TECHNICAL NOTES

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MEASURING ON-SITE SOIL LOSS WITH A MINIATURE EROSION TROUGH

The attached material describes a method of measuring on-site soil loss with a miniature erosion trough.

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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

MEASURING ON-SITE SOIL LOSS WITH A MINIATURE EROSION TROUGH

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MEASURING ON-SITE SOIL LOSS WITH A MINIATURE EROSION TROUGH

Current field technics being used to monitor on-site loss are fairly limited or have proved unsatisfactory for one reason or another. Miniature ersion troughs were developed to provide an alternative to such current methods as erosion pins, 3-F erosion bridge and other cross-sectional technics using tapes, etc. Some of the advantages of using miniature troughs are:

1. provide reliable results and volume of soil-debris can be easily measured.

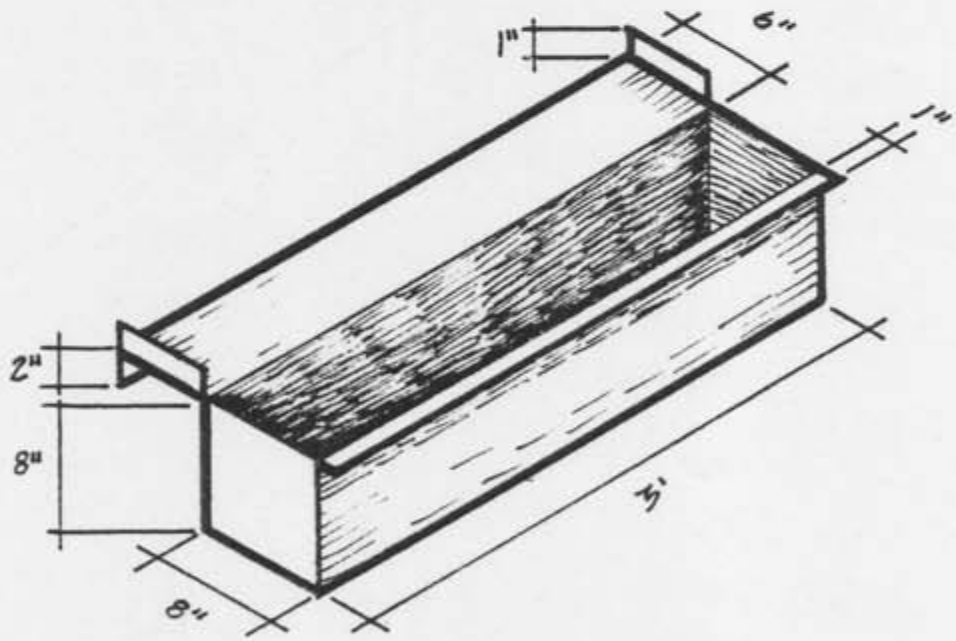
2. are inexpensive (current costs for construction are about $50.00 per trough).

3. are portable and can be carried for short distances.

4. are of rugged construction and capable of being used over again.

In addition, the troughs may be used to monitor for dry ravel during the summer months as well as for erosion associated with water movement that occurs during the winter months. The troughs are made of 20 gauge galvanized sheet metal and are pop riveted and soldered along all seams. The dimensions are 3 feet long, 8 inches wide and 8 inches deep. See diagram below for details and other dimensions. Volume of a trough is approximately 1.3 cu. ft. One side of the trough has a 6-inch wide apron with the side edges turned up to channel all erosion particles into the trough. The upper edge of the apron has a 2-inch lip which can be pressed into the soil surface to prevent undercutting at the soil-apron contact.

EROSION TROUGH



Installation Procedure

Tools needed for installing the trough are: shovel, tile spade and a Polaski tool. Allow about 30 minutes to install a trough and another 20 minutes to stake and attach boarders if required. Dig a shallow trench approximately 8 inches deep and 3 feet long. Dig the trench at right angles to the ground slope. The side of the trough should fit tightly against the cut bank. Make sure the edge of the apron can be pressed 2 inches into the surface and that there are no large restricting roots or stones. If such are present, try to remove them with minimal disturbance or if necessary move the trough to an adjacent site. After the lip is pressed into the soil and the trough is in position, check with a level to make sure the trough is level horizontally. Also check to make sure the apron is approximately at the same angle as the ground slope above. Backfill with soil around all sides and bottom and tamp loose soil until trough is firmly in place. Staking to secure the trough should not be necessary. Make sure there are no large voids along the trough-cut bank interface. Handfill if necessary.

