LARGE BARS SPLICED IN UHPC

Christina Freeman

PRECAST BRIDGE ELEMENTS AND SYSTEMS

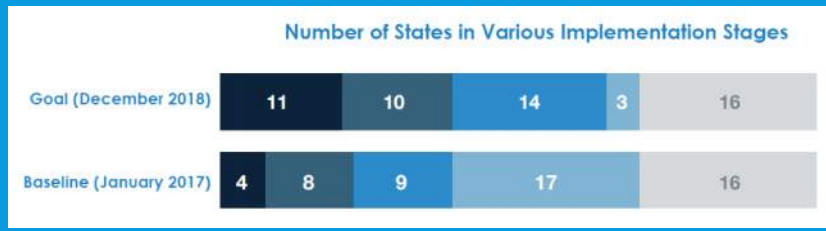
FDOT Transportation Innovation Challenge

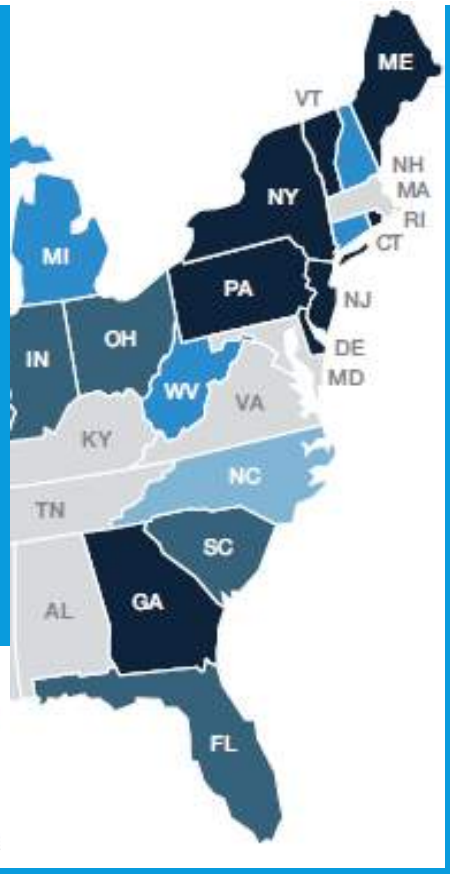
The Department invites you to share your thoughts on ways we can challenge ourselves to be innovative, efficient and exceptional at our **Invitation to Innovation website**

We also invite you to review our Design Office Innovations listed in the links below. Additional innovations will be added as they are identified and developed. If you have any questions, details and contact information are included within the information for each innovation web site.

Structures Design Office

Curved Precast Spliced U-Girder Bridges
Fiber Reinforced Polymer Reinforcing
Geosynthetic Reinforced Soil Integrated Bridge System
Geosynthetic Reinforced Soil Wall
Prefabricated Bridge Elements and Systems
Segmental Block Walls



