



VTRANS UAS

UNMANNED AIRCRAFT SYSTEMS

Presented by
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SAFETY – EFFICIENCY – INNOVATION



March 24, 2021

VTrans UAS Program Mission

The mission of the State of Vermont, Agency of Transportation's unmanned aircraft system (UAS) program is to fly safe and efficient unmanned aircraft missions in full compliance of all FAA rules and regulations.

Mission specific flights will include collecting data for; emergency response, infrastructure inspection, construction site monitoring, remote aerial imagery for VTrans as well providing UAS support for other Vermont State Agencies. VTrans UAS program will have internal steady state operation capacity as well as be augmented by aerial equipment currently provided by outside contractors.



VTrans UAS

Team Information

- VTrans – Policy Planning and Intermodal Development
- Rail and Aviation Bureau
- 6 – FAA Part 107 Certified Remote Pilot in Command
- 4 - Visual Observers
- 1- GIS Analyst/Programmer
- RPIC's based in Lyndonville, Barre, Morrisville, Rutland



Part 107 Remote Pilot in Command

FAA Requirements

- 60 Question FAA Knowledge Test
 - UAS Operating Regulations
 - Airspace Classification and Operation
 - Weather (sources and performance)
 - Loading and Performance
 - Radio Communications Procedures
 - Airport Operations
 - Emergency Procedures
 - Aeronautical Decision Making
 - Physiology
 - Maintenance and inspection Procedure
- Part 61 (manned aircraft) certificate holders with valid flight currency qualify for Part 107 certificate
- Physical and mental health requirements

VTrans Requirements

- Initial pilot training and flight check
- Participation in recurrent training
- UAS Platform-specific training
- Maintain UAS flight currency
- Applicable safety training
- Night operations training

VTrans UAS By the Numbers

- 106 total missions flown
- Approximately 700 total flights
- Approximately 105 flight hours
- 4 VT agencies served
- 5 different UAS in operation with diverse capabilities

