

## RESEARCH SUMMARY

### MDOT CULVERT INSPECTION

#### WHAT WAS THE NEED?

Concrete/corrugated metal culverts (straight, 50-150 ft long, 12" - 48" diameter) are currently inspected visually and less frequently with ground robots by MDOT SHA. The condition of most culverts is unclear due to inspection limitations, which impacts maintenance prioritization. An improved inspection process would allow for a more proactive approach to culvert maintenance.

#### WHAT WAS THE GOAL?

The objective of the study was to conduct video culvert inspections with a small, caged drone (small Unmanned Aircraft System or sUAS) to complement ground robot inspection and compare results. The expected outcome was more reliable, thorough, and timely culvert inspections leading to a better understanding of culvert condition and maintenance priorities.

#### WHAT DID THE RESEARCH TEAM DO?

The initial task was to conduct market research for a suitable commercially available sUAS and video camera to meet MDOT SHA requirements. The Swiss-made Flyability Elios 2 was selected and procured as it was specifically designed for inspection in confined spaces.

**JULY 2021**

**REPORT NUMBER:**  
MD-21-SHA/UM/5-35

**START DATE:**  
June 10, 2020

**COMPLETION DATE:**  
May 31, 2021

**PRINCIPAL INVESTIGATOR:**  
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Once received, airworthiness evaluation of the Elios 2 was completed, along with initial training and indoor test flights.

Next, four local culverts along MD-235 in St. Mary's County were selected based on MDOT recommendations and site surveys. Inspection of the four culverts using the Elios 2 sUAS were completed during the Spring of 2021. Once the testing was complete, the Elios 2 was transferred to MDOT.



culverts under major corridors under direction of the Office of Highway Development. MDOT SHA will also evaluate using the Elios 2 for further applications, such as using its photogrammetry function to develop volume measurements for indoor salt stockpiles, as well as under-bridge structural inspections. The end goal is to increase MDOT SHA expertise, confidence, and effectiveness in operating the Elios 2 until it becomes a regular part of our drone program.

## **LEARN MORE**

To view the complete report, click [here](#).

## **WHAT WAS THE OUTCOME?**

MDOT UAS Coordinator Matt Horowitz reported “...the tests were very successful and provided a strong proof of concept that the Elios drone can be used for video inspections of culverts, up to a certain length and in certain conditions...”

## **HOW WILL MDOT SHA USE THE RESULTS?**

MDOT SHA will build on the proof of concept from this research project and continue to use the Elios 2 to aid in culvert inspections, starting with high priority

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*For more information on research at MDOT SHA, please visit [our website](#).*

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