Utilizing Unmanned Aircraft Systems (UAS) for Bridge Inspections

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APWA Minnesota Chapter
American Public Works Association

Project Background

- MnDOT Bridge Office identified UAS as a potential useful technology
- Additional Research Dollars Available
- Phase I project was scoped, funded and completed in two months, Phase II complete, Phase III started

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Assessment of Current Practices

Access Methods

- Aerial Work Platforms (AWP's)
- Rope Access and Structure Climbing
- Ladders

NBIS and MnDOT Requirements

- Hands On Inspection
- Non Hands on Inspection
- Measurements/Testing

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Assessment of UAS Technology

- Phase I Technology
  - Not capable of looking up
  - Unable to fly without GPS
  - Photo, Video and Thermal Imaging
- Phase II and III Technology
  - Inspection-specific UAS
  - Object Sensing
  - Capable of looking up
  - Fly without GPS, under bridge decks
  - Photo, Video and Thermal Imaging
  - Confined Space

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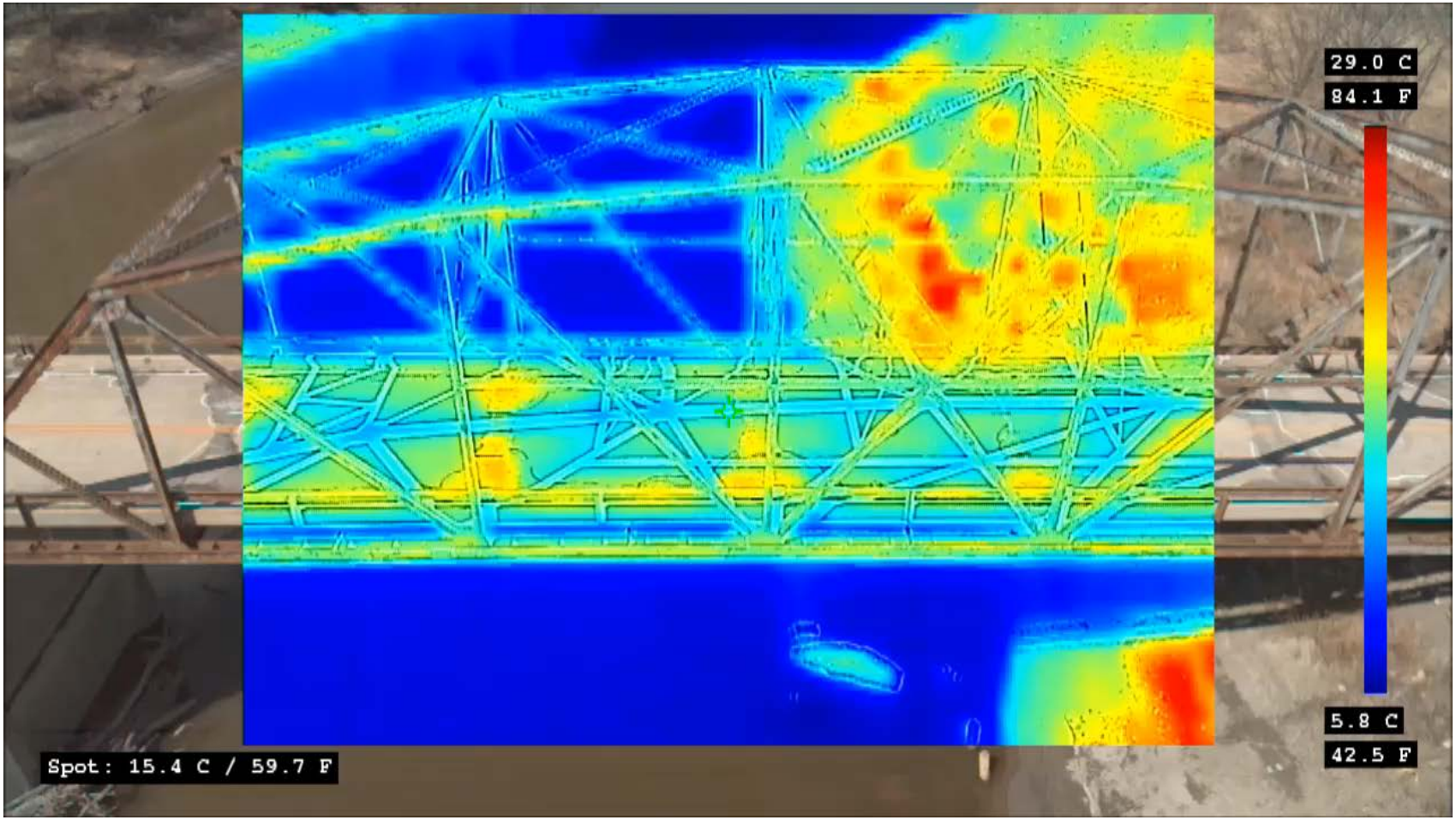
Phase II Study

