NASHUA AIRPORT AUTHORITY

SNOW AND ICE CONTROL PLAN

2016

Scope and Purpose

The safety of the airport employees and users is the highest priority of the Nashua Airport Authority (NAA). This Snow and Ice Control Plan (SICP) has been created to document how Boire Field will work toward mitigating the hazards associated with the regular annual occurrence of snow and ice accumulation. Winter snow conditions reduce traffic volumes and can impair the safety of airport operations. Severe storm conditions can force airport closures. This plan is an effort to minimize these undesirable effects on the airport and ensure as safe an operating environment as possible. The goal of the NAA is to maintain the airport surfaces in a, “no worse than wet” condition. Secondarily, this plan attempts to inform the operating public at Boire Field so they might better understand how snow removal functions are carried out. The Nashua Airport Authority recognizes and understands the need and desire of our stakeholders to be part of the processes that affect them, and this Plan is an attempt to promote communication. Questions or comments on this plan or snow removal operations can be directed to the airport management office at (603) 882-0661 or info@nashuaairport.com.

Section 1 – Definitions

a) Contaminant. Any substance on a runway or taxiway, for the purpose of this Snow and Ice Control Plan (SICP) would be snow, slush, ice or standing water.

b) Dry Snow. Snow that insufficient free water to cause cohesion between individual particles. If when making a snowball, it falls apart, the snow is considered dry.

c) Wet Snow. Snow that has grains coated with liquid water, which bonds the mass together, but that has no excess water in the pore spaces. A well-compacted, solid snowball can be made, but water will not squeeze out.

d) Compacted Snow. Snow that has been compressed into a solid mass that resists further compression and will hold together or break up into lumps if picked up.

e) Slush. Snow that has water content exceeding its freely drained condition, such that it takes on a fluid property (e.g. flowing and splashing). Water will drain from slush when a handful is picked up.

f) Patchy Conditions. Contaminate conditions that cover 25% or less of the cleared/treated/usable surface shall be classified as "Patchy." Conditions covering more than 25% should be considered as covering the total surface area for surface condition reporting purposes.

g) Approved Chemicals. A chemical, either solid or liquid, that meets a generic SAE or MIL specification. (Note, Boire Field does not use any airside approved chemicals at the time of this publication)

h) Fluid Deicer/Anti-Icers. The approved specification is SAE AMS 1435, Fluid, Generic Deicing/Anti-icing, Runways and Taxiways. (Note, Boire Field does not use any airside fluid deicer/anti-icers at the time of this publication)

i) Generic Solids. The approved specification is SAE AMS 1431, Compound, Solid Runway and Taxiway Deicing/Anti-Icing. (Note, Boire Field does not use any airside generic solids at the time of this publication)

Section 2 - Administrative

a) Airport Management Pre-Season Meeting. The meeting should determine if the post season objectives were met, and effective. The maintenance supervisor will typically initiate a meeting in October to discuss equipment and material inventory, repair needs, staffing, budget, training, previous years' issues, and any other topics associated with snow and ice control and this plan. Additionally, the following topics may be discussed in the Pre-Season Meeting:

- Areas Designated as Priority 1 and any new airfield infrastructure
- Clearing operations and follow-up airfield assessments
- Potentials for pilot or vehicular runway incursions or incidents
- Staff requirements and qualifications (training)
- Response time to keep runways, taxiways and apron areas operational
- Radio Communications
- Communication, terminology, frequencies, and procedures
- Monitoring and updating of runway surface conditions
- Issuance of NOTAMS and dissemination to ensure timely notification
- Equipment inventory
- Snow hauling/disposing, snow dumps

b) Pre-event Meetings. Before each snow event, airport management and all available snow removal personnel will conduct a meeting to discuss any issues that have arisen from the last snow event, and any outstanding issues or items that have been resolved. In addition, NAA will ensure that sufficient and qualified staffing, materials, and equipment are available for a snow or ice event.

c) Post Event Meetings. After each snow event airport management will host a meeting within three days to discuss any issues that have arisen from the event.

d) Equipment Preparation. Airfield snow removal equipment shall be inspected prior to utilization for safety and proper operation. At a minimum, the oil level and other pertinent fluids of equipment to be utilized during that snow event will be checked. Also, equipment will be inspected for obvious deficiencies or safety issues.

