2026 Spring Conference at Wisp Resource
McHenry, Maryland

Safe, Economical, and Efficient Structure Assessments

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Innovative Subsurface Evaluation & Engineering, LLC (iSee)

May 8, 2026

BIOGRAPHY

- 38 plus years in Maryland Transportation Public Sector
- Owner and Principal Engineer of Veteran Owned Small Business - iSee
- iSee and our partners brings you innovative methods to safely and efficiently assess your agencies structures.
- Full bio for conference in separate document

OVERVIEW OF iSee

- iSee Incorporated in 2016
- Serves primarily Maryland, but supports Transportation Agencies along the US East Coast and US Mid-West
- MD Certified Small Business in Maryland (CSB) - SB26-092620O
- MD Certified Veteran Owned Small Business (VSBE) - VB25-073966
- iSee and our partners in structural assessments bring you innovative methods to safely and efficiently assess your agencies structures.

Safe, Economical, and Efficient Structure Assessments

Overview of Types of NDT Structure Investigation Tools used by iSee

- Primary Assessment Methods –
  - 3D-GPR –
    - Ground Coupled System
  - High Resolution Video or Imagery
  - Infrared Thermography
  - Rapid Automated Sounding (RAS)

ASTM SPECIFICATIONS

Designation: D6087 – 22

Standard Test Method for Evaluating Asphalt-Covered Concrete Bridge Decks Using Ground Penetrating Radar[1]

Designation: D4788 – 03 (Reapproved 2022)

Standard Test Method for Detecting Delaminations in Bridge Decks Using Infrared Thermography[1]

Designation: D4580/D4580M – 12 (Reapproved 2018)

Standard Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding[1]

Overview of Assessment Methods

3D or Step Frequency Ground Penetrating Radar (3D-GPR) –

- New Construction QA and QC
- Rehabilitation and Repair Assessments
- Structure Health, Service Life Evaluations and Deterioration Assessments
- Emergency Assessments
- Material Evaluations
- Structure transfer acceptance

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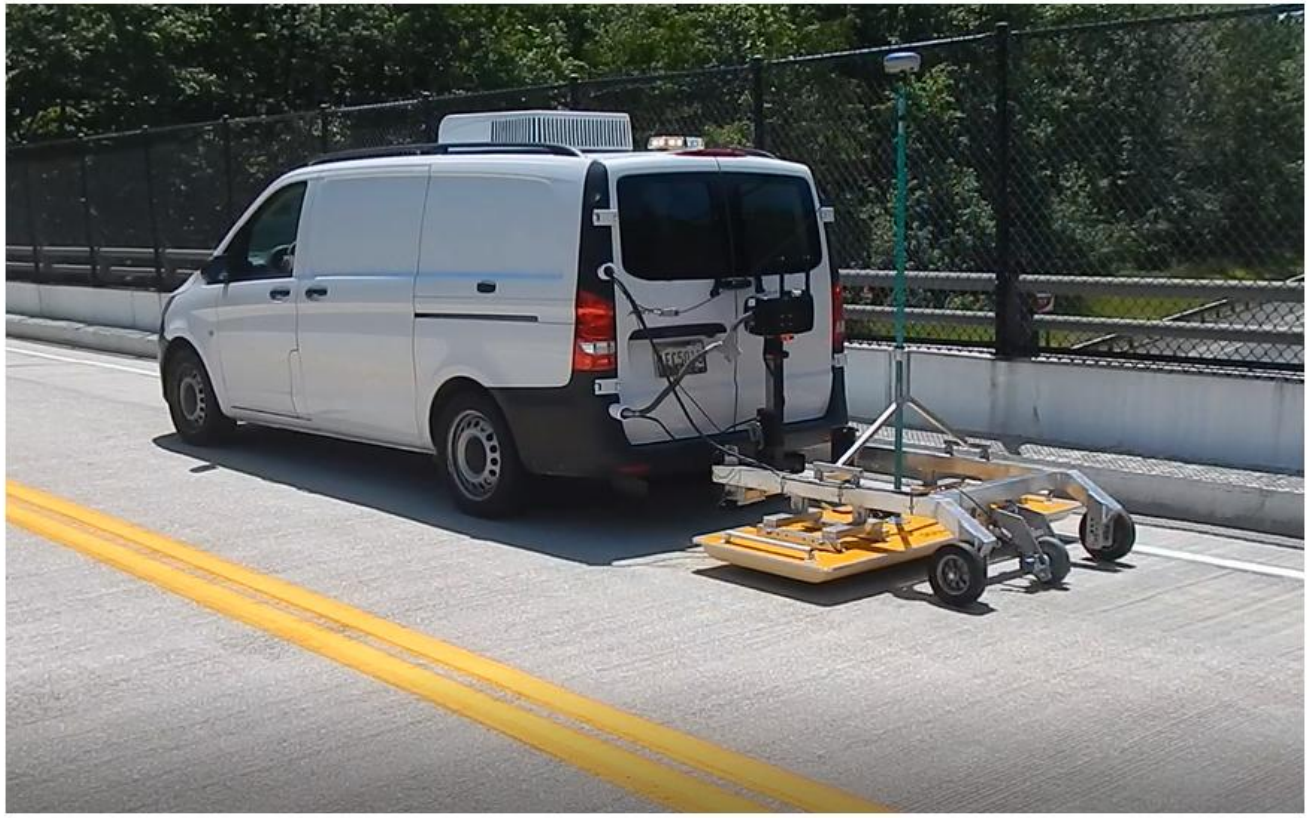
Safe, Economical, and Efficient Structure Assessments

3D-GPR Data Collection – Safe and Efficient (No Lane Closures – Moving Operation)



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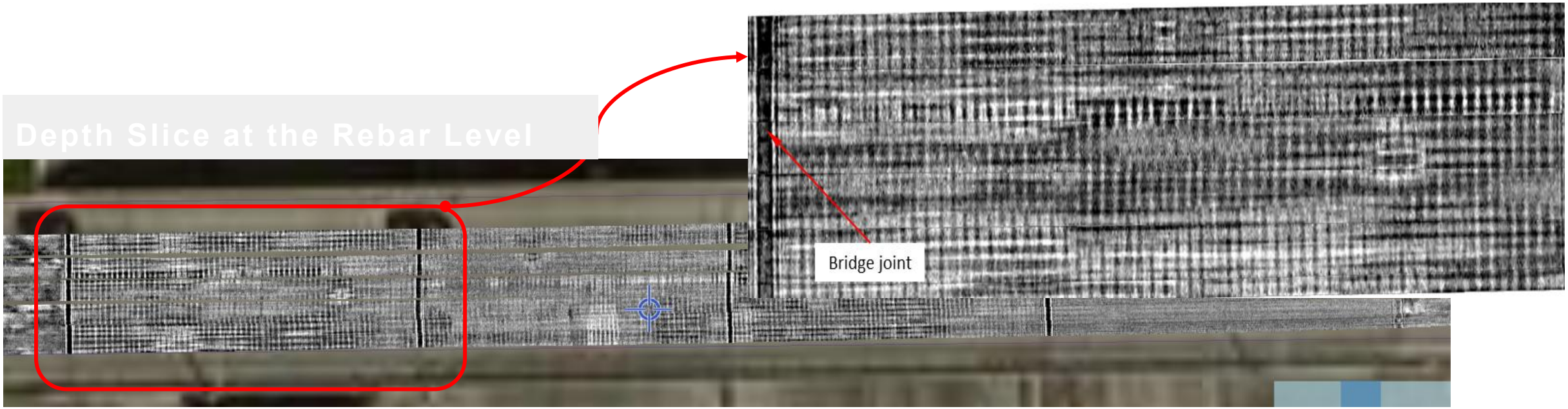
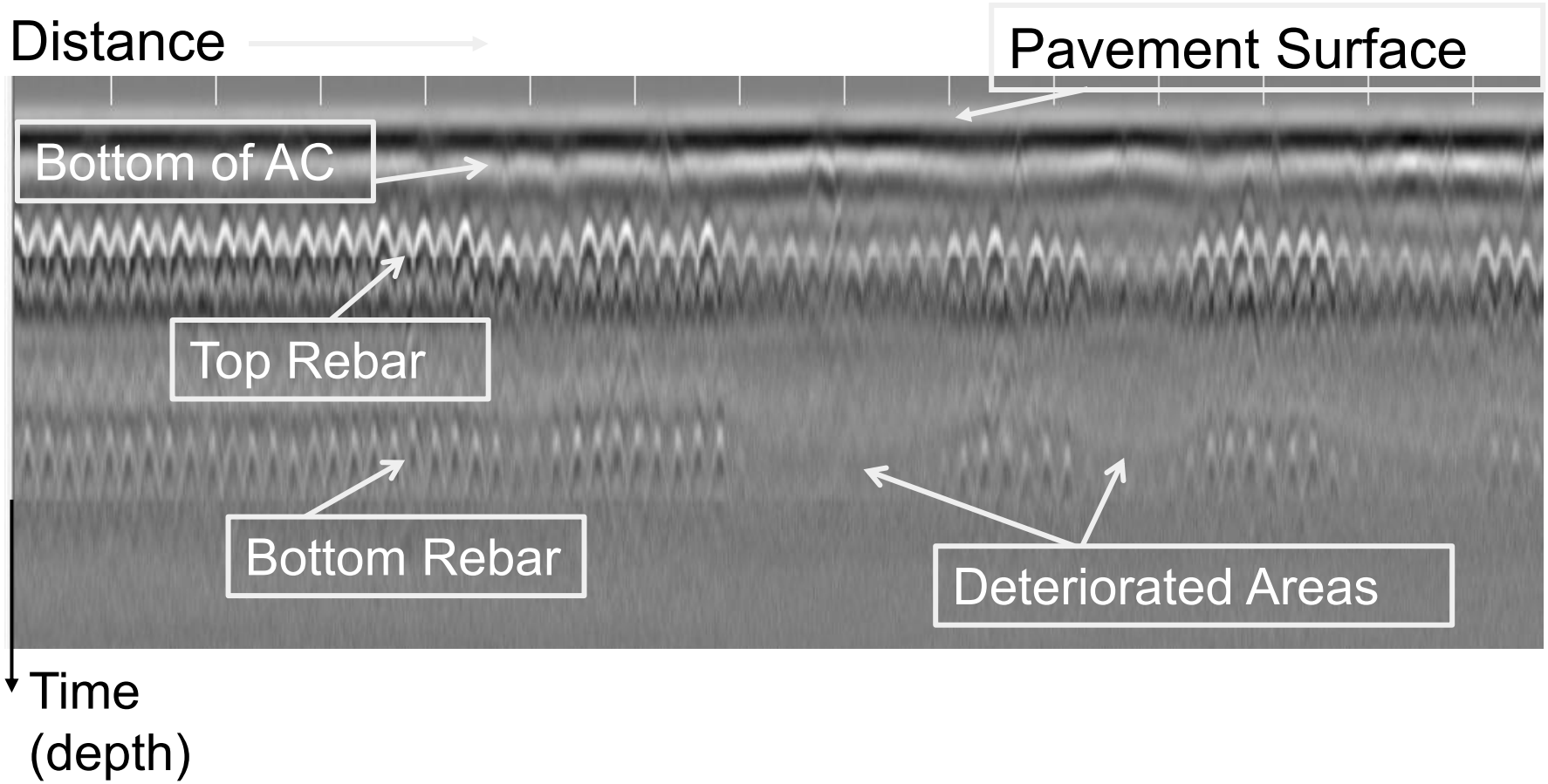
Safe, Economical, and Efficient Structure Assessments

3DGPR ARRAY SYSTEM



SAMPLE GPR DATA SHOWING DETERIORATION



SAMPLE GPR SURVEY OUTPUT

Deterioration Quantities	Area (ft^2)	%
	1742.4	13.1

Deterioration detected with GPR

Increasing severity -->

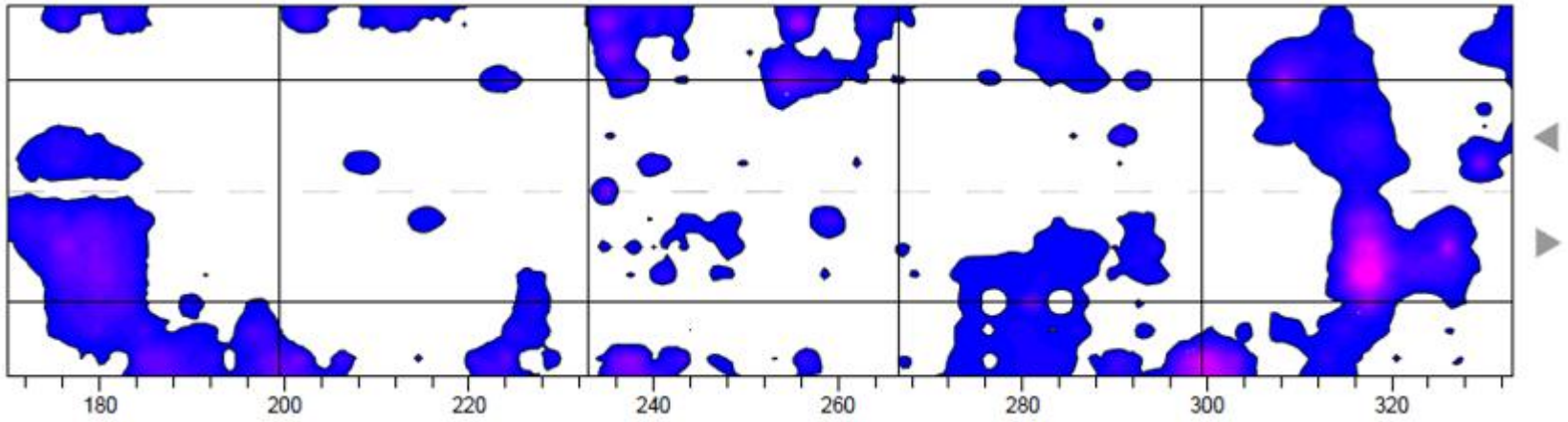
Direction of traffic

Average Rebar Depth = 2.2 in

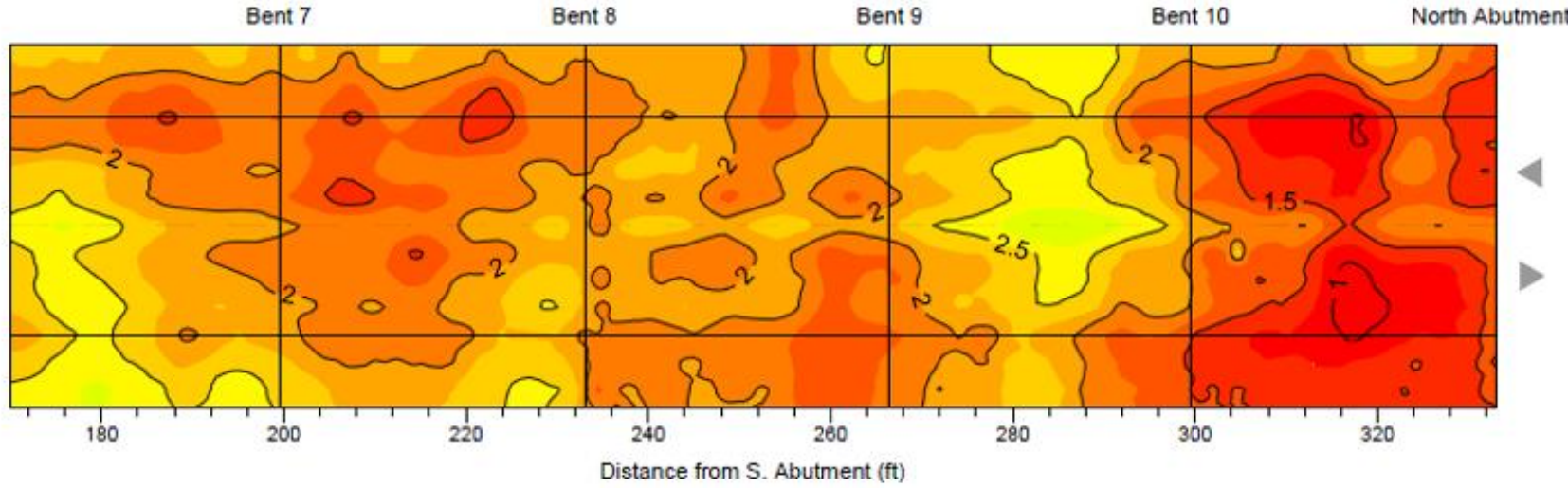
Rebar Depth (in)

