



# NORTH CAROLINA

Department of Transportation



# AGC-DOT Conference 2020

## *Structure Breakout*

Cameron Cochran, PE  
Western RBCE

Aaron Earwood, PE  
Eastern RBCE

# Impervious Dike

---

When we need them and how we pay for them

# Bridge Components or Excavation Below NWS



Interior Bent Cap



Unclassified Structure Excavation



Rip Rap Key-In

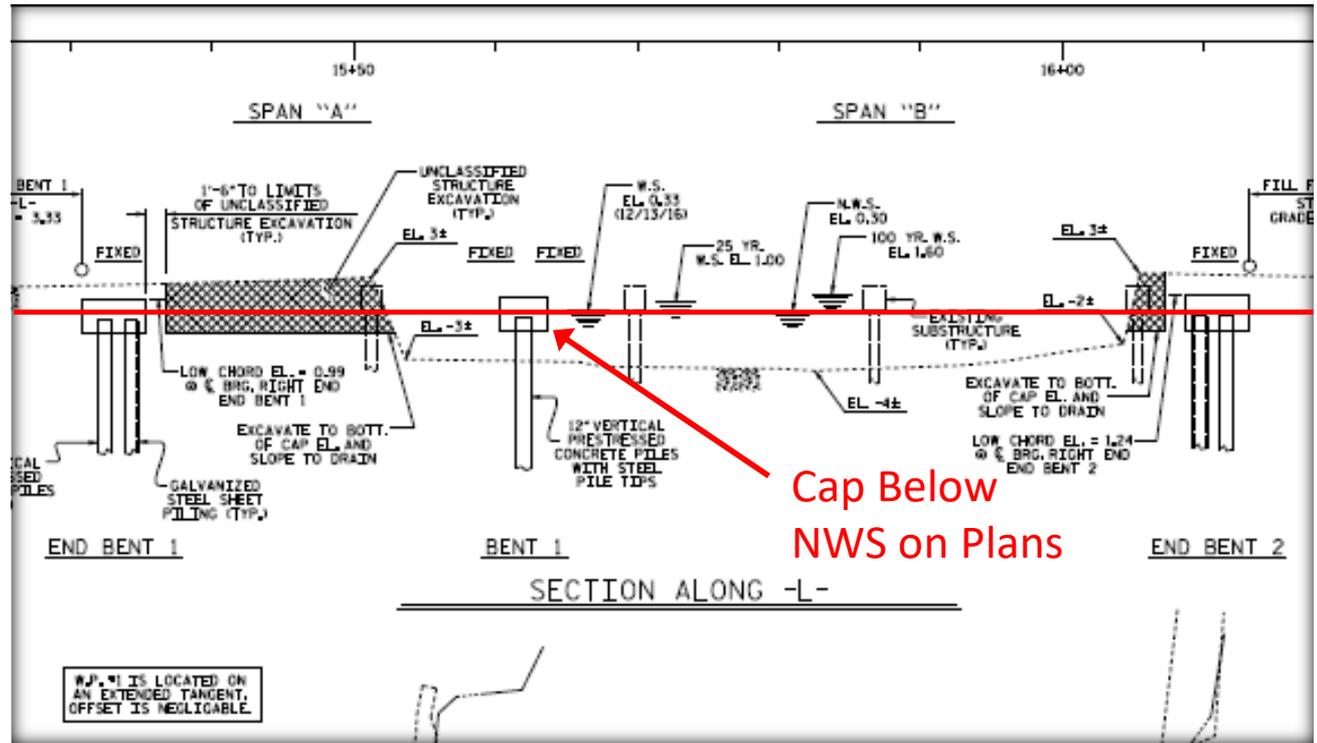


Footing Removal



End Bent

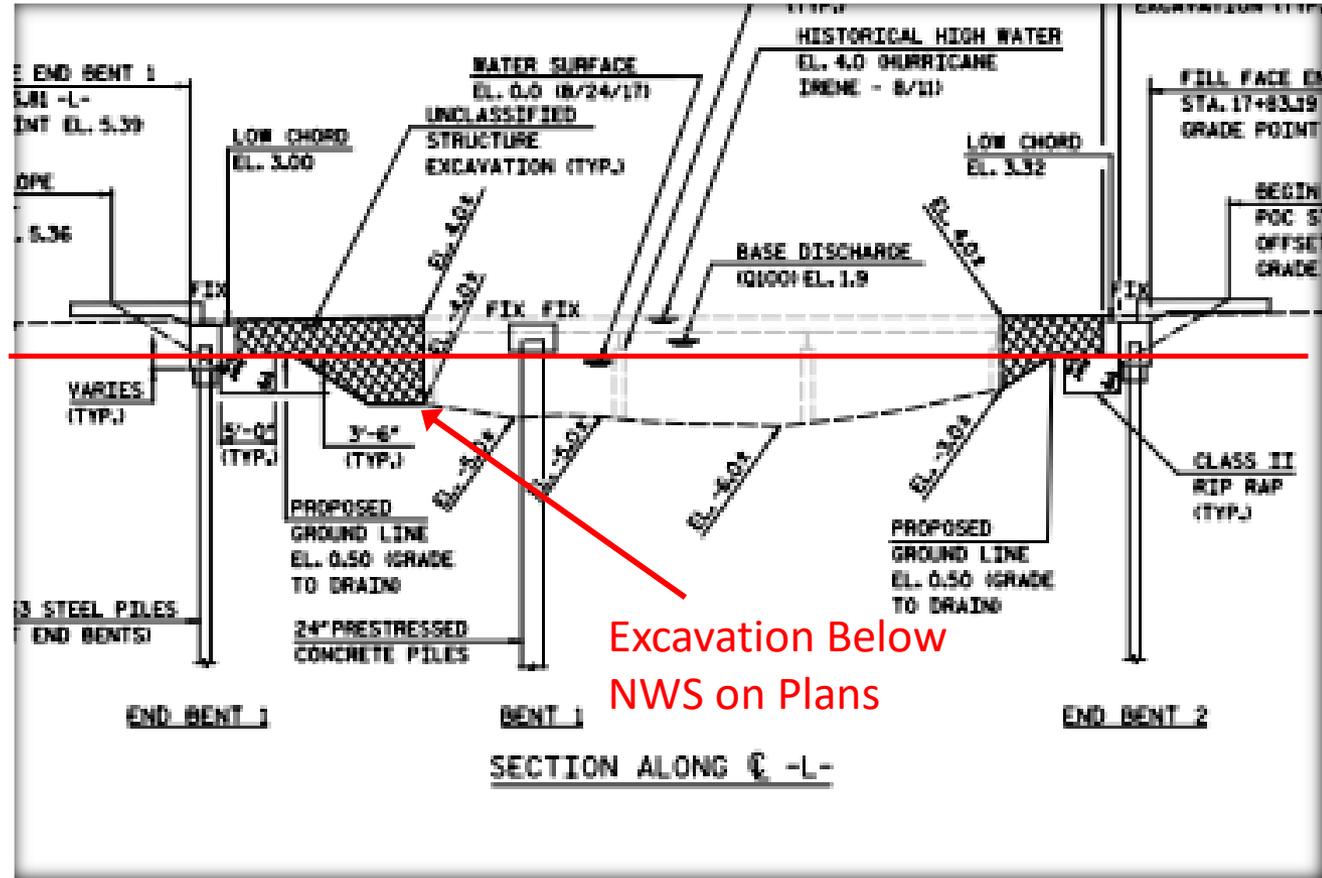
Situation 1  
Interior Bent  
Cap Below  
NWS