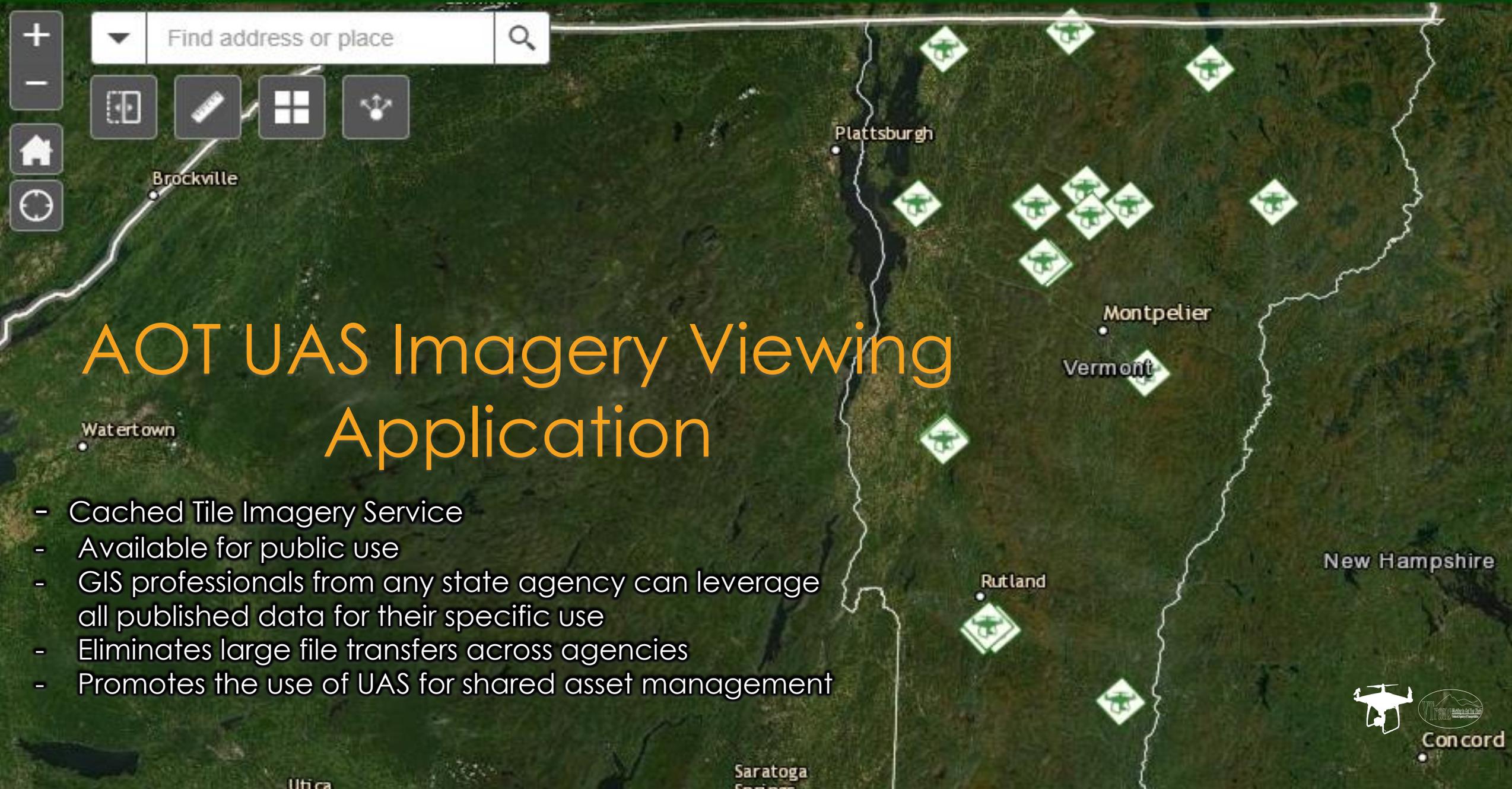


UAS as a Vermont Resource

How can we make UAS data accessible