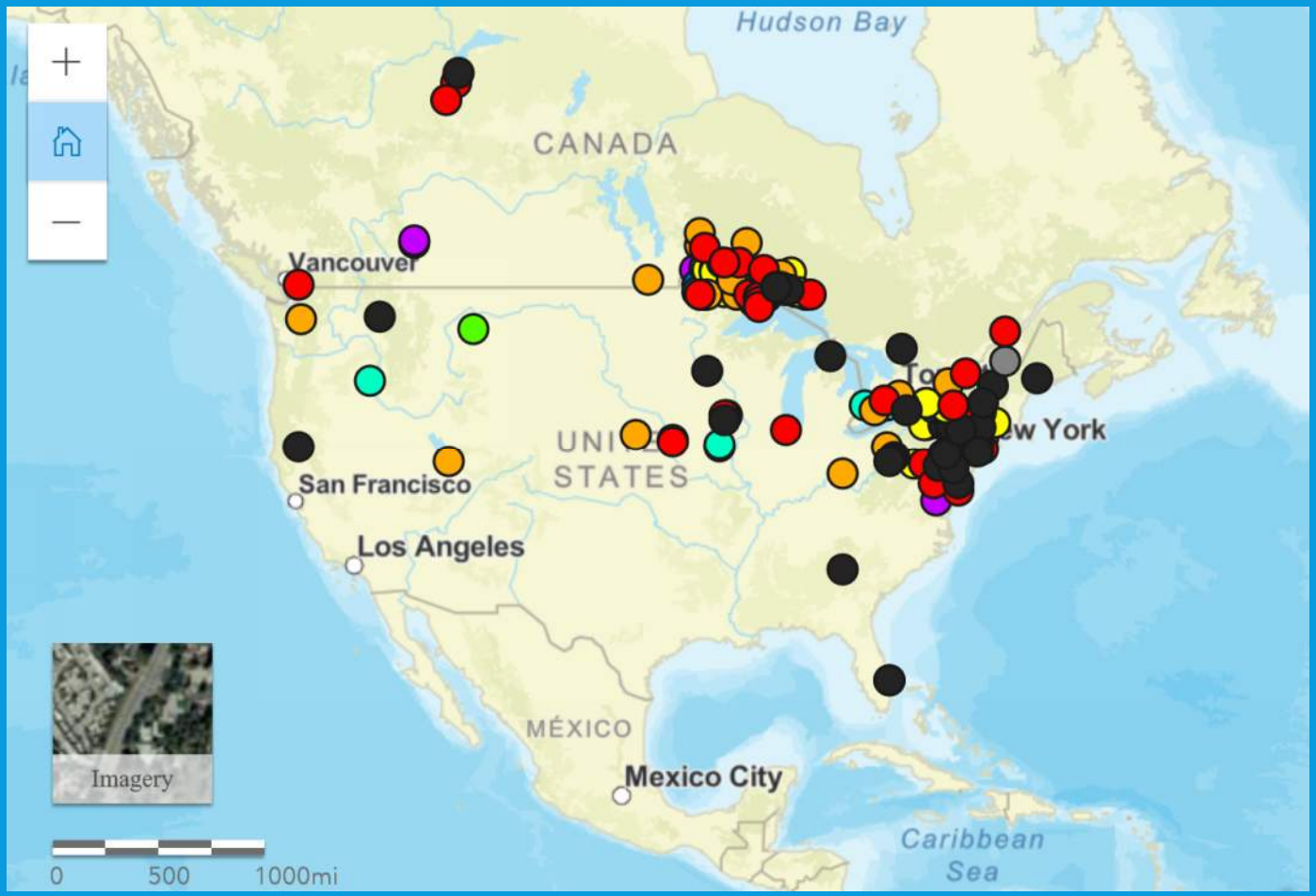


Source: www.fdot.gov, FHWA EDC-4 Summary and Baseline Report

UHPC MATERIAL

- Fiber Reinforced (2%)
- Portland Cement Product
- Water to cementitious ratio < 0.25
- Compressive Strength > 21.7 ksi
- Tensile Strength > 0.72 ksi
- Enhanced Durability

