U.S. Department of Transportation
Federal Highway Administration

Priority, Market-Ready Technologies and Innovations

Augered Piles

Problem: Bridge deficiencies create safety and mobility concerns

As the Nation's highway infrastructure continues to deteriorate, bridge deficiencies adversely impact mobility, safety, and economic development. Many State departments of transportation (DOT) are struggling to maintain an acceptable schedule of bridge maintenance, repair, and replacement. In 2002, 14 percent of all bridges that are 6.1 meters (20 feet) or longer were considered structurally deficient. Restrictions on vehicle weights as a result of these deficiencies may lead to certain vehicles using alternate routes, thus lengthening travel times and reducing efficiency. At the same time, traffic congestion continues to increase.

To mitigate the problems associated with deficient bridges and increased traffic, bridges throughout the country must be replaced or widened, and lane capacity will need to be added. Improving the Nation's infrastructure will require a significant investment. To mitigate congestion, construction schedules must be accelerated to reduce impact to the public and be economically stringent to provide funds for more projects. To achieve these goals, foundation design and construction must identify more efficient and cost-effective methods for supporting structures.

Putting It in Perspective

- Twenty-seven percent of the Nation's bridges are structurally deficient or functionally obsolete.
- One in every five highway projects is considered "traffic sensitive."
- From 1991 to 2001, vehicle travel grew at a rate seven times higher than did added roadway capacity.
- The cost of repairing all U.S. bridge deficiencies is estimated at $136 billion.

Solution: Augered pile foundations offer a low-cost alternative

What are augered piles?

Augered piles are a deep-foundation element characterized by drilling a hollow-stem auger into the ground to form the pile's diameter. Sand-cement grout or concrete is pumped into the hole as the auger is removed, eliminating the need for temporary casing or slurry. After the auger is removed, reinforcement is installed. Typically, augered piles are grouped based on the type of equipment used to install them. The three most common types are Auger Cast-in-Place (ACIP), Continuous Flight Auger, and ACIP-Displacement. Augered piles generally are available in 304.8- to 914.4-millimeter (12- to 36-inch) diameters and typically extend to depths of 18.3–21.3 meters (60–70 feet). In some cases, augered piles have been installed to depths of more than 30.5 meters (100 feet).

Why use augered piles?

Augered piles can be installed quickly and inexpensively, and are a viable foundation alternative to driven piles or drilled shafts for certain applications. Augered piles can support lateral earth and critical and noncritical structures, and can be used in ground improvement applications.

Typical highway project applications for augered piles include structure support for new bridges, bridge widening, sound wall foundations, column support for embankment construction, and secant walls for lateral earth support. Augered piles are a good deep-foundation solution in areas that are environmentally sensitive or require minimal disturbance to human activity.

Successful Applications: States use augered piles on various projects

Approximately 10 State DOTs and the Federal Highway Administration (FHWA) Federal Lands Highway Department have approved the use of augered piles on a project-specific basis.

In the mid-1990s, the Texas DOT began using ACIP piles as foundations for sound walls in the Houston, TX area. The State successfully completed construction of a bridge in Crossley, TX, supporting the abutments on 69 46-centimeter (18-inch) diameter ACIP piles. Pile lengths were as long as 20.4 meters (67 feet). To handle lateral loads, some of the piles were constructed on a 4-to-1 batter. Texas DOT is planning to construct a bridge that will be founded on ACIP piles in Dallas, TX.

To reduce vibrations that might have caused potential damage to an active metro subway line, the District of Columbia DOT used ACIP displacement piles to construct the foundation elements for a portion of a replacement structure. The piles were installed under low headroom conditions and created minimal vibrations, which reduced disturbances to the overhead metro line.

Benefits

- Rapid installation accelerates foundation construction, which reduces project schedules.
- Automated monitoring equipment provides real-time quality control.
- Suitable for low headrooms or confined spaces.
- Limited installation noise and vibration for sensitive urban environments.

Additional Resources

To learn more, visit
www.fhwa.dot.gov/resourcecenter/index.htm.

For more information, contact:

Silas Nichols, FHWA Resource Center
Phone: 410–962–2460
E-mail: silas.nichols@fhwa.dot.gov

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