to AOT, as well as all Vermont state agencies?

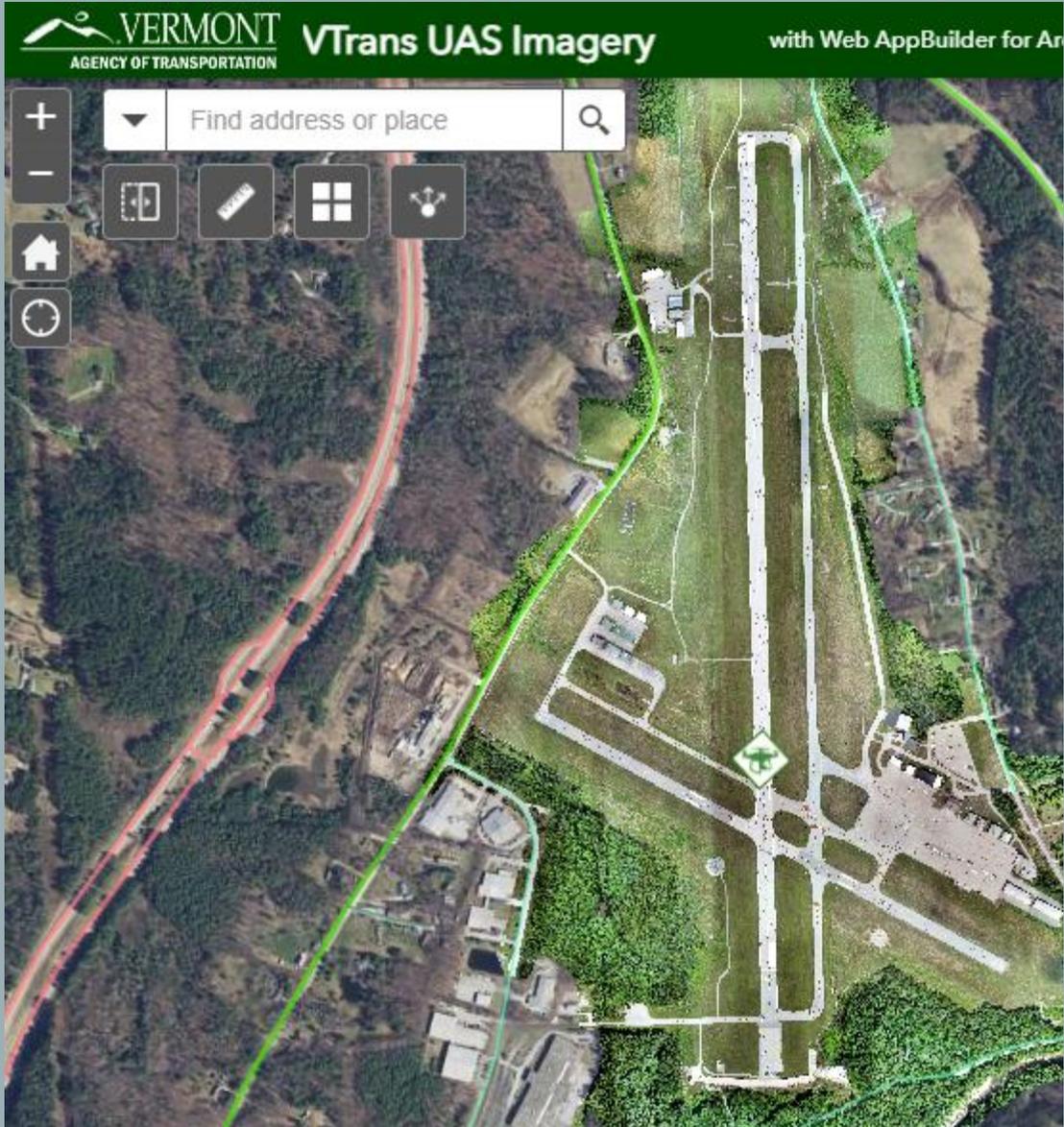
Challenges:

