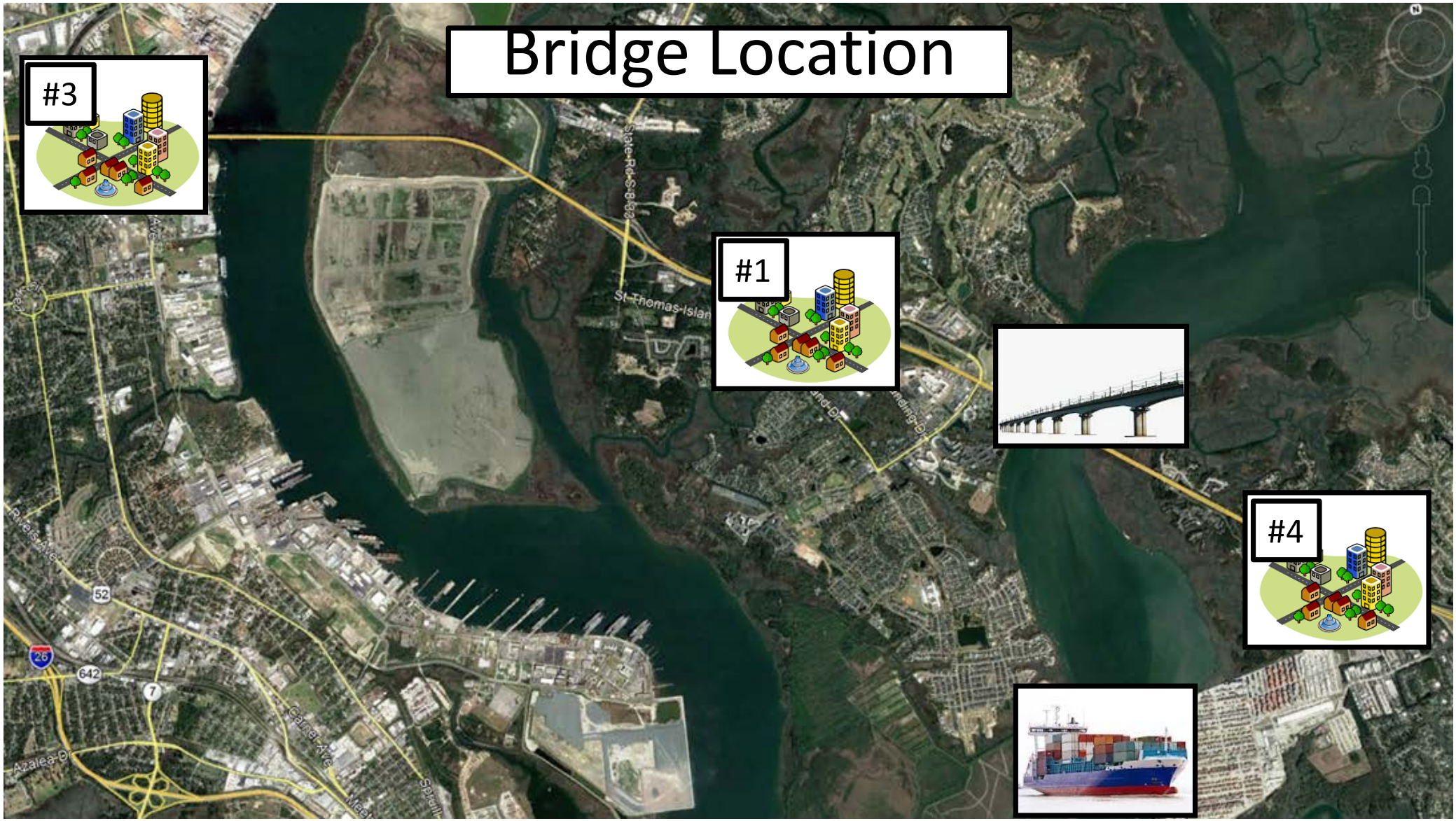
SCDOT Wando River 2018 Bridge Closure

M. Kevin Turner
District 6 Bridge Engineer

Location

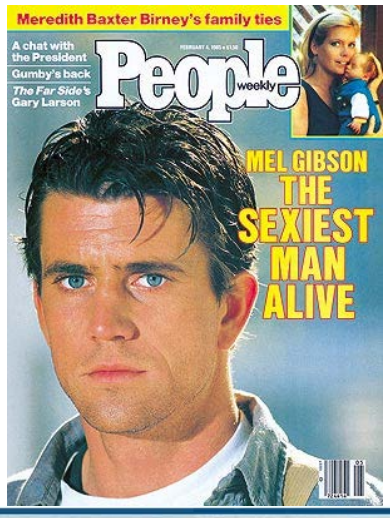
Bridge Location

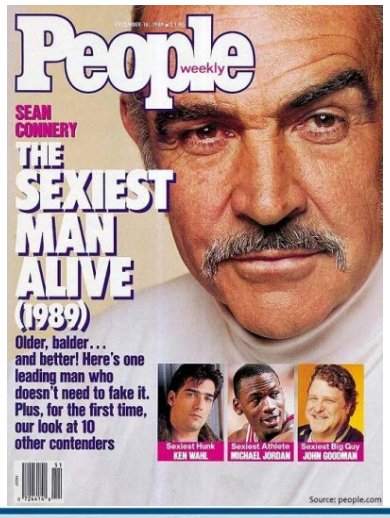


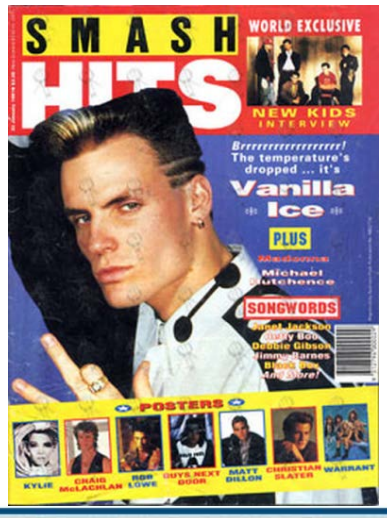
Construction

Construction

- Symmetrical, Twin, Post-tensioned, Concrete, Precast, Segmental Box Girder
- Constructed Between 1985 – 1989, Opened to traffic 1991







