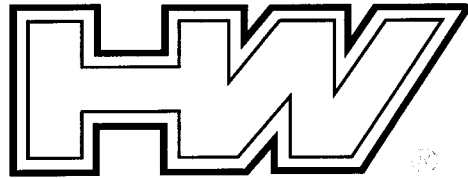


REINFORCED SOIL EMBANKMENT SMOOTH-FACE PANEL

Construction Guide



HILFIKER RETAINING WALLS

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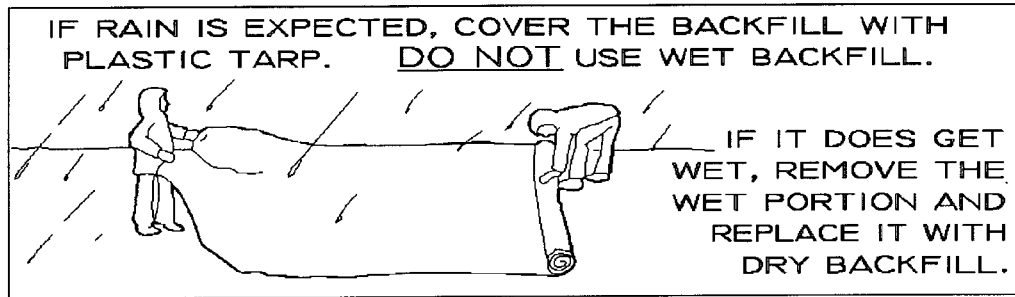


Hilfiker R.S.E. Walls are covered by the following patents:
Patent No. 4,260,296; 4,324,508; 4,343,572 and others.

HILFIKER REINFORCED SOIL EMBANKMENT

The **Reinforced Soil Embankment Retaining Wall** is a composite soil structure. The welded wire mats reinforce the soil, providing the tensile strength needed to make the compacted soil into a suitable structure. The concrete facing elements retain the fill and provide a pleasing appearance.

Backfill material must not have over-optimum moisture. Pumping and lateral movement of the reinforcement mats can occur if the backfill is too wet. The contractor also must protect the backfill from storm water during construction.



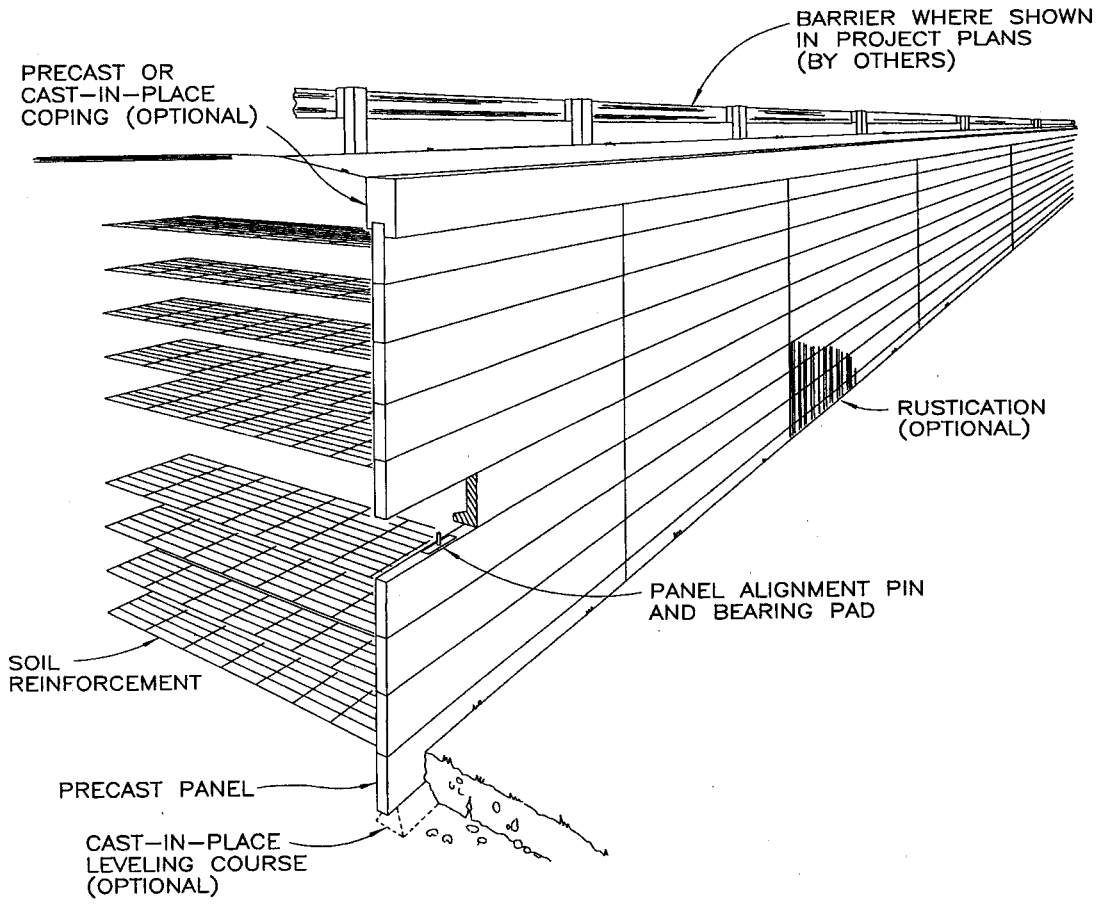
The 6" x 24" (152mm x 609mm) wire spacing in the reinforcement mats allows the use of a wide range of soils for backfill because of the mats' superior pullout resistance. Native material found in the excavation or at the jobsite often can be used for backfill material in the **Reinforced Soil Embankment** wall.