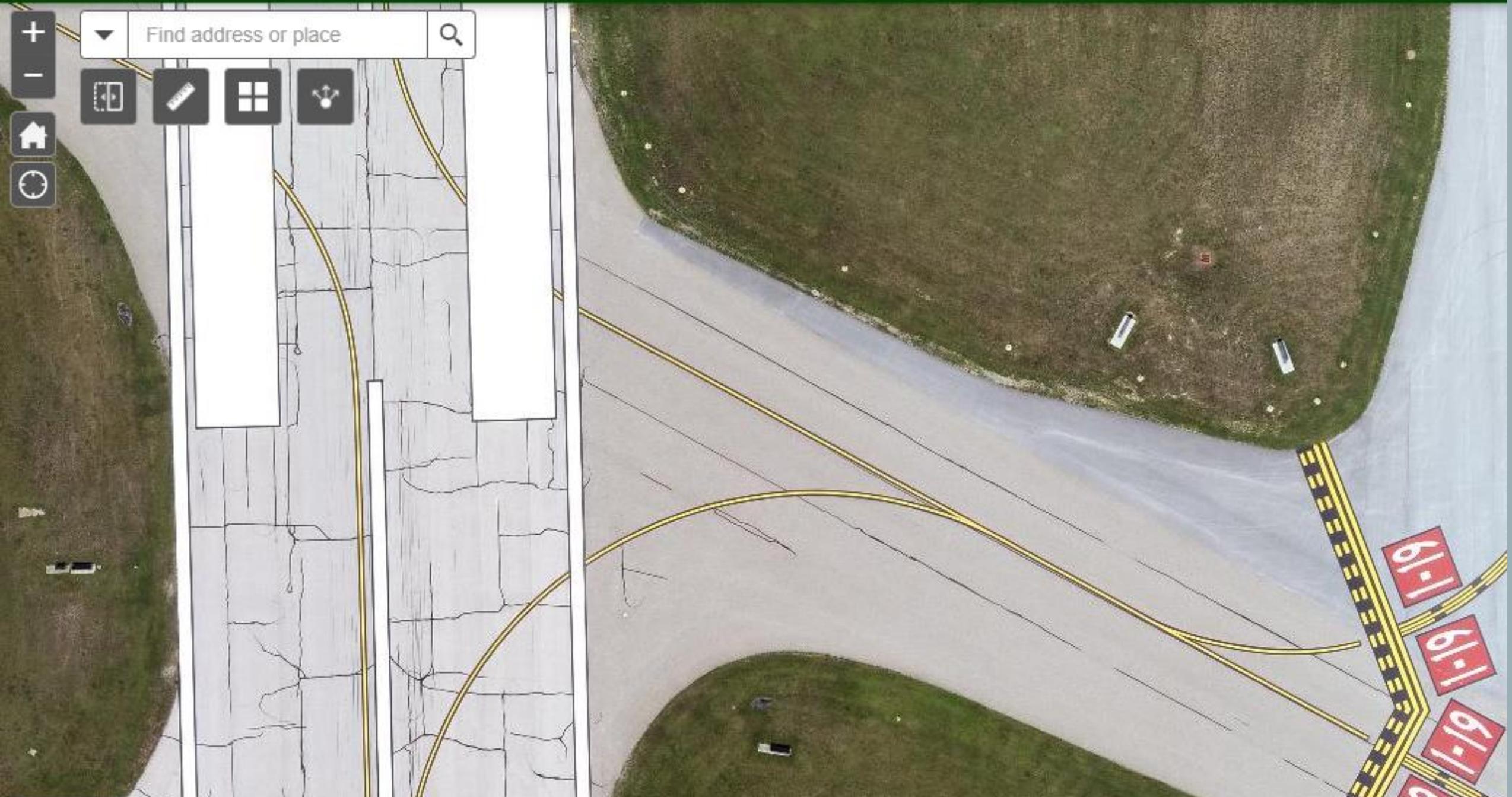
- File size limitations
- Varying IT infrastructure and accessibility across agencies
- Creating general awareness of current UAS imagery and its availability, which can be used for multiple applications.



