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Airport Certification Manual

Minneapolis-St. Paul International Airport (MSP)

Signed by:
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3CE5EE1199D3455...

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Revision Control Sheet

Revision Number	Revision Date	Revision Contents and/or Remarks
001	07/01/07	Pages iv - vi, Revision Control Sheet, Distribution List
001	07/01/07	Page 11-2, Declared Distances & Displaced Thresholds
001	07/01/07	Page 11-3, safety areas for Taxiways K & L
001	07/01/07	Page 12-3, 12-4, 12-5, Taxiway reflectors
001	07/01/07	Page 15-1, & 15-2, paragraph a, vehicles 16 & 17
001	07/01/07	Page 16-1, items c & e
001	07/01/07	Page 21-1, 21-2, 21-3, 21-4, 21-5, Pedestrian and Ground Vehicles
001	07/01/07	Page 24-1, item 3.a
001	07/01/07	Exhibit 1, Operations Organization Chart
001	08/15/06	Exhibit 7, Sign Plan
001	07/01/07	Exhibit 9, Snow Plan
001	07/01/07	Exhibit 13, Letters of Agreement
002	01/22/09	Exhibit 7, Updated Sign Plan
003	03/31/09	Exhibit 9, Snow Plan: Added information related to continuous monitoring and crew resource management.
004	10/31/10	Complete update of the entire document.
005	01/01/12	Page 21-1, 21-2, 21-3, 21-4, 21-5, 21-6, Pedestrian and Ground Vehicles
006	03/18/13	Pages i, iv, Table of Contents and Revision Control Sheet. Pages v-vi, Elimination of Document Control Sheet (page renumbering). Page 4-1, Falsification, reproduction, or alteration of applications, certificates, reports, or records. Page 8-1, 8-2 (format), CEO, Personnel. Page 21-2, 21-4, Pedestrians and Ground Vehicles.
007	09/15/13	00 -Table of Contents; Sections 9, 11, 12, 15, 16, 20, 24, 26, 27; Exhibits 1, 2, 4, 5-2, 6, 7, 9-1, 9-2, 10, 11, 13-1, 13-2, 14, 16, 17.
008	07/31/14	00 - Table of Contents, Section 21
009	08/01/14	Table of Contents, Section 13, Exhibit 9
010	03/24/2016	Updates to 00 - Table of Contents and Sections 12, 15, 16, 17, 20, and 26 as well as Exhibits 1, 4, 7, 10, 12, 14, and 15. Addition of Exhibit 18.

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011	09/01/2016	Changes to Sections 13, 20, 26 and Exhibit 9 to incorporate Runway Condition Codes (RCCs) and other changes to Airport Condition Reporting methods.
012	02/11/2018	Updates to 00 - Table of Contents, Sections 9 and 12 and Revised Movement/Non-Movement Area Letter of Agreement in Exhibit 13.
013	05/11/2018	Updates to 00 - Table of Contents, Distribution List, Section 21, Exhibit 1, Exhibit 5, and Exhibit 9
014	08/31/2018	Updates to Table of Contents, Section 11-Safety Areas, Section 12-Marking, Signs and Lighting, Section 15-ARFF Equipment and Agents, Section 17-Handling and Storing of Hazardous Substances and Materials, Exhibit 10-ARFF Equipment/Personnel, Exhibit 16-Preventive Maintenance Procedures for PAPIs and Generators, Exhibit 17-Engineered Materials Arresting System (EMAS) Maintenance Program, Exhibit 18-Fuel System Inspection Reports and Exhibit 19 - Corrective Action Form
015	11/09/2018	Updates to Section 19- Airport Emergency Plan and Exhibit 11- Airport Emergency Plan
016	06/01/2019	Entire document reformatting, and reorganization. Updates to Section 317- ARFF: Equipment and Agents, Section 321 -Handling and Storing of Hazardous Substances and Materials, Exhibit 303-1-Organization Chart, Exhibit 313-1-Snow Plan, Exhibit 317-1-ARFF Equipment/Personnel, Exhibit 327-1-Daily Self-Inspection Forms, Exhibit 339-1-NOTAM Information
017	09/27/2019	Updates to Distribution List, Section 323-Air Traffic and Wind Direction Indicators, Exhibit 311-2-Preventive Maintenance Inspection Procedures for PAPIs and Generators, Exhibit 313-1-1-Snow Plan, 321-1-Fuel System Inspection Reports, Exhibit 327-1-Self-Inspection Forms
018	10/01/20	Updates to Distribution List, Section C of Section 321 and replacement of pages 4 and 5 of Exhibit 321-1 with new training form.
019	11/20/20	Updates to Distribution List, Section 309, Section 311, Section 321, Section 323, Exhibit 305-2, Exhibit 311-2, and Exhibit 500-1
020	12/23/20	Updates to the Table of Contents and the Sign Plan in Exhibit 311-1.

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020A	06/16/2021	Updates to the Table of Contents, Distribution List, and the Sign Plan in Exhibit 311-1.
021	6/21/2021	Updated Wildlife Hazard Management Plan in Exhibit 337-1.
022	3/25/2022	Updated Table of Contents-Distribution List, Section 303, Section 327, Exhibit 309-1, Exhibit 311-2, and Exhibit 327-1.
023	04/22/2022	Updated Section 311, Section 325, Section 339, Exhibit 325-1 and Exhibit 339-1
024	08/26/2022	Updated Table of Contents, Section 305, Section 311, Exhibit 313-1, Exhibit 321-1, Exhibit 500-1
025	11/18/2022	Updated Table of Contents, Section 301, Section 317, Section 335, Exhibit 101-2, and Exhibit 500-10
026	07/14/2023	Updated Table of Contents, Section 201, Section 311, Section 327, Section 329, and Exhibit 327-1
027	10/06/2023	Updated Table of Contents Distribution List, Section 313 and Exhibit 313-1.
028	10/12/2023	Updated Exhibit 325-1, Airport Emergency Plan - Revision 06
029	12/29/2023	Updated Section 309, Section 317, Section 319, and Exhibit 317-1
030	01/26/2024	Update to the Sign Plan, Exhibit 311-1
031	01/31/2024	Updated Exhibit 325-1, Airport Emergency Plan - Revision 07
032	04/12/2024	Updated Section 337 and Exhibit 337-1, Wildlife Hazard Management Plan
033	05/30/2024	Updated Table of Contents Distribution List, Exhibit 500-6, and added new Exhibit 500-11.
034	07/10/2024	Updated Section 317, Exhibit 317-1, and Exhibit 500-6.
035	09/09/2024	Updated Exhibit 313-1, Snow and Ice Control Plan
036	09/18/2024	Updated Exhibit 325-1, Airport Emergency Plan
037	09/19/2024	Added Sections 401, 403, and Exhibit 500-12
038	11/01/2024	Updated Table of Contents Updated Exhibit 313-1, Snow and Ice Control Plan section 5.7 and Appendices 4, 5, 6, 7, 8, 9, 10, 11 Updated Section 309 page 3 and Exhibit 327-1 page 4
039	11/25/2024	Updated Table of Contents Updated Section 311 Added Exhibit 311-3
040	01/15/2025	Updated Section 317 page 2 and Exhibit 317-1

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Revision Number	Revision Date	Revision Contents and/or Remarks
041	04/07/2025	Added Exhibit 500-13
042	04/08/2025	Updated Section 317 and Exhibit 317-1
043	04/24/2025	Updated Exhibit 325-1 - Airport Emergency Plan
044	05/01/2025	Updated Section 321 and Exhibit 321-1
045	05/16/2025	Updated Section 301, Section 303, and Section 401, and added Section 402
046	07/08/2025	Updated Section 317, Exhibit 317-1, and Exhibit 500-13
047	09/18/2025	Updated Section 329, Exhibit 305-1, Exhibit 311-1, Exhibit 329-1
048	09/23/2025	Updated Section 309, page 1
049	10/09/2025	Updated Exhibit 313-1, Snow and Ice Control Plan
050	10/23/2025	Updated Exhibit 311-1, Sign Plan Area 5
051	11/12/2025	Updated Exhibit 325-1, Airport Emergency Plan, Section 339, Exhibit 339-1, Section 327, and Exhibit 327-1
052	11/25/2025	Updated Section 317, Exhibit 317-1, and Exhibit 500-3
053	02/05/2026	Updated Exhibit 321-1, Exhibit 500-1, renamed Section 115 to 14 CFR Part 3, completely revised Section 14 CFR Part 3, and updated Table of Contents to reflect the renamed section.
054	03/19/2026	Updated Exhibit 500-3
055	05/18/2026	Updated Exhibit 311-2, Removed Exhibits 500-8 and 500-9 due to LOAs being rescinded.
056	09/13/2026	Updated Section 327, Section 329, Section 339, Exhibit 325-1, and Exhibit 327-1
057	11/04/2026	Updated Exhibit 313-1 Snow and Ice Control Plan

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Distribution List

1. Original ACM
2. FAA Airport Certification Inspector
3. MAC Executive Director/CEO
4. MAC Chief Operating Officer
5. MAC Vice President Management and Operations
6. MAC Director of Integrated Operations
7. MAC Director of Airport Maintenance and Asset Management
8. MAC Director of Terminal and Landside Operations
9. MAC Assistant Director of Field Maintenance
10. MAC Director of Real Estate and Airline Affairs
11. MAC Emergency Manager
12. MAC Airport Police Department
13. MAC Airport Fire Department
14. MAC SMS Manager
15. MAC Trades Department
16. MAC Field Maintenance Department
17. MAC Electrical Department
18. MAC Paint Department
19. MAC Airport Development Department
20. MAC Airside Operations Department
21. MAC Emergency Communications Department
22. Air Traffic Manager, FAA Air Traffic Control Tower
23. Manager, FAA Airways Facilities
24. Minnesota State Department of Transportation
25. General Manager, Signature Flight Support

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Distribution List

26. Station Manager, Air Canada
27. Station Manager, WestJet Airlines
28. Station Manager, American Airlines
29. Station Manager, Southwest Airlines
30. Station Manager, Delta Air Lines
31. Station Manager, FedEx
32. Station Manager, Frontier Airlines
33. Station Manager, Icelandair
34. Station Manager, UNIFI
35. Station Manager, Skywest Airlines
36. Station Manager, Endeavor Airlines
37. Station Manager, United Airlines
38. Station Manager, Sun Country Airlines
39. Station Manager, Alaska Airlines
40. Station Manager, DHL
41. Station Manager United Parcel Service
42. 934th Air Force Reserve
43. 133rd Air National Guard
44. Swissport
45. Station Manager, Denver Air Connection
46. Station Manager, Air France/KLM
47. Station Manager, Atlas Air
48. Station Manager, Allegiant Airlines
49. Station Manager, Amazon Air
50. Station Manager, Aer Lingus

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51. Station Manager, Discover Airlines

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Snow and Ice Control Plan
(SICP)

2026-2027

Original Date: 12/09/04

Revision Date: 10/01/26

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SECTION #1

PRE-SEASON AND POST-SEASON WINTER OPERATIONS TOPICS

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Chapter 1. Pre-Season Actions

1.1 Airport Preparation

1.1.1 Airport Management Meetings

As designated by the executive leadership team of the Metropolitan Airports Commission (MAC), the entity which owns and operates Minneapolis – St. Paul International Airport (MSP), the MAC Integrated Operations Department will initiate and lead meetings with the MAC Field Maintenance Department and the MAC Airside Operations Department to discuss snow removal equipment, repair needs, material inventory, staffing, budgeting, training, issues identified from the previous snow season, and any other topics related to this Snow and Ice Control Plan (SICP).

1.1.2 Personnel Training

All MAC Integrated Operations, Airside Operations, and Field Maintenance personnel with access to the movement area shall receive initial training prior to performing any duties in compliance with the SICP. Recurrent training must then be completed at least once every 12 consecutive calendar months (CCM) thereafter. This training is conducted by the MAC Airside Operations Winter Operations Program in coordination with MAC's Manager of Technical Training and Administration. Training records are maintained for 24 CCM.