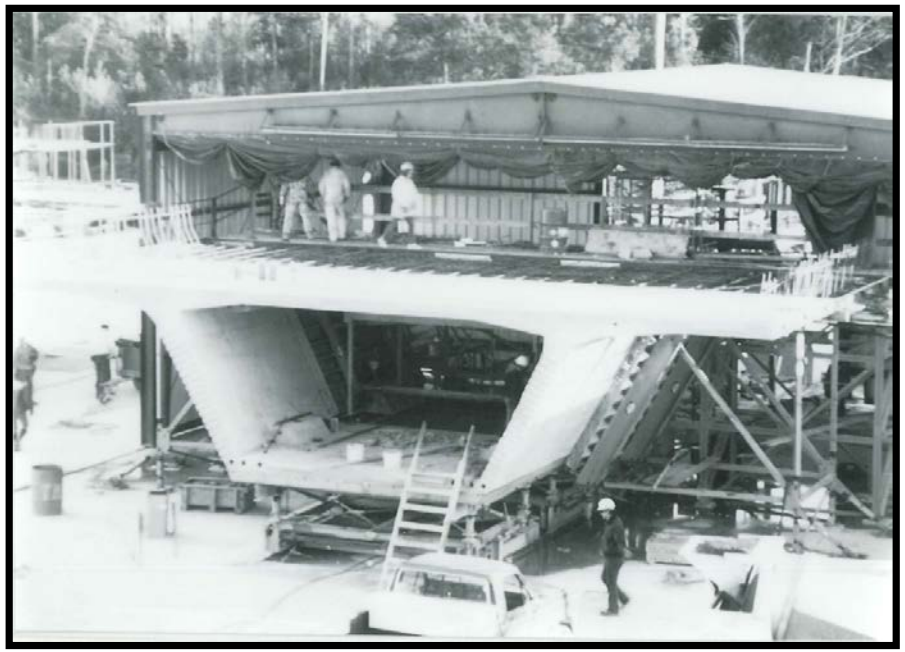
Construction

- T. L. James Associates for a cost of $34M
- Figg and Muller Engineers

=

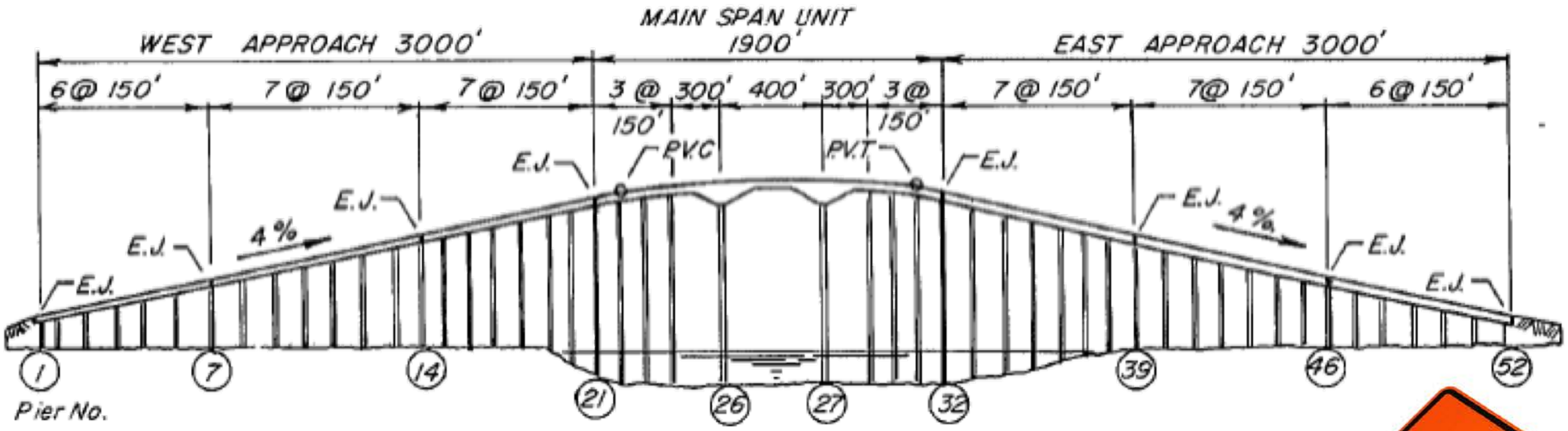
Construction

- Segmental Construction

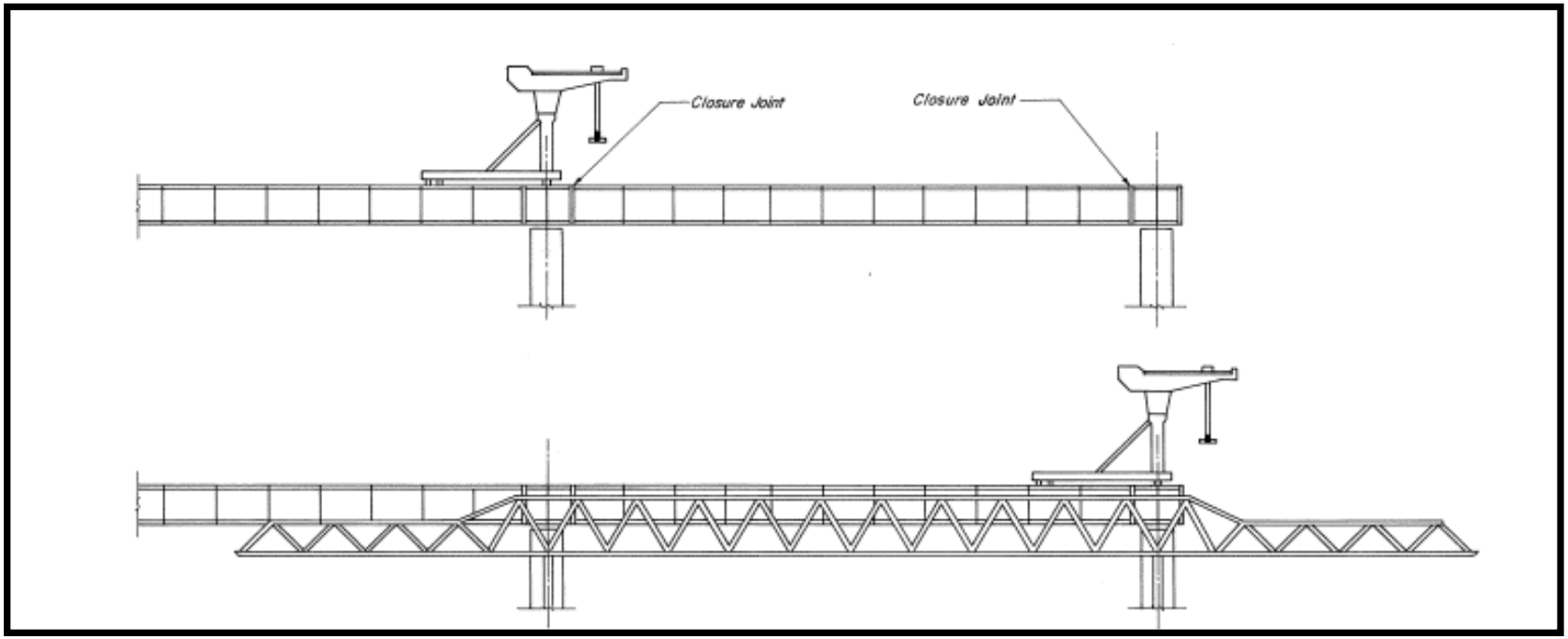


Construction

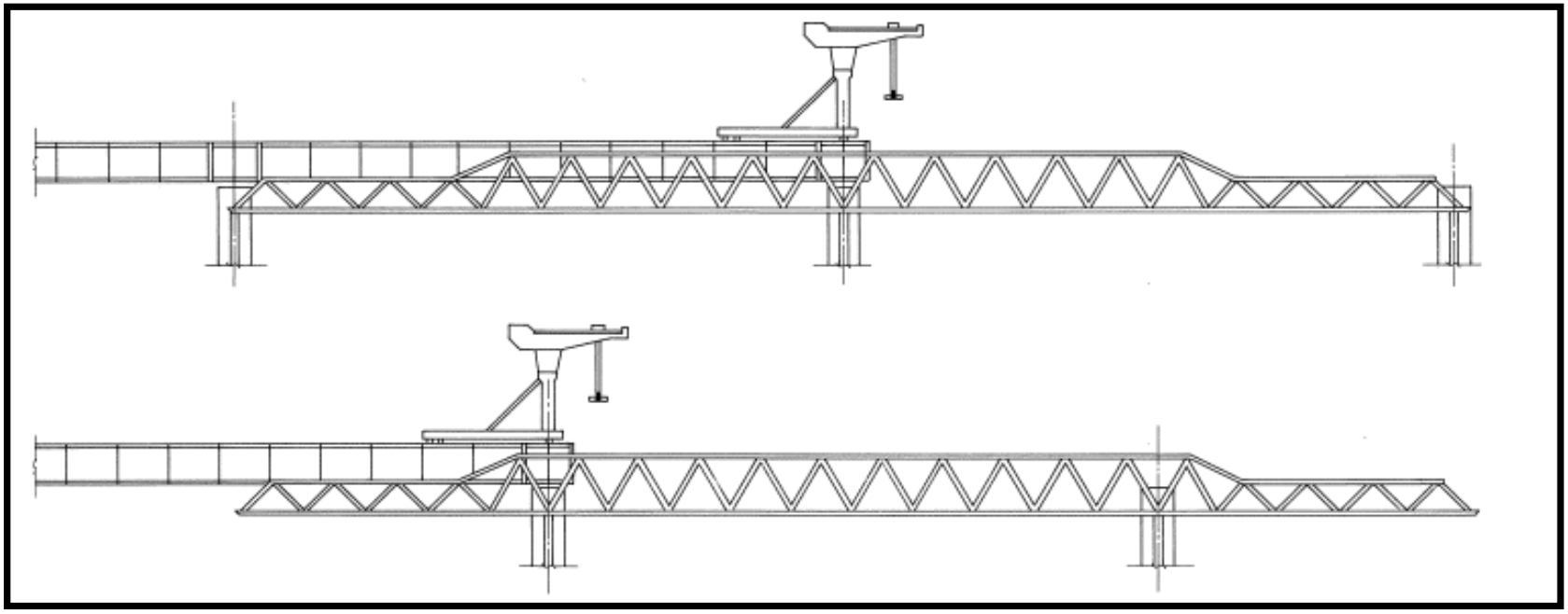
- Span-by-span



Construction



Construction

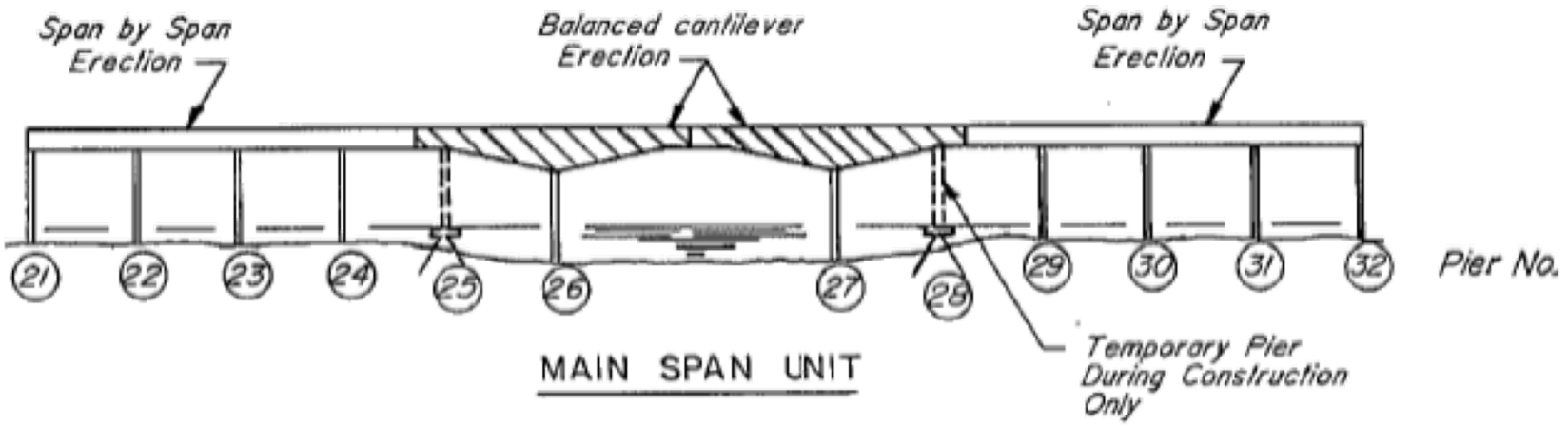


Construction

Construction

Construction

- Balanced Cantilever



Construction

Construction

Construction

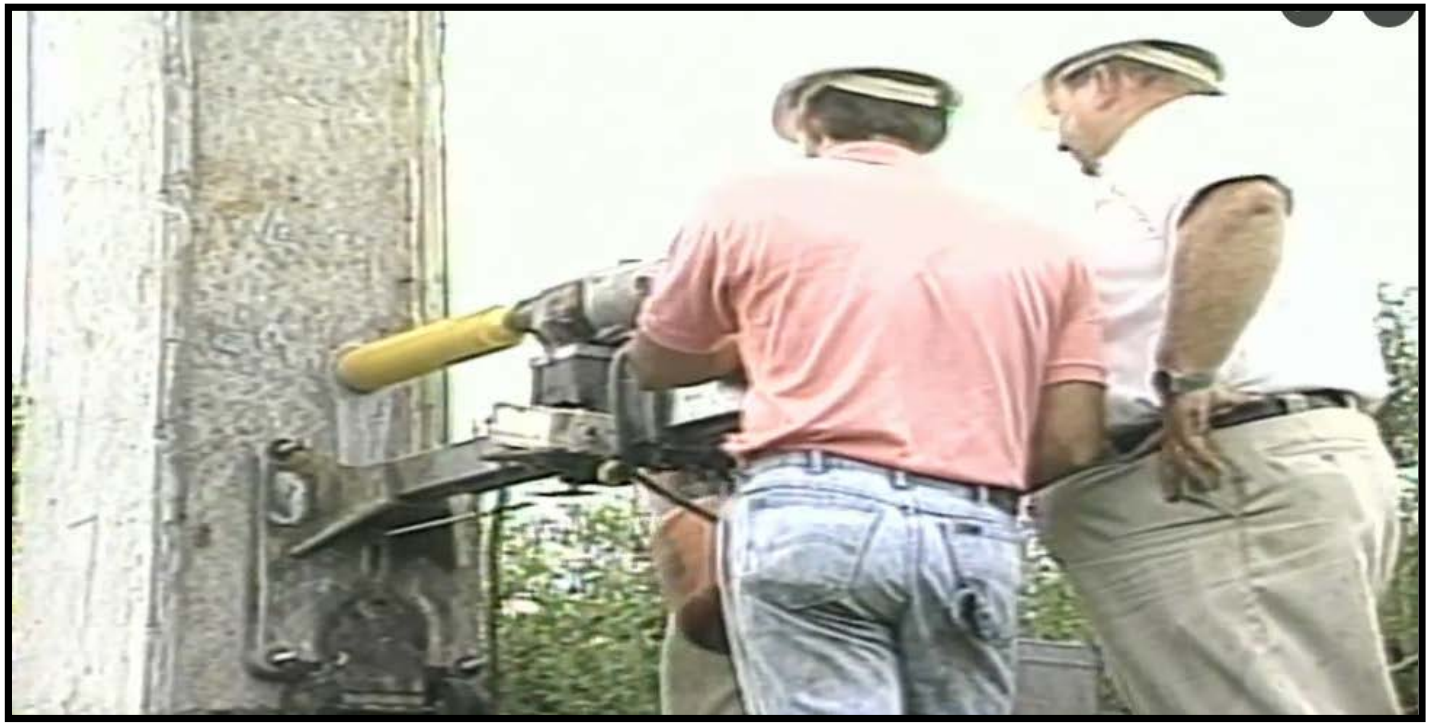
Construction

The World Wide Web Era

A.K.A. 1990

SCDOT

1990



1990

1996

The WikiLeak Era

A.K.A. 2010

SCDOT

2010

2010

- Through investigation performed on both bridges
  - Corrosion Potential
  - Borescope
  - Petrographic Analysis
  - Chemical Composition
  - Chlorides
  - Sulfates & Acids
  - Electrical Resistivity

2010

2010

2010

Table 4.2-2. Corrosion potential measurements.

Location	Corrosion Potentials, mV CSE									
1A	-160	-172	-174	-158						
3	-139	-150	-151	-152	-140	-147	-169	-161		
5A	-182	-182	-181	-214	-231	-161				
7	-195	-180	-190	-196	-195	-194	-194	-194	-195	-195
	-196	-195	-196	-197	-196					
9B	-164	-144	-157	-165	-163	-168	-168	-175		
