (Approximate)

South Terminal	Approximate Linear Path Length	Approx. Area to be Treated (Sq ft.)
UPPER-LEVEL (DEPART. RAMP) NORTH OF DOOR #1	300	5,000
UPPER-LEVEL (DEPART. RAMP) SOUTH OF DOOR #1	820	7,000
COMMERCIAL CURB NORTH	600	15,600
COMMERCIAL CURB SOUTH	400	10,400
C PLAZA/C-9 ACCESS	230	1,400
UNDER RAILROAD BRIDGE	950	12,000
EMPLOYEE PARKING ACCESS CORRIDOR (*UNCOVERED/EXPOSED PORTIONS)	2300	10,000
LONG TERM WALKWAYS	400	4,000
WALKWAY TO OLD INT'L BUSINESS PARK	900	8,000
North Terminal		
EMPLOYEE PARKING ACCESS WALKWAY	100	2,300
MAIN CURB	450	6,400
COMMERCIAL CURB	330	4,200
Other		
AFM EMPLOYEE PARKING WALKWAY	350	3,000
Totals	**8,130**	**89,300**

1.2 Priorities

In order to make efficient use of available resources and meet the most critical needs of ANC employees and tenants, the following priorities have been established in order of importance. Adjustments to these priorities may occur due to variables such as extreme weather events, resource availability, construction, and other factors. Airfield Maintenance (AFM) Foreman and/or AFM Management shall determine where and when significant deviations from the following priorities take place.

Road Priorities
(See maps below for guidance)

1. Postmark Dr, Rockwell Av, Lockheed Av, and Boeing Ln
2. International Airport Rd./South Terminal Loop/Entrance Exit Ramps
3. North Terminal Road/Loop
4. Loading Dock area at South Terminal
5. Lake Hood Drive
6. Old International, West 50th Ave. and South Aircraft Drive
7. All remaining roads around Lake Hood
8. South Airpark Roads
9. (Former) Kulis Air Base Roads

Parking Lot Priorities
(See maps below for guidance)

1. South Terminal Employee Lot (Lot D)
2. Upper Level/Roof of Parking Garage

(Lot G)
3. Approaches to and from Lots and Exit/Entrance gates
4. South Terminal Long Term Parking Lots (Lots E & F)
5. Overflow Lot (Lot H)
6. North Terminal Employee Lot (Lot A)
7. North Terminal Pay Lot (Lot B)
8. Parking Authority Office Lot
9. AFM Employee Lot
10. *Contractor/Projects Lot (Lot C) *Only when specifically requested by AFM Management

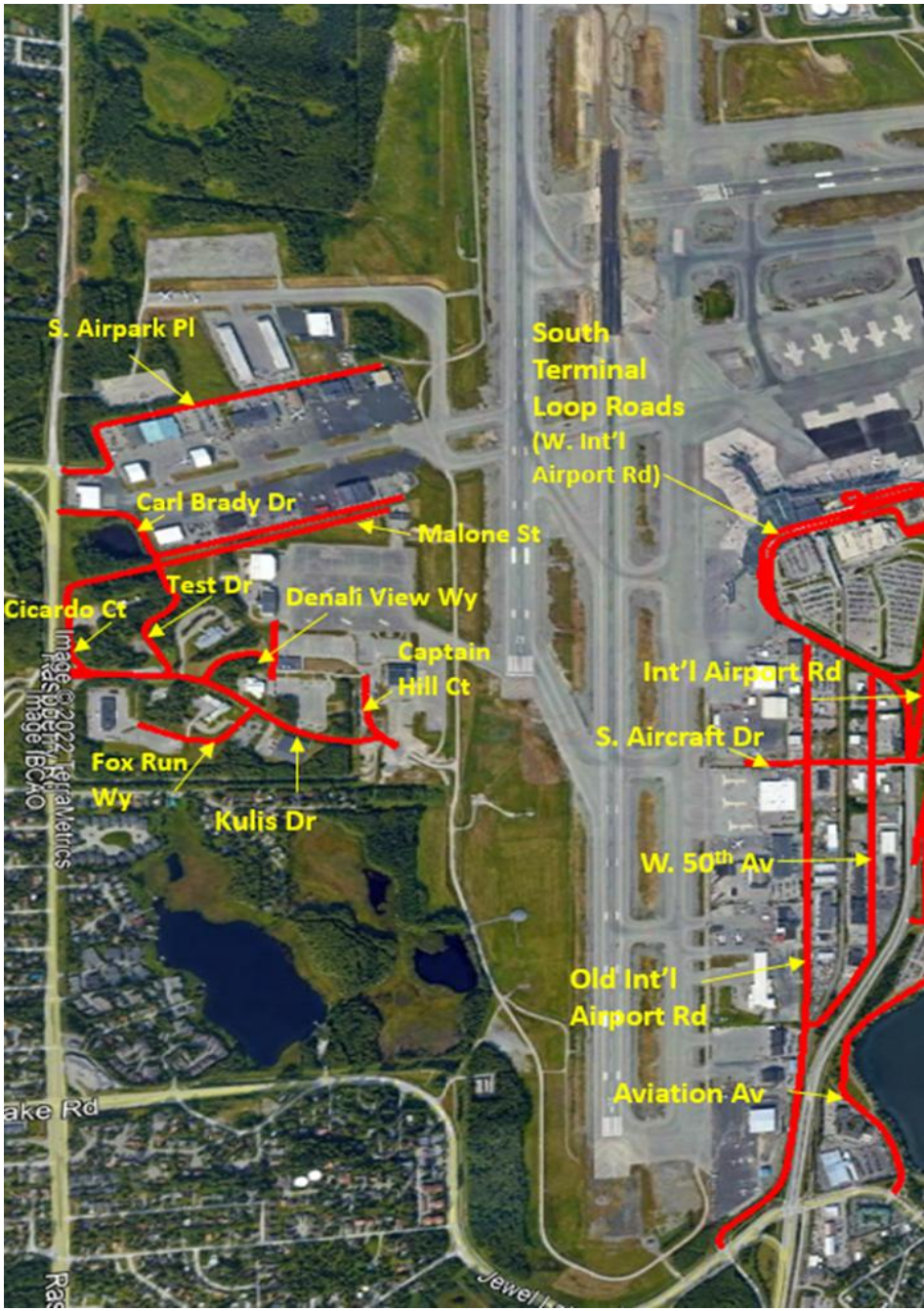
Sidewalk, Walkway & Bike Path Priorities
(See maps below for guidance)

1. ADA Ramps and Parking for Those with Disabilities
2. South Terminal Upper-Level (Departure) Walkways
3. Commercial Curb Walkways
4. South Terminal Employee Parking Access Corridor
5. The C-9 Door Walkway (Adjacent to ANC Staff Offices)
6. North Terminal Walkways and Associated Crosswalks
7. Walkway to the Old International Airport Road Business Park
8. Field Maintenance Facility Sidewalks
9. Bike Paths Adjacent to Postmark Dr.
10. Bike Paths Adjacent to Lakeshore Dr.