1 2 3 4 5 6

Deck Deterioration



Rebar Depth



Overview of Assessment Methods

High Resolution Imagery (HRV)

- Deterioration assessments and rehabilitation planning

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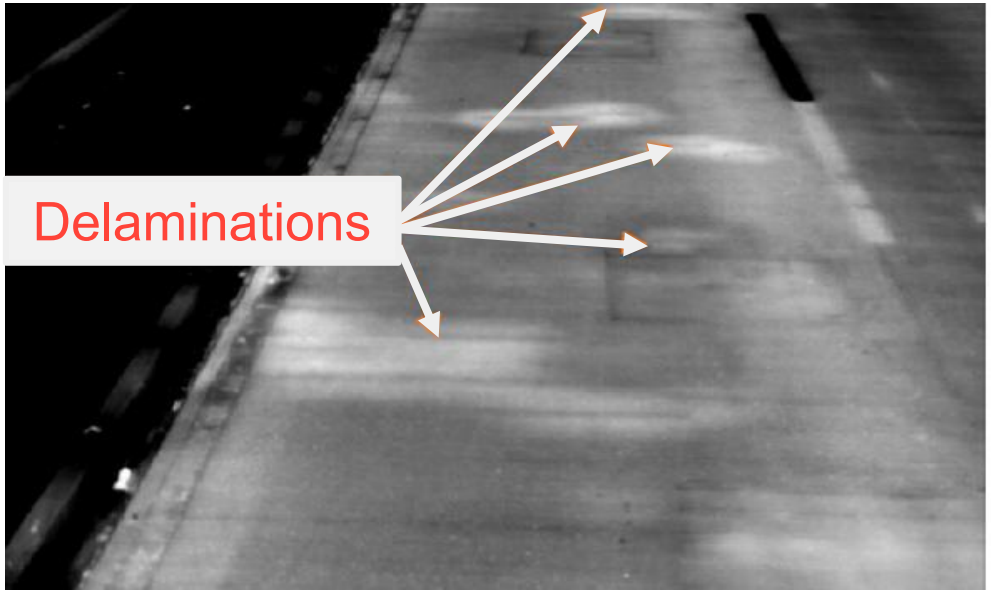
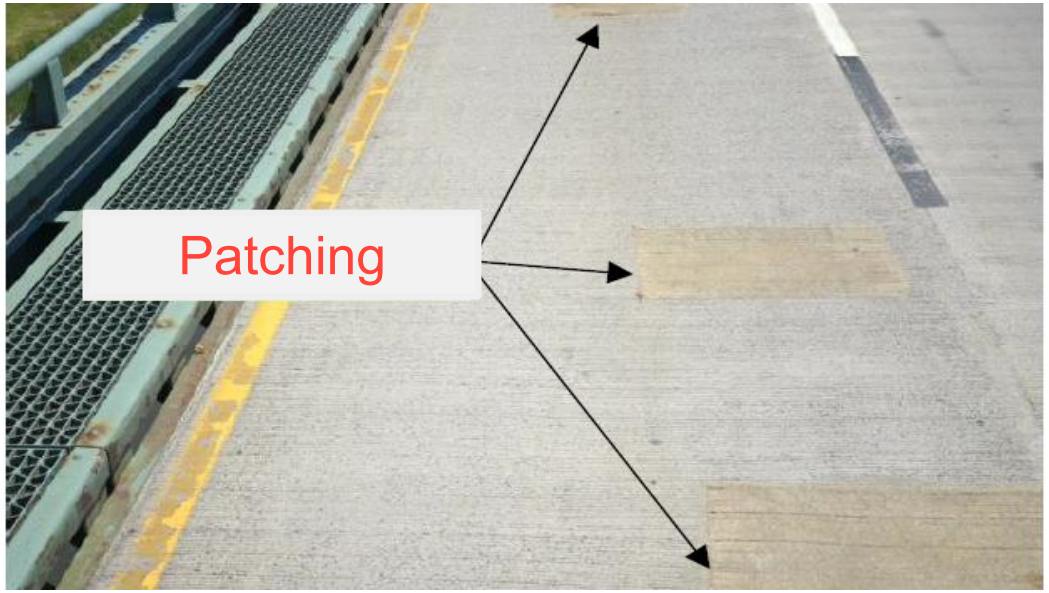
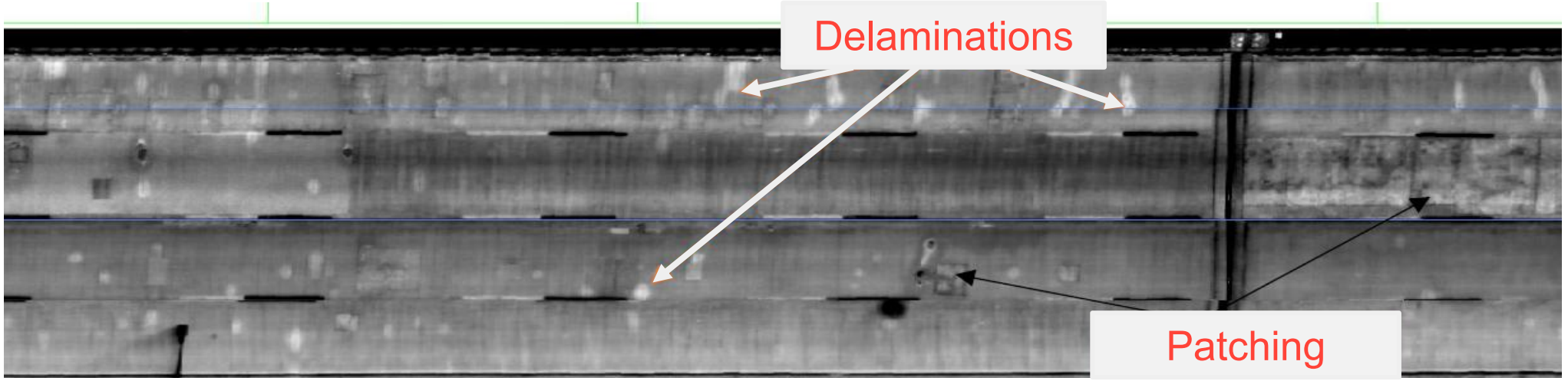
INFRARED & HRV DATA







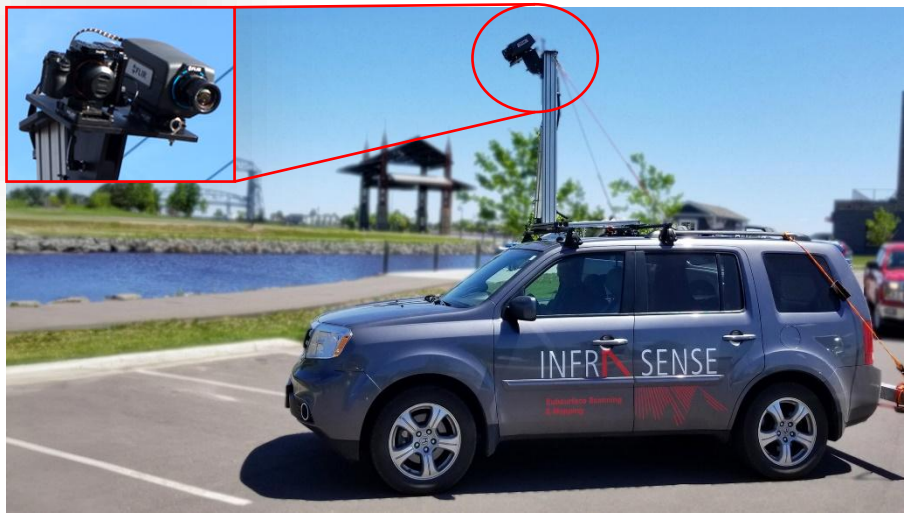
Overview of Assessment Methods

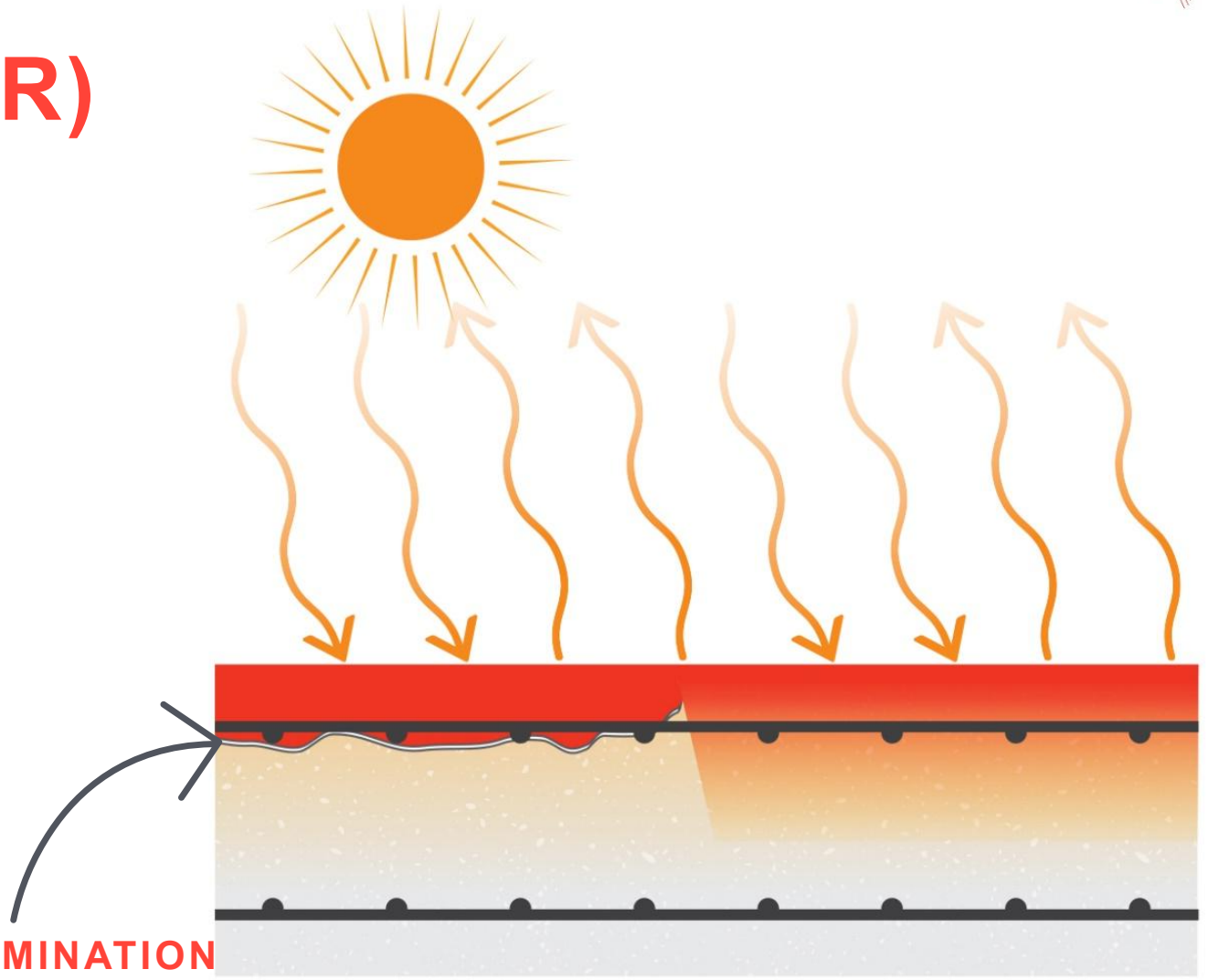
Infrared Thermography (IR)

- Deterioration assessments and rehabilitation planning

INFRARED THERMOGRAPHY (IR) PRINCIPLE

Delaminations act as **thermal barriers** that produce hotspots on the deck surface





IR FOR BRIDGE DECKS

Proven technology

- Widespread utilization over the last 25-30 years
- On thousands of deck structures

IR technology effectively detects deck delamination

Data typically collected from a vehicle-mounted setup

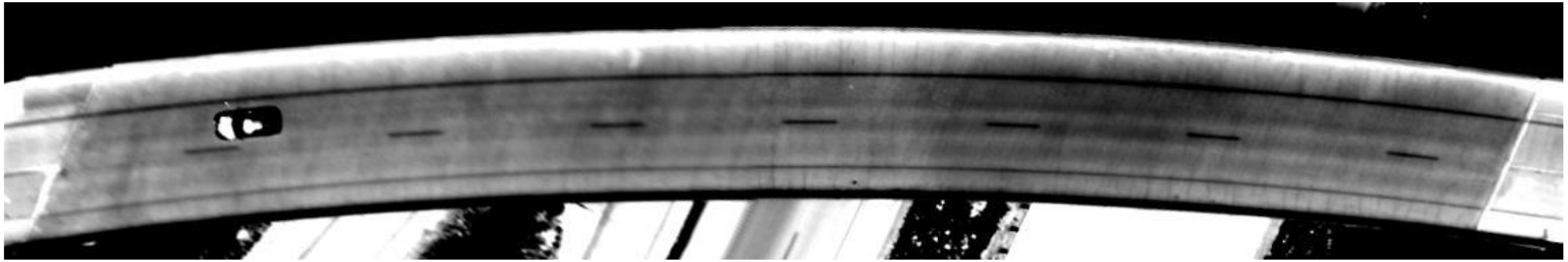
- Data collected at driving speed
- More recently, expanded to aerial operation