- Cost comparison with UBIVs, traffic control
- Explore inspection specific technology including the Sensfly Albris
- Compile a best practices document
- Incorporate into an actual inspection
- Use UAS in the planning of an inspection
- Use a secondary display for bridge inspector
- Deck surveys with zoom camera
- Culvert and Box Girder Inspection
- IR Deck Delamination Assessment at Dawn
- Paint Assessment
- Data on how many hours UAS vs. other methods

Phase II Study



Nielsville Bridge 5767

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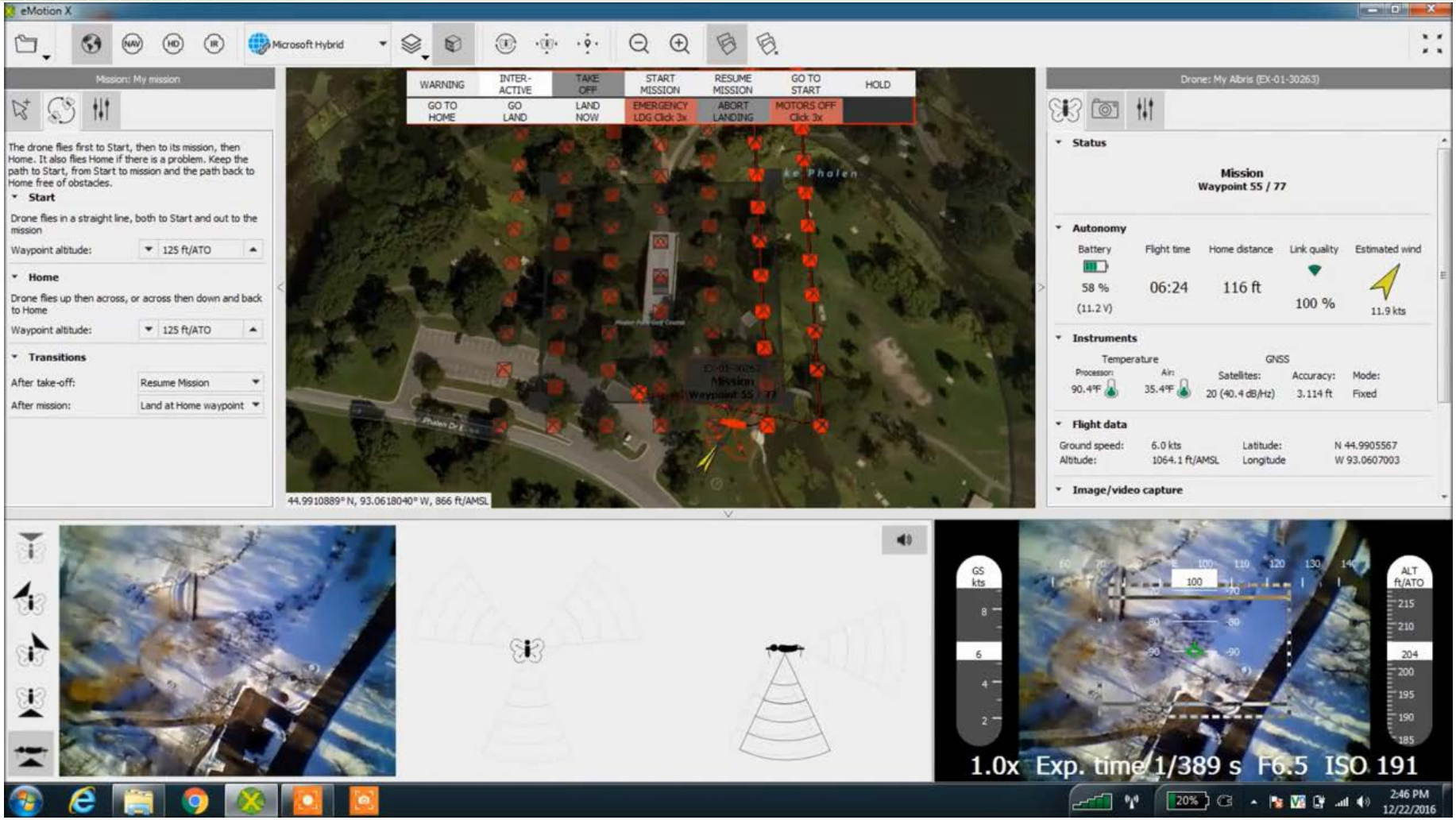
Phase II Study