The top of the trough and the apron should be covered with a suitable top to prevent any direct rainfall from entering. The cover, which can be made from 3/8 inch construction-grade plywood, should set about 4 inches above the apron.

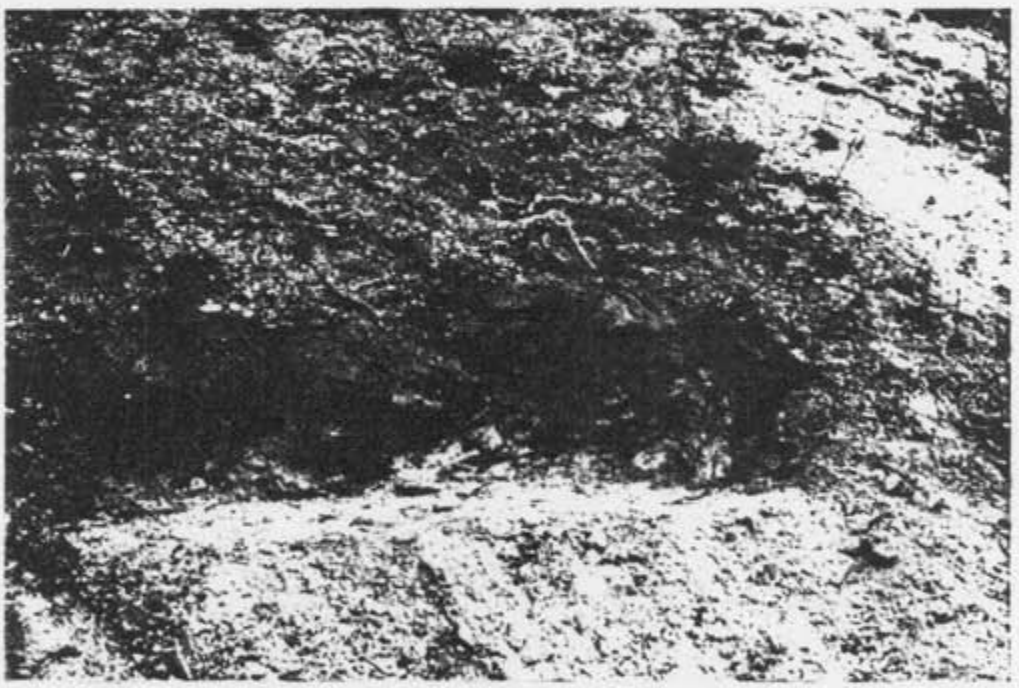


Fig. 1. Shallow trench dug for installing trough.