Fine-grained soils with a high percentage of clays don't have the strength and are more difficult to compact than free-draining granular backfill. Should your job require the use of a marginal fine-grained backfill, the reinforcement mats must be designed to compensate for its lack of strength. Backfill must be protected from saturation with an adequate drainage system if water is present behind the wall.

Disastrous results will occur if backfill material is allowed to become saturated with water.

Compaction of the backfill is also very important to keep the backfill from settling. Ninety to ninety-five percent compaction is recommended. Settlement will occur if the backfill isn't compacted as recommended. Properly installed, the Reinforced Soil Embankment is an exceptionally strong, resilient and economic structure.

Should you have any questions of the design, please contact **Hilfiker Retaining Walls**. We will be pleased to custom-design a retaining wall for your project, whether it be R.S.E., Welded Wire, Eureka Reinforced Soil (Cast-In-Place) Wall, Steepened Slope or Artweld Gabion.

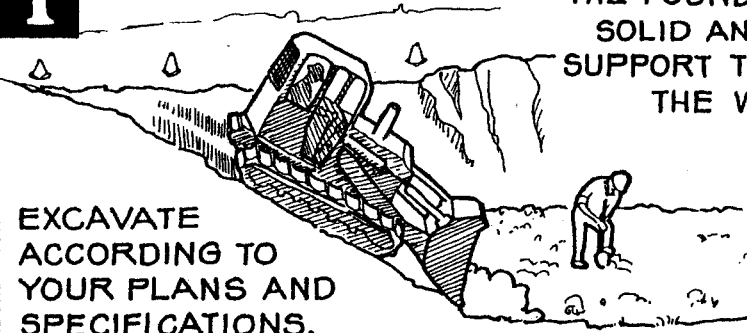


PICTORIAL ELEVATION

EXCAVATION

1

EXCAVATE ACCORDING TO YOUR PLANS AND SPECIFICATIONS.

