

# “PRECAST UHPC PILES TO SUPPORT VERTICAL LOADS IN BRIDGE FOUNDATIONS”

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## BACKGROUND:

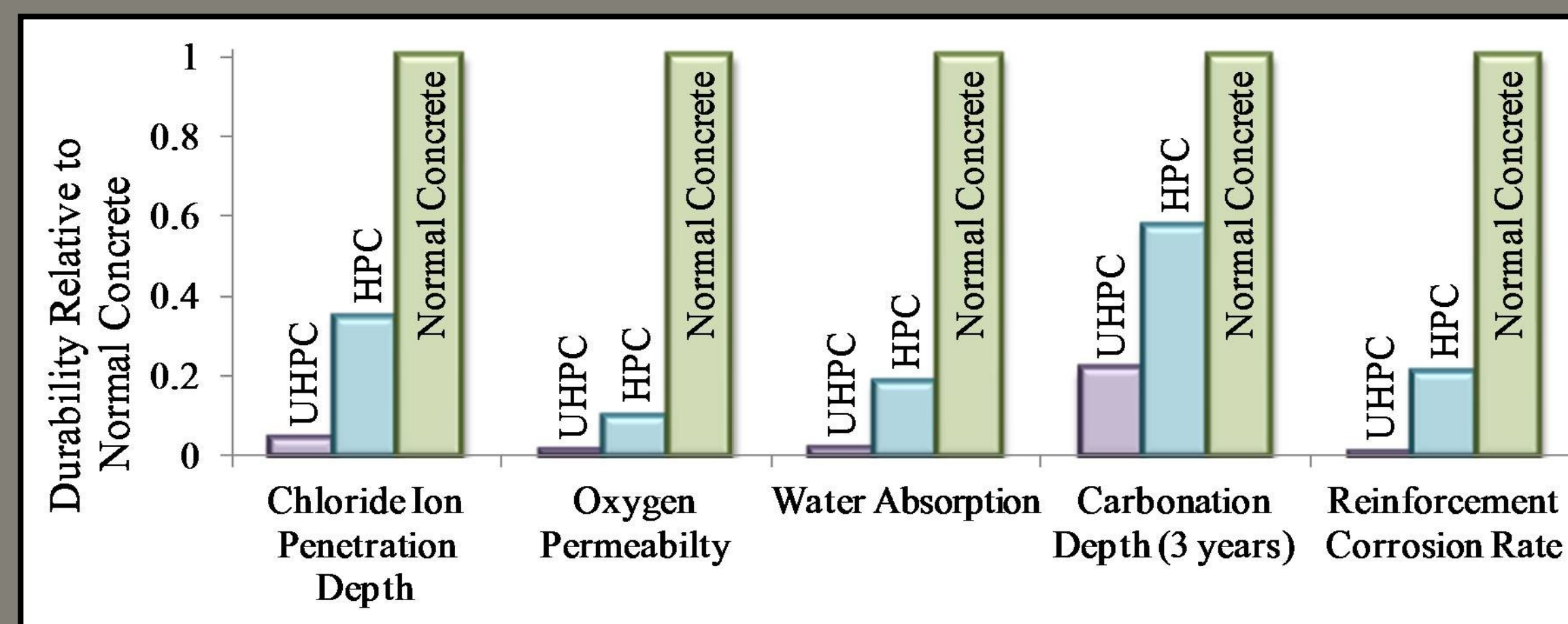
- 20% of the nation’s bridges are structurally deficient or functionally obsolete
- Challenges include increasing the design life and reducing the maintenance costs of bridges
- Durable material must be used in design



