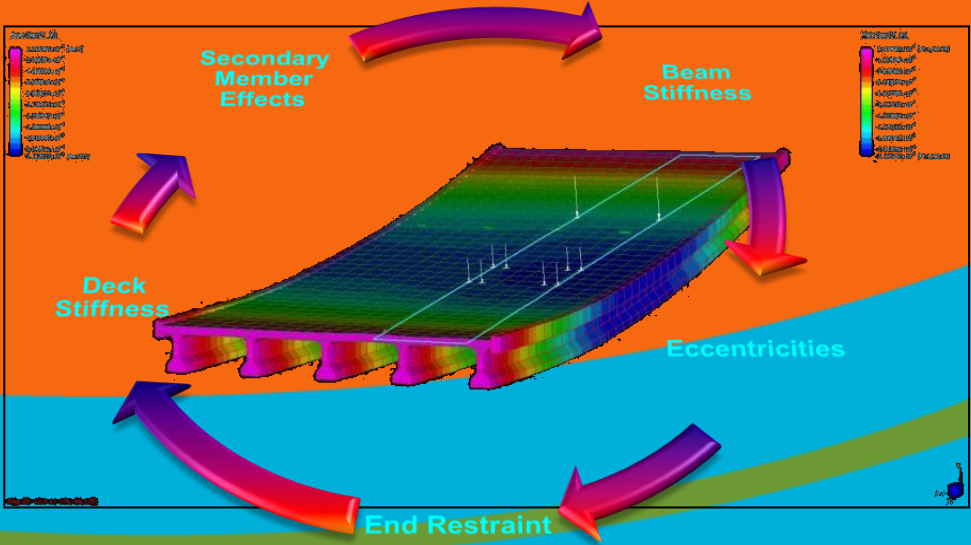
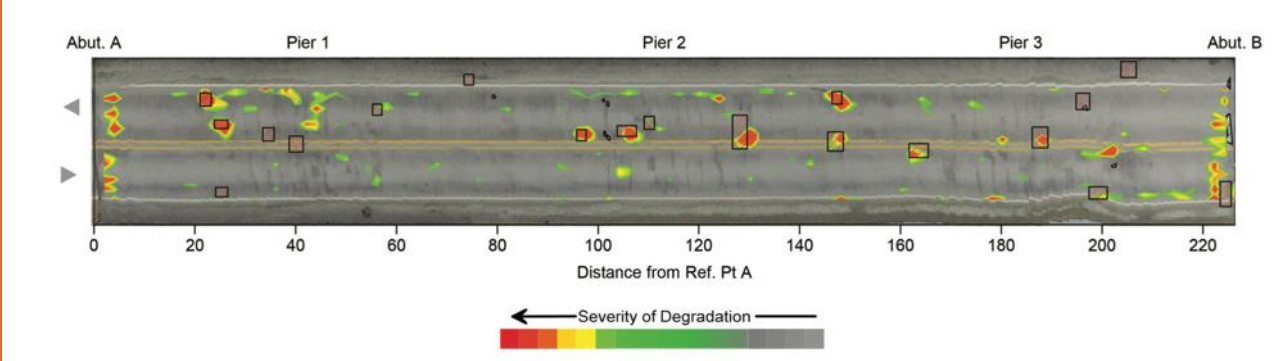


Louisiana NDE Program



History of NDE in Louisiana

- Unknown pile length study (3,000+ Foundations)
- Bridge Deck Evaluation
- Pin Testing
- Void Investigation Drainage Issues
- Refined analysis
- Monitoring
- Load Testing

Louisiana Bridge Facts

- Number of Bridges: 12,698 (22nd in the US)
- Deck Sqft: 182,087,460.7 (4th in the US)



