

A comparative study of bridge deck condition assessment by high frequency GPR antennas

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# Authors:

# **Rutgers University**

- Dr. Nenad Gucunski Chair Civil & Environmental Engineer
- Mr. Carl Rascoe Research Engineer

## GSSI

- Mr. Robert Parrillo Sales Engineer
- Dr. Roger Roberts Research Engineer

## **Rutgers University**

Dr. Nenad Gucunski – Chair Civil & Environmental Engineering Dept. Mr. Carl Rascoe – Research Engineer





# Mr. Robert Parrillo Sales Engineer

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# DELAMINATED DECK AND CHAIN DRAG





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## DECK DELAMINATION





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## Air Launched: Fast Overview





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# Ground Coupled: Detailed Imaging





## Bridges of Warren County





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## **Municipal Drive Bridge**



#### Infrastructure Condition Monitoring Program

# **Church Street Bridge**





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## **Church Street Bridge**



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# DATA PROCESSING

- RADAN and Bridge Assessment Module
- Combine 2-D GPR files into a single 3-D file
- Create a deterioration map
  - 1. time-zero correction, migration, and rebar reflection mapping
  - 2. interactive interpretation
  - 3. contour map of the deterioration data



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# Raw data for 1.5 GHz antenna (a) and 2.6 GHz antenna (b) at 24 scans/foot



(a)

## Processed data and rebar picking

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# Processed data and rebar picking for 2.0 GHz air launched antenna at 24scans/foot

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### **Church Street Bridge**







x(ft)







# Summary and Conclusions:

- Evaluate 2.6 GHz ground coupled antenna on bare concrete decks
- comparison with existing high frequency 1.5 GHz ground coupled and 2.0 GHz air coupled antennas
- 2.6 GHz provides significantly more detail compared to the 1.5 GHz
- strong scatter from the aggregate in the concrete above the rebar level becomes clearly visible.

# Summary and Conclusions (cont'd):

- The immediate benefit is higher confidence in the results
- IE points to similarities
- IE points to differences
- Disadvantages of lower resolution of images from the air coupled antenna are compensated by the capability to conduct surveys of bridge decks at highway speeds

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