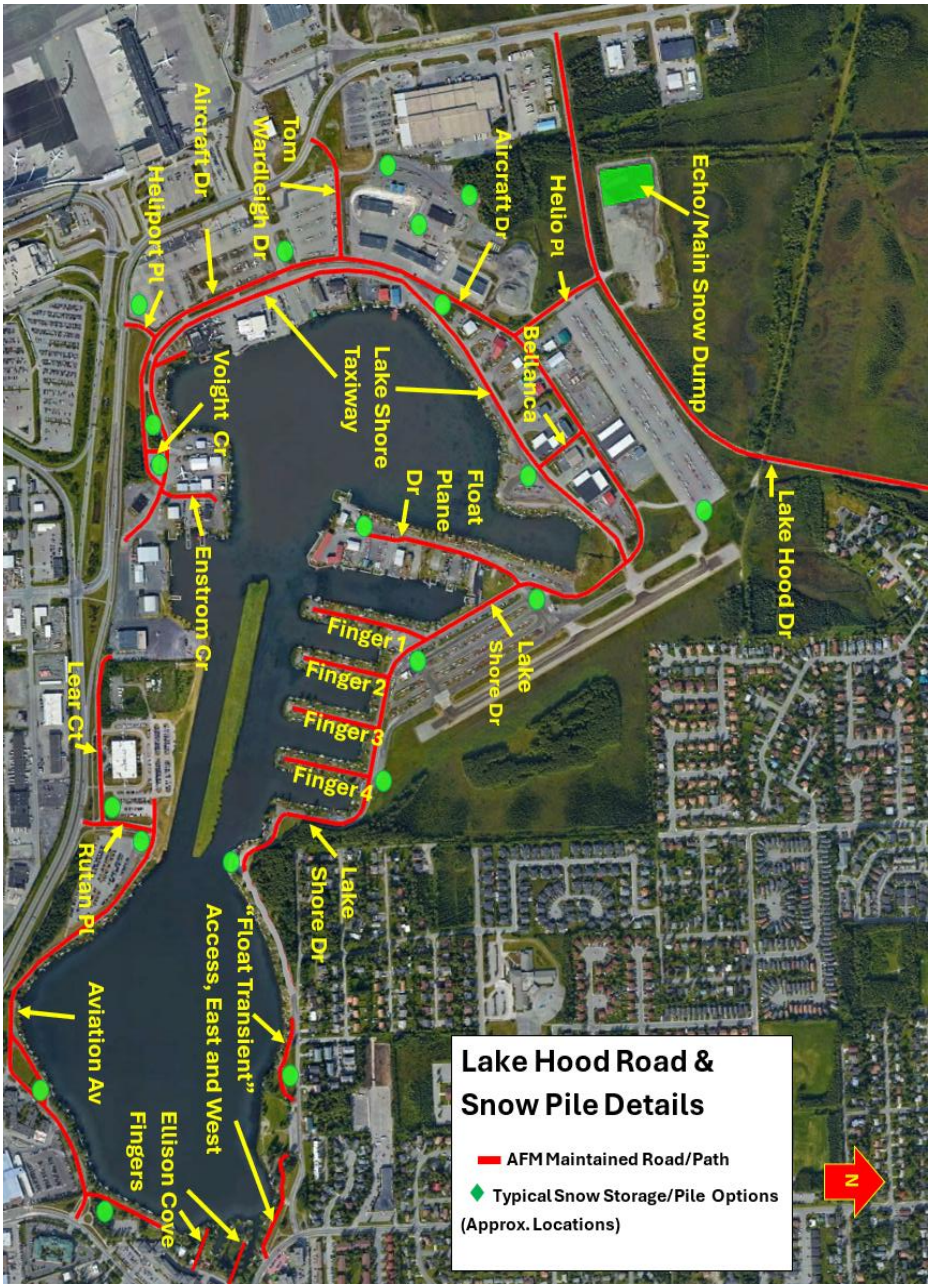
1.3 Maps of Various Landside Areas

The following maps show AFM areas of responsibility for winter maintenance as well as typical locations for temporary snow storage (snow piles).

- Landside Roads North/South
- Lake Hood Road Details
- Parking Lots North/South
- Sidewalks/Walkways North Terminal/South Terminal
- Bike Paths

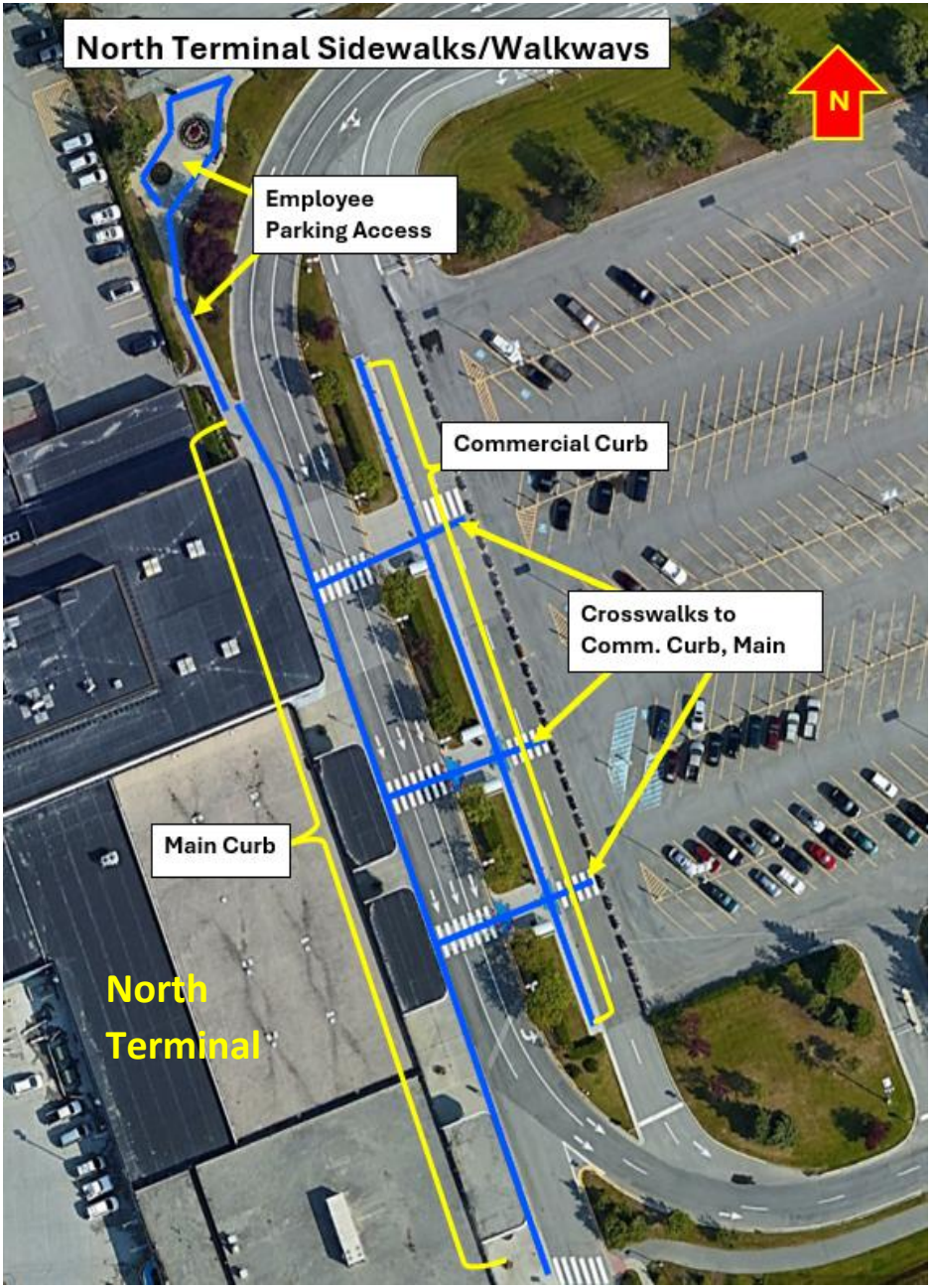

S. Airpark Pl
South Terminal Loop Roads (W. Int'l Airport Rd)
Carl Brady Dr
Malone St
Test Dr
Denali View Wy
Cicardo Ct
Captain Hill Ct
Int'l Airport Rd
S. Aircraft Dr
Fox Run Wy
Kulis Dr
W. 50th Av
Old Int'l Airport Rd
Aviation Av
Image ©2022 TerraMetrics
Image BCAO

