

A line of yellow snowplows is clearing a snow-covered runway at an airport. The plows are moving away from the camera, leaving tracks in the snow. The sky is overcast and grey. In the background, airport buildings and parked aircraft are visible. The overall scene is a winter storm aftermath.

When Hell Froze Over

City of Dallas - Department of Aviation – Winter Storms 2021

Introduction

Benj C. Korson – Airport Emergency Operations Manager

Emergency Management Division

Department of Aviation

City of Dallas

Benjamin.Korson@dallascityhall.com

(o) 214.670.6844



Topics

- Dallas Airport System
 - Stakeholders
- Situation
- Winter Weather Operations
 - Winter Weather Response
- Implementing the Improvement Process
 - What Went Well
 - What Could Be Improved
 - Improvement Actions
- Next Steps



Dallas Airport System

The City of Dallas, Department of Aviation, Airfields

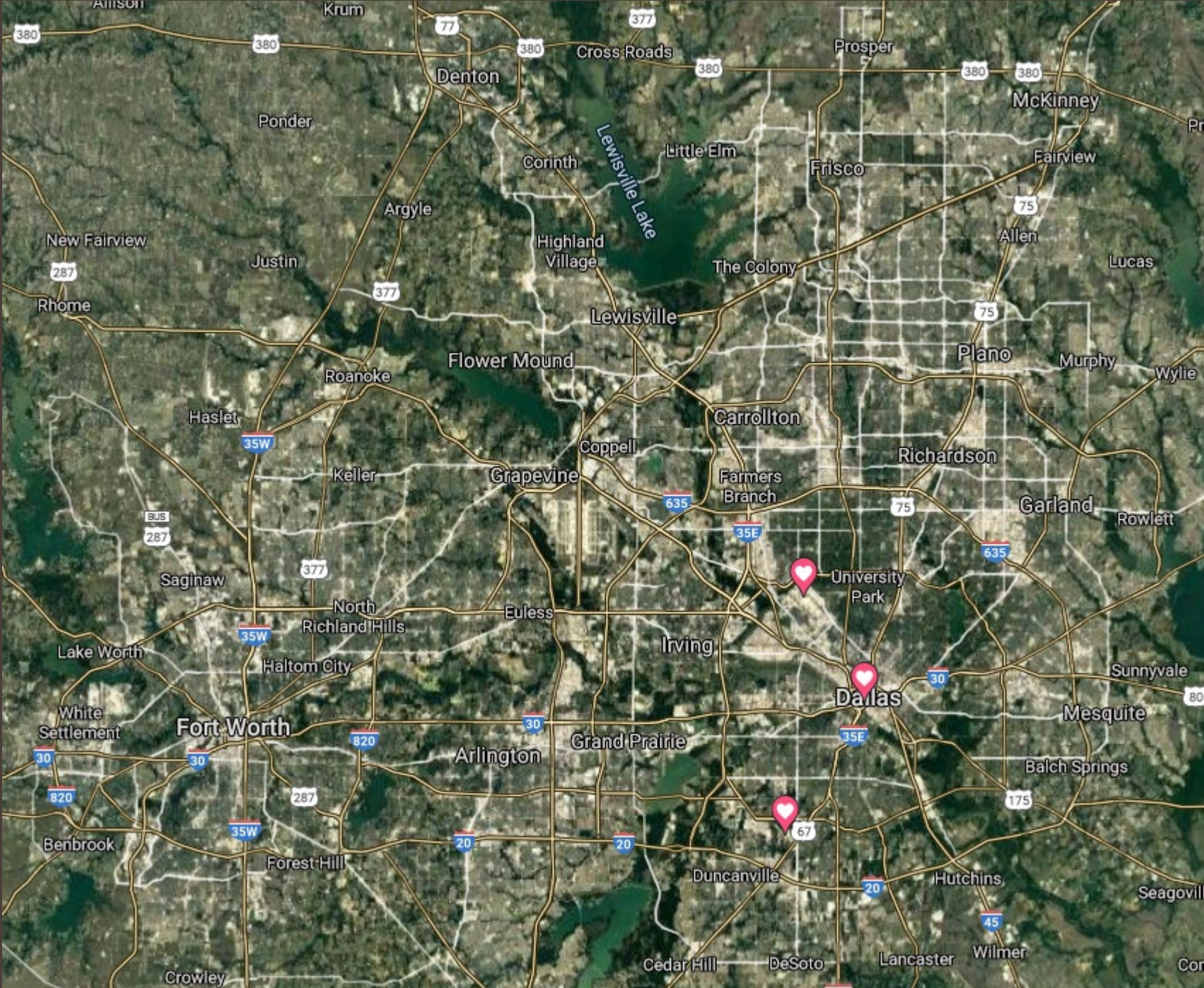


Dallas Airport System

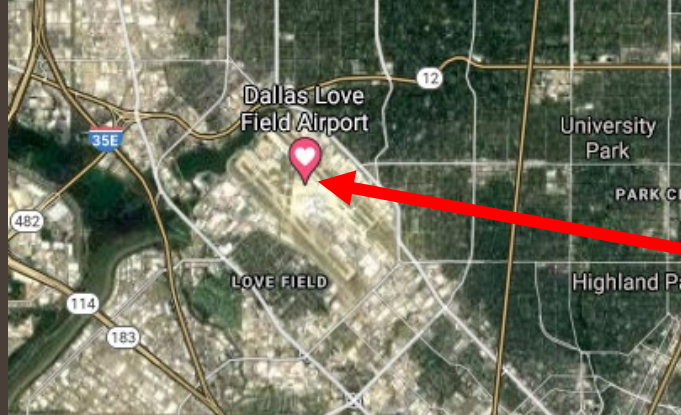


- The Dept. of Aviation manages the Dallas Airport System, which is comprised of three airfields and various lands and properties throughout Dallas.
 - Dallas Executive Airfield
 - Dallas Vertiport Airfield
 - Dallas Love Airfield
- History
 - Dallas Love Field was commissioned on October 19, 1917 as a training base for the U.S. Army Air Service during World War I
 - City of Dallas purchased it in 1927
 - Dallas-Fort Worth International Airport's opened in 1974 (DAL's slowest year)
 - Southwest Airlines founded in 1971 and essentially saved the airfield
 - Wright Amendment instituted to restrict the operations of passenger aircraft to locations within Texas and neighboring states.
 - Wright Amendment repealed in part in 2005, and expired in 2014.
 - 31st busiest airport in the US with 8 million+ enplanements.

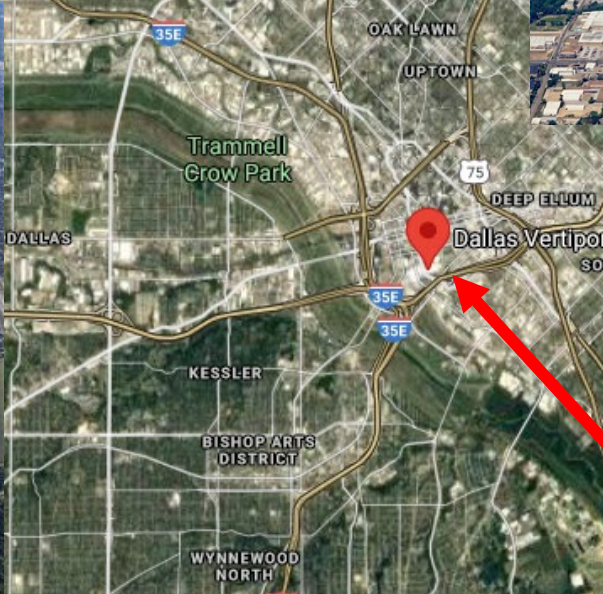
Dallas Airport System



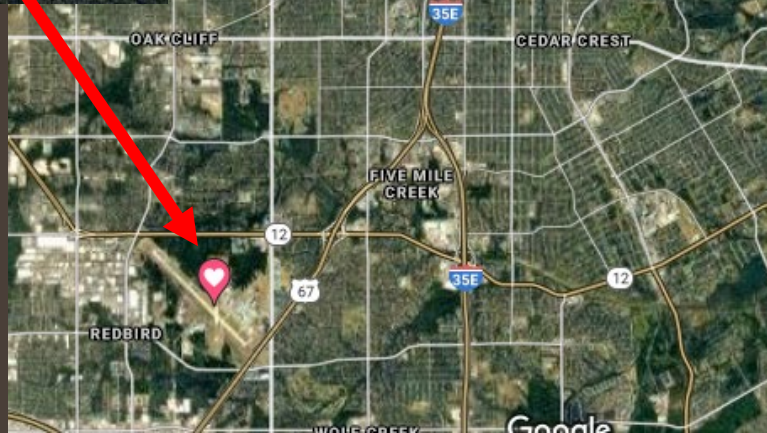
 Dallas Executive Airport




 Dallas Love Field



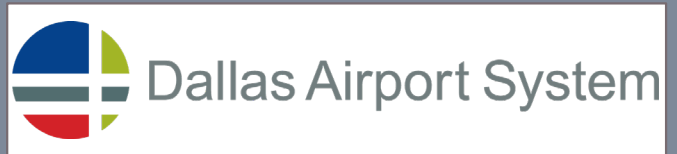
 Dallas Airport System



 Dallas Vertiport

Stakeholders

The major participants and stakeholders



Stakeholders

- City of Dallas
 - Dept of Aviation (AVI)
 - Dallas Police Dept (DPD)
 - Dallas Fire Rescue (DFR)
 - Office of Emergency Management (OEM)