SAMPLE RESULTS

DECK IN GOOD CONDITION

Visual

Infrared

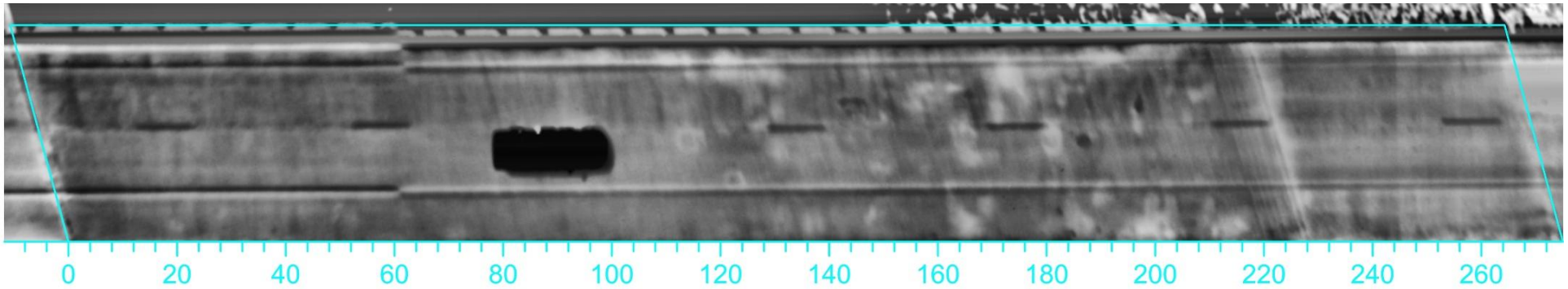


SAMPLE RESULTS

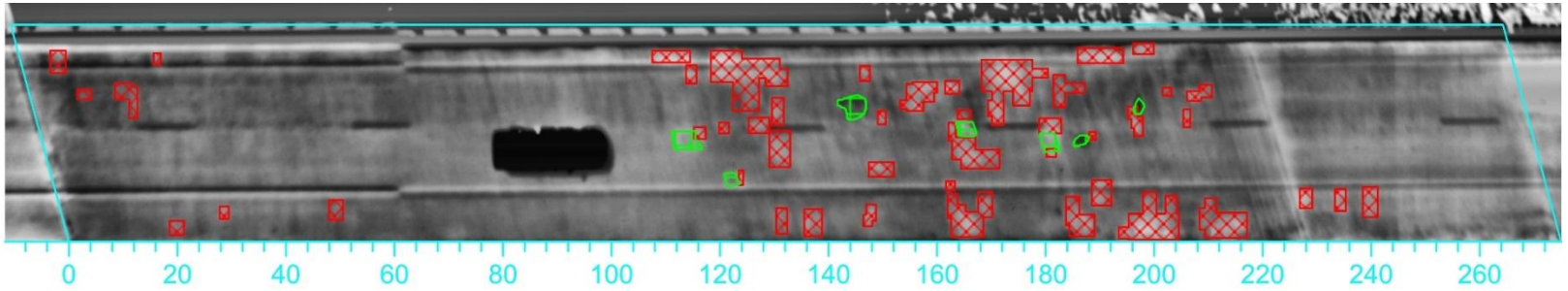
DECK WITH DELAMS & PATCHING

Visual

Infrared



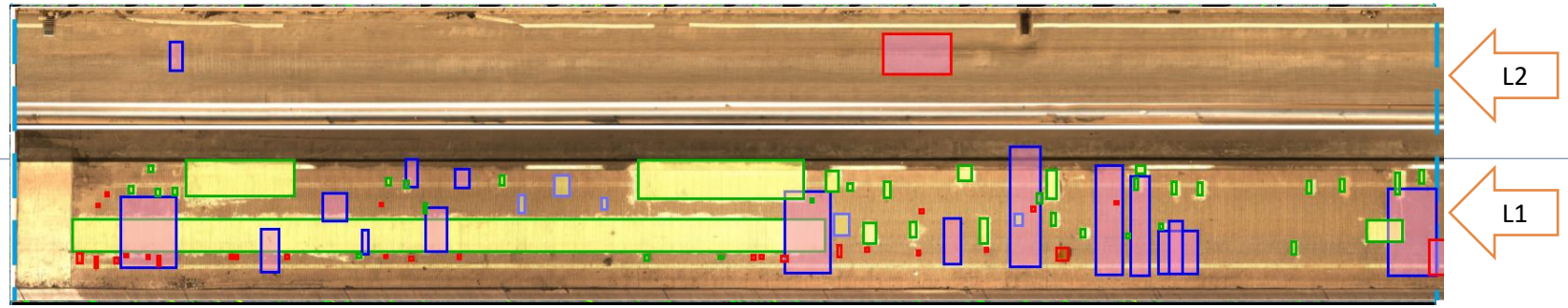
MAPPED RESULTS



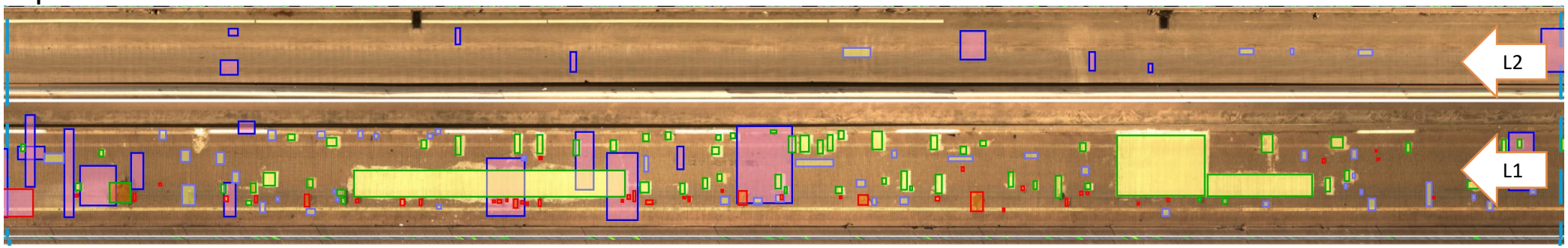
Condition	Map Legend	Quantity (sf)	Quantity (%)
Delamination		780	7.1%
Patching		62	0.6%
Spalling		0	0%

Combined Analysis of IR and GPR

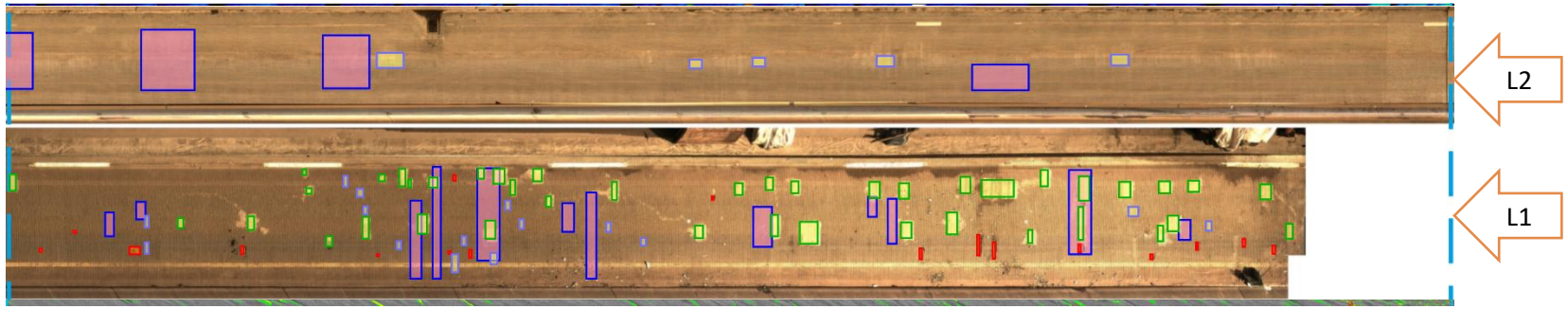
Span 1



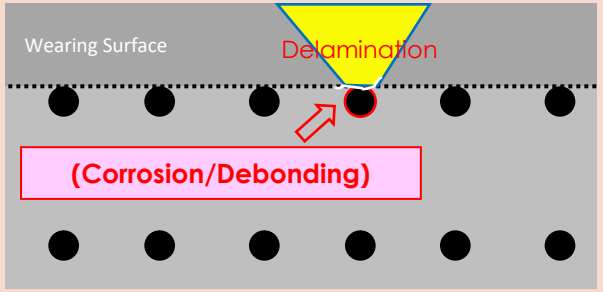
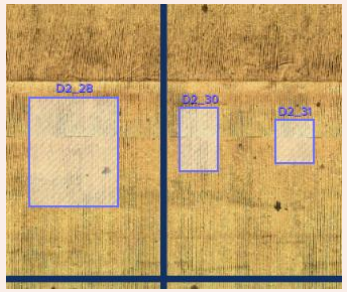
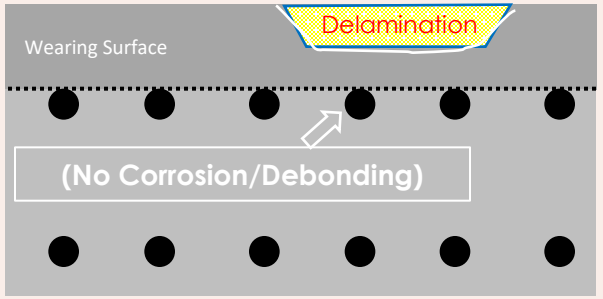
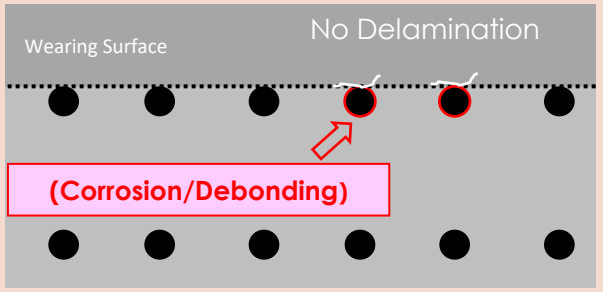
Span 2



Span 3

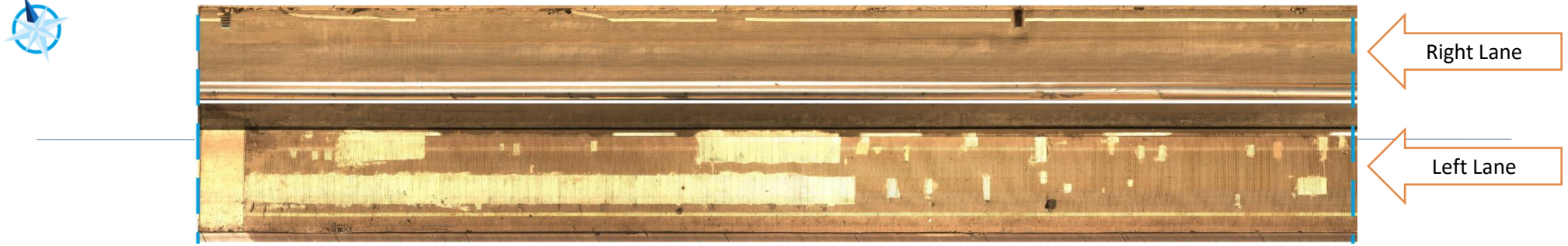


Delamination/Rebar Corrosion and Recommendations

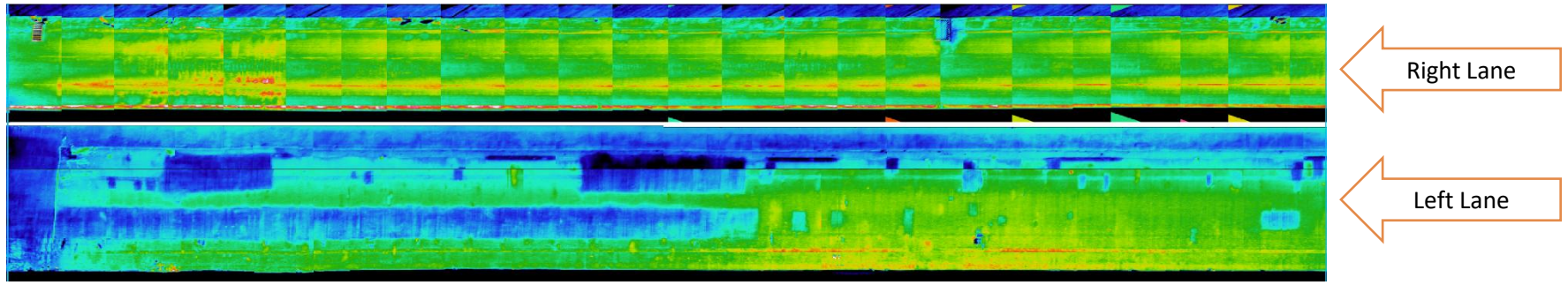
	IRT & GPR results	Graphical description	Recommendation
Case D1 Delamination with Corrosion/Debonding at top rebar			➢ Repair up to the rebar depth ➢ Corrosion protection for rebar (if necessary)
Case D2 Delamination within the overlay layer			➢ Repair within the overlay
Case 3 Corrosion/Debonding at top rebar but no delamination yet			➢ For spot areas, monitoring every 2 years ➢ If it was a majority of the bridge deck, more immediate action