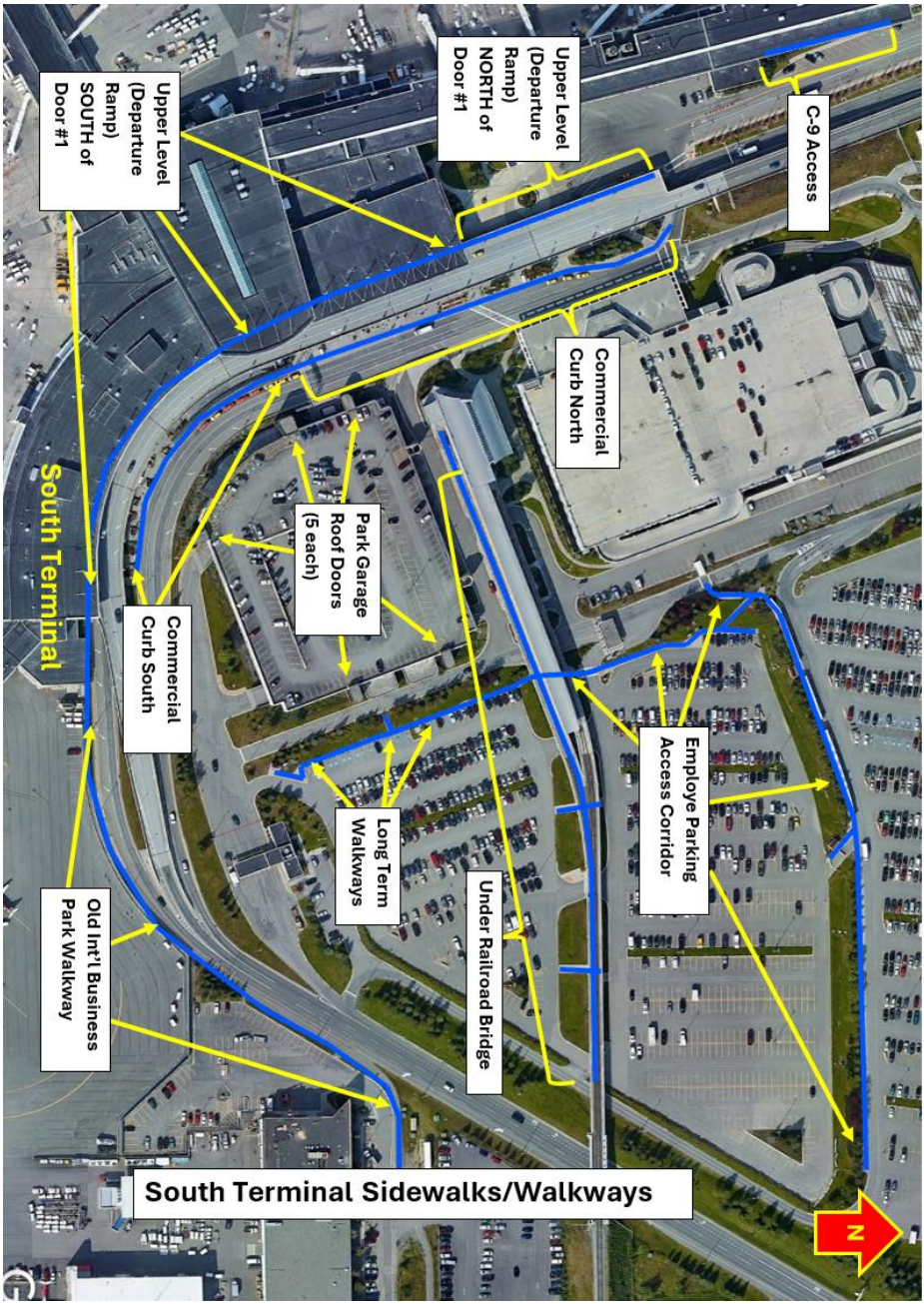

N
Lockheed Av
North Tug Rd
Boeing Ln
Rockwell Av
DeHavilland Av
Tower Rd
Postmark Dr
Tom Wardleigh Dr
Heliport Pl
Helio Pl
Lake Hood Dr
Post-Mark Dr
Aircraft Dr
Float Pane Dr
Int'l Airport Rd
Lear Ct
Lake Shore Dr
Rutan Pl
Landside Roads

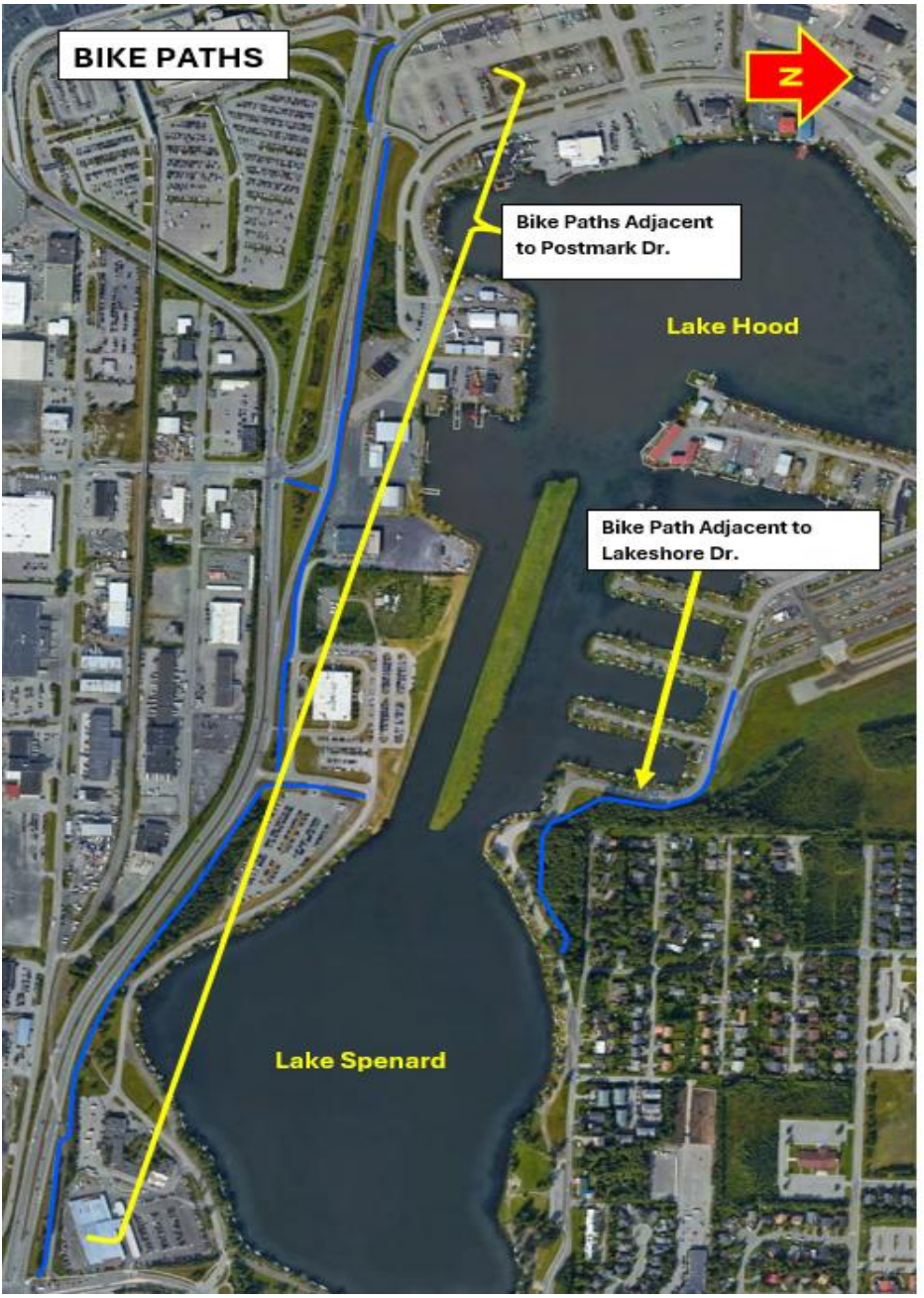

Lake Hood Road &
Snow Pile Details
AFM Maintained Road/Path
Typical Snow Storage/Pile Options
(Approx. Locations)
N
Echo/Main Snow Dump
Lake Hood Dr
Helio Pl
Aircraft Dr
Bellanca
Tom Wardleigh Dr
Aircraft Dr
Heliport Pl
Lake Shore Taxiway
Voight Cr
Float Plane Dr
Enstrom Cr
Finger 1
Finger 2
Finger 3
Finger 4
Lake Shore Dr
Lear Ct
Rutan Pl
Lake Shore Dr
"Float Transient" Access, East and West
Aviation Av
Ellison Cove Fingers


AFM
Employee
Lot
Postmark Drive
N
Lot A
(N. Term Employee)
North Terminal
Lot B
(N. Term Pay Lot)
Car Parking lots, North
Snow piles (approx. location)
Lot C
(Projects lot)


N
Int'l Airport Road
Lot D
(S. Term. Employee)
Lot
H
Lot E
(Long Term)
Lot F
(Long Term)
Park. Authority
Offices Lot
Lot G
(Garage Roof)
ANC South
Terminal
Car Parking Lots, South
Snow Piles (approx. location)


North Terminal Sidewalks/Walkways
N
Employee Parking Access
Commercial Curb
Crosswalks to Comm. Curb, Main
Main Curb
North Terminal


C-9 Access
Upper Level (Departure Ramp) NORTH of Door #1
Upper Level (Departure Ramp) SOUTH of Door #1
Commercial Curb North
Park Garage Roof Doors (5 each)
Commercial Curb South
South Terminal
Employe Parking Access Corridor
Long Term Walkways
Under Railroad Bridge
Old Int'l Business Park Walkway
South Terminal Sidewalks/Walkways
N


BIKE PATHS
N
Bike Paths Adjacent to Postmark Dr.
Lake Hood
Bike Path Adjacent to Lakeshore Dr.
Lake Spenard

2. Safety

FOR EMERGENCIES, IMMEDIATELY CALL
ANC AIRPORT POLICE & FIRE DISPATCH: 907-266-2555

SAFETY for MAINTENANCE PERSONNEL

Personnel engaged in landside snow and ice control face a number of hazards including, but not limited to:

- Vehicular Traffic
- Slips/Trips Falls
- Power tool hazards
- Material Handling (sprains, strains, etc.)