11	-175	-175	-169	-173	-177	-165	-169	-178	-171	-170
13	-159	-113	-160	-162	-160	-162	-157	-156	-160	
13A	-131	-136	-135	-135	-115	-138				
15A	-173	-173	-172	-172	-172	-171	-173			
18B	-149	-149	-150	-151	-148	-148				
24C	-160	-170	-174	-175	-172	-173	-175			

No corrosion activity.
Corrosion activity is uncertain.
Active corrosion.

2010

2010

2010

2010

Same wire as above, but deeper into the void.

Examples of corrosion products oozing out of crevices between individual wires.

2010

- What we learned
  - [redacted] in the Tendon [redacted]
  - [redacted] issues found in the [redacted]
  - Water [redacted] and was getting into [redacted]
  - More investigation [redacted]… but [redacted]

2010

- What we learned
  - Some voids existed in the Tendon Grout
  - No significant issues found in the “free length” of tendons
  - Water was definitely getting through the top of deck and was getting into steel cables and box interior.
  - More investigation was needed at the piers… but how?

2012

- Efforts to Prevent Water Intrusion from Top of Deck

2012

Ball of twine. Bottom of grout vent tube.

Inside grout vent tube.

Grout vent tube open to the top of the deck.

Wire fed through grout vent tube.