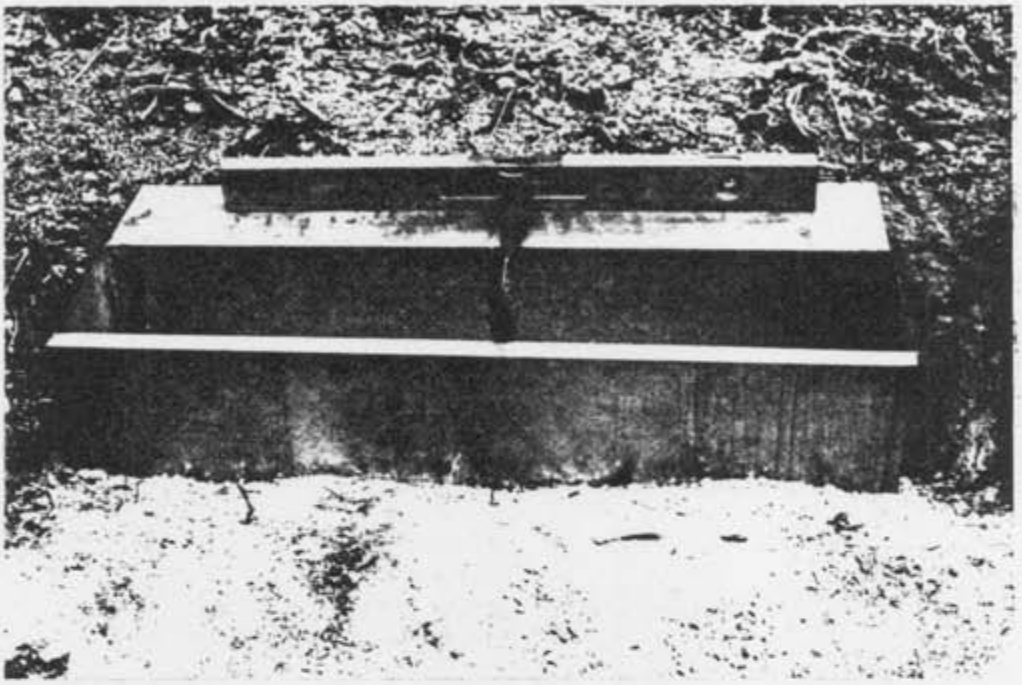


Fig. 2. Checking with Level to ensure trough is leveled "horizontally."

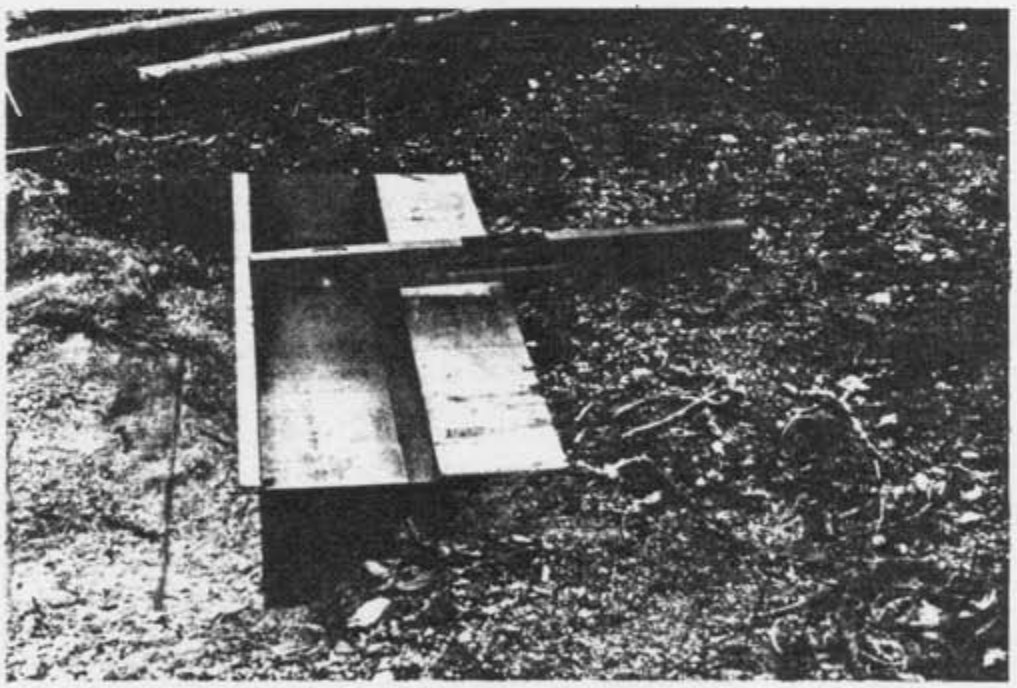


Fig. 3. Checking to ensure apron is aprallel with slope of plot surface.

