Soil Nailing

Soil nailing is an in-place reinforcement of the soil. It uses steel tendons grouted into pre-drilled holes to create a stable block in front of the soil that requires support.

Soil nails are used for the temporary support of excavations, construction of permanent retaining walls, construction or replacement of bridge abutments, and for the control of landslides. When used with other earth retaining techniques, such as micropiles, tiebacks and tiedback elements, they will stabilize large masses of soil.

Soil nail walls are usually built with smaller, easily mobilized equipment and without extensive steel fabrication. This minimizes the start-up time and makes soil nailing the best application for congested sites. Schnabel Foundation Company’s soil nail walls have been successfully installed in stiff clays and silts, some coarse grain soils, mixed soils with rock and weathered rock. The relatively short length of the nails makes soil nails ideal for tight sites and limited right-of-ways or property lines. In the right application, soil nailing is a rapid and economical way to build retaining walls.
The Process

Construction of a soil nailing wall begins with a shallow cut. The height of the cut is determined by the ability of the soil to temporarily stand unsupported. The soil nails are installed by grouting a bar into a hole drilled from the face of the cut. The grout completely fills the drill hole and bonds the bar to the ground over its entire length. Since a large number of nails are required, the ability to rapidly install the nails is key to the economy of soil nailing.

Shotcrete is applied to support the ground between the nails. The sequence of excavation, installation of soil nails and application of shotcrete is repeated in successive lifts until the excavation is completed.
Middle Panel Clockwise from Top: 55-foot deep soil nail wall, Atlanta, GA; Sculpted and colored soil nail wall supports a hillside cut along SR 6 – permanent soil nail wall, Spanish Forks Canyon, UT; Schnabel has designed and built its own soil nailing drills for fast installation, Roslyn, PA. This Panel Top: In some soil conditions, soil nailing is difficult to construct, and creating a smooth vertical face is not practical.

Bottom: Soil nailing when combined with tiebacks, grade beams or other excavation support systems can stabilize large slopes. Permanent soil nail wall, Hickman, KY.
Soil Nail Wall Finishes

The Finishing Touch

Because of the top-down construction sequence, soil nail walls for permanent applications can be finished with a wide variety of construction materials. We have designed and built soil nail walls with faces constructed from gun-finished shotcrete, colored shotcrete, sculpted shotcrete, stone, cast-in-place concrete, pre-cast concrete and wood, providing a range of structural and aesthetic finishes.

Schnabel Foundation Company has designed and built more than 440 soil nail projects for both temporary and permanent applications. We have designed and built some of the largest soil nail projects in the United States. The highest wall contracted to date is 150 feet and the deepest excavation project is 60 feet.

Sculpted shotcrete face.
Permanent soil nailed wall. Reno, NV

Cast-in-place concrete face, permanent soil nail wall. Algonquin, IL

Gun-finished shotcrete. Permanent soil nail wall. Natchez, MS

Form liners can be used to produce a wide variety of attractive finishes on permanent soil nail walls. Asheville, NC