The Brexit Era

A.K.A. 2016

SCDOT

2016

2016

2016

2016

2016

2016

2016

2016

2016

2016

2016

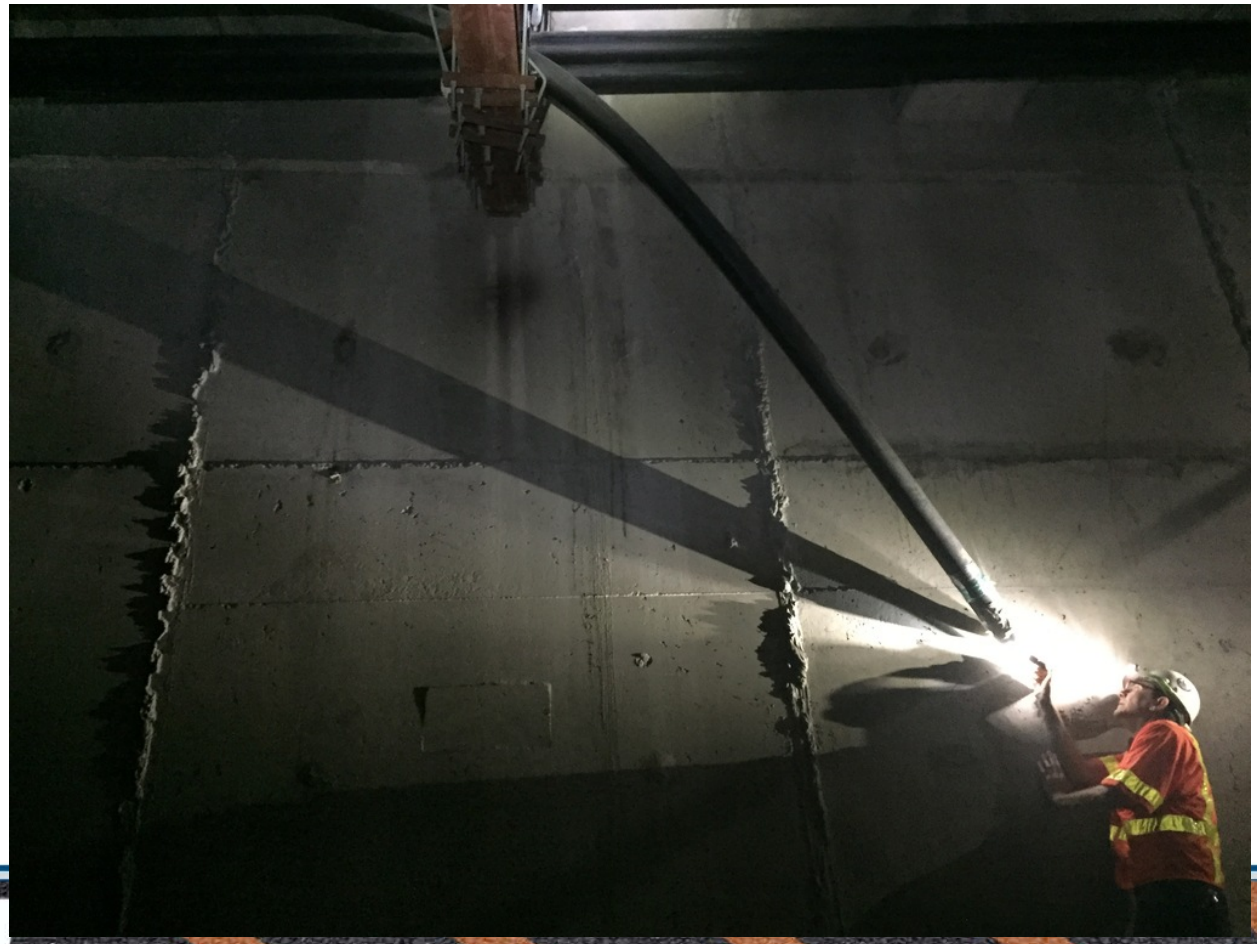
2016

- Confirmed what we knew in 2010.
- WHAT NOW???


