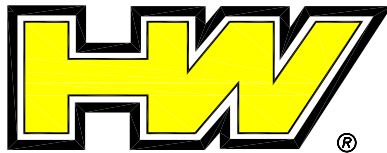


ARTWELD GABIONS & GABION FACED M.S.E. Construction Guide



HILFIKER RETAINING WALLS

1902 Hilfiker Lane
Eureka, California 95503-5711
Local (707)443-5093 - Fax (707)443-2891
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SCAN TO VISIT OUR WEBSITE

The **ArtWeld Gabion** is named for our friend and coworker, Arthur Lee Hilfiker, who originated, developed and tested the gabions before his untimely death in June 1986. Arthur's idea was to develop a gabion that was easily shipped, quickly assembled and structurally superior to conventional gabions. He succeeded admirably.

*The possible uses of **ArtWeld Gabions** are so varied that this guide can not show them all. The purpose of this guide is to detail only the assembly process. Follow your plans for the structural design and site placement.*

ArtWeld Gabions are factory cut from galvanized or non-galvanized 3" x 3" Welded Wire Mesh. The main panel components are fastened together at our facilities with galvanized clips and spiral binders. They are then folded and shipped flat to the site. No flattening, bending, stretching or folding is required in the field. The sides are simply raised and connected together with spiral binders. Because the wire is not bent, no cracking of the galvanized coating can occur. Typically, a 6' x 3' x 3' gabion takes less than 5 minutes to make ready for filling.

The strength of Welded Wire Mesh offers many advantages. It allows careful machine filling. It is easy to hold the alignment of the face. The manufacture of large gabions is possible, up to 24' x 6' x 3', meaning fewer seams to be joined in the field. Also, if a gabion must be cut to fit site conditions, the wire can be cut with bolt cutters without losing structural strength.

ArtWeld Gabions can be manufactured in conventional sizes, or custom sizes for special site conditions. Wire diameter and thickness of galvanizing, if any, can be varied to suit job requirements.

For your next gabion project, contact Hilfiker Retaining Walls for a quote on a product we are proud to manufacture. We look forward to being of service to you and your clients.

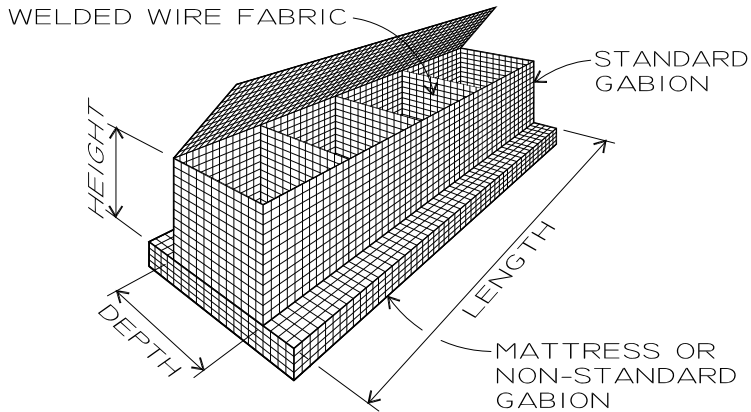
July 2014



3" = 76MM	6' = 1.83M
3' = 914MM	24' = 7.32M



ARTWELD GABIONS CAN BE MANUFACTURED IN BOTH ENGLISH AND METRIC UNITS. FOR SIMPLICITY, DIMENSIONS IN THIS GUIDE REFER ONLY TO **ENGLISH UNITS**. CONSTRUCTION METHODS FOR BOTH TYPES ARE IDENTICAL.



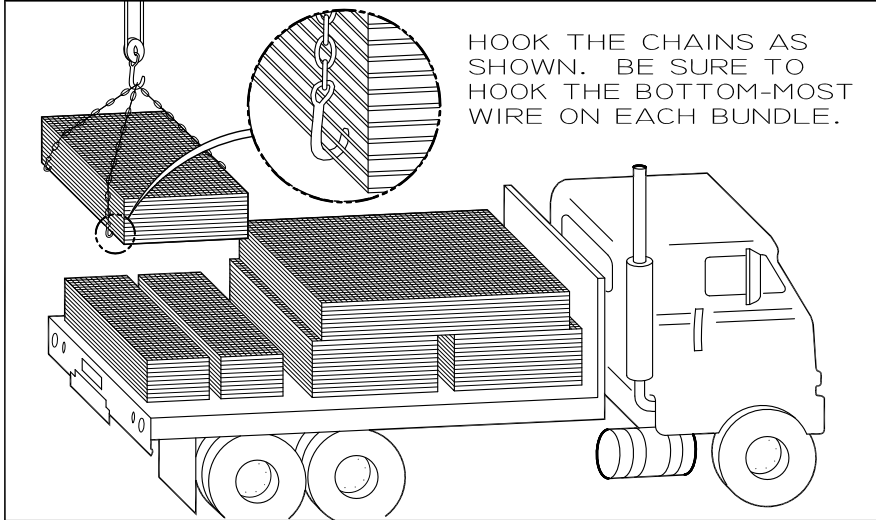
STANDARD **ENGLISH** UNIT GABIONS ARE SIZED IN MULTIPLES OF 3 FEET (0.914 METERS). THEY ARE MANUFACTURED OF 3"x3" (76MM X 76MM) WELDED WIRE FABRIC.

STANDARD **METRIC** UNIT GABIONS ARE SIZED IN MULTIPLES OF 1 METER (3.28 FEET). THEY ARE MANUFACTURED OF 83MM X 83MM (3.25" X 3.25") WELDED WIRE FABRIC.

