





ROBERT OPIE NORRIS JR BRIDGE

NDE-T

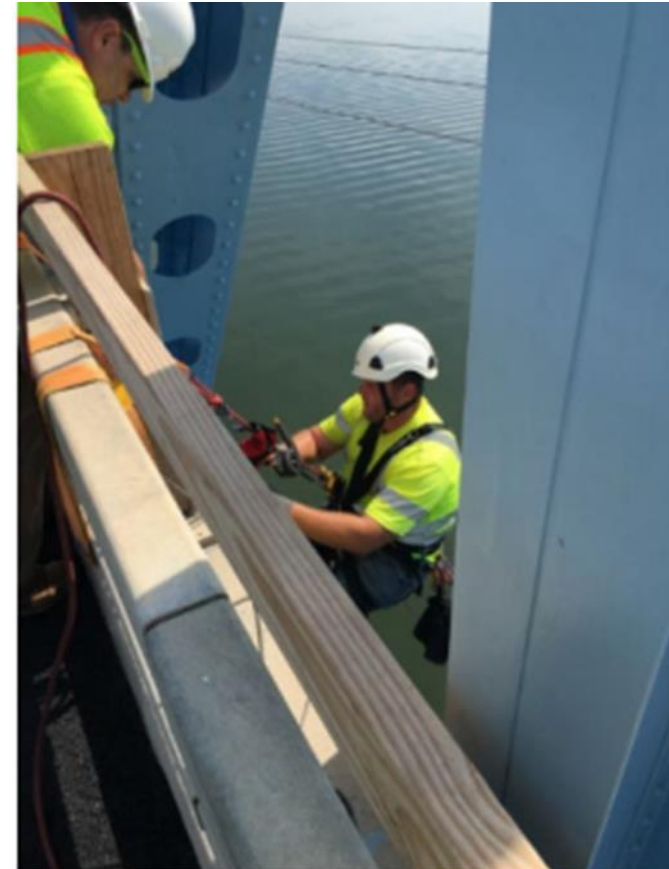
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Fredericksburg District Bridge Engineer

NBPC 2024 – September 10, 2024

Norris Bridge – Structural Health Monitoring

- Bridge Background
- NDT: UT of Pins
- Strain Gage Monitoring
- Load Test



Norris Bridge – Background

- Last crossing of Rappahannock River upriver of Chesapeake Bay
- In service 1957
- 1.9 miles long
- 2 – 11 ft travel lanes, no functional shoulder
- 110 vertical clearance at 600 foot channel span
- 85 mile detour
- Multi-System Structure
 - Rolled Girders
 - Dual Girders
 - Deck Truss
 - Thru Truss



Norris Bridge – Ultrasonic Testing of Pins

96 Fracture Critical Pins

- 93% exhibit varying levels of corrosion on end
- @ 2 weeks to complete
- Several can only be accessed from one end
- Several have keyways
 - False positives which initiated a quality control UT by different personnel
- True positives have occurred
 - Reduced load to 3 Tons
 - Placed secondary support and jacking system
 - Replaced by both planned and emergency contracts



Norris Bridge - Strain Gauge Monitoring

Specific Elements

- Floor Beams
- Gusset Plate
- Secondary Support System

Monthly Report

- Date and Location of Strain Spikes just below Threshold
- Comparison to WIM report identified Vehicle Type
- Working with Operations to establish video recording to identify vehicle owner



Norris Bridge – Load Test

2018 Regular Inspection

- Identified section loss in Floor Beams
- Traditional analytical methods require posting bridge for lower than 45 T load
 - Economic hardship on local citizens and businesses
- Opted for diagnostic load test with calibrated trucks
 - Consultant strain gauged select elements
 - VDOT provided calibrated trucks
- Results used to determine acceptable allowable live load
- Structure allowed to remain at previous 45 T load

Using diagnostic load test on high volume, critical roadway systems