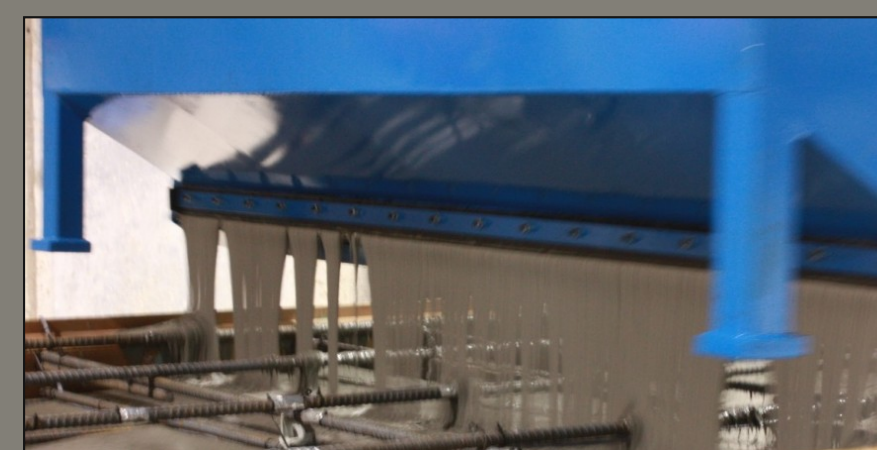
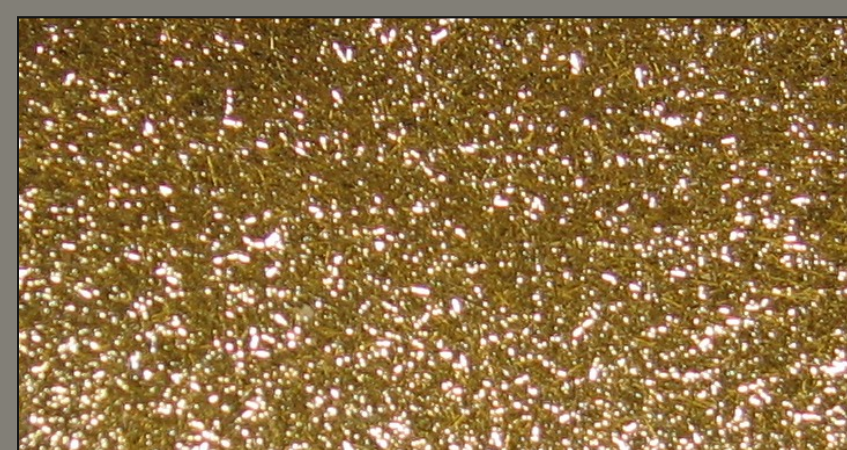
Port Strategy 2007; Salgado 2006, and White et al. 2007 (Clockwise).

## Why UHPC?

- High durability of UHPC material compared to normal concrete material

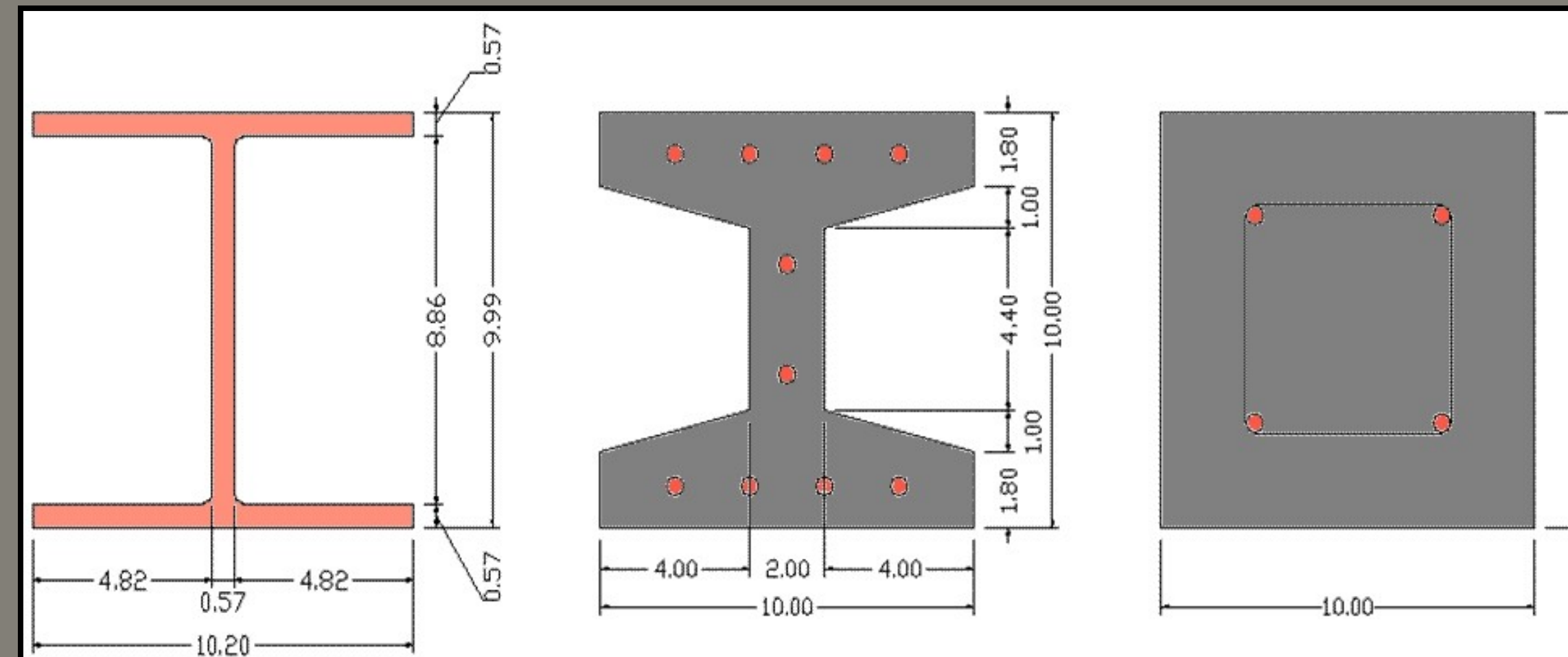


## MATERIAL PROPERTIES UHPC vs. CONCRETE



Property	UHPC	HPC	Normal Concrete
Compressive Strength, ksi	26-30	12-18	4-8
Tensile Strength, ksi	1.7	0.8-0.9	0.3-0.7
Elastic Modulus, ksi	8000	4800-6400	3600-5100

