

DEVELOPMENT OF AN INTEGRATED UNMANNED AERIAL SYSTEMS (UAS) VALIDATION CENTER

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Unmanned Aerial Systems (UAS) have the potential to drastically change how civil infrastructure is inspected, monitored, and managed. This innovative technology can ensure the inspector's safety, provide additional inspection information, and reduce costs. However, a challenge arose as this industry expanded: a lack of standardized guidelines or minimum performance requirements to perform these operations. With no standard tests to verify UAS' ability to conduct inspections and unknown detection capabilities, agencies are left to rely upon consultants' or vendors' promotional material and claims when considering UAS deployment. The following work proposes a series of performance-based assessments and procedural documentation to establish minimum standards for using UAS in bridge inspection applications. Through this work, the following performance-based tests have been developed: (1) a controlled environment simulating bridge geometries to assess the overall capability of a UAS used for bridge inspection [evaluation chamber], (2) an assessment of UAS performance under multiple environmental temperatures [environmental temperature chamber], (3) a UAS performance assessment under varying wind speeds [wind chamber], (4) a consolidated checklist compiling Federal Aviation Administration guidelines and best practices [flight checklist], (5) a field assessment of UAS under conditions analogous to on-site bridge inspection [practical test]. For infrastructure owners, embracing these performance-based assessments will help ensure that UAS meets a minimum level of performance and allow owners to verify and distinguish between various UAS used for bridge inspection. This work also discusses positive feedback from beta testing provided by industry and infrastructure owner representatives, showcasing the effectiveness of providing an authentic assessment of UAS bridge inspection capabilities. Future work encourages the wide implementation of this assessment program and encourages owners to refrain from using untested technology in the inspection of their infrastructure.