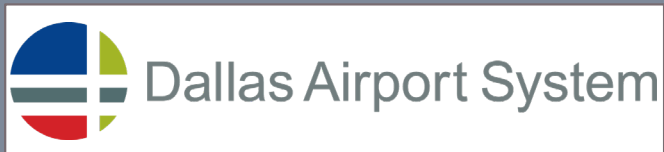
- Federal
 - Federal Aviation Administration (FAA)
 - Transportation Security Administration (TSA)
 - Customs & Border Protection (CBP)



- Airlines
 - Alaska
 - Delta
 - Southwest

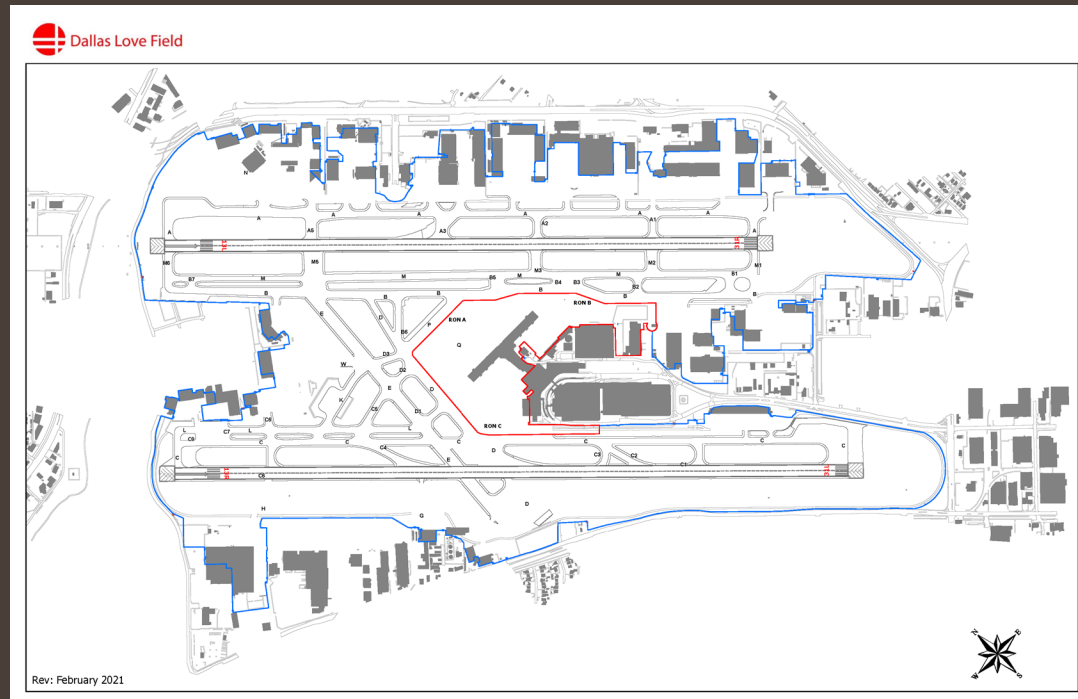


- FBOs
- Vendors/Contractors



Stakeholders

- Department of Aviation (Key Divisions)
 - Airside (ASO) – All things airfield operations
 - Airfield Management (AFM) – All things maintaining the physical airfield
 - Landside (LSO) – All things terminal and passenger operations
 - Facilities (FAC) – All things maintaining the physical buildings
- Airport Operations Center (AOC) – The information center and coordination of all airport operations
- Storeroom, procurement, transportation, finance, admin, security, IT.
- Emergency Management Division – You know what this is...



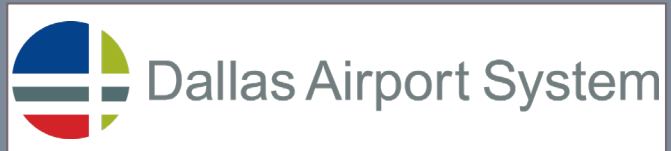
Situation

The facts and numbers of the winter storm crisis.



Situation

- The Numbers:
 - Coldest 3 day stretch in recorded history – 10.8* (02/14-16 Avg)
 - Coldest temp in over 70 years – -2* (02/16)
 - 4.5” of total snow accumulation
 - 139 hours (nearly 6 days) below freezing temps
 - 232 hours if we drop the 1 hour above freezing on Sat.
- Airfield Status:
 - Pandemic decrease in budget and staffing.
 - Extensive turn over since last major winter event.
 - Rebuilding emergency management and preparedness capabilities
 - COVID mandates and prevention practices in place.