Typically, in mid-October or earlier, the maintenance supervisor shall inspect and prepare each piece of snow removal equipment. Required fluids, replacement parts, and snow removal equipment components will be inventoried and stockpiled. Worn items will be replaced as needed.

Section 3 – Snow Removal Operations

a) The maintenance supervisor is responsible for making the decision to commence snow removal operations upon contamination of airport surfaces. In some situations, it may be prudent to wait to begin snow removal operations. In some cases, it may be necessary to close the Airport, or portions thereof to aircraft use if they are deemed to be unsafe for aircraft use. If any airport surfaces are closed, the maintenance supervisor will immediately notify the airport manager. The maintenance supervisor should physically inspect the airport to make the determination as to when to begin snow removal operations.

b) Weather Forecasting.

- The maintenance supervisor is responsible for monitoring the current and/or forecast weather conditions.

- The maintenance supervisor is the person delegated the authority to call-in personnel/snow-team members.
- Conditions are monitored before the storm and periodically throughout the weather event by the maintenance supervisor.
- Sources for weather forecasts and current conditions include TV news, newspapers, online weather resources such as NWS, the air traffic control tower and the on field AWOS (Automated Weather Observation System)

c) Typical shift coverage will provide for each piece of snow removal equipment to be deployed at the beginning of the snow event. The goal in shift coverage is to ensure the Priority 1 areas are cleared of contaminants in the shortest amount of time, thereby restoring the Airport to safe, usable condition. The maintenance supervisor will make determinations throughout the storm event to release snow crew members as the airfield returns to normal conditions and areas are cleared.

d) According to the FAA, the recommended clearance time for Priority 1 areas is two hours. The snow removal team will work toward this goal as safely as possible.

Table 1-2. Clearance Times for Non-Commercial Service Airports

Annual Airplane Operations (includes cargo operations)	*Clearance Time[1] (hour)*
40,000 or more	*2*
10,000 – but less than 40,000	*3*
6,000 – but less than 10,000	*4*
Less than 6,000	*6*

General: Although not specifically defined, Non-Commercial Service Airports are airports that are not classified as Commercial Service Airports [see Table 1-1,general note].

Footnote 1: These airports may wish to have sufficient equipment to clear 1 inch (2.54 cm) of falling snow weighing up to 25 lb/ft^3 (400 kg/m^3) from Priority 1 areas within the recommended clearance times.

e) Airfield Clearing Priorities. Boire Field is segmented for snow clearing purposes into four areas. These areas are listed as Priority 1 through Priority 4. Priority 1 areas are those vital to the takeoff, landing and moving of aircraft to and from the runway. Priority 2 areas are those areas that support Priority 1 areas as well as areas used by on airport businesses. Priority 3 areas are those areas that are not used every day, nor are critical to the takeoff and landing of aircraft or on airport businesses. Priority 4 areas are those that can wait until all other areas are cleared and in some circumstances might be taken care of on subsequent days after the storm. The NAA makes every effort to keep the entire airfield and supporting parking areas cleared of snow and ready for use, but some factors may delay the clearing of an area. These factors include, but are not limited to staffing, particular weather events such impending freezing rain or blowing snow, equipment failures, etc. The priority areas are as follows and can be seen on the attached map in Appendix A:

Priority 1

Priority 1 areas are primary areas that must be cleared as soon as practicable. These areas include the most critical portions of the aircraft movement area and supporting facilities. This will normally include the runway and associated turnoffs, access taxiways leading to the FBO(s) and other airport businesses and designated emergency response roads, NAVAIDs and Mutual Aid access/gates/locks**.** The entire airport would not be a Priority 1 (Figure A-1).

Priority 2

Priority 2 areas are secondary in importance and include the Inner Taxilane and the ramps associated with the on-airport businesses as well as the Airport Maintenance Facility. Typically, Priority 2 areas are cleared simultaneously with the Priority 1 areas. Taxiway B can be considered a Priority 2 area, so long as the remainder of the stub taxiways are cleared (Figure A-1).