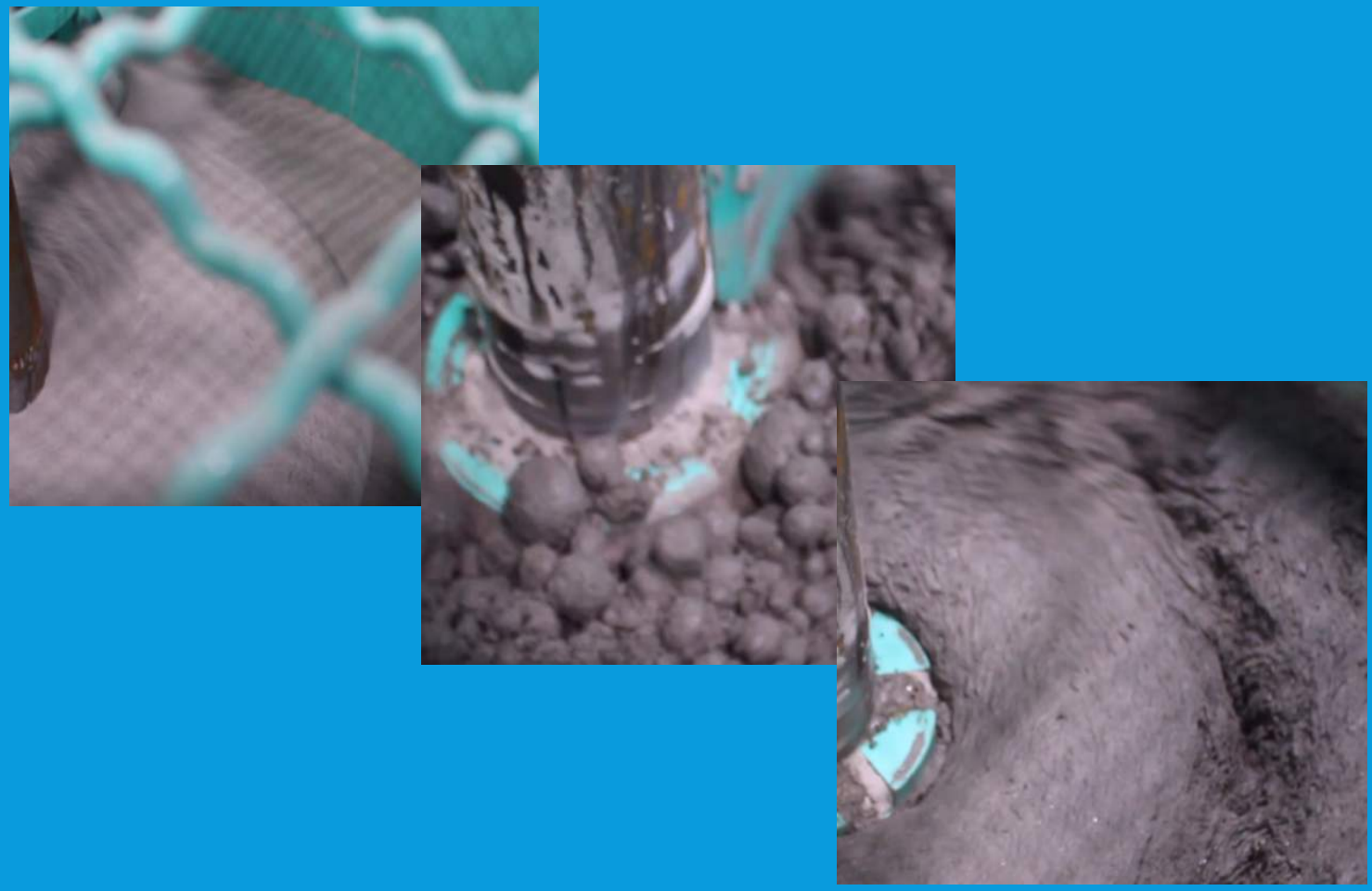
UHPC CONNECTION USE

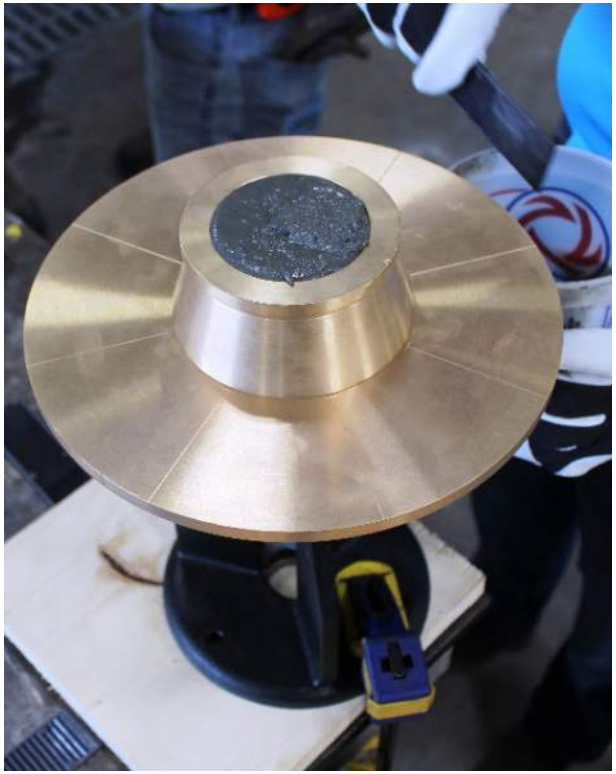


Source: www.fhwa.dot.gov

MIXING

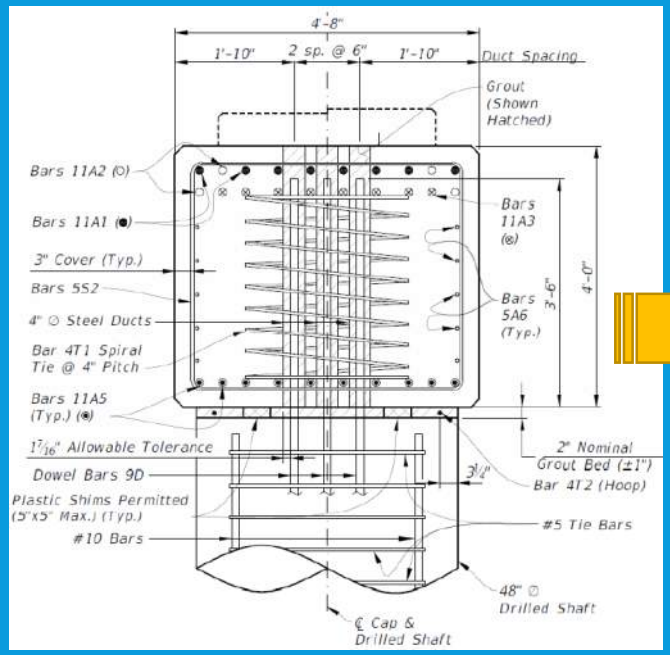
MIXING

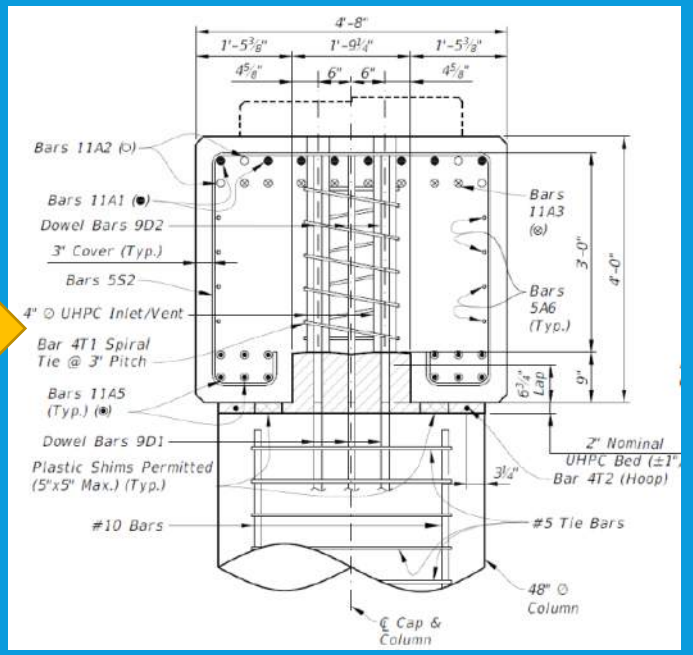


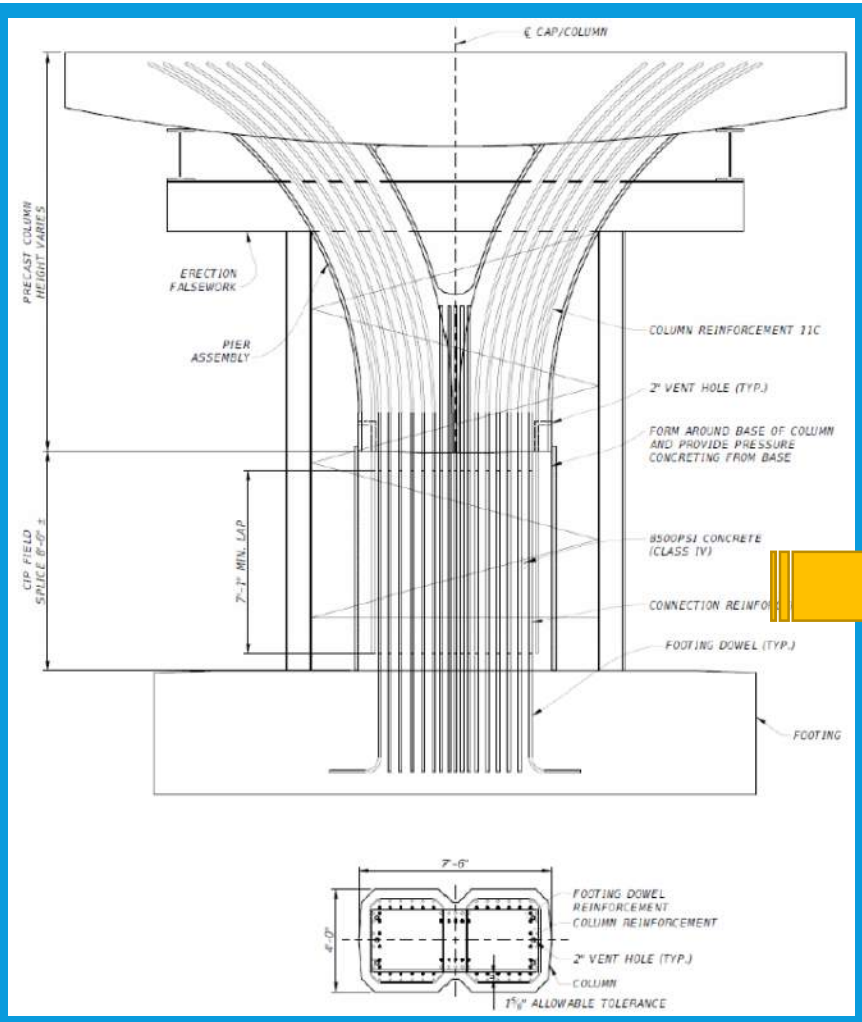

TESTING AND PLACEMENT

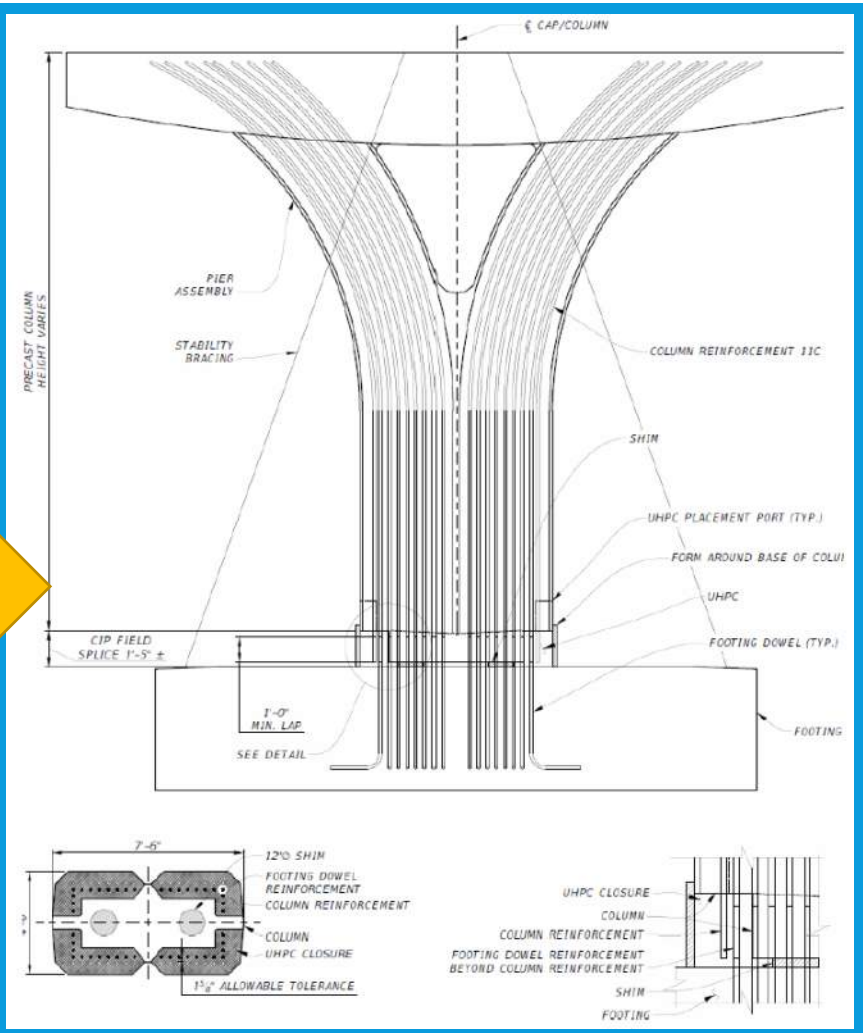