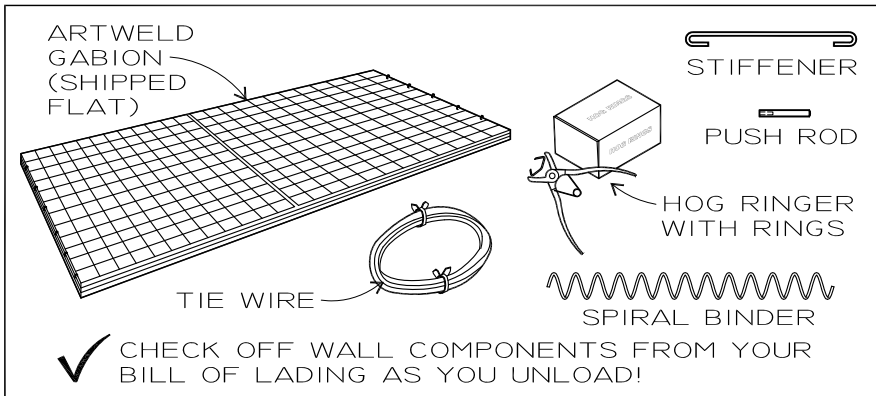
BOTH ENGLISH UNIT AND METRIC UNIT GABIONS ARE SUPPLIED IN 9 GA AND 11 GA GALVANIZED, AND 9 GA NON-GALVANIZED WELDED WIRE FABRIC.

NON-STANDARD SIZES, AND MATTRESSES, CAN BE SPECIAL-ORDERED TO FIT PROJECT REQUIREMENTS.

RECOMMENDED UNLOADING PROCEDURE

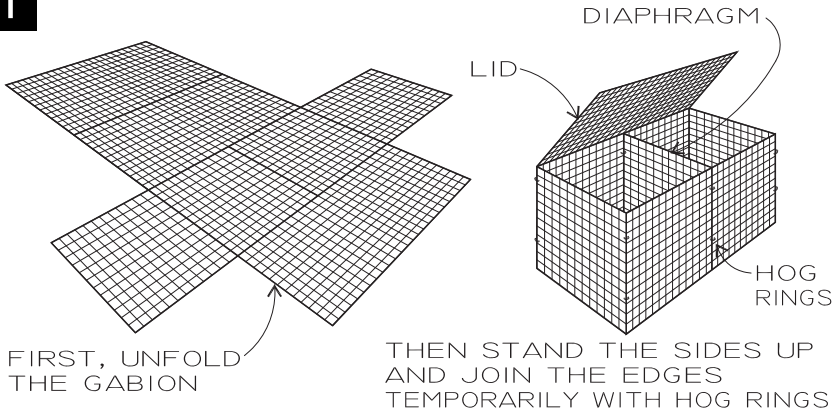


GABION PARTS (NOT TO SCALE)

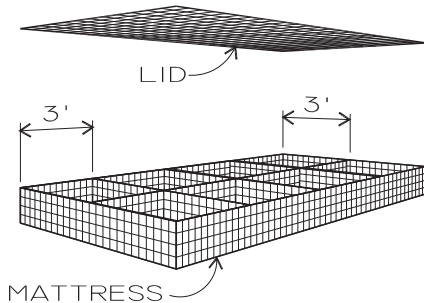


ON-SITE ASSEMBLY

1



THIS GUIDE SHOWS ASSEMBLY WITH HOG RINGS AND SPIRAL BINDERS BECAUSE THAT IS THE EASIEST AND FASTEST ASSEMBLY METHOD.



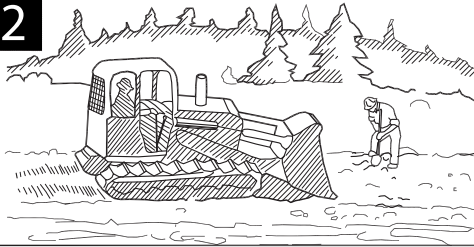
YOU MAY USE TIE WIRE AND HALF-HITCH LACING FOR ALL CONNECTIONS IF DESIRED.

HOG RINGS ARE **NOT** PERMANENT CONNECTIONS AND MUST BE FOLLOWED BY SPIRAL BINDERS OR TIE WIRE.

LIDS ARE NOT FACTORY ATTACHED ON GABIONS WIDER THAN 3'.



2

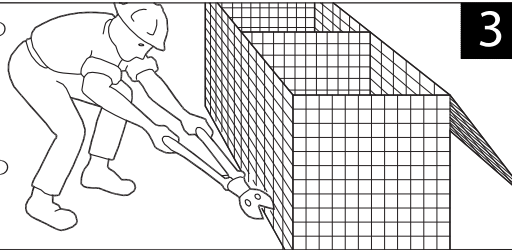


EXCAVATE AND FINE-GRADE THE FOUNDATION.

FOUNDATION MUST BE REASONABLY LEVEL AND CAPABLE OF SUPPORTING IMPOSED LOADS

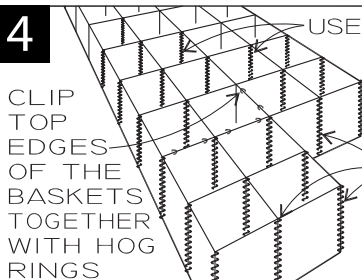
GABIONS MAY BE FIELD CUT TO FIT CURVES, CULVERTS OR ANGLES.

RECONNECT THE ENDS OF THE GABIONS THE SAME WAY YOU WOULD ASSEMBLE AN UNCUT GABION



3

4



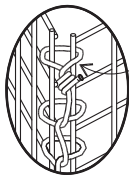
CLIP TOP EDGES OF THE BASKETS TOGETHER WITH HOG RINGS

USE ONE SPIRAL AT EVERY VERTICAL CONNECTION.

