Unmanned Aircraft Systems (UAS) – Bridge Inspection Implementation

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Overview

• **Previous Research**
  • Phase I – April to June 2015
  • Phase II – October 2015 to June 2016
  • Phase III – July 2016 – June 2018

• **UAS Capabilities**
  • Object Sensing
  • 360 Degree Camera
  • Non-GPS Operation
  • Photo, Video, and Thermal Imaging
  • Confined Space

- senseFly albris
  - $35k...now $15k

- Flyability Elios
  - $35k
Issues to Address

• Lack of Quality Inspections
  • Bridge element location – high wall abutments, steep slopes, piers in traffic
  • Deteriorated conditions not being properly assessed

• Access
  • Traditional methods – under-bridge inspection vehicles, ladders, lifts, rope access (LIMITED by lane closure availability…)
  • MnDOT Bridge Inspection Access Requirements

• Cost
  • Inspection by Traditional Access
  • Maintenance Needs – National Highway System Bridge Age
  • SCOPE CREEP
Solution – Project GOALS

1. **Metro District Bridge Inspection Program Implementation**— based on the MnDOT Bridge Inspection Access Requirements and all previous research completed since 2015

2. **UAS Specific Bridge List Development**— report generated by parameters set in SIMS based upon previous research factors

3. **UAS DOT User/Control Manual**— as required by MnDOT Aeronautics

4. **Identification of Sustainable Future Funding**— Federal, State, Local, etc.

ULTIMATELY – District prototype to serve as model for all other agencies governed by the MnDOT Bridge Office Inspection Unit
Benefits

• Improve Quality of Bridge Inspection Data – ACCESS
• Improve Data Quality
  • Point clouds
  • Maps & Orthoplanes
  • 3D Models/CAD
  • Virtual Reality
  • Web Sharing & Mobile Devices
• Improve Bridge Inspection Safety – Minimal Work Zones
• Reduce Traffic Impacts
• Reduce Costs:
  • Time
  • Staffing – two drone personnel, minimal to no work zone staff
  • Equipment
Pier Modeling
Defect Detail
Underwater 3D Pier Modeling
Infrared

Nielsville Bridge 5767
Volume Calculations
Conclusions

• Know your intended purpose for the drone – “off-the-shelf” UAS has limited inspection capabilities

• Using UAS for access is important but documentation and communication of results is more compelling

• UAS can supplement inspections as a tool

• Does not need to replace entire inspection

• Collaborate with other owners to share knowledge and promote future advancement
Questions?

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