The Airfield Maintenance Safety and Health Plan and ADOT&PF/AFM Task Analyses and Hazard Assessments address each of these hazards and should be reviewed frequently with particular attention to the following tasks/subjects:

- Broom (Powered Walk-Behind)
- Cold Weather Safety
- Equipment Mounting/Dismounting
- Hand Tools, Power and Manual
- Lifting, Manual
- Loader (SEE Backhoe & Loader)
- Sander/Sand Truck
- Sign Installation
- Snow Plow
- Trailers and Towed Equipment

- Trucks (Dump, Tractor, Crew Cab and Flatbed)

PPE (Personal Protective Equipment)
Standard PPE for landside snow and ice control includes:

- ANSI 107 Class 2 or 3 Reflective vest or jacket
- Sturdy, safety toe work boots (non-safety toe boots such as “bunny boots” or snowpacks are acceptable for extreme cold)
- Insulated gloves
- Ice cleats (when performing snow and ice control on foot for extended periods)
- Safety glasses (when flying debris hazards are present, i.e. snow blower, powered broom)
- Hearing protection (while operating walk-behind snow blowers or powered brooms)
- Insulated and/or waterproof clothing appropriate for temperatures/conditions

VEHICLE SAFETY

- Speed Limits must be strictly observed
- Beacons/strobes and Backup Alarms must be fully functional and utilized at all times
- Seatbelts are required at all times

PUBLIC SAFETY

The primary goal of snow and ice control in landside areas is to ensure the safe movement of vehicles and pedestrians. To achieve this, it

is essential to systematically observe and promptly address slippery surfaces. The ideal outcome for paved areas is to maintain conditions that are “no worse than wet.” If this standard cannot be met, the use of traction sand may be necessary. See section 3 regarding snow and ice control.

Extreme caution is required while operating vehicles or powered equipment around the traveling public. Never assume pedestrians see or understand the intentions of snow removal equipment and/or personnel. **Pedestrians always have the right of way.** Backup alarms and beacons must be operational at all times. **Snow removal equipment must maintain at least one foot and up to several feet of clearance from stationary objects such as gate installations, buildings, utilities, etc. and parked or moving vehicles.**

Correct hazards immediately when possible. Hazards that can’t be corrected on the spot should be marked/barricaded as appropriate. Report all hazards to AFM Foremen as soon as possible.

3. Principles of Snow & Ice Control

3.1 PRINCIPLES of SNOW REMOVAL

Effective and timely snow removal is crucial in the overall effort to achieve “no worse than wet” pavement surfaces. The more effective and timely snow removal is, the less time and effort will be required for ice control. If deicing (see definition in section 3.2) is required, it’s important to remove as much snow (or other similar contaminants such as slush or sleet) as possible before chemical surface treatments are applied. Snow removal operations may be performed in conjunction with ice control activities at times, but, in general, snow plowing/clearing happens *prior to* deicing.

The depth of snow accumulation, weather forecasts, availability of resources, and traffic volumes will dictate when and how snow removal operations take place. If/when resources are available, snow removal (plowing, shoveling, sweeping, or snow blowing) should commence as soon as possible, but may be postponed for a period of time to let a storm pass or further develop. *In most cases, snow removal*

should not be delayed once accumulation reaches 1.5"-2". During continuous snowfall, removal will take place as needed to keep accumulation to a minimum. AFM Foremen and/or Management will direct the overall timing and nature of landside snow removal operations based on conditions.

Once removal starts, snow and similar contaminants should be moved methodically toward designated storage piles.

Clearance: All snow removal equipment must maintain at least one foot and up to several feet of clearance from parked vehicles, moving vehicles, and other sensitive stationary objects, above ground utilities, and gate/fence structures.

Curb structures, uneven surfaces, and in-pavement utilities can be challenging to avoid during snow removal, but utmost care must be taken when working near these obstructions. Sectional plow attachments designed to move/give way to in-pavement obstructions shall be used in parking lots when feasible.

Snow/Contaminants on sidewalks may be moved/swept/shoveled into parking lanes where vehicle-mounted snowplow equipment can further push it into designated piles.
Snow/Contaminants on parking lot surfaces

should be gathered and pushed directly into established piles.

Snow/Contaminants on roadways will generally be pushed into berms on one or both sides of the roadway and at least two feet outside of the road edge lines (fog lines).

Snow piles will ultimately be transported to permanent snow dump locations (see section 7 for guidance) once resources (i.e. loaders and haul trucks) become available or when piles become so large that they threaten to restrict vehicular traffic.

"Sectional plow attachments designed to move/give way to in-pavement obstructions shall be used in parking lots when feasible."

3.2 PRINCIPLES of ICE CONTROL

Ice control involves the prevention of ice formation and, when necessary, removal of ice. Effective ice control requires:
A. Effective snow removal. Effective snow removal will result in more efficient, and less expensive ice control.
B. Proper selection and application of surface treatments. Proper selection and application of surface treatments requires an understanding of a number of terms and variables explained in the pages below.

Terms/Definitions:

Surface Treatment is the term used for materials (liquid or solid/granular) applied to surfaces in order to prevent ice, eliminate ice, or increase the surface friction of ice.

Anti-icing is the first step in effective ice control. The term "anti-icing" generally refers to the use of chemical surface treatments, pre-storm, to prevent snow/ice contaminants from bonding to pavement surfaces. Anti-icing is an extremely important consideration in advance of freezing rain events. Ensuring surfaces are promptly plowed after snow events is also crucial to ice prevention efforts. See Figure 4 at the end of this section for additional guidance on anti-icing.

Pre-Wetting is the process of adding an

approved liquid deicer to granular material in order to improve performance. Pre-wetting "activates" solid deicer compounds and makes them work faster. Pre-wetting has also been shown to reduce the amount of solid material needed as it allows the material to stick to the intended surface vs. scattering into ditches/roadsides. *When rock salt is applied as a deicer, it should always be pre-wetted when feasible.*

Deicing is the process of removing ice after it's bonded to surfaces. It may occur through mechanical means such as plowing/ scraping/grading or through chemical methods. Ice removal can be challenging and time consuming. *The best way to avoid ice removal is to prevent it from forming in the first place.*

"The overriding goal of Landside winter operations is to ensure the areas identified within this publication are snow/ice free, safe for vehicle and pedestrian travel, and, whenever possible, **"no worse than wet".**

3.3 Surface Treatment Options and Considerations

Chemical ice treatments

Chemical ice treatments work by lowering the freezing point of water allowing ice to melt at colder temperatures. They fall into two categories: Solid (AKA “Granular”) and Liquid.

Solid/Granular Chemicals

Solids/granulars can be a cost-effective option with excellent “burn through” properties under the right conditions. Solids will not work effectively without moisture. Note: *Spreading dry granular deicers on very cold surfaces in very dry (low humidity) conditions will result in little chemical reaction and very little ice melting*. Acceptable landside solid chemical treatments include:

- Rock salt (Sodium Chloride)
- Sodium Formate
- Calcium Chloride
- Magnesium Chloride
- Potassium Chloride
- Blends of various chemicals listed above

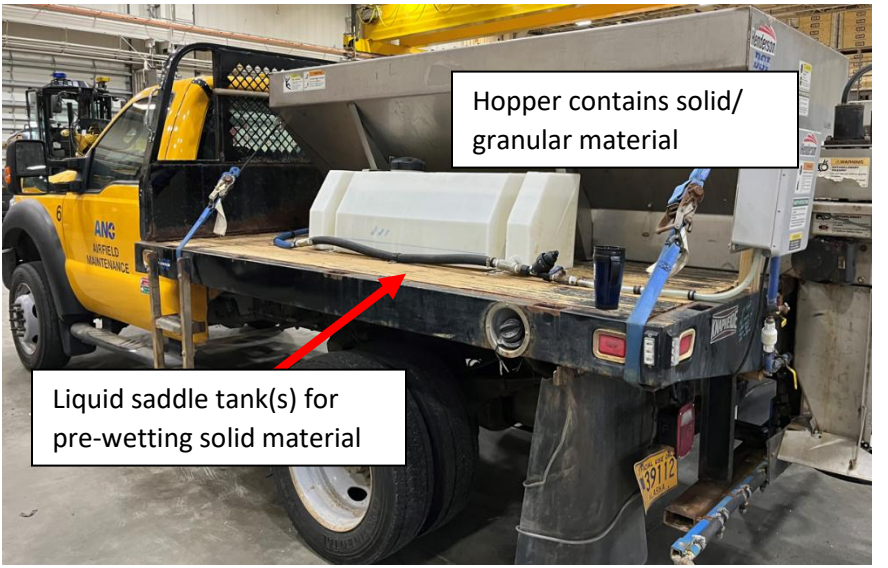
Liquid Chemicals

Liquid chemicals tend to work faster than dry/solid chemicals alone and often continue working at lower temperatures when conditions are cold and dry, but liquids have a limited ability to burn/cut through thick ice.