Visual and IRT Scan

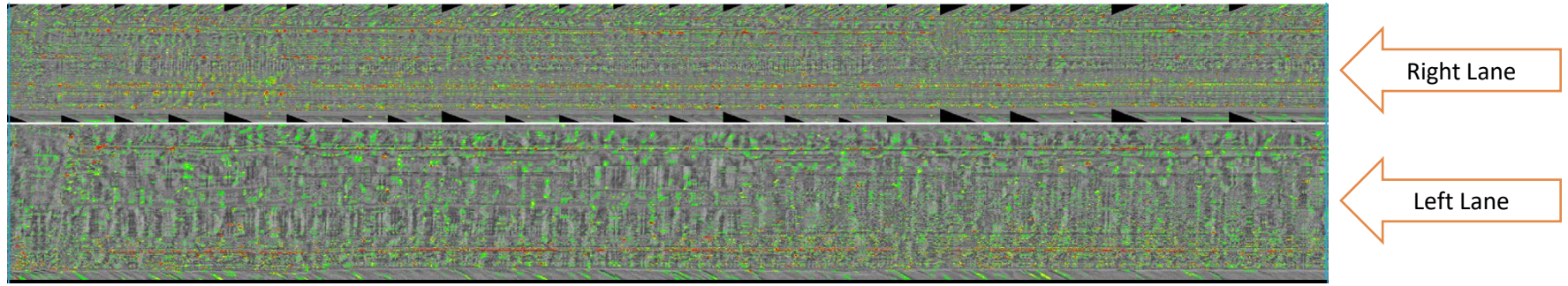
Visual Image



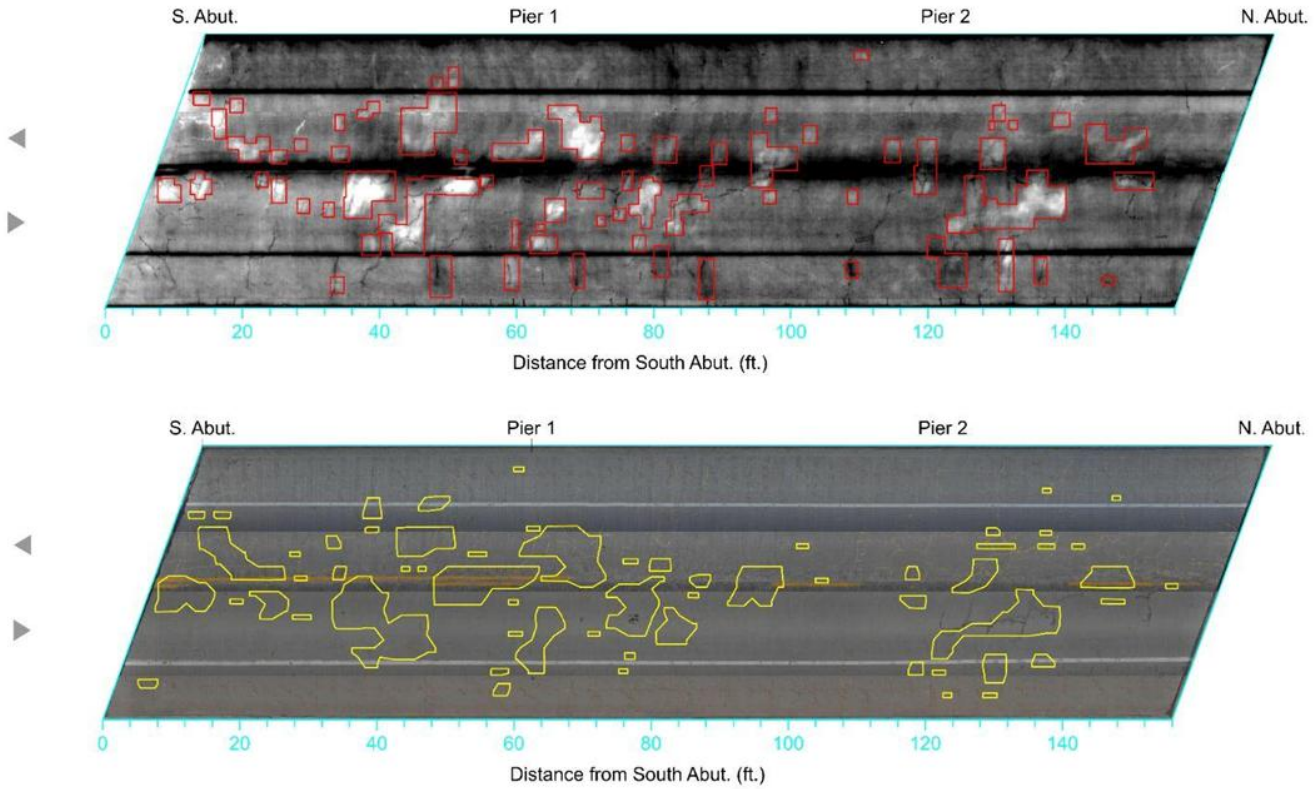
IR Image



IR Processed Image



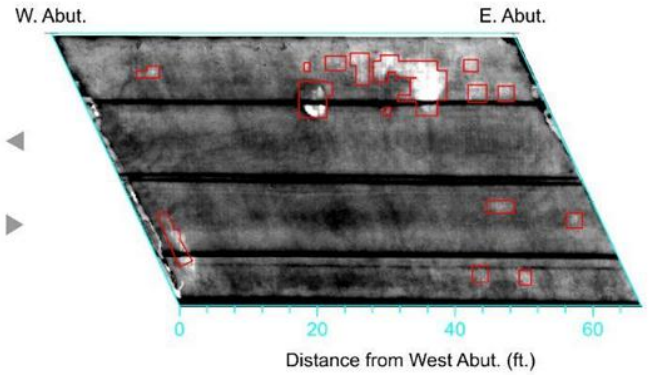
Comparison Example 1

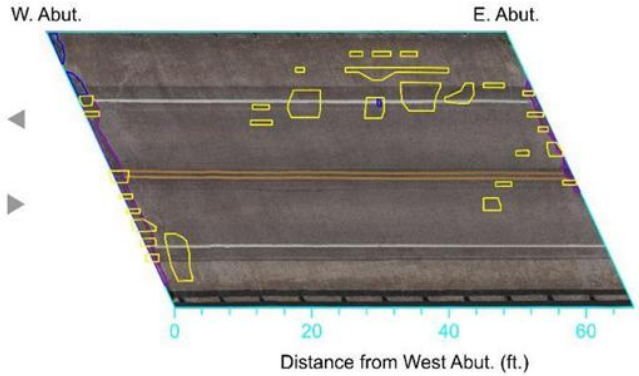


Orientation & Scale	Survey Information	Mapping Legend	Quantity Summary	ft²	%	General Information
1-in = 20-ft 0 20	Level 2 - Vehicle IR Scanned: 06/10/2025 3:49PM ▶ Direction of Traffic	Delamination detected by IR; Concrete Patching; Asphalt Patching	8514 – Concrete Overlay	6240	100	[redacted]
	Infrared Data (Temperature, F) Average 92.9 Standard Deviation 2.9	Delamination detected by RAS; Spalling; Area Not Analyzed	Delaminations (IR)	839.6	13.5	Analyzed By: SB Completed:12/19/2025
			Delaminations (RAS)	724.0	11.6	
			Spalling	0.0	0.0	
			Concrete Patching	0.0	0.0	
			Asphalt Patching	0.0	0.0	
			Area Not Analyzed	0.0	0.0	

Note: The delamination (IR) % was calculated as (Delamination Area) / (Wearing Surface Area - Area Not Analyzed). The total deck area based on imagery is 6240 ft ².

Comparison Example 2

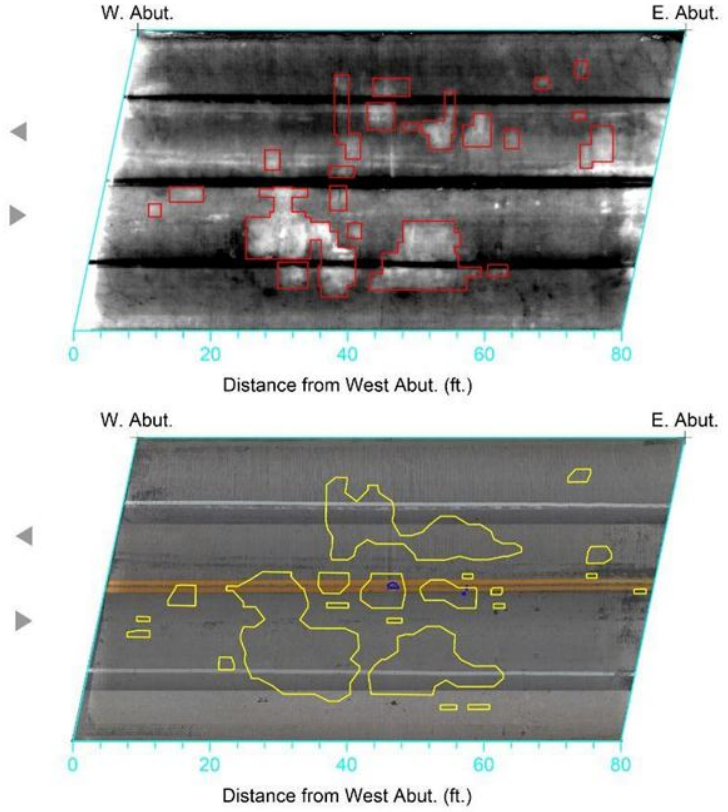




Orientation & Scale	Survey Information	Mapping Legend	Quantity Summary	ft²	%	General Information
1-in = 20-ft 0 20	Level 2 - Vehicle IR Scanned: 07/25/2025 11:43AM ▶ Direction of Traffic	Delamination detected by IR; Concrete Patching; Asphalt Patching	8000 – Wearing Surface (Bare)	2707	100	[redacted]
	Infrared Data (Temperature, F) Average 113.7 Standard Deviation 4.4	Delamination detected by RAS; Spalling; Area Not Analyzed	Delaminations (IR)	151.0	5.6	Analyzed By: SB Completed:12/22/2025
			Delaminations (RAS)	137.6	5.1	
			Spalling	9.0	0.3	
			Concrete Patching	0.0	0.0	
			Asphalt Patching	43.9	1.6	
			Area Not Analyzed	0.0	0.0	

Note: The delamination (IR) % was calculated as (Delamination Area) / (Wearing Surface Area - Area Not Analyzed). The total deck area based on imagery is 2707 ft ².

Comparison Example 3



Orientation & Scale	Survey Information	Mapping Legend	Quantity Summary	ft²	%	General Information
1-in = 20-ft 0 20	Level 2 - Vehicle IR Scanned: 06/10/2025 3:07PM ▶ Direction of Traffic Infrared Data (Temperature, F) Average 88.0 Standard Deviation 4.8	Delamination detected by IR; Concrete Patching; Asphalt Patching; Delamination detected by RAS; Spalling; Area Not Analyzed	8514 – Concrete Overlay Delaminations (IR) Delaminations (RAS) Spalling Concrete Patching Asphalt Patching Area Not Analyzed	3520 435.5 591.5 1.2 0.0 0.0 0.0	100 12.4 16.8 <0.1 0.0 0.0 0.0	[redacted] Analyzed By: SB Completed:12/22/2025

Note: The delamination (IR) % was calculated as (Delamination Area) / (Wearing Surface Area - Area Not Analyzed). The total deck area based on imagery is 3520 ft².

Overview of Assessment Methods

Rapid Automated Sounding (RAS)

- Deterioration assessments and rehabilitation planning

Safe, Economic, and Efficient Structure Assessments

Rapid Automated Sounding (RAS)

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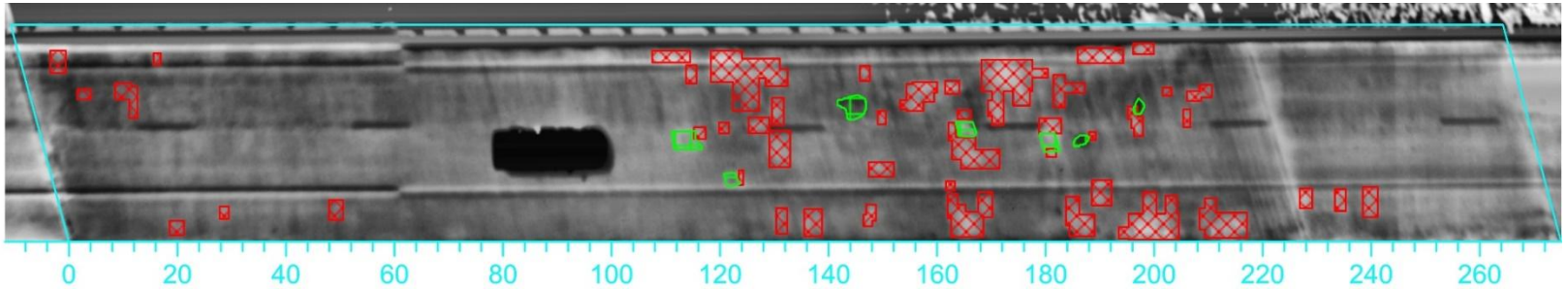
Safe, Economical, and Efficient Structure Assessments

Rapid Automated Sounding (RAS)

MAPPED RESULTS



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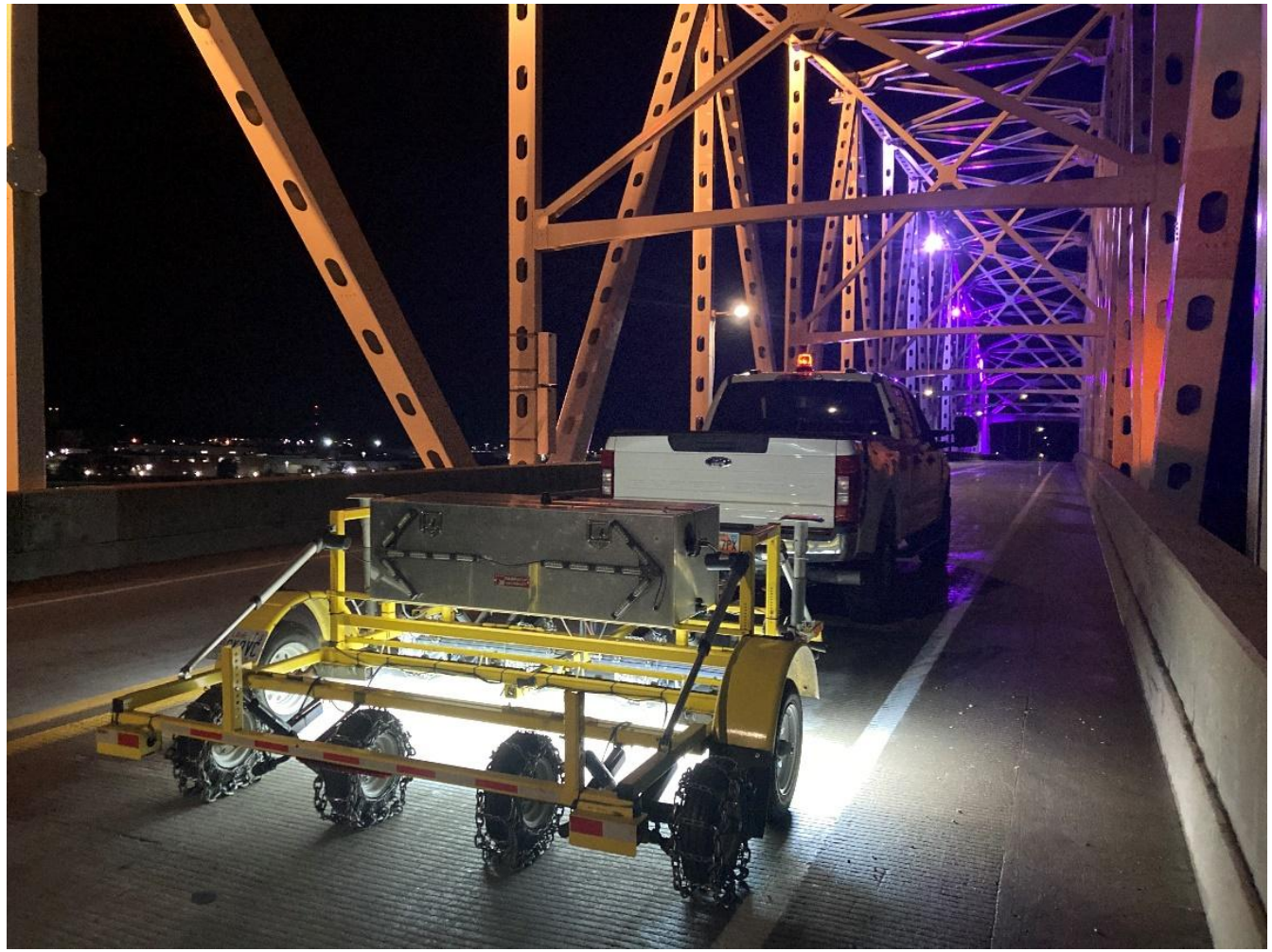
Patching		62	0.6%
Spalling		0	0%

RAPID AUTOMATED SOUNDING (RAS)

