

UAS-Based Inspection of Infrastructure

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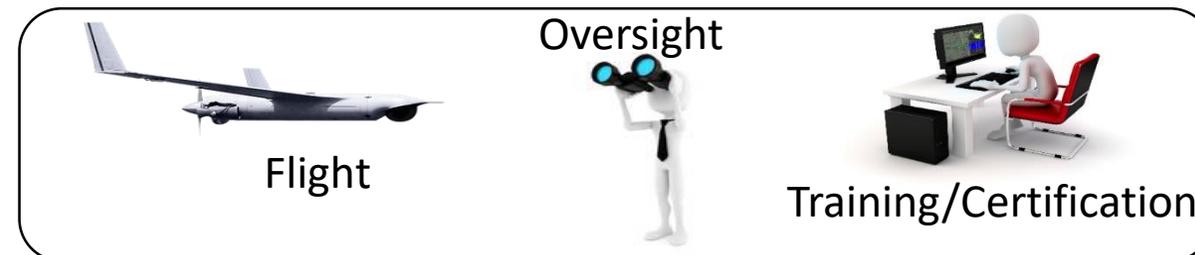
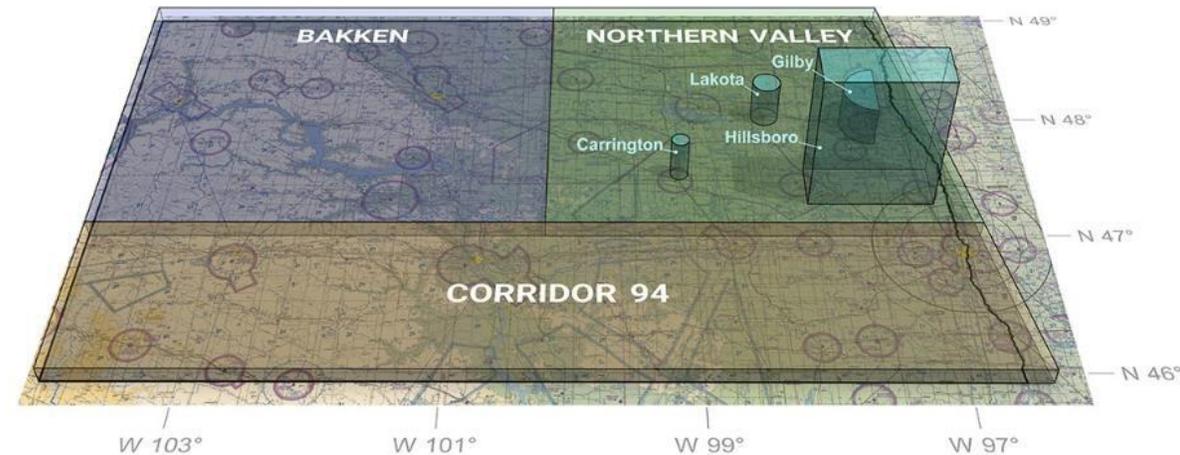
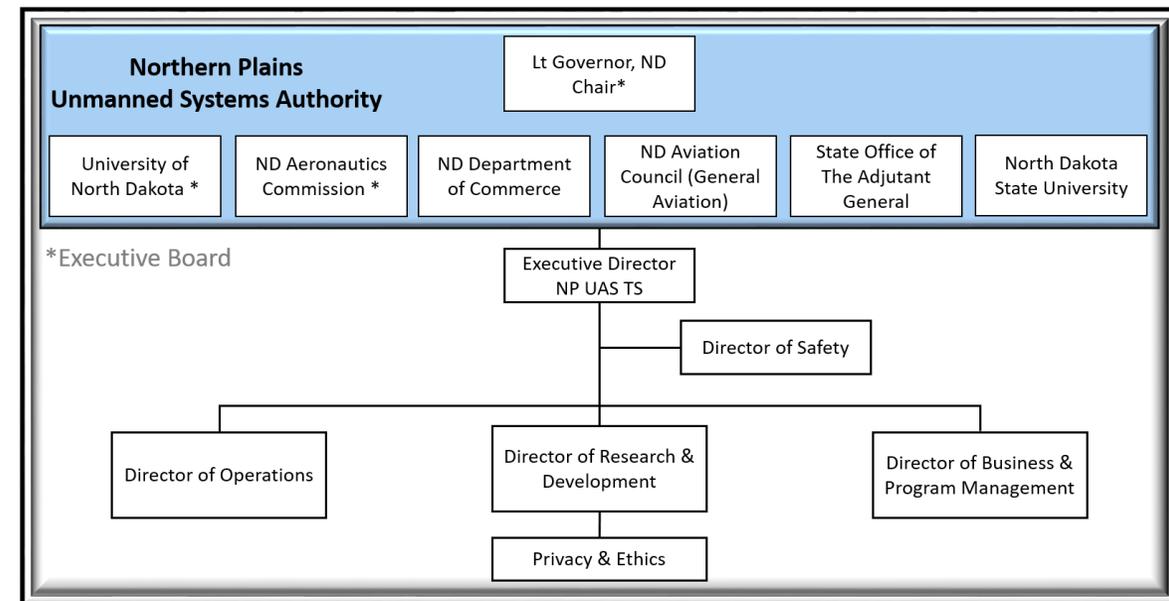
NP UAS TS Background