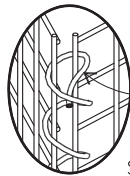
BIND ALL EXTERIOR CORNERS & DIAPHRAGMS

PLACE THE FIRST COURSE OF GABIONS ON THE FOUNDATION.

YOU MAY CLIP THE SIDES TOGETHER WITH HOG RINGS TO HOLD THEM TEMPORARILY.



IF YOU ARE USING TIE WIRE, USE HALF-HITCH LACING AT 3"



CRIMP ENDS OF ALL SPIRAL BINDERS

PERMANENTLY BIND THE GABIONS TOGETHER AS SHOWN FOR THE FULL HEIGHT AT ALL CORNERS AND DIAPHRAGMS.

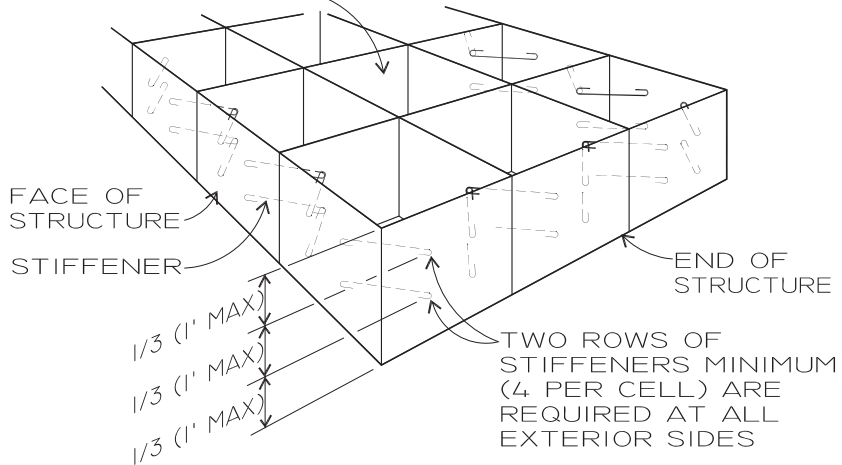


STIFFENER INSTALLATION

5

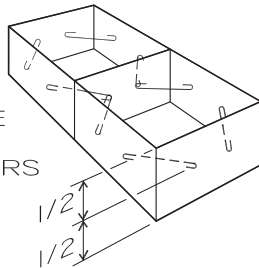
BEFORE FILLING, INSTALL STIFFENERS ACROSS THE CORNERS OF THE GABIONS ON ALL EXTERIOR SIDES OF THE STRUCTURE

NO STIFFENERS IN INTERIOR CELLS

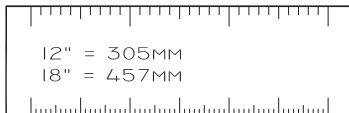
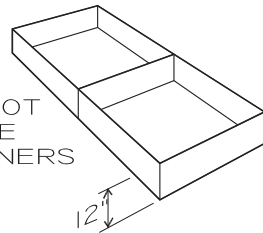


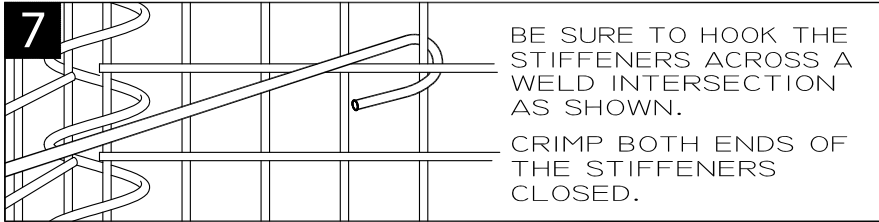
6

18" & 24" GABIONS REQUIRE ONLY ONE ROW OF STIFFENERS



A 12" GABION DOES NOT REQUIRE STIFFENERS



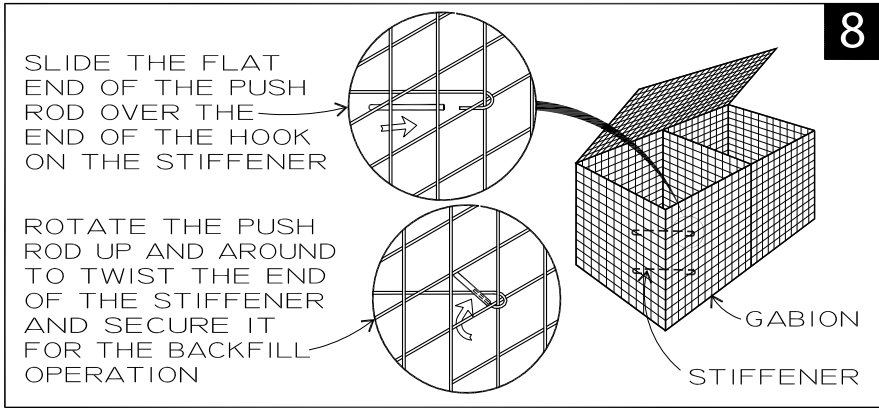


7

BE SURE TO HOOK THE STIFFENERS ACROSS A WELD INTERSECTION AS SHOWN.

CRIMP BOTH ENDS OF THE STIFFENERS CLOSED.