AOT UAS Imagery Viewing Application

- Cached Tile Imagery Service
- Available for public use
- GIS professionals from any state agency can leverage all published data for their specific use
- Eliminates large file transfers across agencies
- Promotes the use of UAS for shared asset management





Find address or place



VTrans UAS

Currently Implemented UAS Applications

- Infrastructure Inspection (Bridge, road, culvert, etc.)
- Post-weather event damage analysis and extent mapping
- Project status tracking via high resolution aerial imagery
- Airport obstruction analysis
- Public Outreach imagery and Social Media presence
- Traffic pattern monitoring
- Geological stability and landslide mapping
- Historic preservation documentation



Emergency Management

White River, Route 14
Royalton, VT
April 2019



Flooding Extent Imagery – Route 302,
Orange, VT
April 2019





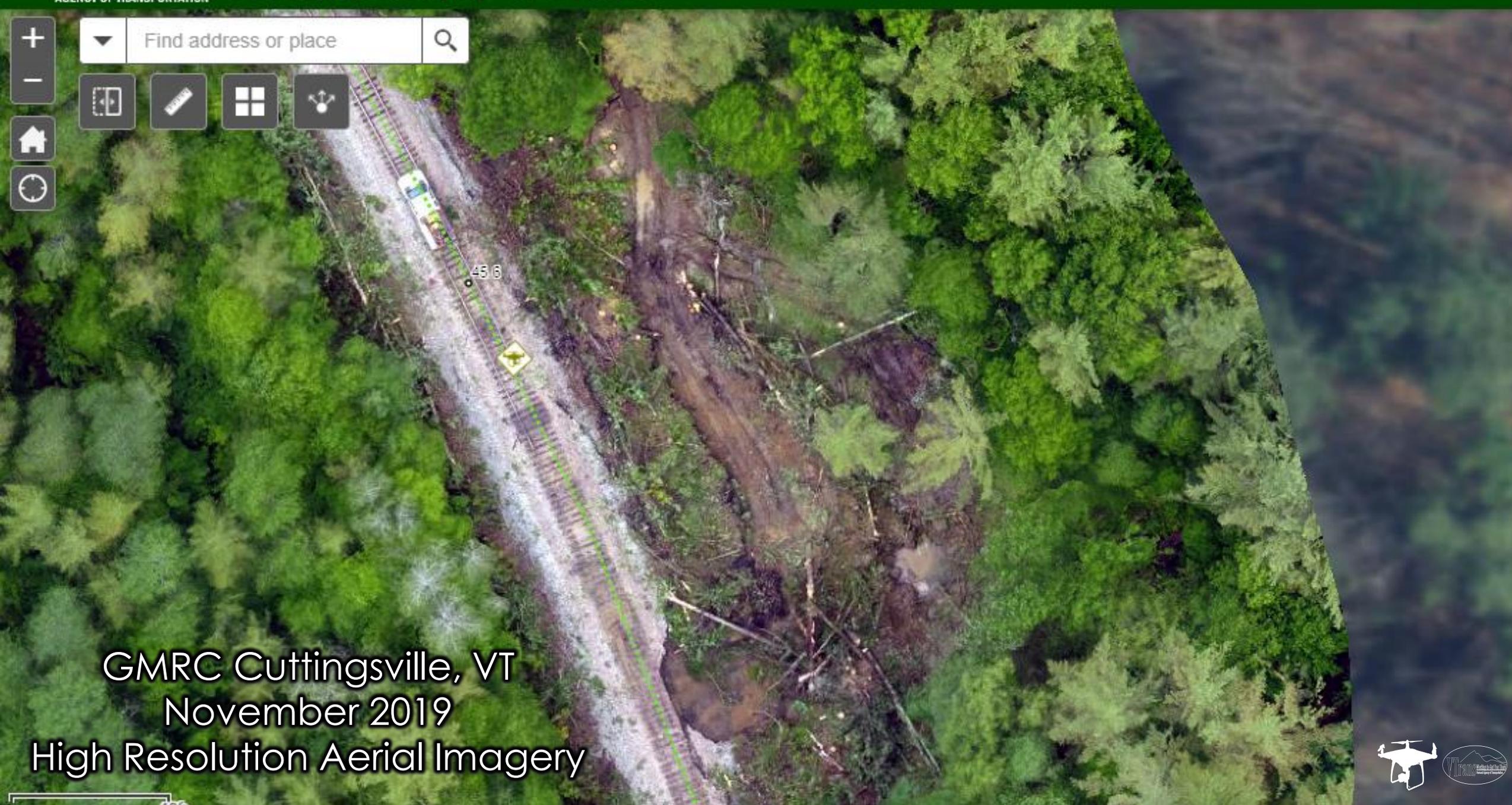
Loveland Brook Bridge Failure
Route 105
Richford, VT
November 2019
Halloween Storm Damage



GMRC Washout
Cuttingsville, VT
November 2019
Halloween Storm Damage



UI navigation and search elements including zoom in (+), zoom out (-), home, refresh, and search bar with text "Find address or place".



GMRC Cuttingsville, VT
November 2019

High Resolution Aerial Imagery



LVRT Washout
Hyde Park, VT
November 2019
Halloween Storm

High Resolution Aerial Imagery



VTrans UAS

Emergency Management Considerations

- Rapid creation of high-resolution maps of affected areas
- On-site safety analysis using UAS – Is it safe to be on site?
- Search and Rescue capability with High Resolution IR
- Documentation for damage estimates and FEMA reimbursement
- Public Awareness of closures and damage extent
- Deployable to various geographic locations with UAS and personnel based around the state



VTrans Daily UAS Operations

Rockslide in Smuggler's Notch
Route 108 Cambridge, VT
May 2020

VTrans Geologists were able
to perform a stability assessment based on
UAS Imagery



Clearly defined debris path
to Route 108





Route 108 Rockslide
Cambridge, VT
November 2020



Origin of Route 108 rockslide. Not safely accessible by VTrans and VGS geologists for assessment.





VTR Dorset, VT
November 2019
High Resolution Aerial Imagery

200fe

-73.011819 43.219952 Degrees



Identification of hydrological features, used to develop potential flood mitigation strategies

VSF - Hartness State Airport Springfield, VT

- UAS Imagery for 8/10 VT Airports
- Pavement condition assessment
- Asset management
- Permitting and Airport Development
- Vegetation management
- Approach obstruction I.D.





Hartness (VSF) - Springfield, VT

2019 Master Permitting Plan - Next to Existing Row

Legend

- Airport Property Line
- + + + Airport Fence Line
- ▭ Disturbed Areas
- New Water Line
- ▭ New Hangar
- ▭ New Road
- ▭ New Apron/Taxilane
- ▭ 325 FT from RWY CL
- ▭ Wetlands Stantec 2019
- ▭ Wetland Stantec 2019 Buffer
- ▭ Wetlands 2016+ Project
- ▭ Wetland 2016+ Project Buffers
- ▭ ANR Wetland Advisory
- ▭ ANR Wetland Advisory Buffer
- ▭ Archaeological Res.