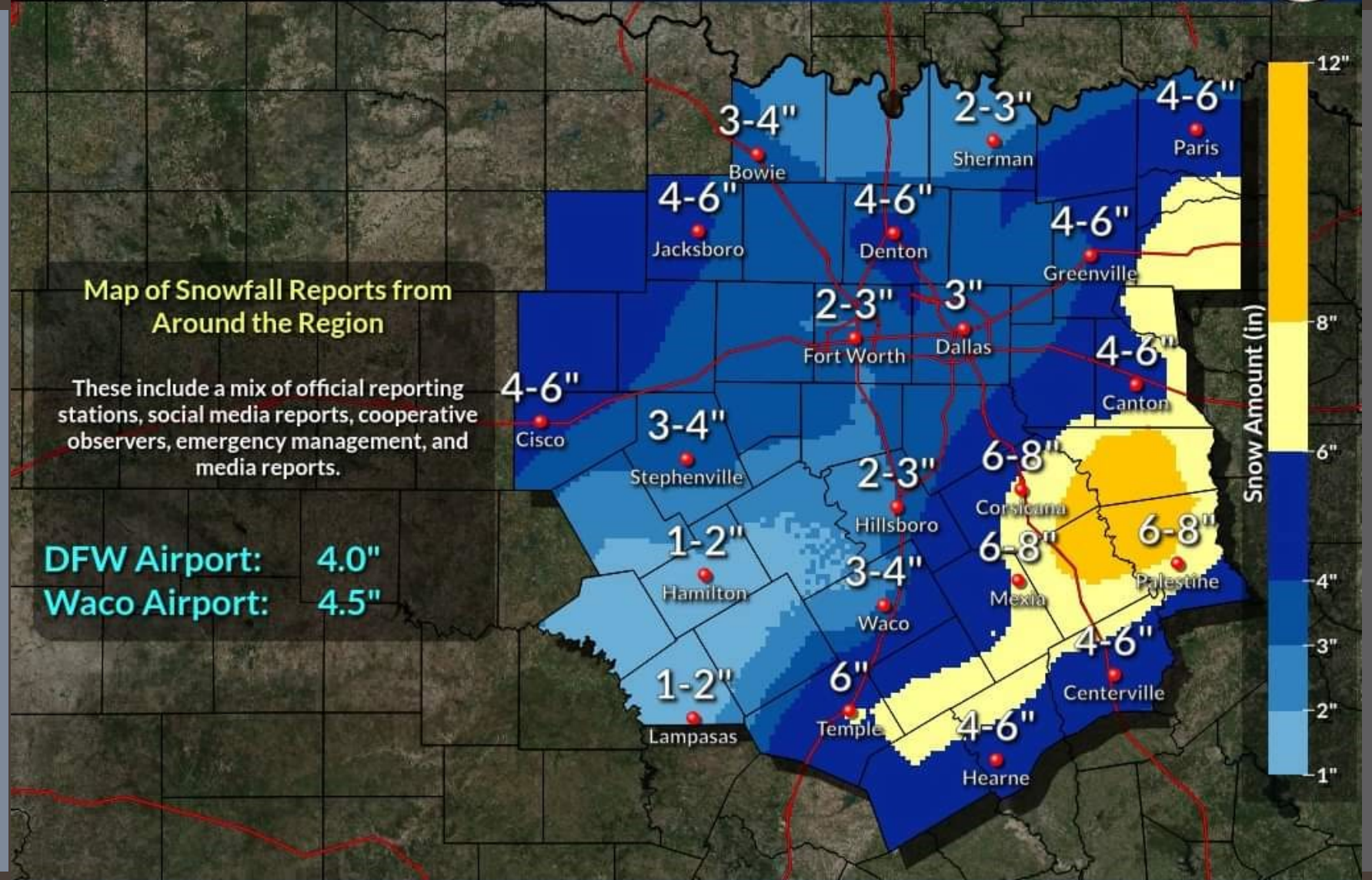
Storm Total Snowfall - 1st Round

Weather Forecast Office
Fort Worth, TX



February 14-15, 2021

Issued Feb 21, 2021 7:50 AM CST



Situation



NWSFort Worth

weather.gov/fortworth

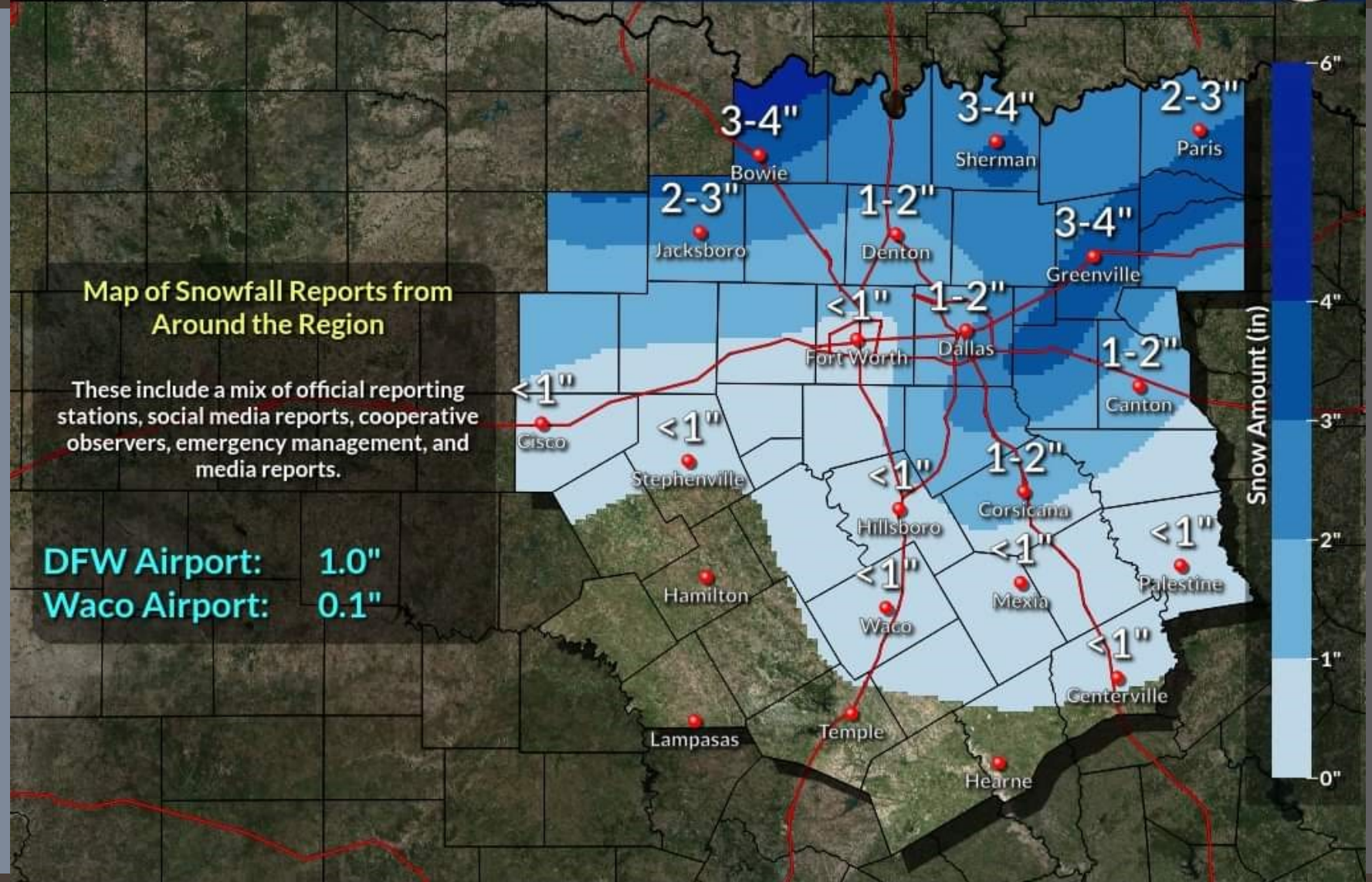
Storm Total Snowfall - 2nd Round

Weather Forecast Office
Fort Worth, TX



February 16-17, 2021

Issued Feb 21, 2021 7:54 AM CST



Situation



NWSFort Worth

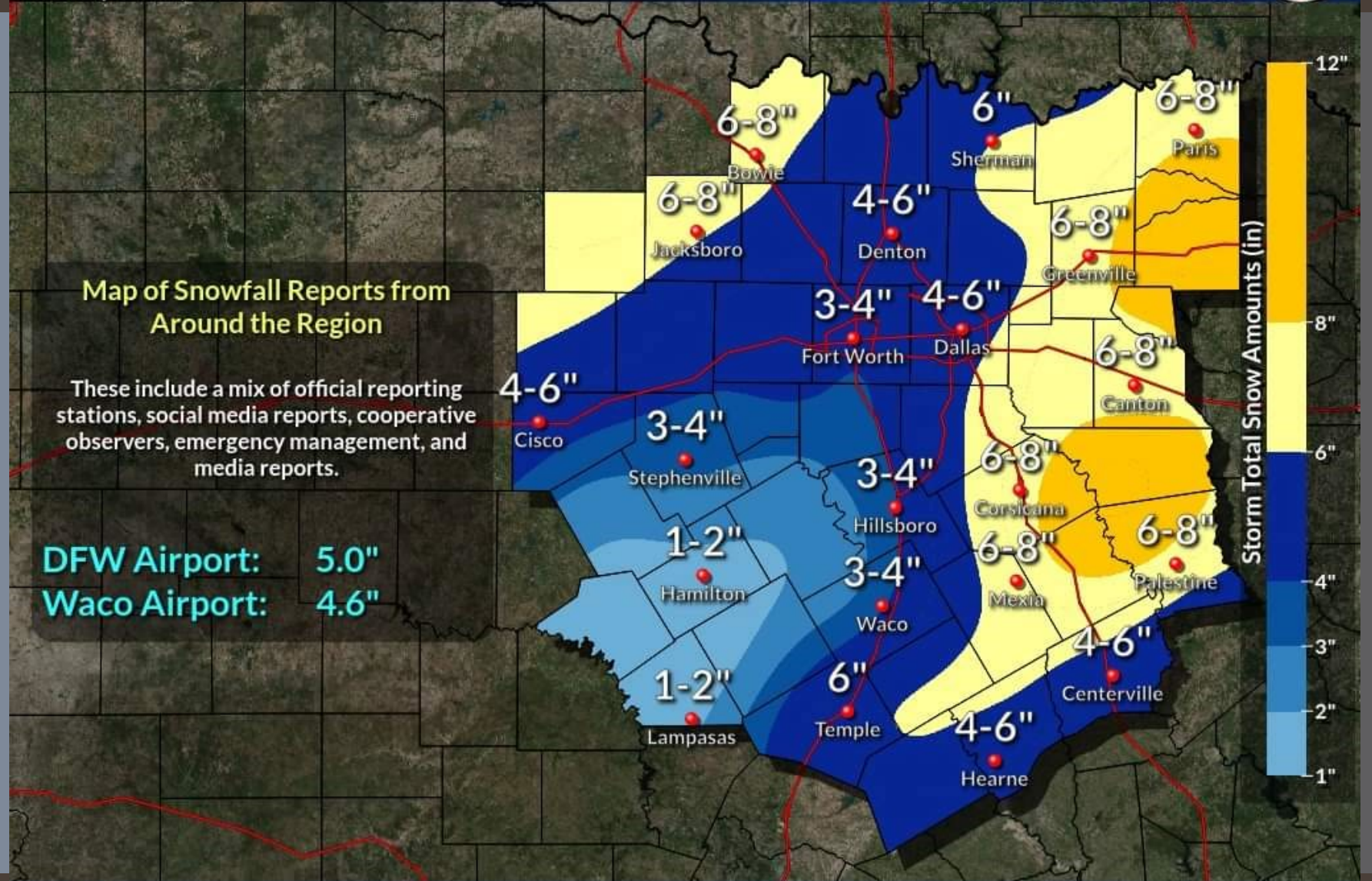
weather.gov/fortworth

Storm Total Snowfall

February 14-17, 2021

Weather Forecast Office
Fort Worth, TX

Issued Feb 21, 2021 7:59 AM CST



Situation



NWSFort Worth

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Major Winter Storm Today

Weather Forecast Office

Fort Worth, TX



Valentine's Day Snow Storm 2021

Issued February 14, 2021 5:17 AM CT

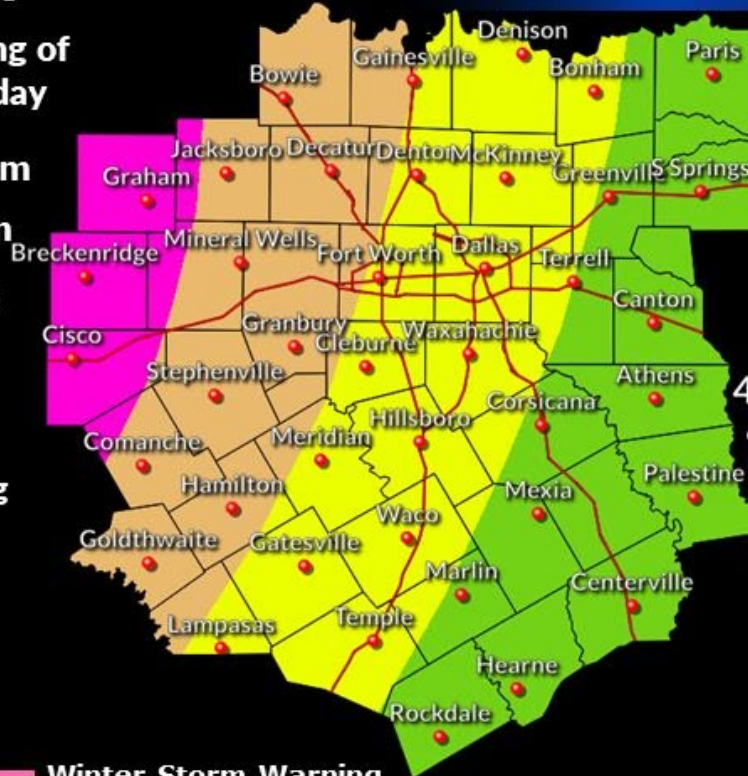
Approximate Timing of Heavy Snow Sunday

- 10am to 12pm
- 12pm to 2pm
- 2pm to 4pm
- 4pm to 6pm

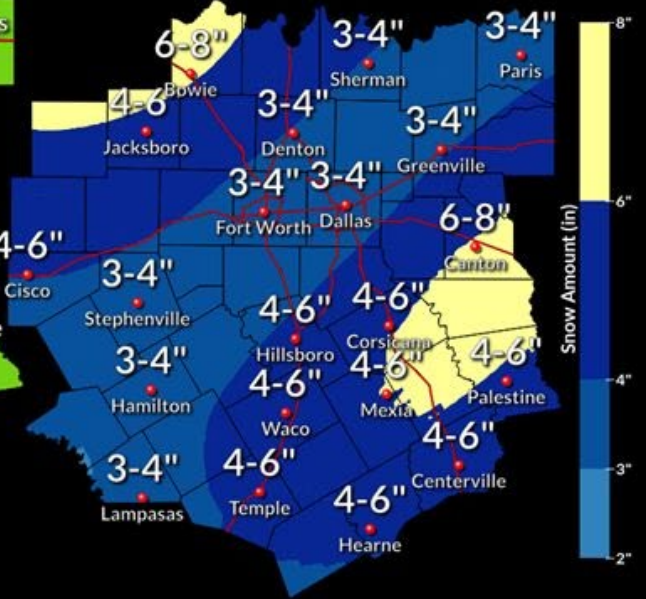
Winter Storm Warning



Winter Storm Warning Through 6 PM Monday



Forecast Snowfall



Mostly Likely Snowfall