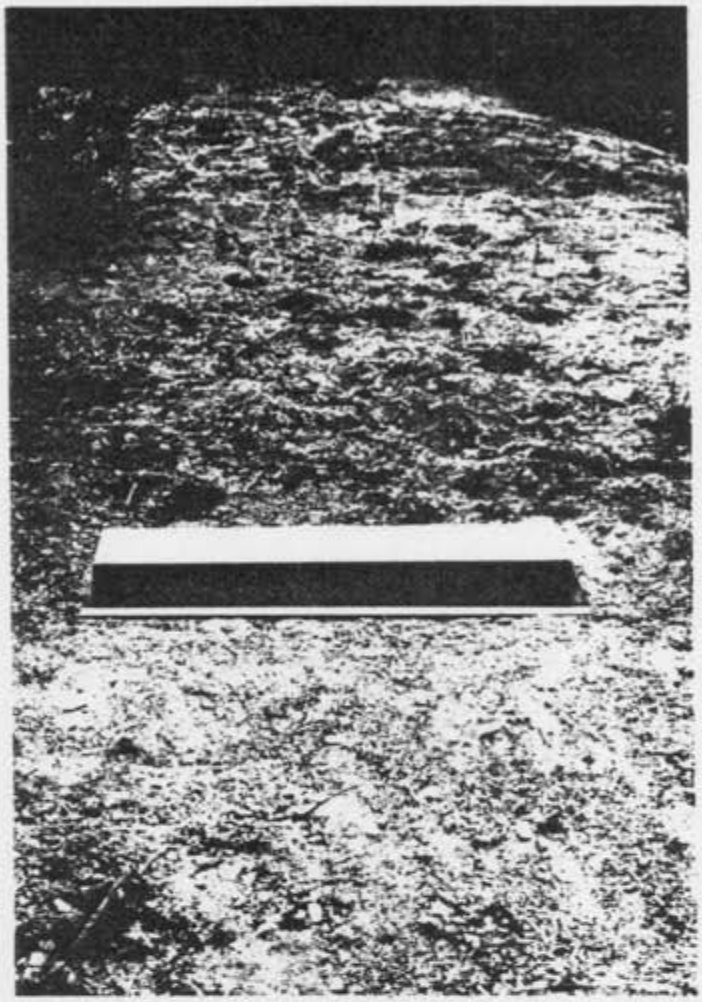


Fig. 4 Trough firmly in place with apron on upslope.

Size of Plot or Drainage Area

The drainage area in back of the trough should be well defined either by natural ground relief features (for example, miniature concave slope) or use of installed boarders. Boarders can be made of wood 2' x 4's, channel metal or plastic material. A drainage area of 24 to 50 sq. feet is adequate.

Cleanout Procedure

If free standing water is present in the trough, this should first be siphoned off. Remove all soil-debris and place in large (40 pound) canvas bag or other suitable container. Determine total weight minus the weight of the canvas bag. This can be done directly in the field by using a hanging scale with hook. A sample should be taken for moisture determination so results can be expressed on oven dry weight basis. If the size or plot area is known, results can easily be converted to tons per acre. There are other cleanout alternative methods which can probably just as satisfactory as the above procedures. Air drying samples may be sufficient in some instances.