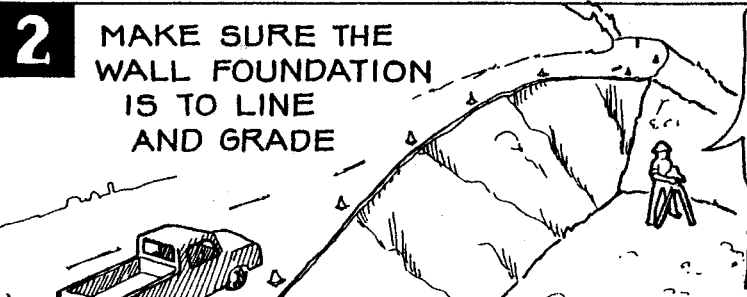


THE FOUNDATION MUST BE SOLID AND ABLE TO SUPPORT THE WEIGHT OF THE WALL

IF FILL IS REQUIRED, PLACE IT AS DIRECTED BY THE SOILS ENGINEER

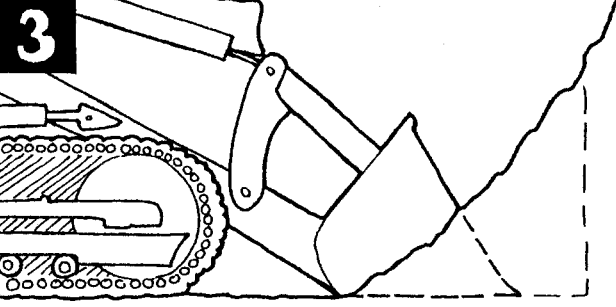
2

MAKE SURE THE WALL FOUNDATION IS TO LINE AND GRADE



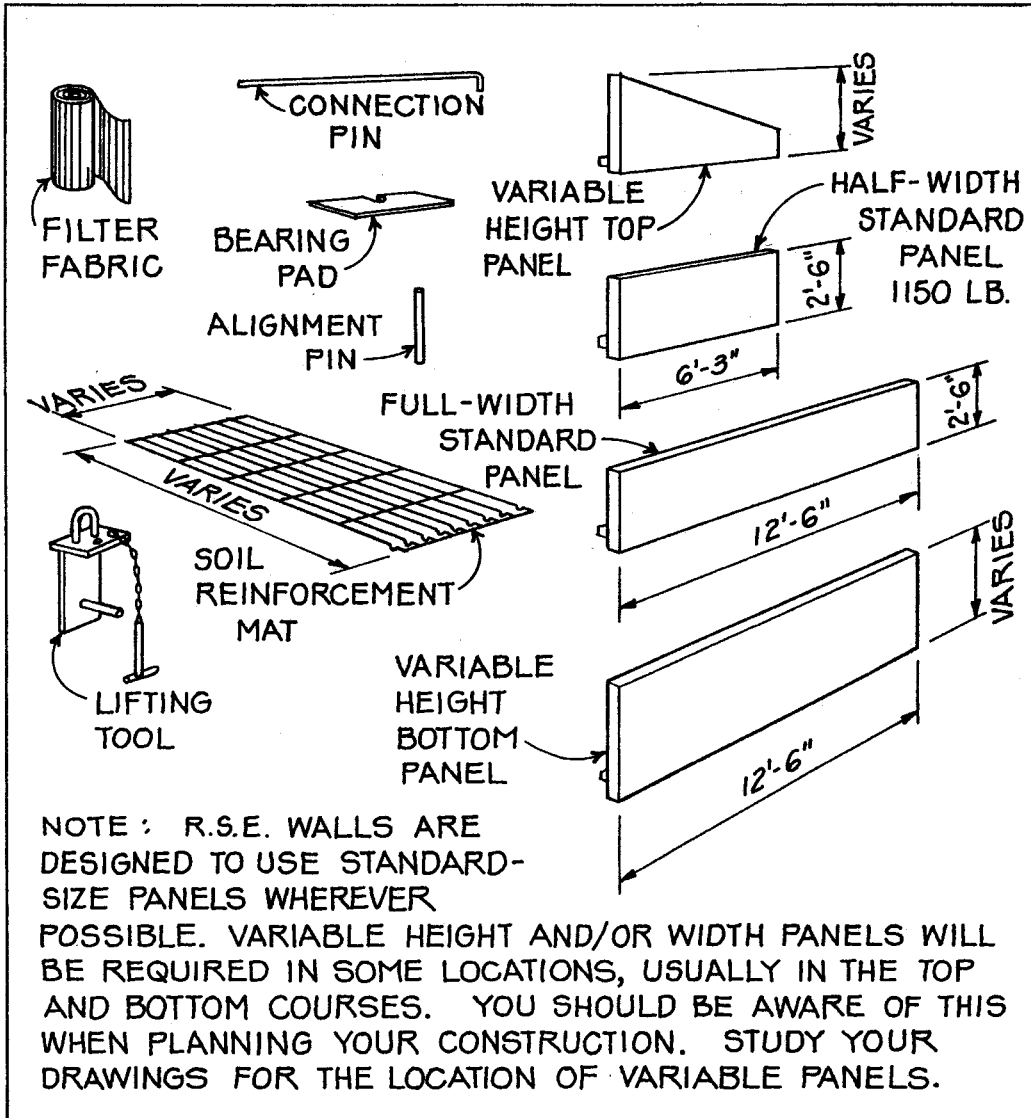
A LITTLE TIME SPENT NOW WILL SAVE A LOT OF TIME LATER

3



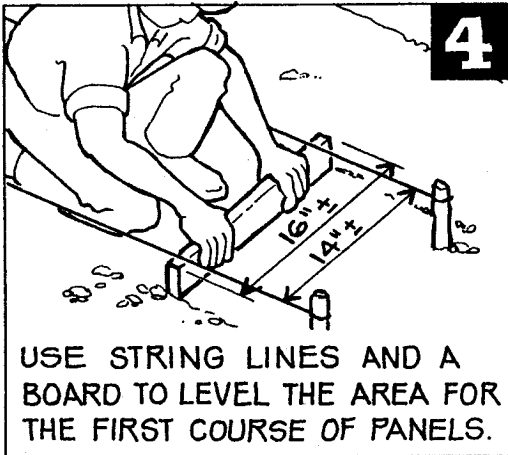
BENCH THE ENDS OF THE WALL INTO SOLID GROUND. THIS PREVENTS SETTLING AND EROSION OF THE FOUNDATION LATER.

WALL PARTS

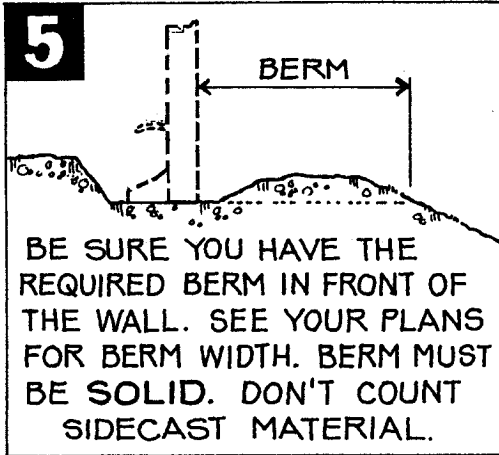


| | | |
|----------|---|-------|
| 2' - 6" | = | 0.76m |
| 6' - 3" | = | 1.9 m |
| 12' - 6" | = | 3.81m |