Wind chills as low as 15 below zero (-15 F) will be life-threatening to people and animals outside without adequate warmth! North winds of 20-25 MPH with snow will result in white-out conditions with snow drifts making driving treacherous!

NWSFortWorth

weather.gov/fortworth

Situation



Major Winter Storm Today

Weather Forecast Office

Fort Worth, TX



Valentine's Day Snow Storm 2021

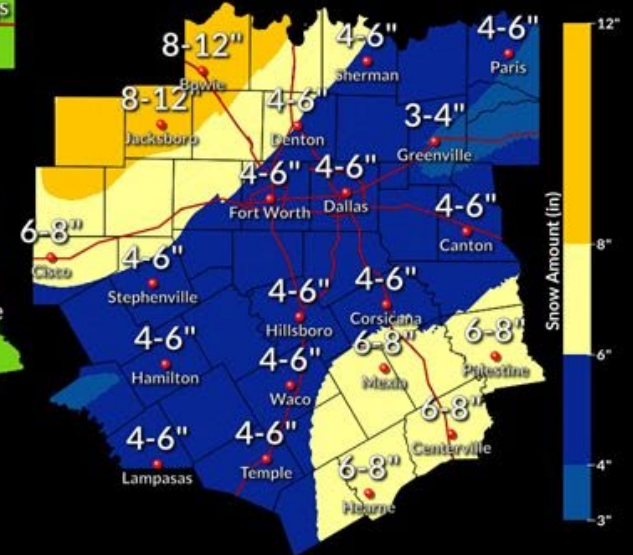
Issued February 14, 2021 11:28 AM CT

Approximate Timing of Heavy Snow Sunday

- 10am to 12pm
- 12pm to 2pm
- 2pm to 4pm
- 4pm to 6pm



Forecast Snowfall



Winter Storm Warning



Winter Storm Warning Through 6 PM Monday

Mostly Likely Snowfall

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NWSFortWorth

weather.gov/fortworth

Situation



Situation

Very Dangerous Wind Chills

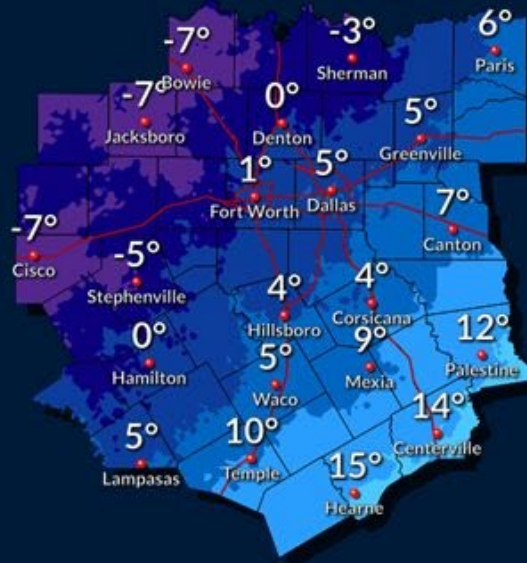
Weather Forecast Office
Fort Worth, TX



Below zero wind chills possible the next few days!

Issued February 14, 2021 7:39 AM CT

Today (Sunday)



Sun Night - Monday



Mon Night - Tuesday



Winter Weather Operations

The plan and the decision making process.