2018
ROAD
WORK
AHEAD

May 14

May 14



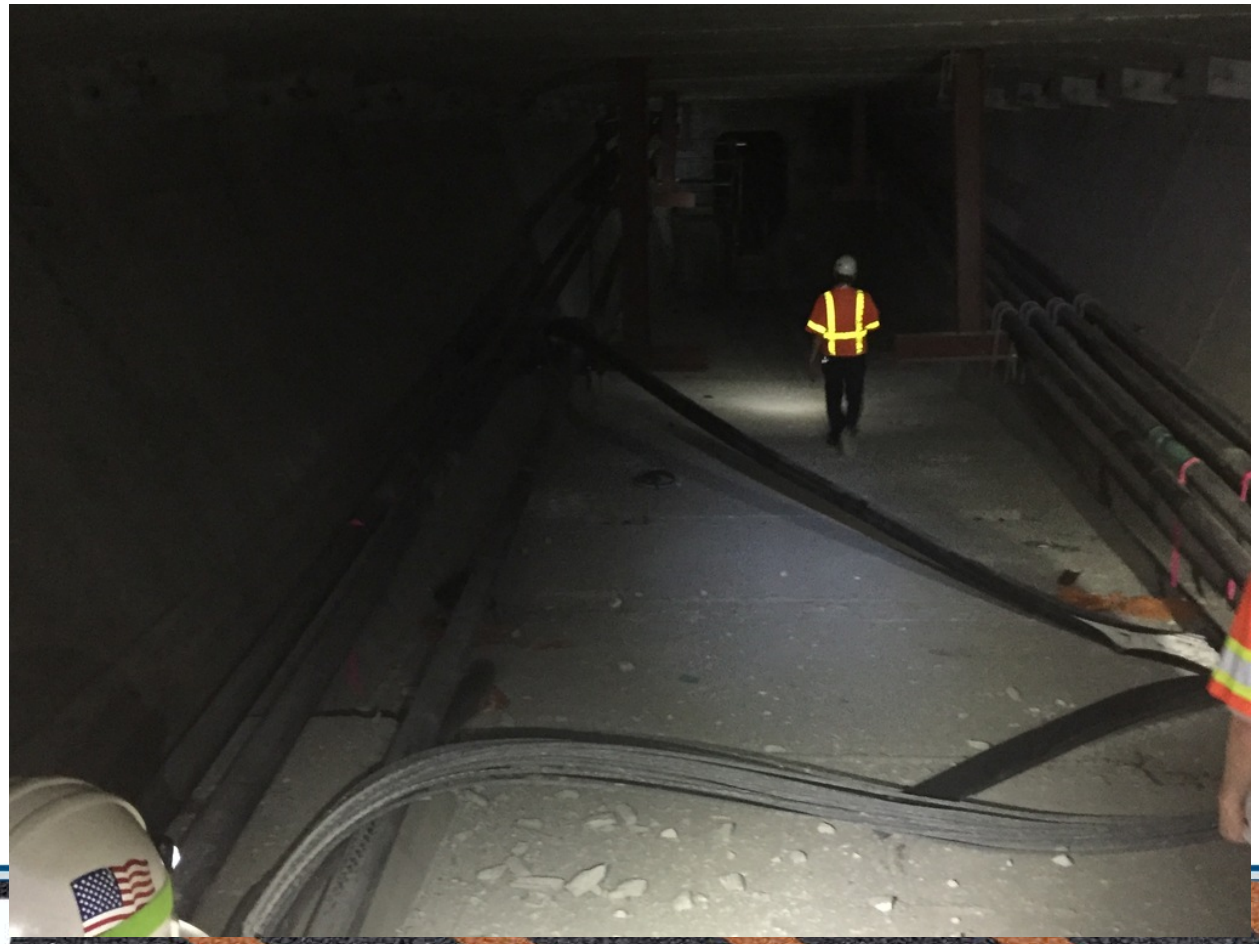
May 14

May 14

May 14

May 14

May 14



May 14

May 14

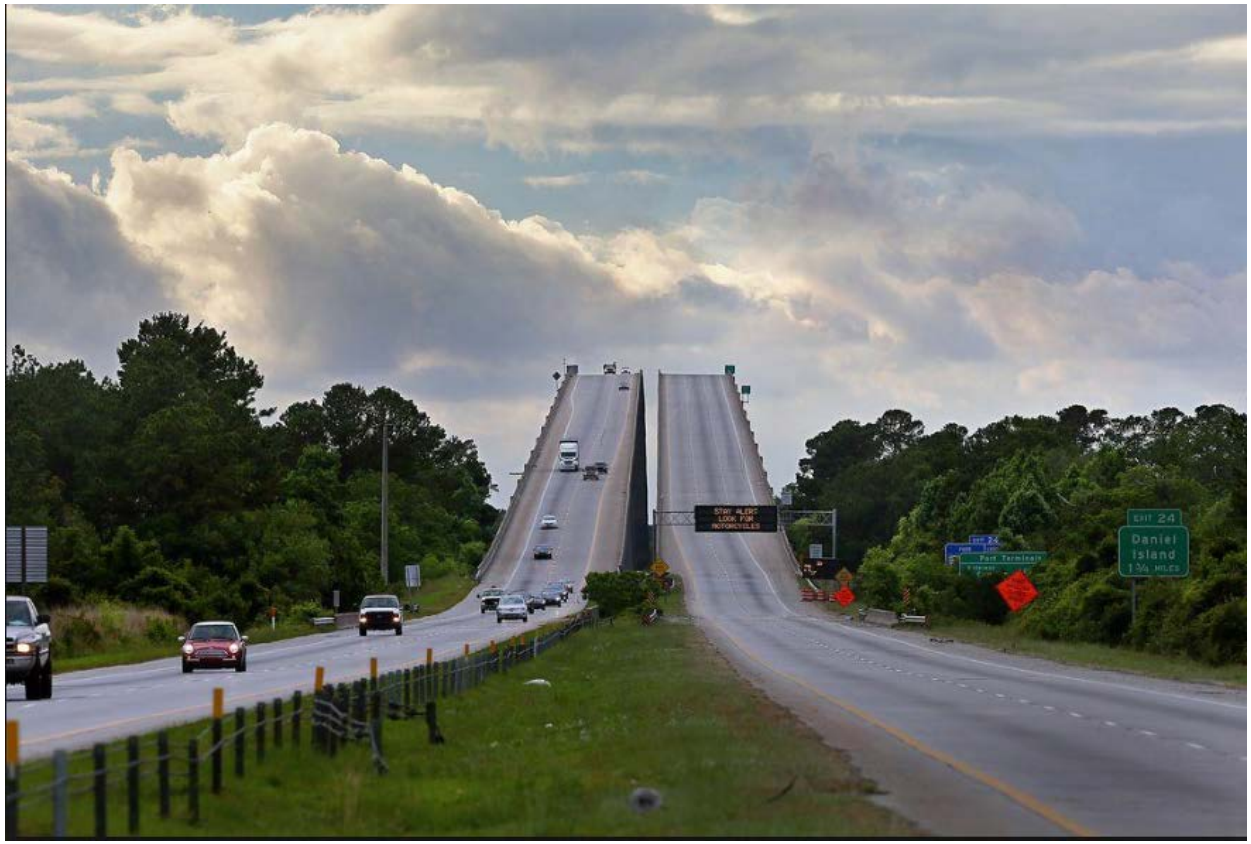
May 14

May 14

May 14


WANDO BRIDGE CLOSED
HAPPENING NOW
526
Island Park Dr
Seven Farms Dr
River Landing Dr
Daniel Island Dr
Elfe St
I-526 W
I-526 E
WANDO BRIDGE