BOTTOM COURSE



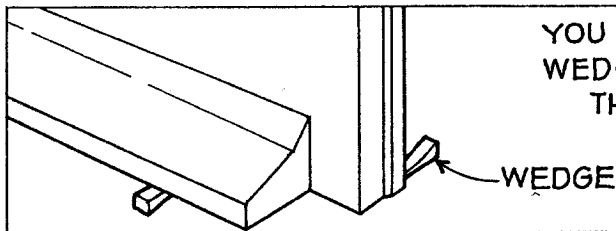
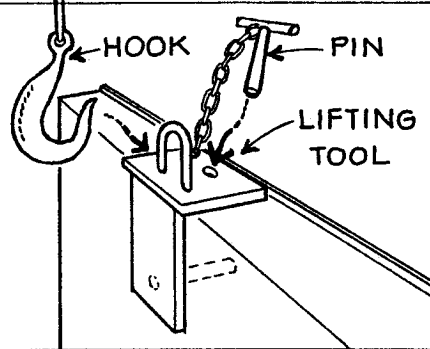
4 USE STRING LINES AND A BOARD TO LEVEL THE AREA FOR THE FIRST COURSE OF PANELS.



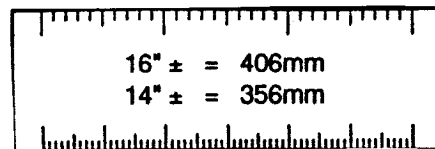
5 BE SURE YOU HAVE THE REQUIRED BERM IN FRONT OF THE WALL. SEE YOUR PLANS FOR BERM WIDTH. BERM MUST BE **SOLID**. DON'T COUNT SIDECAST MATERIAL.

NOTE : A CAST-IN-PLACE LEVELING COURSE MAY BE USED TO INCREASE PRODUCTION ON LONG RUNS.

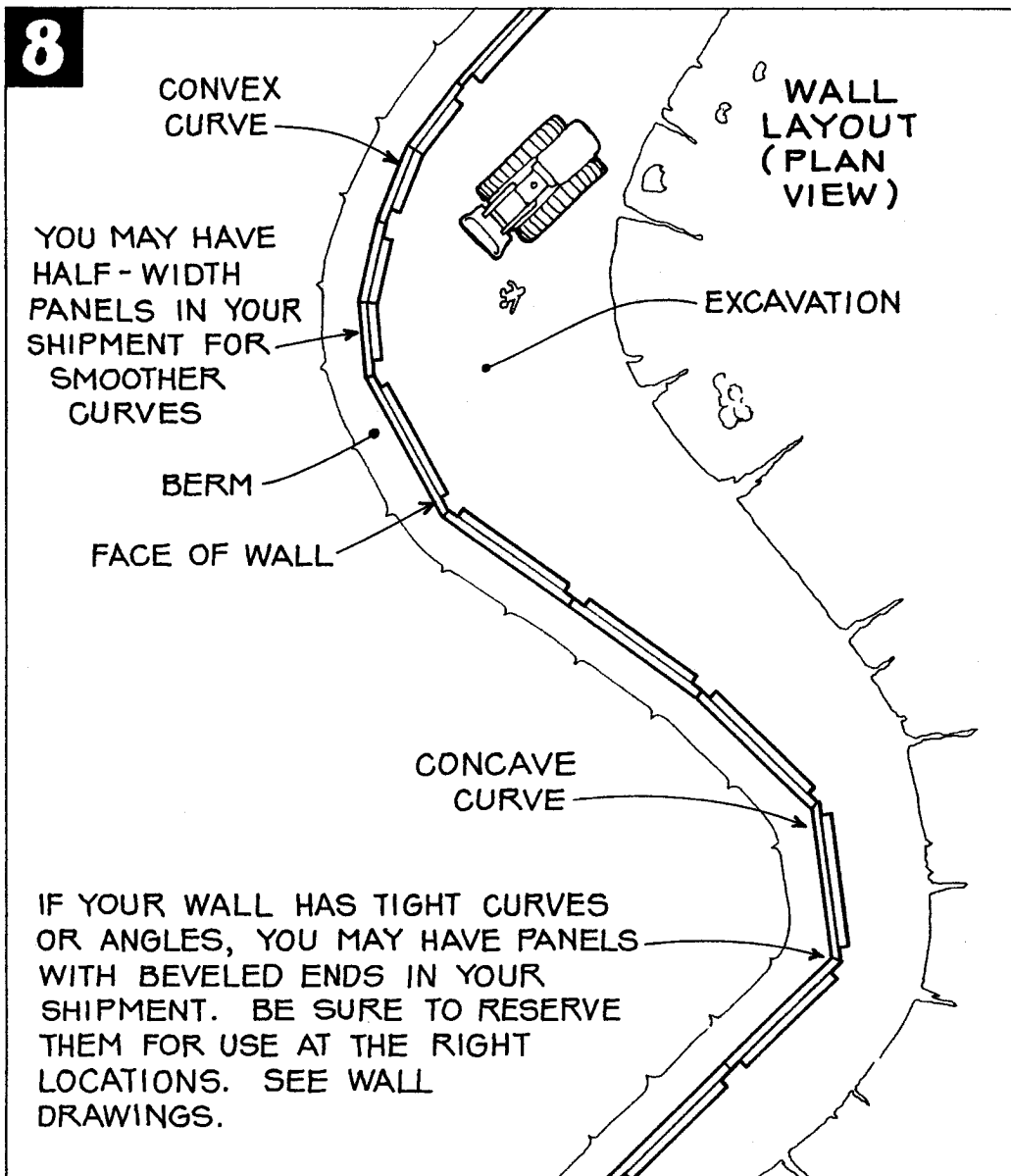
6 MOVE PANELS ONE AT A TIME TO THE PREPARED FOUNDATION. USE TWO LIFTING TOOLS PER PANEL. SLIDE THE BRACKETS ONTO THE PANELS AND DROP THE CHAINED PINS INTO THE TOP HOLES. **BE SURE THE PANELS ARE LEVEL AND STABLE BEFORE YOU REMOVE THE HOOKS.**



