



Product Overview

Reinforced soil retaining walls [commonly grouped as Mechanically Stabilized Embankments – MSE] represent an innovative method of resolving familiar as well as unfamiliar and challenging problems. Instead of regarding soil as a mass to be contained by force, the earth itself is reinforced to become an integral part of the structure. The walls behave as gravity structures in an integral unit and provide structural flexibility. Welded wire mats placed within layers of compacted backfill provide the necessary tensile strength. Native soils at the site or from excavation are often acceptable for backfill. The resulting structure is strong, yet resilient.

Hilfiker Retaining Wall systems provide designers with flexibility and adaptability, limited only by the desires of the end user. Some uses are new highway construction, storm damage repair, bridge abutments, embankment stabilization, storage facilities, erosion control, headwalls, mine dump facilities, and as temporary structures for highway re-alignment work and construction staging. **Hilfiker Retaining Wall** systems have no special restrictions on site conditions that are different from any other reinforced soil structure. As with all soil structures, external stability considerations must be satisfied, i.e., sliding, overturning, and bearing capacity. In general, Hilfiker Walls with wire mesh reinforcement [transverse and longitudinal wires] are probably better able than other soil systems of withstanding differential settlement, lateral movement, and other types of abuse.

Of the Hilfiker systems, the **Welded Wire Wall** is the most economical and adaptable to a variety of site conditions. Hilfiker was the first MSE manufacturer to have the face and soil reinforcing mechanism incorporated as one-unit. The materials “stand alone” and are ready to backfill once set. No external bracing required. Lightweight Welded Wire Wall components require a minimum of labor and equipment for installation. The face of the wall may be built battered or vertical; left as is, hydroseeded, faced with timber, or other fascia treatment as desired by the owner. The **Welded Wire Wall** is a very forgiving yet resilient system.

Our **Welded Wire Steepened Slope** System utilizes our 8"x12" or 8"x24" wire wall reinforcement mesh as its primary soil reinforcement and is interlocked with 6"x9" facing mesh [secondary] elements with 3"x3" backing mats. The secondary facing elements are installed 3' along the face at 2.12' vertical increments and incorporated with the primary mats at 4.24' increments. We have prefabricated the facing units to maintain a 1H:1V slope on each 2.12' layer. To build a flatter slope, step [set back] each layer to create the desired slope; this ensures a common lift thickness with the fill while making slope transitions. The Steepened Slope System enables the landscape architect to incorporate virtually any type of sod or vegetation that will best suit the environment. Low-growth, maintenance-free vegetation is typically specified.

Eureka Reinforced Soil [ERS]: This system is similar in concept and construction to the Welded Wire Wall, with the addition of either precast full-height fascia panels, or a cast-in-place [CIP] finish. For CIP, as the wall is erected form anchors are installed in the correct size and pattern to accommodate the desired form system and pour rates. Upon completion of the wall and any settlement period that may be required, the reinforcing steel and forming system are erected utilizing previously installed form anchors, then the 6"-8" thick fascia is poured and stripped. For Precast, typically two connection brackets are provided at the top of each panel. The completed wall will have the appearance of a non-proprietary cast-in-place wall utilizing virtually any architectural treatment that may be desired. This system is typically utilized in applications where you may encounter poor foundations causing differential settlement within the wall or in an application that may require a special or full height-architectural pattern without horizontal lines. The ERS can also just be treated with a blown mortar [shotcrete] finish. The ERS offers the contractor all of the advantages of “Two-Stage” construction.

ArtWeld Gabions are prefabricated of either 9 or 11 gauge *welded* wire mesh, and may be used to advantage in any gabion application. Utilizing the square grid [3"x3"] of the mesh fabric, spiral binders, pre-formed stiffeners [corner braces], inherent strength, ease of construction, and long life make Hilfiker's gabions superior to conventional twisted wire gabions. We offer Class III Galvanized or Non-Galvanized (brite basic) baskets.