Cap Below  
NWS on Plans

Situation 2

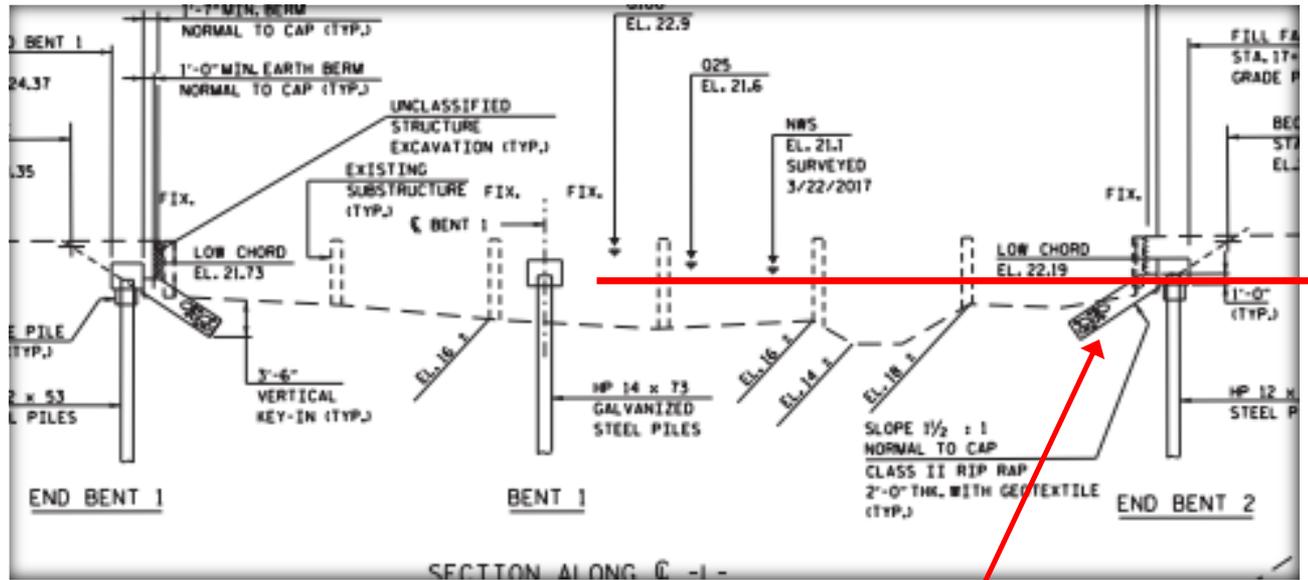
Unclassified  
Structure  
Excavation  
Below NWS