Training content is reviewed and updated annually based on recommendations from the previous post-season critique and any policy or procedural changes planned for the upcoming snow season. Training is delivered through MAC's electronic Learning Management System (LMS), and includes the following:

1.1.2.1 MAC Airside Operations and Integrated Operations Personnel

Training topics include:

- MAC Field Maintenance assignments
- Communication protocols
- Snow removal runway inspections/closures
- Runway plowing configurations
- Runway closure and reopening procedures
- Runway / taxiway closure criteria
- NIL braking action reports
- Runway Condition Assessment Matrix (RCAM)
- Snow Control Center (SCC) and airfield positions/responsibilities
- MSP/FAA Letters of Agreement (LOA) relevant to the SICP
- Airfield clearing priorities
- Winter CFME procedures
- Aircraft deicing configurations/operations
- Whiteout / low-visibility conditions
- Review of MSP SICP, highlighting any changes.

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1.1.2.2 Field Maintenance Personnel

Complete training through the MAC LMS, classroom training, and hands-on equipment training.

Training topics include:

- Runway incursion prevention
- Airfield familiarization
- Whiteout / low-visibility conditions
- Communications
- SICP Updates
- Equipment familiarization and usage
- Airfield assignments
- Scenario-based plowing configuration training
- Airfield access points and routes

1.1.2.3 Contractor Personnel

Complete training through instructor-led classroom training, and hands-on equipment training.

Training topics include:

- Equipment familiarization and usage
- Airfield familiarization
- SICP
- SMGCS
- Runway incursion prevention
- Non-movement area training

1.1.3 Equipment Preparation

MAC owns and operates multiple Continuous Friction Measuring Equipment (CFME) vehicles. These CFME vehicles are inspected and certified annually by a manufacturer's representative. Additionally, trained MAC Airside Operations personnel calibrate and inspect these CFME vehicles in accordance with the manufacturer's specifications on a regular schedule and prior to operating the vehicle.

Required fluids, replacement parts, and snow removal equipment components will be inventoried and stockpiled accordingly.

1.2 Snow and Ice Control Committee Meetings

MAC has established a Snow and Ice Control Committee (SICC) to provide feedback and recommendations regarding snow and ice removal operations and this SICP. The SICC is chaired by the Assistant Director, Integrated Operations, or their designee, and typically includes representatives from:

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1.2.1 MAC

- Integrated Operations
- Airside Operations
- Field Maintenance
- Fleet Services
- Trades
- Safety Management System
- Emergency Management
- Terminal Operations/Facilities
- Landside Operations
- Environmental Affairs
- Risk Management
- Operations Optimization
- Technical Training

1.2.2 Federal Aviation Administration (FAA)

- MSP Air Traffic Control Tower (MSP ATCT)
- MSP Terminal Radar Approach Control Facility (TRACON - M98)
- Minneapolis Air Route Traffic Control Center (ARTCC - ZMP)

1.2.3 Additional SICC Members

- MSP Airlines
- MSP Non-airline Tenants
- Snow Removal Contractors

Prior to the snow season, the SICC Chair, or their designee, will initiate notifications to airport stakeholders to review the SICP in preparation for the preseason kick-off meeting, which is held each fall. Recordings and/or minutes from SICC meetings will be made available upon request through the MAC Integrated Operations Department.

The following topics are examples of subject matter for discussion for the preseason kick-off meeting:

- Airport clearing operations discussion topics:
  - Airfield clearing priorities
  - Preplanned closures
  - New airfield infrastructure
  - Snow and ice removal tactics and field condition assessments
  - Irregular Operations (IROPS)
  - Pilot and vehicular runway incursions or incidents, documentation, and reporting
  - Staff requirements and qualifications/training programs
  - Streamline decision making processes
  - Response time to keep runways, taxiways, and apron areas operational
  - Communication, terminology, frequencies, and procedures

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- Weather and pavement surface monitoring
- Dissemination of Field Conditions (FICONs) and surface closures
- Equipment inventory
- Status of procurement contracts, including storage of materials
- Validation of deicer certification letters from vendors (if applicable)
- Procedures for storm water runoff mitigation
- New runoff requirements for containment or collection
- Status of snow removal contractor staffing and equipment
- Pilot Reports (PIREPs), snow pile locations, snow melting procedures, wingtip restrictions, and snow hauling

- Air Carrier ground deicing programs:
  - Assessing all air carriers deicing programs by reviewing airport surface flow strategies; reviewing ground time and takeoff clearances after deicing; analyzing and adjusting aircraft deicing plans
  - Maximizing efficiency of operations during icing conditions by identifying locations for airplane deicing; planning taxi routes to minimize ground times; developing rates for deiced departures; allocating departure slots; determination of airport deicing crew needs; verifying communications
  - MSP Aircraft Deicing Field Rule
  - MSP Deice Procedures, to include widebody deicing locations/procedures

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Chapter 2. Post-Event and Post-Season Actions

2.1 Post-Event Critiques

The SICC, at a minimum, will conduct a post-event critique meeting after every Category 4 and Category 5 winter event, as defined in Section 3.1. A post-event critique may also be requested by any SICC member following *any* winter event, regardless of perceived impact. The SICC chair, or their designee, is responsible for scheduling and hosting all critique meetings.

If winter events occur back-to-back, and do not allow for separate critique meetings, one will be held as soon as possible after the final event.

2.2 Post-Season

At the conclusion of each winter season, a formal post-season SICC meeting will be initiated and facilitated by the SICC Chair to review the season and recommend any changes prior to next season. The same topics discussed at the pre-season SICC meeting will be covered at the post-season meeting, along with any new items identified throughout the past snow season.

MAC Integrated Operations, Airside Operations, and Field Maintenance will also carry out ongoing internal post-season tasks that include, but are not limited to, reviewing and updating training, winter procedures, and the SICP. The SICP will be reviewed and updated annually by MAC Integrated Operations, with input from other SICC members.

MAC Field Maintenance will also inspect, repair, and prepare equipment for seasonal storage.

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SECTION #2

WINTER EVENT ACTIONS AND PROCEDURES

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Chapter 3. Snow Removal Action Criteria

3.1 Winter Event Categorization

MAC utilizes a winter event categorization model to support management decisions related to snow removal crew staffing, Snow Control Center (SCC) staffing, airfield surfaces maintained, and communication standards. Because winter events impacting MSP involve many variables, this categorization is meant to guide SCC and MAC Field Maintenance leadership rather than serve as strict criteria. Winter event categories will be established during pre-event planning and adjusted as conditions evolve during events. Winter event categorization will be communicated to MSP stakeholders.

MSP winter event categories are defined as follows:

Category 1 – Monitoring

- Air or surface temperatures below 32°F; and
- No precipitation forecast

Category 2 – Minor Event

- Forecast of less than 1” of snow accumulation

Category 3 – Standard Event

- Forecast of 1-6” of snow accumulation; or
- Freezing precipitation is possible, but unlikely

Category 4 – Major Event

- Forecast of 6-12” of snow accumulation; or
- Forecast of 3-6” of snow accumulation and non-standard runway configuration; or
- Minor freezing precipitation is likely

Category 5 – Extreme Event

- Forecast of greater than 12” of snow accumulation; or
- Greater than 6” of snow accumulation and non-standard runway configuration; or
- Significant freezing precipitation is likely

3.2 Activating Snow Removal Personnel

MAC will utilize weather forecasts and its winter event categorization model to help determine activation levels of snow removal personnel. MAC Integrated Operations, Airside Operations, and Field Maintenance will continuously monitor weather conditions leading up to snow and ice events. The Assistant Director, Field Maintenance, or their designee, is responsible for ensuring that a sufficient number of properly trained snow and ice removal personnel are on-site during forecast winter weather events.

MAC Field Maintenance personnel assigned to snow and ice control duties include full-time, seasonal, temporary, and part-time on-demand heavy equipment operators, as well as contracted airside and landside equipment operators. All personnel conducting snow

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and ice removal operations on the Air Operations Area (AOA) are employees who have completed applicable training, including AOA driver training, testing, and licensing.

The Senior Manager, Integrated Operations, or their designee, will develop a staffing plan for the MAC Integrated Operations and Airside Operations Departments based on the weather forecast and winter event category. They will ensure the following positions are filled, as necessary, for the duration of the event:

Snow Control Center (SCC) Positions

- SCC Manager
- SCC Runways*
- SCC Taxiways/Aprons – North*
- SCC Taxiways/Aprons – South*
- SCC Liaison*
- SCC Phones/Support*

Airfield Positions

- CFME
- Runway Condition Vehicle (RCV)*
- Taxiways/Aprons Condition Vehicle – North (TCV-N) *
- Taxiways/Aprons Condition Vehicle – South (TCV-S) *

**These roles may be combined for Category 1, 2, and 3 winter events, during overnight hours, or at any time at the discretion of management.*

Further explanation of MAC Integrated Operations, Airside Operations and Field Maintenance staffing and roles is provided in paragraphs 3.7.1 and 3.7.2.

3.3 Weather Forecasting

The SCC Manager is ultimately responsible for monitoring current and forecasted weather conditions including, but not always limited to, air and surface temperatures, winds, precipitation type and intensity using the following resources:

The National Weather Service (NWS) Twin Cities is the MAC's primary resource and partner for monitoring current and forecasted weather conditions and supporting winter weather decision-making at MSP. NWS Twin Cities works closely with the MAC, providing 24/7 access to NWS forecasters, a custom MSP forecast webpage, and participation in SICC meetings. NWS also provides long-range forecasts during the preseason SICC meeting and a post snow season recap at the postseason SICC meeting. MAC Integrated Operations, Airside Operations, and Field Maintenance personnel will participate in conference calls with NWS Twin Cities to receive updates as needed.

Vaisala Xweather Horizon is a digital platform that integrates real-time data from MSP's in-pavement runway sensors with advanced weather forecasting to help improve winter operations situational awareness and decision making. MSP has in-pavement sensors installed on all four runways that detect air/surface temp, ice, chemical, and precipitation on the pavement. This tool also helps make informed decisions on when to chemically

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treat airfield surfaces and when and what type of snow removal techniques are most appropriate. This tool is available 24/7.

Weather Sentry–Airport Operations Edition (DTN) provides a custom forecast for MSP four times daily, including hourly precipitation type, winds information, surface temperatures, dew point, accumulation amounts, and precipitation probability. It also provides a forecast outlook and synopsis. MAC Integrated Operations, Airside Operations, or Field Maintenance management may contact DTN directly for additional details or clarification. DTN additionally offers radar services and automated email/text alerts for lightning in the vicinity of MSP. This weather resource is available 24/7.

Praedictix is a weather service the MAC contracts with to provide on-site meteorologists in the SCC to help monitor, inform, and assist in making real-time weather decisions in active winter weather events.

Weather Watch provides three daily forecasts as well as daily and monthly climatological reports.

3.4 Chain of Command

The Assistant Director, Integrated Operations has overall responsibility for MSP's snow and ice removal operation. The Senior Manager, Integrated Operations, or their designee, is responsible for creating the staffing plan for the MAC Airside Operations Department, which staffs the SCC and airfield condition monitoring positions during winter events.

Managers, Integrated Operations oversee Airside Operations personnel in the SCC and on the airfield, ensuring assignments are met and all procedures contained in the SICP are followed. Assistant Managers, Airside Operations (AMs) are responsible for inspecting, monitoring, and documenting airfield conditions in accordance with procedures outlined in this SICP. AMs continuously monitor airfield conditions whenever winter precipitation is active and field conditions (FICONs) are worse than wet. AMs report FICONs to the SCC, which issues timely FICON NOTAMs.

Leading up to winter events, the Senior Manager, Integrated Operations, or their designee, advises MAC Field Maintenance management of impending weather events that may result in the accumulation of snow or freezing precipitation on airport surfaces. MAC Field Maintenance management is then responsible for ensuring adequate snow and ice removal staffing is on site to meet the requirements of this SICP. When additional personnel are required, MAC Field Maintenance initiates an automated notification system to call in staff. The automated alert is issued prior to the start of the winter event.