Louisiana Major Bridges

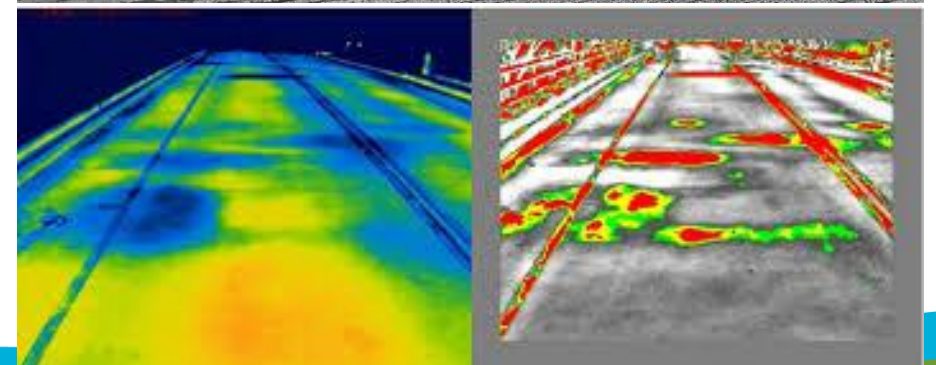
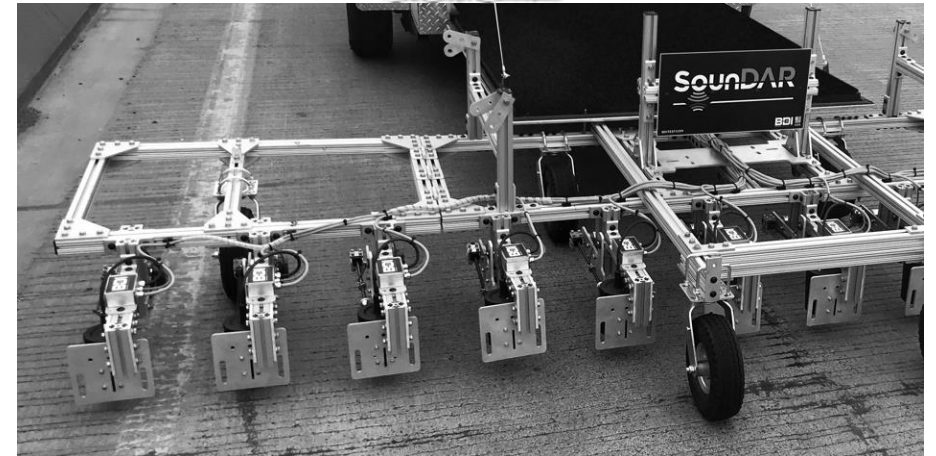
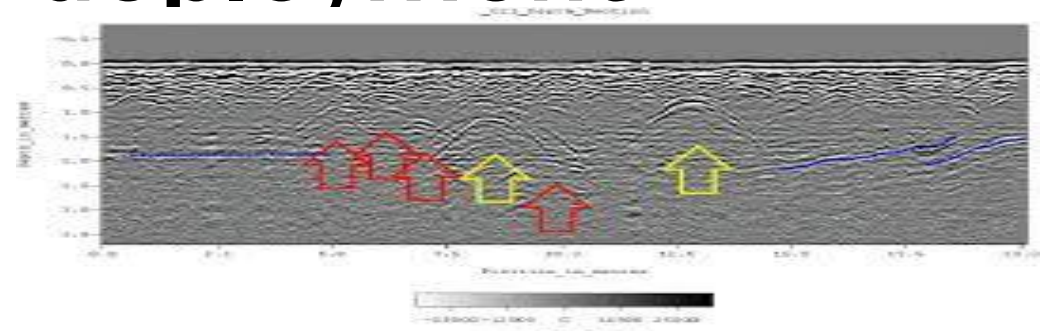
1 - State Name	8 - Structure Number	49 - Structure Length (ft.)	27 - Year Built	29 - Average Daily Traffic	22 - Owner Agency	3 - County Name	City (InfoBridge Place Co
~ [] x	~ [] x	== [] x	== [] x	== [] x	~ [] x	~ [] x	~ []
22 - Louisiana	625230123900732	127,269.0	1965	18,830	Local Toll Authority	103 - St. Tammar	50115 - Metairie CDP
22 - Louisiana	625230123900731	127,200.1	1956	18,830	Local Toll Authority	103 - St. Tammar	48225 - Mandeville city
22 - Louisiana	624804520100002	76,713.9	1975	24,000	State Highway Age	095 - St. John the	0 - No Place Code
22 - Louisiana	624804520100001	75,831.0	1975	24,000	State Highway Age	095 - St. John the	42030 - Laplace CDP
22 - Louisiana	024504501400002	50,814.0	1972	32,050	State Highway Age	089 - St. Charles	0 - No Place Code
22 - Louisiana	024504501400001	50,772.0	1972	48,723	State Highway Age	089 - St. Charles	42030 - Laplace CDP
22 - Louisiana	625304529000582	42,125.0	1979	17,665	State Highway Age	105 - Tangipahoa	0 - No Place Code
22 - Louisiana	625304529000581	42,125.0	1979	39,850	State Highway Age	105 - Tangipahoa	0 - No Place Code
22 - Louisiana	612404500700652	41,996.1	1972	1,585	State Highway Age	047 - Iberville Par	0 - No Place Code
22 - Louisiana	612404500700651	41,996.1	1972	21,450	State Highway Age	047 - Iberville Par	0 - No Place Code
1 - Alabama	011931	39,728.0	1978	32,384	State Highway Age	097 - Mobile Cou	50000 - Mobile city
1 - Alabama	011930	39,723.1	1978	32,387	State Highway Age	097 - Mobile Cou	50000 - Mobile city
6 - California	35 0054	36,068.9	1967	120,000	State Highway Age	081 - San Mateo	25338 - Foster City city
12 - Florida	900101	35,867.8	1982	11,300	State Highway Age	087 - Monroe Cou	0 - No Place Code