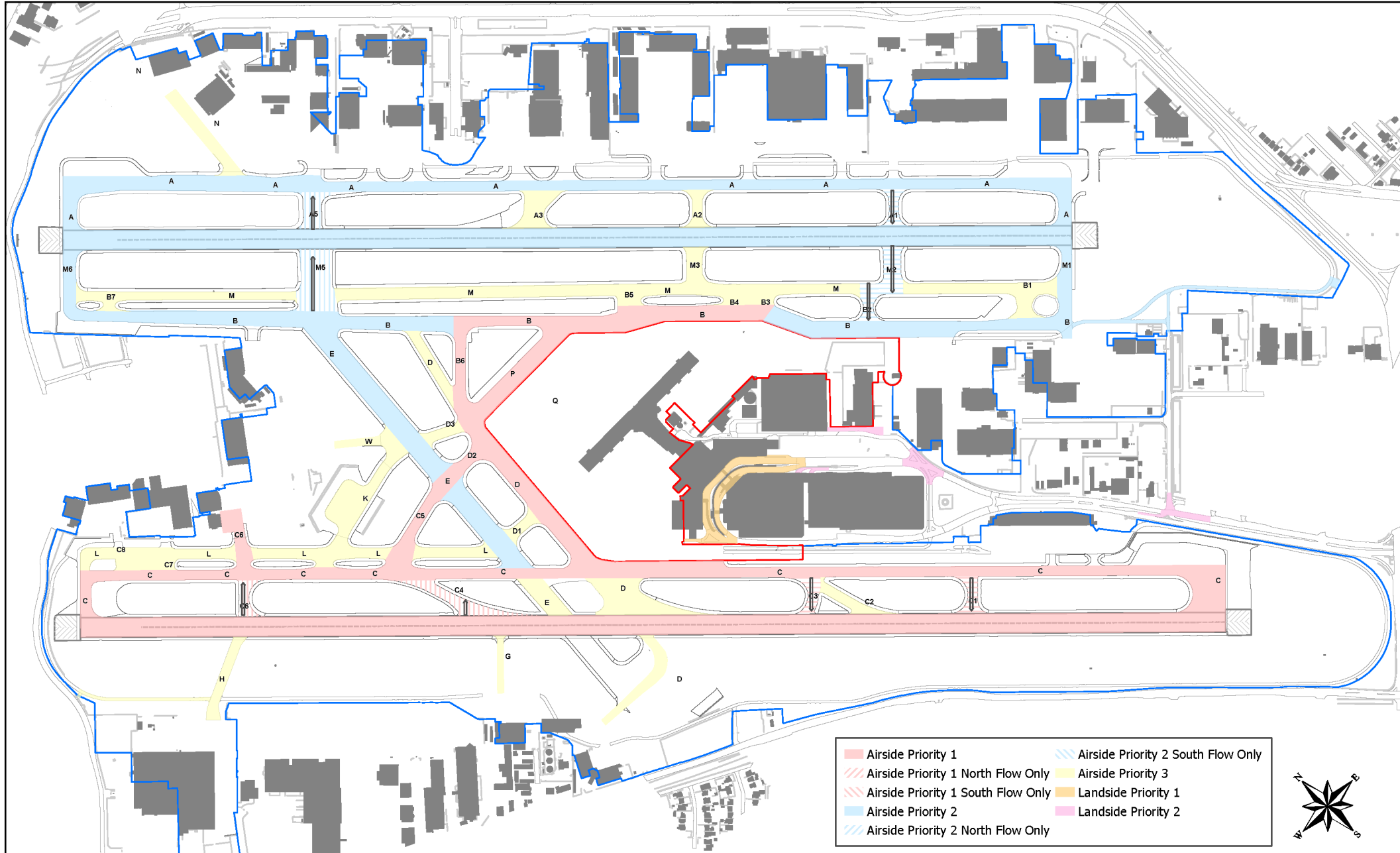


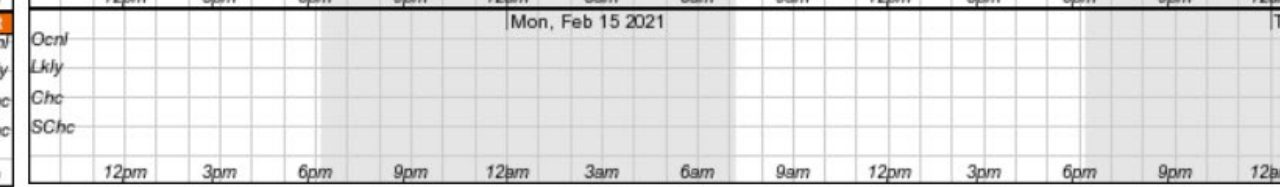
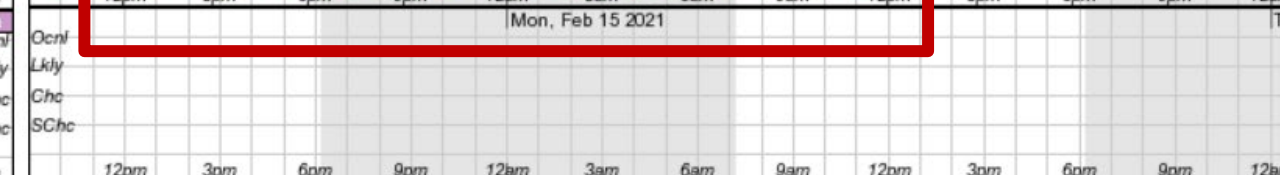
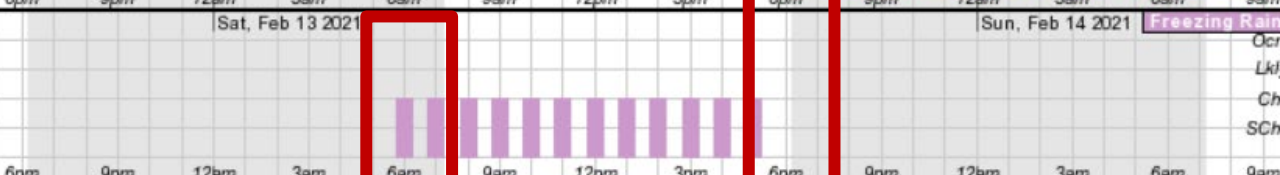
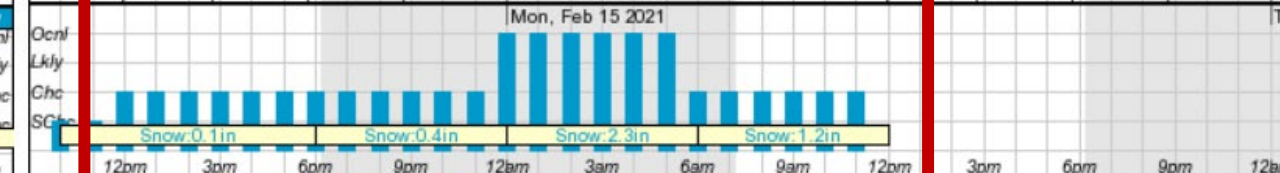
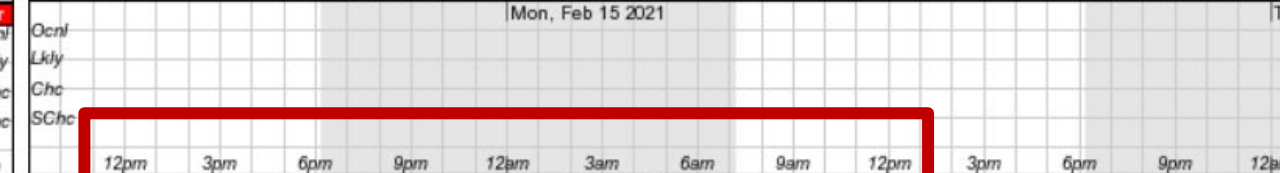
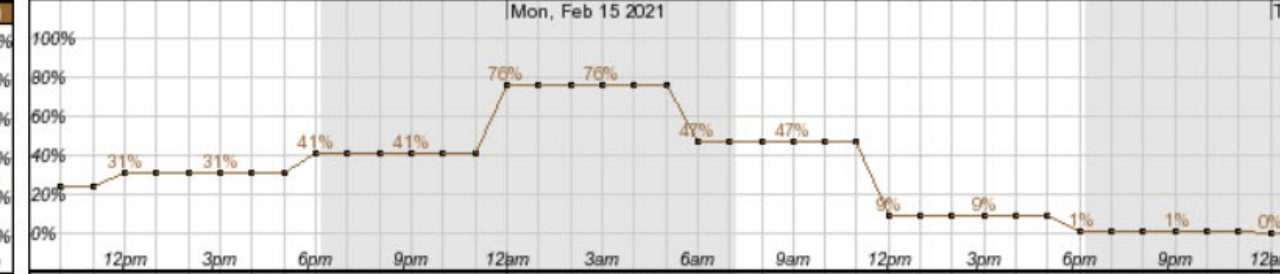
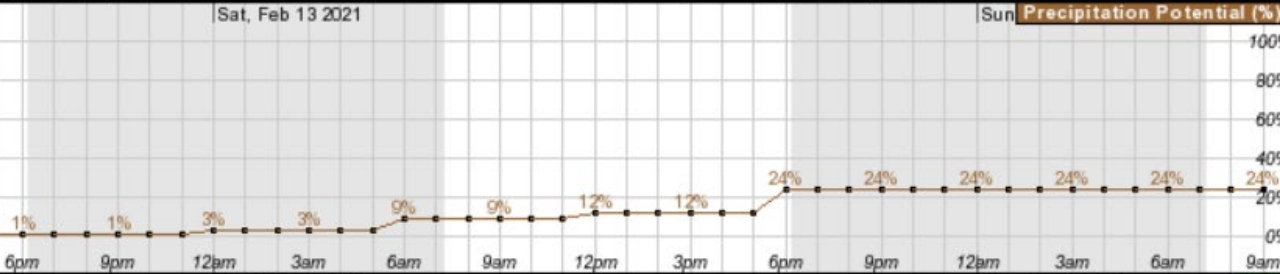
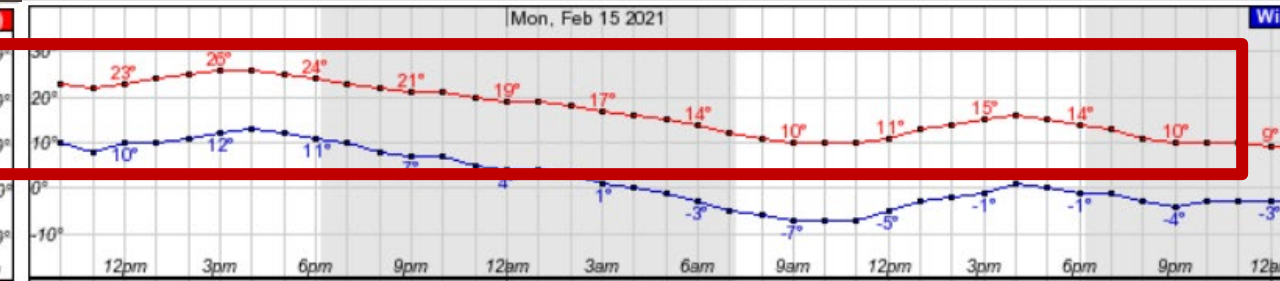
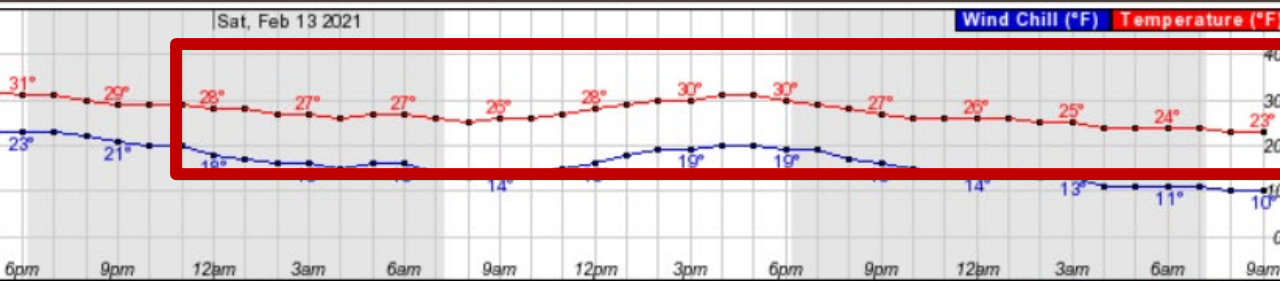
Emergency Response Process