*USING THE PUSH RODS **



8

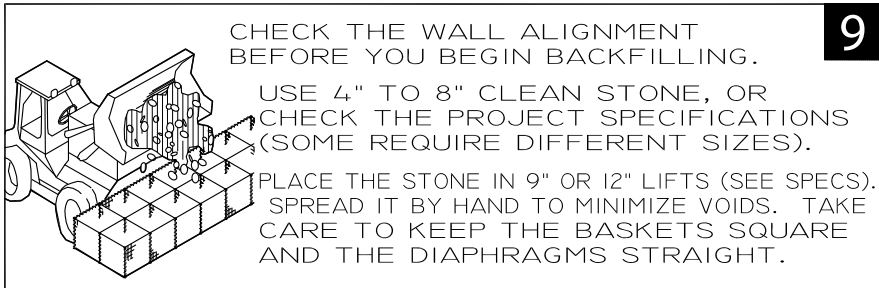
SLIDE THE FLAT END OF THE PUSH ROD OVER THE END OF THE HOOK ON THE STIFFENER

ROTATE THE PUSH ROD UP AND AROUND TO TWIST THE END OF THE STIFFENER AND SECURE IT FOR THE BACKFILL OPERATION

GABION

STIFFENER

BEGIN THE FILL

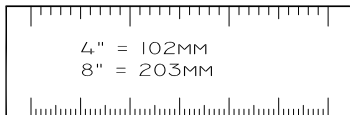


9

CHECK THE WALL ALIGNMENT BEFORE YOU BEGIN BACKFILLING.

USE 4" TO 8" CLEAN STONE, OR CHECK THE PROJECT SPECIFICATIONS (SOME REQUIRE DIFFERENT SIZES).

PLACE THE STONE IN 9" OR 12" LIFTS (SEE SPECS). SPREAD IT BY HAND TO MINIMIZE VOIDS. TAKE CARE TO KEEP THE BASKETS SQUARE AND THE DIAPHRAGMS STRAIGHT.

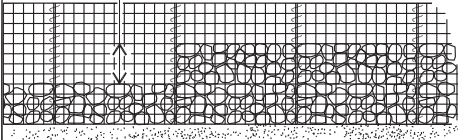


4" = 102MM
8" = 203MM

*Push rods no longer included with Hilfiker's gabion materials supply. Any hand tool used to twist and secure the end of the stiffeners will suffice.

10

12" MAXIMUM
RECOMMENDED

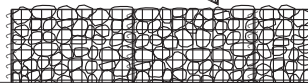


IT IS RECOMMENDED THAT THE FILL IN ANY CELL NEVER BE MORE THAN 12" HIGHER THAN THE FILL IN AN ADJOINING CELL.

11

CONTINUE FILLING THE GABIONS IN 12" LIFTS UNTIL THEY ARE FILLED. FILL FLUSH OR SLIGHTLY ABOVE THE TOP OF THE GABION.

FLUSH



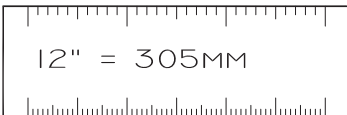
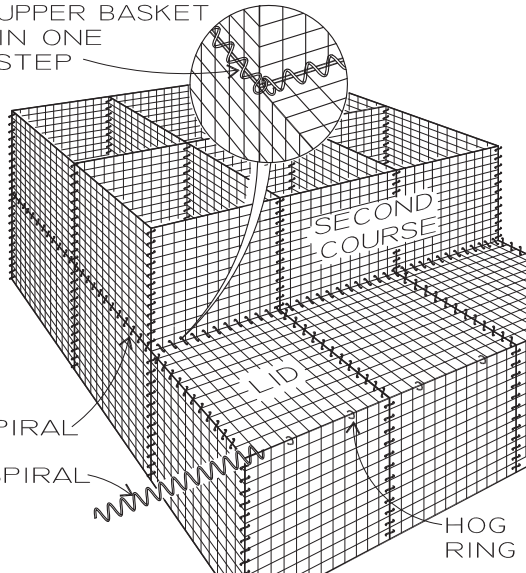
LOWER THE LIDS. YOU MAY USE HOG RINGS FOR TEMPORARY CONNECTIONS. INSTALL SPIRALS AT ALL PERIMETER AND DIAPHRAGM EDGES.

PLACE THE NEXT COURSE OF GABIONS. USE SPIRALS TO PERMANENTLY BIND THE FRONT, BACK AND SIDES TO THE FILLED GABIONS OR PER THE PROJECT SPECIFICATIONS.

REPEAT STEPS (4) THRU (12) TO THE TOP OF THE STRUCTURE.