NDE Deck Scanning

- I-20 Vicksburg
- Atchafalya Basin
- Grand Ecore
- I-10 over City Park Lake
- Bonnet Carre Spillway
- I-55 Manchac Swamp
- I-10 Twin Spans
- US-11 Irish Bayou
- Scanned 7 of the 9 longest bridges in the state
 - Causeway is self inspected
- Represents over 80 miles of deck evaluation

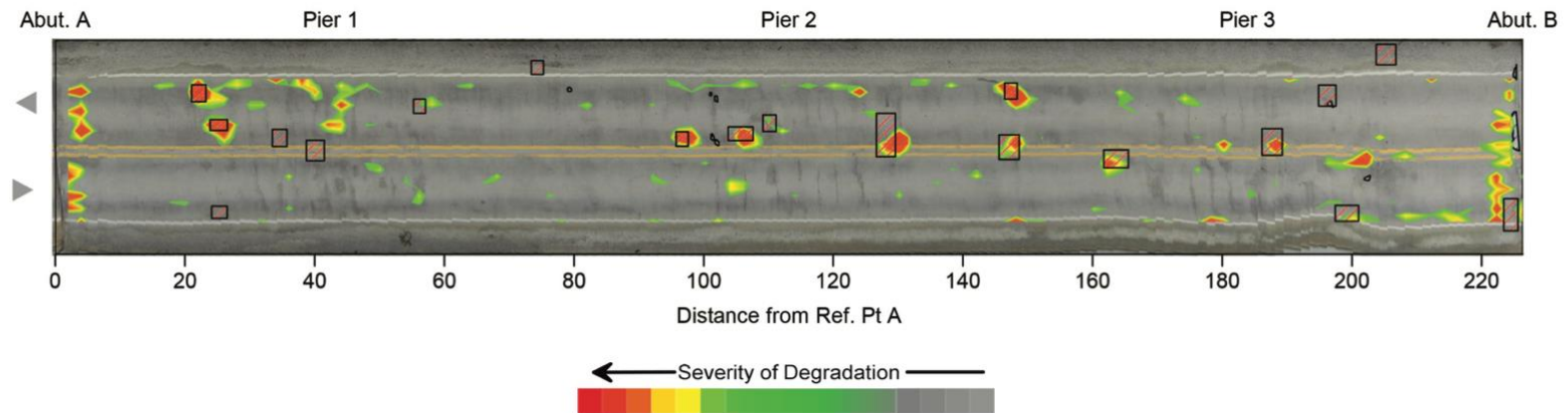
multi-technology deployment

- GPR for precursors to deck degradation (3D Radar)
- SounDAR to identify existing delaminations
- Vehicle based (or UAS/Drone) for deck IR/HRI