Excavation Below  
NWS on Plans

### Situation 3

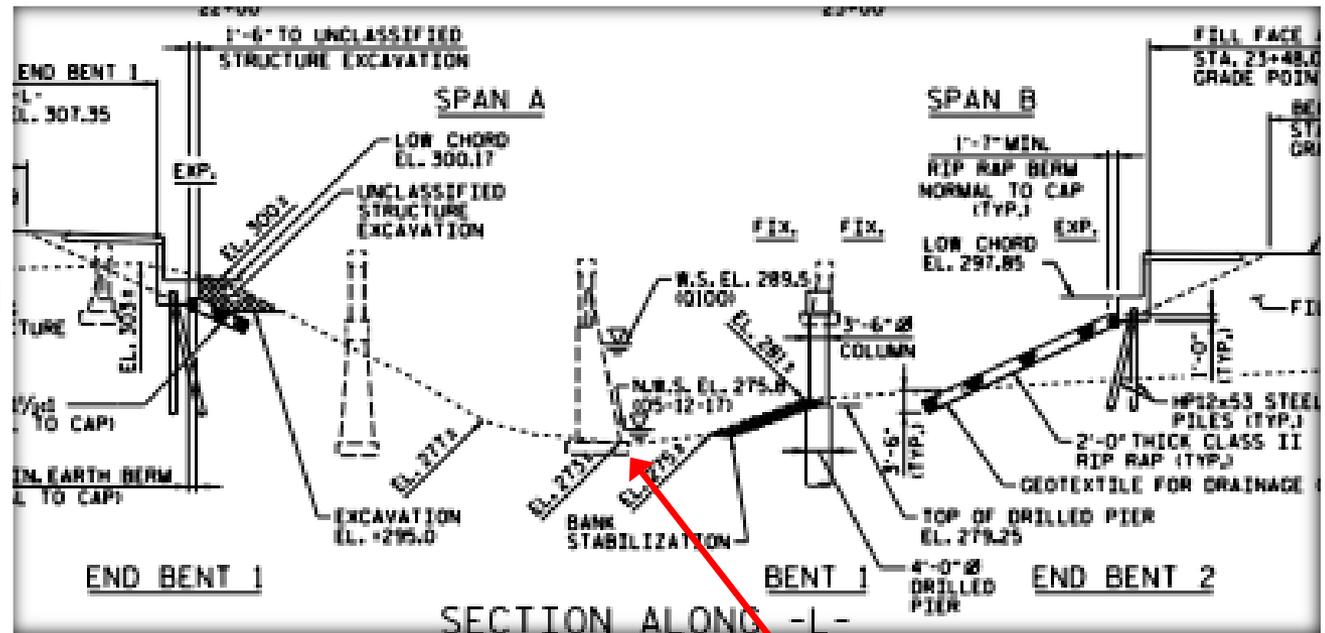
Rip Rap Key-  
In Below  
NWS



Rip Rap Key  
Below NWS

Situation 4

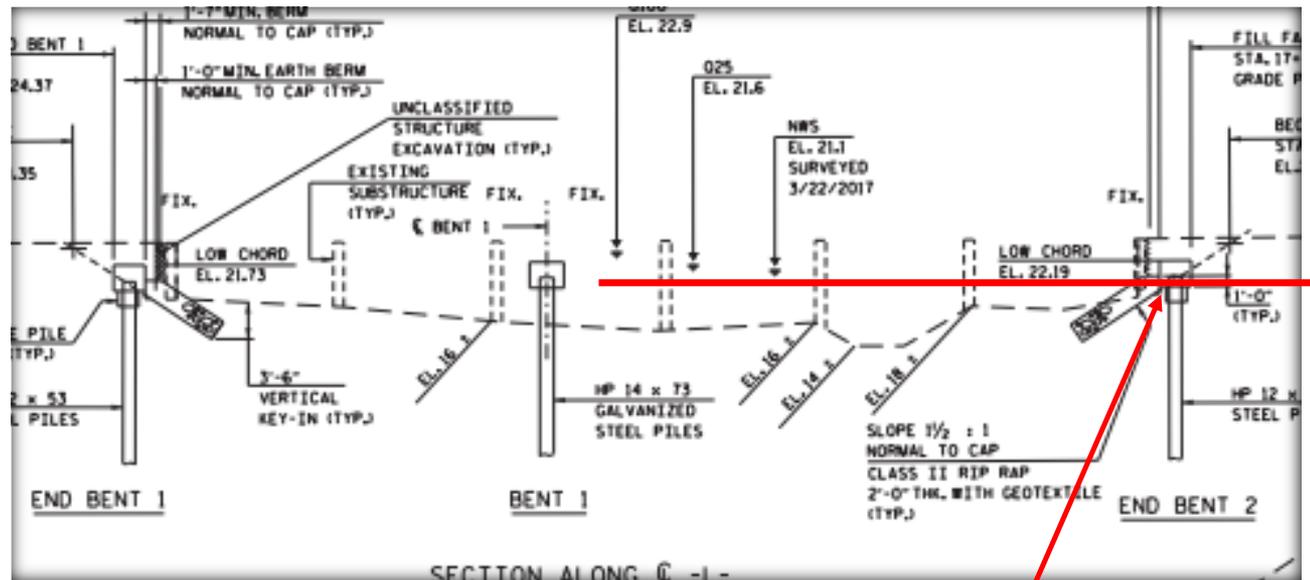
Footing  
Removal  
Below NWS



Footing  
Removal  
Below NWS

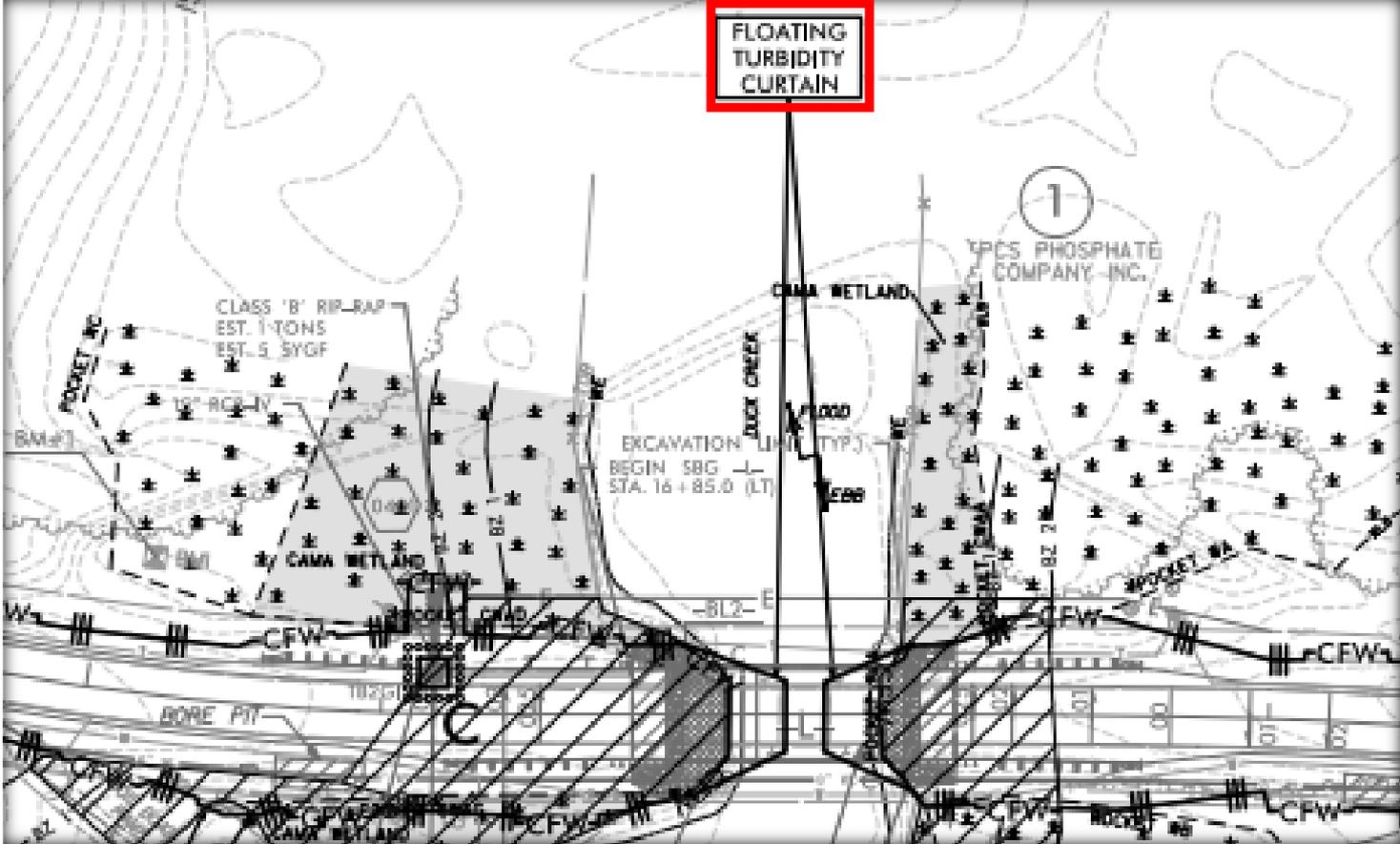
Situation 5

Bottom of  
End Bent  
Below NWS

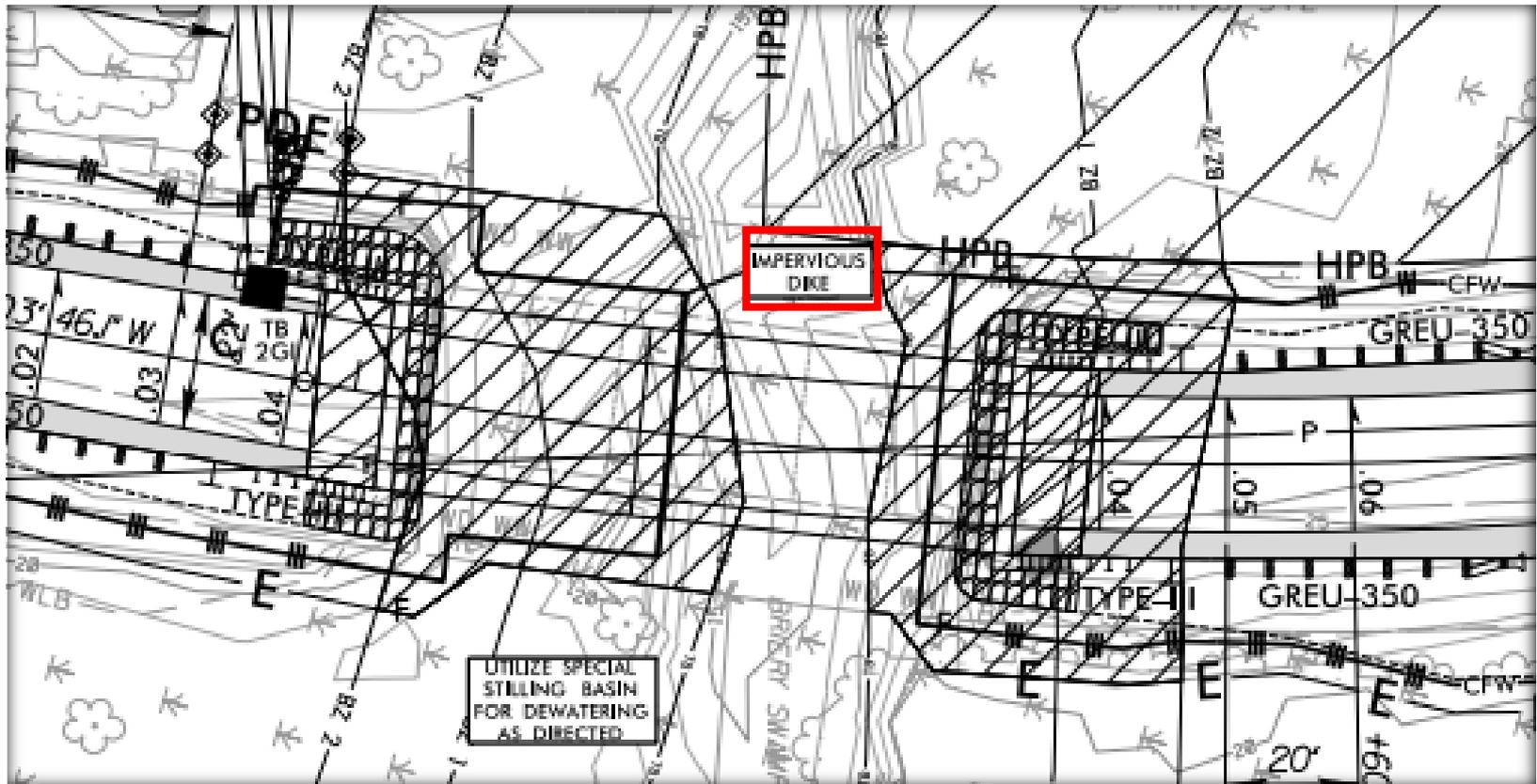


End Bent  
Below NWS

# Floating Turbidity Curtain on Erosion Control Plans



## Impervious Dike on Erosion Control Plans



# Unclassified Structure Excavation

---

## **SECTION 412 UNCLASSIFIED STRUCTURE EXCAVATION**

### **412-1 DESCRIPTION**

Excavate any material not classified as foundation excavation, box culvert excavation or channel excavation whose removal is required for the construction of bridges, retaining walls of reinforced concrete or reinforced masonry, arch culverts and box culverts without floor slabs, and which is classified as unclassified structure excavation in the plans, in accordance with the contract or as directed. Excavate, blast, brace, shore, provide sheeting and cribbing, backfill, haul and dispose of materials.

Do not deposit excavated materials, nor construct earth dikes or other temporary earth structures, in rivers, streams or impoundment or so near to such waters that they are carried into any river, stream or impoundment by stream flow or surface runoff.

Dispose of all timber, stumps and debris in accordance with Article 200-6.

### **412-2 PRESERVATION OF CHANNEL**

Unless otherwise required by the contract, do not excavate in stream channels. Do not disturb the natural stream bed adjacent to the structure without permission.

Do not place material in a stream without approval. Remove materials placed within the stream area and leave the stream in its original condition, unless otherwise permitted.

# Foundation Excavation

---

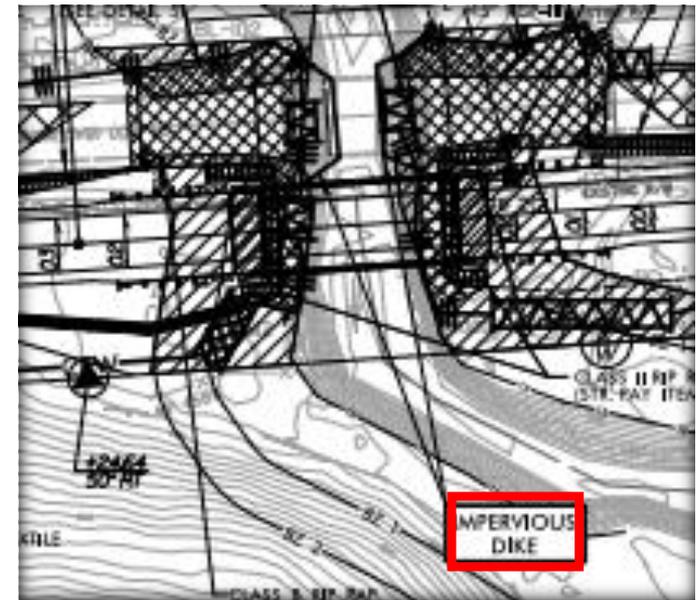
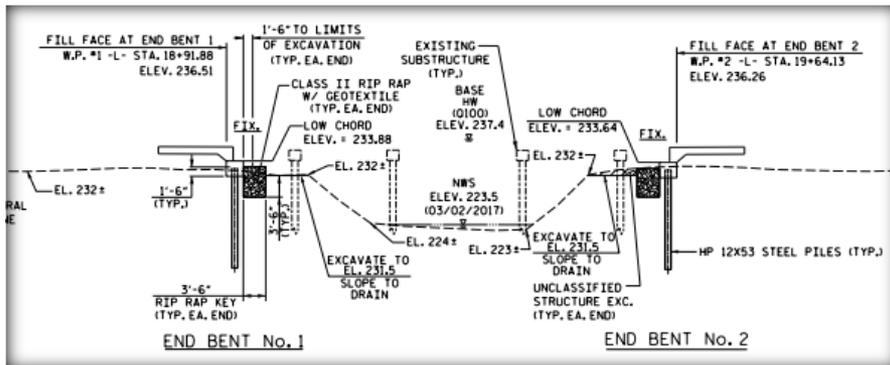
## **SECTION 410 FOUNDATION EXCAVATION**

### **410-1 DESCRIPTION**

Excavate any material as necessary for the construction of foundations and end bent caps for bridges, retaining walls of reinforced concrete or reinforced masonry, arch culverts and box culverts without floor slabs in accordance with the contract or as directed. Excavate, perform exploratory drilling at footings to a depth not to exceed 5 feet, blast, drain, divert water, bail and pump. Provide and remove bracing, shoring, sheeting, cribbing and cofferdams; substructure scour protection, subsurface drainage and drawings; and backfill including hauling and disposal of materials.