Priority 3

Priority 3 areas are tertiary areas that should be cleared after the Priority 1 and Priority 2 areas are cleared and open for use. These areas include the tie-down ramps and in between T-hangars that do not house businesses. Typically, Priority 3 areas are cleared simultaneously or immediately following the clearing of Priority 1 and Priority 2 areas (Figure A-1).

Priority 4

Priority 4 areas include service roads and access roads to airfield equipment. In some cases, Priority 4 areas might be left for the following days after the storm, however the maintenance supervisor should coordinate closely with FAA Tech-Ops to ensure they have adequate access to FAA owned equipment.

f) Snow Removal Operations Triggers. Typically, snow removal operations will commence when contaminants hamper operation or decrease braking action. In circumstances where snow will be followed by freezing rain or freezing conditions, it may be prudent to delay the start of snow removal operations to create an insulating layer between the freezing condition and the paved surface, thereby preventing bonding.

g) Closing of Airport Surfaces. Airport surfaces will be initially closed as snow removal begins. On the runway, snow removal involves plowing windrows and gradually forcing all of the snow to the edge of a surface where it can be blown or thrown over the edge lights. While the windrow is being pulled to the side, it presents a significant hazard to aircraft operations. Surfaces will also be closed when any of the parameters are met in the following table.

Precipitation	Depth in Inches
Slush	*1 inch*
Wet Snow	*2 inches*
Dry Snow	*3 inches*
Ice or Freezing Rain	*100% coverage*

Boire Field serves such a diverse array of aircraft types and operator experience that it would be difficult or impossible to try and accommodate everyone's operational limitations. The maintenance supervisor will err on the side of caution if he or she thinks a surface might not be safe for use and should be closed to aircraft use.

As soon as conditions allow. The maintenance supervisor will change the closed condition of a surface to a PPR (Prior Permission Required) with sufficient time to allow for men and equipment to vacate the surface for arriving or departing aircraft. A PPR will only be used in cases where the surface is rendered as safe as possible by the removal of contaminants. A typical PPR will be issued for 15 or 30 minutes on both ground and tower frequencies.
In all circumstances where surfaces are impacted by contamination, snow removal operations or closures, an appropriate NOTAM will be issued notifying the public about the circumstance.

Additionally, the NAA has a Letter of Agreement with the Nashua FAA Contract Tower that states:

> Nashua Tower shall cease landing and takeoff operations and immediately notify Nashua Airport Authority upon receipt of a PIREP [Pilot Report] of NIL braking action on the runway. Resume landings and takeoffs operations only after notification by Nashua Airport Authority that the runway is safe for use.

h) Snow Equipment List. The maintenance supervisor will work toward having every piece of available snow removal equipment in operation with an operator to clear snow. The current inventory includes (vehicle callsigns are in parenthesis):

a. 2007 624J John Deere Loader, 30,000 lbs. (SNOW 50)
b. 1985 FG-85 Fiat Grader, 35,000 lbs. (SNOW 30)
c. 1985 FR-15 Fiat Loader, 30,000 lbs.
d. 1996 SL-150 Samsung Loader, 30,000 lbs. (SNOW 11)
e. 1979 SMI Rotary Plow, 28,000 lbs. (SNOW 40)
f. 1985 MP-3D Sno-Go Rotary Plow, Loader Mount, 7,500 lbs.
g. 1988 75-C Michigan Loader, 32,000 lbs. (SNOW 12)
h. 2011 MP-3D Sno-Go Rotary Plow, Loader Mount, 8,400 lbs.
i. 2014 764HSD John Deere High Speed Dozer, 34,000 lbs. (SNOW 60)

j. 1988 1954 International Dump Truck, 48,000 lbs. (SNOW 23)
k. 2007 MB Pavement Broom, Loader Mount.
l. 2009 F350 Ford with Plow and Caster Spreader, 10,600 lbs.
m. 2002 K-2500 Chevrolet Pickup with plow, 8,600 lbs.

i) Storage of Snow and Ice Control Equipment. Snow removal equipment is stored and maintained inside the Snow Removal Equipment building at 93 Perimeter Rd. This building includes several heated bays.

j) FAA-Approved Chemicals. At the time of this publication, the NAA does not utilize any FAA-Approved chemicals for anti-ice or de-ice. The Ford Pickup does have a material spreader which is typically filled with road salt and sand and is reserved for the landside parking lots. This vehicle is rarely taken out onto the airport when filled as these are not FAA approved materials and they are never deployed airside.