Gabion-Faced M.S.E. Retaining Wall: In 1990, we assisted the Federal Highway Administration in developing this type of wall system. To date, we have supplied the majority of the projects that FHWA has issued, for approximately 130,000 SF. This wall system consists of our 9-gauge ArtWeld Gabions used as the facing, in conjunction with welded wire soil reinforcement mats used to reinforce the fill vertically every 3 feet. The welded wire soil reinforcement mats match up and connect very nicely to our 3"x3" welded wire gabion baskets. In all projects we have utilized our premium 9-gauge facing baskets [some projects specify 3-gauge facing panels], because of the superior performance in assembly, backfilling, and alignment. This system goes together well and by having the soil reinforcement mats spaced every 3 foot vertically, you should also see timely production in your backfilling operations.

The **Trinity Wall** System was designed and named for a project that we did for the Trinity Alps Resort. The January storms of 1997 left a few of the resort's cabins precariously undercut by the Stuart Fork River. The owner was able to acquire permission from the California Department of Fish and Game to enter the stream channel to re-grade and use on-site materials to stabilize the banks. The owner wanted to install a Gabion Wall, but after looking at the on-site gravel that we were going to have to utilize to backfill the wall (8"-12" cobble), it was clearly too large to use in a Gabion or even a Welded Wire Retaining Wall. One other factor that we were going to have to deal with was water in the excavation. We wanted to get the toe of the wall as deep in the stream channel as possible to prevent future scour. This required us to make grade for the base of the wall under water. Anyone that has tried this knows it can be quite difficult. We could see that we were going to have to try something different.

Our solution was to utilize the large, heavy gauge wire panels that we use in our Welded Wire Retaining Wall and the spirals used in our ArtWeld Gabions to build large open-top and open-bottom baskets with vertical partitions spaced out enough to accommodate the large on-site cobbles. The open-top made it very easy to load the Trinity basket using an excavator and open-bottom gave us the versatility to submerge the bottom of the basket in the excavation, level it up, backfill through the basket to fill any irregularities in the foundation, then continue backfilling until the baskets were full. This technique worked extremely well and minimized the time that was spent in the stream channel. If de-watering your excavation isn't an option, the Trinity Wall is the only way to go!

The **Reinforced Soil Embankment/Smooth Face**, lends itself to a variety of architectural treatments [form liners], as well as a smooth finish, which will meet most any specification requirement. The standard RSE/Smooth Face panel is 31.25 SF [12.5' long by 2.5' tall]. We also manufacture special panels, which can be varied from 1.75' to 6.0' in height to accommodate wall requirements. This, combined with the cantilever footing at the back of the panel, allows accelerated construction rates as well as improved compaction at the wall face.

Hilfiker Retaining Wall's designs meet or exceed state, local and federal specifications as pertain to M.S.E. retaining wall systems and components. Depending on the wall type, delivery to jobsite can normally begin within one to four weeks of receipt of final drawings. As for cost, the Hilfiker systems are very competitive and economical. The Welded Wire Wall can cost about one-half that of a conventional concrete wall. It also can be installed in far less time using ordinary equipment and tools. Please phone a technical rep at our Eureka office for price estimates on specific projects or if you need additional information on any of our wall systems.

Estimating Prices

The design engineer/contractor can use the following prices for estimating the manufacturer's materials prices on standard wall designs. For wall heights **greater than 30 feet and non-standard loading conditions** [i.e., Mining Applications], it is recommended you get a project-specific estimating price from a Hilfiker Technical Representative.

• Welded Wire Wall	\$ 6.00 - \$12.00 per face square foot
• Welded Wire Steepened Slope	\$ 5.00 - \$ 8.00 per face square foot
• ArtWeld Gabions	\$19.00 - \$40.00 per cubic yard
• Gabion-Faced M.S.E. System	\$ 8.00 - \$14.00 per face square foot
• Eureka Reinforced Soil	\$ 7.00 - \$13.00 per face square foot
• Trinity Wall	\$ 6.00 - \$11.00 per face square foot
• Reinforced Soil Embankment [Smooth Face]	\$14.00 - \$20.00 per face square foot

These prices are for materials only. Labor to build and backfill, the cost of excavation, and the cost of backfill [if imported] are commonly separate bid items. The material price on the Eureka Reinforced Soil does not include the cost of form work or concrete. This may average \$7.00 - \$10.00 FSF, depending on the architectural finish.