Do not deposit excavated materials or construct earth dikes or other temporary earth structures in rivers, streams or impoundment or so near to such waters that they are carried into any river, stream or impoundment by stream flow or surface runoff. As an exception to the above, obtain written approval for the use of confined earth materials in cofferdams for structure foundations.

# Impervious Dike on Erosion Control Plans Structure Plan Note “Incidental”



THE BRIDGE WILL BE REMOVED FROM THE TOP DOWN, FIRST REMOVING THE ASPHALT WITH CONTAINMENT MEASURES IN PLACE TO PREVENT BRIDGE COMPONENTS FROM DROPPING INTO THE STREAM. THE METHOD OF CONTAINMENT WILL BE PROPOSED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THIS WILL BE FOLLOWED BY REMOVAL OF THE DECKING, GIRDERS, ETC., AND FINALLY THE WOODEN PILES. AN ATTEMPT SHALL BE MADE TO COMPLETELY REMOVE THE EXISTING TIMBER PILES (WITH CONCRETE ENCASEMENTS WHERE APPLICABLE) BEHIND AN IMPERVIOUS DIKE (THIS IS INCIDENTAL TO THE WORK); HOWEVER, IF THIS CANNOT BE ACCOMPLISHED WITH MINIMAL SUBSTRATE DISTURBANCE, THE PILES WILL BE PINCHED OFF ONE FOOT BELOW THE MUD LINE. BELOW THE RIP RAP OR CUT FLUSH WITH EXISTING RIP RAP AS DIRECTED BY THE ENGINEER. THE CONTRACTOR WILL NOT BE ALLOWED TO DRAG REMOVED TIMBER PILES ON OR ACROSS THE STREAMBED. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

## Things To Consider

---

- NWS Elevation is not static
  - Seasonal
  - Tidal
  - Wind Driven
  - Beavers
  - Heavy Rainfall
  - Plan error
- Can work be done other ways?
  - Behind existing timber abutment
  - Only using turbidity curtain
  - Removing beavers
  - Waiting for wind to shift. How long?
  - Waiting for high water to recede. How long?
  - Timing tides
  - Precast Caps
  - Watertight Forms
  - Working within a causeway

Working  
Behind  
Turbidity  
Curtain and  
Timber  
Abutment



# Options for Discussion

---

No Change	Impervious Dike - Incidental	Impervious Dike – Pay Item
Leave as-is, with current interpretation of specifications	Show Impervious Dike and note that it will be incidental if needed.	Show Impervious Dike and have a pay item if needed
Bidders may interpret differently	Clear to all bidders  If need and don't include in bid, Contractor's risk  If included by Contractor and don't need, DOT paying for something not needed	Clear to all bidders  Reduces risk on all parties. If not needed, it is not paid, and nobody loses money or pays for something not needed  Will Contractors make less of an effort to construct without impervious dike if there are options or if waiting is an option?  What if sheet piles delivered and water drops and not needed?

