

Pile Installation



FEMA

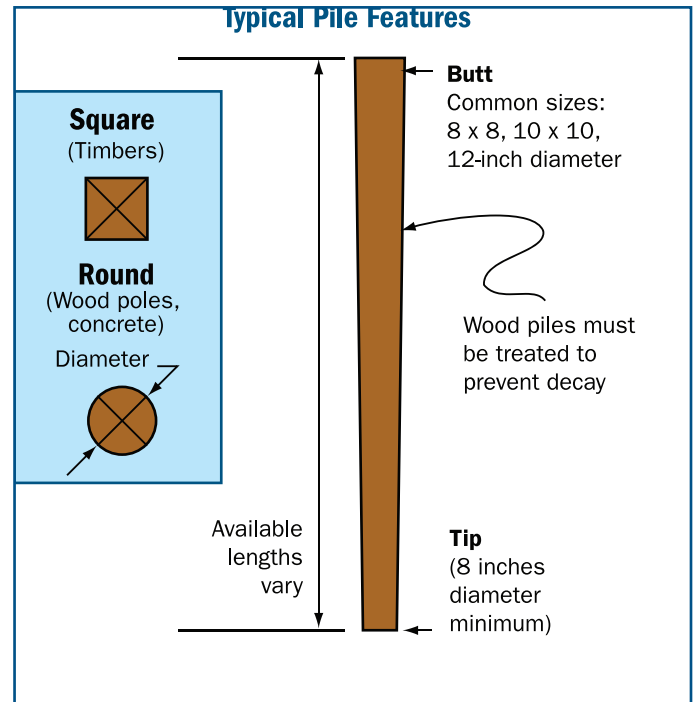


HOME BUILDER'S GUIDE TO COASTAL CONSTRUCTION FEMA 499/August 2005 Technical Fact Sheet No. 12

Purpose: To provide basic information about pile design and installation.

Key Issues

- Use a pile type that is appropriate for local conditions.
- Have piles designed by a foundation engineer for adequate layout, size, and length.
- Use installation methods that are appropriate for the conditions.
- Brace piles properly during construction.
- Make accurate field cuts, and treat all cuts and drilled holes to prevent decay.
- Have all pile-to-beam connections engineered, and use corrosion-resistant hardware. (See Fact Sheet No. 8.)

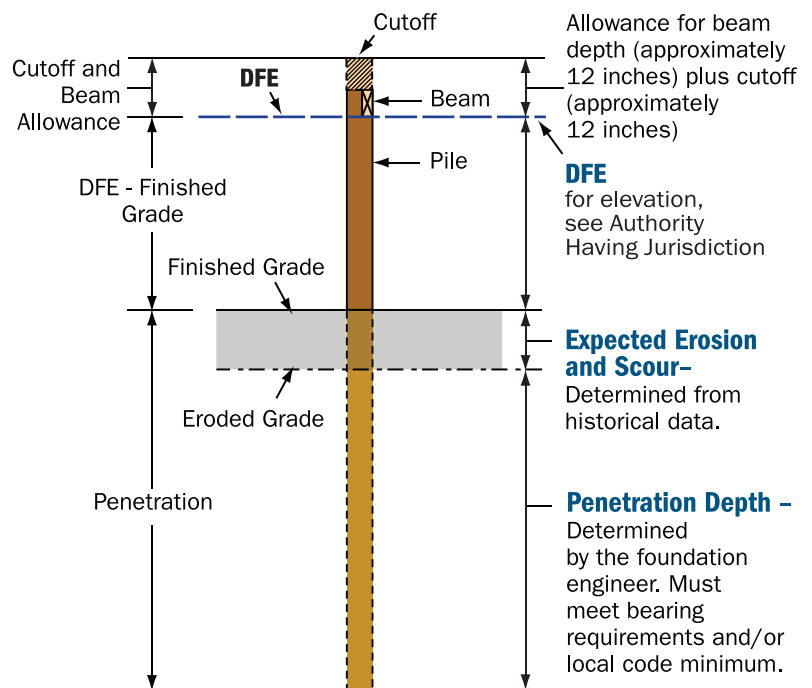


Pile Types

Treated wood piles are the most common type of pile used in coastal construction. They can be square or round in cross section. Wood piles are easily cut and adjusted in the field and are typically the most economical type. Concrete and steel can also be used but are less common. Concrete piles are more expensive, but they are stronger and more durable. Steel piles are rarely used, because of potential corrosion problems.

Pile Size and Length

Pile size and length are determined by the foundation engineer. Specified bearing and penetration requirements must be met. Piles should have no less than an 8-inch tip diameter; minimum timber size should be 8x8. The total length of the pile is based on code requirements, calculated penetration requirements, erosion potential, Design Flood Elevation (DFE), and allowance for cut-off and beam width (see figure at right).



Note: Misaligned piles lead to connection problems. See Fact Sheet No. 13 for information about making connections to misaligned piles.

