

Spiralnail Wall System

The Hilfiker Twist in Soil Nailing



Above, is a Spiralnail being installed using a Vibro Driver attached to an excavator in a slide repair project. This Spiralnail is being driven through the facing mats to create a 1:1 stabilized steep slope.

Below, is a gabion-faced wall using Spiralnails for soil reinforcement. The Spiralnail is capable of being driven through the filled gabion as opposed to conventional soil nails that would require drilling and placement prior to filling the gabion. The ability to drive the nail makes Spiralnail quicker and less complicated to install, thus saving time on the jobsite. This project is located on Price Creek Road in Humboldt County, CA.



Below, another section of Seaward Way Road in Whidbey Island, where Island County Public Works Department in Washington State decided to use Hilfiker Spiralnails over a graded slope with topsoil and welded wire mats to create a 1:1 stabilized steep slope.



Above, Seaward Way Road in Whidbey Island, Washington had suffered several slides and was in need of repairs. Island County Public Works Department decided to use Hilfiker Spiralnails for this repair project. A series of Spiralnails were used over welded wire mat facing to create a temporary shoring wall. The area was then filled, building a welded wire wall to complete the repair.



Hilfiker Retaining Walls

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Revolutionary Twist In Soil Nailing Technology

The Spiralnail is the most recent addition to the Hilfiker product lineup. It was initially designed as an alternative to drill-and-grout soil nailing, but its uses are not limited to standard soil nailing applications. Because the Spiralnail is driven directly into the earth, it can be used in a wide array of situations that conventional soil nailing methods cannot. Conventional drill-and-grout soil nailing requires multiple construction stages and is complicated and time-consuming. With conventional soil nailing a hole must first be drilled and cleaned, then a steel bar centered in the hole, grout or cement injected into the hole to bind in the steel bar, and then waiting until it sets before continuing construction. Spiralnail is driven or drilled directly into the soil eliminating the multiple steps that are required for conventional soil nailing. And since the Spiralnail is in direct contact with the soil around it, it can be designed for immediate soil retention and continual excavation. Spiralnails can also be designed to act as a drain. The spiral design provides a continual passive inclusion with the soil, whereas a tube without spirals would offer only skin friction with soil. Tests conducted on Spiralnails have confirmed a tremendous pullout resistance.

Spiralnail system is a soil reinforcement method for use on projects such as retaining walls, stabilizing steep slopes, roadway widening, guardrail support, roadway sub-drainage, and foundation improvement. Spiralnail is compatible with our other systems. It can be used with quick build welded wire facing, gabion facing, "Spider" slope face reinforcement, and pre-cast concrete facing methods. Spiralnails can be used to form a tieback for cast in place or pre-cast panels to build a wall. An example would be the Eureka Sidewalk improvements shown on the back of this brochure. Spiralnails can be used as effective soil drains. They can also be used to repair or reinforce existing walls. They can be used to support temporary walls and for construction shoring where conventional soil nailing would not be time or cost effective.

Spiralnails have proven to be an effective method of stabilizing steep slopes and repairing slides. For graded steepened slopes, the nails can be easily driven through reinforcement mats placed over a prepared surface; or for natural slopes, specially designed "Spiders" working together with Spiralnails make it possible to stabilize steepened slopes and leave the sensitive vegetation intact. The "Spiders" create a reinforced wire web over the slope face, with the spiralnails driven to avoid existing trees, hence leaving the native vegetation to grow unabated.

An interesting use of the new Spiralnail is in building foundation support as piles or pen-piles, called Spiralpiles. Spiralpiles can be driven using small vibro or vibro-percussion drivers for foundation support in new construction, or adjacent to an existing foundation structure to provide added bearing for the structure without requiring the excavation normally required to reach the depths that a Spiralpile can reach for bearing.

A technical research program on Spiralnail properties was completed at the University of Washington Geotechnical Engineering Department, sponsored by Hilfiker Retaining Walls. Technical analysis, engineering design, and construction technical assistance is available through Hilfiker's highly experienced engineering consultants.

The applications and descriptions in this brochure do not cover all of the possible uses of the Spiralnail system.

To determine if Spiralnail will work for your particular application, or to learn about the other uses of Spiralnail, Spiralpiles, or any of our other products contact Hilfiker Retaining Walls.