ONE SPIRAL MAY BE USED TO CONNECT THE LID AND UPPER BASKET IN ONE STEP

12



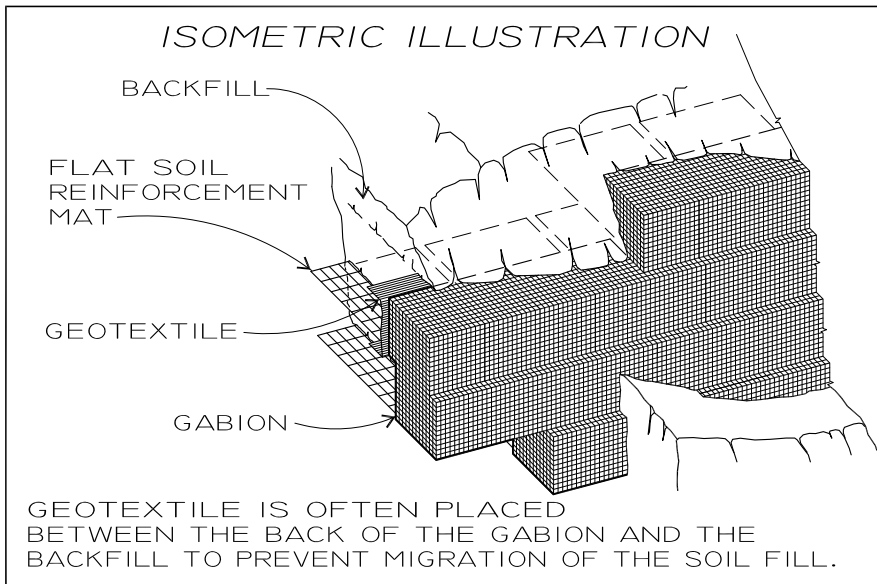
NOTES

GABION-FACED M.S.E. WALL

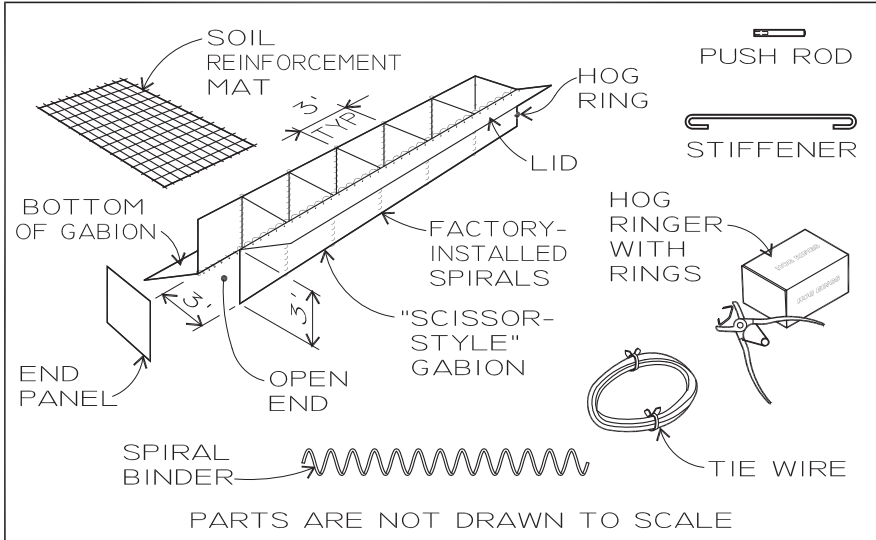
The Hilfiker Gabion Faced M.S.E. Wall combines **ArtWeld Gabions** at the face of the structure, with welded wire soil reinforcement mats spaced vertically at 3-foot intervals.

The "scissor-style" gabions are manufactured in lengths up to 18 feet. "Scissor-style" refers to the folding pattern of the gabions. They are partially pre-assembled at our factory, with the vertical edges of the diaphragms permanently connected to the vertical faces, and the lid and bottom panels connected to the main body along one long side. They are folded flat for shipment.

The wire gauge and length of the welded wire soil reinforcement mats will vary as required for each specific site.

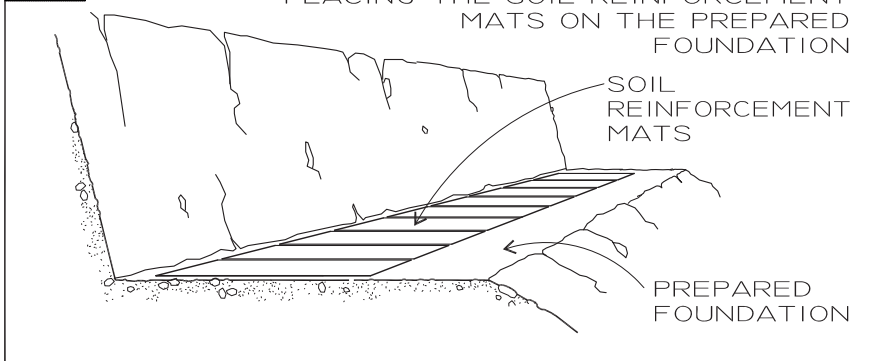


GABION FACED M.S.E. WALL PARTS



13

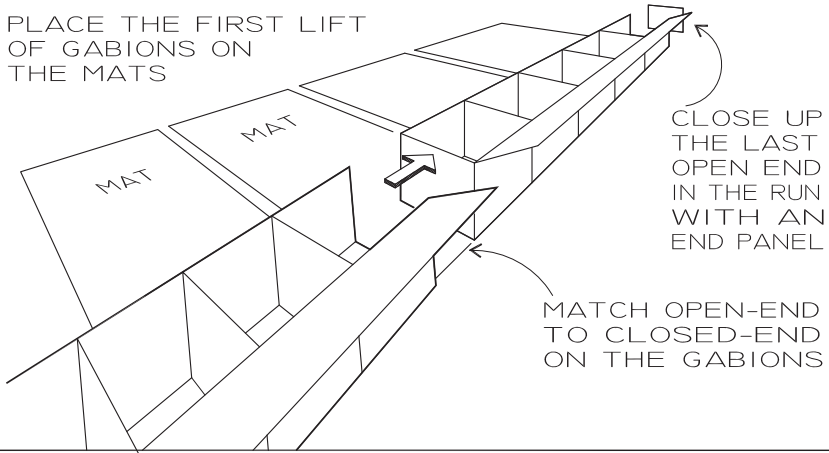
BEGIN THE GABION FACED M.S.E. WALL BY PLACING THE SOIL REINFORCEMENT MATS ON THE PREPARED FOUNDATION



14

UNFOLD THE GABIONS AND CLOSE THE BOTTOM PANELS. YOU CAN CLIP THEM TEMPORARILY WITH HOG RINGS.

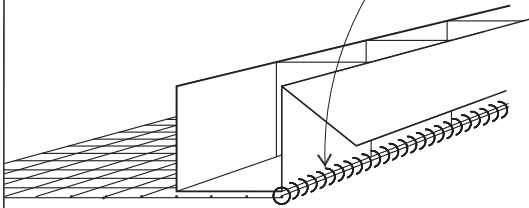
PLACE THE FIRST LIFT OF GABIONS ON THE MATS



15

LINE UP THE BOTTOM FACE OF THE GABION WITH THE FIRST TRANSVERSE WIRE ON THE MAT.