Disturbed Area: 15940 sqft

Impervious Areas:

New Apron/
Taxilane = 7150 sqft

New Buildings:

1 Medium, 60' x 80' = 4800 sqft

Updated: 2/12/2021



An aerial photograph of a large industrial or construction site in winter. The ground is covered in snow, with some dark patches of earth or gravel visible. Several large, rectangular buildings with light-colored roofs are scattered across the site. A road or path runs diagonally from the top right towards the center. In the bottom right corner, there is a small white drone icon and a circular logo for 'Aerial Solutions' with a mountain range in the background.

VTrans Garage
District 9 Irasburg, VT
March 2021

- 15 active flight requests for VTrans facilities
- Storm water plan development
- Facility safety plan design

Digital Surface Model
Elevations by color
From UAS Imagery



UAS for Public Outreach

Vermont Agency of Transportation
Published by Nick Cartularo [?] · May 29, 2020 · 🌐

Some photos of the meal distribution efforts at Caledonia County State Airport. The final tally was well over 850 cars served. Thank you to Vermont Foodbank, Vermont National Guard, and our VTtrans crews who continue to meet the call.




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825 Reactions, Comments & Shares 📊

431 Like	119 On Post	312 On Shares
47 Love	10 On Post	37 On Shares
3 Haha	1 On Post	2 On Shares
100 Wow	14 On Post	86 On Shares
7 Sad	3 On Post	4 On Shares
100 Comments	16 On Post	84 On Shares
139 Shares	139 On Post	0 On Shares

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1,528 Photo Views	1 Link Clicks 📊	1,506 Other Clicks 📊
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Vermont Agency of Transportation
Published by Nick Cartularo [?] · August 20, 2020 · 🌐

More progress on the Middlebury Bridge & Rail project as crews work simultaneously to rebuild the downtown and install retaining walls in the rail corridor.

You can find out more about the project at:
<https://vtrans.vermont.gov/projects/middlebury>




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52 Reactions, Comments & Shares 📊

41 Like	37 On Post	4 On Shares
2 Love	2 On Post	0 On Shares
1 Wow	1 On Post	0 On Shares
1 Comments	0 On Post	1 On Shares
7 Shares	7 On Post	0 On Shares

412 Post Clicks

245 Photo Views	19 Link Clicks 📊	148 Other Clicks 📊
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NEGATIVE FEEDBACK