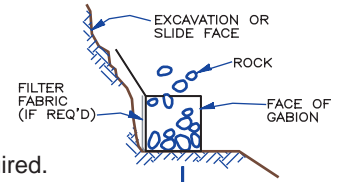


Left, Spiralnail attached to a Spider. This Spiralnail is one of 50 Spiralnails, including Spiralnail drains, used to complete a slide repair project along North Camano Drive in Washington. The Spiders attached to the Spiralnails reinforce and confine the face of slope through existing vegetation and around existing trees. Presently, this is the only method available for repairing or stabilizing steep slopes that leaves the existing vegetation and trees intact.

Example Construction Sequence Using Gabions

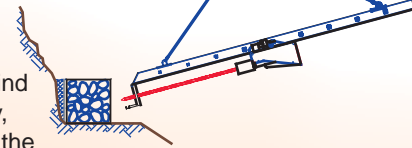
Step 1

Place the first course of gabions on the prepared foundation. Connect the vertical edges of the gabions together with spiral binders. Install filter fabric behind the gabions, if required. Fill the gabions with suitable rock.



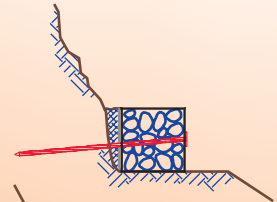
Step 2

Close the lids on the gabions and secure with spiral binders. Place and compact backfill behind the gabions to fill the gap, if any, between the existing slope and the back of the gabions.



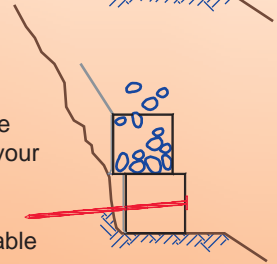
Step 3

Install the bearing plates and Spiralnails, header beam or grade beam as applicable. Nail lengths and spacing shall be according to your project plans.



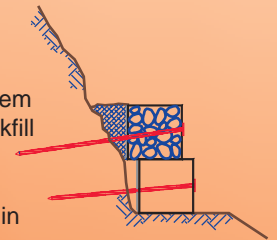
Step 4

Place the second lift of gabions on top of the first lift. Offset the gabion lifts as shown in your project plans. Bind the two lifts of gabions together with spiral binders. Place the filter fabric, if required. Fill the gabions with suitable rock.



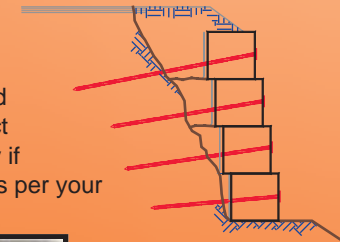
Step 5

Close the lids on the gabions and secure them with spiral binders. Place and compact backfill behind the gabions to fill the gap, if any, between the excavation and the gabion. Install the bearing plates and Spiralnails as in step 3.



Step 6

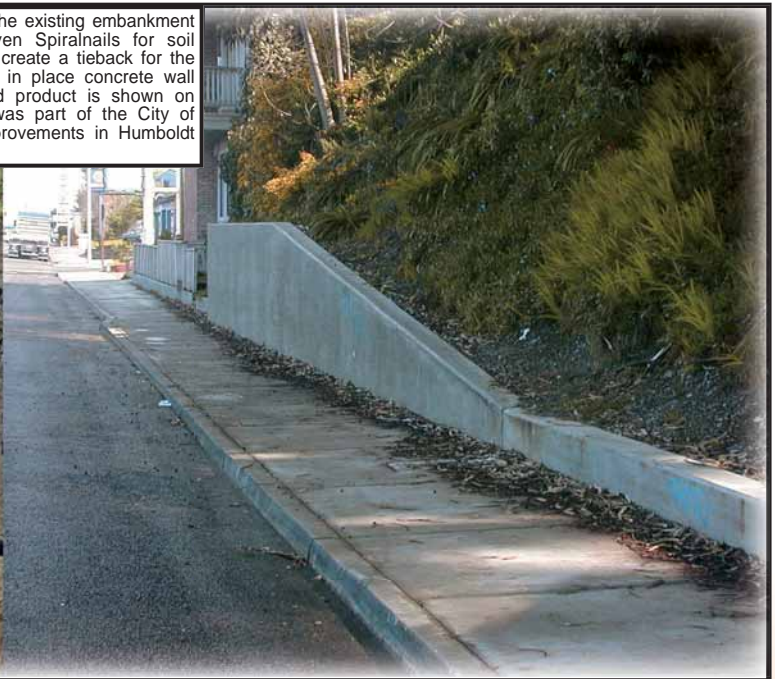
Repeat steps 1 through 5 until desired height is reached. Place and compact backfill against toe of wall for toe bury if necessary. Finish top of wall grade as per your project plans.