CONNECTION POSSIBILITIES



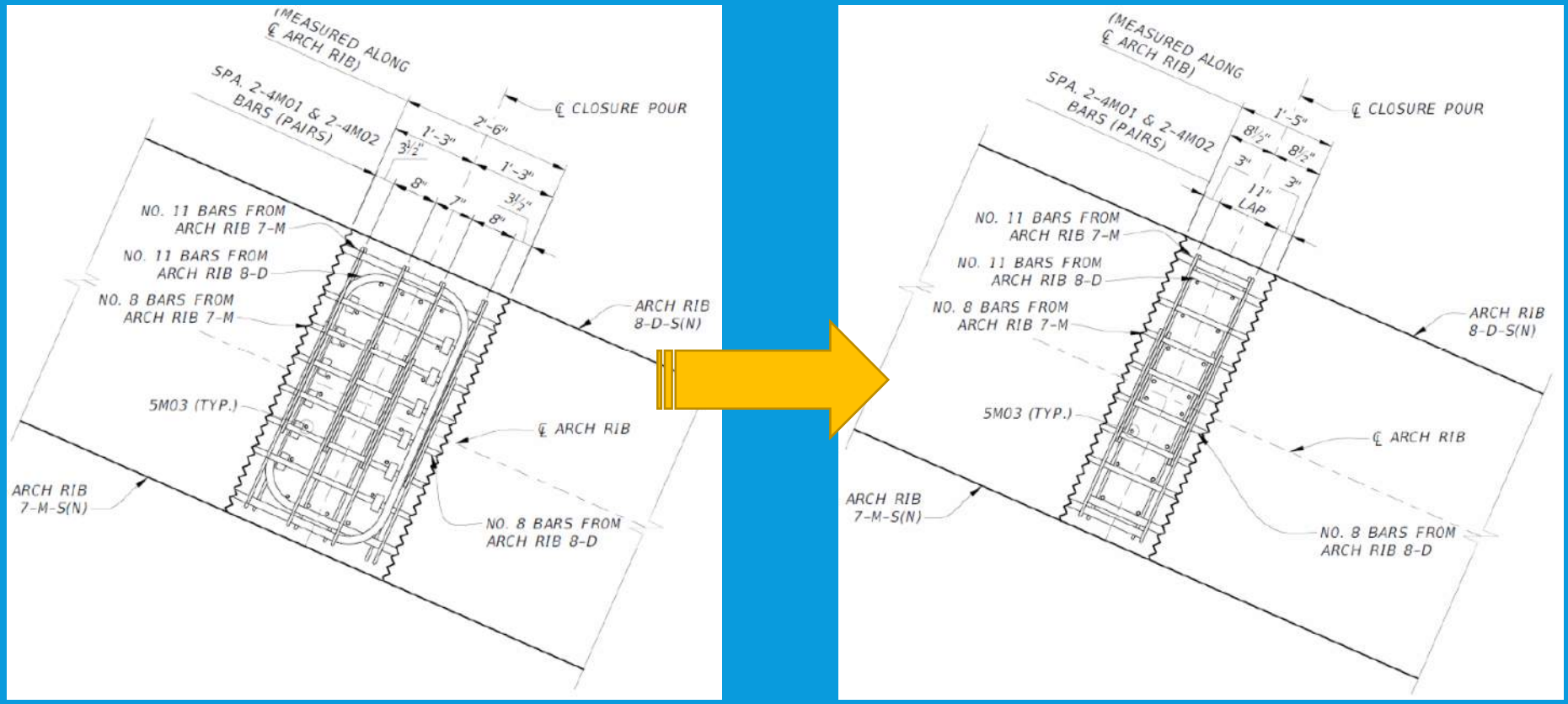


CONNECTION POSSIBILITIES

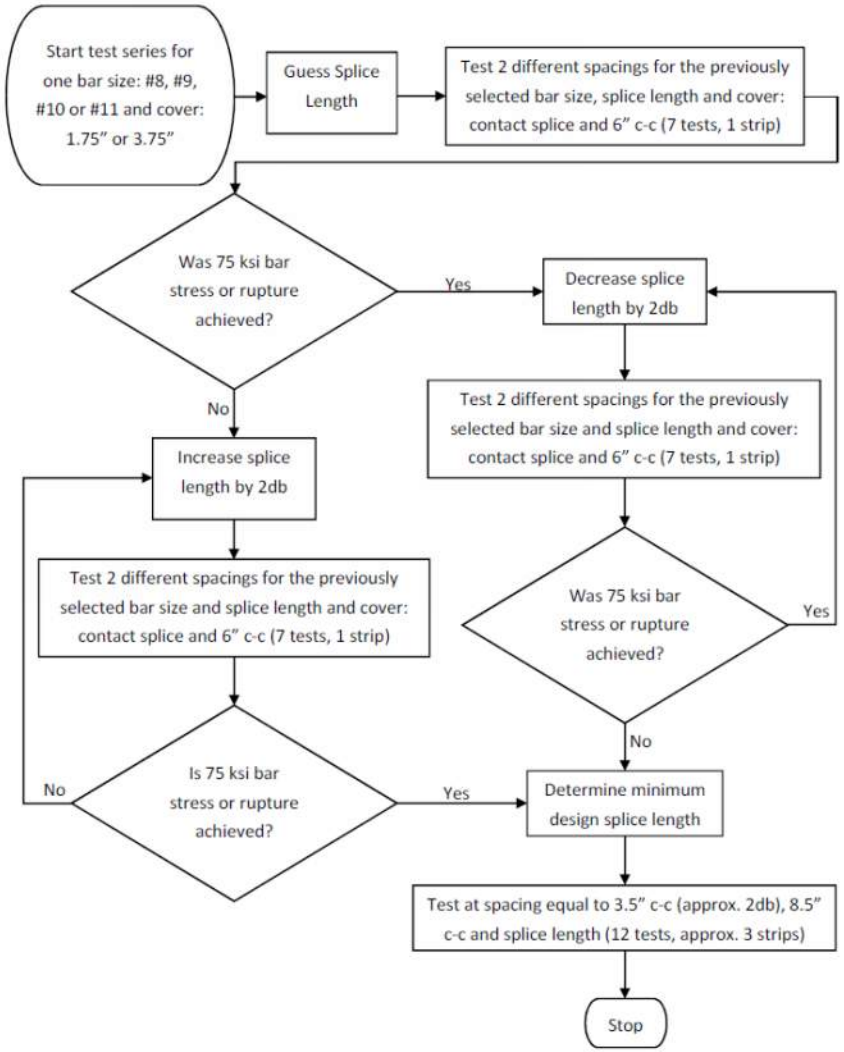




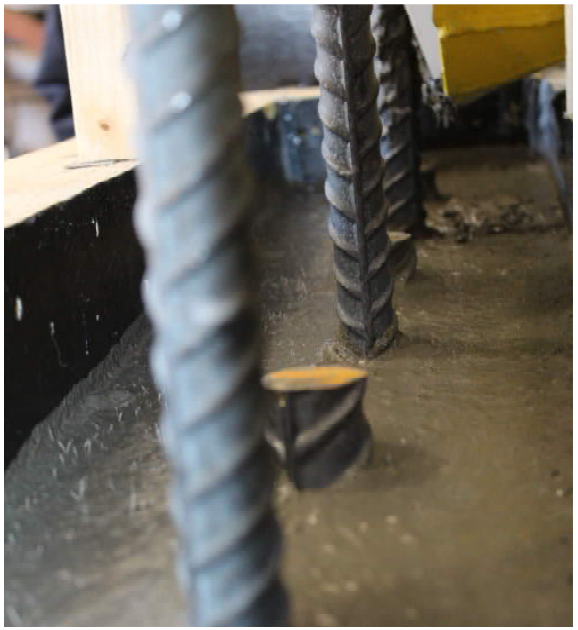
CONNECTION POSSIBILITIES

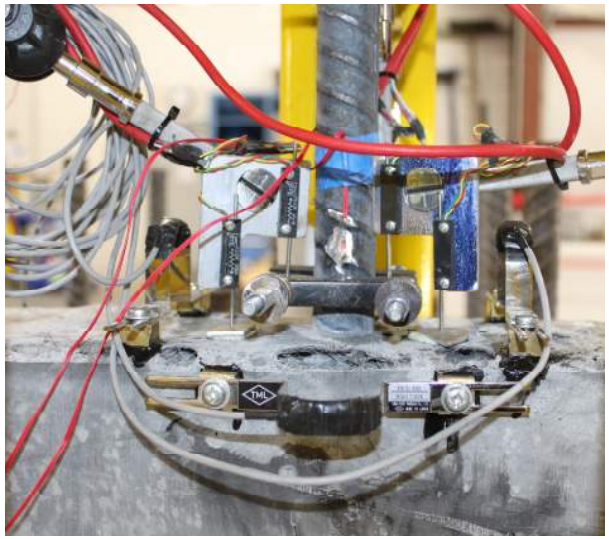


FLOWCHART

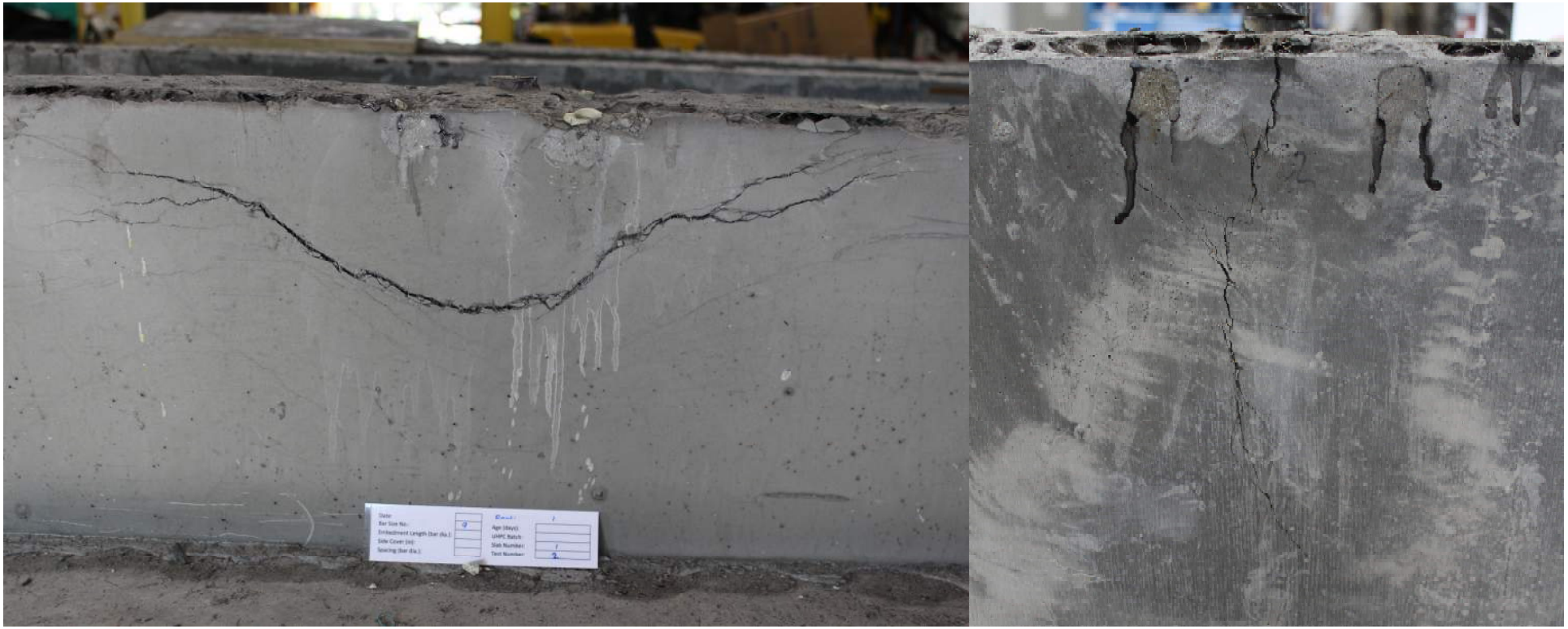

Start test series for one bar size: #8, #9, #10 or #11 and cover: 1.75" or 3.75"