# CSL Testing



Why.... When....?

# Temporary Bridges



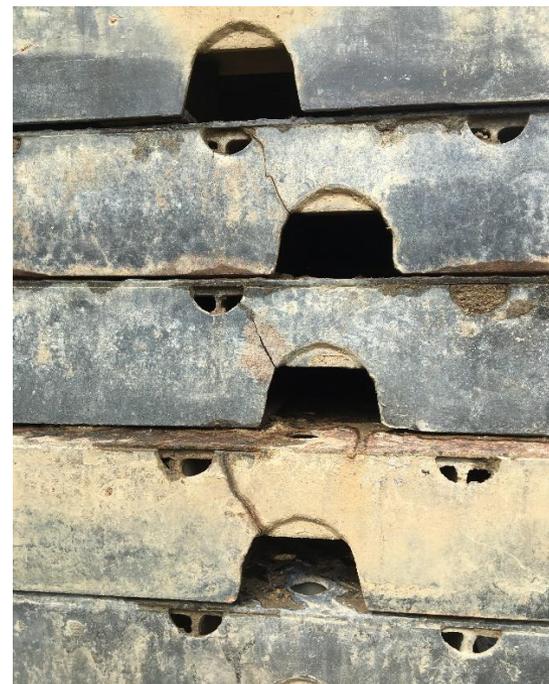
# Temporary Bridges



# Damaged Material



# Cracked Deck Panels



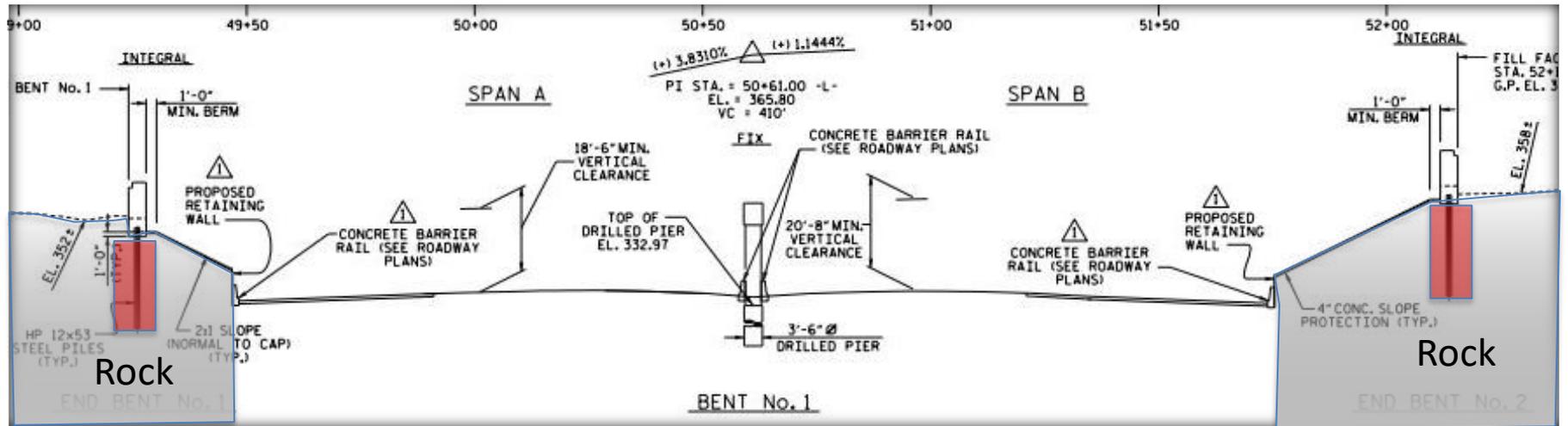
# Temporary Bridges

- Any used material must be shown on the approved drawings (including damage)
- Inspections
  - Prior to loading (Written Certification)
  - Regularly scheduled
    - 1 Month after opening
    - Every 6 Months
    - Every 3 Months (if ADTT > 2000)
  - Inspection Report on SMU Website

# Pre-Construction Questions & Training for Panel Bridges

- Contact M&T to verify condition of material prior to assembly.
  - Used material and condition should also be shown on design drawings
- Stephen Burke (Eastern Region Area Divisions 1-6 & 8)
  - Materials and Tests Unit, Manufactured Materials Group
  - [sburke@ncdot.gov](mailto:sburke@ncdot.gov)
  - Mobile: (919) 524-5203
- Steve Walton (Western Region Area Divisions 7 & 9-14)
  - On behalf of the Materials and Tests Unit, Manufactured Materials Group
  - HDR Engineering
  - [Steven.Walton@hdrinc.com](mailto:Steven.Walton@hdrinc.com)
  - Mobile: (336) 406-6502