RAPID AUTOMATED SOUNDING (RAS) PRINCIPLE

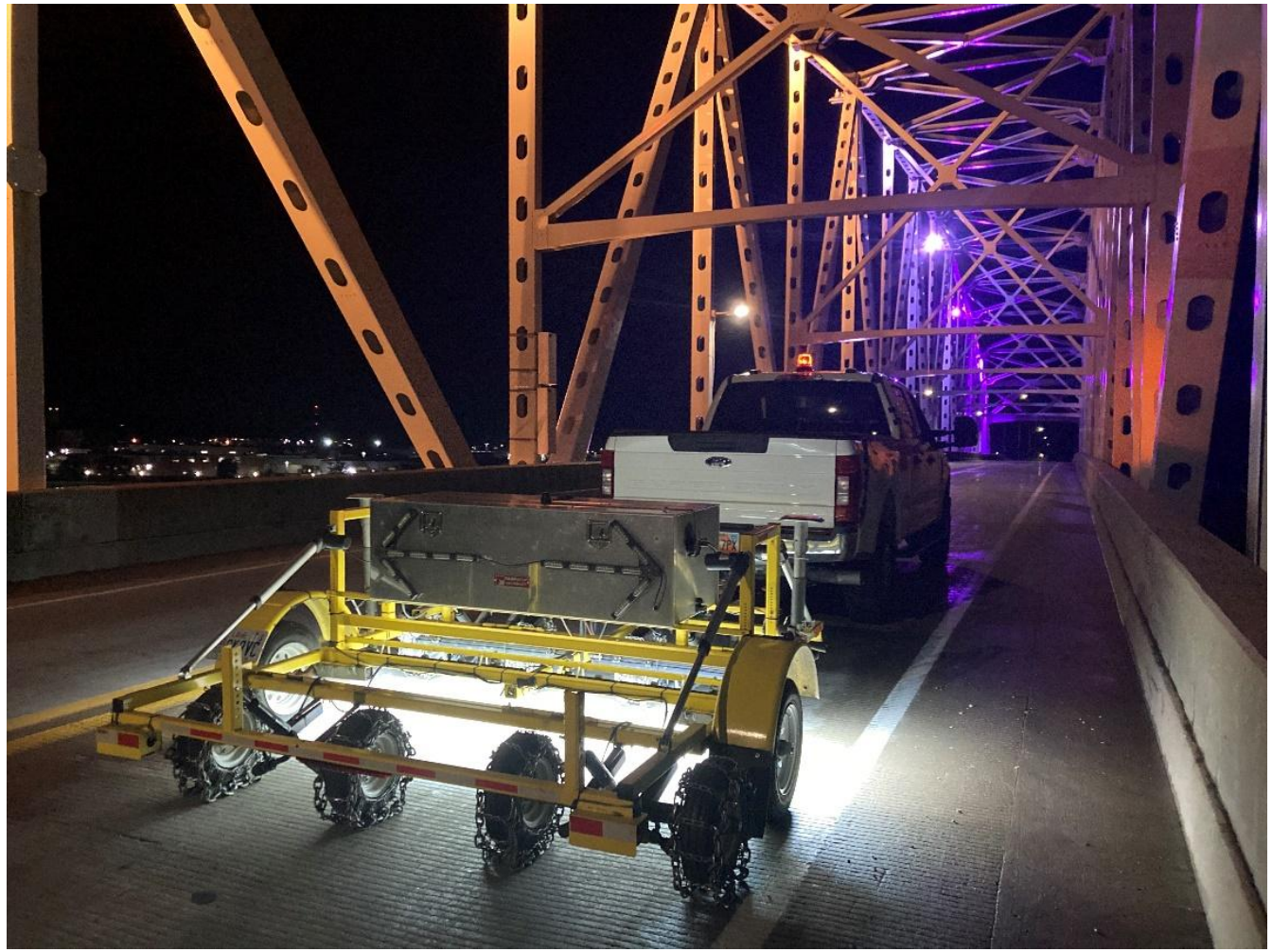
- Chain drag or hammer sounding are widely used and commonly accepted techniques for delamination location
- RAS automates these methods with chains attached to wheels moving at ~20 MPH
  - Chain impacts are consistent
  - Removes subjectivity of manual chaining
  - Increases safety with all personnel remaining in vehicles
  - Inspections completed in minutes rather than hours

RAPID AUTOMATED SOUNDING (RAS)
DATA COLLECTION



- Chain-affixed wheels impact the deck.
- Microphones record acoustic response to on-board computer.
- High-speed high-resolution cameras capture surface defects
- Data synchronized with GPS and surface imaging for precise location referencing.

RAPID AUTOMATED SOUNDING (RAS)
DATA COLLECTION



- Chain-affixed wheels impact the deck.
- Microphones record acoustic response to on-board computer.
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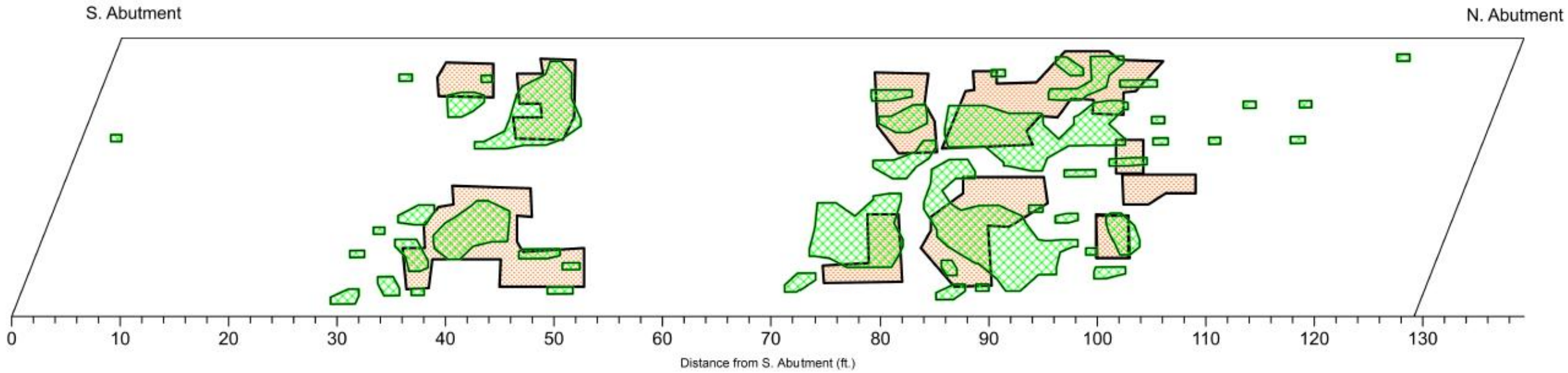
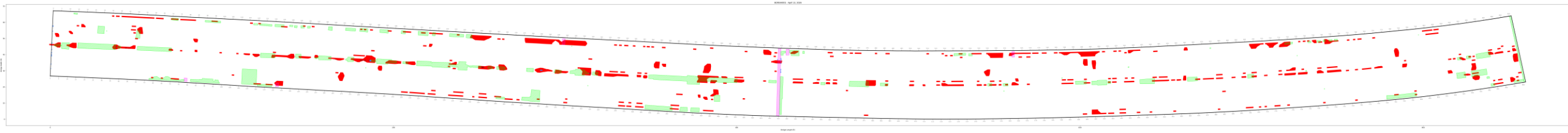
RAPID AUTOMATED SOUNDING (RAS)
COMPARISON TO CHAIN-DRAG



Conditions Legend	Orientation	Quantity Summary		General Information
Chain-Drag Delaminations		RAS Delamination Quantity (%)	11.5	Bridge ID: B290049 CTH M over IH 90-94 WB
ABI RAS Delaminations	Direction of traffic	CD Delamination Quantity (%)	11.7	

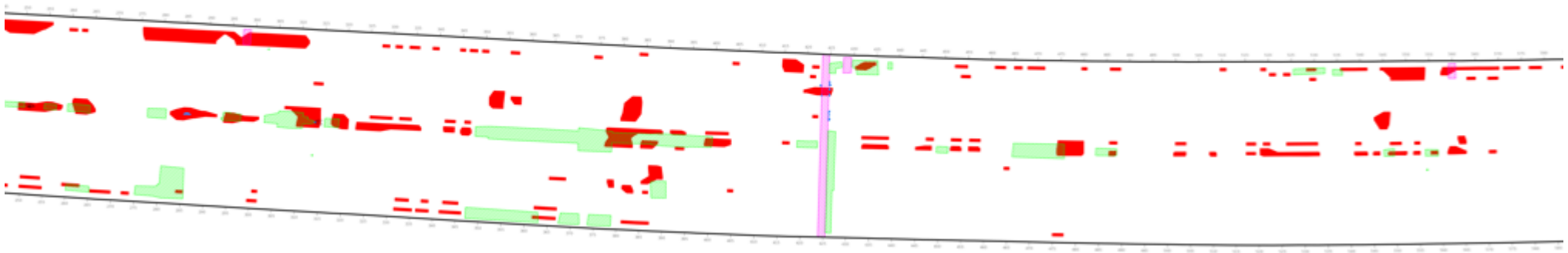
Overview of Assessment Methods

Rapid Automated Sounding (RAS) Output MDTA Bridge - 2026



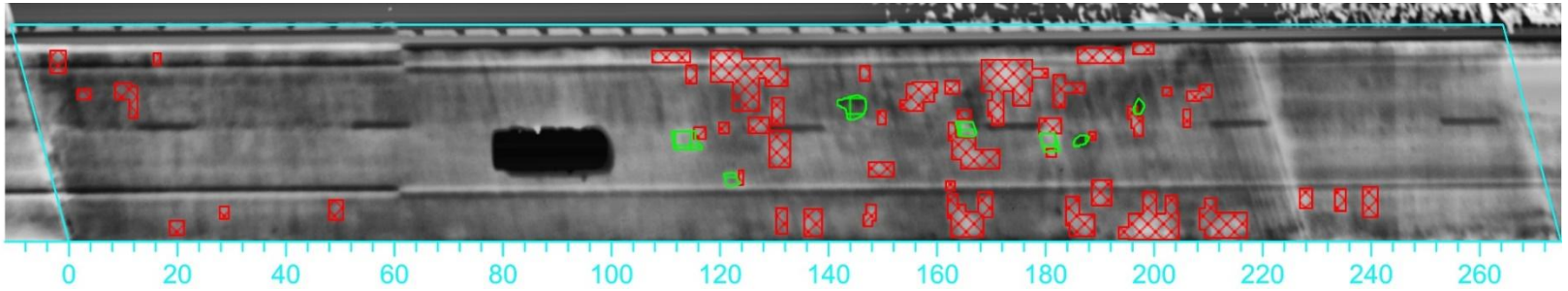
Overview of Assessment Methods

Rapid Automated Sounding (RAS) Output for MDTA Bridge - 2026



Safe, Economical, and Efficient Structure Assessments

MAPPED RESULTS



Condition	Map Legend	Quantity (sf)	Quantity (%)
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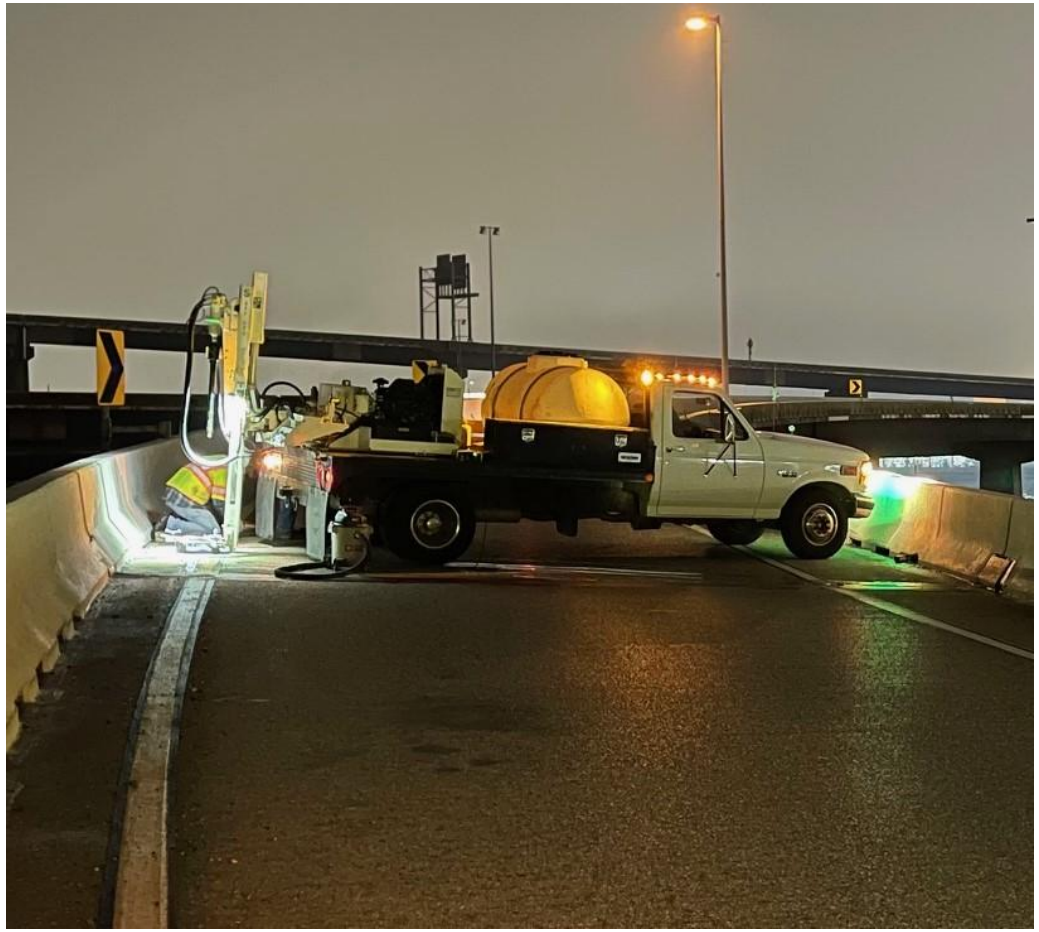
Bridge Deck Investigation Equipment

- Core Rig



Safe, Economical, and Efficient Structure Assessments

Evaluating various types of Structures :

- Approach Slab/Retaining Walls
- Embedded Rail Structures
- Dams/Spillways
- Tunnels

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Safe, Economical, and Efficient Structure Assessments

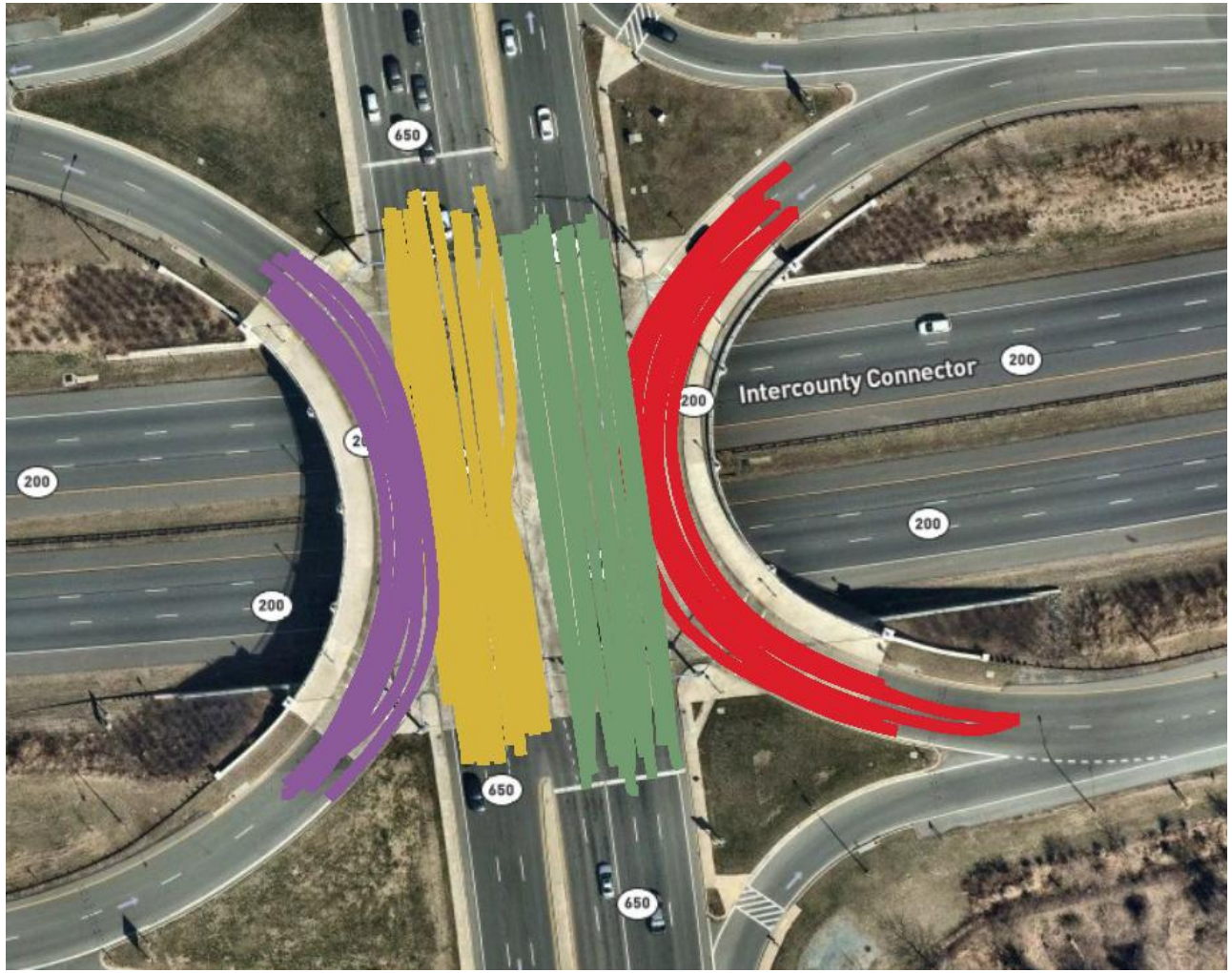
Bridges Approaches / Deck Evaluations along a Corridor or in an Interchange