7 YOU CAN USE WOOD WEDGES TO PLUMB THE PANELS

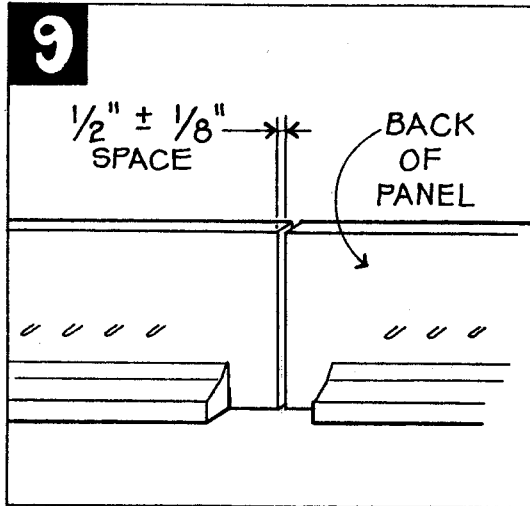


8



PANEL SPACING

9



$\frac{1}{2}'' \pm \frac{1}{8}''$
SPACE

BACK OF PANEL

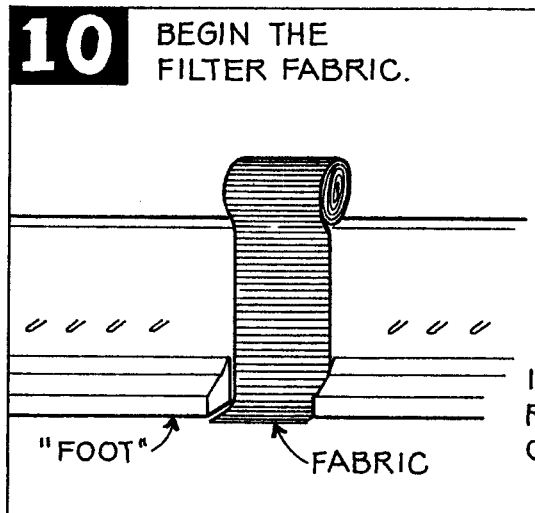
PANELS ARE CAST APPROXIMATELY $\frac{1}{2}$ INCH SHORTER THAN THE LENGTH THEY ARE INTENDED TO SPAN.

INSTALL THE PANELS WITH $\frac{1}{2}$ " SPACE BETWEEN THEM.

CHECK CAREFULLY. SPACING IS IMPORTANT.

FILTER FABRIC

10 BEGIN THE FILTER FABRIC.



"FOOT"

FABRIC

COVER EACH SPACE BETWEEN THE PANELS. CENTER THE FABRIC BETWEEN THE "FOOT" EXTENSIONS. DON'T CUT THE FABRIC OFF TILL YOU GET TO THE TOP OF THE WALL.

IF YOU NEED TO START A NEW ROLL PARTWAY UP THE WALL, OVERLAP THE ENDS 12" .

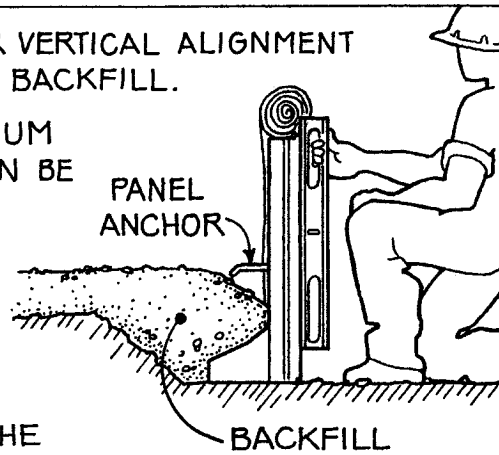
| | | |
|-----------------|---|-------|
| $\frac{1}{2}''$ | = | 13mm |
| $\frac{1}{8}''$ | = | 3mm |
| 12" | = | 305mm |

11

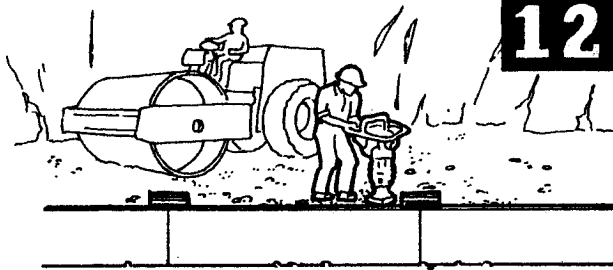
CHECK THE PANELS FOR VERTICAL ALIGNMENT BEFORE YOU START THE BACKFILL.