A full crew call – 100% of MAC maintenance personnel – will be initiated for any Category 3 and higher winter event. For Category 1 and 2 winter events, a partial crew may be called in. If pre-treating or sanding is required prior to an event or after a freeze/thaw cycle, regular shifts will perform the work, however additional personnel may be held over or called in as necessary. For Category 3, 4, and 5 winter events, MAC Field Maintenance also typically activates contract snow and ice removal services for both airside and landside areas.

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3.5 Triggers for Initiating Snow Removal Operations

Snow:

Snow and ice removal operations will begin when contaminants on the airfield are reported at the following depths:

Precipitation Type	Depth in Inches
Slush	1/4”
Wet Snow	1/2”
Dry Snow	1/2”
Freezing Rain/Ice	Any amount

Freezing Rain or Ice:

Prior to freezing precipitation impacting MSP, MAC Integrated Operations and Field Maintenance will determine which airfield surfaces will be pre-treated, with which type of chemical and/or sand, and when. Decisions will consider the following factors:

- Forecast precipitation type
- Forecast precipitation amount/rate
- Forecasted runway configuration(s)
- Current and forecast air and surface temperatures
- Anticipated duration of event
- Anticipated airport arrival and departure rates

3.6 Surface Closure Criteria

During active winter precipitation, movement area surfaces must be closed once the following thresholds are met:

Surface	Precipitation Type	Depth in Inches
Taxiway	Slush	Greater than 1”
Taxiway	Wet Snow	3”
Taxiway	Dry Snow	6”
Runway	Slush	Greater than 0.5”
Runway	Wet Snow	1.5”
Runway	Dry Snow	2”

In addition to the accumulation thresholds noted above, surfaces will be closed when any of the following criteria are met:

- **Active Snowfall:** If open surfaces have not been inspected within the preceding three hours
- **Active Freezing Precipitation:** If open surfaces have not been inspected within the preceding two hours
- **NIL Braking Action**: When a NIL braking action report is received on any open surface

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3.7 Personnel Responsible

3.7.1 MAC Integrated Operations and Airside Operations Departments

Senior Manager, Integrated Operations

- Responsible for high-level strategic and procedural planning and execution for MSP winter operations and this SICP
- Plans and coordinates with multiple external agencies
- Delegates SICP duties within the Integrated Operations Department
- Provides, as needed, general oversight to ensure compliance with this SICP and Part 139 requirements during winter events

SCC Manager

- Oversees Airside SCC and airfield personnel to ensures safe, compliant, and effective execution of the SICP during their shift
- Creates and executes staffing plans for SCC and airfield positions
- Coordinates all runway closures in active winter events
- Determines whether runway condition codes are downgraded or upgraded
- Leads pre-event and post-event SICC meetings
- Staffed by Manager, Integrated Operations or higher

SCC Runway Position

- Communicates runway closure times and adjustments coordinated by SCC Manager to MAC airfield staff
- Ensures all runway-related documentation is completed
- Coordinates with Airfield CFME and RCV personnel to ensure inspection requirements are met and documented
- Staffed by a Coordinator, an Assistant Manager, or a Manager

SCC Taxiway/Apron – North Position
Referred to as SCC Taxiway/Apron – East Position when the airport is in a straight Runway 04-22 or 17-35/04-22 configuration

- Coordinates with the TCV-N (or *East*) Inspector
- Maintains documentation required for all taxiways, aprons, and deice pads north of Runway 12R-30L, or east of Runway 04-22 in a straight 04-22 or 17-35/04-22 configuration
- Staffed by a Coordinator, an Assistant Manager, or a Manager

SCC Taxiways/Aprons – South Position
Referred to as SCC Taxiway/Apron – West Position when the airport is in a straight Runway 04-22 or 17-35/04-22 configuration

- Coordinates with the TCV-S (or *West*) Inspector
- Maintains documentation required for all taxiways, aprons, and deice pads south of Runway 12R-30L, or west of Runway 04-22 in a straight 04-22 or 17-35/04-22 configuration
- Staffed by a Coordinator, an Assistant Manager, or a Manager

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SCC Phones/Support Position

- Primarily responsible for the SCC main phone line (612-726-5111) and communicates pertinent information to other SCC staff
- Supports other SCC positions as able
- Staffed by a Coordinator, an Assistant Manager, or a Manager

SCC Liaison Position

- Supports SCC Manager
- Coordinates with external departments and agencies as required
- Staffed by Manager, Integrated Operations or higher
- Initiates and leads stakeholder meetings during snow events
- Staffed by Manager, Integrated Operations or higher

Airfield CFME Operator

- Conducts friction evaluations when winter contaminants are present on the airfield, and relays results electronically and via radio to the SCC
- Typically, responsible for closing and opening runways with ATC during active winter events
- Provides ATC with runway condition codes when opening a runway
- Staffed by an Assistant Manager, or a Manager

Airfield Runway Condition Vehicle (RCV)

- Inspects runways and open runway feeder taxiways
- Reports runway contaminant type, depth, and coverage percentage to the SCC Runway position for documentation
- Monitors ATC Local Control frequency for pilot reported braking action reports, and passes them along to the SCC
- Staffed by an Assistant Manager, or a Manager

Airfield Taxiway Condition Vehicle (TCV) – North
Referred to as the Airfield TCV – East Inspector when the airport is in a straight 4-22 or 17-35/4-22 configuration

- Inspects taxiways, aprons, and deice pads north of Runway 12R-30L, or east of Runway 4-22 in a straight 4-22 or 17-35 configuration.
- Provides contaminant type, depth, and coverage for their surfaces to the SCC Taxiways/Apron – North (or *East)* Position
- Monitors Ground Control Frequency associated with their surfaces for pilot reported braking action reports, and passes them along to the SCC
- Staffed by an Assistant Manager, or a Manager

Airfield Taxiway Condition Vehicle (TCV) – South
Referred to as the Airfield TCV – West Inspector when the airport is in a straight 4-22 or 17-35/4-22 configuration

- Inspects taxiways, aprons, and deice pads south of Runway 12R-30L, or west of Runway 4-22 in a straight 4-22 or 17-35 configuration

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- Provides contaminant type, depth, and coverage for their surfaces to the SCC Taxiways/Apron – South (or *West*) Position
- Monitors Ground Control Frequency associated with their surfaces for pilot reported braking action reports, and passes them along to the SCC
- Staffed by an Assistant Manager, or a Manager

3.7.2 MAC Field Maintenance Department

Assistant Director, Field Maintenance

- Responsible for mechanical and chemical removal of contaminants on runways, taxiways, and ramp areas
- Plans, coordinates, and directs maintenance staff through the SCC throughout the duration of the event
- May serve as maintenance liaison in SCC

Operations Manager, Field Maintenance

- Monitors and supervises the overall activities of the Field Maintenance department
- Provides staffing to meet the needs of snow removal
- May serve as maintenance liaison in SCC
- Plans, coordinates, and directs fleet staff for normal and emergency repairs on snow removal fleet

Duty Manager, Field Maintenance

- Responsible for the control and direction of runway, taxiway, apron, and landside teams
- Reports to the Field Maintenance Manager, Operations

Assistant Manager, Fleet Services

- There may be up to 2 shifts in the equipment shop. Each shift will be under the control of an Assistant Manager of Fleet Services

Working Foreperson

- Lead plow coordination for snow removal on runways and taxiways
- Working Foreperson will be assigned the responsibility for directing the apron clearing at Terminal 1 & Terminal 2
- Works directly with contractor, airline representatives and the SCC for timely contaminant removal at aircraft aprons and gates

3.7.3 Contractor

When activated, the Contractor is responsible for snow removal and snow melting on the Terminal 1 and Terminal 2 Aprons, as well as the 30R, 30L and Terminal 2 Remote Deice Pads, and any other non-movement area aprons. The contractor will coordinate snow removal activities with the MAC Field Maintenance Duty Manager and/or Working Foreperson, airline representatives and/or the SCC. If the Contractor is not used, MAC Field Maintenance is responsible to perform these functions.

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3.8 Snow Control Center (SCC)

During snow and ice control events, the MAC Integrated Operations department leads the MSP's SCC with this function taking place in the MAC Airside Operations Center (AOC). The SCC is responsible for coordinating airport snow removal activities, surface closures and openings, and issuing NOTAMs. It also coordinates communication and information sharing with ATCT, air carriers, and other airport users.

The SCC Manager has authority to implement Incident Command procedures during snow and ice control emergencies with the SCC Liaison acting as the Incident Commander.

3.9 Airfield Clearing Priorities

MSP's airfield clearing priorities are established to maximize operational safety and efficiency, taking into account runway configurations, personnel, fleet mix, MSP ATC needs, and air carrier needs.

These priorities are organized into a Priority 1, 2, and 3 classification system, as defined in sections 3.9.1–3 below. At MSP, the surfaces designated as Priority 1, 2, or 3 vary depending on the runway configuration(s) in use during the event. MAC maintains internal training documents and diagrams for each configuration and its priority surfaces. The overall airfield clearing priority diagrams are displayed in Appendices 3, 4, and 5.

3.9.1 Priority 1

Priority 1 surfaces are MSP's most critical airfield surfaces, essential to maintaining a minimum level of safe and acceptable service during all winter event categories. Priority 1 surfaces include one primary runway and a minimum required set of taxiways that allow commercial aircraft to transition between their terminal gate, deicing pad, and the runway. In all runway configurations, Priority 1 surfaces include mutual aid vehicle access gates 222 and 439, as well as access routes between ARFF stations 1 and 2 and the airfield.

If Priority 1 surfaces cannot be maintained safely, and must be temporarily closed, they are the first surfaces cleared and returned to service in order to re-establish aircraft operations after severe winter event.

3.9.2 Priority 2

Priority 2 surfaces are typically maintained simultaneously with Priority 1 surfaces but are not as critical to maintaining a minimum level of service during severe winter events. During Category 5 events, Priority 2 surfaces will typically be closed to focus efforts and resources on Priority 1 surfaces.

In cleanup efforts or re-establishment of operations, Priority 2 surfaces are cleared and re-opened after Priority 1 surfaces, but before Priority 3 surfaces.

3.9.3 Priority 3

Priority 3 surfaces are the least critical airfield surfaces at MSP. During Category 3, 4, and 5 events, these surfaces may be closed at the onset of winter

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precipitation—or when 1" of snow accumulation or any amount of ice is observed—at the discretion of the SCC Manager. Priority 3 surfaces are cleaned and reopened during post-event cleanup efforts, after Priority 1 and 2 surfaces have been addressed.

3.10 Airfield Target Clearance Times

As a commercial service airport with more than 40,000 annual operations, MSP has personnel, equipment, and procedures in place to clear 1" of snow from all Priority 1 surfaces within 30 minutes, in accordance with Table 1-1 from Advisory Circular (AC) 150/5200-30D, Airport Field Condition Assessments and Winter Operations Safety, and reprinted below.

Table 1-1. Clearance Times for Commercial Service Airports

Annual Airplane Operations (includes cargo operations)	Clearance Time[1] (hour)
40,000 or more	1/2
10,000 – but less than 40,000	1
6,000 – but less than 10,000	1 1/2
Less than 6,000	2
General: Commercial Service Airport means a public-use airport that the U.S. Secretary of Transportation determines has at least 2,500 passenger boardings each year and that receives scheduled passenger airplane service [see 49 U.S.C. 47102(7)]. Footnote 1: These airports should 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 targeted clearance times.	

3.11 Snow Equipment List

A complete list of winter equipment deployed at MSP is shown in Appendix 2.

3.12 Storage of Snow and Ice Control Equipment

All snow and ice removal equipment is stored in the heated airport maintenance facilities, located at the north side and the west side of the airfield.

3.13 Definitions

Ash

Ash is a grayish white to black solid residue of combustion normally originating from pulverized particulate matter ejected by volcanic eruption.

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Compacted Snow

Compacted snow is snow that has been compressed and consolidated into a solid form that resists further compression such that an airplane will remain on its surface without displacing any of it. If a chunk of compressed snow can be picked up by hand, it will hold together or can be broken into smaller chunks rather that falling away as individual snow particles.

Note: A layer of compacted snow over ice must be reported as compacted snow only.