Safe, Economical, and Efficient Structure Assessments

Bridges Decks/Approaches

Safe, Economical, and Efficient Structure Assessments

Irregular Bridge Geometries – still able to scan entire deck



Safe, Economical, and Efficient Structure Assessments

Evaluating various types of Structures :

- Approach Slab/Retaining Walls
- Embedded Rail Structures
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Safe, Economical, and Efficient Structure Assessments

Evaluating various types of Structures :

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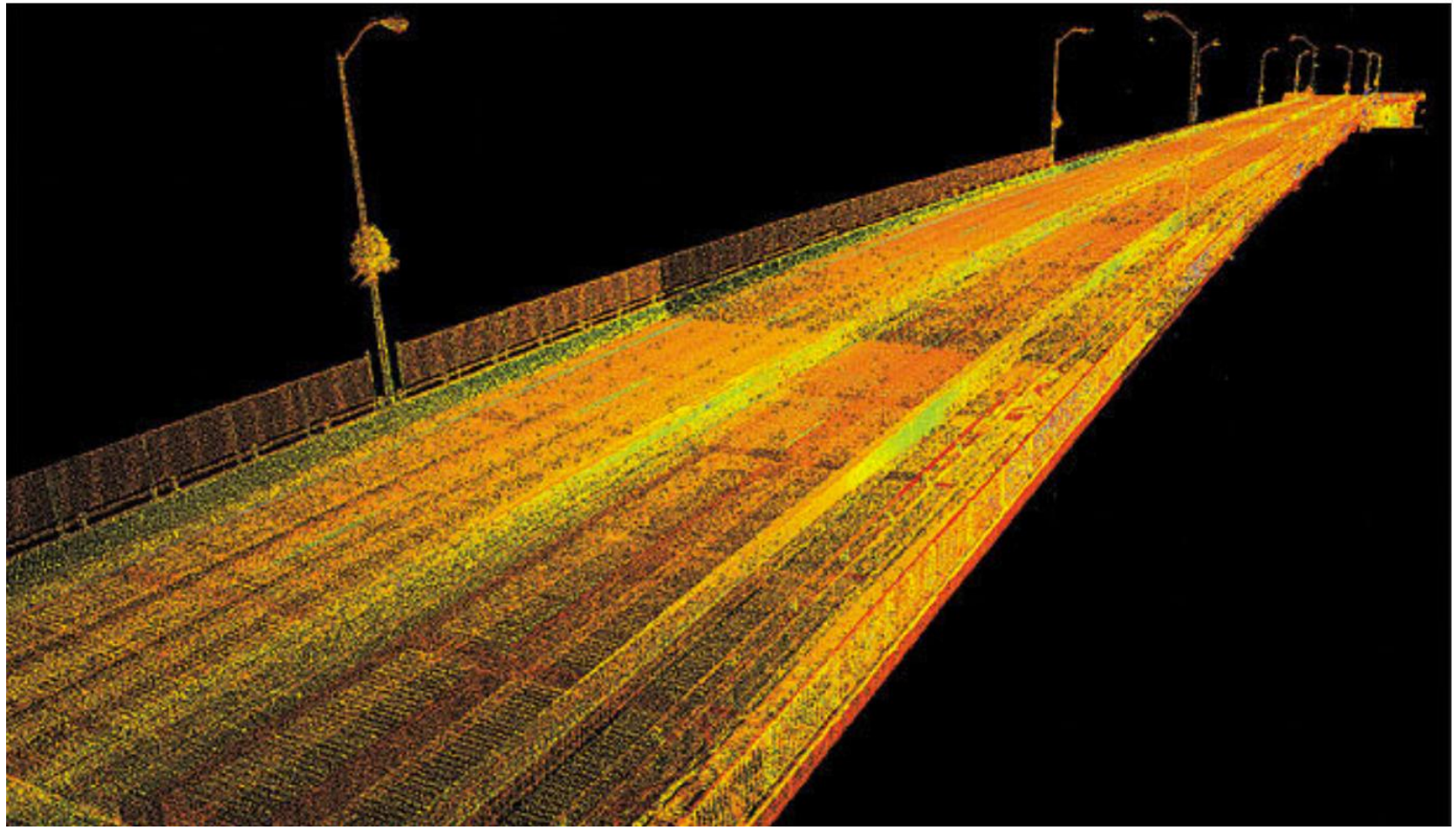
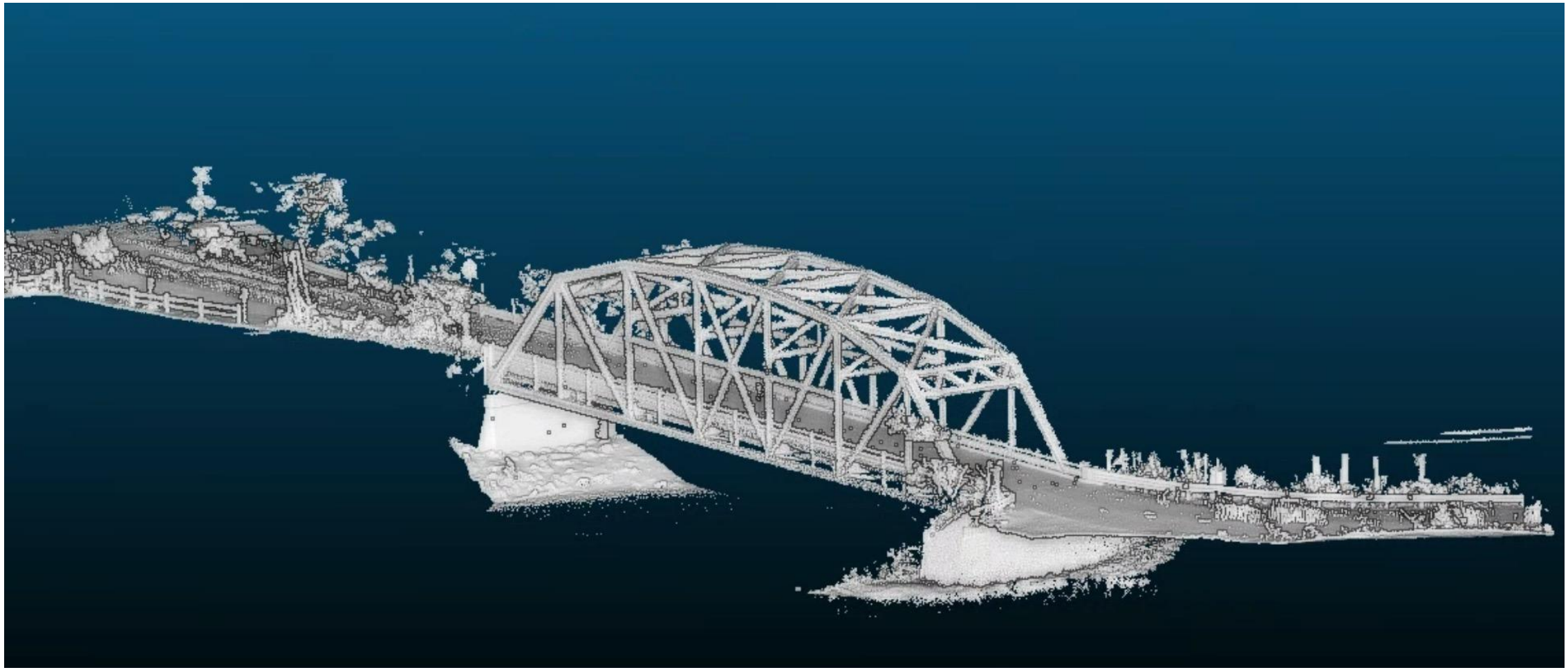
Mobile LiDAR Head (Hovermap)

Point Cloud Model of Bridge Approaches and Decks



Bridge 3D point clouds



Processed by Synergy360

Bridge Underside 3D point clouds

Processed by Synergy360

Safe, Economical, and Efficient Structure Assessments

Evaluation Types :

- Tunnels - 3D GPR is effective in most soil conditions to 8 to 10 ft

National Mall – Panel 19

Evaluating Subsidence and Undermining of Infrastructure

Evaluation Types :

- Bridge Approach Slabs –

Performed with the on-road investigation equipment

Approach Slab

Repaired with Grout – shallow voids of 1 to 4 inches

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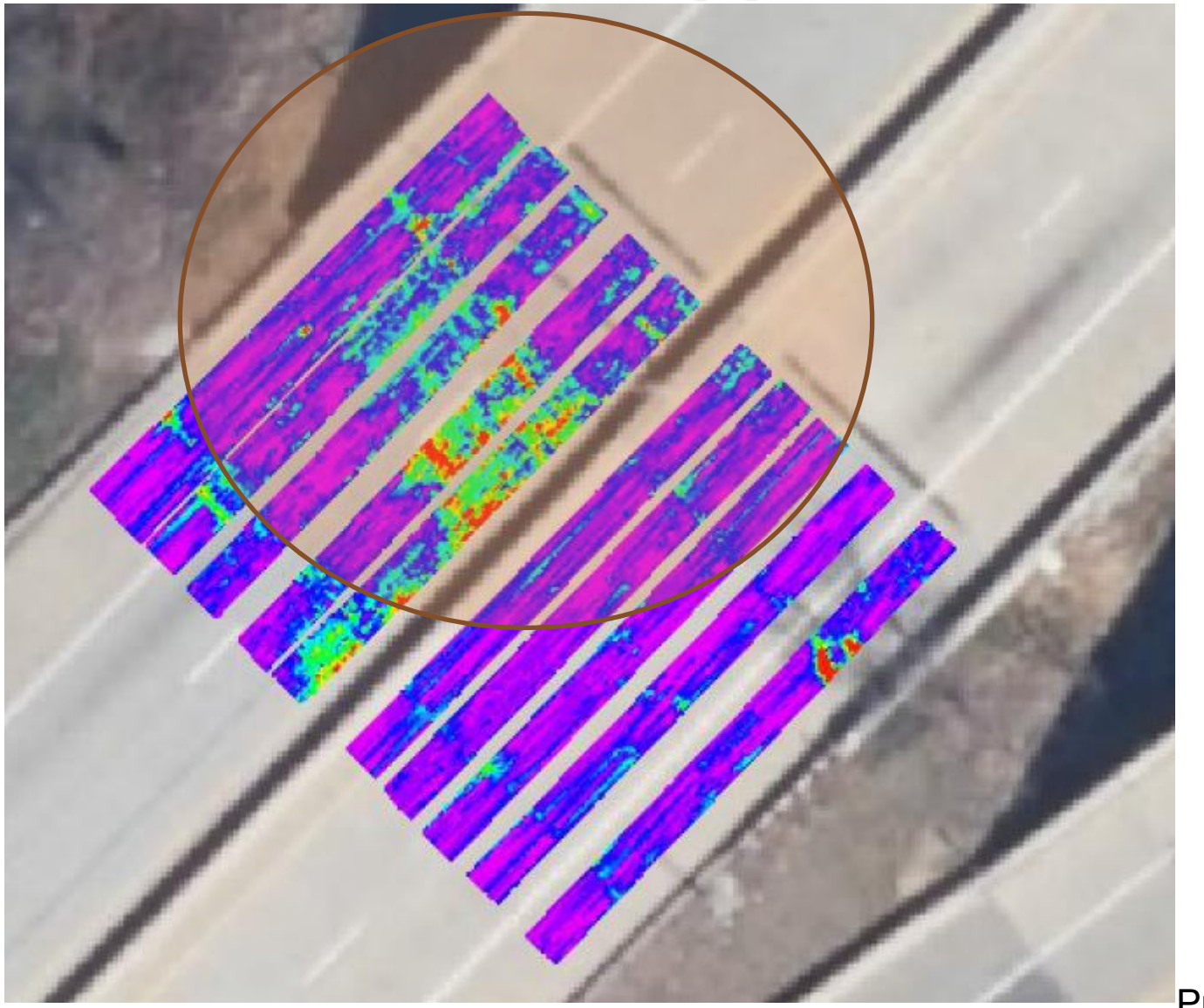
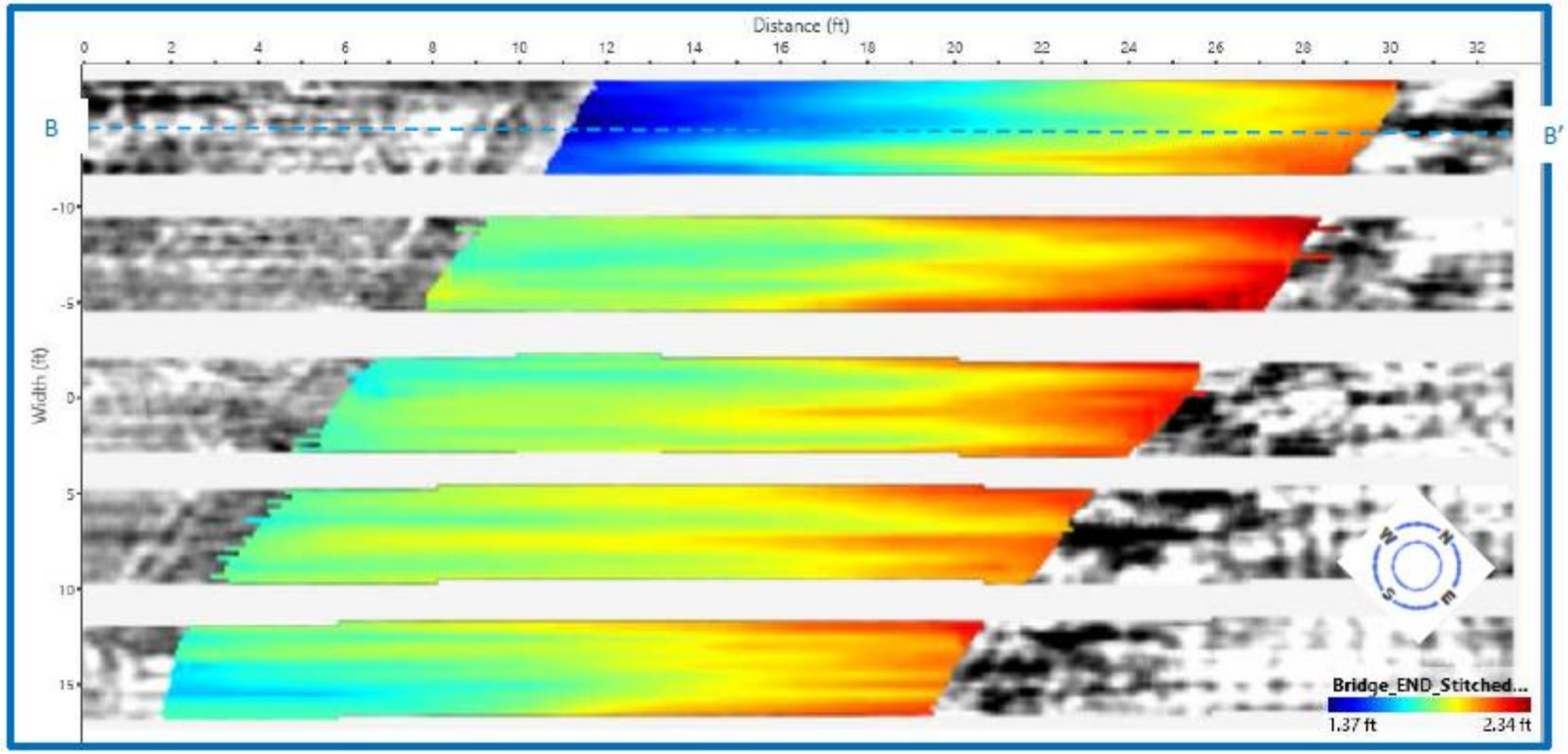
Voids Below the Approach / Exit Slabs



Exit Slab condition display (void locations shown)

Processed by Starodub, Inc.

