Bank Stabilization
Shoreline Protection at Lake Seminole

Actions to protect the shoreline by stabilizing banks are authorized by Lake Seminole's Resource Management Office through the "Nationwide Permit Program" (*Code of Federal Regulations*, Title 33, Chapter II, Part 330). These actions may include placing material like rip-rap or serge stone along the shoreline, or installing retaining walls in steeper situations. Retaining walls may be constructed of wood, metal sheet piling, or reinforced earth incorporating modular precast "stones." Other "natural-looking" construction may be considered; however, poured-in-place concrete, concrete blocks, bricks, and other similar materials having a "commercial" appearance will not be approved. Applicant must meet with a member of the resource management staff to discuss the proposed work then submit a plan showing the work site and design of the proposed shoreline protection. This plan shall address any specific items resulting from the meeting and include a dimensioned layout showing all construction materials. Written approval must be received before starting work. In general, bank stabilization actions shall comply with the following basic guidelines:

- The activity shall be a single and complete project with a maximum length of 500 feet. Larger activities require a Department of the Army permit and cannot be permitted through the "Nationwide Permit Program."

- No more than an average of one cubic yard of rip-rap or other stabilizing materials shall be placed per linear foot.

- Retaining walls shall be of a sound engineering design addressing the following:

  Hydrostatic Pressure - Water often infiltrates the back-fill of a shoreline retaining wall—not only from run-off behind it, but also from the lake against its face. When water on the lake side of the wall recedes, water remaining behind the wall may take longer to drain. Both situations causes additional hydrostatic pressure behind the wall which can cause it to fail. Therefore, it is important to encourage water to drain from behind the wall by including gravel back-fill and weepholes in its construction.

  Fines Migration - Water seeping through the ground can carry small particles of soil (*i.e.* fines) and lake water moving in front of the wall can suck soil from behind it. These effects eventually can undermine the ground behind the wall or cause siltation into the water. To control this, the wall construction should include gravel back-fill and filter fabric.

  Scour - Boat wakes, stream flow, and even small waves cause turbulence as they lap against a wall. The force from this action is directed down against the wall in a circular motion that digs into the soil at the wall's base (e.g. toe). If unprotected, the soil at the bottom of the wall will be eaten away allowing the back-fill behind the wall to collapse. In some cases either a wall's foundation or supporting pilings are undermined and the

wall collapses. Therefore, rip-rap toe protection shall be incorporated when installing shoreline retaining walls.

- Retaining walls shall have two inch diameter weepholes within one foot above the wall's toe. Weepholes shall be no farther than four feet apart.

- Retaining wall toes shall be protected with rip-rap size stones placed in an 18-inch deep "v-shaped" trench against the wall's entire water-side base. This protection shall extend out from the wall to a distance equal to at least of _ of the wall's height.

- Retaining walls must be secured with "deadman" anchors or tiebacks.

- A 12" wide free drainage band of granular fill shall be placed behind the retaining wall and extend down to the weepholes. This fill shall be smooth rounded (not crushed) clean gravel ½" to 1¾" in size.

- Backfilled behind the gravel band, if needed, shall be well compacted clean fill material free of rocks or other debris.

- Synthetic filter cloth (geotextile) shall be placed between the gravel band and the excavated face of existing soil, or compacted backfill. The geotextile will allow water to flow through, but restrict movement of soil fines into the gravel. Filter cloth shall be equal to Type III, erosion control cloth, with an EOS (equivalent opening size) of forty.

- Upright pilings for retaining walls shall not be smaller than four inches square (or diameter), nor larger than eight inches square (or diameter). They shall be installed no farther than eight feet apart and driven to a depth below ground equal to no less than _ of the wall's face height or five feet, whichever is greater.

- Cross-members for wooden retaining walls generally shall be either 2"x 6" or 2"x 8" square cut timber boards; however, site conditions may cause the Resource Management Office to require larger sizes. The lowest cross-member's bottom edge shall be at least 18 inches below the natural ground level at the wall's toe.

- All wooden members must be preserved to resist decaying with a treatment approved by the Corps of Engineers.