Example: When operating on the surface, significant rutting or compaction will not occur. Compacted snow may include a mixture of snow and embedded ice; if it is more ice than compacted snow, then it should be reported as either ice or wet ice, as applicable.

Contaminant

A contaminant is a deposit such as frost, any snow, slush, ice, or water on an airport pavement where the effects could be detrimental to the friction characteristics of the pavement surface.

Contaminated Runway

For purposes of generating a runway condition code and airplane performance, a runway is considered contaminated when *more than 25 percent* of the overall runway length and width coverage or cleared width is covered by frost, ice, or any depth of snow, slush, or water.

When runway contaminants exist, but overall coverage within the area of the runway that is being maintained is *25 percent or less*, the contaminants will still be reported. However, a runway condition code will not be generated.

Note: While mud, ash, sand, and oil are reportable contaminants, there is no associated airplane performance data available for these contaminants and no Runway Condition Code (RwyCC) will be reported. Mud is the only contaminant in this reference where a measured depth is reportable.

Exception: Rubber is not subject to the 25 percent rule, and will be reported as *Slippery When Wet* when the pavement evaluation/friction deterioration indicates the averaged Mu (coefficient of friction) value on the wet pavement surface is below the Minimum Friction Level classification specified in Table 3-2, Friction Level Classification for Runway Pavement Surfaces, of AC 150/5320-12 *Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces*.

Dry Runway/Pavement

Use the term “DRY” to describe runway/pavement surfaces that are neither wet nor contaminated. A FICON NOTAM must not be originated for the sole purpose of reporting a dry runway. A dry runway surface should be reported only when there is need to report conditions on the remainder of the surface.

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Dry Snow
Dry snow is snow that has insufficient free water to cause it to stick together. This generally occurs at temperatures below 32° F (0° C). If when making a snowball, it falls apart, the snow is considered dry.

Eutectic Temperature/Composition
A deicing chemical melts ice by lowering the freezing point. The extent of this freezing point depression depends on the chemical and water in the system. The limit of freezing point depression, equivalent to the lowest temperature that the chemical will melt ice, occurs with a specific amount of chemical. This temperature is called *eutectic temperature*, and the amount of chemical is the eutectic composition. Collectively, they are referred to as the eutectic point.

Field Condition Report (FICON)
A FICON is a NOTAM generated to reflect pavement surface conditions on runways, taxiways, and aprons and Runway Condition Codes (RwyCCs) if greater than 25 percent of the overall runway length and width coverage or cleared width of the runway is contaminated.

Frost
Frost consists of ice crystals formed from airborne moisture that condenses on a surface whose temperature is below freezing. Frost differs from ice in that the frost crystals grow independently and therefore have a more granular texture.

Note: Heavy frost that has noticeable depth may have friction qualities similar to ice and downgrading the runway condition code accordingly should be considered. If driving a vehicle over the frost does not result in tire tracks down to bare pavement, the frost should be considered to have sufficient depth to consider a downgrade of the runway condition code.

Ice
Ice is the solid form of frozen water including ice that is textured (i.e., rough or scarified ice). Note: A layer of ice over compacted snow must be reported as ice only.

Layered Contaminant
A layered contaminant is a contaminant consisting of two overlapping contaminants. The RCAM identifies the approved list of layered contaminants, including:

- Dry Snow over Compacted Snow
- Wet Snow over Compacted Snow
- Slush over Ice
- Water over Compacted Snow
- Dry Snow over Ice
- Wet Snow over Ice

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Mud
Mud is wet, sticky, soft earth material.

Multiple Contaminants
Multiple contaminants are a combination of contaminants (as identified in the RCAM) observed on paved surfaces. When reporting multiple contaminants, only the two most prevalent contaminants are reported. When reporting on runways, up to two contaminant types may be reported for each runway third. The Runway Condition Code (when applicable) will be based on the most hazardous contaminant, when both contaminants are not from the same category in the RCAM. The reported contaminants may consist of a single layered contaminant, two single contaminants, or two layered contaminants. The reporting of "multiple contaminants" represent contaminants which are located adjacent to each other, not to be confused with a "layered contaminant" which is overlapping. For example:

- Single contaminant and Layered contaminant.
  'Wet' ***and*** 'Wet Snow over Compacted Snow'
- Single contaminant and Single contaminant.
  'Wet Snow' ***and*** 'Slush'
- Layered contaminant and Layered contaminant.
  'Dry Snow over Compacted Snow' ***and*** 'Dry Snow over Ice'

Oil
Oil is a viscous liquid, derived from petroleum or synthetic material, especially for use as a fuel or lubricant.

Patchy
A description that can be associated with a contaminant covering 25 percent or less of the reported portions of a taxiway, apron, or heliport. Patchy cannot be used to describe contaminants on any runway.

Runways (Primary and Secondary)
Primary
Primary Runways are runways being actively used or expected to be used during existing or anticipated adverse meteorological conditions, where the majority of the takeoff and landing operations take place.

Secondary
Secondary runways are runways that support a primary runway and is less operationally critical. Takeoff and landing operations on such a runway are generally less frequent than on a primary runway. Snow removal operations on these secondary runways should not occur until Priority 1 surfaces are satisfactorily cleared and serviceable.

Runway Condition Assessment Matrix (RCAM)
RCAM is the tool by which an airport operator will assess a runway surface when contaminants are present.

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Runway Condition Code (RwyCC)
Runway Condition Codes describe runway conditions based on defined contaminants for each runway third. Use of RwyCCs harmonizes with ICAO Annex 14, providing a standardized "shorthand" format (e.g., 4/3/2) for reporting. Pilots use RwyCCs to conduct takeoff and landing performance assessments. Airports report RwyCCs based on the direction of the assessment which can apply in reverse for aircraft operating from the opposite direction.

Note: Report only one set of RwyCCs per runway. For example, do not report two runway condition reports (one from each end) for a runway as this may cause confusion for pilots and unnecessarily saturates the NOTAM system.

Sand
Sand is a sedimentary material, finer than a granule and coarser than silt.

Slippery When Wet Runway
For runways where a friction survey (conducted for pavement maintenance) indicates the averaged Mu value at 40 mph on the wet pavement surface failed to meet the minimum friction level classification specified in AC 150/5320-12, *Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces*, the airport operator must reports via the NOTAM system a RwyCC of '3' for the entire runway (by thirds: 3/3/3) when the runway is wet. The runway condition description "Slippery When Wet" is used for this condition. *Do not report a "Wet" runway when a "SLIPPERY WHEN WET" NOTAM is in effect.* When a "SLIPPERY WHEN WET" NOTAM is in effect, report the runway condition "Slippery When Wet" instead of "Wet" for the relevant thirds. If airport operator judgment deems a downgrade is necessary, the downgrade must be made such that all three runway thirds match (i.e. 3/3/3, 2/2/2, 1/1/1). An airport may discontinue the use of this NOTAM when the runway minimum friction level classification has been met or exceeded.

Slippery When Wet is only reported when a pavement maintenance evaluation indicates the averaged Mu value on the wet pavement surface is below the Minimum Friction Level classification specified in Table 3-2 of AC 150/5320-12. Some contributing factors that can create this condition include rubber buildup, groove failures/wear, and pavement macro/micro textures.

Slush
Slush is snow that has water content exceeding a freely drained condition such that it takes on fluid properties (e.g., flowing and splashing). Water will drain from slush when a handful is picked up. This type of water-saturated snow will be displaced with a splatter by a heel and toe slap-down motion against the ground.

Water
Water is the liquid state of water. For purposes of condition reporting and airplane performance, water is greater than 1/8" (3mm) in depth.

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Wet Ice
Wet ice is ice that is melting, or ice with a layer of water (any depth) on top.

Wet Runway
A runway is wet when it is neither dry nor contaminated. For purposes of condition reporting and airplane performance, a runway can be considered wet when more than 25 percent of the overall runway length and width coverage or cleared width being used is covered by any visible dampness or water that is 1/8" (3 mm) or less in depth.

Wet Snow
Wet snow is 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.

3.14 Snow and Ice Control Recordkeeping

MAC Integrated Operations or Airside Operations will document the following snow and ice control management activities:

- Begin and end time of continuous monitoring
- Surface inspection results and times
- Runway treatment type and times
- Runway and taxiway closure and opening times
- Dissemination of Field Condition Reports (FICONs) to ATC and other stakeholders
- Pilot braking action reports received from ATC as they deteriorate or improve

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Chapter 4. Snow Clearing Operations and Ice Prevention

4.1 Snow Clearing Principals

4.1.1 Aprons and Terminals

At MSP, Terminal 1 and Terminal 2 Aprons are categorized as Priority 1 surfaces. As such, MAC Field Maintenance Management will ensure adequate personnel and equipment are available to maintain these aprons. A working foreperson will supervise snow and ice removal on both Terminal 1 and Terminal 2 Aprons.

MAC Electricians will ensure that airport signage is visible to the maximum extent possible.

If less than 1" of forecasted snow, MAC Field Maintenance teams will remove snow and contaminants by pushing out from the terminals to the islands. Any large snow piles will be communicated to the SCC. Snow removal crews will load and haul excess accumulation of snow. Any contaminated snow will be deposited at pre-approved snow storage locations as designated by the MAC Environmental Affairs Department. The tenant airline will be responsible for moving equipment and cleaning terminal door entries and/or hand shoveling.

MAC Airside Operations will monitor wingtip clearance issues as snow is pushed away from gates out towards taxiway islands along Taxiways A, D, and P. Taxiway restrictions and closures will be implemented if snow piles exceed height profiles established in AC150/5200-30, current edition.

A snow removal contractor will generally be activated whenever 1" or more of snow is forecasted. The contractor will be responsible for snow removal on the non-movement areas only. Their standard procedure will be to move snow within the non-movement area to open gates, where a snow-melter is pre-positioned. Placement of the snow-melter will be coordinated with tenant airlines on an event-by-event basis. Snow will be loaded into the melter, with the water going directly into designated storm sewers.

All other parking aprons at MSP are classified as Priority 3 surfaces. These aprons will be maintained by a combination of contractors and MAC Field Maintenance on an as needed basis. The SCC will continually monitor these surfaces during an active winter event and MAC Field Maintenance will have a working foreperson assigned to these aprons.

4.1.2 Runways

Effective runway snow and ice control operations at MSP rely on two critical elements:

- Rapid and effective deployment of personnel and equipment
- Continuous monitoring of changing airfield conditions and timely dissemination of information to airport users

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Many factors are considered prior to the commencement of snow and ice control such as precipitation type, rate, wind, air temperature and pavement temperature.

MAC Field Maintenance Duty Managers will oversee the deployment of runway and taxiway teams. The runway teams will be responsible for clearing runways, runway feeder taxiways, and designated taxiways. The teams can break off into subgroups to maximize clearing efforts on taxiways.

For runway and taxiway snow removal operations, MAC Field Maintenance will primarily utilize multifunction equipment (MFE) to remove snow according to pre-determined factors. A combination of brooms, plows, and blowers will also assist in the removal of the contaminant. Deicer trucks may be utilized to apply liquid deicer as well as solid chemical/sand trucks where needed.

Types of equipment and uses:

- MFEs combining brooms, air blowers, and plows, serve as the primary airfield snow removal equipment at MSP
- Dedicated airfield plows and front mounted brooms will be used as secondary equipment to MFEs
- High speed airfield blowers will be used to remove windrows
- Airfield deicer trucks will apply liquid deicer determined by weather and pavement conditions
- Airfield combo solid chemical/sand trucks will apply sand and/or solid chemical to the surface of the runway determined by weather and pavement conditions
- All equipment utilized for snow and ice removal at MSP is listed in Appendix 2

Snow and ice control operations commence when dry or wet snow reaches a depth of 1/2”, when slush reaches a depth of 1/4”, or immediately upon the onset of freezing rain or freezing drizzle. In addition, snow and ice control operations will take place when surface inspections and/or friction tests indicate corrective action is necessary to provide safe aircraft operational services.

All open runways will be inspected at least once every three hours during active snowfall and at least once every two hours during active freezing precipitation.