Liquids can also be more challenging to transport, store, and distribute. Acceptable liquid chemical treatments include:

- Calcium Chloride Liquid, sometimes referred to as “Brine” (70% water/23-30% Calcium Chloride)
- Potassium Acetate (50% water/50% Pot. Acet.)

Industry best practices and many recent cases studies strongly suggest that a combination of solids and liquids is the best approach.



Typical landside surface treatment-spreader vehicle.

Liquid vs. Solid Deicer	Pros	Cons
Solid	• May be more cost effective than liquid (depends on product) • Better ability to "burn through" thick ice, once activated • Easy to distribute (no pumps, sprayers needed)	• Needs moisture to activate (not effective in very dry environments) • Solids can bounce and scatter into ditches/roadsides during distribution and/or may be displaced easily by traffic, wind, etc.
Liquid	• Activates faster than solid (immediate) • Often works better at colder temperatures • Sticks to surfaces vs. bouncing/ scattering	• Dilutes and washes away easily in rain/high moisture environments • Can cause greater hazards (more slippery conditions) when applied directly to thick ice

Traction Sand

Traction sand used in landside areas is often referred to as “road sand”. Road sand is stored separately from and created differently than airfield/”runway sand”. Road sand cannot be used within most of the Airport Operations Area (AOA). Road sand is blended in various configurations (course or fine) depending on conditions. The table below shows a typical configuration.

Traction Aggregate Specifications	
Sieve Designation	**% Passing by Weight**
3/8”	100
#4	70-100
#8	0-35
#16	0-10
#30	0-5
#200	0-1

When applied to icy surfaces, sand can be an effective treatment to increase surface friction. At times, ice prevention or ice removal isn’t practical (i.e. surface temperatures too cold or other treatment options/resources aren’t available) and the application of traction sand will be necessary in order to support safe vehicle and pedestrian movement. Sand is the preferred surface treatment on gravel surfaces/roads because deicers may “eat into” or soften the frozen roadbed, but the use of traction sand should be minimized on paved surfaces when effective chemical deicer methods are feasible.

Sand may also be used at times to absorb water and “dry out” surfaces when necessary (note: sand should be swept up/removed as soon as possible when used as a drying agent).

Blending Deicers with Sand

Solid and liquid deicing chemicals may be added to sand in order to prevent freezing/clumping or to help sand penetrate and “stick” better. A 10% mixture of solid or liquid deicing chemical is generally all that’s needed to prevent sand from freezing/clumping.

Blending more than 10% deicer with road sand (such as a 50/50 salt/sand mixture) may prove to be wasteful. Rather than getting the benefits of both products, sand can get buried in a slushy mixture as salt melts the surface layer, negating the intended purpose of sand.

Surface Treatment Costs

As with most aspects of airfield/landside maintenance operations, cost is an important factor to consider. The following table shows recent costs of various surface treatments.

Surface Treatment	Approx. Cost per Pound (2024)
Rock Salt (Solid)	$ .10
Sodium Formate (Solid)	$ 1.10
Sidewalk Ice Melter (Solid)	$ .35
Road Sand	$ .01
Calcium Chloride (Liquid)	$ .20
Potassium Acetate (Liquid)	$ .67

Beyond price per pound, one must consider the *quantity* of each treatment needed per square foot to effectively control ice.

Environmental Impacts/Structural Impacts
Overuse of surface treatment products is not only wasteful and costly; it might have other damaging, irreversible consequences. For instance, too much salt and salt/chloride-containing material can be harmful to surrounding plant life, aquatic life, ground/drinking water and is potentially detrimental to concrete and metal structures. A careful balance must be maintained between traffic/pedestrian safety and environmental and infrastructure preservation.

Surface treatments should never be applied beyond recommended application rates and should not be dispersed on surfaces other than established roads/paths/walkways.

Salt/chlorides should never be sprayed or scattered directly on grass/plants/trees/shrubs or metal-containing objects such as vehicles, ticket gates, and barricades. Salt/chlorides should not be used on parking garage surfaces including the upper level of the ANC garage (roof).

Selecting and Applying the Proper Treatment

Selection of the proper surface treatment should take all above-mentioned variables into consideration. Ice control materials should be applied in accordance with manufacturer's recommendations and established industry standards.

Application rates may vary depending upon the type of storm, surface temperatures, moisture levels, and other variables. *Applying more than the recommended rates will NOT improve or "speed up" ice melting*.

Knowing approximate surface temperatures is key to selecting the proper treatment. The warmer the temperatures, the faster chemical treatments will work, and, in general, less is needed. A handheld infrared sensor or truck mounted sensor must be used to determine surface temperatures.

"Knowing approximate surface temperatures is key to selecting the proper treatment… A handheld infrared sensor or truck mounted sensor must be used to determine surface temperatures."

Calibrating Spreaders and Sprayers

Periodic calibration of surface treatment distribution equipment is crucial in order to get an accurate assessment of the actual quantities of solid and/or liquid treatments being applied.

From small, manual push behind spreaders to multi-yard spreaders mounted on heavy trucks to liquid deicer tankers holding thousands of gallons, all makes and models of equipment have an applicable calibration procedure.

Much of AFM's surface treatment fleet contains electronic displays and/or controls which notify

the operator how much material is being distributed, but without proper initial and periodic calibration in accordance with manufacturer's specifications, the overall accuracy of electronically reported quantities/rates can't be trusted. AFM mechanics and deicing equipment operators must work together to ensure equipment is properly and regularly calibrated to prevent over/under application.

Figure 1 below offers further guidance on various surface treatment options, application rates and special instructions.

Figure 2 below shows approximate surface treatment quantities needed to cover ANC parking lot aisles

Figure 3 below offers guidance on quantities of solid deicer recommended for various walkways/sidewalks

Figure 4 flow chart below provides guidance on when to use liquid anti-icing methods

AFM Surface Treatment Options/Guidance

Product	Effective Minimum Surface Temperature Range	Standard Application Rates	Where to Use	Notes
Solid/Granular Surface Treatments				
Rock Salt pre-wetted w/ Calcium Chloride "Brine" *1*	0° F *when pre-wetted*. Dry rock salt only effective down to 15°	• 0°-15° F, Use 3-5 Lbs./1,000 Sqft. • 15°-25° F, Use 2-4 Lbs./1,000 Sqft. • 25°-32° F, Use 1-2 Lbs./ 1,000 Sqft.	Parking Lots A-F & H. DO NOT USE ON PARKING GARAGE STRUCTURE (Lot G)	Prewet w/approx. 20-40 gallons liquid per Yard of Rock Salt. When possible, Rock Salt should always be pre-wetted.
Sidewalk/Walkway Granular Ice-Melter *2*	-20° F	Use approximately 8 Lbs./1000 Sqft.	All Sidewalks/Walkways	Using sidewalk ice melter on larger surfaces such as parking lanes is cost prohibitive.
Sodium Formate (SF) Solid Deicer *3*	0° F	*For "light ice and compacted snow"* • ≤ 14° F, Use 6-8 Lbs./1,000 Sqft. • 14°-23° F, Use 4-6 Lbs./1,000 Sqft. • 23°-25° F, Use 2-4 Lbs./1,000 Sqft.	May be Use anywhere including Parking Garage (see Special Instructions)	In most cases, Rock Salt is preferred over SF for landside applications due to cost considerations.
Road Sand	All Temps.	20-50 Lbs./1,000 Sqft.	May be used anywhere	The use of traction sand should be minimized when/where effective chemical deicer methods are feasible.
Liquid Surface Treatments				
Calcium Chloride Liquid "Brine" (25% solution)	0° F	40 gallons/Acre for Anti-icing	Parking Lots A-F & H. DO NOT USE ON PARKING GARAGE STRUCTURE (Lot G)	Straight Calcium Chloride liquid is primarily used as an anti-icing agent. It's also effective as a pre-wetting agent/additive to Rock Salt.
Potassium Acetate Liquid (50% solution) *4*	-25° F	.5-1 gallon/1,000 Sqft.	May be Use anywhere including Parking Garage (see Notes)	In most cases, Calcium Chloride is preferred over Potass. Acet. For landside

