



**NORTH CAROLINA**  
Department of Transportation

# NCDOT Research Program

Trey Carroll, PE

Assistant State Structures Engineer

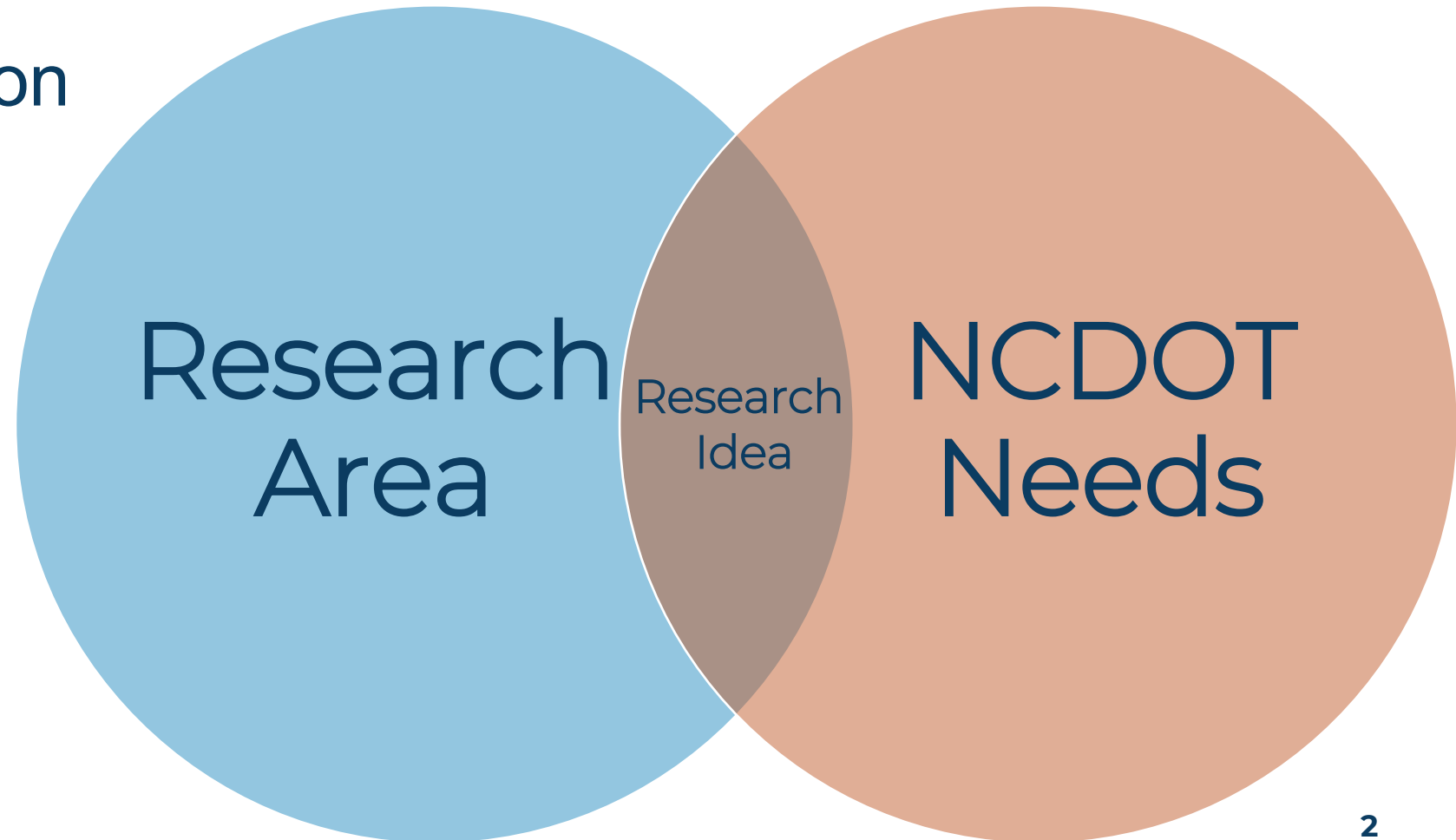
NCDOT Structures Management Unit

April 20, 2026

Connecting people, products and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina

# Successful Research Ideas:

1. Early Coordination
2. Collaboration
3. Communication
4. Implementation



# Successful Research Ideas:

## 1. Early Coordination

- a. Establish a Productive Partnership
- b. Strategic Priorities
- c. Insight into Departmental Processes