At MSP, it is standard practice to plow and sweep a runway full-length and full width in two passes. MFEs are primarily used to displace and sweep the snow from runway centerline to runway edge in an echelon, or “conga-line,” formation. Rubber-bladed plows and brooms operate on runways equipped with in-pavement lighting. High speed airfield snow blowers throw the snow from the runway edge over edge lights and into islands between runways and taxiways.

MAC Airside Operations inspects runway safety areas to ensure aircraft propeller, engine, and wingtip clearances. If snowbank heights do not meet the requirements under Figure 4-1 for Advisory Circular 150/5200-30, current edition, a NOTAM will be issued, and MSP ATCT will be notified of appropriate clearance

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restrictions. Snow stored in safety areas not meeting AC criteria will be hauled away as soon as practicable.

One down and back runway plowing operation with assigned equipment is typically sufficient to clear the runway edge-to-edge. Under strong wind conditions, it may be necessary to move the snow from one runway edge to the other edge. Sanding and liquid/solid chemical applications follow immediately behind the snow and ice removal equipment as conditions warrant.

Standard practice for treating icy surfaces is to spread a combination of sand and liquid and/or solid chemicals. Use of these products may be suspended during low temperatures and/or high winds due to these conditions decreasing the effectiveness of the products.

Priority runway feeder taxiways connecting the runway with the parallel taxiways are then cleared by working snow back from the radius and then plowing in a diagonal manner from one corner to the opposite corner. This method leaves snow uniformly distributed at the taxiway edges with no heavy deposits at the radius. MAC Field Maintenance management is responsible for reporting to the CFME operator when all snow removal equipment is clear of the runway. Radio communications and required visual inspections help ensure that all vehicles are clear of the runway.

After snow and/or ice removal on a runway it is standard practice to update FICONs and conduct a runway friction survey to determine the effectiveness of treatment and to determine whether that runway can safely reopen. MAC Airside Operations will have a CFME operator and RCV perform these tasks. The RCV will communicate updated surface conditions to the SCC, while the CFME operator will provide friction survey data. The SCC will then update the FICON NOTAM and determine the new RwyCC. The CFME operator will open the runway on the appropriate ATC frequency and provide ATC with the updated RwyCC.

4.1.3 Taxiways

If less than 1” of snow is forecasted, snow removal from Terminal 1 and Terminal 2 aircraft parking positions is accomplished simultaneously with adjacent taxiway snow removal. Equipment pushes snow from aircraft parking positions to a point where snow piles can be collected by larger snow removal equipment. Standard procedure is to move the snow to a taxiway edge, to the side of an apron or to a designated snow storage area. Airfield snow blowers throw the snow into islands between taxiways or runways, or to an area clear of aircraft parking aprons.

MAC Electric personnel will ensure that all airport signage is visible to the maximum extent possible, as detailed in section 4.1.4.

MAC Airside Operations inspects taxiway safety areas to ensure aircraft propeller, engine pod and wingtip clearances. If snowbank heights do not meet the requirements under figure 4-1 for Advisory Circular 150/5200-30, a NOTAM will

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be issued, and MSP ATCT will be notified of appropriate clearance restrictions. The NOTAM will remain in effect until snowbank heights meet AC criteria. Snow stored in safety areas not meeting AC criteria will be hauled away as soon as practicable. Snow pile heights will be monitored, and snow hauling will be scheduled as soon as practicable to preclude runway to taxiway visibility obstructions. Snow is relocated to designated snow storage locations or is hauled to AOA snow melting facilities.

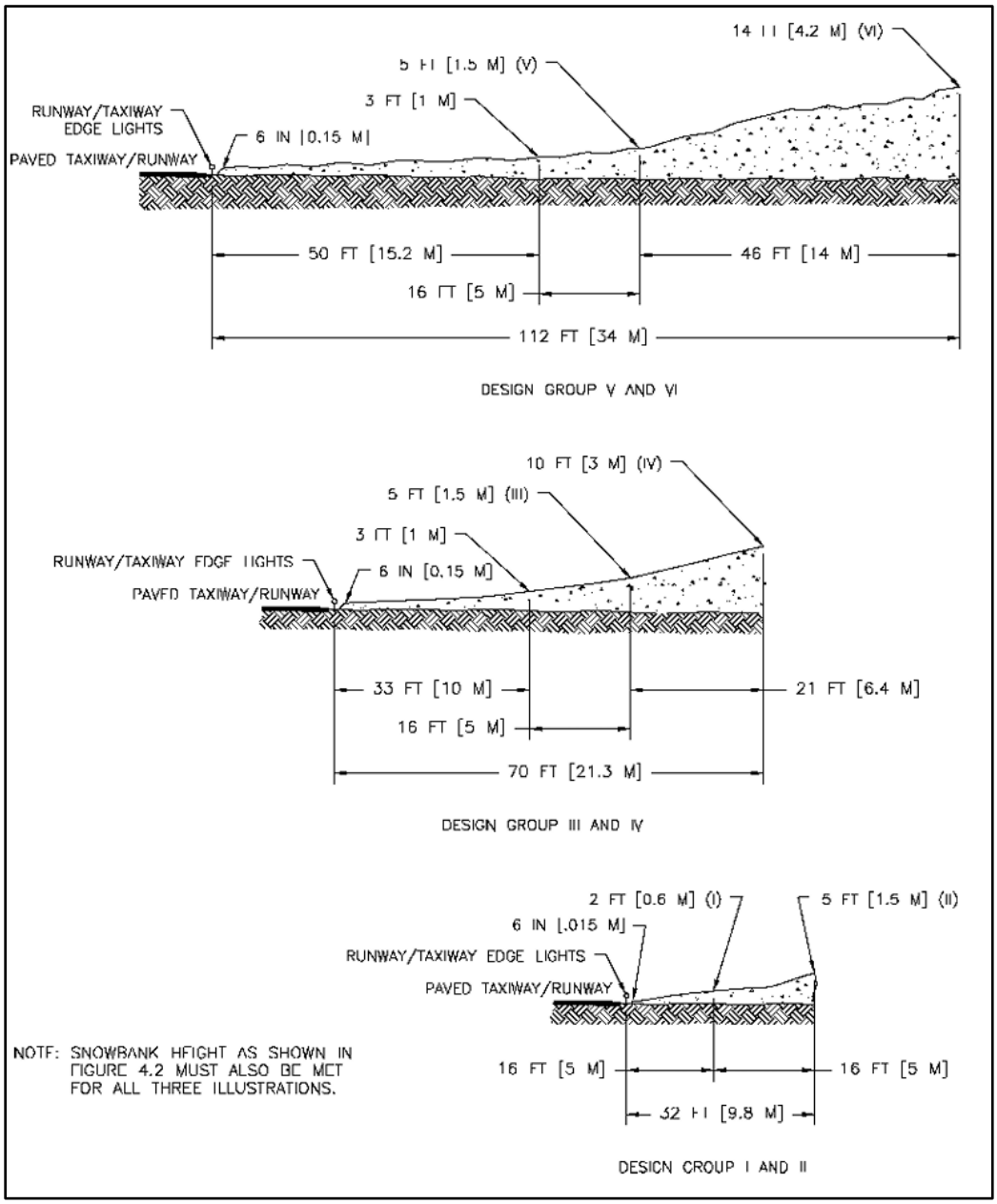


Figure 4-1 AC 150/5200-30 1

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When a NIL braking action report is received or any other perceived unsafe hazard or condition exists, the surface will be immediately closed until the hazard or condition no longer exists, as detailed in Section 5.7.

4.1.4 Airfield Signage

Airfield signage is regularly obscured by snow and ice buildup during active snowfall events. MAC Airside Operations will be responsible for continuously inspecting the legibility of all airfield signage on open surfaces during active events. If signage is determined to be obscured, MAC Airside Operations will immediately issue a Lighted Sign Status – Obscured NOTAM for all affected surfaces/signs and advise the ATCT via phone or radio. MAC Electricians will be the primary agency responsible for clearing obscured signage in active events and subsequent cleanup efforts. MAC Field Maintenance will assist with sign cleanup when significant snow accumulations are present around or near the sign bases.

This SICP identifies airfield sign clearing priorities based on active runway configuration/flow, preplanned closures, and with a focus on mitigating runway incursions. In active snow and ice events, there will be a focus on mandatory instruction signs using the following priorities:

Priority 1 Signs

Mandatory runway, ILS holding, and approach holding position signs associated with open and active runways where aircraft can be expected to cross or proceed onto these runways or critical areas.

Priority 2 Signs

Mandatory runway, ILS holding, and approach holding position signs associated with open and active runways where feeder taxiway/crossing is closed and not used, or where aircraft are expected to exit the runway only.

Priority 3 Signs

Mandatory runway, ILS holding, and approach holding position signs that are associated with closed runways.

All other signage on the airfield (i.e., non-mandatory instruction signage) will be addressed as able, but primarily during cleanup operations.

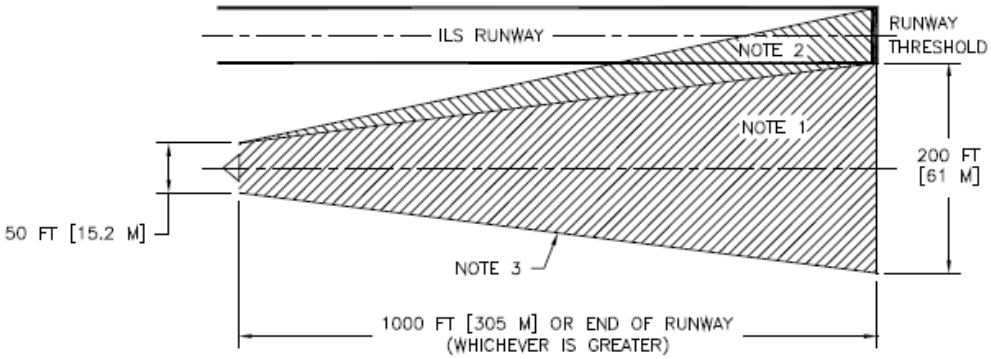
MAC maintains internal training materials and diagrams on how the signs are categorized.

4.1.5 NAVAIDs

FAA Technical Operations and the SCC work together, with the help of MAC Field Maintenance, to ensure operation of equipment critical to the National Airspace System. If snow levels exceed depth limitations as listed in figure 4-2 of *AC 150/5200-30, current edition*, a request from FAA Technical Operations for snow removal from around NAVAIDs and from ILS critical areas will be routed through the SCC to Field Maintenance management.

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NOTES:

1. CATEGORY I GLIDE SLOPE SNOW CLEARANCE AREA.
2. CATEGORY II AND III GLIDE SLOPE SNOW CLEARANCE AREA. THE AREA DEPICTED UNDER NOTE 1 SHALL ALSO BE CLEARED.
3. THE DEPTH OF SNOWBANKS ALONG THE EDGES OF THE CLEARED AREA SHALL BE LESS THEN 2 FEET.

ACTION TAKEN	SNOW DEPTH		
	SBR <6 IN [15 cm] NR. CEGS <18 IN [45 cm]	SBR 6 TO 8 IN [15 TO 20 cm] NR. CEGS 18 TO 24 IN [45 TO 60 cm]	SBR >8 IN [20 cm] NR. CEGS <24 IN [60 cm]
SNOW REMOVAL (SEE ABOVE FIGURE)	REMOVAL NOT REQUIRED RESTORE FULL SERVICE AND CATEGORY.	ILS CATEGORY I REMOVE SNOW 50 FT [15M] WIDE AT MAST WIDENING TO 200 FT [60M] WIDE AT 1000 FT [300M] OR END OF RUNWAY TOWARD MIDDLE AMRKER. ILS CATEGORIES II AND III AS ABOVE PLUS WIDEN THE AREA TO INCLUDE A LINE FROM THE MAST TO THE FAR EDGE OF RUNWAY THRESHOLD.	
NO SNOW REMOVAL	RESTORE FULL SERVICE AND CATEGORY.	ALL CATEGORIES RESTORE TO CATEGORY I SERVICE. CATEGORY D AIRCRAFT MINIMA RAISED TO LOCALIZER ONLY. TYPICAL NOTAM TEXT: "DUE TO SNOW ON THE IXXX (APPROPRIATE IDENTIFER) GLIDE SLOPE, MINIMA TEMPORARILRY RAISED TO LOCALIZER ONLY FOR CATEGORY D AIRCRAFT" IF APPLICABLE, "CATEGORY II NA"* OR "CATEGORY II/III NA".	ALL CATEGORIES APPROACH RESTRICTED TO LOCALIZER ONLY MINIMA. TYPICAL NOTAM TEXT: "DUE TO SNOW ON THE IXXX (APPROPRIATE IDENTIFER) GLIDE SLOPE, MINIMA TEMPORARILRY RAISED TO LOCALIZER ONLY.