PLACE BACKFILL IN 8" MINIMUM LAYERS, OR LAYERS THAT CAN BE PROPERLY COMPACTED. THE BACKFILL BEHIND THE PANELS CAN BE MECHANICALLY OR HAND TAMPED, DEPENDING ON THE BACKFILL QUALITY AND SIZE OF EQUIPMENT.

BACKFILL TO THE LEVEL OF THE TOP OF THE PANEL ANCHORS.



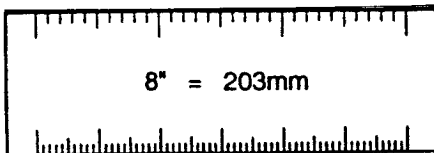
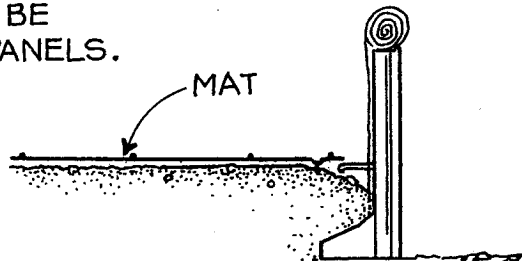
THIS WALL IS A SOIL STRUCTURE. PROPER COMPACTION IS VERY IMPORTANT. COMPACT EVERY LIFT PROPERLY AND CAREFULLY.

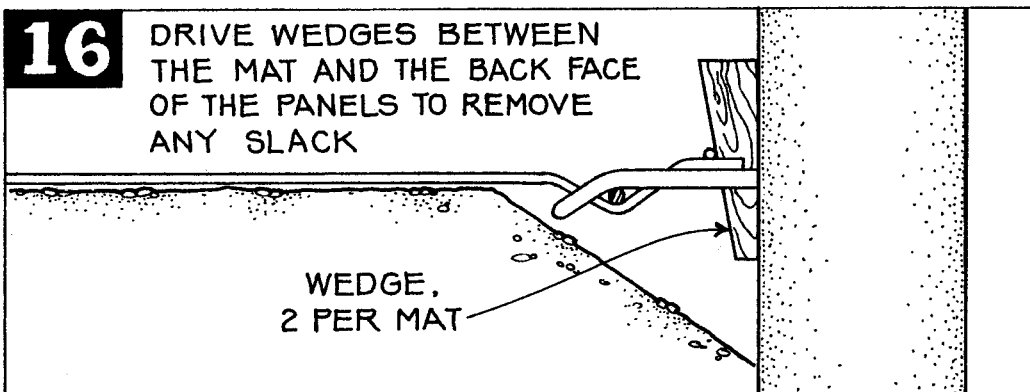
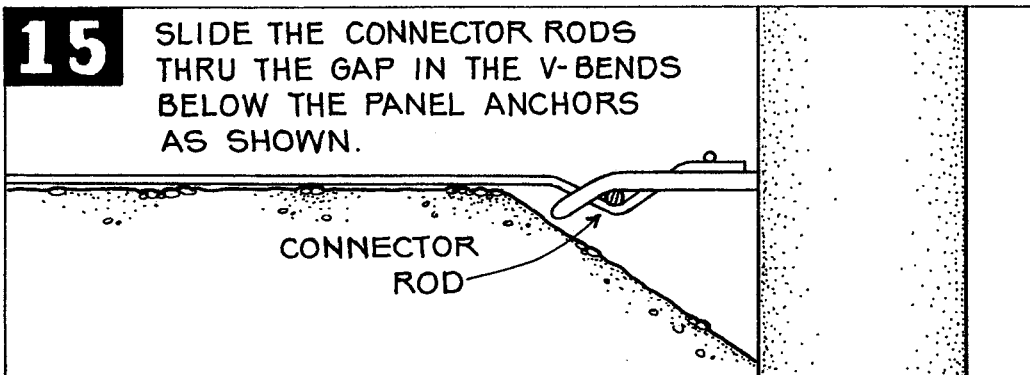
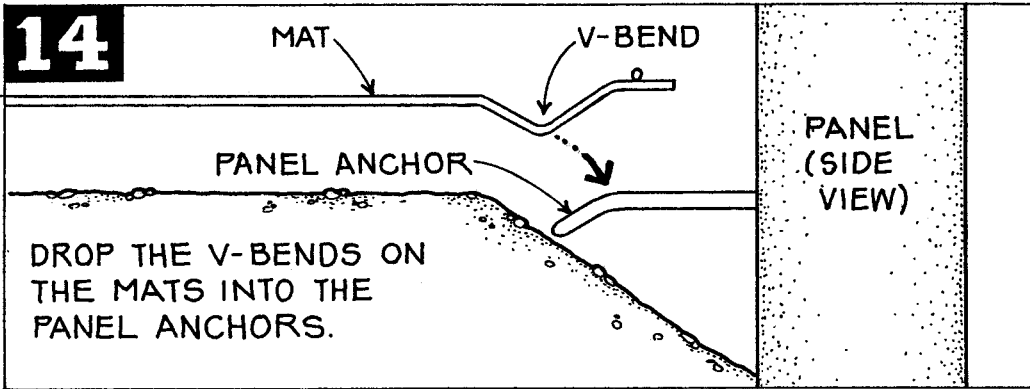


13

PLACE THE MATS ONTO THE BACKFILL READY TO BE CONNECTED TO THE PANELS.