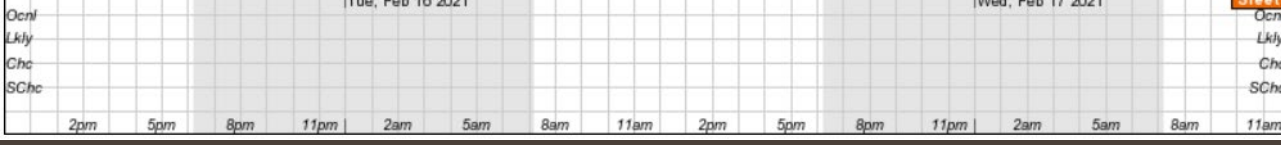
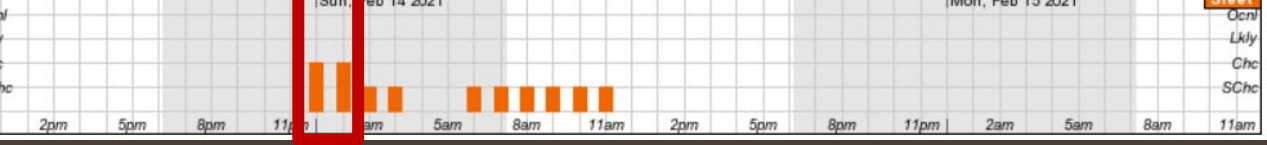
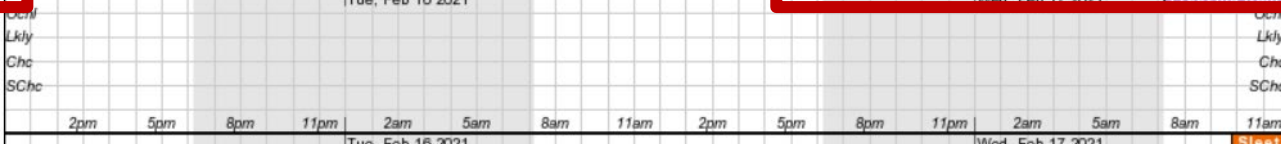
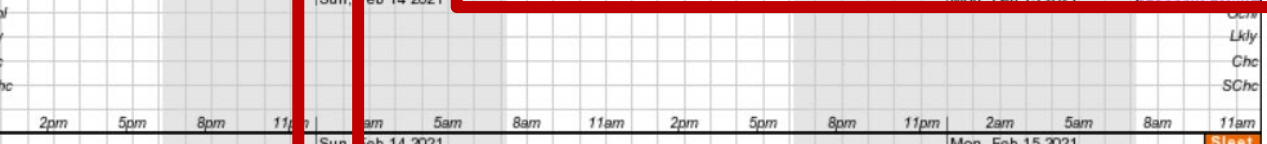
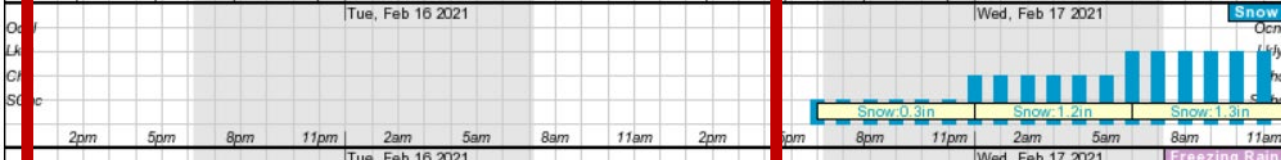
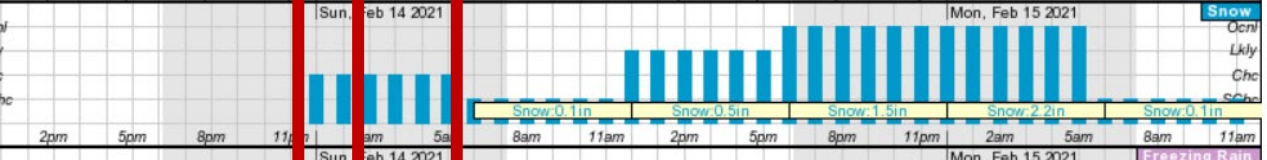
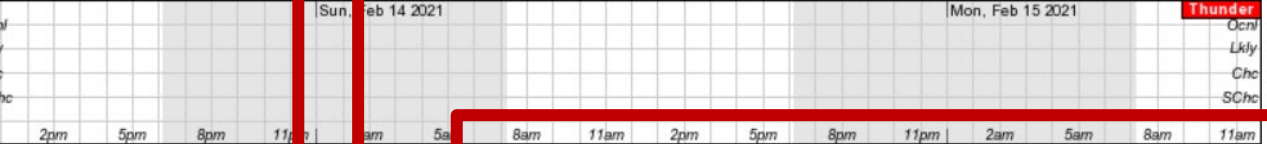
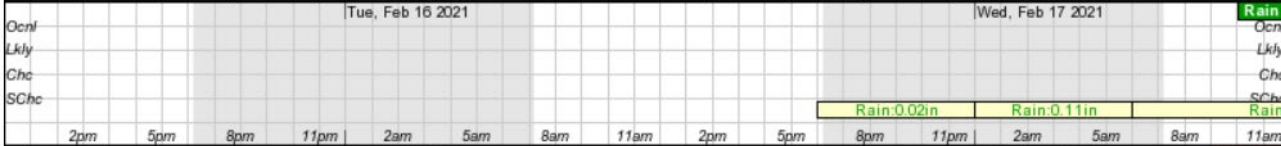
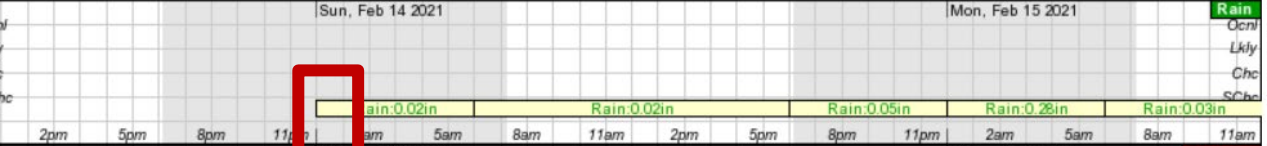
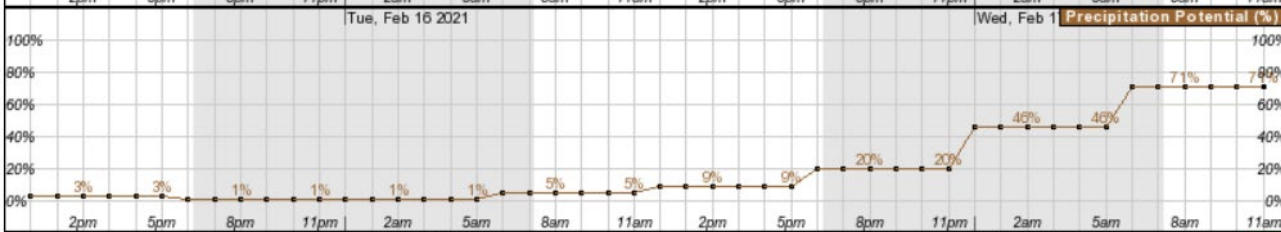
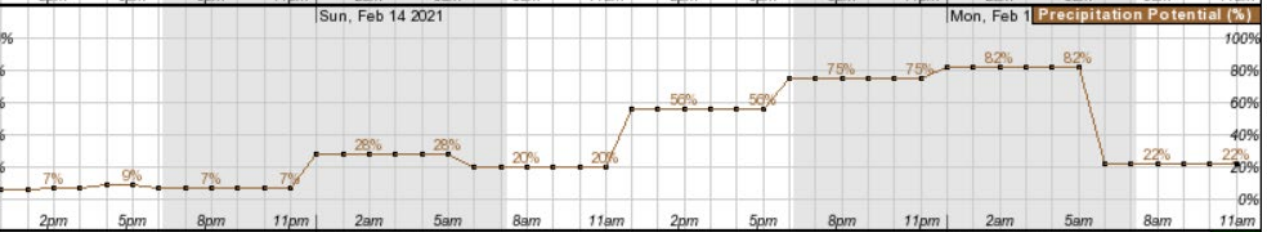
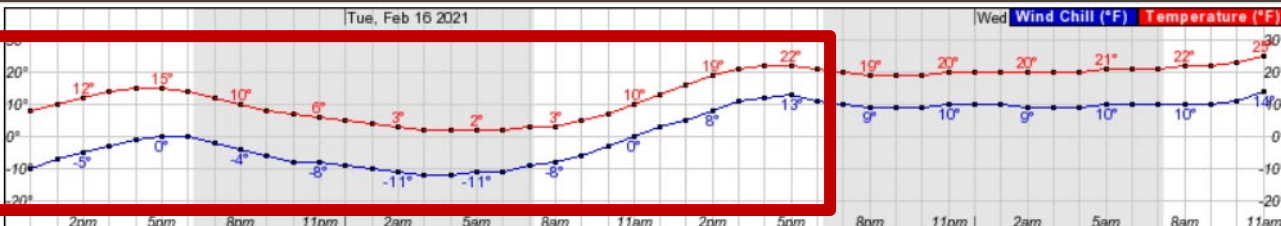
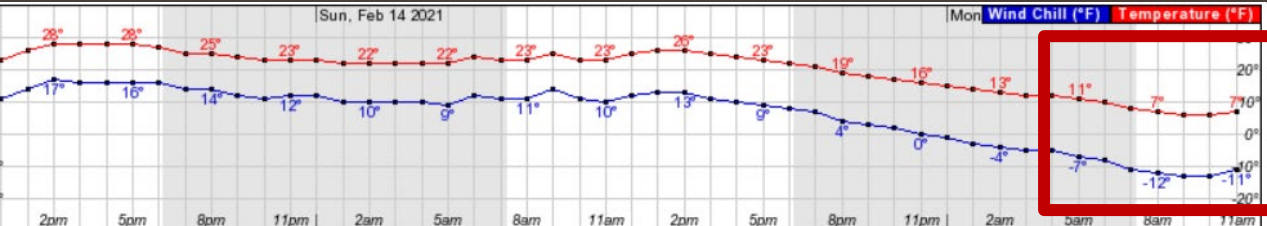
- Departmental Resilience (Preparedness)
 - Annual training, plan reviews, and equipment checks
- Adverse Weather Possible
 - Staff Readiness and Equipment Checks
- Adverse Weather Forecasted
 - Sr. Management Discussion
 - Executive Decision to Begin Emergency Operations
 - AEOC Activated to Monitor Weather and Coordinate Emergency Operations
 - Emergency Notification and Coordination Calls Begins
- Ongoing Incident
 - Regularly scheduled coordination calls
 - Continuous situational awareness and status updates
 - Escalated issues addressed by task force with senior management
- Recovery and Reset
 - Assess damage and analyze impacts
 - Reset equipment and restock supplies
 - After Action Review and Improvement Plan



AIRFIELD CLEARING PRIORITIES







Winter Weather Response

The blow by blow of the weather event.