Bridge Mapping Mission

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Phase III – Project Goals

- Statewide UAS Inspection Contract – based on the MnDOT Bridge Access Inspection Policy list
- Overall Cost Effectiveness – at a statewide level for both District and local agency bridges
- Inspection Quality and Safety Improvements – close-up, 3D, and thermal imagery
- Identification of Sustainable Future Funding

Phase III – Confined Space

Flyability Elios Drone

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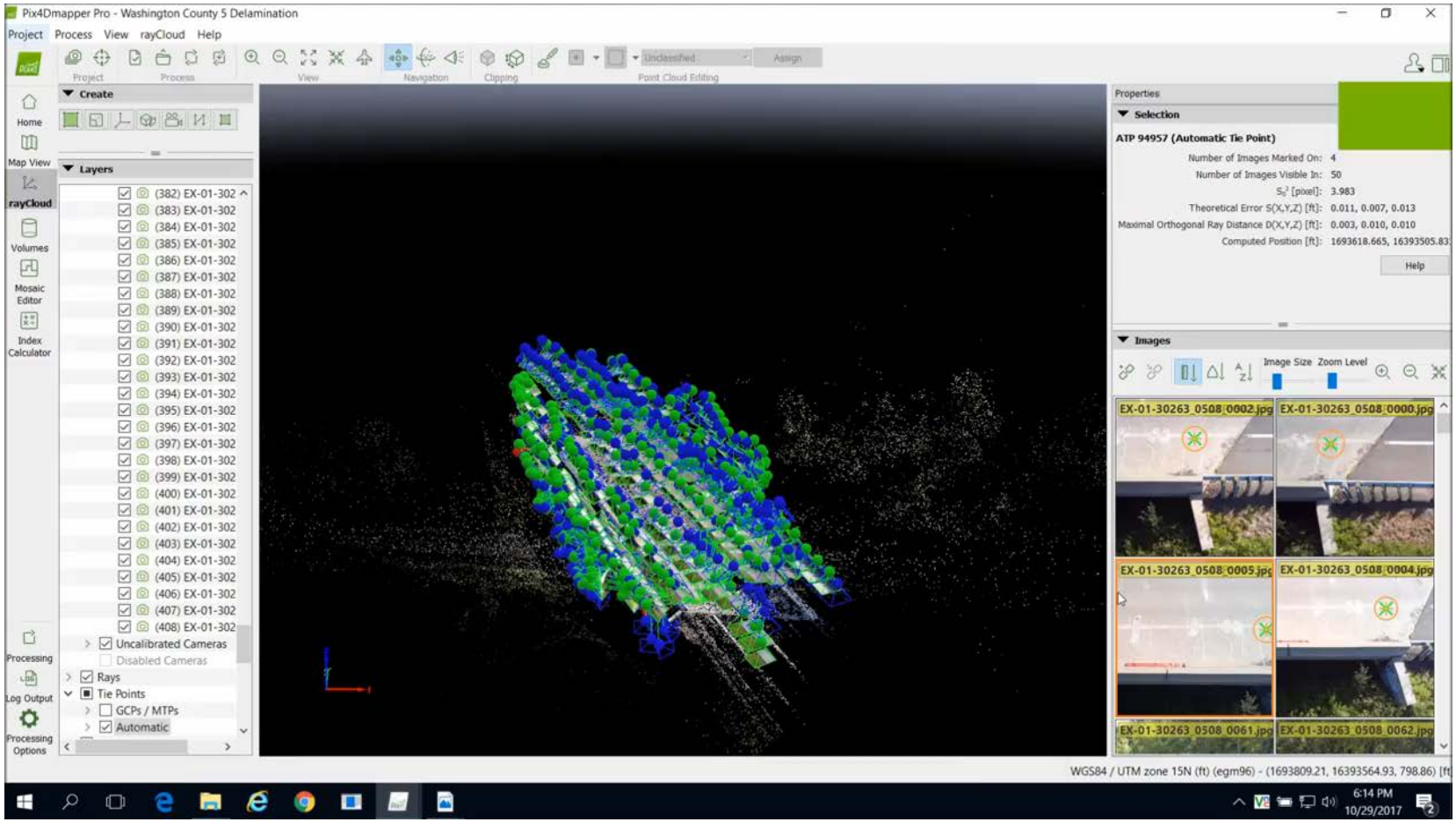
3D Photo Log