- Metal sheet piles shall be 2"x10" tongue-and-groove.

- All hardware materials shall be hot dipped galvanized.

- Reinforced earth retaining wall shall be constructed of dry-laid "rough stone" faced precast masonry units. These units shall be interlocking and incorporate a continuous horizontal "geogrid" mat of high density polyethylene to anchor the wall into the back-

fill. Installation shall be according to manufacturer's specifications.

- Finished grade behind the wall shall be planted with native vegetation immediately after the wall is completed.

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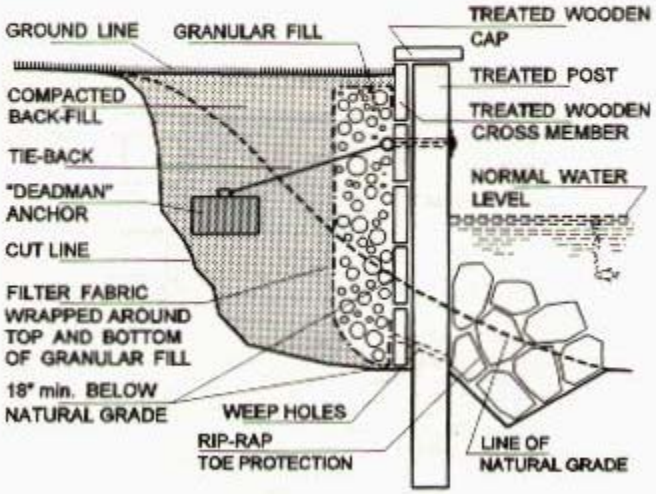
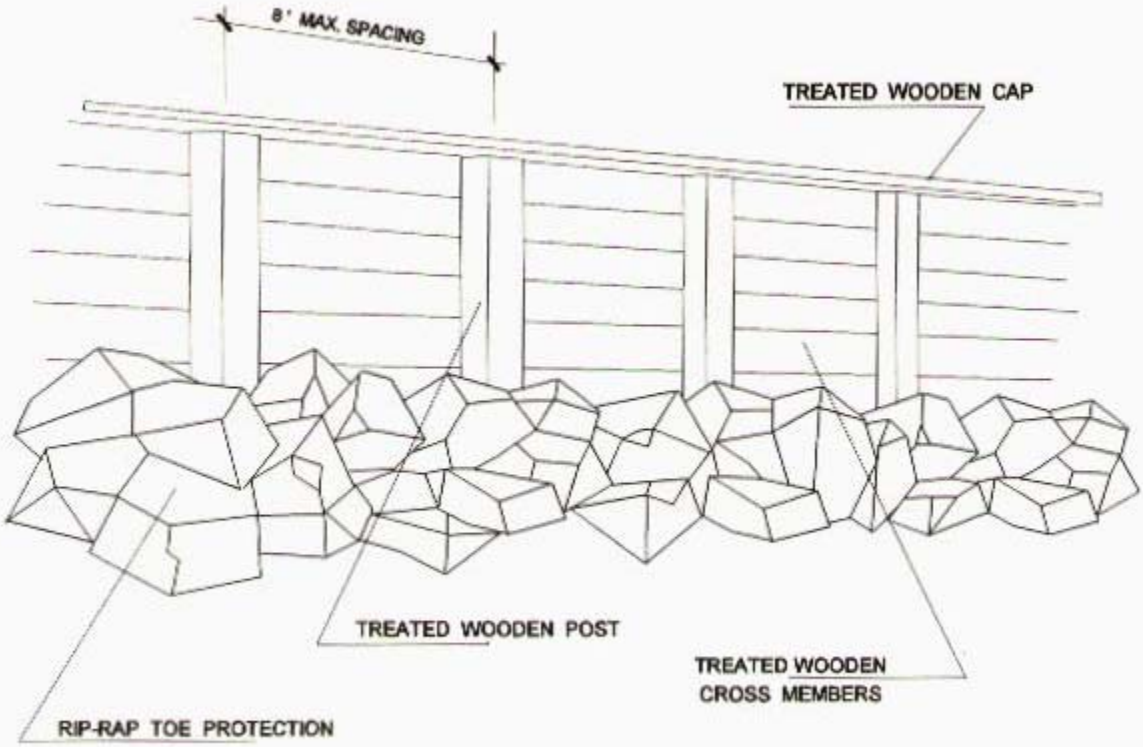