# Integral End Bents



Integral

Fixed

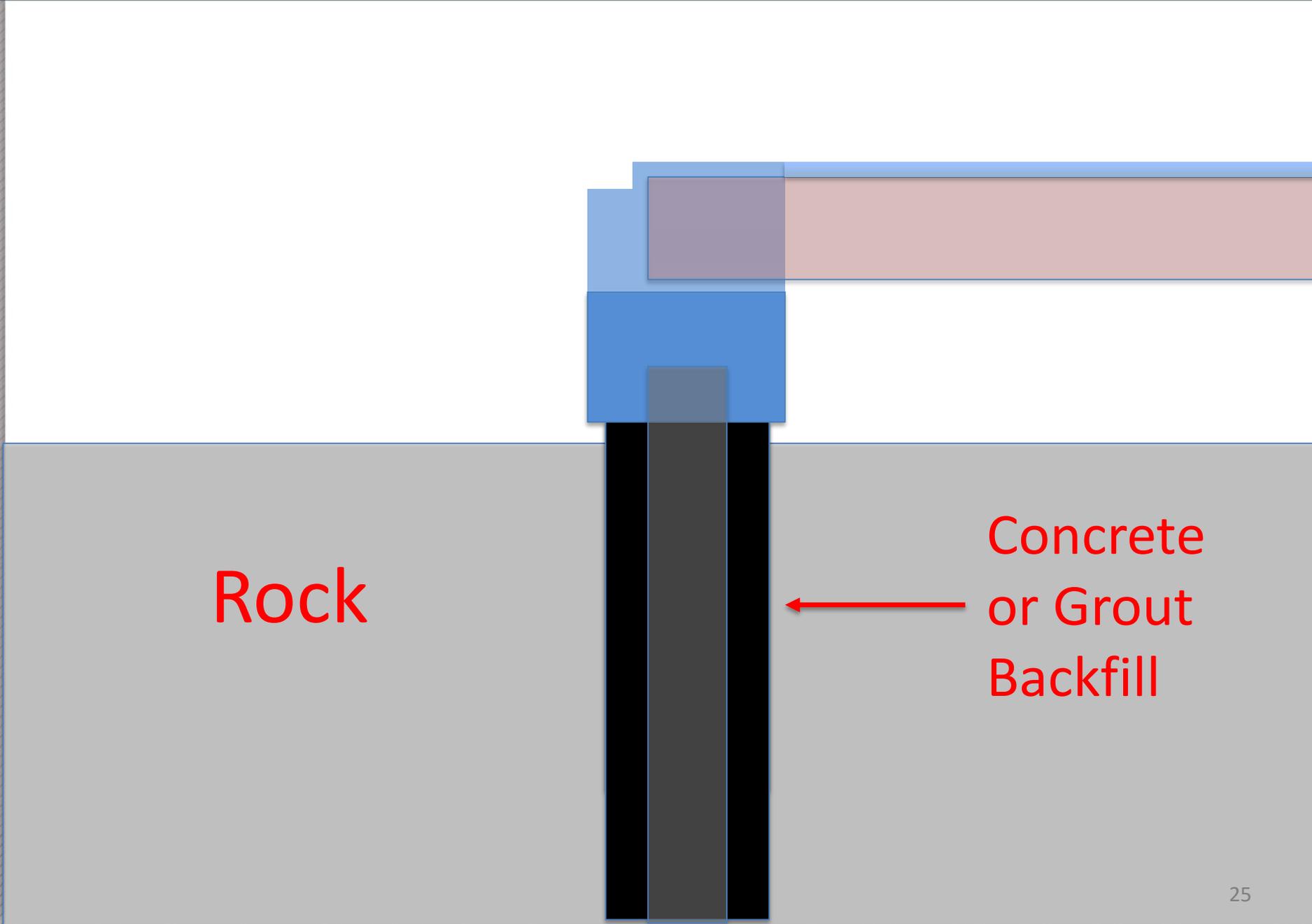
Integral



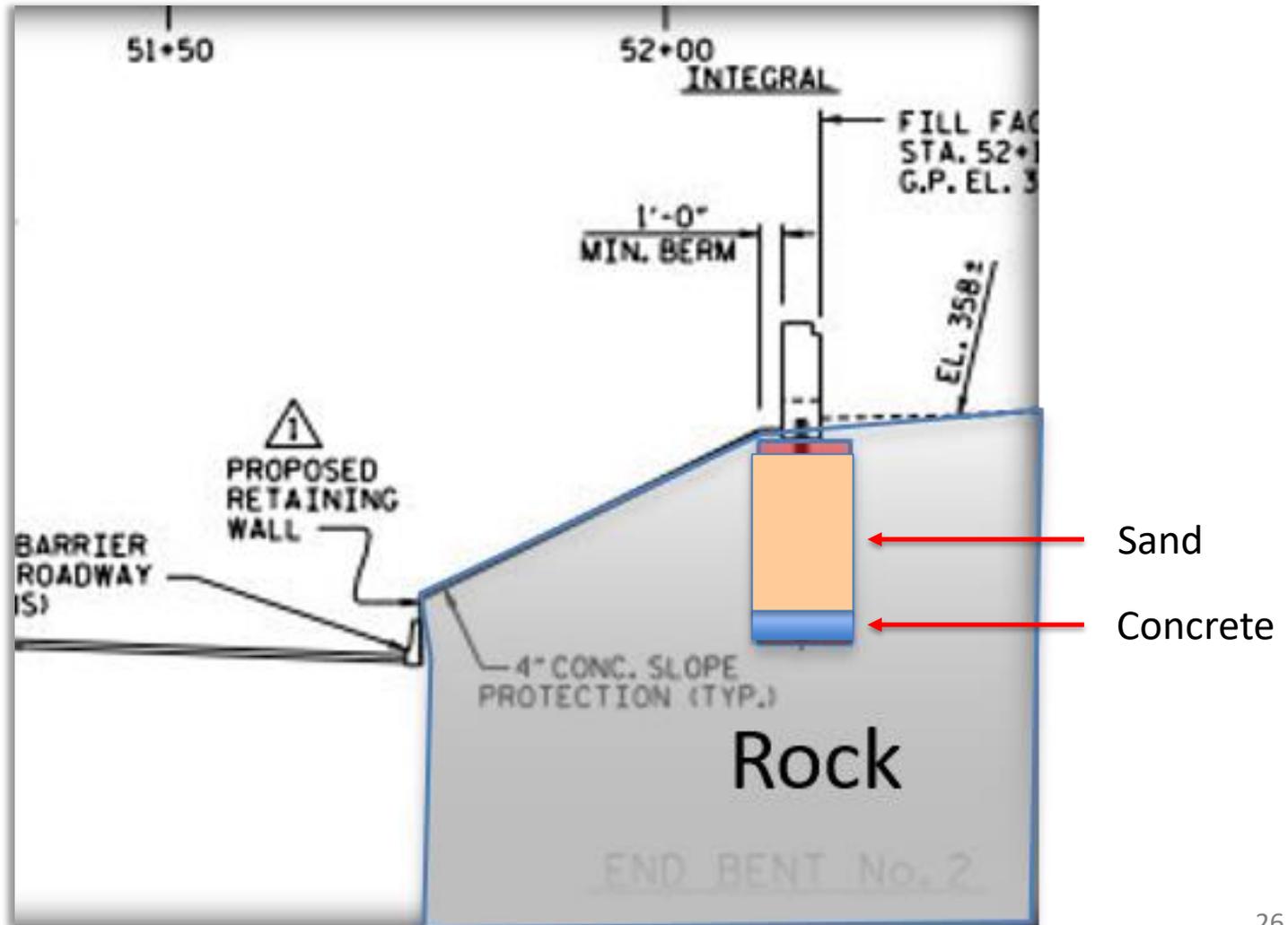
Expansion gets pushed to End Bents

Rock

Concrete  
or Grout  
Backfill



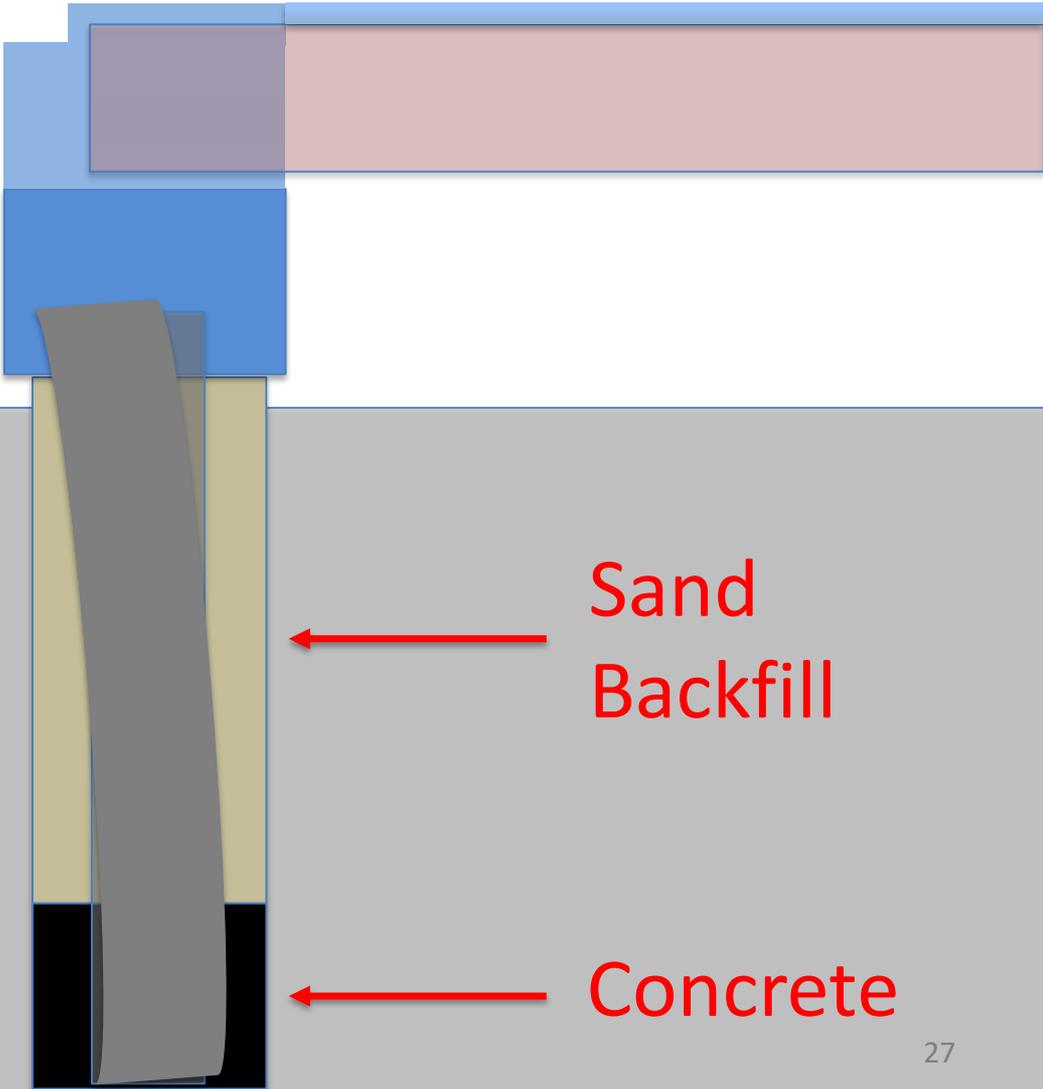
# Integral End Bents



Rock

Sand  
Backfill

Concrete







Separation

# Spalls



When in Rock  
Look for the plan note!