Figure 1

1 Based on various recommendations from "Wisconsin Salt Wise-Winter Maintenance Manual"

2 Rate based on experience. Various Ice Melter recommendation may differ from these recommendations.

3 NASi/SF Ecoway recommendation

4 NASi/Alpine RF-11 recommendation

Figure 2

PARKING LOT Surface Treatment Quantities, Approximate (*For Main Lanes/Aisles Only)

Parking Lot Description	Areas			LIQUID Gallons Needed @ Various Rates for ANTI-ICING (Not Pre-Wetting)			SOLID Rock Salt Needed @ Various Rates (Pre-Wetted at 20-40 Gallons Liquid per Yard)						Traction Sand	
	Linear Path Thru Main Aisles (ft.)	Avg. Width of Path (ft.)	Area to be Treated (Sq ft.)	30 Gals./Acre (0.75 Gals./1000 sqft.)	40 Gals./Acre (0.92 Gals./1000 sqft.)	50 Gals./Acre (1.15 Gals./1000 sqft.)	88 Lbs./Acre (2 Lbs./1000 sqft.)		175 Lbs./Acre (4 lbs./1000 sqft.)		260 Lbs./Acre (6 lbs./1000 sqft.)		1,300 Lbs./Acre (30 lbs./1000 sqft.)	
							Pounds	Yards	Pounds	Yards	Pounds	Yards	Pounds	Yards
Lot A (N. Term Employee)	1,443	25	36,075	25	33	41	72.15	0.03	144.30	0.1	216	0.1	1,082	0.4
Lot B (N. Term Pay Lot)	3,821	25	95,525	66	88	110	191.05	0.1	382.1	0.2	573.15	0.3	2,866	1.0
Lot D (S. Term Employee)	7,417	25	185,425	128	170	213	370.85	0.2	741.7	0.3	1112.55	0.5	5,563	1.9
Lot E (Long Term Lot)	4,908	25	122,700	85	113	141	245.4	0.1	490.8	0.2	736.2	0.3	3,681	1.2
Lot F (Long Term Lot)	3,587	25	89,675	62	82	103	179.35	0.1	358.7	0.2	538.05	0.2	2,690	0.9
Lot H (Overflow/Oversize)	625	25	15,625	11	14	18	31.25	0.0	62.5	0.0	93.75	0.0	469	0.2
S. Term Lot Exit Area	918	25	22,950	16	21	26	45.9	0.0	91.8	0.0	137.7	0.1	689	0.2
Total	22,719	25	567,975	391	522	652	1135.95	0.5	2271.9	1.1	3407.85	1.6	17,039	5.7

*Lot G (Parking Garage) Receives NO Salt or Salt Brine

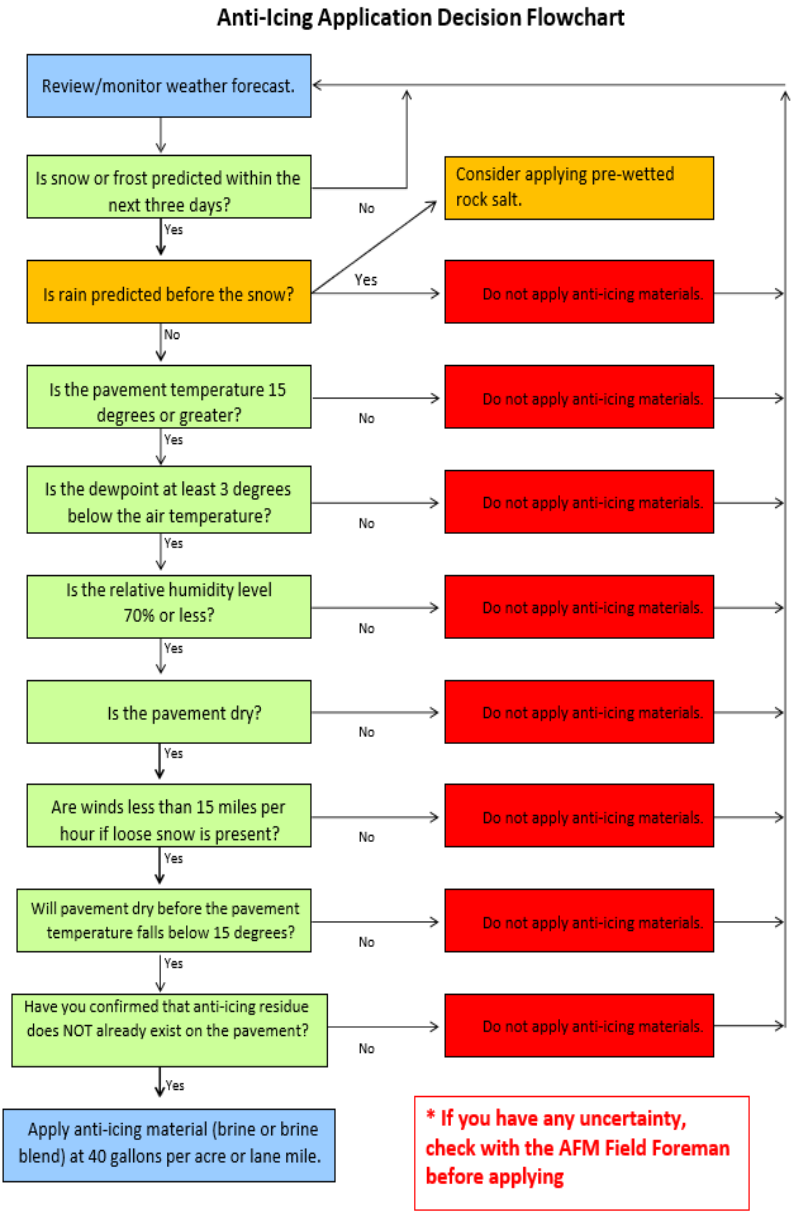
**Lot C (Projects Lot) Generally Not in Use

Figure 3

SIDEWALK/WALKWAY Treatment (Ice Melt) Quantites, APPROXIMATE

South Terminal	Approx. Area to be Treated (Sq ft.)	Bags Ice Melt Needed @ Approx. 8 Lbs. per 1000 Sqft. (50 lb. Bags)
UPPER-LEVEL (DEPART. RAMP) NORTH OF DOOR #1	5,000	0.8
UPPER-LEVEL (DEPART. RAMP) SOUTH OF DOOR #1	7,000	1.1
COMMERCIAL CURB NORTH	15,600	2.5
COMMERCIAL CURB SOUTH	10,400	1.7
C PLAZA/C-9 ACCESS	1,400	0.2
UNDER RAILROAD BRIDGE	12,000	1.9
EMPLOYEE PARKING ACCESS CORRIDOR (*UNCOVERED/EXPOSED PORTIONS)	10,000	1.6
LONG TERM WALKWAYS	4,000	1
WALKWAY TO OLD INT'L BUSINESS PARK	8,000	No Ice Melt
North Terminal		
EMPLOYEE PARKING ACCESS WALKWAY	2,300	0.4
MAIN CURB	6,400	1.0
COMMERCIAL CURB	4,200	0.7
Totals	86,300	12.5
Other		
AFM EMPLOYEE PARKING WALKWAY	3,000	0.5
Totals	**136,200**	**25.5**

Figure 4


Anti-Icing Application Decision Flowchart
Review/monitor weather forecast.
Is snow or frost predicted within the next three days?
No
Consider applying pre-wetted rock salt.
Yes
Is rain predicted before the snow?
Yes
Do not apply anti-icing materials.
No
Is the pavement temperature 15 degrees or greater?
No
Do not apply anti-icing materials.
Yes
Is the dewpoint at least 3 degrees below the air temperature?
No
Do not apply anti-icing materials.
Yes
Is the relative humidity level 70% or less?
No
Do not apply anti-icing materials.
Yes
Is the pavement dry?
No
Do not apply anti-icing materials.
Yes
Are winds less than 15 miles per hour if loose snow is present?
No
Do not apply anti-icing materials.
Yes
Will pavement dry before the pavement temperature falls below 15 degrees?
No
Do not apply anti-icing materials.
Yes
Have you confirmed that anti-icing residue does NOT already exist on the pavement?
No
Do not apply anti-icing materials.
Yes
Apply anti-icing material (brine or brine blend) at 40 gallons per acre or lane mile.
* If you have any uncertainty, check with the AFM Field Foreman before applying

4. EQUIPMENT

Common hand tools such as shovels, chippers, and scrapers as well as heavy motorized equipment and vehicles will be required for efficient snow and ice control within ANC landside areas. The following list is a suggested inventory for hand tools and small motorized equipment:

Small Equipt. ANC Landside Snow/Ice Control	Specifications/ Notes	Optimal Inventory Quantity
Walk-Behind Snow Blowers	• 28”-32” clearing width • Wheeled and Tracked options preferred	3-4
Walk-Behind Power Brooms	• 36”-48” clearing width	3-4
Push-Behind Deicer/Sand Spreaders	120 Lb. Capacity	6
Snow Shovels	Assorted	20-30

Various light and heavy-duty vehicles will also be necessary to address parking lots and roadways. The following table identifies optimal specifications and quantities needed for efficient landside snow and ice control.