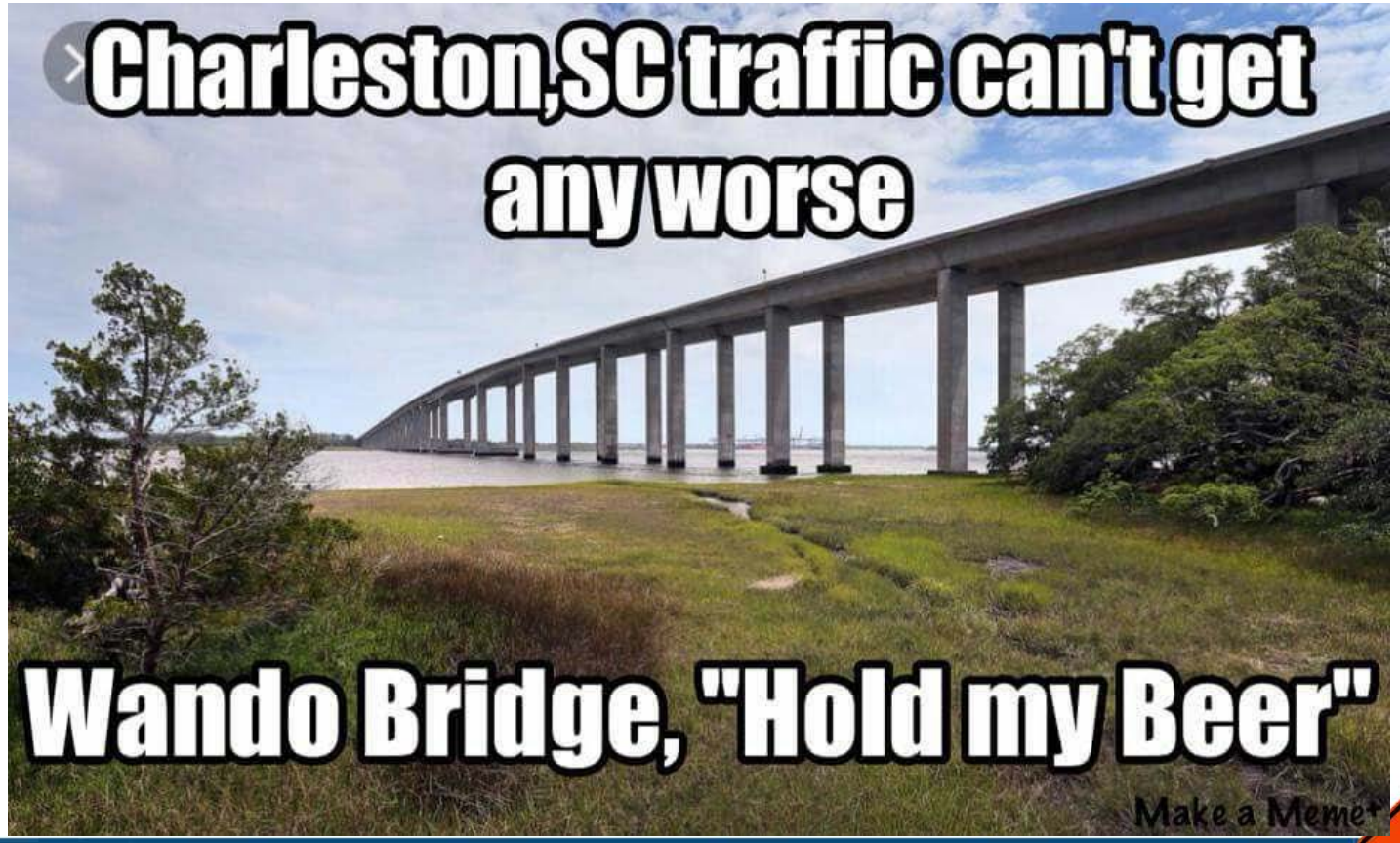
May 14



May 14

May 15

May 15

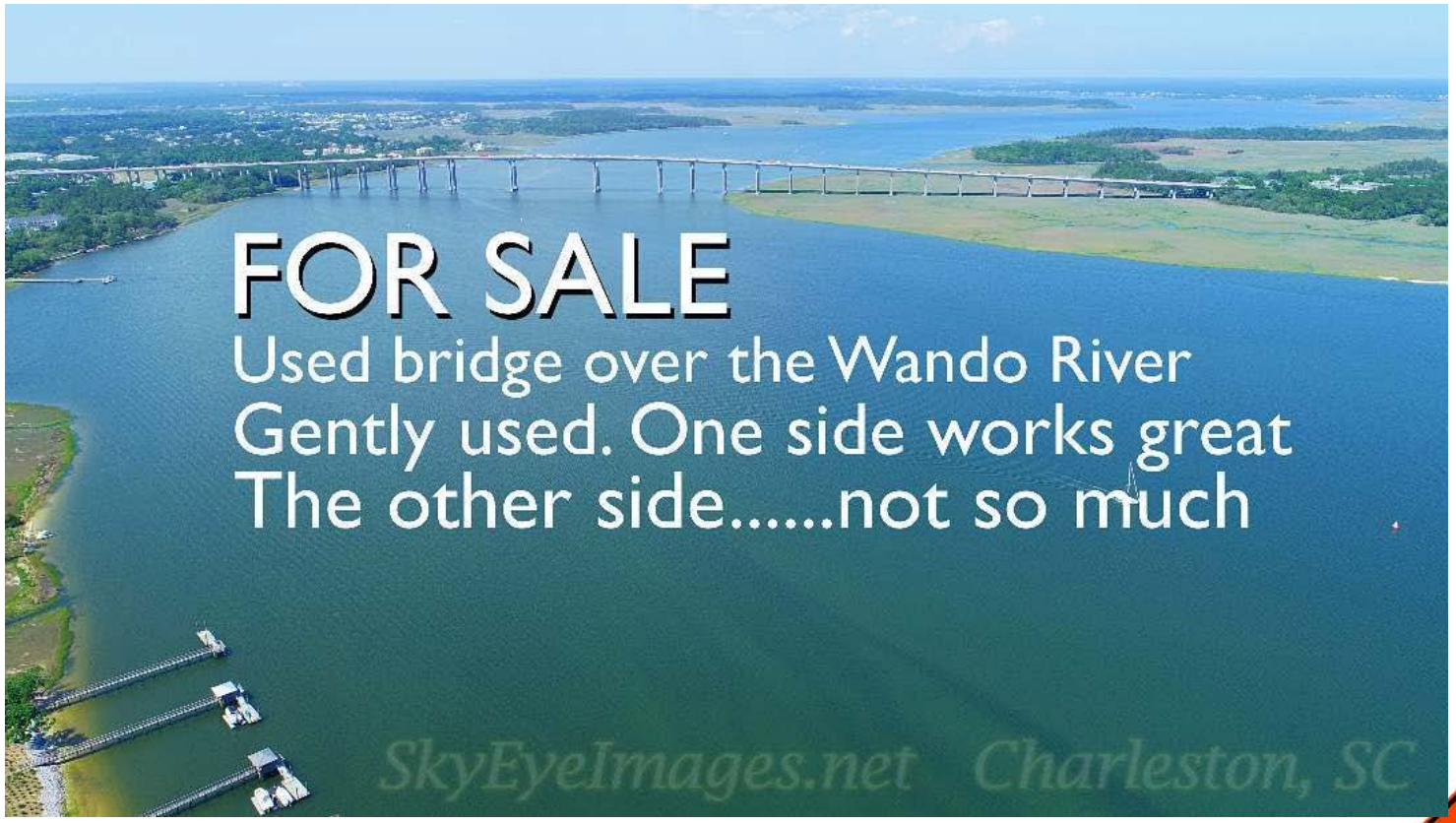

Charleston,SC traffic can't get any worse
Wando Bridge, "Hold my Beer"
Make a Meme

May 15


SCDOT
EMERGENCY BRIDGE REPAIR TEAM
TO THE RESCUE


SORRY FOLKS
MT. PLEASANT'S
CLOSED
LIVE 5 NEWS

May 15


FOR SALE
Used bridge over the Wando River
Gently used. One side works great
The other side.....not so much
SkyEyeImages.net Charleston, SC

