

The purpose of agricultural drainage is to provide an aerated plant root environment suitable for crop production and to ensure suitable conditions for field operations. Surface drainage is the removal of excess water from the land surface through improved natural channels, constructed open ditches or shaping of the soil surface.

Open Ditching

Open ditches are the most widely used form of surface drainage in the region (*Figure 1*). They act as field perimeter drains, cut-off drains (collecting water from an upslope wooded or other area) and outlets for other drainage systems. When planning an open ditch system there are a number of considerations:

1. Volume of water to be drained
2. Topography
3. Type of soil
4. Depth requirements

The slope of a ditch is determined by the area's topography. Slopes as little as 0.05% or 0.5 m/1,000 m (0.5 ft./1,000 ft.) may be used. In situations where open ditches are required to transport large volumes of water on steep slopes, they should be carefully planned to avoid ditch bottom and side slope erosion. If high water velocities are expected, the open ditch should be rock lined or water control structures installed to prevent erosion.



Figure 1. Open sloped ditch.

Open ditches require adequate side slopes to prevent eroding and sloughing of ditch banks. *Table 1* indicates the recommended side slopes for various soil types. A typical open ditch cross-section is shown in *Figure 2*. Note that the minimum ditch bottom width for soils susceptible to erosion is 1.0 m (3.3 ft.).

Table 1. Side slopes based on soil type.

Soil type	Shallow Channels < 1.2 m (4 ft.)	Deep Channels > 1.2 m (4 ft.)
Peat and muck	Vertical	0.25:1
Heavy Clay	0.5:1	1:1
Clay or silt Loam	1:1	1.5:1
Sandy Loam	1.5:1	2:1
Loose Sandy	2:1	3:1

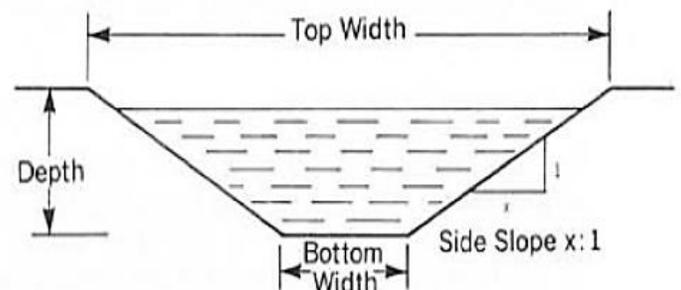


Figure 2. Typical open ditch cross-section.

Ditch banks should be seeded with a grass mixture as soon as possible after construction. This will help stabilize the ditch bank and prevent bank erosion. Also, sediment control structures such as settling ponds and check dams may be required to prevent sedimentation of downstream watercourses.

Land Leveling

The purpose of land leveling is to grade or level the surface of a field to eliminate areas where surface water may pond and negatively affect crop production. To level upland fields, the topsoil from the higher field areas and low ponding areas is removed and piled. The ponding areas are then filled with subsoil and then the topsoil is replaced. Finally, land smoothing is usually performed with a land leveler after the bulk of the soil has been moved by larger equipment.

Grassed Waterways

Grassed waterways are broad, shallow vegetated channels (Figure 3) designed and constructed to carry natural concentrations of surface water runoff, discharge from terrace systems or diversion channels, and farm pond emergency spillways. Grassed waterways help to prevent gully erosion and are normally constructed in depressions where water can collect and flow to an outlet. Grassed waterways should not be used for continuous flows as prolonged wetness in the waterway will result in poor vegetative cover. If they must be used under these circumstances, special supplemental treatment should be considered such as grade control structures, stone centers or subsurface drainage.



Figure 3. Grassed waterway.

Grassed waterways should be designed to transport peak runoff volume at low velocities (Figure 4) and should discharge into a ditch or stream.

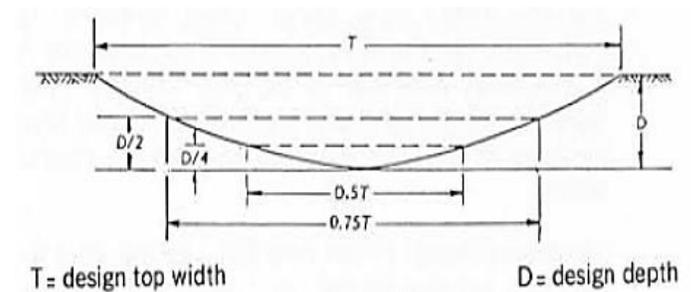


Figure 4. Grassed waterway cross section.

Dykeland Drainage

Dykeland soils are poorly drained. Land forming has been successfully used to improve drainage and to make larger fields.

Two principle methods of dykeland forming have been developed:

- (a) Crowns - area between shallow open ditches is crowned so that the cross-section midpoint slopes from 1 to 2% to the ditches. The distance between these ditches is normally 35-60 m (115-200 ft.).
- (b) Runs - water drains from the crown to a "run" or low area formed between the crowns rather than a shallow ditch. A run usually has a gradient of 0.1 – 0.4% to an open collector ditch. Run lengths are usually less than 150 m (500 ft.).

For more information contact the EFP Team or visit the factsheet section of our website at <https://www.nsf-fane.ca/efp/resources/factsheets/> to access:

Land Forming on Dykelands
Farm Drainage in the Atlantic Provinces



(902) 893-2293
www.nsf-fane.ca/efp/