Vehicles ANC Landside Snow/Ice Control	Specifications/ Notes	Optimal Inventory Quantity
Wheel Loader for Loading/Hauling Snow with Snow Bucket	• 40,000-100,000+ lb. operating weight • 12-20 yd. snow bucket	3
Wheel Loader (mid-size) with Plow Attachments	• 20,000-30,000 lb. operating weight • 10'-14' sectional snowplow • 2-3 yard bucket	3
Compact Wheel Loader with Plow Attachments	• 10,000-15,000 lb. operating weight • 8'-10' sectional snowplow • 1-2 yard bucket	1
"Skid Steer" Compact Loader	• Bucket for stacking snow • 8'-10' snowplow	1
Municipal (bike path) tractor	• 5000-6000 lb. operating weight • 50"-70" snow blower attachment • 5'-6' angle broom/sweeper	1
Pickup Truck with Plow Attachment	• Minimum 3/4 ton chassis, 4X4 • Minimum 10,000 lb. GVWR • 8'-10' snowplow • 7' Overall Height Maximum	3
Liquid Deicer Truck (Light Duty)	• Minimum 1 ton chassis, 4X4 • 300-500 gallon capacity • Adjustable spray width up to 25' pattern	1
Solid Deicer/Sand Spreader Truck (Light Duty)	• Minimum 1 ton chassis, 4X4 • Minimum 17.500 GVWR • Minimum 2 yard capacity • Pre-wetting capable with at least 60 gallon liquid capacity	2
Solid Deicer/Sand Spreader Truck (Heavy Duty)	• Minimum 68,000 GVWR • Minimum 8 yard capacity • Pre-wetting capable with at least 100 gallon liquid capacity • Oscillating Belly blade	1
Motor Grader	• Minimum 14' moldboard • Minimum 40,000 lb. operating weight	2
"End Dump" Truck	• Minimum 68,000 GVWR • Minimum 15 yard capacity	3
Side Dump Tractor/Trailer Combination	• Minimum 108,000 GCVWR • Minimum 20 yard capacity	3

5. OBSERVATIONS & DOCUMENTATION

Careful, frequent, and systematic examinations of landside environmental conditions are crucial for successful winter operations. Observing and recording data points such as surface temperature and the nature of snow/ice accumulation not only helps determine the overall “plan of attack”, but also provides evidence of an analytical and responsible approach to snow and ice control. In the face of growing demands for higher levels of service and more professionalism in winter maintenance, public entities such as ANC must continually strive to effectively “show their work” when questioned by stakeholders.

In addition to collecting surface condition data, an accurate accounting of product use is required to ensure efficient and consistent surface treatment strategies. Solid/liquid deicer and traction sand quantities used must be accounted for every shift, every day.

The method of recording all above-related information shall be carried out through a variety of methods listed below:

The **“Landside Daily Report”** is primarily focused on the observation and treatment of sidewalk/walkway conditions . It is to be completed once per shift and turned into supervisor(s) for review.

The **“ANC Parking Lot Shift Activity Log”** is primarily focused on parking lot conditions in the main aisles and what snow and ice control activities take place on any given day or shift. The log is to be completed once per shift and submitted each day for review.

The **“Sand and Deicer Log”** is used to communicate surface treatment quantities being distributed on all ANC pavement surfaces including landside roads.

Software and other electronic solutions can be helpful in documenting some of the above-mentioned data. Technology such as GPS tracking, product usage sensors, dashcam footage, etc. shall be used as appropriate to help ensure all landside winter operations are carried out in a safe, efficient, consistent, and cost-effective manner.

6. BARRICADES, GATE ARMS & TRAFFIC CONTROL

Portable and stationary barricades, gate arms, and other temporary traffic control devices are necessary to:

- Prevent unauthorized access to ANC property/parking lots
- Prevent access to snow storage areas
- Prevent public access to areas where snow removal is underway
- Allow for safe and efficient snow hauling operations

All barricades, gate arms, traffic control devices, and associated signage must be installed, moved, and replaced with utmost care. Failure to diligently set/replace barricades, signs and other traffic control devices WILL result in significant service delays and create a serious hindrance to snow and ice control efforts.

Parking Lot Section Closures
Various sections of ANC parking lots will need to be “blocked off” periodically to enable detailed snow and ice removal. Swing gate

arms and/or other temporary traffic control devices must be maneuvered in a fashion that significantly reduces public vehicle access to the section being serviced. Signage such as the example shown will also be necessary to communicate the purpose of the closure/barricades:

The schedule and process for closing sections will vary depending on conditions, but the following guidelines will generally apply:

- Close no more than 1-2 sections per lot at a time

- Sections (except those in Lots E & F) should be closed for no more than 4 days at a time
- Sections within Lots E & F (Long Term Parking) may need to be closed longer than 4 days for effective maintenance
- Sections should be closed systematically starting with those closest to the terminal and working away (West to East)

“Swing gate arm”

Gate Arms

Numerous “gate arms” also known as “swing gate arms” or “ticket spitter arms” are located throughout ANC parking lots and must be carefully avoided to prevent costly damage and unnecessary delays. Gate arm rules of thumb:

- Nothing larger than a pickup truck should pass through ANC ticket gate entrances/exits unless no other means of access are feasible
- Spotters must be used when vehicles larger than pickup trucks must pass through ticket

gates

- If frequent travel through automated parking lot gates is required (such as with some snow hauling operations) the parking lot authority should be contacted to disable or “lock” an automated gate in the up position
- Manual swing gates must be locked in position for safety and to prevent tampering.

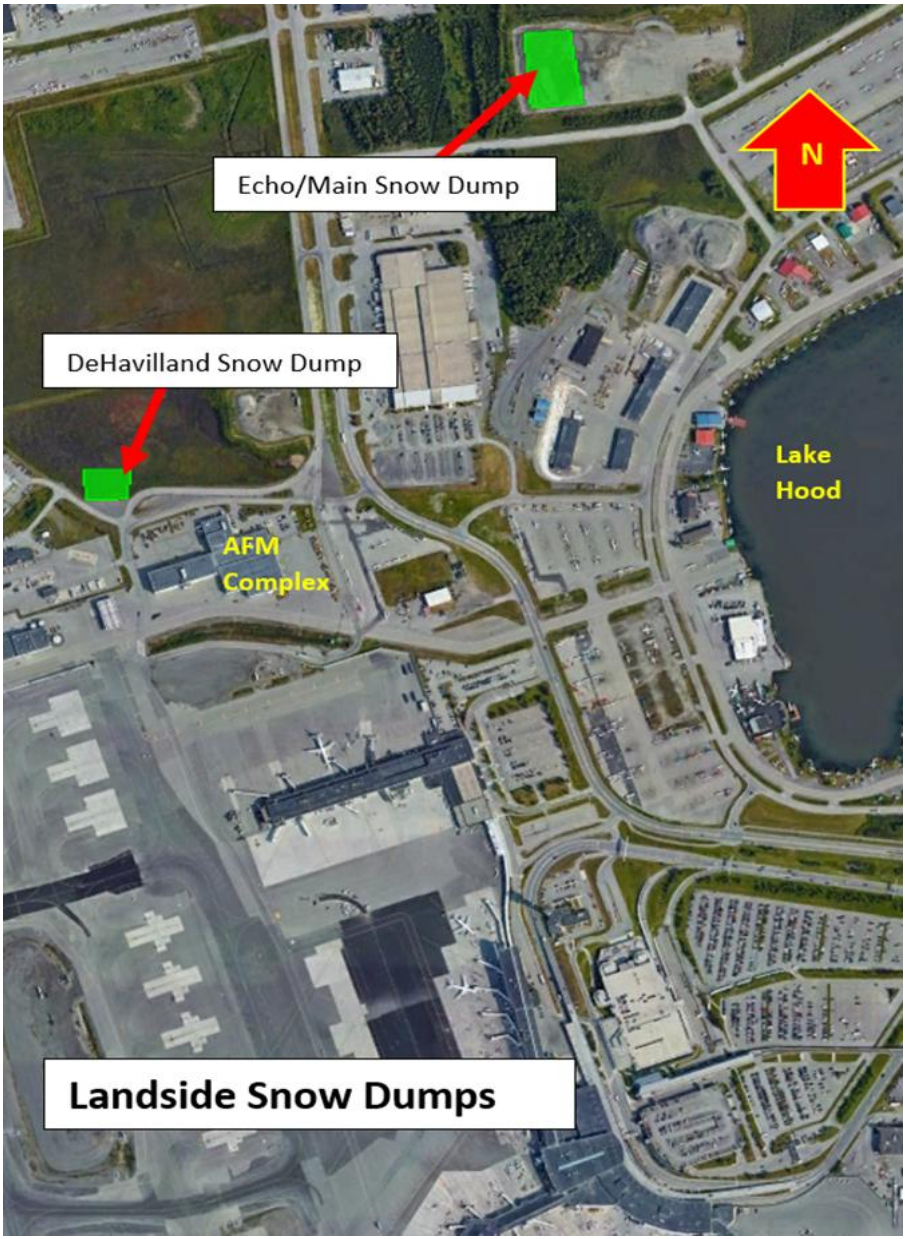
“Ticket spitter arm”