Bridge Inspection Modeling

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Bridge Modeling

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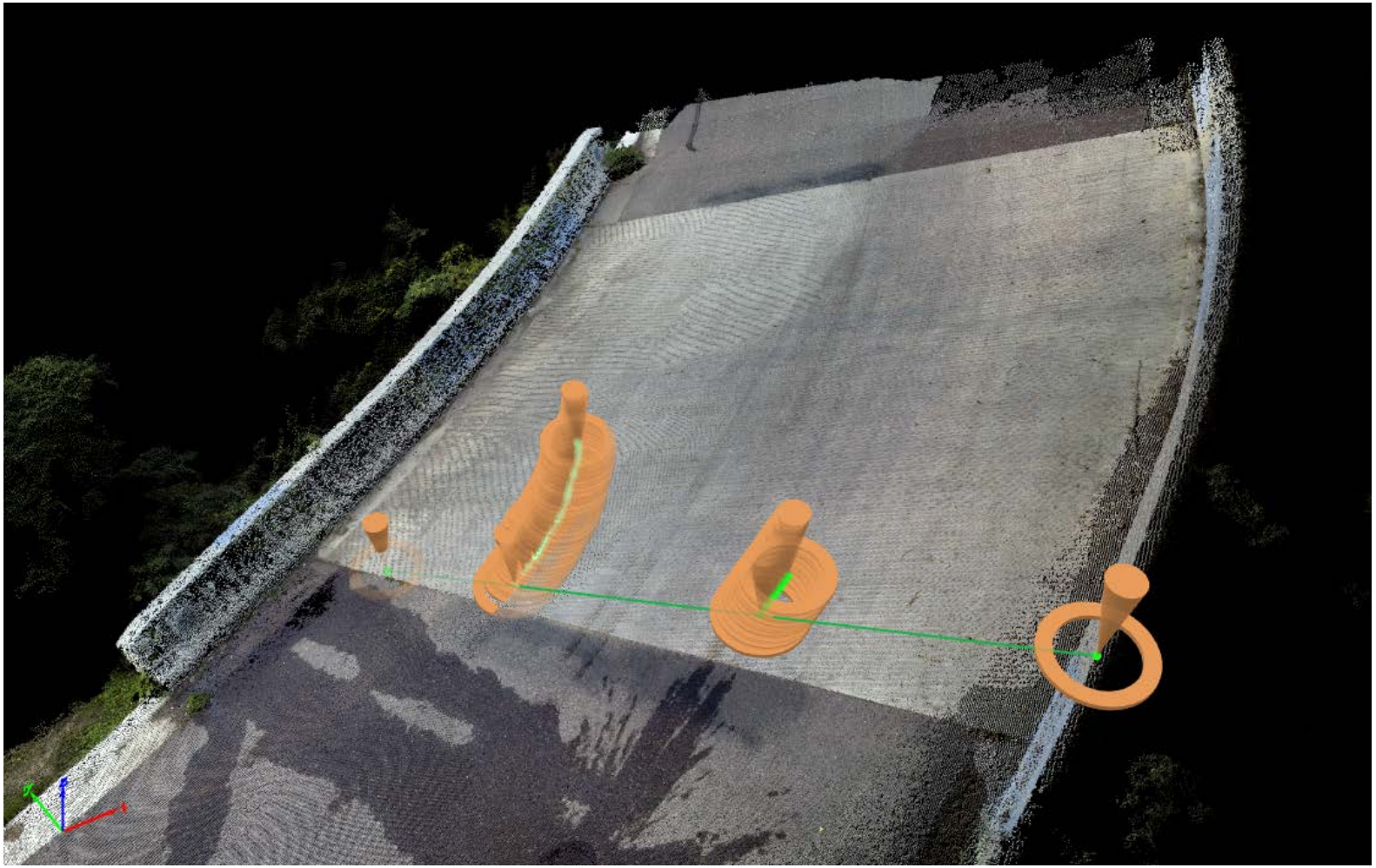
Bridge Modeling