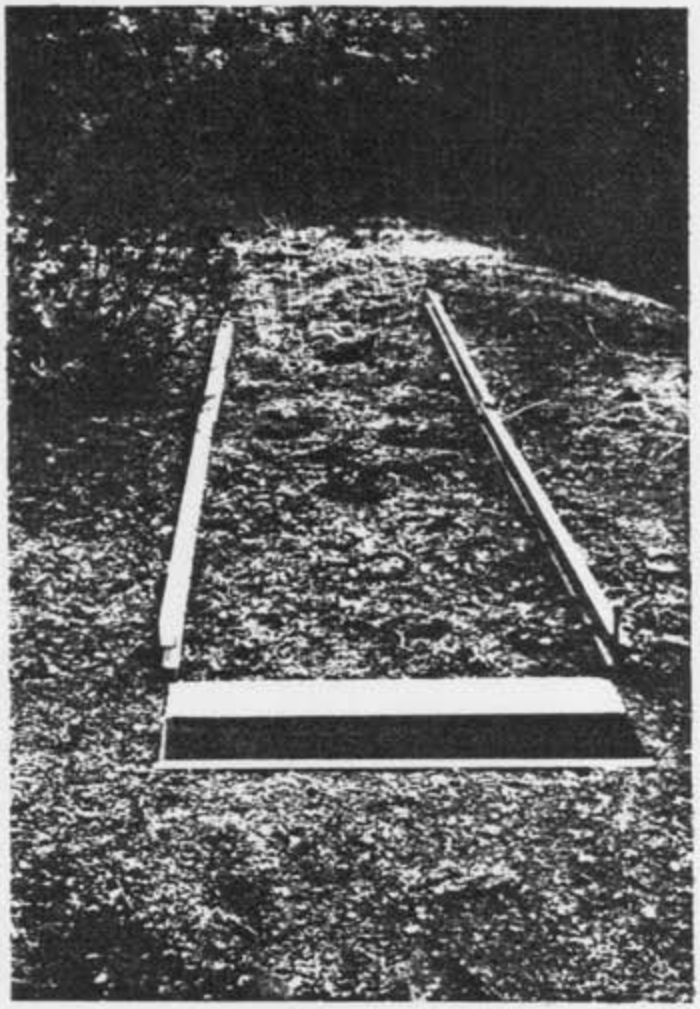


Fig. 5. Trough with side boarders attached and staked. Note upper part of boarder is missing.

Cleanout Frequency

Unless a major storm event has occurred it is anticipated that cleanout trips can be limited to one or two trips per winter season. In areas of high overland flow, more frequent inspections may be necessary. When dry ravel is being monitored, it is anticipated that only one cleanout per season will be necessary.

Where overflow hazard exists, the trough can be modified as follows: cut a 3/40-inch diameter hole at the top of the trough (downslope side) and attach a 3-foot long hose to trough. Attach the other end of hose to a canvas bag which should serve to trap or filter out most fines while allowing the water to drain out.

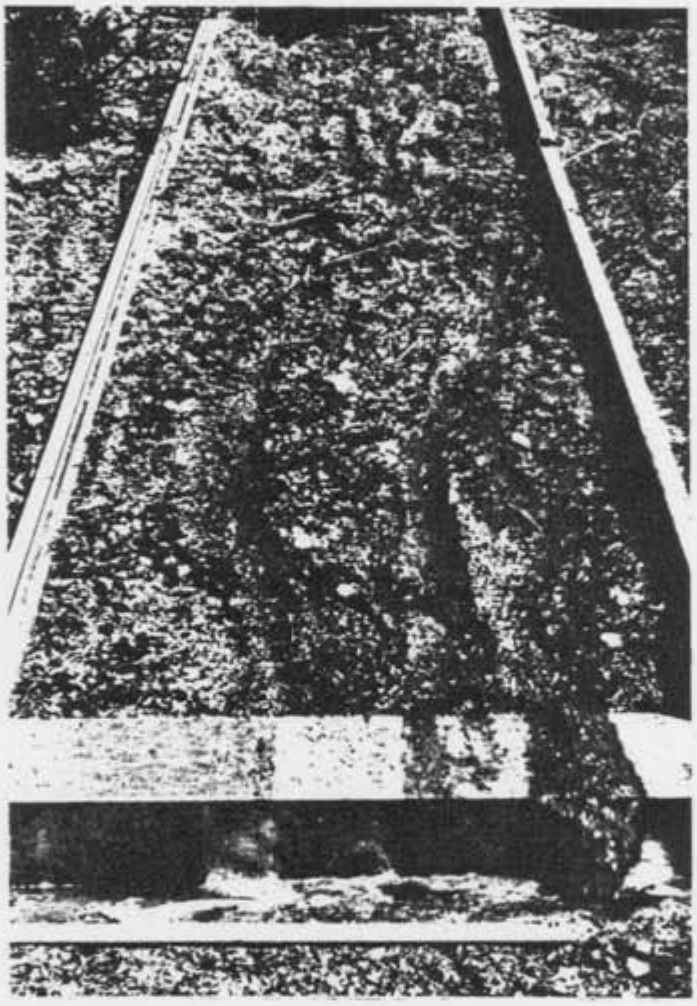


Fig. 6. Test plot showing trough about to overflow due to excessive watering to produce overland flow. No undercutting observed along apron-soil interface.