CHECK YOUR PLANS CAREFULLY FOR THE CORRECT MAT LENGTH AND WIRE SIZE AT EACH PANEL LOCATION.





17

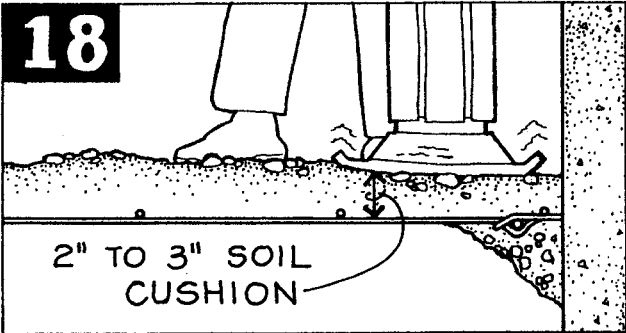
WHEN ALL THE MATS ARE CONNECTED AND WEDGED, BEGIN THE BACKFILL.



DO NOT OPERATE HEAVY EQUIPMENT ON BARE WIRE !

INSTALL ALIGNMENT PINS, 2 PER PANEL, IN THE TOP HOLES IN THE PANELS.

18



2" TO 3" SOIL CUSHION

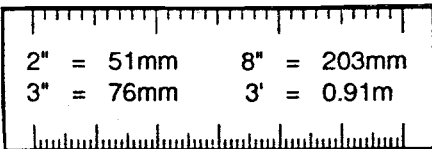
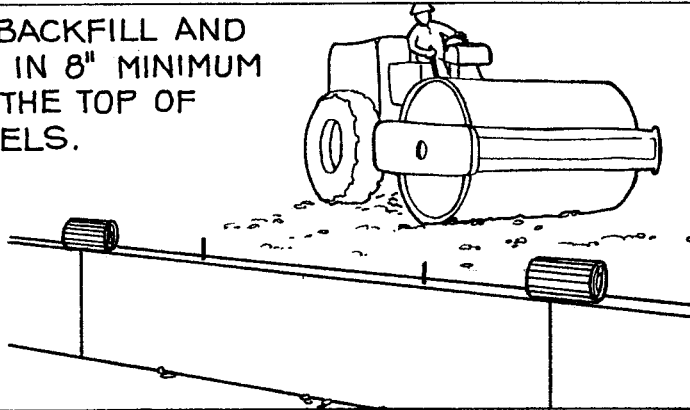
USE A HAND TAMPER TO COMPACT NEAR THE PANELS.

KEEP A 2" TO 3" CUSHION OF FILL UNDER THE TAMPER TO PROTECT THE CONNECTION WIRES.

19

CONTINUE BACKFILL AND COMPACTION IN 8" MINIMUM LAYERS TO THE TOP OF THE PANELS.

DO NOT OPERATE HEAVY EQUIPMENT WITHIN 3 FEET OF THE BACK OF THE PANELS.

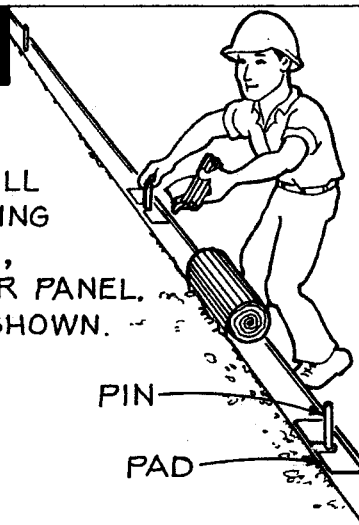


20

INSTALL BEARING PADS, 2 PER PANEL, AS SHOWN.

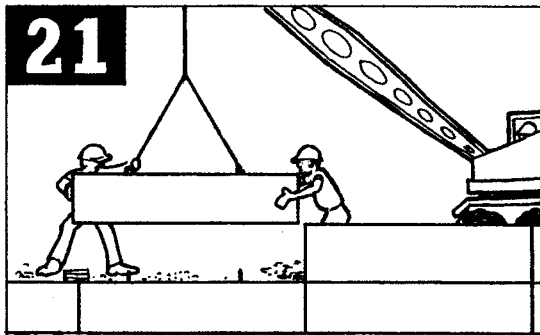
PIN

PAD



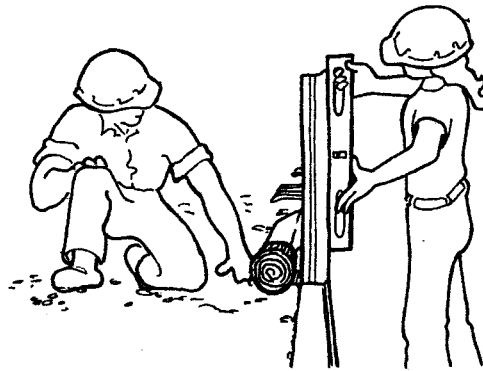
21

USING LIFTING TOOLS, CAREFULLY LOWER THE NEXT COURSE OF PANELS OVER THE ALIGNMENT PINS



22

MAKE CERTAIN THAT THE COMPACTED BACKFILL BELOW THE FOOT IS GRADED LEVEL WITH THE TOP-REAR PANEL SURFACE TO SUPPORT THE FOOT AND PANEL!
CHECK PANELS FOR VERTICAL ALIGNMENT. PLUMB AS SHOWN IN STEP 7.