Approach / Exit Slabs



Uneven thickness of Approach Slab

Processed by Nexco-West

Safe, Economical, and Efficient Structure Assessments

Tunnel/Utility Investigation

Howard Street Light Rail

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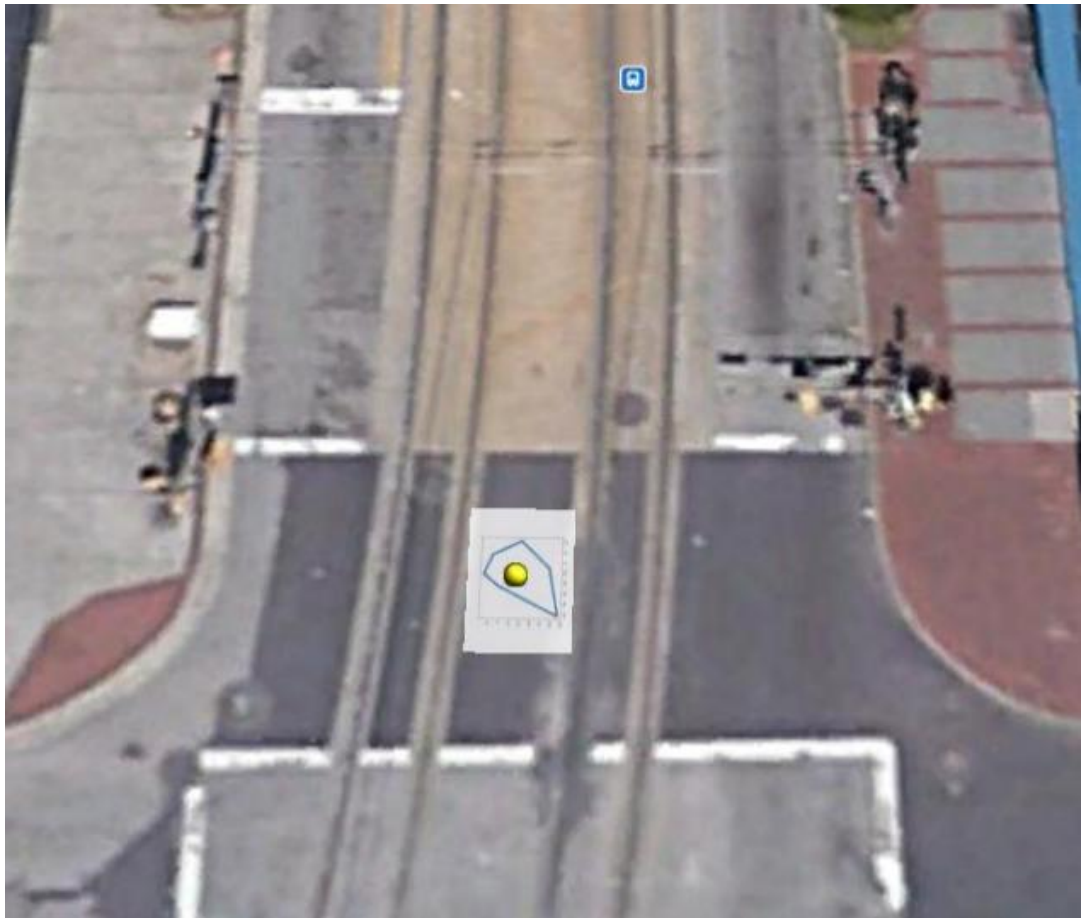
Safe, Economical, and Efficient Structure Assessments

Tunnel/Utility Investigation



Howard Street Light Rail

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Safe, Economical, and Efficient Structure Assessments

Howard Street Light Rail

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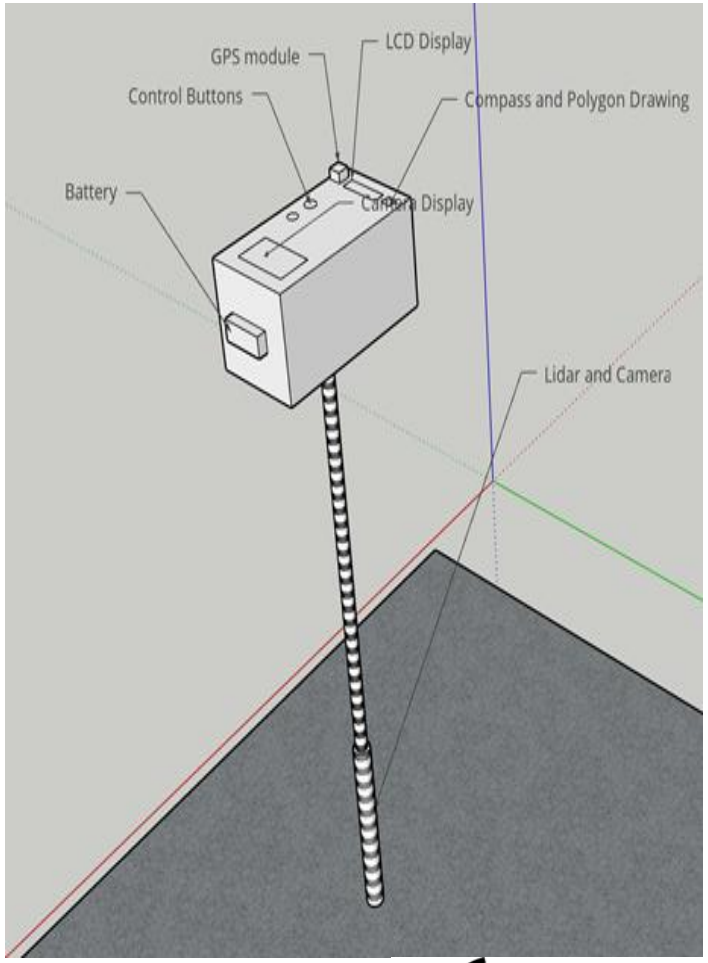
Void LiDAR Measuring Tool



LiDAR Head -- 3 ft depth to head (3 inch core hole required for entry)

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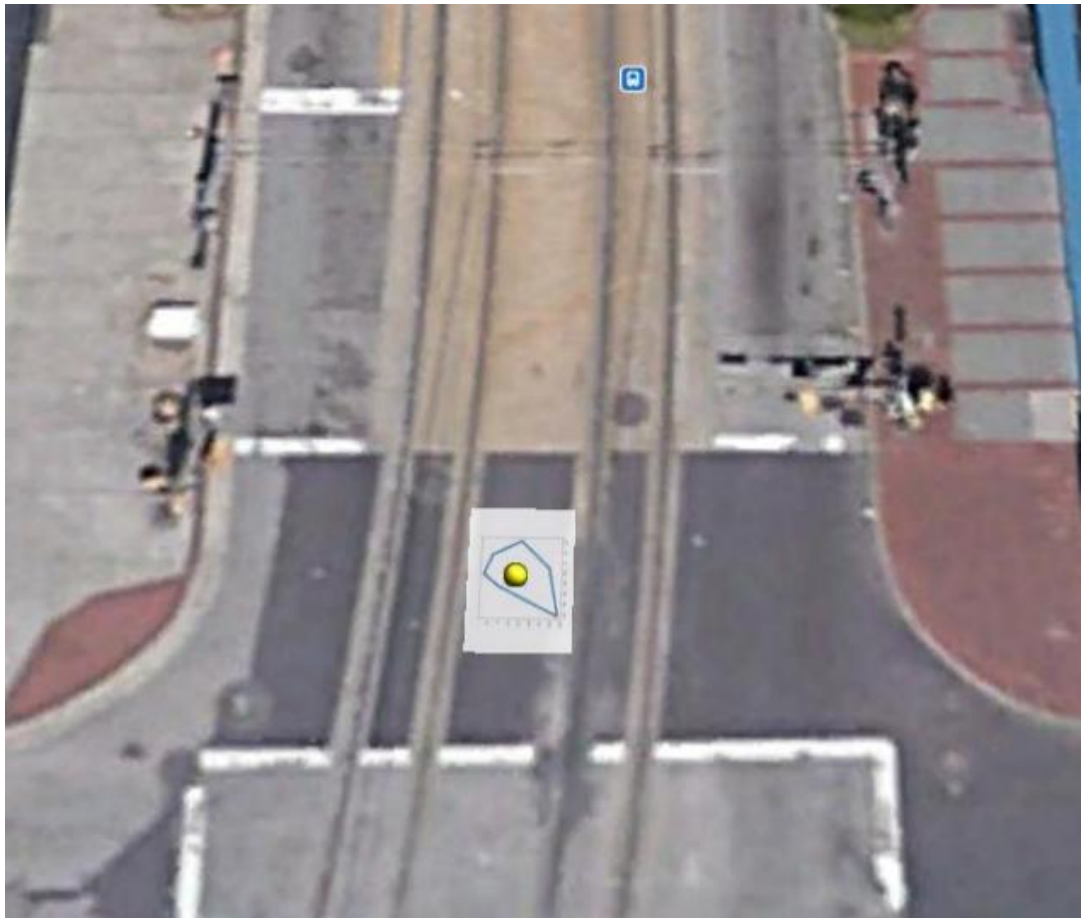
Safe, Economical, and Efficient Structure Assessments

Tunnel/Utility Investigation



Howard Street Light Rail

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Safe, Economical, and Efficient Structure Assessments

Light Rail Investigation

Under Howard Street Light Rail – Down Hole Camera and LiDAR

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Safe, Economical, and Efficient Structure Assessments

Evaluation Types :

- Drainage Structures/**Retaining Walls –**

Typically these investigations are under roadways, so this is typically done with the on-road GPR system

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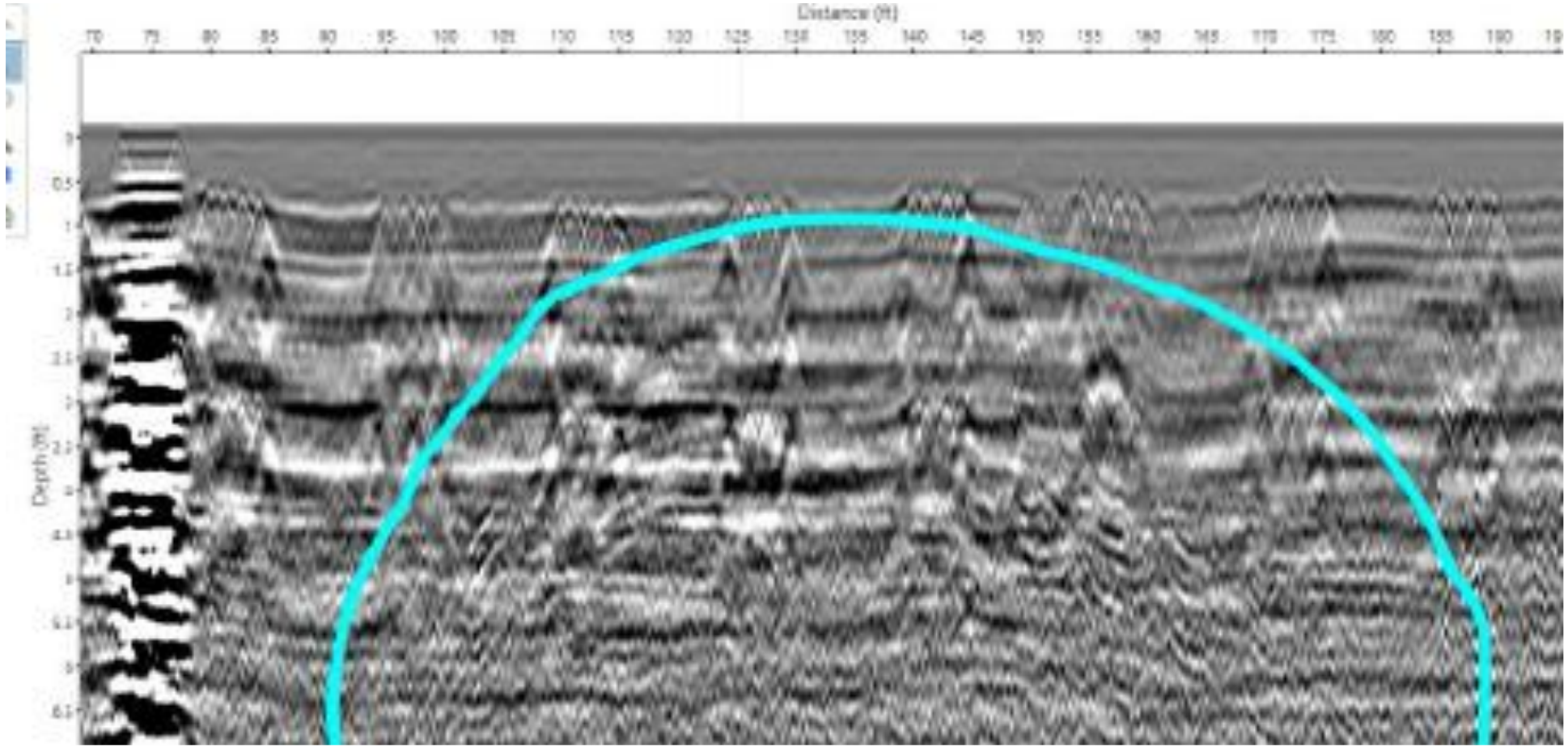
Safe, Economical, and Efficient Structure Assessments

Retaining Structure Investigation - Virginia



Indicate soil raveling below the concrete

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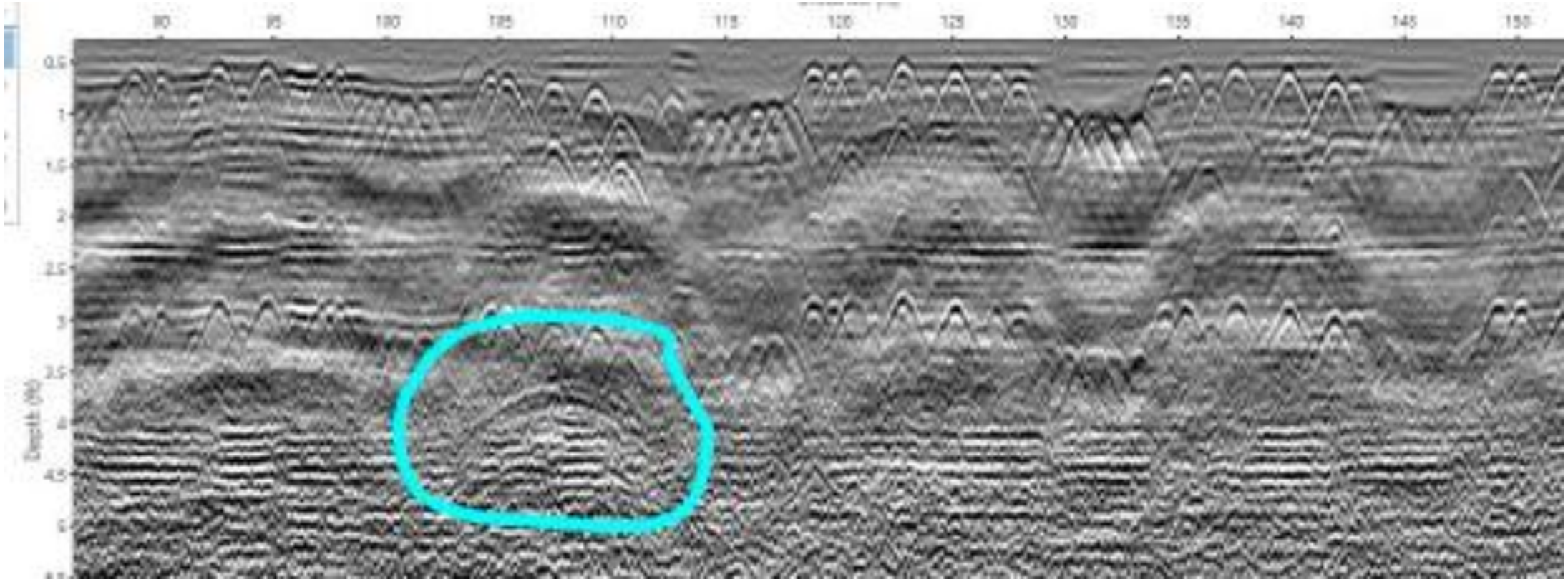
Retaining Structure Investigation



Discrete feature like debris in the fill, void, boulder, etc.