SounDAR Use

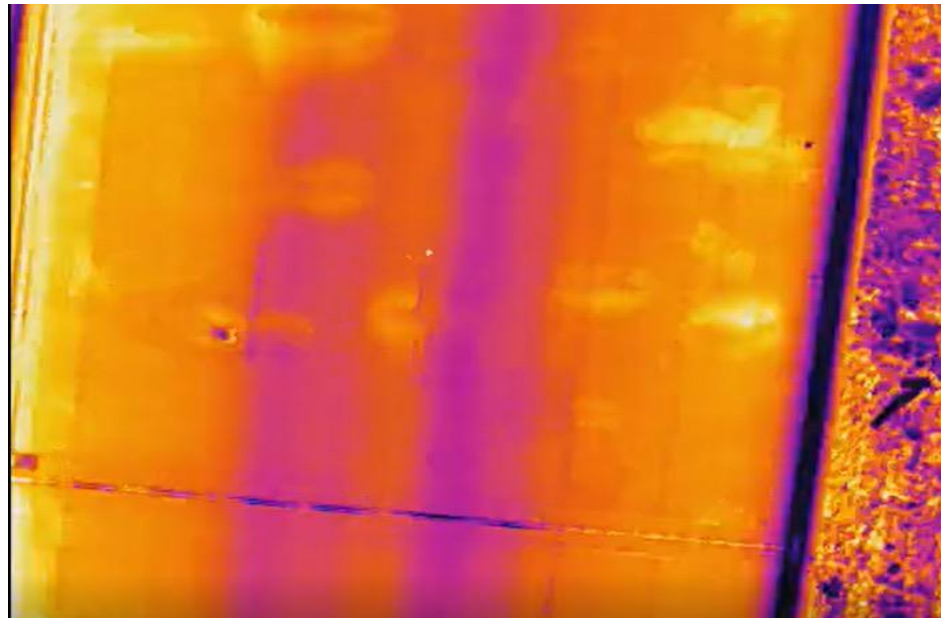
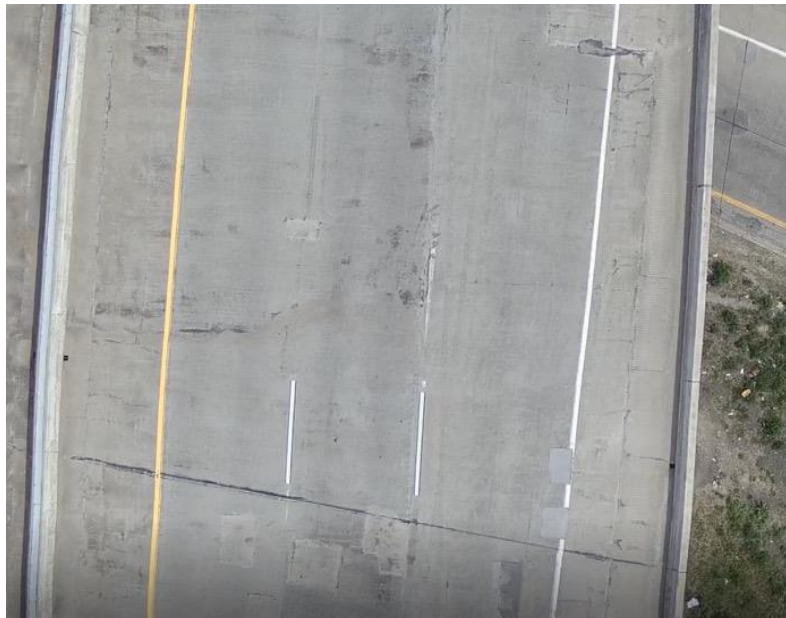
- Thousands of impacts are analyzed through automated algorithm to identify flaw
- Data mapped to identify areas of intact and poor concrete.
- Results mirror those identified with traditional sounding and are geospatial.
- Paired with High Resolution Video for improved mapping and NBE classification (CS1 – CS4).



Sample SounDAR Compared to Manual Chain Drag (Chain Drag in Black Boxes)

Drone Scanning

- High Resolution Imagery (HRI), Lidar, Infrared (IR) via drone

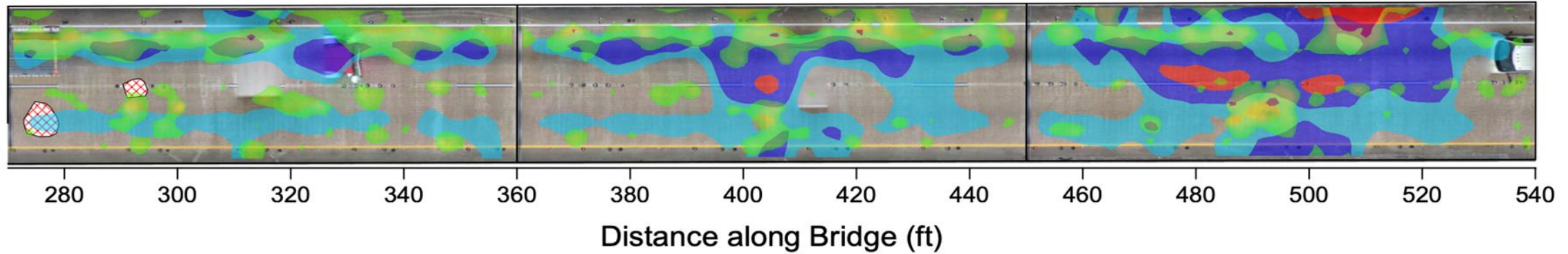


Combined Data

Bent 4

Bent 5

Bent 6



Concrete Condition Legend	Orientation	Condition Summary				
<p>3D Radar (GPR)</p> <p>SounDAR</p> <p>← Severity of Degradation →</p> <p>Patching Spalling Delamination (IR) </p>		Concrete Condition	GPR (sf)	SounDAR (sf)	Concrete Feature	HRI-IR (sf)
		Good	6,786.4	4,234.7	Patching	0.0
		Fair	2,810.1	646.5	Spalling	0.0
		Poor	248.9	279.5	Delaminations	153.5

Various NDE Implementation

➤ Acoustic

- Concrete:
 - Impact/Pulse Echo
 - Ultrasonic Tomography (MIRA)
 - Deck Acoustic Response (SounDAR)
- Steel:
 - Ultrasonic Testing (UT)

➤ Electromagnetic

- Ground Penetrating Radar (GPR)
- Infrared Thermography

➤ Electrochemical

- Half Cell Potential

➤ Unknown Foundations

- Parallel Seismic,
- Ultraseismic and Sonic Echo/Impulse Response

➤ Physical Methods

- Coring
- Petrography
- Chloride Sampling and Testing
- Rebound Hammer

QUESTIONS

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