SPIRAL THE BOTTOM FACE OF THE GABION TO THE FIRST TRANSVERSE WIRE ON THE MAT

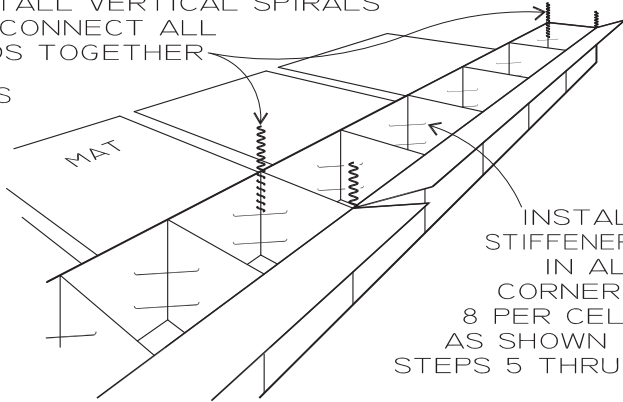
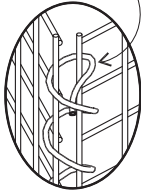


THE SPIRAL WILL PERMANENTLY CONNECT THE BOTTOM OF THE GABION TO THE FRONT, AND CONNECT THE GABION TO THE MAT IN ONE STEP

16

INSTALL VERTICAL SPIRALS TO CONNECT ALL ENDS TOGETHER

CRIMP ENDS OF ALL SPIRALS CLOSED



INSTALL STIFFENERS IN ALL CORNERS, 8 PER CELL, AS SHOWN IN STEPS 5 THRU 8

BEGIN THE BACKFILL

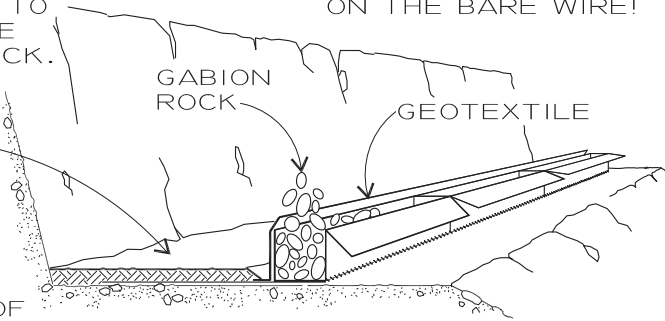
INSTALL GEOTEXTILE AGAINST THE BACK OF THE GABIONS.

17

PLACE AND COMPACT A LIFT OF BACKFILL OVER THE MATS PRIOR TO PLACING THE GABION ROCK. PLACE THE ROCK AS SHOWN IN STEPS 9 TO 11.

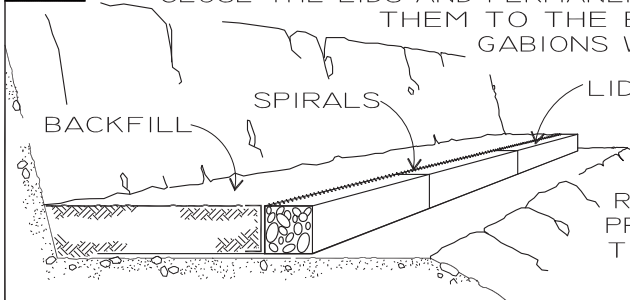
DO NOT OPERATE HEAVY EQUIPMENT ON THE BARE WIRE!

NEVER BACKFILL AGAINST THE BACK OF AN EMPTY BASKET



18

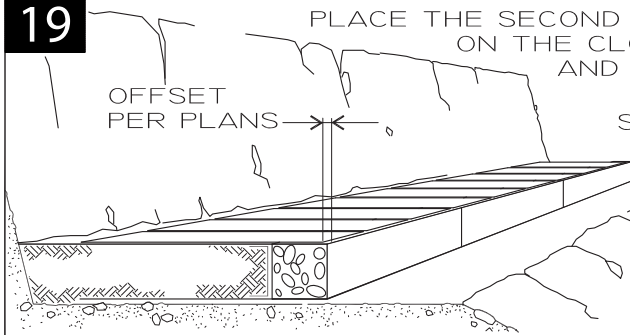
WHEN THE GABIONS ARE FILLED WITH ROCK, CLOSE THE LIDS AND PERMANENTLY CONNECT THEM TO THE BACK OF THE GABIONS WITH SPIRALS.



COMPLETE THE SOIL BACKFILL AND COMPACTION AS REQUIRED IN THE PROJECT PLANS TO THE TOP OF THE BASKETS

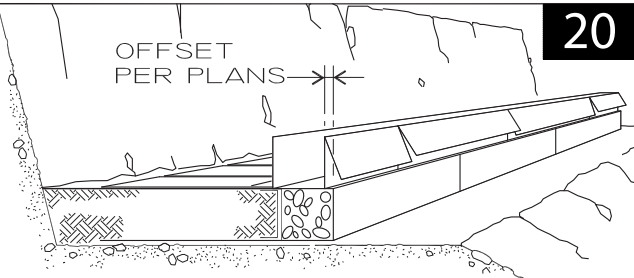
19

PLACE THE SECOND LIFT OF MATS ON THE CLOSED GABIONS AND THE BACKFILL



SET THE FIRST TRANSVERSE WIRE ON THE MATS 6" BACK FROM THE FACE OF THE GABIONS. SEE STEP 21.