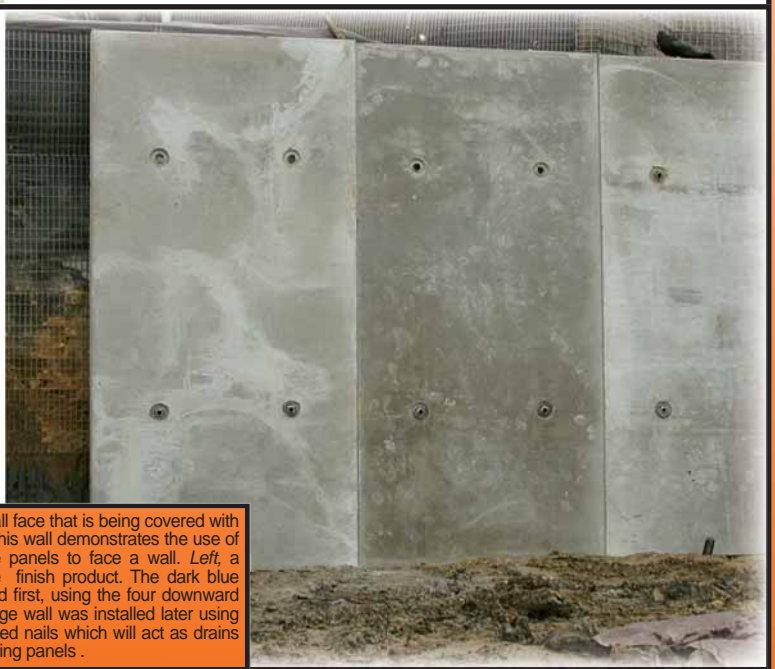
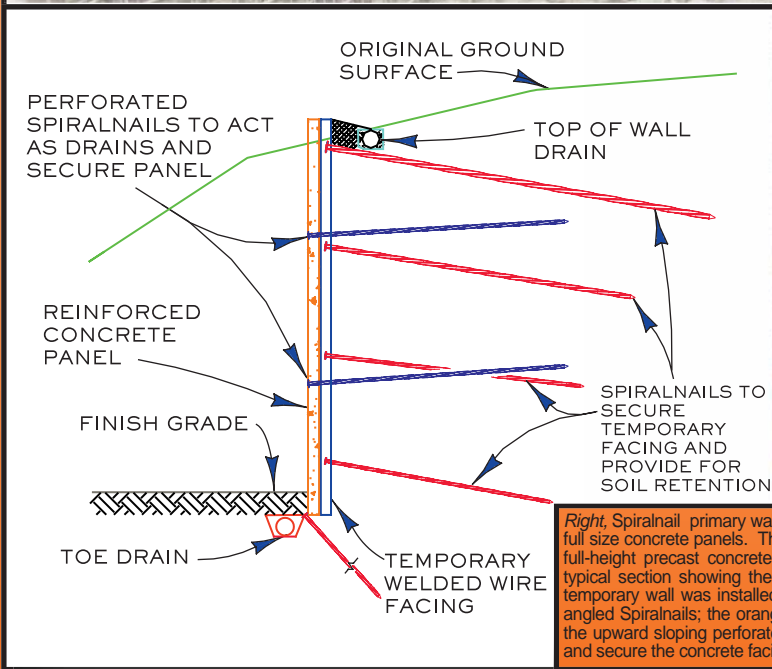
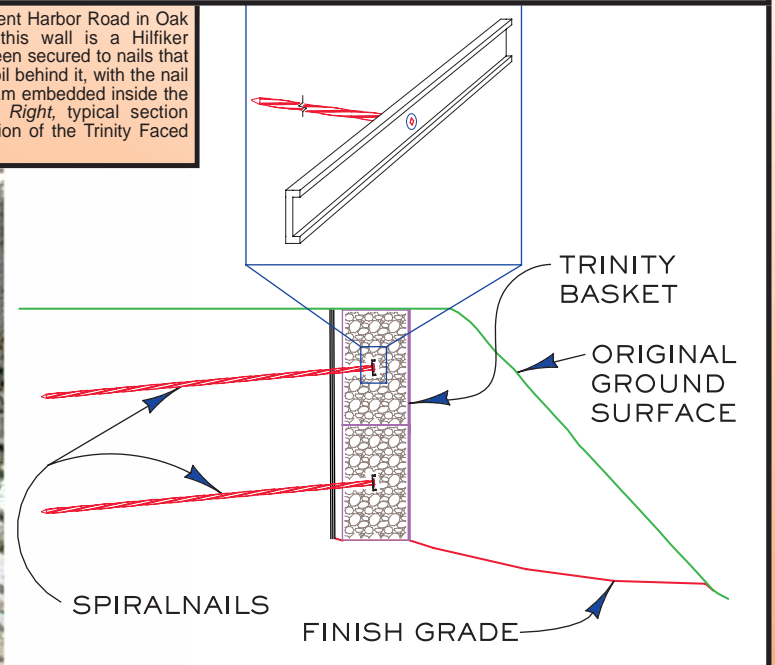
On Left is a finished Gabion Faced Spiralnail Wall located in Humboldt County, California. This wall was constructed using the method described above.