# Barrier Rail



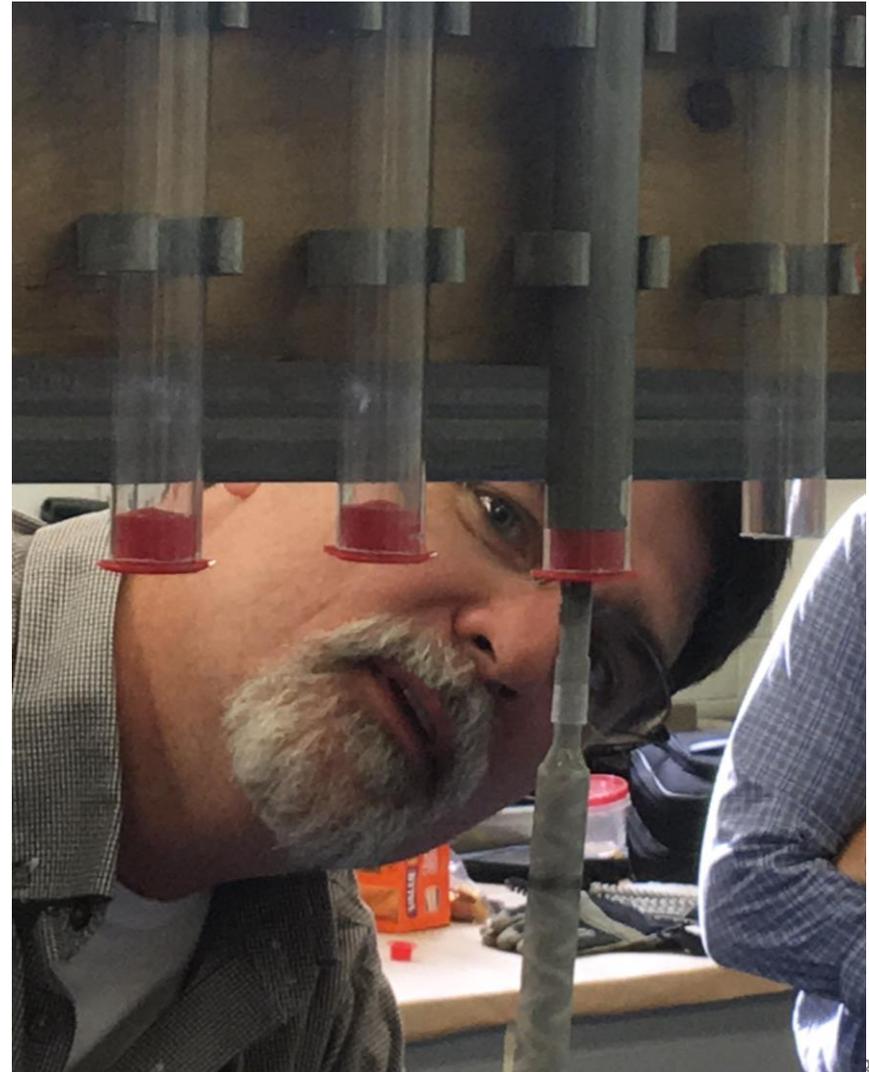
# Barrier Rail



# Barrier Rail



# Adhesive Anchors



# Adhesive Anchors

Some of them didn't look so good

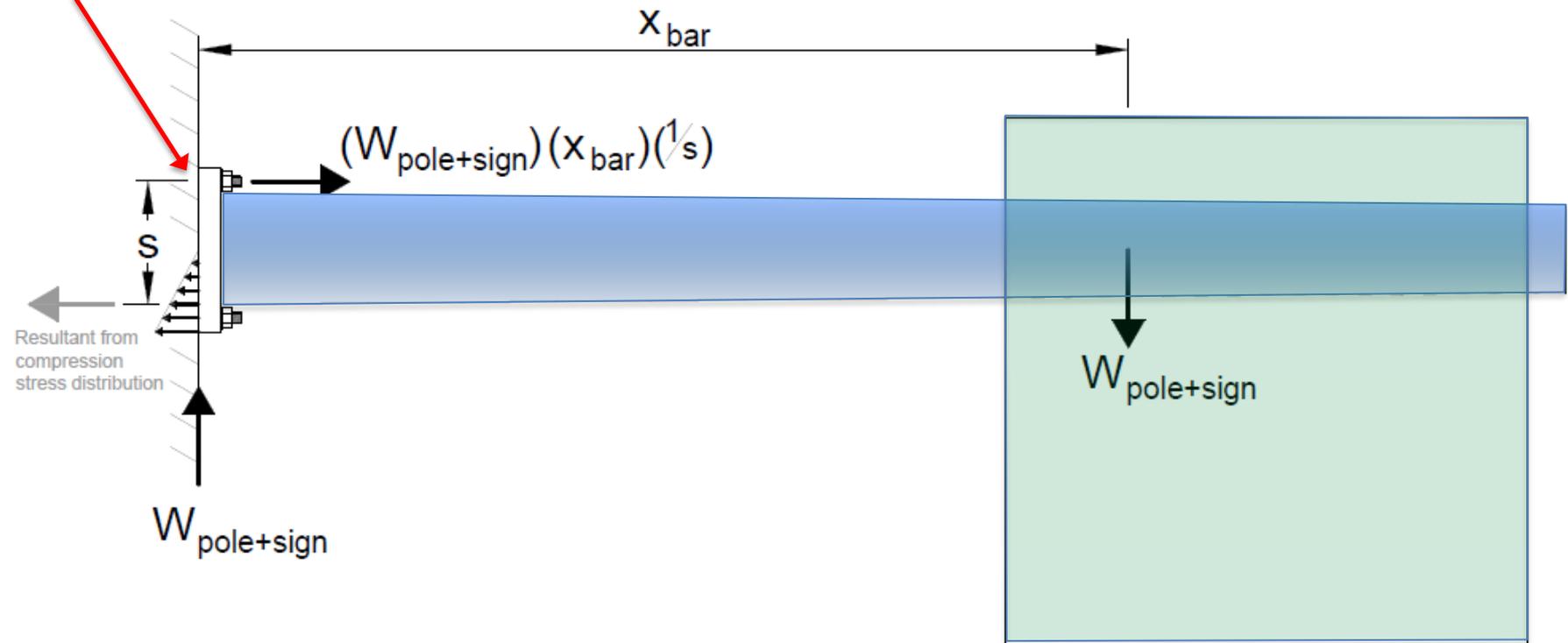


# Adhesive Anchors

- NCDOT policy prohibits installation of adhesive anchors in sustained tension
- This includes not only overhead, but some installations such as cantilever