www.npuasts.com

- One of 7 FAA Selected UAS Test Site
- Mission

“Collaborate with FAA and industry partners to develop equipment, systems, rules, and procedures to safely integrate unmanned aircraft into the NAS without negatively impacting existing general or commercial aviation.”

- Customized COAs
- Services
 - Flight Operations
 - Flight Oversight
 - Training
 - Consulting
 - Credentialing/Certification



Infrastructure UAS Ops

Application Types

- Linear Infrastructure Inspections
 - Railway, powerlines, pipelines, roadways, etc.
- Point Infrastructure Inspections
 - Wind turbines, towers, building construction, etc.

Operational Considerations

- Rural vs Urban
- Distance from Structures
 - Horizontal and Vertical
- Environmental Conditions
 - Equipment and flight crew
 - Infrastructure

Linear Infrastructure Inspection

- Usually operated at altitudes above or adjacent to the infrastructure
- Increased UAS endurance requirements



- Pulse Vapor 55
 - Rotary wing
 - Small UAS (<55 lbs)
 - Daisy-Chained Visual Observers



- Elbit Hermes 450
 - ~1000 lbs
 - Chase Plane Visual Observer

Point Infrastructure Inspection

- Usually operated in and around the structures
- Requires stability and precision
- UND Powerline Inspection Research
 - Collaborate with regional utility industry partners
 - Conduct sensor trade study for component inspections
 - Assess performance for close-up inspections (2016)
 - Demonstrate beyond visual line of sight surveys (2017)
- Flights to date
 - Freely Alta 8
 - Rotary wing
 - Top-mounted sensor
 - Visual Line of Sight Operations
 - Flown within 10'-15' of structure, ~ 200' tall, in winds up to 20 kts



Point Infrastructure Inspection

- Building Construction

- Variety of sUAS (<55 lbs)
- Rotary wing
- Operated 20-25 ft from building
- Reduced wind limits by $\frac{1}{2}$



Building Construction Inspections



Cold Weather Testing Equipment for Roof Inspections

- Roof Inspection (Insurance)

- Rotary wing
- Small UAS (<55 lbs)
- Operated 10-20 ft above roof

Pre-Flight Planning

- Evaluate operational environment
 - Urban vs Rural
 - Low Altitude vs High Altitude
- Monitor weather conditions to identify flight dates
 - Use standard online tools (~4-7 days in advance)
- Confirm flight conditions day prior
 - Ceilings, precipitation, wind, temperature
- Confirm UAS can operate in forecasted weather conditions
 - Onsite/nearest weather station conditions and pilot judgement determine go/no-go each flight

Weather Effects on UAS Infrastructure Ops

- Larger UAS – Plan for weather similar to manned aircraft
- Small UAS – Greater impact from weather
 - Wind eddies and microclimates in and around structures
 - UAS autopilot capability and excess power critical for stable flight in higher winds
- Adjust weather minimums
 - BVLOS flights
 - Flight close to structures
- Supporting equipment subjected to environmental conditions
 - Tablet/phones turn off during extreme weather
 - DAA/obstacle avoidance systems impacted by weather conditions
- Flight crew subjected to environmental conditions

Questions?