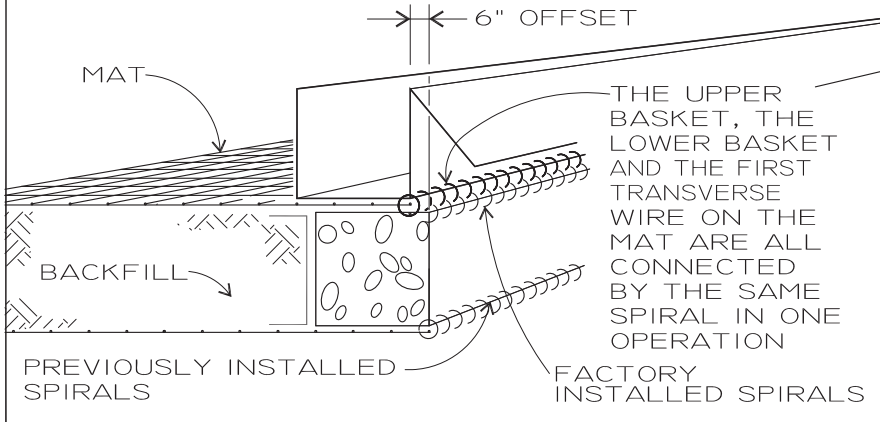
PLACE THE SECOND ROW OF GABIONS ON THE MATS, WITH THE FRONT FACE OFFSET FROM THE GABIONS BELOW



20

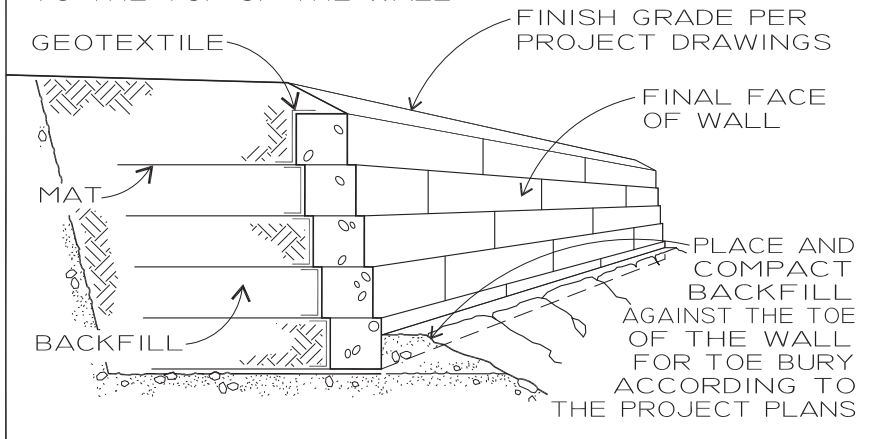
21

PERMANENTLY CONNECT THE GABIONS AND MATS WITH SPIRALS AS SHOWN.



CONTINUE STEPS 16 THRU 21 TO THE TOP OF THE WALL

22



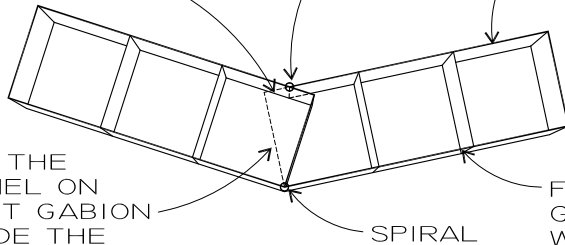
FORMING ANGLES WITH GABIONS

TO FORM A CONVEX ANGLE (PLAN VIEW LOOKING DOWN ON THE WALL)

TRIM THE BACK OF
THE GABION IF
NECESSARY

SPIRAL
OR TIE
WIRE

BACK OF
GABION
WALL



REMOVE THE
END PANEL ON
THE LEFT GABION
AND SLIDE THE
END OF THE RIGHT
GABION INSIDE. OVERLAP
THE BOTTOM AND LID PANELS

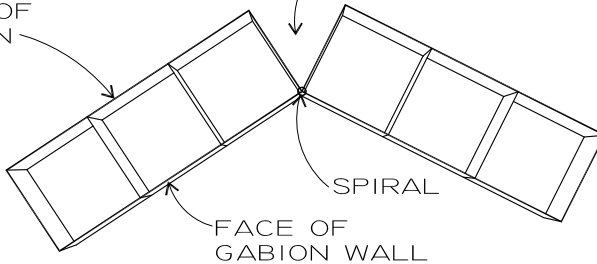
SPIRAL

FACE OF
GABION
WALL

TO FORM A CONCAVE ANGLE (PLAN VIEW LOOKING DOWN ON THE WALL)