May 16

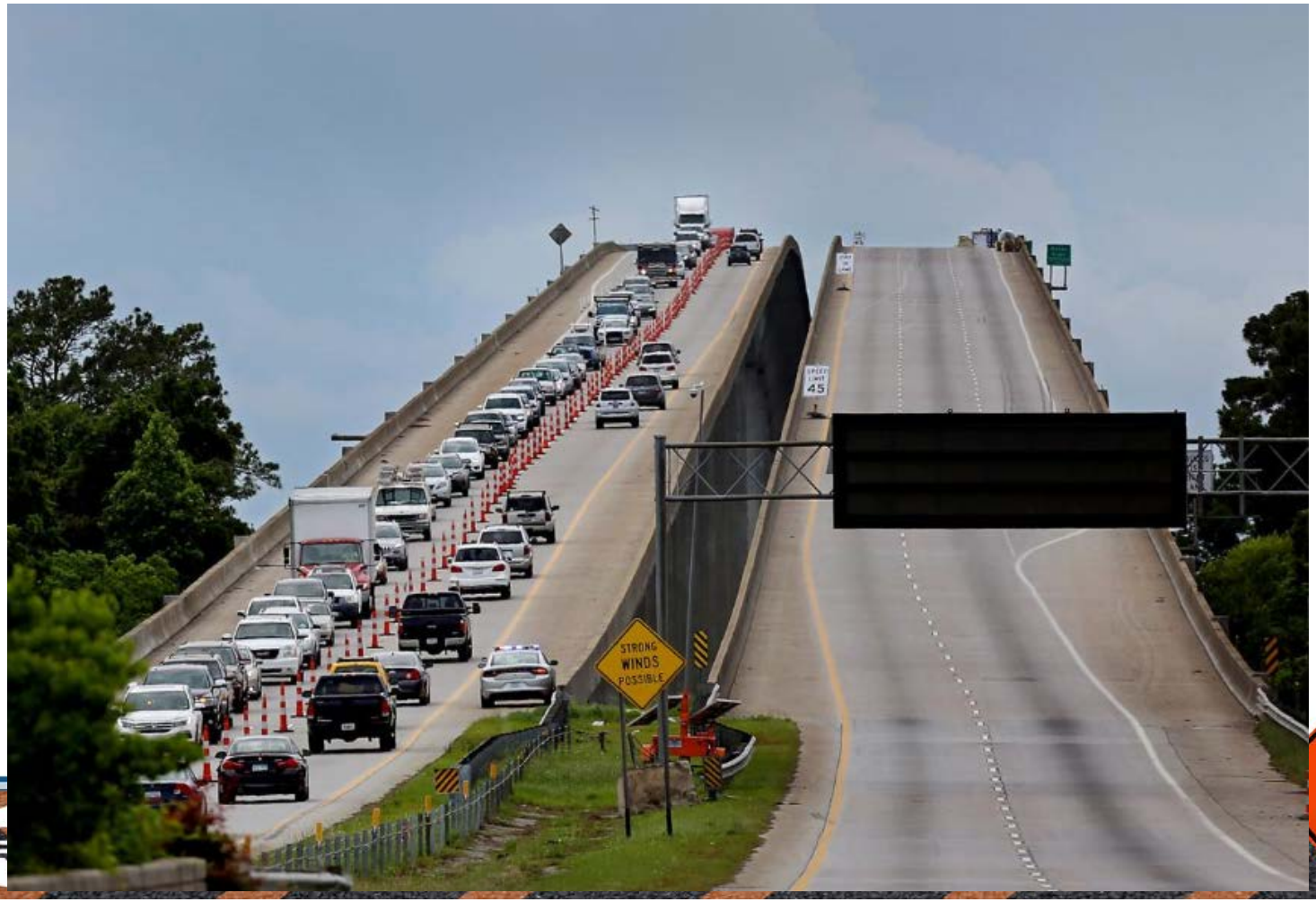
May 17

May 19

May 19

May 20

May 20



May 16

May 18

May 18

May 18

May 25

May 20

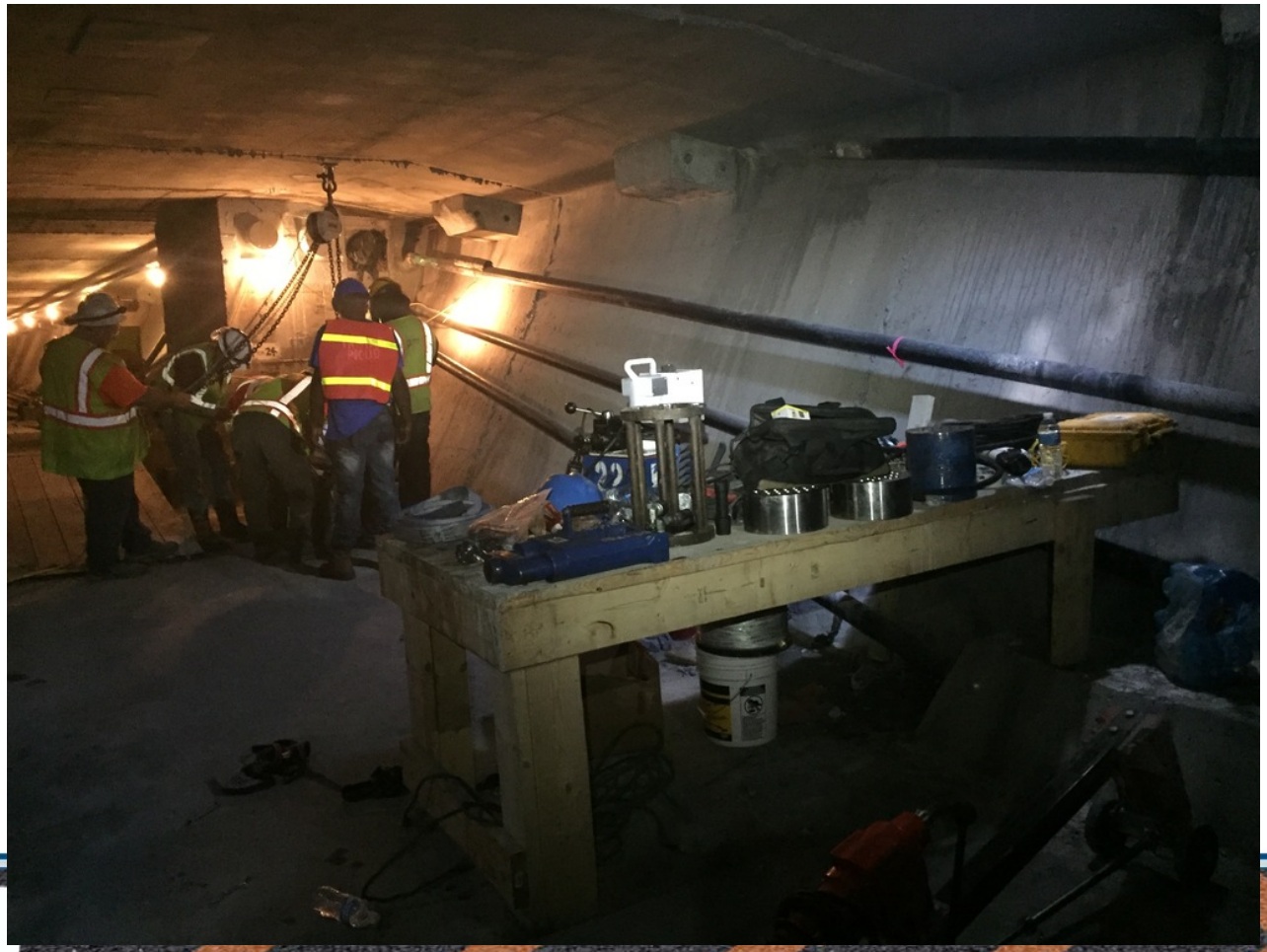
May 21

May 22

May 22

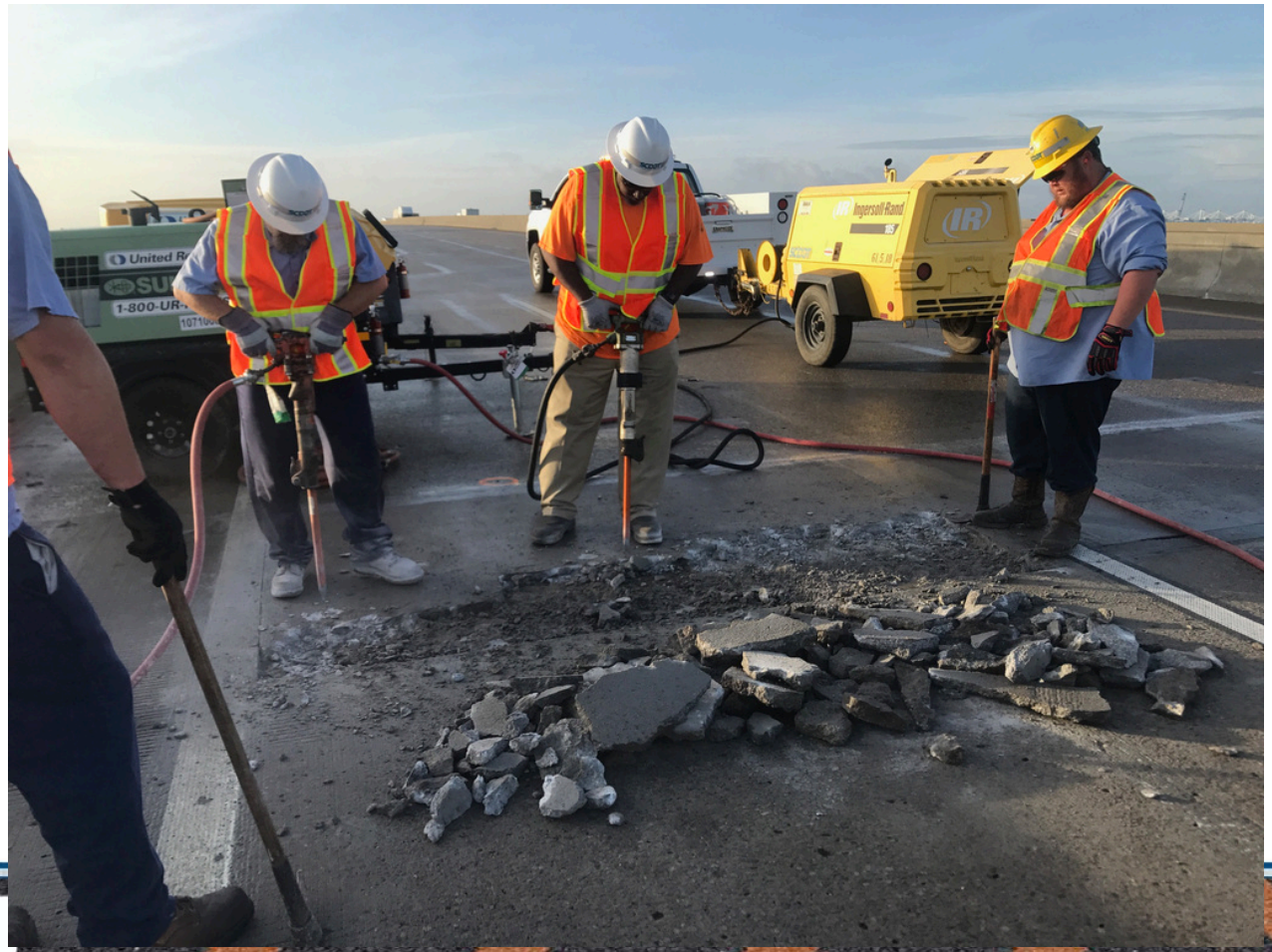
May 25

May 25



May 19

May 24



May 24

May 24

May 29

May 31

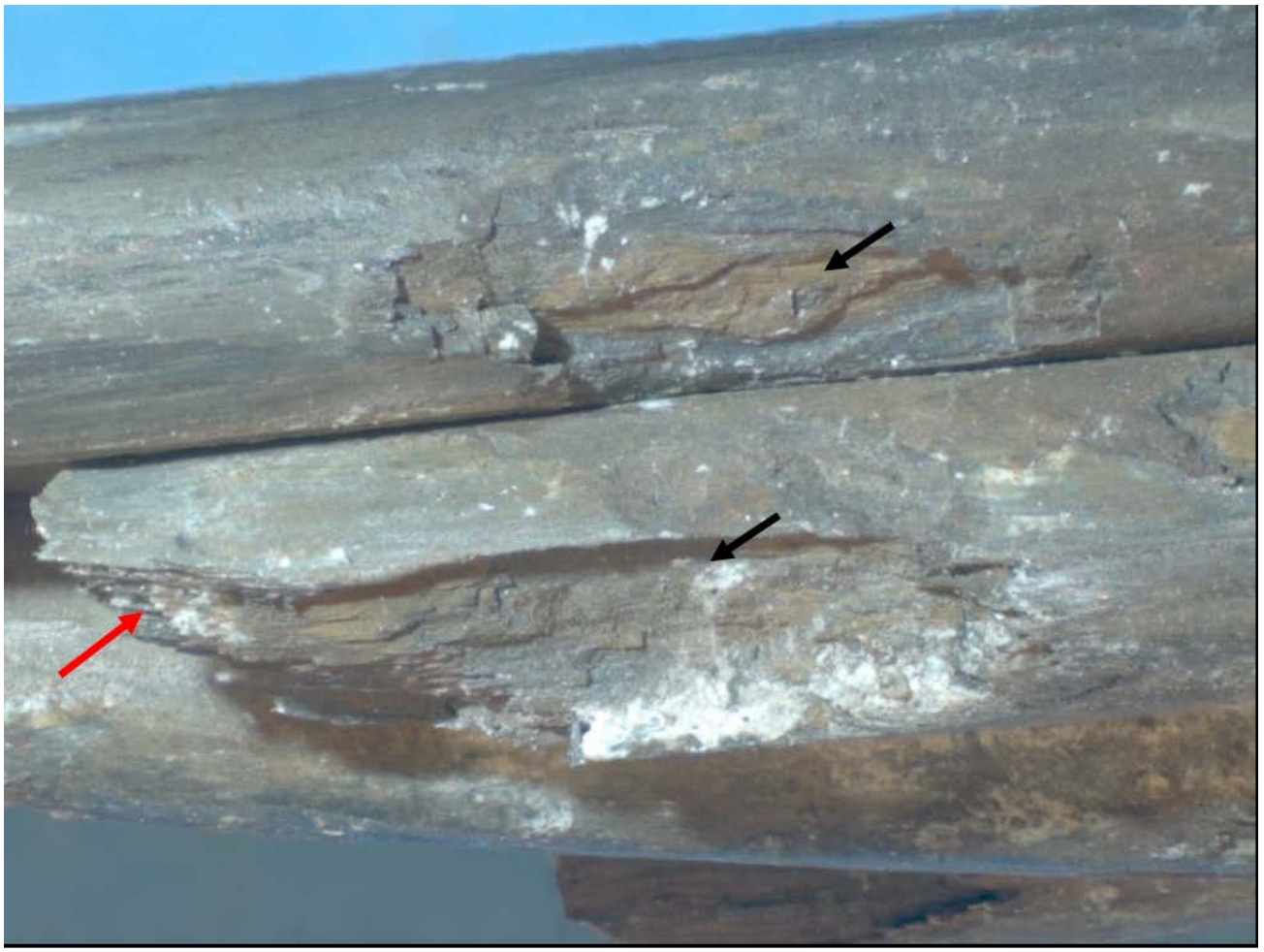
May 22

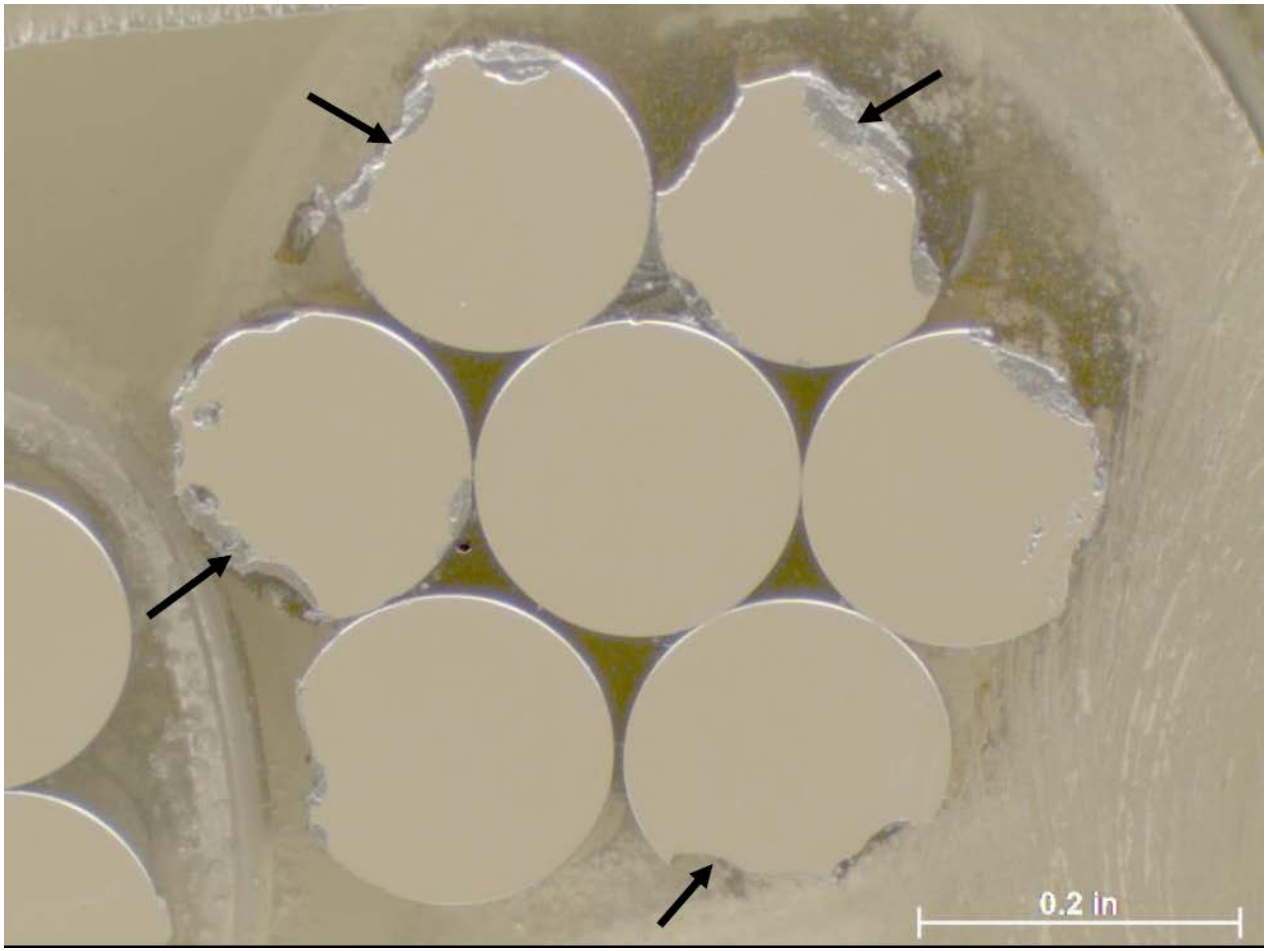
May 22

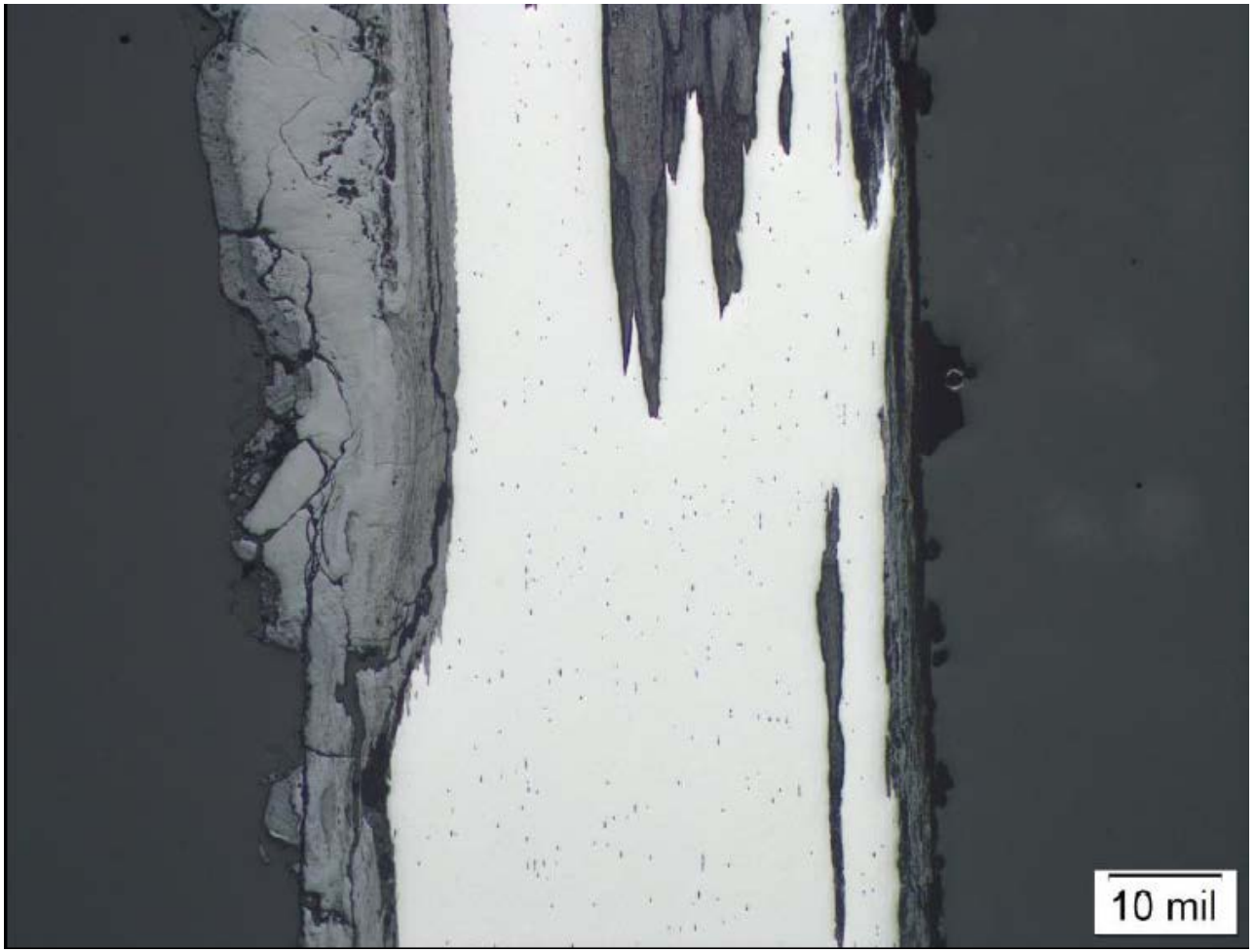
June 2

June 2

Since Then….




0.2 in


10 mil


WARNING:
Do not place
combustible
material on or
near unit
substation.


Wando EB Span 26 Thu Sep 27 10:02:39 2018
1:1


The Future
Holds…
ROAD
WORK
AHEAD

The Future Holds…

- Continued Efforts To Prevent Water
- Other Known Repairs
- Redundancy in the EBLs
- Structural Health Monitoring Technologies
- More Rapid Repair Methodologies

Thank You For Your Time

Kevin Turner, PE
District Bridge Engineer

SCDOT