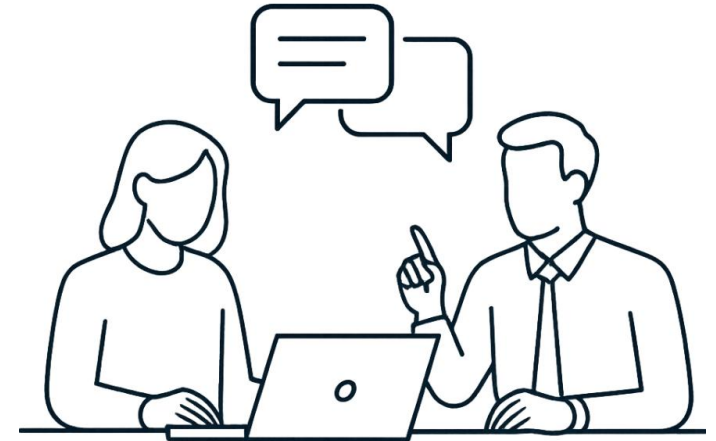
## 2. Collaboration

- a. Generate Ideas
- b. Idea Urgency/Need
- c. Project Champion



# Successful Research Ideas:

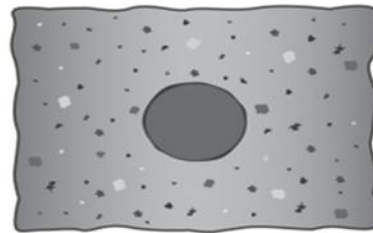
3. Communication
  - a. Idea Refinement
  - b. Project Feasibility/Schedule
  
4. Implementation
  - a. Focused
  - b. Tangible



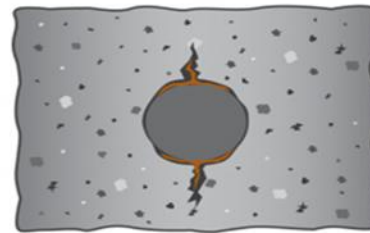
# Case Study

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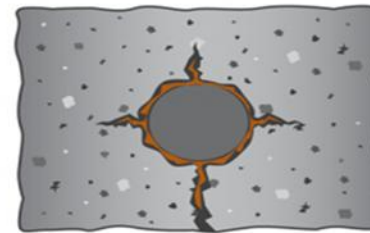
# Corrosion in Concrete Bridges:



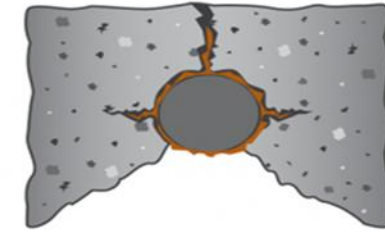
**BEFORE CORROSION.**



**BUILD-UP OF CORROSION PRODUCTS.**



**FURTHER CORROSION. SURFACE CRACKS. STAINS.**



**EVENTUAL SPALLING. CORRODED BAR. EXPOSED.**



# FRP Advantages

- High longitudinal Strength to Weight Ratio
- Non-Corrosive
- Lightweight -  $\frac{1}{4}$  the weight of steel
- Good fatigue endurance
- Larger Crack width
- Electrically & thermally non-conductive

# FRP Disadvantages

- No Yielding
- Low Transverse strength
- Sensitive to UV
- Susceptible to Fire
- Low Modulus
- Tensile strength of bent portion lower than straight portion.



## RP2014-09

### *CFRP Strands in Prestressed Cored Slab Units*



#### Research & Development

### CFRP Strands in Prestressed Cored Slab Units

Griffith Shapack, EIT  
Rudolf Seracino, PhD  
Gregory Lucier, PhD  
Sami Rizkalla, PhD

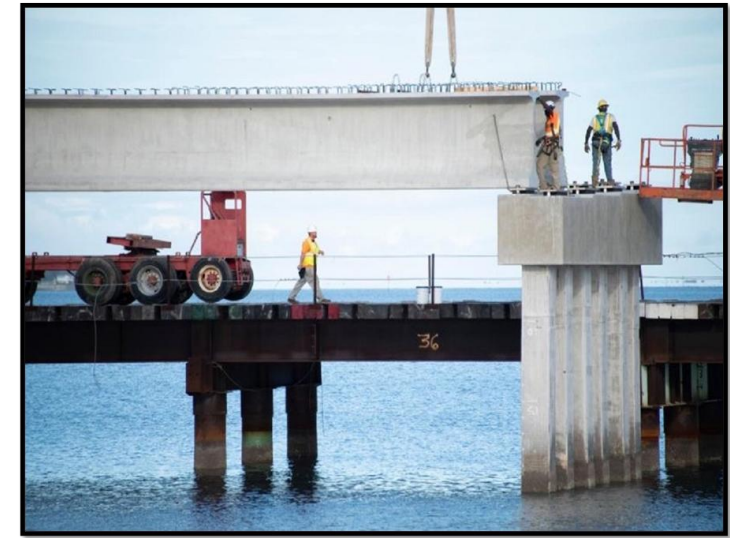
Department of Civil, Construction,  
and Environmental Engineering  
North Carolina State University

FHWA / NC / 2014-09  
February 2016



## RP2022-08

### *Harkers Island Bridge Replacement: Material Characterization and Structural Performance*



# Corrosion in Concrete Bridges:



## RP2018-16:

*Mechanically-Fastened FRP to Retrofit Existing Prestressed Concrete Bridge Beams*

## RP2024-15:

*Behavior of Repaired Sampson County Bridge Beams after 2 Years in Service*



# Contact Us

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**Thank you!**