Section 4 – Snow Clearing Principles

a) Runway and Taxiways. Runways and taxiways are typically plowed into windrows by the grader and or a loader capable of receiving the articulating hydraulic plow. The direction of the plowing is dependent on the current and forecast winds. Ideally, all the snow is pushed toward the infield where it is blown over the lights with a rotary plow. In some circumstances, the winds will favor pushing snow to the east side of the runway. In either case, the section of the runway between Taxiway D and Taxiway A-North, the snow is ALWAYS plowed toward the infield. This section of the runway is adjacent to the Watts Endfire Glide Slope array which cannot support snow being blown toward it. If snow is pushed to the edge of the runway in this area, we have no way of removing it. In cases where winds are out of the west, it is sometimes prudent to have a smaller loader with an adjustable plow that is much more agile than the grader to care for that loop of the runway/taxiway circuit. This invariably takes a loader away from their task of clearing snow from hangars and ramps but the tradeoff is worth it.

Once all the snow is windrowed, a blower or rotary plow casts the snow over and beyond the lights.

Simultaneously or after the plowing/blowing operation is complete, the MB Pavement Broom is usually deployed to attempt to get the pavement down to, “no worse than wet” conditions. At this point, solar radiation is extremely helpful in remediating any remaining contaminants.

In some circumstances, it is acceptable to clear the runway at less than the 100’ full width to accommodate operations of smaller piston and helicopter operations. In these cases, the pilots and Tower will be made fully aware of the existing conditions.

b) Snow Bank Height Profiles – See Figure 4-1

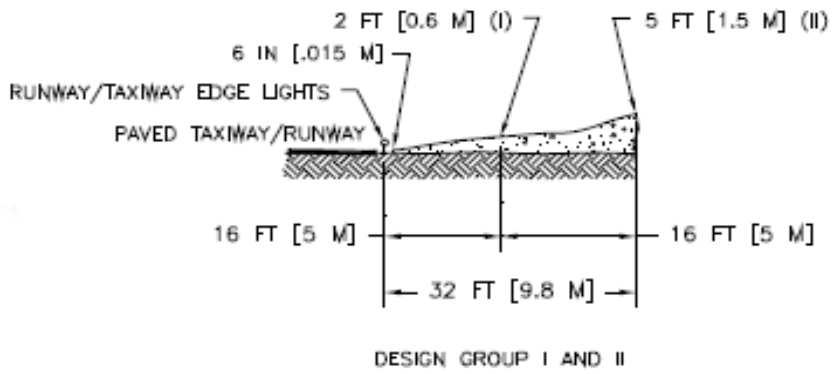

Figure 4-1. Snow Bank Profile Limits Along Edges of Runways and Taxiways with the Airplane Wheels On Full Strength Pavement

c) Tenants are responsible for snow clearing in their lease area, however the NAA performs snow removal for a nominal fee. Tenants may contract their own snow removal, however contractors must provide proof of insurance naming the City of Nashua and the Nashua Airport Authority as additional insureds and must undergo driver training to operate on the airport.

d) After all priority areas are cleared, care should be taken to ensure all lights and signs are dug out and are visible to pilots.

e) Care should always be taken to ensure snow is not stockpiled in taxiway or taxilane safety areas or object free areas unless it meets the criteria in Figure 4-1 above. Snow should never be stockpiled in the Runway Safety Areas or Object Free Areas.

f) If snow needs to be hauled away, there are at least two areas where it can be dumped. Typically, snow is stored at the old grass tie-downs or out of the way on India Ramp.

g) NAVAIDs/Weather Observation Equipment:

a. Snow should never be stored or dumped in the critical areas of the localizer or glide slope. Also, when blowing snow from the runway, ejected snow should never be directed at PAPI's or any other NAVAIDs.
b. No snow may be piled within 50 feet of the AWOS system and there should be no piles of snow over 7 feet high within 200 feet of the AWOS.

h) Controlling/Mitigating Snow Drifts is accomplished by utilizing snow trenches or snow fences where applicable. Each year, a snow fence is deployed in the field adjacent to the air traffic control tower to mitigate the hazards of snow drifting across Perimeter Rd.

