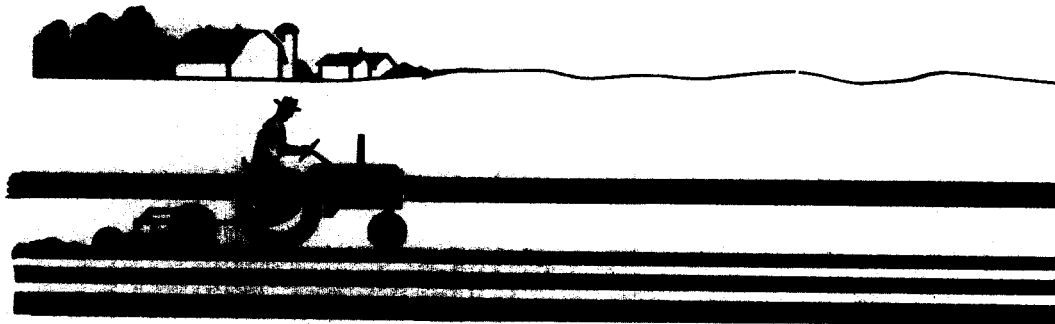




# LAND FORMING

*for farm  
surface drainage*



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## IMPORTANT

In planning a drainage system for a farm, or for part of a farm, the landowner must observe laws governing the diversion of water onto neighboring land and into road ditches and streams. Adequate outlets must exist. Road culverts downstream from the land to be drained must be large enough to handle the expected runoff without damage to roads or neighboring farms.

When water is drained onto or across a neighbor's property an easement must be obtained to avoid legal difficulties. It is essential that farm drainage be planned on a watershed basis. This will permit all farms in the watershed to be drained in an orderly manner.

## SURFACE DRAINAGE SYSTEMS

The purpose of land forming is to provide surface drainage from the field into an area drainage system. Three field drainage systems are practiced in North Dakota. Good field surface drainage can be accomplished by using one or a combination of these systems.

**1. THE RANDOM DITCH SYSTEM (fig. 1)** – Used in fields that have a few depressions too deep or too large to fill in by grading. Ditches can be used to connect several depressions and carry the water to a suitable outlet. The ditches should be built with 8 to 1 side slope for ease in crossing with farm machinery. Random ditches are best adapted to the more undulating land surfaces.

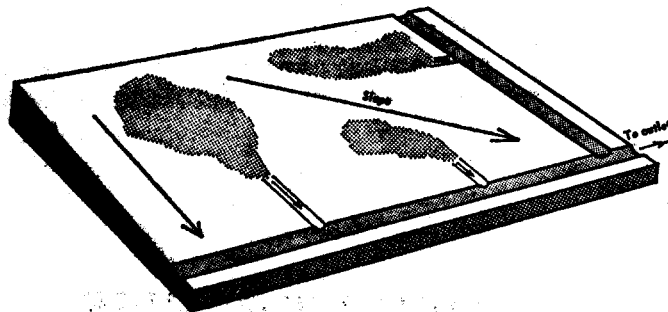


Fig. 1. Random ditch system of drainage. Spoil from ditches is used to partially fill depressions.

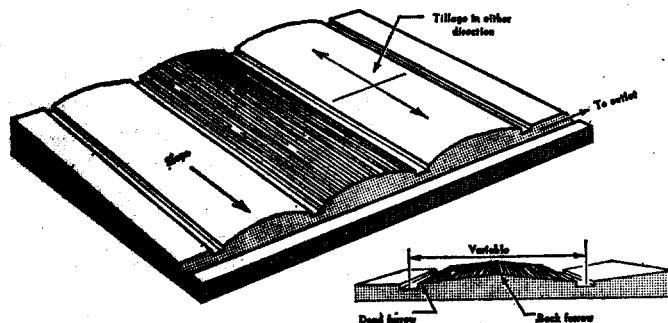


Fig. 2. The bedding system. Beds are formed by plowing so that deadfurrows run parallel to the general slope of the land.

**2. BEDDING SYSTEM (fig. 2)** – Adapted to flat fields with tight soils. The system drains water from beds into dead furrows. The dead furrows drain into across-the-slope collection ditches which run to the main outlet. The beds, or lands, are laid out with the furrow running in the direction of the greatest slope.

Flat slopes and soils with low permeability require narrow beds.

Table 1

| Permeability  | Bed Width     |
|---|---------------|
| Very slow (water stands on surface 48 hrs. or more) | 23 to 37 feet |
| Slow (water stands on surface 24 to 48 hrs.)        | 44 to 51 feet |
| Fair (water stands on surface less than 24 hrs.)    | 58 to 93 feet |

Bedding systems are often hard to manage. Their main advantage is that they can be constructed and maintained by the farmer with farm size equipment.

**3. PARALLEL DITCH SYSTEM (fig. 3)** – This system is adapted to flat, poorly drained soils, in which there are many shallow depressions. The ditches are at right angles to the outlet drains and are parallel to each other, but the distance between them is not necessarily the same. This system is the most desirable surface drainage method.

The parallel ditches should be laid out across the natural slope so they will act as diversion as well as drainage ditches. This keeps excess water from accumulating in low places and permits the removal of the runoff from all parts of the field at a fairly uniform rate.

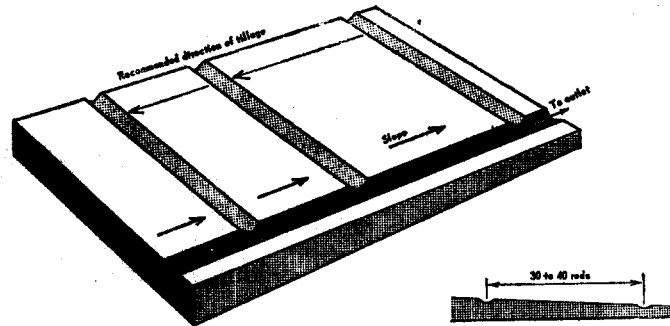


Fig. 3. Parallel ditch system on a continuous slope. Ditches have 8 to 1 side slopes to facilitate tillage.

## LAND SMOOTHING

Land smoothing helps all types of surface drainage systems. Land smoothing is grading, or planing by mechanical means, of the land surface to take off minor high spots and fill low areas which tend to retard or store runoff water. Its purpose is to smooth the land so the surface water will run off with the natural slope of the land. It is especially effective in fields having small depressions and a flat slope.

Land smoothing is best accomplished in two operations. First, rough grading where earth is taken from high spots and filled into the low areas. Second, following rough grading, the land is planed with a mechanical type land plane.

Land smoothing, when properly performed, is the single most effective surface drainage practice on land with slopes of 2 per cent or less, and one of the cheapest.

To obtain maximum efficiency it is necessary to augment land smoothing with a system of interception ditches. The ditches provide (1) soil to fill low spots, (2) reduction in overland flow run off, (3) the creation of necessary slope in the field and (4) provides for more rapid removal of run off water.

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