Guess Splice Length
Test 2 different spacings for the previously selected bar size, splice length and cover: contact splice and 6" c-c (7 tests, 1 strip)
Was 75 ksi bar stress or rupture achieved?
Yes
Decrease splice length by 2db
Test 2 different spacings for the previously selected bar size and splice length and cover: contact splice and 6" c-c (7 tests, 1 strip)
Was 75 ksi bar stress or rupture achieved?
Yes
No
Increase splice length by 2db
Test 2 different spacings for the previously selected bar size and splice length and cover: contact splice and 6" c-c (7 tests, 1 strip)
Is 75 ksi bar stress or rupture achieved?
No
Yes
Determine minimum design splice length
Test at spacing equal to 3.5" c-c (approx. 2db), 8.5" c-c and splice length (12 tests, approx. 3 strips)
Stop

UHPC PLACEMENT





TESTING



BREAK MODES

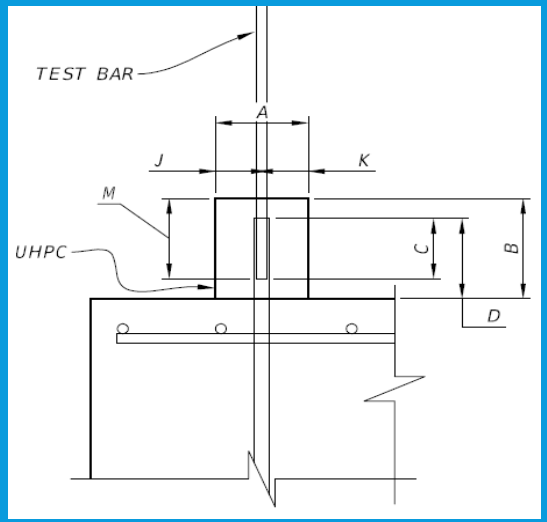
RESULTS PROCESSING

- As-Built Dimensions
- Concrete Compressive Strength
- Tensile Properties per ASTM C1609
- Failure Mode
- Maximum and Cracking Loads
- Maximum Bar Strain and Stress
- Bar Slip
- Bond Stress per Equations from Literature

PRELIMINARY RESULTS

Required Embedment Length (M, D) in Terms of Bar Diameters

		Bar Size	
		No. 8 (Per FHWA)	No. 9
Cover	1.75 inch	8	10
	3.75 in	8	8



ANY QUESTIONS?

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