Pile Layout

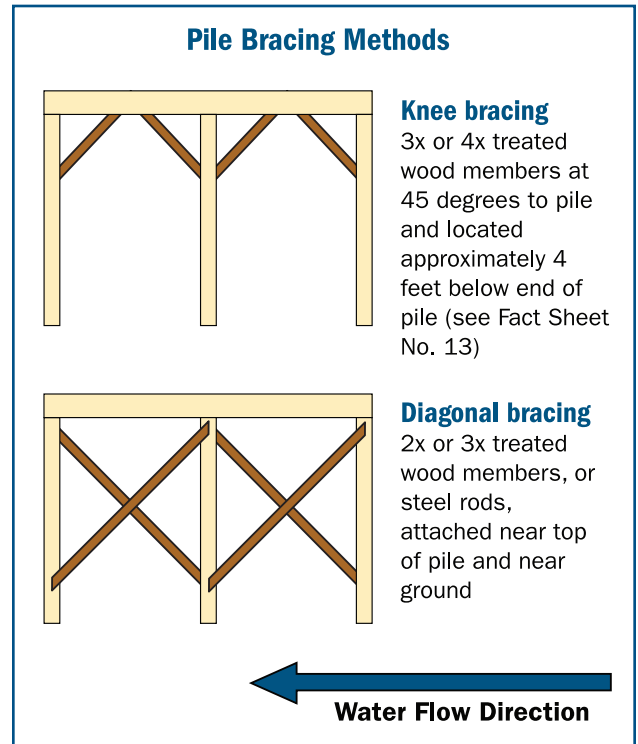
The pile layout is determined by the foundation engineer. Accurate placement and correction of misaligned piles is important. Pile placement should not result in more than 50 percent of the pile cross-section being cut for girder or other connections. Verify proper pile locations on drawings before construction and clarify any discrepancies. Layout can be done by a licensed design professional, a construction surveyor, the foundation contractor, or the builder. The layout process must always include establishing an elevation for the finished first floor. Construction of the first-floor platform should not begin until this elevation is established (see Fact Sheet No. 4).

Installation Methods

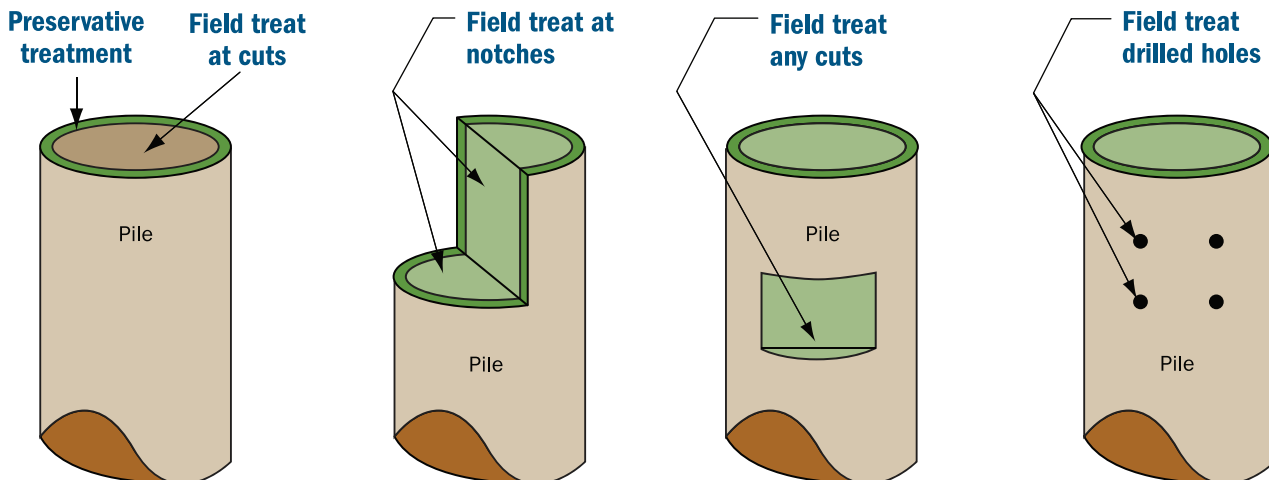
Piles can be driven, augured, or jetted into place. The installation method will vary with soil conditions, bearing requirements, equipment available, and local practice. One common method is to initially jet the pile to a few feet short of required penetration, then complete the installation by driving with a drop hammer.

Pile Bracing

Pile bracing is determined by the foundation engineer. Common bracing methods include knee and diagonal bracing. Bracing is often oriented perpendicular to the shoreline so that it is not struck broadside by waves, debris, and velocity flow (see figure at right). Temporary bracing or jacking to align piles and hold true during construction is the responsibility of the contractor.



To avoid costly pile repairs or replacement, measure, locate, and double-check the required pile cutoff elevations before cutting off piles.



Field Cutting and Drilling

A chain saw is the common tool of choice for making cuts and notches in wood piles. After making cuts, exposed areas should be field-treated to prevent decay.

Connections

The connection of the pile to the structural members is one of the most critical connections in the structure. Always follow design specifications and use corrosion-resistant hardware (see Fact Sheet Nos. 8 and 13).

Verification of Pile Capacity

Generally, pile capacity for residential construction is not verified in the field. If a specified minimum pile penetration is provided, bearing is assumed to be acceptable for the local soil conditions. Subsurface soil conditions can vary from the typical assumed conditions, so verification of pile capacity may be prudent, particularly for expensive coastal homes. Various methods are available for predicting pile capacity. Consult a foundation engineer for the most appropriate method for the site.

Additional Resources

American Forest and Paper Association (AF&PA). *National Design Specification for Wood Construction*. (www.afandpa.org)

American Society for Standards and Testing (ASTM). *Standard Specification for Round Timber Piles*, ASTM D25. (www.astm.org)

American Wood-Preservers Association (AWPA). *All Timber Products – Preservative Treatment by Pressure Processes*, AWPA C1-00; *Lumber, Timber, Bridge Ties and Mine Ties – Preservative Treatment by Pressure Processes*, AWPA C2-01; *Piles – Preservative Treatment by Pressure Process*, AWPA C3-99; and others. (www.awpa.com)

Pile Buck, Inc. *Coastal Construction*. (www.pilebuck.com)