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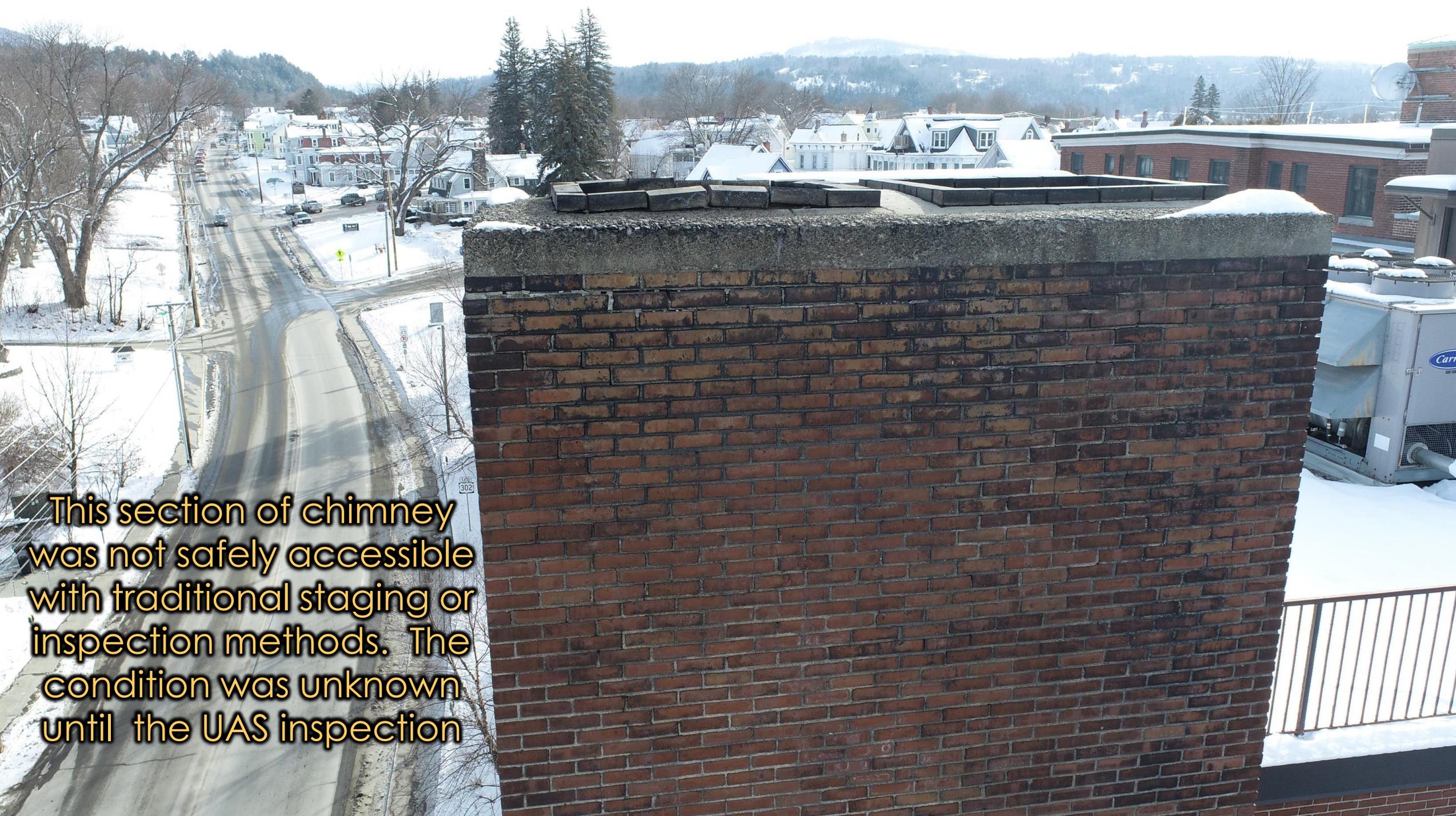
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VT Inter-agency Collaboration

Macfarland State Office Building
BGS Request
Brick Condition Inspection
Barre, VT
January 2021

- 300 detailed photos in one day of flight
- Eliminated the need for staging or person-lift
- Photos given to BGS architect to prioritize repair
- **“In-house” solution makes UAS technology attainable for many project budgets**





This section of chimney was not safely accessible with traditional staging or inspection methods. The condition was unknown until the UAS inspection

An aerial photograph of a slate roof. A brick chimney is visible in the upper center, and a green vent is on the right. The roof is covered in grey slate tiles, some showing signs of wear and discoloration. A dark metal roof is visible on the left side.

Waterbury State Office Complex Slate Roof Condition Inspection

Waterbury, VT
March 2019

- 500 detailed photos in one day of flight
- Eliminated the need for staging or person-lift
- Photos given to BGS architect to prioritize repair

Cotton Brook Landslide

Waterbury, VT

June 2019

- Public Outreach Imagery, Mapping, Digital Terrain Model
- Volume of sediment Estimate
- Stability Assessment
- Collaboration with VGS Geologists, FPR, UVM and Norwich University
-



Cotton Brook Landslide

Waterbury, VT

August 2020

- Year to year comparison
- +1.4 Acres from 2019-2020



Cotton Brook Delta
Waterbury, VT
June 2019



Cotton Brook Delta
Waterbury, VT
September 2020



VTrans UAS and VSP UAS

- Parallel UAS program development
- Collaborative training efforts
- Consistent equipment selection
- Reciprocal UAS support established



Search and Rescue Training with UAS
Vermont State Police
Windsor, VT - September 2020



AOT UAS

Looking Forward

- To provide **consistent**, and **accurate** UAS imagery and data for various transportation applications.
- Continual development and integration of UAS for AOT.
- Continue to work across agency lines to provide a valuable resource to all sections of Vermont government.
- Remain ready for deployment in emergency situations.
- Expand awareness and education regarding the efficiency and safety of UAS operations.



Questions?

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