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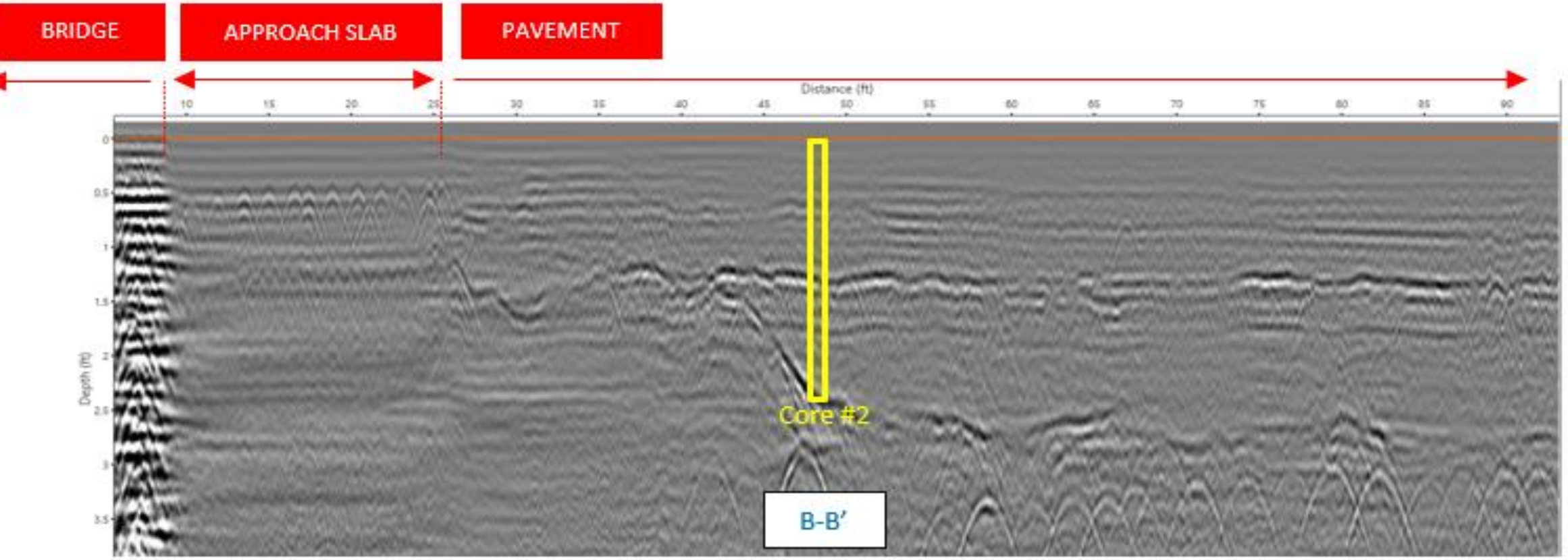
Safe, Economical, and Efficient Structure Assessments

Retaining Structure Investigation - Maryland



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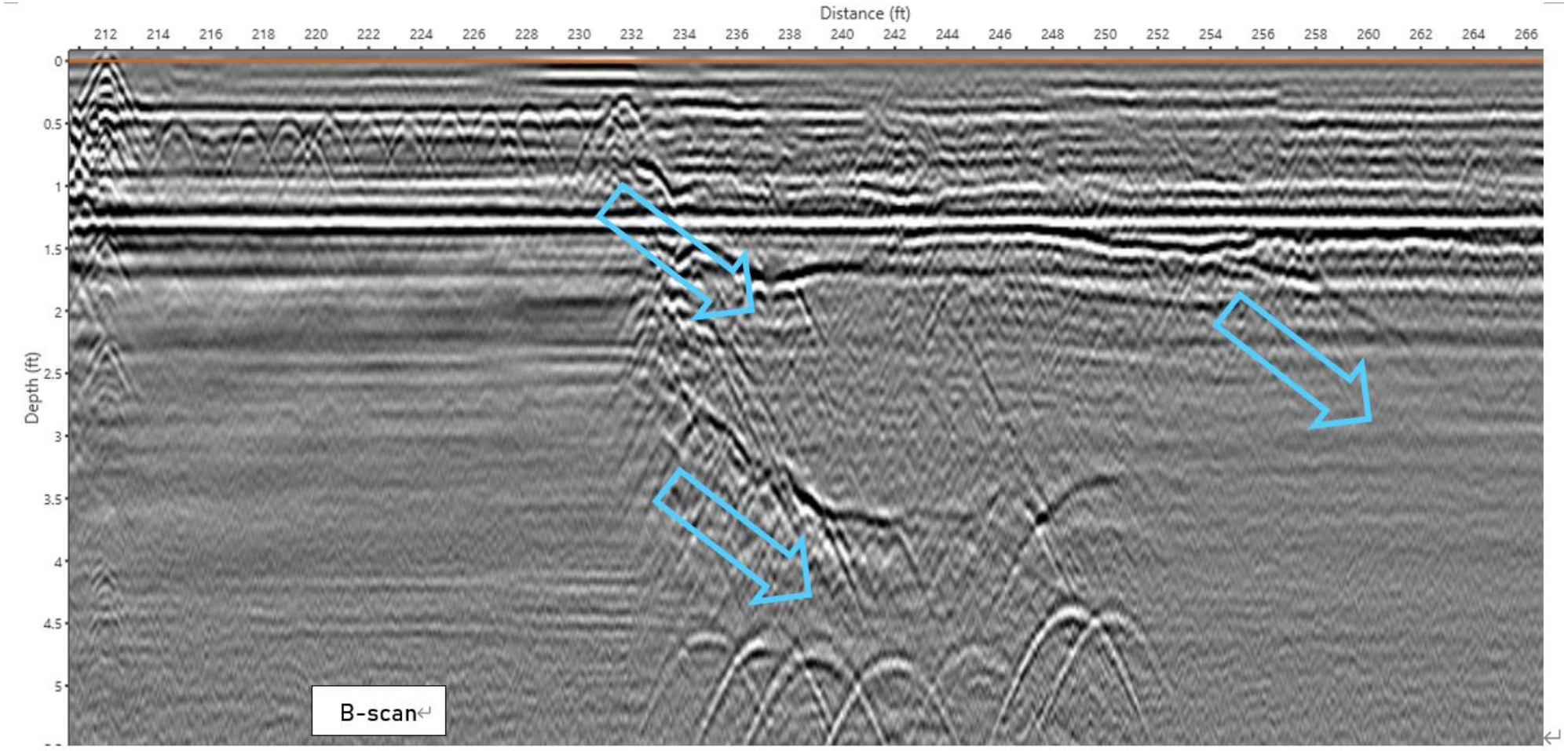
Safe, Economical, and Efficient Structure Assessments

Retaining Structure Investigation - Maryland



Void Under Approach Exit Slab

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Safe, Economical, and Efficient Structure Assessments

Retaining Structure Investigation - Maryland

Evaluating Bridge Approaches

Retaining Structure Investigation - Maryland

Safe, Economical, and Efficient Structure Assessments

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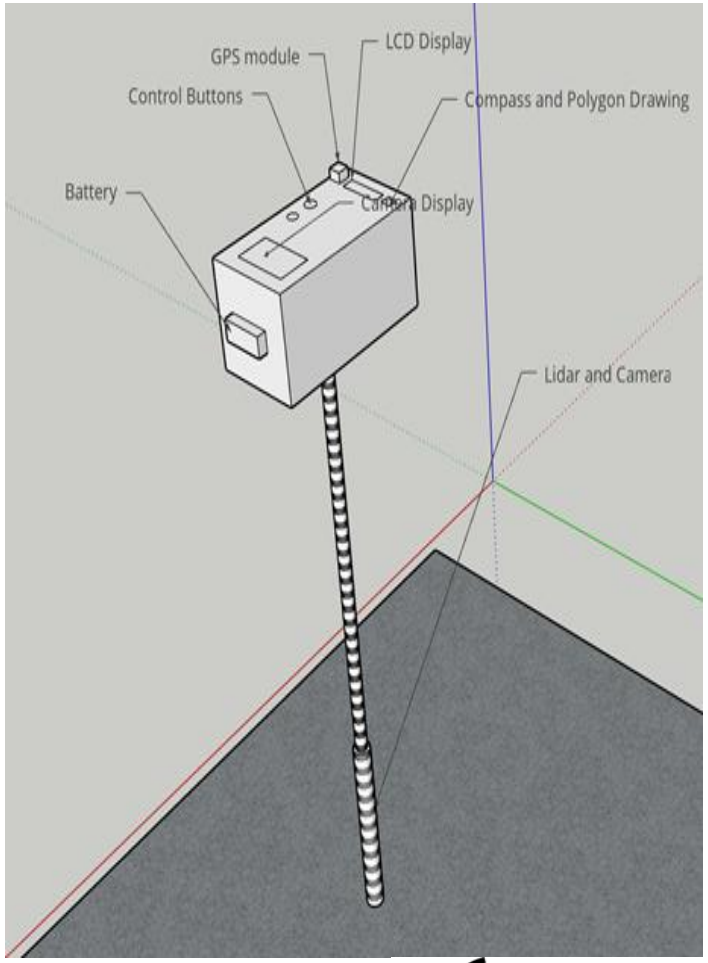
Retaining Structure Investigation - Maryland

Safe, Economical, and Efficient Structure Assessments

Retaining Structure Investigation - Maryland

Void LiDAR Measuring Tool



LiDAR Head -- 3 ft depth to head (3 inch core hole required for entry)

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Retaining Structure Investigation - Maryland

MSE wall reinforcing strap crossing within the void

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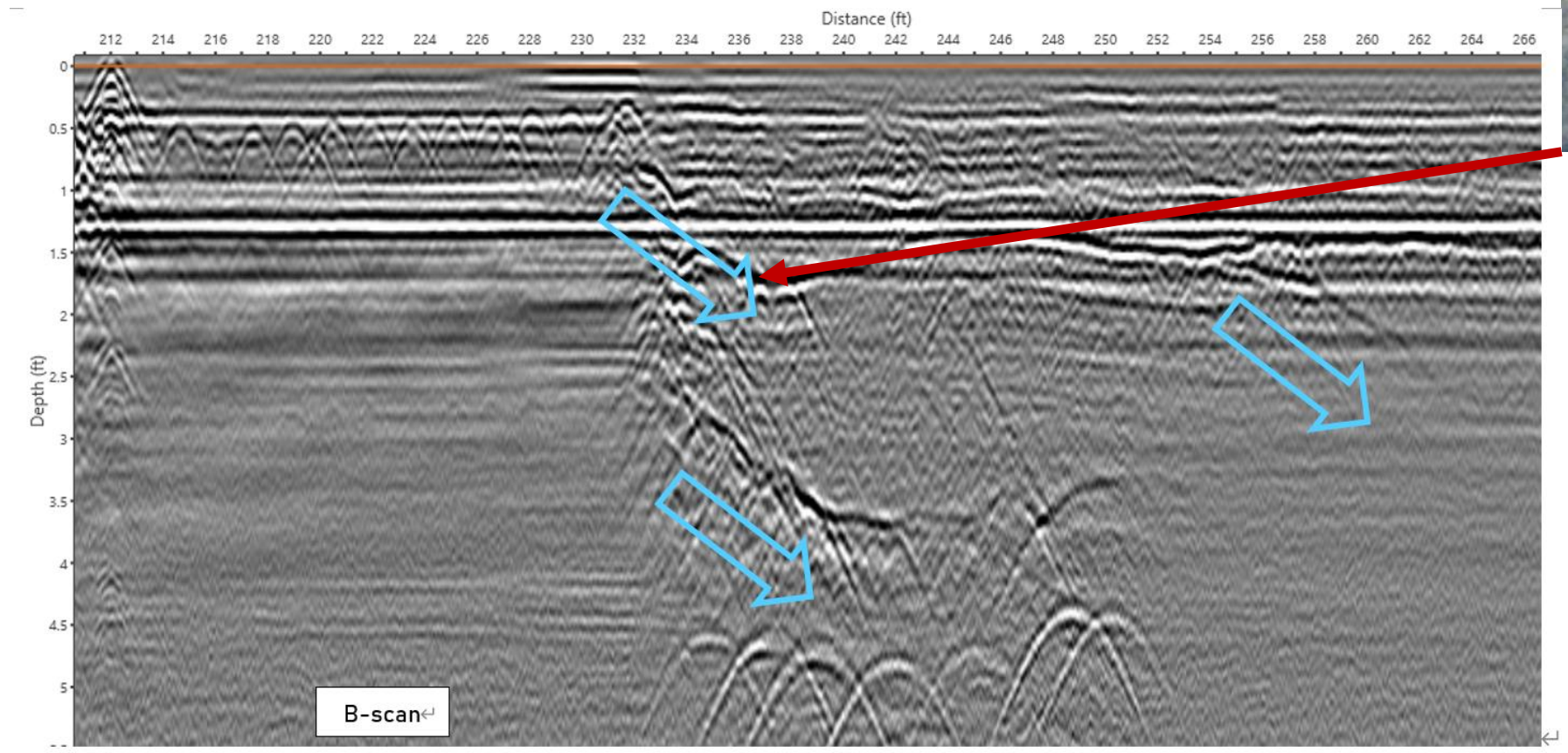
Retaining Structure Investigation - Maryland

Safe, Economical, and Efficient Structure Assessments

Retaining Structure Investigation - Maryland



Underside of approach slab with void below

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Safe, Economical, and Efficient Structure Assessments

Evaluation Types :

- Dam/Spillways –

Typically these investigations are off road applications.

Safe, Economical, and Efficient Structure Assessments

Dam Investigation

Off Road 3D GPR Access

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Trap Pond Spillway

Experience and References (Public)

Illinois Department
of Transportation

A/E Firm Partners

GPI

QUESTIONS?

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E-mail: mark.Wolcott@iseeusa.net

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