* NA (NOT AUTHORIZED)

Figure 4-2. ILS CAT I and CAT II/III Snow Clearance Area Depth Limitations

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4.2 Controlling Snow Drifts

During and after snow events, the potential for snow drifts is high. MAC Airside Operations will be responsible for the continuous monitoring of snow drifts. The SCC will advise airport users of drifts via NOTAMs until MAC Field Maintenance can remove the drifts.

4.3 Snow Disposal

The SCC Manager will coordinate with MAC Field Maintenance Duty Managers to determine the most effective strategy to remove excess snow on the airfield. If snowbanks or piles that require runway, taxiway, or apron restrictions or closures the SCC will create a priority list so that the snowbanks causing the most impact are removed first.

Snow will be disposed of by either hauling it to one of the airfield snowmelters or to a designated snow storage area on the airport campus. These snow storage areas have identified height limits to prevent snow from infringing on any Part 77 surfaces.

4.4 Methods for Ice Control and Removal–Chemicals

Liquid De-icer.

On average, MAC Field Maintenance utilizes approximately 500,000 gallons of runway deicer on the airfield annually. The current specifications call for potassium acetate-based fluid, specially formulated with inhibitors, to anti-ice and de-ice airport runways and taxiways.

Solid De-icer.

A pelletized solid airfield deicer is available for use on compacted snow and ice areas of the airfield. Sodium formate, sodium acetate, and a sodium formate/acetate blend are the three (3) solid deicers available. These products meet FAA specifications. Approximately 100 metric tons are kept on hand for use during ice storms or for compacted snow and ice problem areas.

In the event there are potential or anticipated shortages of deicing products (liquid or solid) available from the manufacturers who are supplying the airport industry, the MAC will seek to procure alternative de-icing products that meet FAA specifications for effective treatment of the airfield runways and taxiways.

Deicer fluid is applied to runways, taxiways, deice pads, and occasionally ramps to prevent the formation of ice and snow bonding to the pavement and to facilitate melting. The efficacy of deicer is determined by ambient temperature, solar action, and aircraft movement.

Consequently, deicer is not as effective in well below freezing temperatures. However, deicer fluid's snow melting abilities below freezing temperatures during the day are enhanced by the solar energy. Certain liquid deicer products can remain on the pavement surfaces longer than others due to their chemical composition; this can result in the SCC

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issuing wet FICONs on runways and taxiways even when temperatures are below freezing and well after winter precipitation has ended.

4.5 Sand (for the purposes of treating a winter surface)

Sand is applied on the airfield surfaces on an as-needed basis. MAC Field Maintenance will ensure the sand used meets FAA gradient standards Sand used on AOA surfaces meets criteria as established in tables 4-2 of *AC 150/5200-30, current edition.* Sand spreading equipment provides the option of "pre-wetting" the sand with liquid chemical if conditions warrant that type of application. At MSP, sand used on the airfield is stored in an indoor, heated facility.

Table 4-2. Standard Gradation for Sand

Sieve Designation	Percent by Weight Passing
8	100
80	0-2

4.6 Surface Incident/Runway Incursion Mitigation Procedures

As a function of the SICC, any issues, incidents, and concerns from MSP's stakeholders are communicated and reviewed. A plan of action will then be discussed and implemented to prevent future occurrences. All vehicle operators conducting snow removal operations on the movement area must possess a valid, movement area driver license. Personnel are trained, tested and licensed annually. Movement area driver training curriculum includes driver and vehicle requirements, airport layout, non-movement area operating requirements, movement area operating requirements, runway incursion prevention including a review of previous incidents, special driving conditions, signs and markings, lighting and navigational aids, communications, aircraft identification and AOA Operating Ordinance requirements.

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

4.6.1 Radio Communication

All vehicles, or lead vehicle, operating on the movement area are equipped with radios capable of direct communication with the MSP ATCT. All MAC snow removal vehicles operating in the movement area have call signs that are numbered in a manner identifying the type of equipment to MSP ATCT personnel. All MAC and contractor snow removal vehicles are also equipped with two-way radios to provide vehicle-to-vehicle and vehicle-to-base communications. Personnel are trained to operate radio equipment with proficiency.

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All vehicles operating on the movement area will monitor the appropriate ATC frequency or will be under escort from a lead vehicle that is monitoring the appropriate frequency.

4.6.2 Failed Radio Communication

Personnel operating on the movement area are trained to clear the movement areas immediately if they lose the ability to monitor the MSP ATCT radio in their vehicle. Personnel are further trained to use the MAC 800 MHz radio system to communicate to their supervisor and/or the SCC if they experience any radio issues. If both the MSP ATCT and 800 MHz radios fail, personnel will utilize cell phones to contact their supervisor and/or the SCC.

4.6.3 Low Visibility and Whiteout Conditions

Conditions and restrictions as listed in the MSP Surface Movement Guidance Control System (SMGCS) Plan apply during snow/ice control operations. Vehicle movements on the movement area, with the exception for the purpose of emergency response, are prohibited when runway visual range (RVR) is below 300 feet.

All personnel that operate on the movement area have been trained to stop and immediately contact MSP ATCT if they lose situational awareness on the airfield due to whiteout conditions, or other conditions that cause visibility to suddenly decrease.

4.6.4 Driver Fatigue

During most snow and ice events, the full complement of MAC Field Maintenance personnel will normally be on duty conducting snow and ice control operations. Field Maintenance management will schedule routine breaks, meal breaks and rest periods. During extended snow and ice control events, crews will rotate in and out of rest and/or sleep periods. The MAC provides food, drink, rest facilities and sleeping quarters to Field Maintenance personnel to mitigate fatigue and to address other human performance factors.

MAC Field Maintenance has established limits that personnel can work to prevent driver fatigue based on work schedule and circadian rhythm. Field Maintenance staff, and contracted staff, generally work sixteen (16) hour shifts during snow and ice control operations. There may be times when airfield conditions require employees to work longer shifts.

MAC Airside Operations shifts are normally 10 to 12 hours, ensuring a minimum of 8 hours between shifts. Any shift of 6 hours or more is guaranteed one 30-minute unpaid lunch and two 15-minute paid breaks. Airside staff can be rotated between positions in the SCC and the airfield to mitigate fatigue.

All MAC personnel operating within the AOA are expected to self-monitor using the IM SAFE checklist. Anyone who identifies a condition that would prevent them from safely operating in the AOA must notify their supervisor before operating a vehicle in the area.

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Chapter 5. Surface Assessment and Reporting

MAC SCC and airfield inspectors will monitor all open paved surface conditions to plan and carry out appropriate maintenance actions in accordance with the SICP. MSP strives to maintain a 'no worse than wet' surface condition, with the understanding that is not always possible.

In complying with Part 139.339, MSP will utilize NOTAM Manager for the collection and dissemination of NOTAM information to air carriers, and other airport users.

The SCC issues FICONs through the FAA's Digital NOTAM Manager System and will utilize the Runway Condition Assessment Matrix (RCAM) as appropriate. Air carriers and other airport tenants may also obtain current FICONs by referencing MSP's Aerobahn Airport Status Dashboard or by contacting the SCC. FICONs are issued as soon as practicable after each open runway, taxiway, or apron surface inspection/assessment is completed.

5.1 Conducting Surface Assessments (Runways, Taxiways, and Aprons)

During an active winter weather event, MAC Airside Operations will continuously inspect all open movement and non-movement area surfaces and update their FICONs– except for exclusive leasehold areas.

While continuous monitoring is in effect, the goal will be that each individual open surface will be inspected at least every two hours during active snow events and every one hour during active freezing precipitation events. These inspection intervals will never exceed three hours for active snow events or two hours for freezing precipitation events.

If a surface cannot be inspected within these inspection intervals the surface must be closed until it is treated and/or inspected. Closed surfaces must be inspected with a new FICON issued when opened.

The continuous inspection of open movement and non-movement areas will be documented through MAC's Part 139 inspection software. Every FICON NOTAM issued during continuous inspections will be attached to the continuous monitoring inspection form.

5.2 Applying the Runway Condition Assessment Matrix (RCAM)

5.2.1 Determining Runway Conditions

MAC Airside Operations personnel will determine contaminant type, depth and percentage of coverage present on runway surfaces during runway closures, or during continuous monitoring physical inspections. This contaminant information will be input into the NOTAM Manager to determine Runway Condition Codes (RwyCCs) as stated in the following steps. The Runway Condition Assessment Matrix (RCAM) is included as Appendix 1 to this document.

Step 1: Runway Condition Code (RwyCC) Applicability:

If 25 percent or less of the overall runway length and width or cleared width is covered with contaminants, RwyCCs must not be applied, or reported. The SCC

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will report the contaminant percentage, type and depth for each third of the runway, to include any associated treatments or improvements.

or

If the overall runway length and width coverage or cleared width is greater than 25 percent, RwyCCs must be assigned, and reported, informing airplane operators of the contaminant present, and associated codes for each third of the runway. (The reported codes will serve as a trigger for all airplane operators to conduct a takeoff and/or landing performance assessment).

Step 2: Apply Assessment Criteria

Based on the contaminants observed, the associated RwyCC for each third of the runway will be assigned.

Step 3: Validating Runway Condition Codes

If the observations and runway friction data obtained by MSP determine that RwyCCs assigned accurately reflect the runway conditions and performance, no further action is necessary, and the RwyCCs generated may be disseminated.

5.2.2 Downgrade Assessment Criteria

When observations and runway friction data indicate a more slippery condition than generated by the RCAM, the SCC Manager may choose to downgrade the RwyCC(s). When applicable, the downgrade of RwyCCs may be based on friction (μ) readings, vehicle control, pilot reported braking action, temperature or rate of precipitation.

NOTE: Temperatures near and above freezing (e.g., at negative 26.6° F (-3° C) and warmer) may cause contaminants to behave more slippery than indicated by the runway condition code given in the RCAM. At these temperatures, MSP will exercise a heightened awareness of airfield conditions and should downgrade the RwyCC if appropriate.

5.2.3 Upgrade Assessment Criteria Based on Friction Assessments

RwyCCs of 0 or 1 may only be upgraded when the following requirements are met:

1. All observations, judgment, and vehicle braking action support the higher RwyCC, and
2. Mu values of 40 or greater are obtained for the affected third(s) of the runway by a CFME that is operated within allowable parameters.
3. This ability to raise the reported RwyCC to no higher than a code 3 can only be applied to those runway conditions listed under code 0 and 1 in the RCAM. (See footnote 2 on the RCAM.)
4. MAC Airside Operations will 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.

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a. 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.
b. If sand or other approved runway treatments are used to satisfy the requirements for issuing the higher runway condition code, the monitoring program must confirm continued effectiveness of the treatment.

5.3 Runway Friction Surveys, Equipment, and Procedures

MAC Airside Operations utilizes CFME vehicles to conduct runway friction testing. The current CFME fleet includes:

- OPS51 – Halliday RT3
- OPS55 – Halliday RT3

5.3.1 Conditions Acceptable to Use CFME to Conduct Runway Friction Surveys

The data obtained from such runway friction surveys are only considered to be reliable when the surface is contaminated under any of the following conditions:

- Ice or wet ice.
- Compacted snow at any depth.
- Dry snow 1” or less.
- Wet snow or slush 1/8” or less.