SPREAD THE GABIONS
APART AS NECESSARY

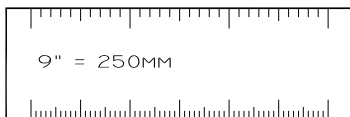
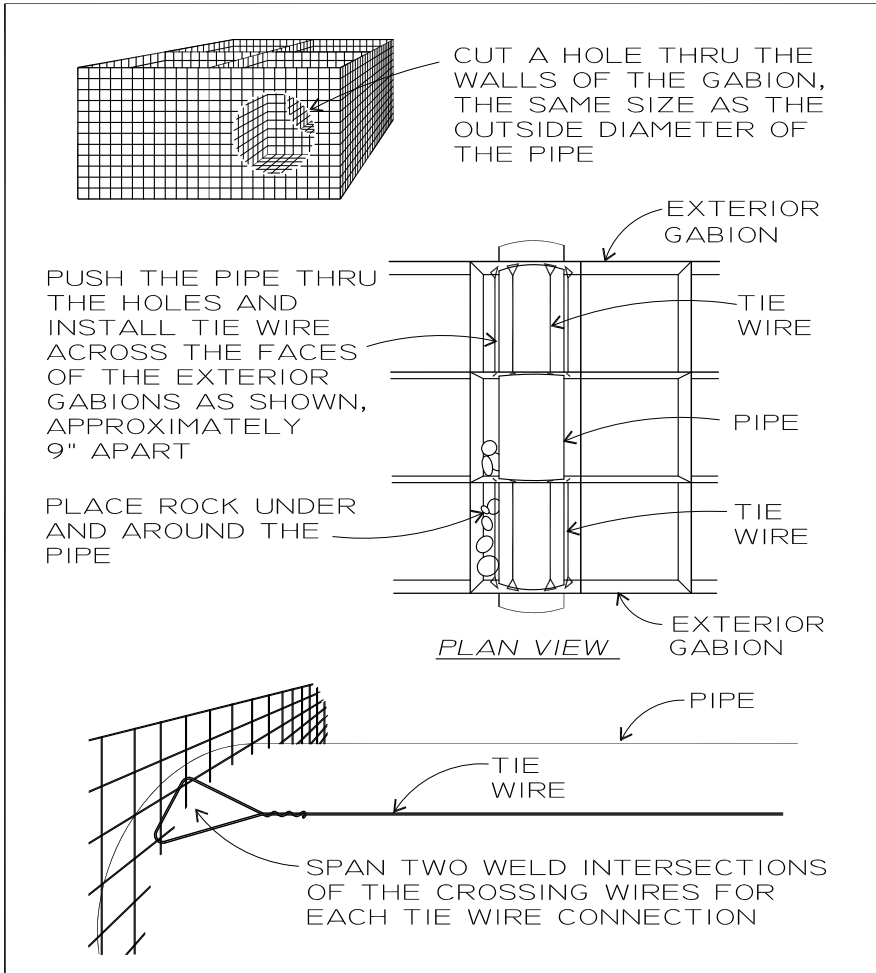
BACK OF
GABION
WALL



SPIRAL

FACE OF
GABION
WALL

PIPE PENETRATION THRU GABION



GABION WIRE SPECIFICATIONS

USA WIRE GAUGE	DIAMETER, INCHES	MINIMUM ALLOWABLE AVERAGE GABION WIRE DIAMETER WITH CLASS 3 ZINC-COATING, INCHES
9	.148	.144
11	.120	.116
13.5	.086	.082 (STANDARD TIE WIRE)

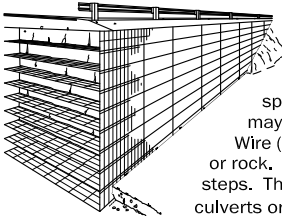
**SOIL REINFORCEMENT MAT
WIRE SIZE COMPARISON TABLE**

"W" SIZE NUMBER	NOMINAL DIAMETER (INCHES)	NOMINAL DIAMETER (MM)
W12.0	.391	9.9
W9.5	.348	8.8
W7.0	.299	7.6
W4.5	.239	6.1
W4.0	.226	5.7
W3.5	.211	5.4

FOR MORE INFORMATION ON WELDED WIRE REINFORCEMENT (WWR)
CHECK THE WEBSITE FOR THE WIRE REINFORCEMENT INSTITUTE.
WWW.WIREREINFORCEMENTINSTITUTE.ORG

HILFIKER MSE WALL SYSTEMS

OTHER HILFIKER PRODUCTS

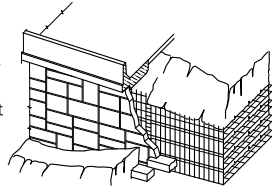


WELDED WIRE WALL

The Hilfiker Welded Wire Retaining Wall is a flexible soil reinforcement system. It is composed of Welded Wire Mesh mats and compacted soil. Mats are supplied in 8' (2.44m) spans, and 24" (610mm) horizontal lifts. The final wall face may be vertical or battered, and may remain exposed Welded Wire (as shown) or may be covered with air-blown mortar, plants or rock. The Welded Wire Wall is adaptable to curves, angles and steps. The mats are easily cut to permit installation of penetrating culverts or pipes, or to fit special site applications.

EUREKA REINFORCED SOIL (E.R.S.)

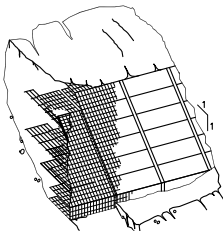
The Hilfiker E.R.S. Retaining Wall begins as a Welded Wire Wall, with the addition of face anchors to tie to a concrete face. After completion and settlement of the Welded Wire Wall, a solid facing is attached. This may be cast-in-place concrete, precast full-height concrete panels, or special rock or gunite as required by the project specifications. The facial treatment of this retaining wall adapts easily to almost any pattern or concept.



HILFIKER STEEPENED SLOPE

The Hilfiker Steepened Slope system is composed of Welded Wire Fabric components. The flat primary soil reinforcement mats are interlocked with bent facing mats, prefabricated to a 1:1 slope. The slope may be flattened, if desired, by stepping back each layer. Behind the facing mats are Welded Wire Fabric backing mats incorporated with erosion mat or sod.

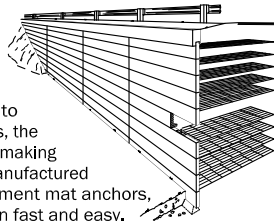
Virtually any type of sod or vegetation that will best suit the environment may be used with this system. Low-growth, maintenance-free vegetation is typically specified.



REINFORCED SOIL EMBANKMENT (SMOOTH FACE)

The R.S.E. Smooth Face Retaining Wall retains most of the advantages of the Hilfiker Welded Wire Wall, while providing the additional durability of precast face panels.

The concrete panels can be cast with a smooth finish, or to match a variety of architectural treatments. In most structures, the simple 12'-6" x 2'-6" (3.81m x 0.76m) standard panel is used, making all the panels interchangeable. Special panel sizes can be manufactured when required. Panels are cast with pre-installed reinforcement mat anchors, and a cantilever footing at the back face, making installation fast and easy.



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