Wind ditches are typically cut along all east-west taxiways such as TWY B, TWY C, TWY D etc. A minimum of two wind ditches has been found to be useful in mitigating snow drifting across the stub taxiways. Deeper the ditches and steep the sidewalls make this technique most effective.

i) In years of heavy snowfall, it is advantageous to run a snow blower along both sides of the lights on the runway and along the taxiways to make room for additional snowfall. This technique prevents lights from becoming buried in snow.

j) At the time of the writing of this document, the NAA does not use any FAA approved anti or deice chemicals or applications. There are no approved locations on the airport for the chemical deicing of aircraft.

Section 5 - Runway Incursion/Surface Incident Mitigation Procedures

Each year at the pre-season snow meeting, any incidents in the past will be discussed to ensure they do not occur again. Also, any ideas for preventing accidents or incidents during snow removal are encouraged to be shared.

Vehicles will be marked and lighted in accordance with AC 150/2510-5, *Painting, Marking and Lighting of Vehicles Used on an Airport.*

a) Radio Communications. NAA vehicle operators identify themselves to the air traffic control tower by the number of the vehicle they are operating. Requests for access to the Airport Movement Area (AMA) should be made on Ground frequency at 121.8 Mhz. Operators should continually monitor this frequency while they are operating on the taxiways.

Requests for access to the runway should be made on Tower frequency at 133.2 MHz and operators should continually monitor the frequency while operating on the runway surface.

b) In the event of failed radio communication with ATC, operators should exit the Airport Movement Area and contact the air traffic control tower by phone. If an operator finds themselves in a situation where they cannot communicate with the air traffic control tower via radio and they need to access the Airport Movement Area or the runway to get back to the shop (i.e. on the northeast side of the runway) to have radio equipment inspected, they should call the air traffic control tower via phone at (603) 595-2104 in order to get clearance to cross the runway or to access the AMA. If a piece of equipment is unable to communicate with the air traffic control tower via radio, either it should be parked until the radio can be serviced, or a handheld radio should be taken to ensure two way communications is maintained.

d) In the event of low visibility and/or whiteout conditions the maintenance supervisor may suspend snow removal operations until they can be conducted safely.

Section 6 – Surface Condition Reporting

a) Condition reporting will be provided whenever the pavement condition is worse than bare and wet and when conditions change. NOTAMs will be issued to inform pilots and the public about surface conditions.

In general, conditions will be reported as:

- Surface conditions by contaminants types and depths.
- Friction reporting if applicable (i.e. braking action good, medium, poor or nil)
- When the cleared runway width is less than full width, and if there are uncleared runway edges with a different condition from cleared width on runway.

Generally, during winter conditions, the airfield will be inspected more regularly to assess any changing conditions. Days with higher winds should trigger more frequent inspections and care should be taken during freeze/thaw cycles as snow typically blows onto paved surfaces, melts and then refreezes causing ice. NOTAMS should be continually adjusted to reflect the actual conditions on the airport. Conditions to be aware of that may prompt changes to surface conditions might include:

- Active snow event
- Plowing/brooming/deicing
- Rapidly rising or falling temperatures
- Rapidly changing conditions

Typically, conditions are assessed in an operations vehicle, however any vehicle could serve to assess airfield conditions. At the time of the writing of this document, no mechanical devices are being utilized to measure friction conditions on paved surfaces. As of October 1, 2016, vehicle braking action reports will no longer be an acceptable means of conveying runway information to pilots.

It is the maintenance supervisor's responsibility to ensure the NOTAMS issued accurately reflect the current conditions on the airport.

b) In December, 2005 a Boeing 737 overran a snow-covered runway at BWI, killing a 5-year-old boy in a vehicle the aircraft collided with. The FAA responded by developing the TALPA ARC (Takeoff and Landing Performance Assessment Aviation Rulemaking Committee) which was a consortium of aircraft operators, airports and alphabet groups tasked with addressing requirements for aircraft and airport operators. The committee developed the Runway Condition Assessment Matrix (RCAM) which was designed to convey standardized information to pilots about contamination on runways in an objective format. The RCAM chart is shown

below. The RCAM divides the runway into thirds with a 6 being dry pavement and a 0 being braking action NIL.