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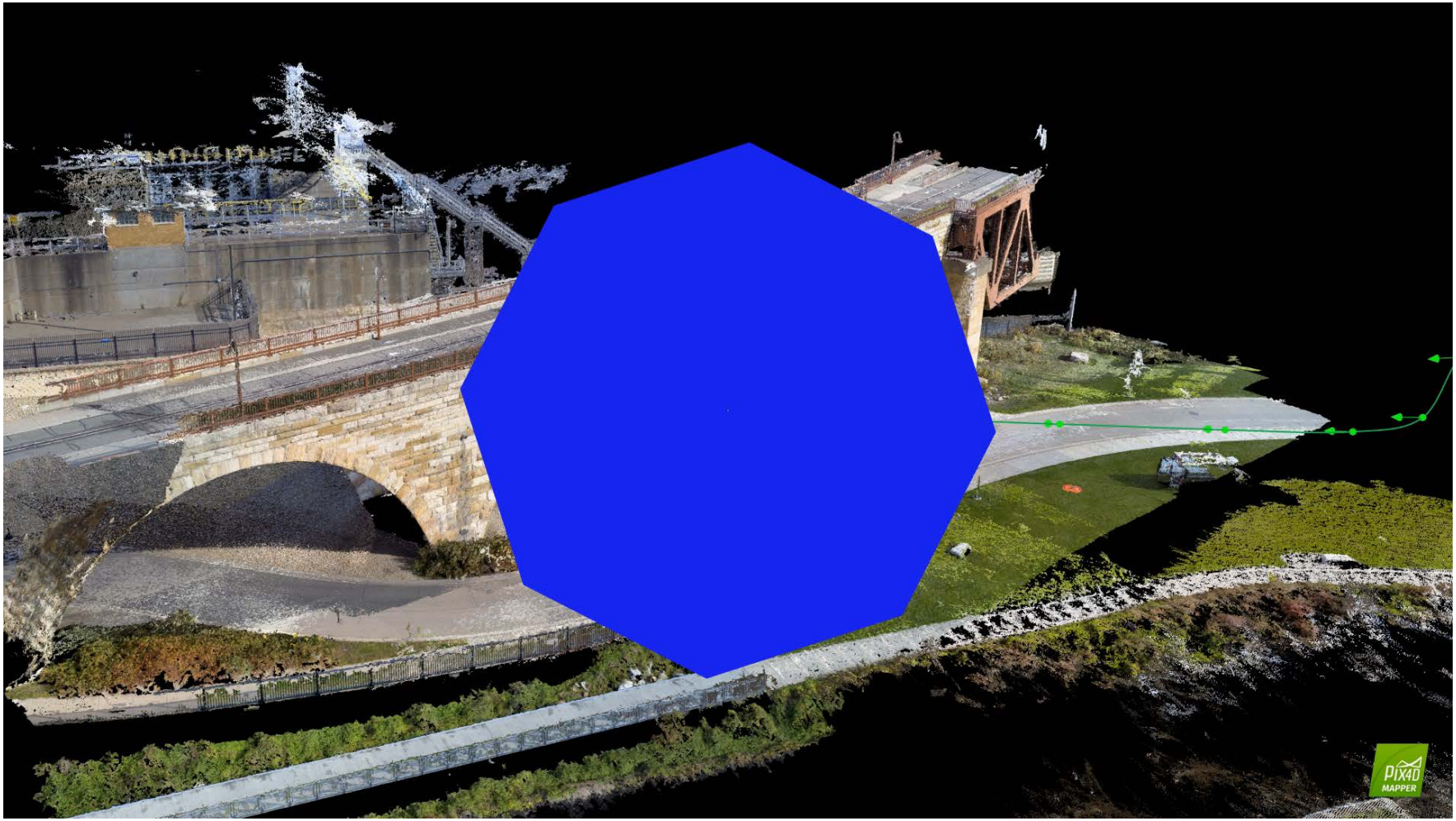

Bridge Inspection Modeling

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Conclusions

- UAS can be used in the field during bridge inspections safely.
- Image quality allows for the identification of defects.
- Tactile functions cannot be replicated using UAS.
- UASs can be cost effective.
- UASs can provide a very efficient way to collect infrared images
- Safety risks could be minimized with the use of UASs.
- UASs can be utilized to determine channel conditions.
- UASs can provide important pre-inspection information.
- “Off the shelf” UAS’s have limited inspection capability.
- FAA Part 107 allows greater flexibility than Section 333 process

Public Response

- Hundreds of news articles and stories
- Overwhelmingly positive
- Safety, reduced closures and cost efficiency valued by public

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Questions/Contact Information

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