

Terrace and Hillside Ditch

TERRACE/HILLSIDE DITCH DEFINITION

A small channel that has a supporting ridge on the lower side, constructed across an eroding slope to address severe erosion. This practice is used in the collection zone.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to steeply sloping sites where surface flow is causing severe erosion and damaging sloping upland or collection zone. Terraces/Hillside ditches shall not be used to provide protection to buildings, roads, or other improvements. Terraces/Hillside ditches are not to be used to convey water for irrigation.

VOCABULARY NOTE:

In Afghanistan, the term 'Terrace' and 'Hillside Ditch' is used to describe small ditches that are constructed on contour to control erosion on steep slopes. In the United States, this practice is often referred to as 'Hillside Ditches'. While it is noted that there are some differences in form and function between what is referred to as Terraces and Hillside Ditches in the US, the term Terrace/Hillside Ditch will be used in this SOP as is commonly used in Afghanistan.

TERRACE/HILLSIDE DITCH PURPOSE

This practice is applied as part of a resource management in the collection zone for one or more of the following purposes:

- Reduce surface erosion by rainfall runoff
- Retain runoff for moisture conservation
- To promote establishment trees and shrubs
- To safely control the flow of water by diverting runoff from upland sloping areas or collection zones to a stable outlet.

REVEGETATION

Hillside ditches and terraces are also used to promote the establishment of vegetation such as trees and shrubs. Trees and shrubs can be placed in the invert of the ditch and the area around the planting shall be mulched. This will facilitate surface irrigation as well as the capture of rain fall runoff. This practice is labor intensive and disturbs soil. If the slope is relatively flat (<5%) and/or the soil is in good condition, consideration should be given to only using surface excavation at planting site. This surface excavation should involve the construction of a mound of soil just down slope of the planting. The mound should be shaped in an upstream crescent shape.

CONSTRUCTION

Terraces and Hillside ditches are channels and ridges constructed across slopes and are used to reduce soil erosion and retain runoff to allow it to soak into the ground. This practice requires sufficient soil depth

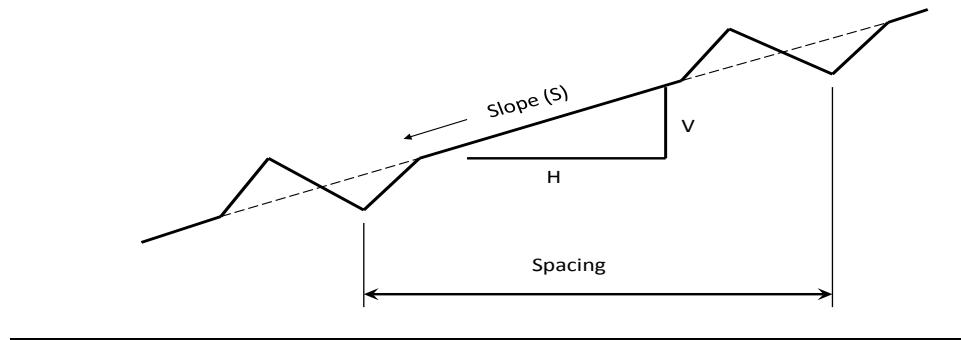
for construction and can not be applied on rock. The Hillside /Terrace ditches shall be constructed parallel to contour lines, and the channels shall be level or flat so that water will not flow downhill. To accommodate farm machinery and farming operations, design cropland terraces/hillside ditches with long gentle curves. When multiple terraces/hillside ditches are used in a field, they should be designed to be as parallel to one another as practicable. The contractor will meet specifications for depth, spacing, inclusion of terrace plugs, contour slope, and compaction of excavated soil.

Depth: the minimum depth shall be 30 centimeters, and maximum depth shall be 45 cm (to prevent excessive surface disturbance).

Width: The invert (channel bottom) width should be 30 to 50 cm.

Spacing: Spacing depends on slope. Guidance is as follows:

Average Slope In percent	V:H	Maximum Spacing (meters)
12 or less	1V:8H or less	12
12 to 25	1V:8H to 1V:4H	10
25 to 40	1V:4H to 1V:2.5H	8

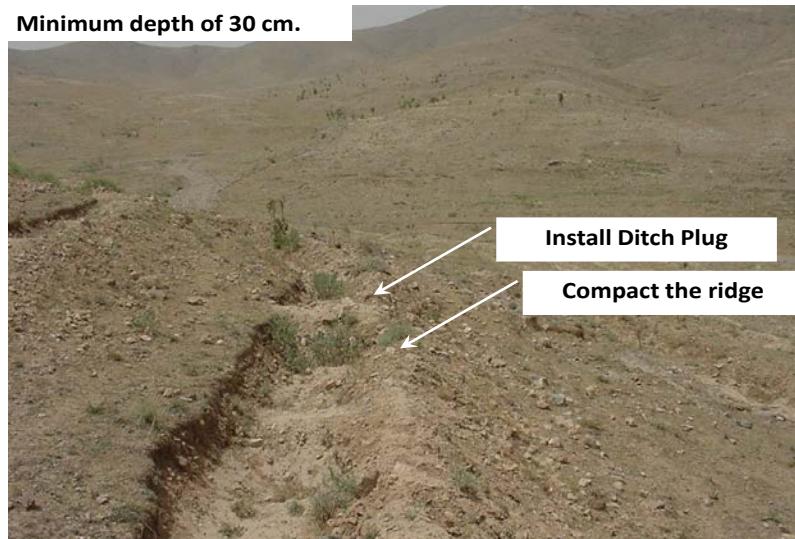


Length: The maximum allowable length of ditch draining in one direction is 150 meters.

Plugs: Shall be installed every 30 meters. The minimum height of the plug will equal $\frac{1}{2}$ the depth of the terrace ditch.

Outlets. Terraces/Hillside Ditches shall have adequate outlets sufficient to convey runoff from large rainfall events without causing further erosion. Locate or establish adequate outlets prior to the construction of this practice. An outlet may be a grade control structure, a natural or constructed waterway, rip rap energy dissipation, infiltration basin, pond, a stable watercourse, or a stable disposal area such as a well-established pasture.

Compaction of excavated soil: Excavated soil will be placed on the down slope side of the terrace ditch and hand compacted to form a ridge along the down slope edge of the terrace ditch. Top width shall be 15-30 cm.



Contour Slope: In general, Terraces/Hillside Ditches shall be near level and average no more than 0.5% slope. These practices can also be designed to convey water at no more than the maximum velocity that the soil can withstand without being eroded. The maximum velocity for erosion-resistant soils (c lay textural classification) is 0.8 ft/s; for average and for easily erodible soils (sand textural classification), 0.5 m/s. However, it should be noted that the 0.5% slope limitation is sufficient for most situations.

MEASUREMENT AND PAYMENT

Terraces/Hillside ditches are measured by the linear foot along the centerline of the terrace.

The contract price paid per linear foot for terraces/hillside ditches includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the terraces, complete in place, including removal of materials, cleanup and disposal of waste construction debris, and backfilling and repairing holes, depressions and other ground disturbance, as specified in Section (III), General Provision, and as directed by the PPO/PRT Engineer.

OPERATION AND MAINTENANCE

An Operation and Maintenance plan shall be prepared for use by the landowner or operator. The plan shall include provisions to address the following, as a minimum:

- Remove vegetative growth or debris interfering with the proper functioning practice, as necessary.
- Remove debris interfering with the outlet operation, as necessary.
- Maintain vegetation planted in the terrace/hillside ditch.
- Removal of sediment that has accumulated in the ditch channel to maintain capacity and grade.

Maintenance and repairs should be done on a routine basis with special emphasis on inspection as soon as possible after heavy rainfall events.

REFERENCES

USDA, NRCS. Practice Standard 600, Terraces

USDA, NRCS. Practice Standard 423, Hillside Ditch

USDA, NRCS. National Engineering Handbook, Part 650, Engineering Field Handbook, Chapter 8.