5.3.2 When to Conduct

Runway friction tests will be performed when the following conditions occur:

1. After anti-icing, deicing, sanding or snow/ice removal operations.
2. When pilot braking reports, surface sensor data and field observations indicate that runway surface friction levels are approaching minimum operating values
3. After an aircraft accident/incident occurs on a runway when surface friction could be a contributing factor.
4. Prior to opening a runway on which an aircraft accident/incident occurred.
5. At any time, the SCC Manager determines that runway surface friction information will be useful for the safe operation at the airport.

5.3.3 How to Conduct

Standard practice is to conduct a one-way friction run on a closed runway, 10 feet on the right side of the runway centerline at 40 mph. Safety considerations might require friction runs be done at less than 40 mph.

The runway will be closed, or remain closed, for additional treatment when a friction run identifies an area of less than:

- 20μ for any continuous 500-foot section of a runway, or
- 10μ at any point on a runway

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In either case, the runway will remain closed until a friction test indicates no 500-foot sections of runway with continuous readings less than 20μ and no point on the runway below 10μ.

5.3.4 Calibration

CFME vehicles are inspected and certified annually by a manufacturer's representative. Additionally, trained MAC Airside Operations personnel calibrate and inspect the CFME vehicles in accordance with the manufacturer's specifications on a regular schedule and prior to operating the vehicle.

5.4 Surface Condition Reporting

MAC Airside Operations field inspectors will monitor and report changing airfield conditions to the SCC, who will issue FICONs via NOTAM Manager. FICONs are issued as soon as practicable upon completion of a surface inspection when reportable contaminants are observed.

5.4.1 Runways

Runway FICONs and their associated RwyCCs will be updated as soon as practicable after every physical inspection of a runway, if reportable contaminants are observed. In active snowfall, FICONs must be updated at least every three hours. In active freezing precipitation FICONs must be updated at least every two hours. If a reportable contaminant is still present on a runway when it is no longer precipitating, the FICON must be updated at least every 12-hours.

The term 'DRY' is used to describe a surface that is neither wet nor contaminated. While a FICON NOTAM is not generated for the sole purpose of reporting a dry runway, a dry surface will be reported when there is need to report conditions on the remainder of the surface. (For example: snow is present on the first two thirds of the runway.)

5.4.2 Taxiway and Aprons

Taxiway, apron, and deice pad FICONs will be updated as soon as practicable after every physical inspection of the surface(s), if reportable contaminants are observed. In active snowfall, FICONs must be updated at least every three hours. In active freezing precipitation FICONs must be updated at least every two hours. If a reportable contaminant is still present on a taxiway, apron, or deice pad when it is no longer precipitating, the FICONs must be updated at least every 24 hours or as conditions change.

5.5 Reportable Contaminants without Performance Data.

If present, unable to be removed, and posing no hazard, mud will be reported with a measured depth. Ash, oil, sand, and rubber contaminants will be reported without a measured depth. These contaminants will not generate a RwyCC.

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5.6 Slippery When Wet Runway.

For runways where a friction survey (for the purposes of pavement maintenance) indicates the averaged Mu value at 40 mph on the wet pavement surface failed to meet the minimum friction level classification specified in AC 150/5320-12, MSP will report via NOTAM Manager a RwyCC of '3' for the entire runway (by thirds: 3/3/3) when the runway is wet.

A runway condition description of 'Slippery When Wet' will be used for this condition.

If it is determined by MSP that a downgrade is necessary, the downgrade will be made to all three runway thirds match (i.e., 3/3/3, 2/2/2, 1/1/1).

The NOTAM will be cancelled when the minimum runway friction level classification has been met or exceeded.

5.7 Preplanned Closures

The SICC has developed preplanned airfield closures, organized by runway configuration, to be utilized in Category 3, 4, and 5 winter events. At the discretion of the SCC Manager, these closures are activated at the onset of the precipitation, when snow accumulation reaches 1" and forecast or radar indicate continued snowfall, or when any depth of freezing contaminant is reported. The goal of these closures is to help snow removal crews and airfield inspectors focus their efforts on higher priority airfield surfaces that allow MSP to continue to operate safely and efficiently during significant events.

5.8 Continuous Monitoring and Deteriorating Conditions.

Continuous monitoring procedures will be implemented at the discretion of the SCC Manager, for all open airfield surfaces, when active precipitation is reported *and* any airfield surface FICON is reported as worse than wet. All open runways, taxiways, aprons, and deice pads will be inspected at least every three hours in active snowfall and at least every two hours in active freezing precipitation. These inspection timers will be monitored by the SCC referencing the last FICON observation time for each surface and keeping the airfield inspectors aware of any surfaces approaching these timer thresholds. If an open surface is not inspected within these times, the SCC must immediately inform the airfield inspector to close the surface(s) over the appropriate ATC frequency until it can be inspected.

If any airfield surface receives back-to-back BA poor PIREPs, MAC airfield inspectors must inspect that surface as soon as possible and advise the SCC and ATC if the surface needs a closure and/or treatment. For back-to-back runway BA poor PIREPs, the SCC must coordinate with ATC to form a Build-a-Gap (BAG) runway inspection as soon as possible to determine if the runway needs to be closed and treated.

If braking action NIL PIREPs are reported by ATC to the SCC or overheard on frequency, the airfield inspector responsible for that surface must immediately close the

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affected surface over the appropriate frequency and not allow any more aircraft operations on that surface until treated, inspected, and re-opened.

Under deteriorating conditions, the SCC and airfield inspectors will take all reasonable steps using available equipment and materials that are appropriate for the condition to improve the braking action.

Deteriorating conditions include, but are not limited to:

- Frozen or freezing precipitation.
- Falling air or pavement temperatures may cause a wet runway to freeze.
- Rising air or pavement temperatures that may cause frozen contaminants to melt.
- Removal of abrasives previously applied to the runway due to wind or airplane effects.
- Frozen contaminants blown onto the runway by wind

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SECTION #3

APPENDICES

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Appendix 1: Runway Condition Assessment Matrix (RCAM)

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	39 to 30	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	29 to 21	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		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		Braking deceleration OR directional control is between Medium and Poor.	Medium to Poor
• Ice [2]	1		Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	Poor
• Wet Ice [2] • Slush over Ice [2] • 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

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[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.

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Appendix 2: MAC Snow Removal Equipment List

MULTI-FUNCTION SNOWPLOWS

2008 OSHKOSH 616-1503
2008 OSHKOSH 616-1593
2008 OSHKOSH 616-1597
2008 OSHKOSH 616-1603
2008 OSHKOSH 616-1605
2008 OSHKOSH 616-1611
2015 OSHKOSH 616-1273
2015 OSHKOSH 616-1306
2015 OSHKOSH 616-1308
2017 OSHKOSH 616-1373
2017 OSHKOSH 616-1375
2018 OSHKOSH 616-1441
2018 OSHKOSH 616-1457
2020 OSHKOSH 616-1506
2025 MB 616-2524
2025 MB 616-2525
2025 MB 616-2526
2025 MB 616-2527
2025 MB 616-2539
2026 MB 616-2601
2026 MB 616-2602
2026 MB 616-2603
2026 MB 616-2604
2026 MB 616-2605
2026 MB 616-2606
2026 MB 616-2607
2026 MB 616-2608
2026 MB 616-2609
2026 MB 616-2665

SNOWPLOWS

2008 OSHKOSH 616-1039
2015 OSHKOSH 616-1312
2015 OSHKOSH 616-1313

RUNWAY BROOMS

2018 OSHKOSH 616-1446
2018 OSHKOSH 616-1466
2018 OSHKOSH 616-1467
2026 MB 616-2616

SNOW BLOWERS - up to 7,500 tons per hour
(4-wheel drive rotary snow blower, with approximately 150' cast)

1998 OSHKOSH 616-683
1999 OSHKOSH 616-736
2006 OSHKOSH 616-937
2009 OSHKOSH 616-1046
2014 OSHKOSH 616-1221
2018 OSHKOSH 616-1439
2018 OSHKOSH 616-1440
2018 OSHKOSH 616-1465
2024 MB 616-1751
2024 MB 616-1752
2024 MB 616-1753
2024 MB 616-1754
2024 MB 616-1755
2026 MB 616-2610
2026 MB 616-2611

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SAND/SOLID DEICER SPREADERS
(12-yard capacity)

2017 FREIGHTLINER 616-1335
2017 FREIGHTLINER 616-1336
2017 FREIGHTLINER 616-1344
2019 FREIGHTLINER 616-1454
2021 FREIGHTLINER 616-1543

SAND/SOLID/LIQUID DEICER/SPREADER
(up to 10-yard capacity, 2,000-gallon capacity)

2006 FREIGHTLINER 616-939
2006 FREIGHTLINER 616-941
2014 FREIGHTLINER 616-1183
2015 FREIGHTLINER 616-1216
2015 FREIGHTLINER 616-1217
2026 MB 616-2528
2026 MB 616-2529
2026 MB 616-2538

LIQUID CHEMICAL SPREADER
(4,000-gallon capacity)

2000 STERLING 616-779
2016 FREIGHTLINER 616-1281
2016 FREIGHTLINER 616-1327
2019 FREIGHTLINER 616-1461
2019 FREIGHTLINER 616-1462
2021 FREIGHTLINER 616-1545
2023 FREIGHTLINER 616-1741
2023 FREIGHTLINER 616-1742
2026 MB 616-2623
2026 MB 616-2624
2026 MB 616-2625

LIGHT & SIGN PLOW

2016 HAGIE 616-1276
2020 HAGIE 616-1548

LOADERS

2024 CATERPILLAR 620-101
2024 CATERPILLAR 620-102
2024 CATERPILLAR 620-103
2024 CATERPILLAR 620-104
2024 CATERPILLAR 620-105
2024 CATERPILLAR 620-106
2024 CATERPILLAR 620-107
2024 CATERPILLAR 620-108
2024 CATERPILLAR 620-109
2024 CATERPILLAR 620-110
2024 CATERPILLAR 620-111
2024 CATERPILLAR 620-112
2024 CATERPILLAR 620-113
2024 CATERPILLAR 620-114
2024 CATERPILLAR 620-116
2024 CATERPILLAR 620-117
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2024 CATERPILLAR 620-119
2024 CATERPILLAR 620-120
2024 CATERPILLAR 620-121
2024 CATERPILLAR 620-122
2024 CATERPILLAR 620-123
2024 CATERPILLAR 620-124
2024 CATERPILLAR 620-125
2024 CATERPILLAR 620-126
2024 CATERPILLAR 620-127
2024 CATERPILLAR 620-128

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GRADER
2024 CATERPILLAR 620-129

TRACTORS WITH SNOWBLOWERS
2012 JOHN DEERE 616-1151
2014 JOHN DEERE 616-1188

TRACTORS WITH BROOMS
2009 JOHN DEERE 616-1080
2009 JOHN DEERE 616-1081
2009 JOHN DEERE 616-1082
2009 JOHN DEERE 616-1083

TRACTORS WITH PUSHERS
2009 JOHN DEERE 616-1084
2009 JOHN DEERE 616-1085
2010 JOHN DEERE 616-1103
2010 JOHN DEERE 616-1104
2017 JOHN DEERE 616-1337
2017 JOHN DEERE 616-1338
2017 JOHN DEERE 616-1339
2018 JOHN DEERE 616-1377
2019 JOHN DEERE 616-1447
2019 JOHN DEERE 616-1448
2019 JOHN DEERE 616-1449

TRIAXLE DUMP TRUCK
2002 FREIGHTLINER 616-829
2016 FREIGHTLINER 616-1277
2016 FREIGHTLINER 616-1278
2016 FREIGHTLINER 616-1279
2026 FREIGHTLINER 616-1756
2026 FREIGHTLINER 616-1757
2026 FREIGHTLINER 616-1758

SKIDSTEERS
2010 BOBCAT 616-1095
2014 BOBCAT 616-1218
2024 CATERPILLER 620-0131
2024 CATERPILLER 620-0132
2024 CATERPILLER 620-0133

TOOLCATS
(UTV with front bucket/broom and dump bed)
2018 BOBCAT 616-1469
2018 BOBCAT 616-1470
2018 BOBCAT 616-1471
2018 BOBCAT 616-1472