7. SNOW HAULING

Snow hauling operations will be necessary as established snow piles start to grow. Hauling should occur as time permits, but before piles grow so large that they impede traffic/access lanes. Significant snow fall/accumulation on the garage roof will generally need to be hauled immediately as it's pushed down snow chutes located at the north end of the structure. Snow may not be stored/piled on the roof due to weight considerations.

Landside snow will be hauled to one of two landside snow dumps: The DeHavilland Snow Dump or the Echo/Main Snow Dump (See map/locations below). The DeHavilland Snow Dump is closer to the primary snow piles generated in ANC parking lots; therefore it should be considered the best option. Snow collected in and around the Lake Hood complex should be transported to the Echo/Main Snow Dump.

Snow hauling strategies will vary depending on the location in which snow piles are stored. Haul routes in and out of parking lots or other areas may vary in relation to parking lot vacancy rates, road traffic, etc.


Echo/Main Snow Dump
N
DeHavilland Snow Dump
Lake
Hood
AFM
Complex
Landside Snow Dumps

The following rules of thumb apply to all hauling operations:

Assess the Area. Identify the most strategic locations for loading and dumping snow, considering access routes and potential obstructions.

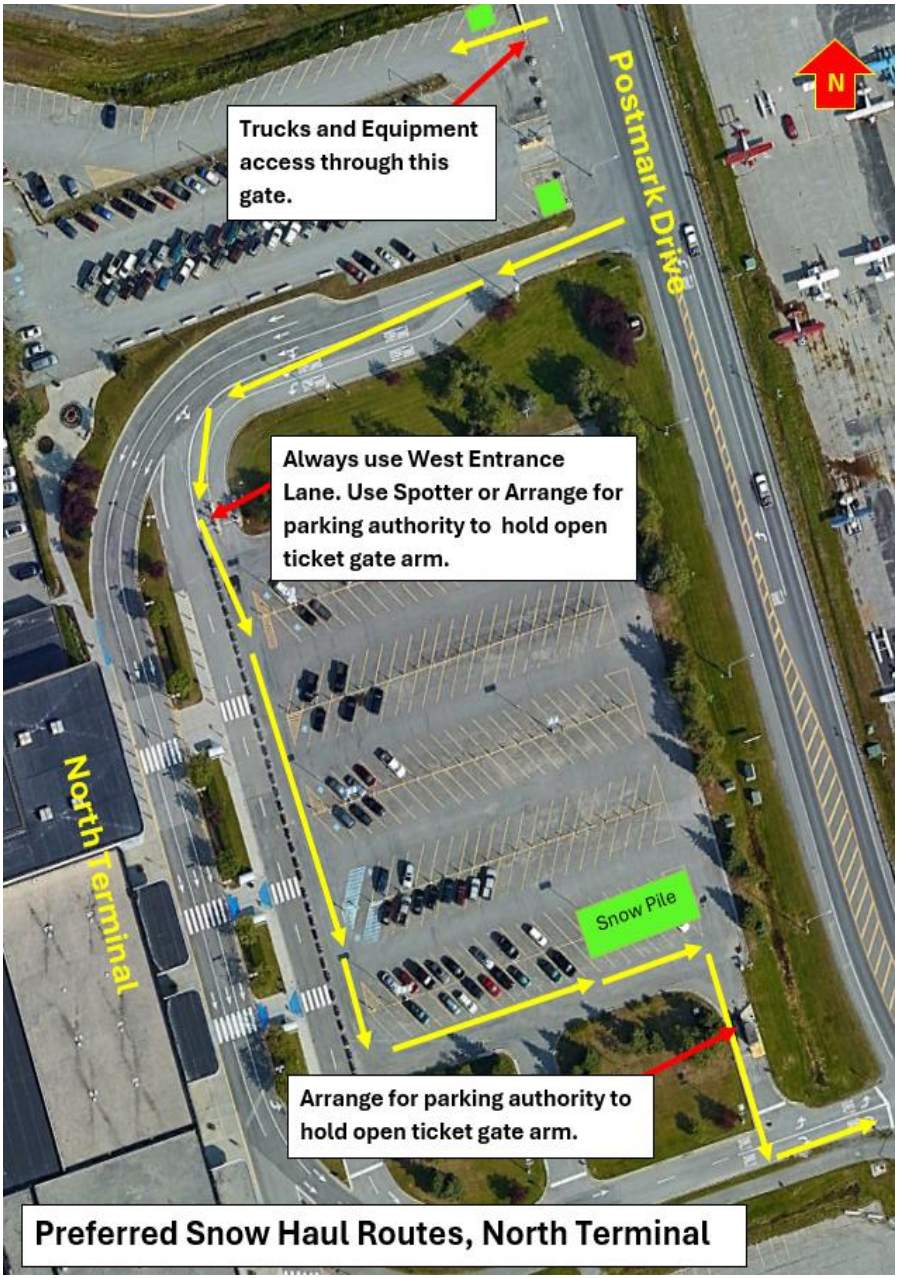
Use the Right Equipment. Load and haul with the highest volume transport vehicles and largest capacity loaders that can safely maneuver in the areas surrounding snow piles. Snow buckets with protective guards should always be used for loading AFM-owned trucks/trailers or any time there's a danger of large snow chunks rolling off the back of the bucket potentially damaging windshields or injuring the loader operator.

Snow bucket with snow guard

Side dump trailers with 20+ yard capacities should be considered the primary snow hauler, but certain parking lot areas will not permit safe passage of these large tractor-trailer units. End-dump trucks are the other option (maximum 15 cu. yd. capacity).

Do not overload trucks. If snow spills/falls out of truck/trailer beds, address it immediately to prevent damage/injury to the traveling public.

See common haul routes for parking lot piles and associated details below.


Trucks and Equipment access through this gate.
Postmark Drive
N
Always use West Entrance Lane. Use Spotter or Arrange for parking authority to hold open ticket gate arm.
North Terminal
Snow Pile
Arrange for parking authority to hold open ticket gate arm.
Preferred Snow Haul Routes, North Terminal


International Airport Road
N
Remote Cntrl. Gate Arm.
Snow Pile
Remote Cntrl. Gate Arm.
Snow Pile
Swing Gate with padlock.
Preferred Snow Haul Routes, South

8. CONCLUSION

The goal of this manual is to help ensure effective and predictable maintenance practices for the benefit of ANC, its employees, and all airport stakeholders.

The guidelines within this publication may need to be altered at times to accommodate unusual/unique weather events, emergency situations, construction, and/or resource shortages, but deviations from the standard procedures within the manual should be kept to a minimum.

This manual may be updated on an annual basis (or more frequently) as airport infrastructure evolves and/or new technologies come into play.

NOTES: