



2023 MCOA MnDOT - NavSystems

Michael Hartell | Interim Assistant Director
Aeronautics



mndot.gov/aero

Key Topics

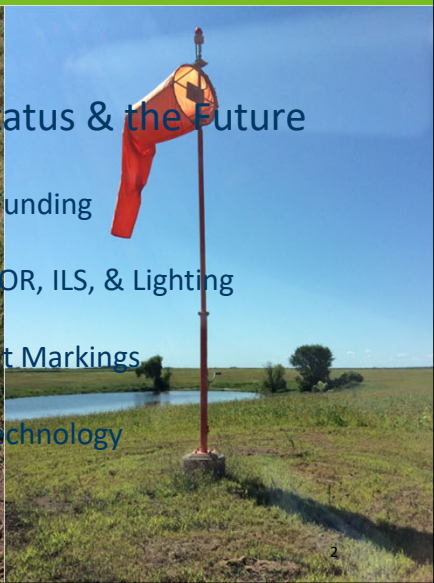


- Since 2019
- Workforce Update

5/9/2023



mndot.gov/aero



- System Status & the Future
 - Budget/Funding
 - AWOS, VOR, ILS, & Lighting
 - Pavement Markings
 - Future Technology

2

Where we have been

- Technicians and key MnDOT staff were Retiring in 2019
 - All MnDOT NavSystems personnel retired
 - Contractors of 30+ years have retired as well
- All equipment required FAA Verification by authority technicians
 - No clear path to certify technicians
 - DBT only national contractor to support ongoing maintenance needs



5/9/2023

mndot.gov/aero

3

System Challenges

- System monitoring not within MnDOT standards to continue operating
- Outdated and inefficient methods of tracking outages and open maintenance items
- Most of our systems were beyond the end of useful life and parts procurement limited, work force institutional knowledge lost to retirements
- No known training or approved courses to have new people certified
- Instrument lighting systems no verification authority technicians to maintain.
- Learned all that challenged us through many Gotcha moments!



5/9/2023

mndot.gov/aero

4

Deployed Technology

- Tracking the sure volume of issues and insuring they were completed in a timely manner was overwhelming!
- Solution: Archibus, MnDOT was already using and served multiple purposes for us
 - We are tracking open issues for equipment, parts management, overall inventory of the system.
 - We manage all required system inspections
- On any given day we now know how many open service tickets we have and we are able to see average time to repair.
- 358 service tickets were completed in 2022



5/9/2023

mndot.gov/aero

5

Deployed Technology

- To address the non compliant software used in monitoring systems.
 - We have been able to design and deploy a virtual technician application that allows our people and verification authority technicians to log into the systems much like they were standing in the sheds. With this application they are able to do basic resets and see what is working.
 - This brought access to sites like BRD Loc and GS with bad phone lines and FFM with no phone lines.
 - Work is continuing to move towards a full technician application through the onsite service computer reducing down time and need for a physical service call.
 - Should a service call be needed a good idea of the issue is known and most likely parts can be included with the trip reducing the need for secondary visits to complete work.

5/9/2023

mndot.gov/aero



Workforce Update

- What we needed as the perfect new team member:
 - Computer networking expert
 - Telecommunication system Expert
 - Two-way Radio system Expert
 - Ability to take any new technology and make it work with old technology
 - Ability to look at any NavSystem technology and figure out how to fix it.
 - Combined that with a person that is passionate about serving the aviation community along with being great fun to work with regardless of the challenge.
- This was and is an incredible ask list!



5/9/2023

mndot.gov/aero

8

Our Team

- The full package was delivered when Kris Christenson appeared!
- Since joining the team he has been a major reason we have been able to keep the old systems running and embark on new technologies.
- Kris had been with MnDOT with State Wide radio for about 3 years before joining our team in 2019.



5/9/2023

mndot.gov/aero

9

Our Team

- John Dalton Joined us Mid Summer 2019, he had been with MnDOT at State Radio for about 10 years prior.
 - He had been building out tower sites for the network.
- John Dalton continues to excel in his role as lead project manager for our nav aids upgrades.
 - Among his many roles John manages:
 - 350 FCC licenses
 - Tracks and monitors each step in Nav aids construction projects.
 - Coordinates with our external partners including FAA, Airport Sponsors, and Consultants.
 - Inside Aeronautics he coordinates through all sections working for diligently with Development section to insure nav aids projects stay on track.