# Adhesive Anchors

Sustained  
Tension



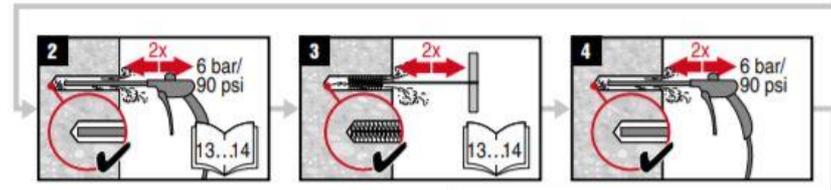
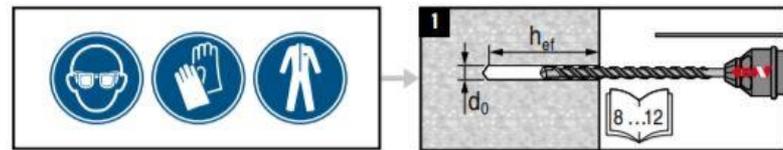
# Adhesive Anchors

- On a Case-by-Case, if there are no other options, may be done if approved by the Engineer (SMU) and only then by an ACI Certified Installer. Must use approved system.

# Adhesive Anchors

Always follow the Manufacturers Printed Installation Instructions

4		<p>HIT-V HAS HIS-N Rebar</p>		$d_0:$ $7/16" \dots 1 1/2"$ $10 \dots 40 \text{ mm}$	$h_{ef}:$ $2 3/8" \dots 75 1/2"$ $60 \dots 1920 \text{ mm}$
---	--	------------------------------------------	--	------------------------------------------------------------	-------------------------------------------------------------------



	B	C	D
	$2 3/8" \dots 9 7/8"$ $60 \dots 250 \text{ mm}$	$2 3/8" \dots 75 1/2"$ $60 \dots 1920 \text{ mm}$	$2 3/8" \dots 75 1/2"$ $60 \dots 1920 \text{ mm}$

# Adhesive Anchors



Inspector Training Or Video  
Coming Soon.....

# Crane Operator Certifications



# Construction Unit Regions

## Construction Unit Region And Area Engineers

**B. C. Skeens, PE (Brian)**  
Assistant State Construction Engineer  
(Western Region - Divisions 7, 9 - 14)  
3931 NC 226 S  
Marion, NC 27852  
Cell: 828-803-1461

**A. C. Cochran, PE (Cameron)**  
Regional Bridge Construction Engineer  
(Western Region - Divisions 7, 9 - 14)  
253 Webster Road  
Sylva, NC 28779  
Cell: 828-777-2690

**W. W. Jones III, PE (Wiley)**  
Assistant State Construction Engineer  
(Eastern Region - Divisions 1 - 6, and 8)  
1543 Mail Service Center  
Raleigh, NC 27699-1543  
Office: 919-707-2403  
Cell: 919-880-1753

**A. V. Earwood, PE (Aaron)**  
Regional Bridge Construction Engineer  
(Eastern Region - Divisions 1 - 6, and 8)  
1543 Mail Service Center  
Raleigh, NC 27699-1543  
Office: 919-730-5138  
Cell: 919-707-2413

Divisions 11 & 12  
**D. W. Eller (Doug)**  
P.O. Box 1460  
Boone, NC 28607  
CS# 15-91-02  
Office: 828-268-6022  
Cell: 336-877-7048

Division 9  
**V. G. Davis, PE (Vickie)**  
1580 Henderson Grove  
Church Road  
Salisbury, NC 28147  
CS# 05-31-01  
Cell: 704-202-0945

Division 7  
**A. E. Griffith, PE (Aaron)**  
121-E Shields Park Drive  
Kernersville, NC 27284  
CS# 02-16-44  
Cell: 336-215-9170

Division 5  
**T. B. Brooks, PE (Troy)**  
1543 Mail Service Center  
Raleigh, NC 27699-1543  
Office: 919-707-2420  
Cell: 336-972-4627

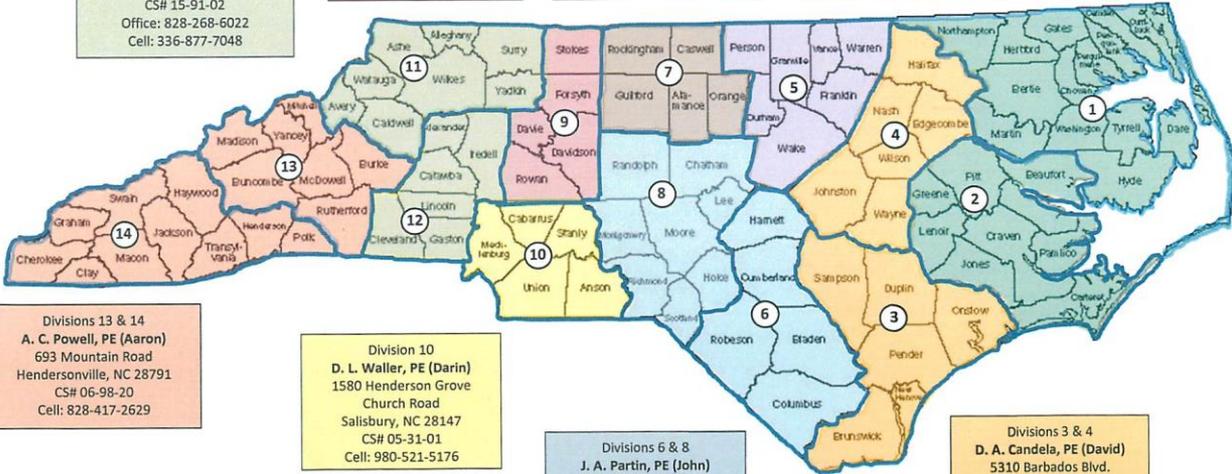
Divisions 1 & 2  
**R. S. Hall, PE (Randy)**  
209 South Glenburnie Road  
New Bern, NC 28560  
CS# 16-00-04  
Cell: 252-675-3208

Divisions 13 & 14  
**A. C. Powell, PE (Aaron)**  
693 Mountain Road  
Hendersonville, NC 28791  
CS# 06-98-20  
Cell: 828-417-2629

Division 10  
**D. L. Waller, PE (Darin)**  
1580 Henderson Grove  
Church Road  
Salisbury, NC 28147  
CS# 05-31-01  
Cell: 980-521-5176

Divisions 6 & 8  
**J. A. Partin, PE (John)**  
300 DOT Drive  
Asheboro, NC 27204  
CS# 13-62-07  
Cell: 336-847-1226

Divisions 3 & 4  
**D. A. Candela, PE (David)**  
5310 Barbados Blvd.  
Suite 102  
Castle Hayne, NC 28429  
CS# 04-08-04  
Cell: 910-524-4931



# Questions?



# Or Other Topics.....