ROAD PLOWS
2014 FREIGHTLINER 616-1184
2014 FREIGHTLINER 616-1185
2015 FREIGHTLINER 616-1219
2019 FREIGHTLINER 616-1445
2019 FREIGHTLINER 616-1463
2019 FREIGHTLINER 616-1464

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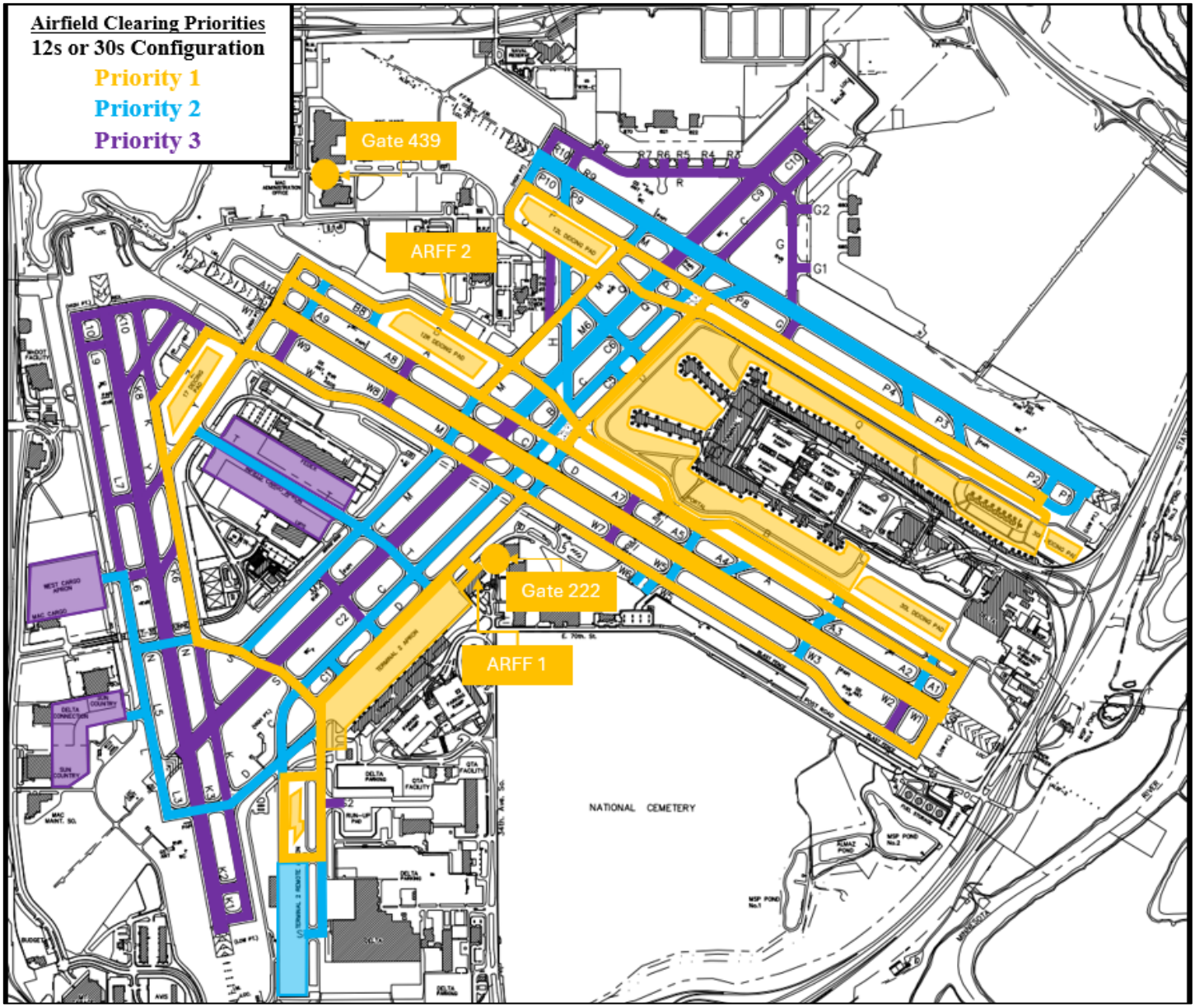
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Appendix 3: Airfield Clearing Priorities – 12s or 30s Configuration



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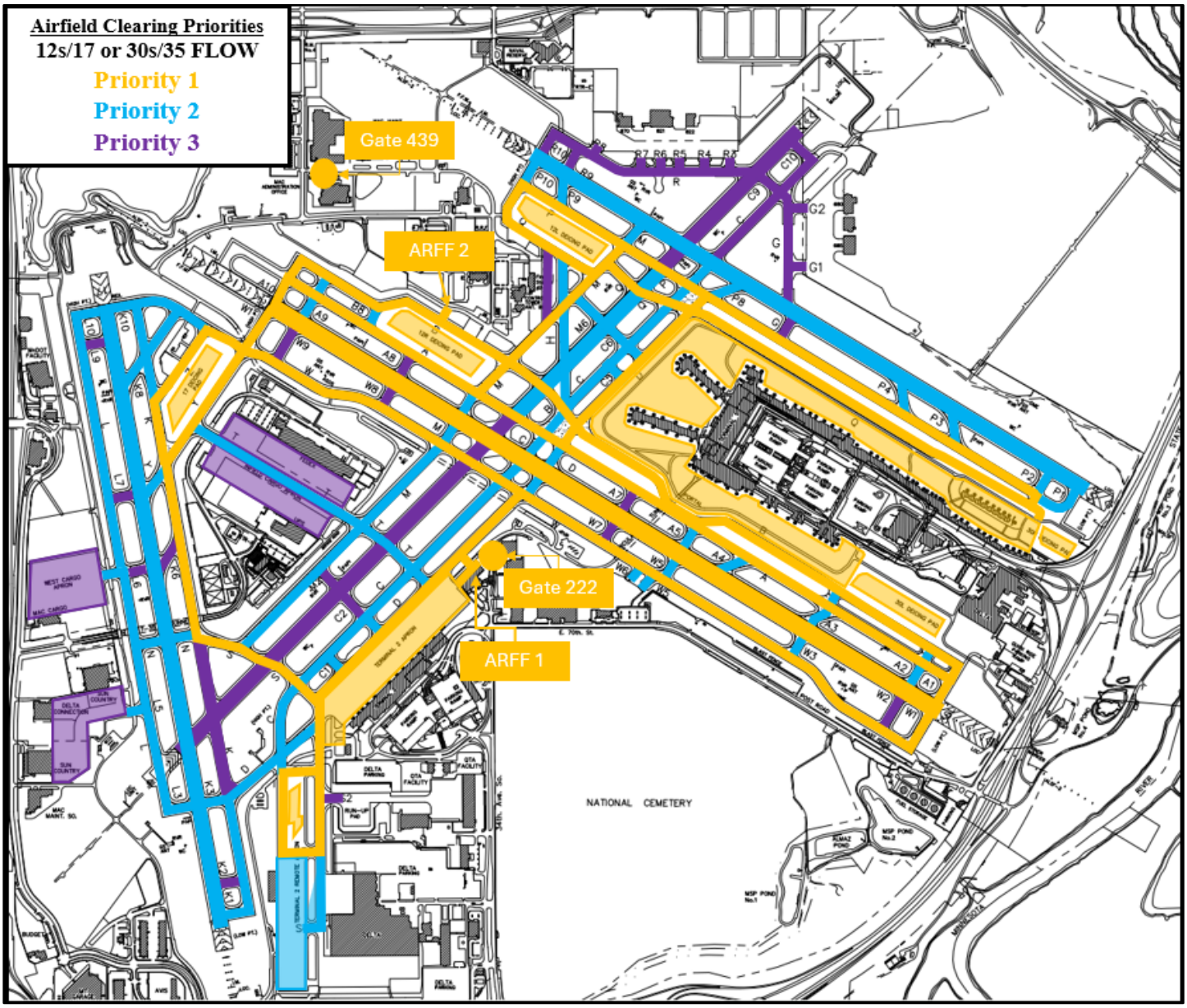
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Appendix 4: Airfield Clearing Priorities - 12s/17 or 30s/35 Configuration



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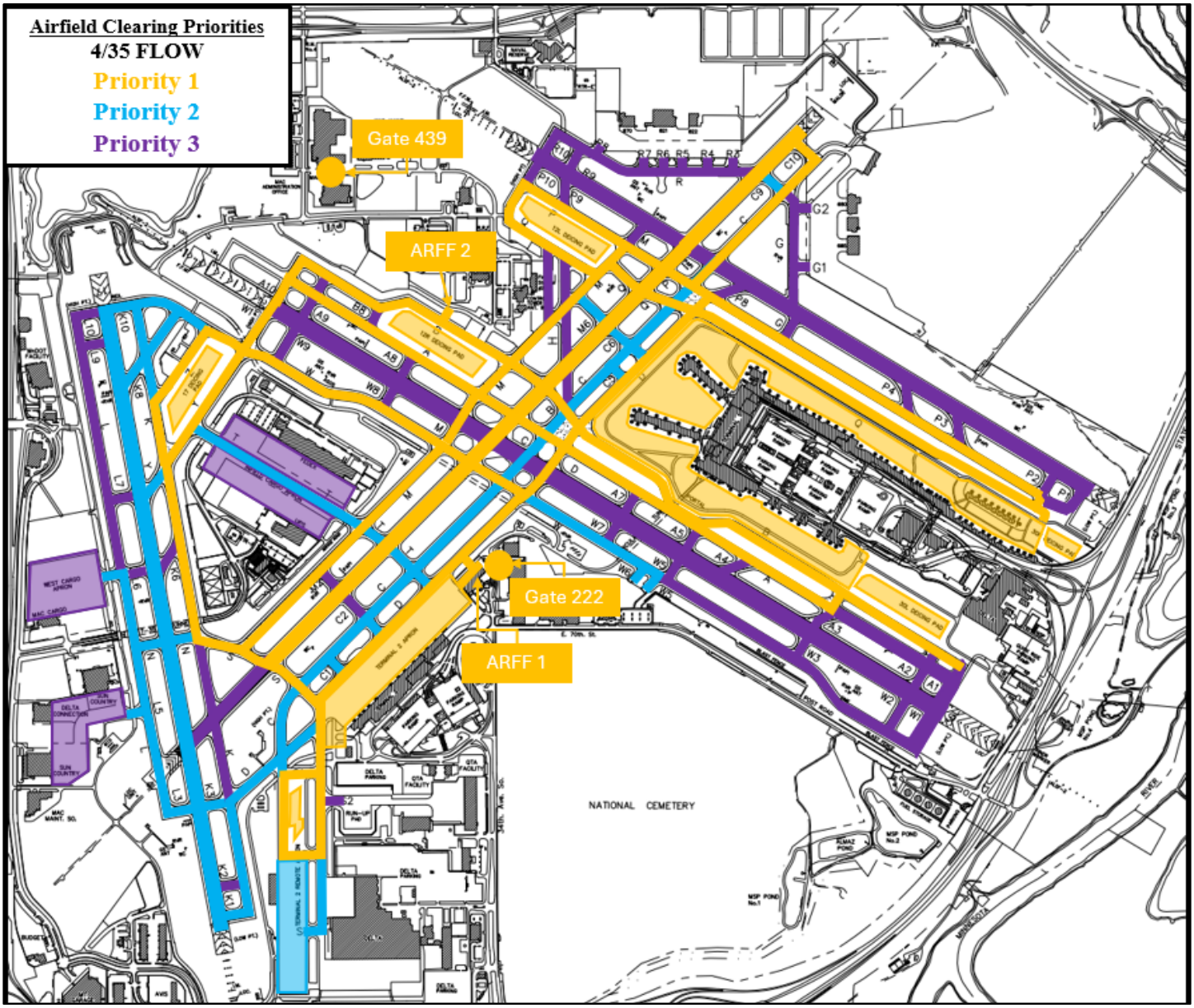
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Appendix 5: Airfield Clearing Priorities – 4/35 Configuration



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