Assessment Criteria		Downgrade Assessment Criteria		
Runway Condition Description	**Code**	**Mu (μ) [1]**	**Vehicle Deceleration or Directional Control Observation**	**Pilot Reported Braking Action**
• Dry	6	40 or Higher	---	---
• Frost • Wet (Includes Damp and 1/8 inch depth or less of water) ***1/8 inch (3mm) depth or less of:*** • Slush • Dry Snow • Wet Snow	5	40 or Higher	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	Good
5° F (-15°C) and Colder outside air temperature: • Compacted Snow	4	39 to 30	Braking deceleration OR directional control is between Good and Medium.	Good to Medium
• Slippery When Wet (wet runway) • Dry Snow or Wet Snow (Any depth) over Compacted Snow ***Greater than 1/8 inch (3mm) depth of:*** • Dry Snow • Wet Snow ***Warmer than 5° F (-15°C) outside air temperature:*** • Compacted Snow	3	39 to 30	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	Medium
Greater than 1/8 (3mm) inch depth of: • Water • Slush	2	29 to 21	Braking deceleration OR directional control is between Medium and Poor.	Medium to Poor
• Ice [2]	1	29 to 21	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	Poor
• Wet Ice [2] • Slush over Ice • Water over Compacted Snow [2] • Dry Snow or Wet Snow over Ice [2]	0	20 or Lower	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	Nil

[1] The correlation of the Mu (μ) values with runway conditions and condition codes in the Matrix are only approximate ranges for a generic friction measuring device **and are intended to be used only to downgrade a runway condition code; with the exception of circumstances identified in Note 2.** Airport operators should use their best judgment when using friction measuring devices for downgrade assessments, including their experience with the specific measuring devices used.

[2] In some circumstances, these runway surface conditions may not be as slippery as the runway condition code assigned by the Matrix. The airport operator may issue a higher runway condition code (but no higher than code 3) for each third of the runway if the Mu value for that third of the runway is 40 or greater obtained by a properly operated and calibrated friction measuring device, **and all other observations, judgment, and vehicle braking action support the higher runway condition code. The decision to issue a higher runway condition code than would be called for by the Matrix cannot be based on Mu values alone; all available means of assessing runway slipperiness must be used and must support the higher runway condition code.** This ability to raise the reported runway condition code to a code 1, 2, or 3 can only be applied to those runway conditions listed under codes 0 and 1 in the Matrix.

The airport operator must also continually monitor the runway surface as long as the higher code is in effect to ensure that the runway surface condition does not deteriorate below the assigned code. The extent of monitoring must consider all variables that may affect the runway surface condition, including any precipitation conditions, changing temperatures, effects of wind, frequency of runway use, and type of aircraft using the runway. If sand or other approved runway treatments are used to satisfy the requirements for issuing this higher runway condition code, the continued monitoring program must confirm continued effectiveness of the treatment.

Caution: Temperatures near and above freezing (e.g., at 26.6° F (-3°C) and warmer) may cause contaminants to behave more slippery than indicated by the runway condition code given in the Matrix. At these temperatures, airport operators should exercise a heightened level of runway assessment, and should downgrade the runway condition code if appropriate.

c) NOTAMS will be issued conveying the Runway Condition Code (RCC) as well as a description of the surface contaminants through the NOTAM system by calling 1-

877-487-6867. The caller will convey the surface contaminants of the runway in thirds and the briefer will calculate the RCC to be placed in the NOTAM.

Section 7 – Post Season Activities

a) Post Season Snow Meeting. After each snow season, a Post Season Snow Meeting will be held, typically in April to review the snow season issues and recommend any changes to this plan for subsequent years. The same topics as the Pre-Season Snow Meeting will be reviewed.

b) The Airport Maintenance Department will assess all snow removal equipment and initiate any repairs or changes of wear parts, etc.

c) The Airport Manager will update this SICP if necessary based on the Post Season Snow Meeting recommendations

Section 8 – Appendix

Figure A-1 – Snow Clearing Priority Areas