CROSS-SECTION OF WOODEN RETAINING WALL



ELEVATION OF WOODEN RETAINING WALL

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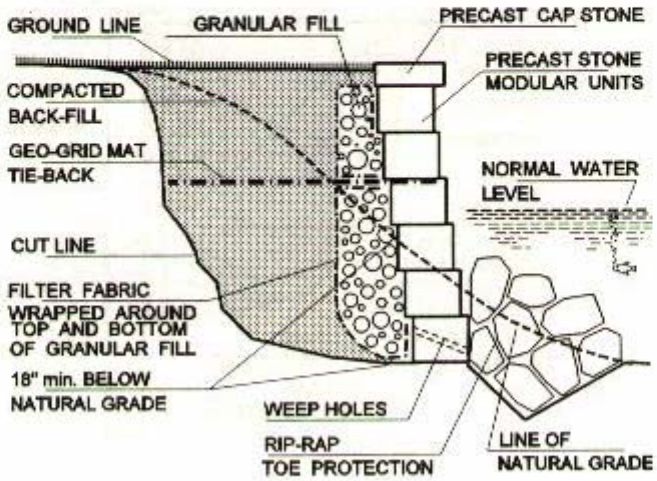
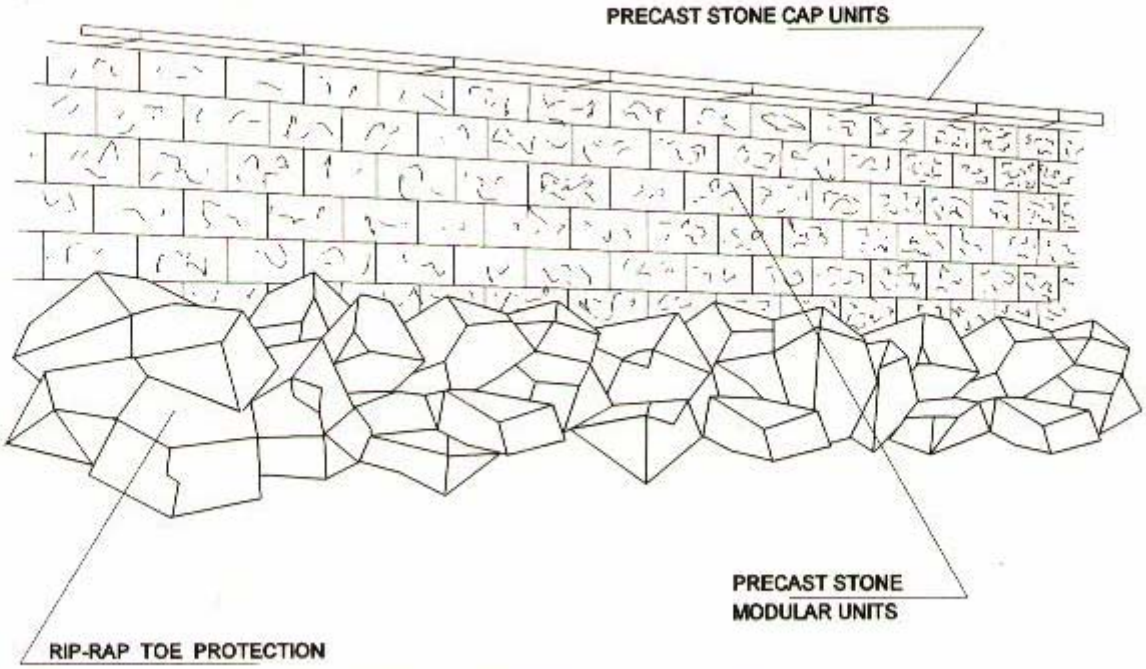


CROSS-SECTION OF REINFORCED EARTH RETAINING WALL



ELEVATION OF REINFORCED EARTH RETAINING WALL