On *Left*, placed into the existing embankment are 26 laterally driven Spiralnails for soil reinforcement and to create a tieback for the installation of a cast in place concrete wall facing. The finished product is shown on *Right*. This project was part of the City of Eureka Sidewalk Improvements in Humboldt County, California.



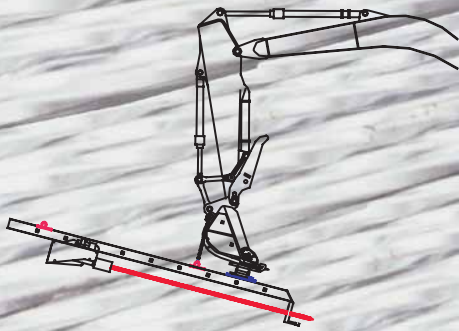
Left, located on Crescent Harbor Road in Oak Harbor, Washington this wall is a Hilfiker Trinity Wall that has been secured to nails that were driven into the soil behind it, with the nail heads and header beam embedded inside the wall and not visible. *Right*, typical section showing the construction of the Trinity Faced Spiralnail wall.



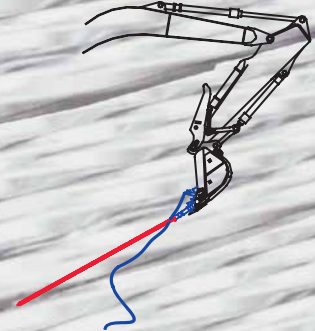
Right, Spiralnail primary wall face that is being covered with full size concrete panels. This wall demonstrates the use of full-height precast concrete panels to face a wall. *Left*, a typical section showing the finish product. The dark blue temporary wall was installed first, using the four downward angled Spiralnails; the orange wall was installed later using the upward sloping perforated nails which will act as drains and secure the concrete facing panels.



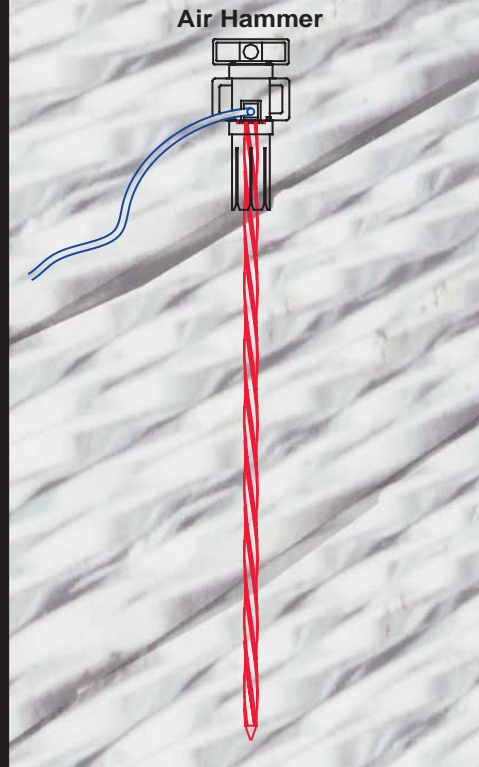
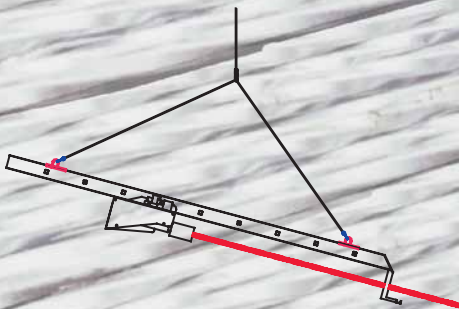
Vibro Percussion Sled on an Excavator



Vibro Driver



Vibro Percussion Sled on a Sling



Air Hammer



Hoe Pack

