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

Why UHPC?

- High durability of UHPC material compared to normal concrete material

Material Properties UHPC vs. Concrete

<table>
<thead>
<tr>
<th>Property</th>
<th>UHPC</th>
<th>HPC</th>
<th>Normal Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength, ksi</td>
<td>26-30</td>
<td>12-18</td>
<td>4-8</td>
</tr>
<tr>
<td>Tensile Strength, ksi</td>
<td>1.7</td>
<td>0.8-0.9</td>
<td>0.3-0.7</td>
</tr>
<tr>
<td>Elastic Modulus, ksi</td>
<td>8000</td>
<td>4800-6400</td>
<td>3600-5100</td>
</tr>
</tbody>
</table>

Benefit of UHPC Piles:

- Increased driveability over normal concrete due 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:

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)