## HP 10 x 57, UHPC, AND CONCRETE PILE CROSS-SECTION (IN INCHES)



Parameter	HP 10 x 57	UHPC	Normal Concrete
Area, in <sup>2</sup>	16.8	56.8	100.0
Weight/ft, lb	57.2	61.1	107.6
Moment of Inertia (Weak Axis), in <sup>4</sup>	101	370	833

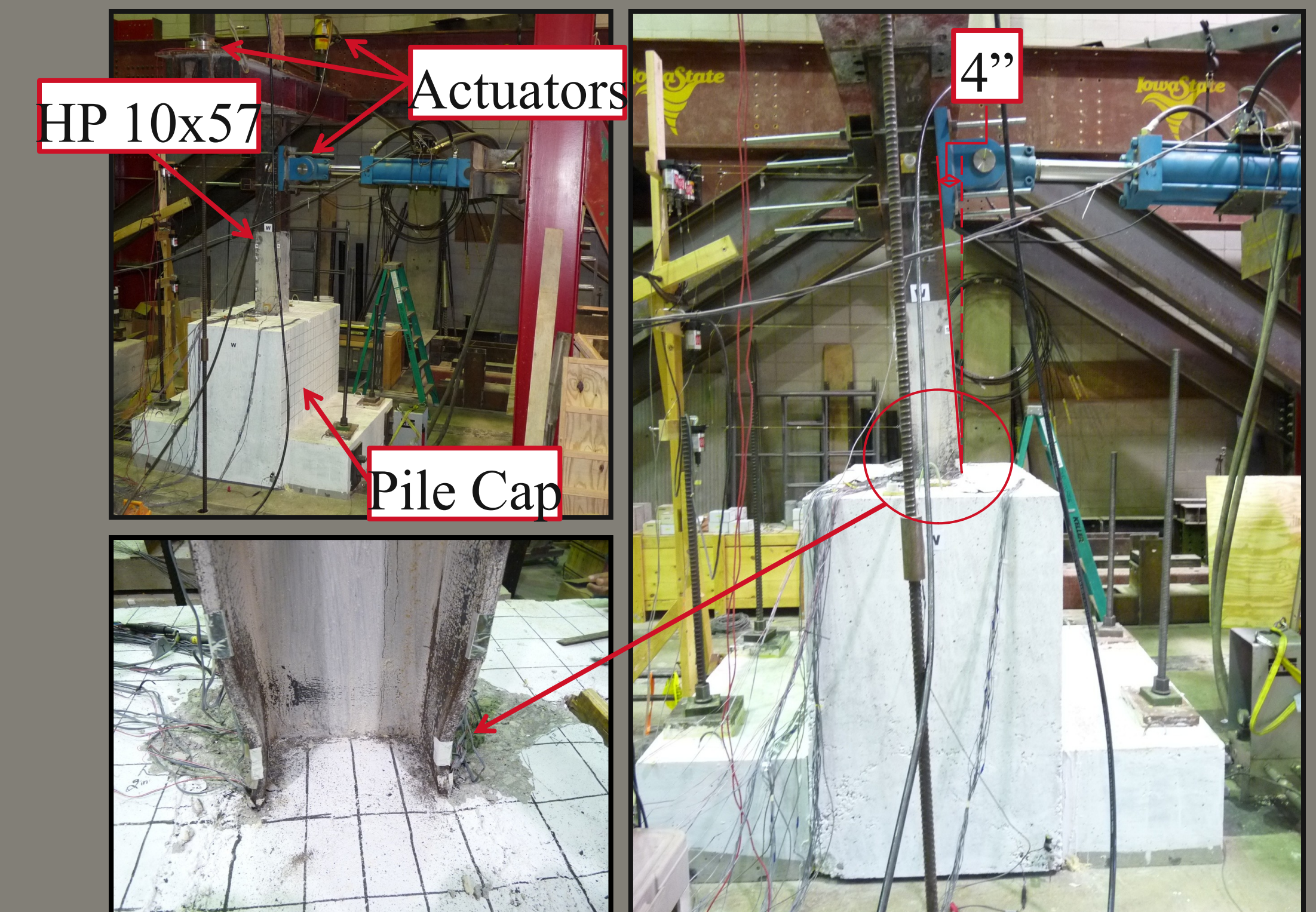
## BENEFIT OF UHPC PILES:

- Increased driveability over normal concrete do to the reduced cross-sectional area
- 86% increased vertical load capacity over HP 10x57 piles
- Same driving equipment as steel piles
- No pile cushion necessary during driving
- Lower maintenance cost

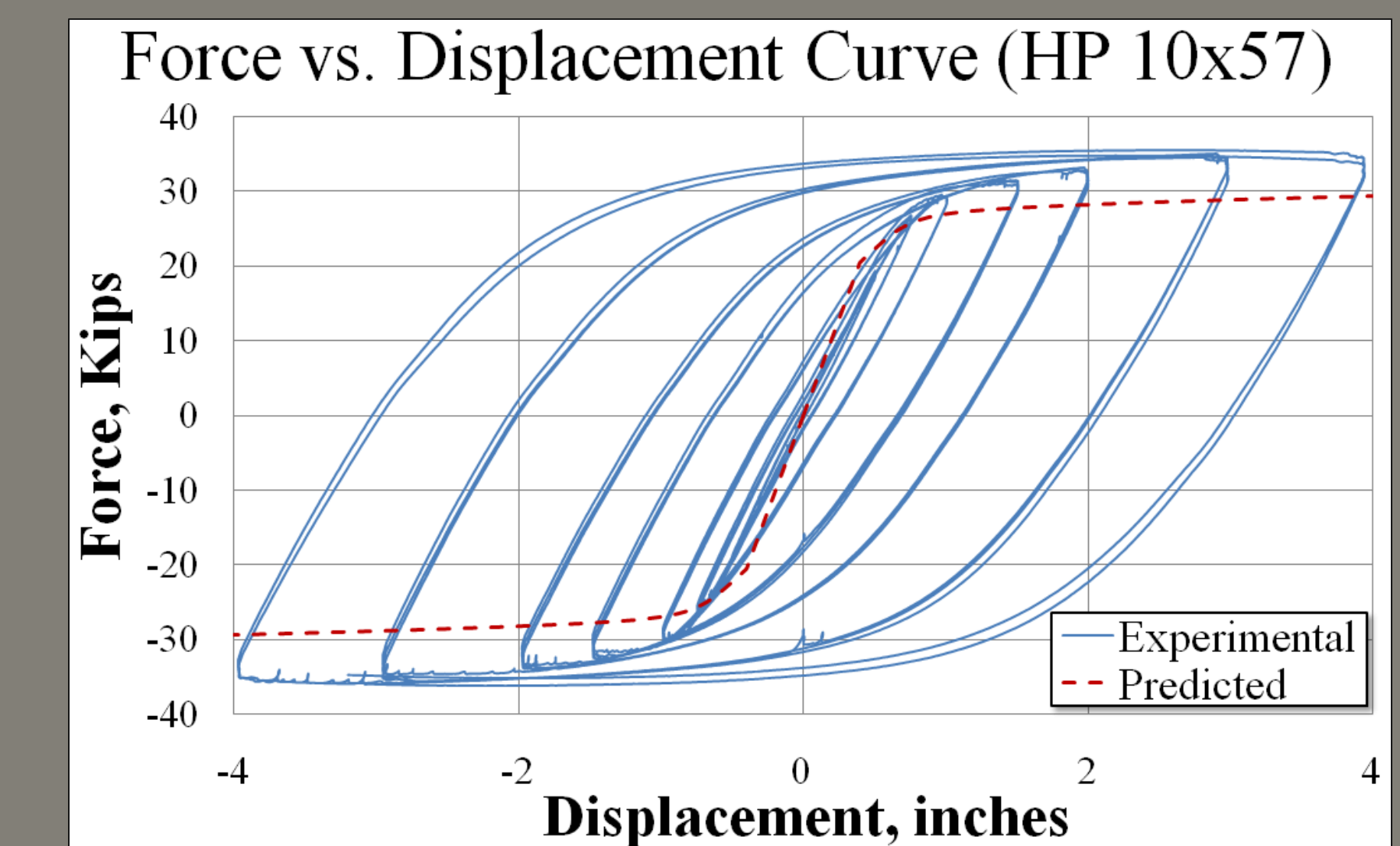
## UHPC PILE-TO-PILE CAP CONNECTION TEST CONSTRUCTION:



## CONNECTION TEST:



## RESULTS OF LABORATORY TEST:



## FUTURE UHPC WORK:

1. Laboratory Testing:
  - UHPC pile connection test
2. Field Testing:
  - Static Load Test
  - Lateral Load Test
3. Long Term Monitoring:
  - 56' UHPC pile (Sac County Bridge )