CONTINUE PLACING BACKFILL, MATS, PINS AND PADS AS SHOWN IN STEPS 11 THRU 22 TO THE TOP OF THE WALL.

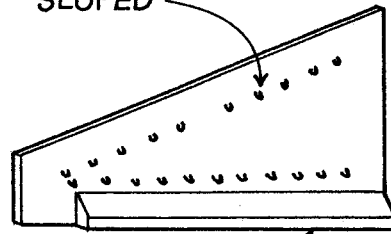
23

SOME OR ALL OF YOUR TOP PANELS MAY BE HALF-WIDTH AND/OR VARIABLE HEIGHT.

MEASURE THE TOP PANELS AND CHECK YOUR PLANS FOR THE CORRECT PLACEMENT.

INSTALL THEM USING THE SAME METHODS YOU USED FOR THE OTHER PANELS.

MAT INSTALLED HERE WILL BE SLOPED



HALF-WIDTH VARIABLE HEIGHT PANEL

24

PLACE AND COMPACT THE BACKFILL UP TO THE LEVEL OF THE TOP OF THE PANEL ANCHORS.

INSTALL THE MATS. SOME MAY BE HALF-WIDTH MATS.

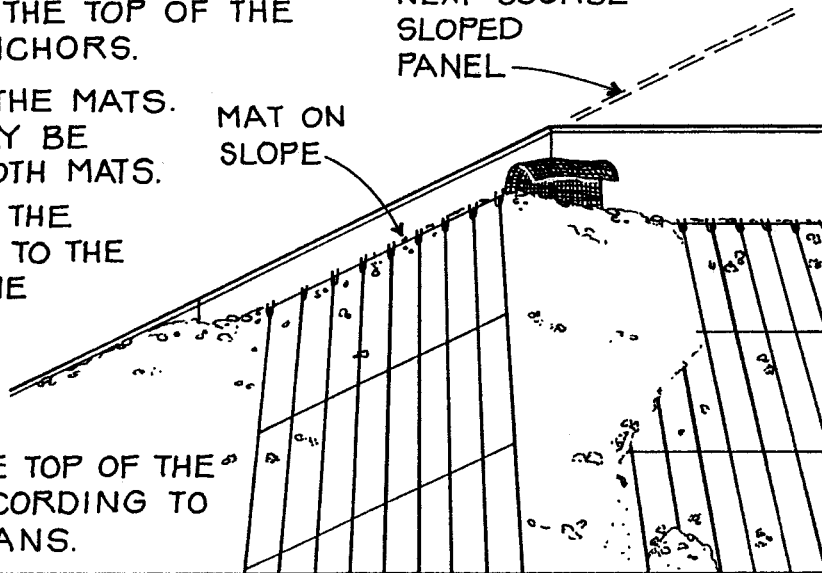
CONTINUE THE BACKFILL TO THE TOP OF THE PANEL.

CUT OFF FILTER FABRIC.

FINISH THE TOP OF THE WALL ACCORDING TO YOUR PLANS.

NEXT COURSE SLOPED PANEL

MAT ON SLOPE



WIRE SIZE COMPARISON TABLE

| "W" SIZE NUMBER | NOMINAL DIAMETER (INCHES) | NOMINAL DIAMETER (MM) |
|-----------------|---------------------------|-----------------------|
| W12.0 | .391 | 9.93 |
| W9.5 | .348 | 8.84 |
| W7.0 | .299 | 7.60 |
| W4.5 | .239 | 6.07 |
| W3.5 | .211 | 5.36 |

WIRE SPECIFICATIONS

| ASTM SPECIFICATION | AASHTO STANDARD | TITLE |
|--------------------|-----------------|---|
| A 82 | M 32 | COLD-DRAWN STEEL WIRE FOR CONCRETE REINFORCEMENT |
| A 185 | M 55 | WELDED STEEL WIRE FABRIC FOR CONCRETE REINFORCEMENT |
| A 123 | M III | ZINC (HOT DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS |

WELDED SMOOTH WIRE FABRIC ASTM A 185

| WIRE SIZE | TENSILE STRENGTH PSI | YIELD STRENGTH PSI | WELD SHEAR STRENGTH |
|-------------|----------------------|---------------------|---------------------|
| W1.2 & OVER | 75,000 (520 MPA) | 65,000 (450 MPA) | 35,000 (240 MPA) |

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