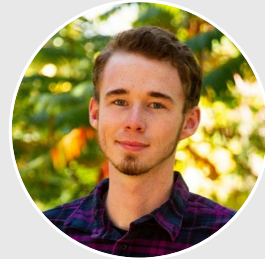
5/9/2023

mndot.gov/aero

10

Our Team

- Nate Sievert joined our team in May of 2019 as a student worker.
 - His first summer he went from airport to airport inventorying every navaid system down to every spare component.
 - In May 2021 Nate graduated from UofM with a degree in system planning and a minor in GIS systems. (Same as we use to manage our airports inspection data)
 - We were able to hire Nate full time to the team and he dug right in:
 - Managed the deployment of the Archibus program
 - Took over the migration from GIS to Enterprise GIS with airports GIS integrated
 - Is working to become the program manager for the airports marking project



5/9/2023

mndot.gov/aero

11

Our Team

- Casey Carlson Joined our team in March 2021.
 - First Aeronautics employee not to be based in St. Paul.
 - Casey had been with District 2 serving as a master electrician before joining our team.
 - Within the first 6 months Casey was on the team he had created a state wide procurement contract allowing all municipalities to purchase Airport lighting equipment at a state negotiated price.
 - Actively manages departmental contracts.
 - Professional/Technical (PT) contracts.
 - State Procurement contracts between vendors and MN airports.
 - Reimbursable Agreements (RA) contracts between Aeronautics and the FAA, for flight checks.
 - Casey has accepted an expanded role as Navigation Systems Coordinator. In addition to his previous duties
 - His expanded duties will have him working closely with all sections and assisting the Airport Operations Director with Navaids related issues on the operations team.



5/9/2023

mndot.gov/aero

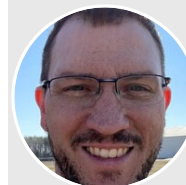
12

Our Team

2 More radio engineers!

Remember the wish list? We asked and 2 more super stars to appear!

- **Nick Kremer:** In addition to Nick's general duties, he is also leading the efforts to maintain the ATC Towers at St Cloud, and Anoka.
- **Luis Canelon – Lander:** In addition to Luis' general duties, he is leading the efforts to maintain our MnWAS computer's at airports across MN.



5/9/2023

13

FAA Certifications

- Kris Christenson completed the following
 - VOR/DME Verification authority certification
 - AWOS Verification authority for all state-owned systems.
 - Field training underway on ILS systems
- Casey has become FAA Verification Authority certified on MALSR/MALSF statewide
- Luis and Nick have recently passed their AWOS Verification Authority certification tests!
 - This is a huge win for Aeronautics, as it now gives us self-sufficiency, by having verification authority to repair our own AWOS stations without being fully reliant on outside contractors.



5/9/2023

mndot.gov/aero

14



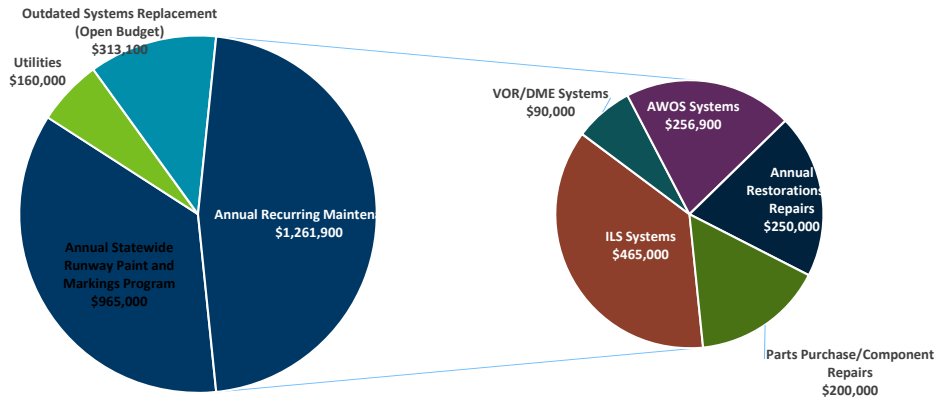
Current System Status & the Future

System Status - Current State of Minnesota NavSystems Inventory

- 21 ILS systems
- 79 AWOS
- 135 MnWas Computers
- 6 VOR/DME Stations
- 20 GCO's - Ground Communication Units
- 3 RCO's - Remote Communication outlets
- 21 MALSR/MALSF Approach Lighting Systems
- 420 Airport lighting systems
- 80 Airport Internet connections with Wifi



System Status - NavSystems Program Budget, SFY2021



5/9/2023

Source: MnDOT Aeronautics 2021

17

Future System Outlook-“The rust has set in”

MnDOT Aeronautics has limited funding available to airports in the form of grants for AWOS replacements. *(standard rates letter splits apply)*

Most of you folks have gone through our grant processes before. Each airport has an appropriate “grant rate” which is preset based on size of community (sponsor) and whether NPIAS or not.

The airport (sponsor) will need to pitch in for their share. Between 5-30% of total project cost. *(civil work portion only)*

Expect to set aside funds for your upcoming project, and make sure they are on your CIP (capital improvement plan)



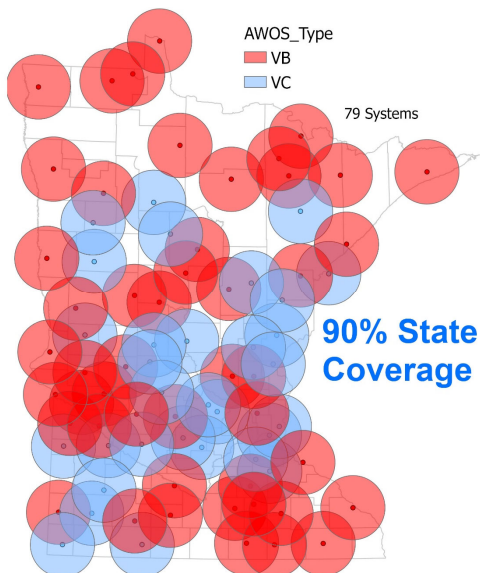
5/9/2023

mndot.gov/aero

18

79 AWOS Weather Stations

- SASP states 65 of 79 stations must be moved due to current siting criteria
- 40 units are no longer manufacturer supported
 - No new certified parts available.

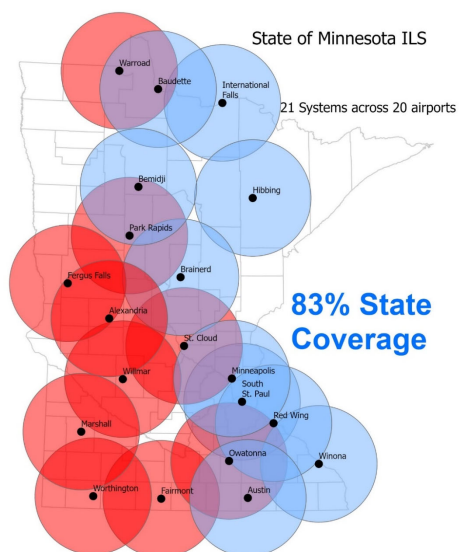


5/9/2023

19

21 ILS Systems

- 21 ILS systems
- 9 of the systems are MK10's
 - As of Dec 2021, No longer supported and no more parts. Not even a repair of failed components.

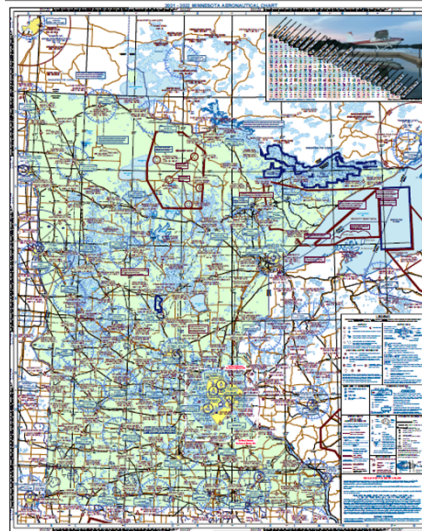


5/9/2023

20

System Status - Funding

- In FY23 2.2 Million is set aside to replace NavSystems under grant
 - AWOS'
 - ILS'
- MnDOT has requested \$15M in general fund money to modernize state-owned NavSystems within the Governor's FY2024 Capital Budget



5/9/2023

• Source: MnDOT Aeronautics 2023

21

NavSystems Progress

- November 2021 Commissioned Halfway VOR/DME
- Marshall VOR/DME replacements underway
- Replaced five AWOS stations at:
 - Detroit Lakes
 - Duluth Sky Harbor
 - Buffalo
 - Tracy
 - Preston
- 12 more AWOS replacements currently in queue
- 2 MALSF systems commissioned: DTL and ROX



5/9/2023

mndot.gov/aero

22

NavSystem Progress

- Hibbing (HIB) Interlock with Duluth tower project completed
 - GS RWY 13 needs Antennas repaired
 - Loc RWY 13 remains operational
- Warroad ILS replacement planned for 2023
 - Marshall in 2024
 - Alexandria in 2025



5/9/2023

mndot.gov/aero

23

System Status – Lighting

- Casey has become FAA Verification Authority certified on MALSR/MALSF
 - Continuing work on statewide electrical contractor program to certify electricians
 - Delivered new steady burn lamps to all 21 airports with MALSR/MALSF systems (non-Fed)
 - Continuing to work with manufacturers for quality lamp replacements, including integration of LED's



- Please reach out to Casey with any of your questions regarding airport lighting
 - Airport Electrical Administrator – Casey Carlson 651-600-8656

5/9/2023

mndot.gov/aero

24

Contract Pricing in place for Lighting supplies

- MnDOT has established a state wide contract for Airport lighting equipment:
- Airport personnel can call direct to the vendor and reference contract number “L-533(5)” to utilize; or by simply referring to the “MN State Contract” when speaking with the vendors.
- Current Vendors listed on this contract are:
 - Multi Electric (OCEM Airfield)
 - Airport Lighting Company
 - ADB Safegate
- The current contract is in place until 2026.
- Please reach out to Casey Carlson from the NavSys Group for more information.