Day	Wed - 10	Thur - 11	Fri - 12	Sat - 13	Sun - 14	Mon - 15	Tue - 16	Wed - 17	Thur - 18	Fri - 19	Sat - 20	Sun - 21
Weather	Broken 32/33/28 Drizzle, Overnight Icing	Overcast 28/30/25 Early Icing, Drizzle	Broken 25/28/24 No Precip	Overcast 25/32/21 Lite Fr. Rain, Lite Overnigh t Freeze	Overcast 21/22/11 Flurries, Snow, Overnight Snow	Overcast 11/14/07 3" Snow Accu	Overcast 07/21/03 Lite Fr. Rain	Overcast 03/29/20 Flurries, Fr. Rain, Lite Icing, Snow	Overcast 20/31/21 1.5" Snow/ Winter Mix Accu	Broken 21/42/16 No Precip, Overnight Freeze	Sunny 16/57/29 No Precip, Overnight Freeze	Sunny 29/75/45 No Precip
Other Impacts	Pandemic	Pandemic	Pandemic	Pandemic	Pandemic Stranded Passengers	Pandemic Stranded Passengers	Pandemic Stranded Passengers	Pandemic Stranded Passengers	Pandemic Stranded Passengers	Pandemic Widespread Power Outage	Pandemic Widespread Power Outage	Pandemic Widespread Power Outage
Response	Airfield Icing Mitigation Operations	Pre-Event Planning	Pre-Event Coord Call	AEOC–Level 3 AVI Recall Start All prep complete before sunset	All Divisions Engaged Priority 1 Airside/ Landside maintained	All Divisions Engaged Priority 1 Airside/ Landside maintained	Temporary AVI release and team swap Priority 2 Opened	All Divisions Engaged Priority 1 Airside/ Landside maintained	Priority 1 Airside/ Landside maintained, Priority 2 opened. AVI Recall released (as able)	FAC/AFM address thaw issues.	Airfield Clear of Accu. FAC/AFM address thaw issues.	FAC/AFM address thaw issues. Impact assessment

Increasingly Complex Challenges

- Ongoing pandemic that requires protective protocols
 - Sheltering 130+ employees
 - 24 hour operations
 - Limited space



Response Operations



Increasingly Complex Challenges

- Unreliable power supply and surrounding infrastructure
 - Threat of extended power outages
 - Threat of water supply outages
 - Surrounding community experiencing outages



Response Operations



Increasingly Complex Challenges

- Compromised transportation access to airfield
 - limiting food and resource supply chain (De-ice)
 - Restricting vendor and concessions staffing

Response Operations



Increasingly Complex Challenges

Response Operations

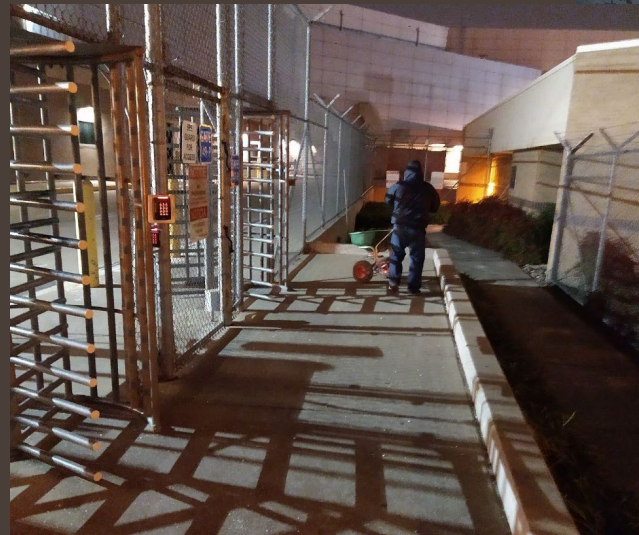
- Equipment malfunctions and failures
 - Snow Removal equipment struggling to operation continuously
 - Operations vehicles having systems failures
 - Iced over equipment



Increasingly Complex Challenges

Response Operations

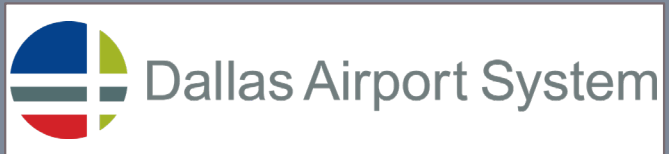
- Exhausted staff with families experiencing personal emergencies
 - Hard hours for extended operations
 - Families calling without power/water/food
 - Unable to help, stranded/recalled



Increasingly Complex Challenges

Response Operations

- Extreme weather working environment
 - Cold weather gear was insufficient
 - Dispersal and staging of anti ice supplies
 - Warming stations and staff rotations



Response Operations

- Operational Outcomes
 - Priority 1 Areas maintained throughout the entire incident.
 - 8,400+ overtime hours executed by 130+ personnel.
 - No major injuries/accidents reported (only a few reports of slips without injuries).
 - An estimated 300+ flights and 15,000+ passengers were able to travel due to Love Field staying open.

AIRPORT STAYED OPEN



Implementing the Improvement Process



Improvement Process

- Historically:
 - A quick hotwash and a couple action items
 - Annual plan review with minimal changes
- New Process:
 - Full improvement cycle with assessments of strengths and weaknesses
 - Eventually headed towards implementing and integrating with existing ISO management practices.
 - ISO 22320 – Security and Resilience – Emergency Management

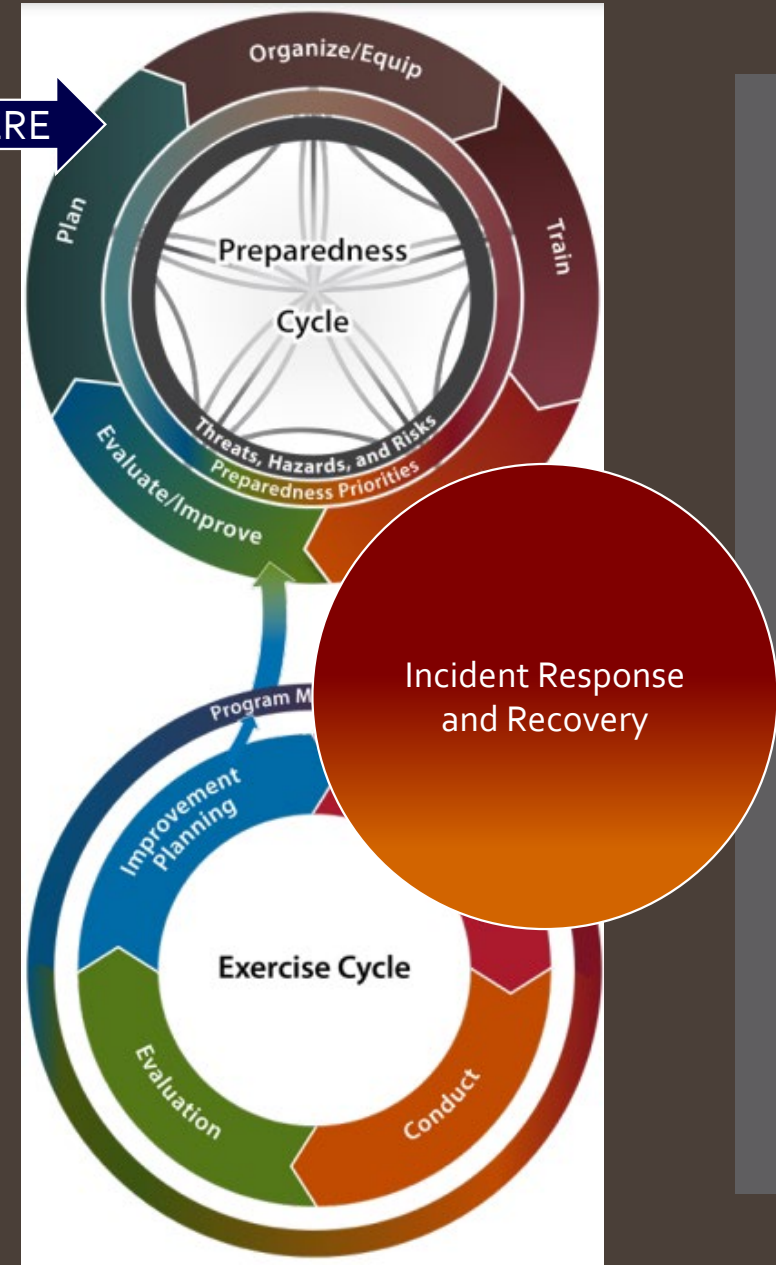


Improvement Process



- Hotwash Meeting
 - Initial thoughts and ID critical areas.
- After Action Review of Operations
 - Survey of comments, challenges, successes, and input for improvement
 - Assess and categorize comments into key focus areas
- Improvement Workgroups
 - Convened workgroups to develop solutions for identified challenges
- Implementation
 - Update the policies, plan, and procedures.
 - Fix, upgrade, replace equipment
 - Training, exercises, etc.