5/9/2023

mndot.gov/aero

25

OF
TION

Pavement Markings

Pavement Markings

- Provided via MnDOT contract to all public airports
- Recently began inspecting markings
 - Review longevity of paint
 - Quality of paint and reflectivity
 - Four year rotation
 - Part 139 not included
 - Allows comparisons
 - Use
 - Location/Geography
 - Pavement Condition



5/9/2023

mndot.gov/aero

27

Pavement Markings

- Equipment can provide:
 - If markings meet required reflective levels
 - Green/Blue - Good
 - Orange/Red – Below Standards
- Imagery of:
 - Pavement
 - Markings
 - Airport Landscape



5/9/2023

mndot.gov/aero

28

Pavement Markings

Example of markings that are NOT up to standard:



LLG7 2022-09-22 12:37:55 C00K AIRPORT R GPS=47.825684,-92.694405 L=117.1 R=68.2 Odo=0.007mi



5/9/2023

mndot.gov/aero

29

Pavement Markings

Example of markings that are up to standard:



LLG7 2022-09-13 13:46:27 A_DYT_RhY_14 GPS=45.025448,-93.087547 L=333.2 R=421.7 Odo=0.000mi



5/9/2023

mndot.gov/aero

30



Heber Valley (KHCR) UTC:14:45 Local:08:45

METAR KHCR 031435Z AUTO 07004KT 1SM -SN OVC006 M01/M03 A2956 RMK AO2

New to MN: Weather Camera's at our airports

CLEARDAY VISUAL REFERENCE

7100' MSL 2:25 SM
Mt. Timpanogos 11800' MSL 13 SM
Site Elevation: 5635' MSL

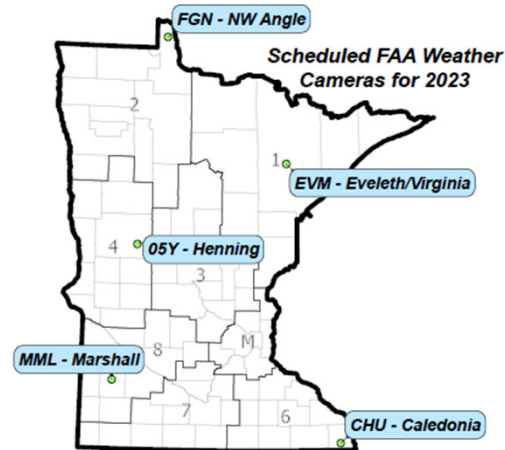
Show Camera Loop

North (0°) SouthEast (129°) SouthWest (223°)

5/9/2023 Weather Data Weather Trends PIREPs Sectional RCO Airport Info NOTAMS (PilotWeb) 32

New to MN: Weather Camera's at our airports

- Airports scheduled for Summer/Fall 2023
 - Eveleth Virginia
 - Marshall
 - Henning
 - Caledonia
 - Oak Island - NW Angle
- Four camera directions
- Latest image is 2.5 minutes old
- <https://weathercams.faa.gov>



5/9/2023

mndot.gov/aero

33

NavSystems and the SASP

- Addendum to the SASP for NavSys
- Questions we need answers to: (from users and airports)
 - Do airports need more than 1 ILS at a given airport?
 - If there are 2 RNAV LPV approaches with 1 ILS does this support the need?
 - What is the right distance for a precision land based approach for optimal or necessary GA coverage?
 - How is safety impacted if AWOS/ILS is offline?



5/9/2023

mndot.gov/aero

34

Operations Coordinator Contacts

- To begin discussions about replacing a Navigation System, please reach out to your airports Regional Operations Coordinator



Jim McCanney
South Region
612-346-8029
James.McCanney@state.mn.us



Tim Jarvis
Central Region
651-357-0591
Timothy.Jarvis@state.mn.us



Jared Wedel
North Region
612-297-2739
Jared.Wedel@state.mn.us

5/9/2023

35

Other Navigation System Contacts

All Navigation System related problems may be sent to: navaids.dot@state.mn.us

Lighting
Systems



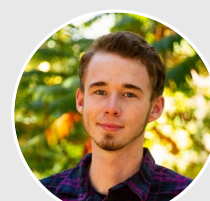
Casey Carlson
651-600-8656
Casey.Carlson@state.mn.us

NavSystems
Maintenance



Kris Christenson
651-485-4501
Kris.Christenson@state.mn.us

Pavement
Markings



Nate Sievert
651-724-7567
Nathanial.Sievert@state.mn.us

5/9/2023

36



Questions?

5/9/2023

mndot.gov/aero

37