We are HERE →



What Went Well



What Went Well

- Department Wide:
 - Personnel excelled and persevered in an extreme environment.
 - Decision for early recall allowed for identification of outstanding preparation requirements and improved readiness posture.
 - Consistent coordination with reliable information to all partners and stakeholders.
 - Rapid identification and addressing problems as they arose, with full support from leadership.



What Went Well



- Airside Operations
 - Seamless coordination between divisions in continuous snow removal operations.
- Airfield Management
 - Rapid skills development for equipment operations and snow removal theory.
 - Maintained operational functionality even with equipment challenges and maintenance issues.
- Terminal Operations
 - Provided support to stranded passengers during extended travel challenges
 - Supported other divisions during peak operations.
- Facilities Maintenance
 - Maintained continuous utilities and infrastructure services despite regional outages and impacts.
 - Pre-emptive draining and clearing of vulnerable services and rapid response to leaks and outages.
- Emergency Management
 - Consistent coordination calls and situational awareness briefs.



What Could Be Improved



What Could Be Improved

- Department Wide Considerations:
 - Build on the 'good enough' to make the airport even more resilient to extreme events.
 - Additional training and drills on operations and familiarity with emergency procedures.
 - Update all SOPs, plans, and policies with lessons learned.



What Could Be Improved

- Coordination
 - Better processes for information collection, analysis, and dissemination for a common operating picture.
 - Clearer and consistent relationship among the various coordination and operation centers.
 - Extending coordination efforts past response operations through recovery operations.
- Communication
 - Developing channel management protocols and drill on tactical and operational communication and coordination during incidents.
- Personnel Wellbeing
 - Develop better wellbeing solutions for extended events.
 - Better sleeping, shower, and kitchen spaces.
 - Personnel preparedness and mental health resources.



What Could Be Improved



- Transportation
 - Limited ground transportation combined with limited nearby hotel availability created a bottleneck of stranded passengers.
- Equipment
 - Consider rollover plows and other snow blower attachments to improve removal capabilities.
 - Hardening equipment against extreme weather impacts of exposed elements.
 - Warming stations for passengers and airfield personnel.
- Facilities
 - Identify and address potentially vulnerable utilities and infrastructure that need to be hardened to extreme weather impacts.
- Supply Chain
 - Limited storage space and personnel challenges for vendors led to critical shortages during extended event.



Improvement Actions



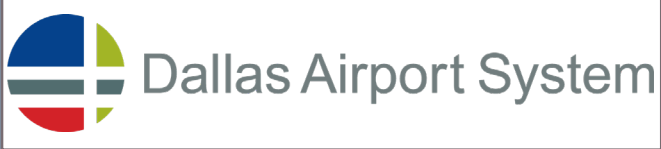
Coordination



Issue Reported for Improvement	Proposed Action(s)
<p>Lack of snow control center prevented efficient snow removal coordination and resource planning, and put AOC in position of passing on removal operations information. Future events should include the mobilization of a “Snow Control Center” or “Snow Desk” as outlined in the SICP, for the management of the event.</p>	<p>Formalize Snow Control Center, AOC, and AEOC coordination: During snow/ice events that does not escalate into a crisis level incident - The AOC will filter and push all Snow/Ice operations related calls to the SCC via the Snow Desk Officer (Utilizing the Sr. Airside Office Cell Phone #, and Airside Radio Channel). <u>If the event escalates into an incident, then the AEOC will be activated, and the AOC will push all incident communications to the AEOC</u> and the AEOC will filter and push the snow/ice operations information to the SCC via the Snow Desk.</p>
<p>Could use more frequent, detailed, and digestible information regarding general airfield status, snow removal operations, runway sensors.</p>	<p>The implementation of the VEOCI system will provide a wide range of <u>summarized and detailed information</u> for the whole airfield, department, and divisions.</p>
<p>Consistent, scheduled, and tiered (team, division, dept, general) coordination calls and trouble shooting calls provided a dependable source of information, operational status, and leadership direction</p>	<p>Formalize a tiered incident reporting/briefing cycle. After initial kick-off call: Establish <u>6-hour operations focused call rhythm</u> at 0230, 0830, 1430, and 2030; <u>Establish Daily Department Wide Call</u> at 1000 (Each Division is expected to roll up their information via their own internal calls before this call. Operations divisions will be represented by AD with summary), <u>Establish Daily Partner call</u> at 1100 (Dept summary provided by AD). <u>Build VEOCI Partner Dashboard.</u> <u>Extend coordination calls to encompass recovery</u> (Operation calls will switch to recovery divisions nad may become daily calls). Daily partner calls may shift to weekly calls until recovery is closed).</p>
<p>Additional support for RBD operations.</p>	<p>Coordinate with Rafael, research support requirements that he sees is needed for KRBD and identify potential support capabilities to meet those needs, without compromising regulatory compliance for KDAL.</p> <p>Develop plan to address identified issues.</p>

Communication

Issue for Improvement	Proposed Action(s)
<p>Congested Radio Channels due to cross traffic. AVI should establish “tactical” channels for event communications. Tactical channels could be identified as “Tac-1” and “Tac-2” or similar titles. Any special activities should be communicated on these tactical channels to keep daily use frequencies open and available for “normal” activities that might be occurring outside of the event. Develop the SOP and training.</p>	<p>Updated radio and communications training to include the <u>implementation of tactical channels</u> (Talk 1, 2, and 3) and <u>simplex channels</u> (Local 1 and 2) for event, incident, or specific operational coordination activities. Reviewing Radio programming.</p>
<p>Additional radios for personnel and for cross coordination with partners (DPD/DFR). Had trouble communicating with staff who only had cell phones. Lack of direct comms ability with DPD and DFR made coordination challenging.</p>	<p>Review radio usage and programming for partners. Research options for interoperable communications platforms.</p>
<p>Check and update contact list regularly.</p>	<p>Utilize VEOCI Mass Notification capabilities and send out monthly "Tests/Reminders to update contacts".</p>
<p>Clear communication within each Division</p>	<p>Dashboard/information hub for <u>status and situational awareness updates between coordination calls</u></p>
	<p><u>Plain language communication during coordination calls, less reliance on airfield knowledge/NOTAMs</u></p>
	<p>Robust external <u>crisis communications plan</u></p>



Wellbeing

Issue for Improvement	Proposed Action(s)
Tools, clothing and other PPE.	1. Create an Emergency Funds Account to provide employees, that have to stay overnight, any supplies that may have to be bought. This would apply to AFM, AOC, Concessions, Facilities, OPS, Security, TOPS and any other division that has to come-in during any major emergency. 2. Purchase proper PPE (Jackets, gloves, rubber boots).
Personal Lives affected (No power, Electricity, Etc.)	1. Create an emergency outreach list that can support employee's families , if they lose power and water.
Personal Hygiene (Showers Unavailable)	Ensure showers and hygiene capabilities for all divisions. 1. SRE: No water in men's shower and no hot water in the women's shower. <u>Terminal: No showers.</u> Bldg. A - Fitness Center: No cold water in men's shower and access should be given to all AVI employees. 2. <u>Soap in the showers can be provided.</u> 3. Division Leadership must let everyone know to <u>bring their own hygiene products from home</u> , if they will stay overnight. 4. Provide liquid shampoo, conditioner and body wash in the showers. 5. Employees must listen to these messages and leadership should ensure that the communication goes out to every everyone as well. 6. Facilities can provide <u>disinfectant to spray the showers</u> after each use.
Nutrition and Hydration	Develop a feeding plan. 1. Units have to be clear about <u># of employees needing meals</u> . 2. Division must prepare a <u>Pick-Up Schedule</u> for food to match the service provided by the Concessions team. 3. Provide a diverse menu , if available. 4. Partner with the Storeroom team to <u>deliver food</u> . 5. Make Concessionaires aware of the upcoming event so that they are prepared. A <u>refrigeration truck can be staged to keep excess food</u> .
Sleeping Quarters	1. Add the topic of sleeping quarters to the snow plan for each division according to their needs. 2. Have a <u>central place where we can provide space for teams to place beds</u> (Ex. Alpha Conference Room) and with proper rest rooms and showers available. 3. <u>Prepare a schedule</u> where half of your teams work and the other half rests.
Product and Equipment Training	1. Add a section to the Environmental training related to de-icing products to be used on roads and sidewalks. 2. <u>Store de-icing products in the Storeroom and SRE.</u>
Employee Appreciation	Individual awards should be given by each division. Gift bags, certificates etc, presented by the Director and Division managers.



Next Steps



Next Steps

- Finalize Improvement Plan and implement recommended solutions.
- Conduct consistent familiarization training on emergency response and equipment operations.
- Address improvements to equipment, utilities, and operational functionality to be better prepared to address such an extreme incident.



Questions?



Dallas Airport System

Key Contact Information

Emergency Management Division

- AVIEmergencyManagement@dallascityhall.com
- 214.670.6844

Benj Korson, CEM

- Emergency Management Coordinator
- Benjamin.Korson@dallascityhall.com
- 469.540.8394

Nicole Kutchen, PEM

- Emergency Management Specialist
- Nicole.kutchen@dallascityhall.com
- 000.000.0000

