BMPs FOR CROPLAND SURFACE DRAINAGE

Accurate diagnosis of drainage problems and proper planning are essential before selecting BMPs. This chapter describes surface drainage methods, follows with planning tips, and concludes with brief descriptions of surface drainage BMPs.

SURFACE DRAINAGE METHODS

Unmanaged surface water runoff will cause serious topsoil erosion and sediment loading in open outlet drains and streams.

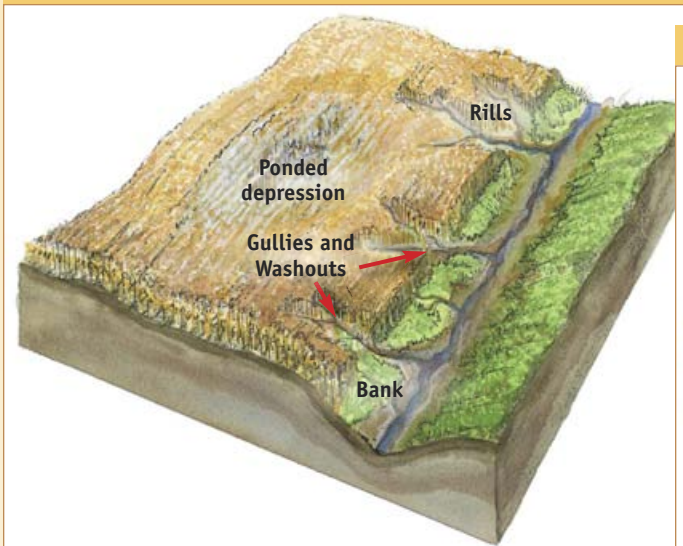
Surface drainage systems – including inlets, erosion control structures, and land-shaping – are designed to safely convey water on cropland to a proper outlet. Diverting surface runoff to managed drainage systems reduces the impact of cropland runoff on surface waters and natural habitats.

Surface drainage systems move water that is very slow to, or cannot, infiltrate. They don't lower the water table.

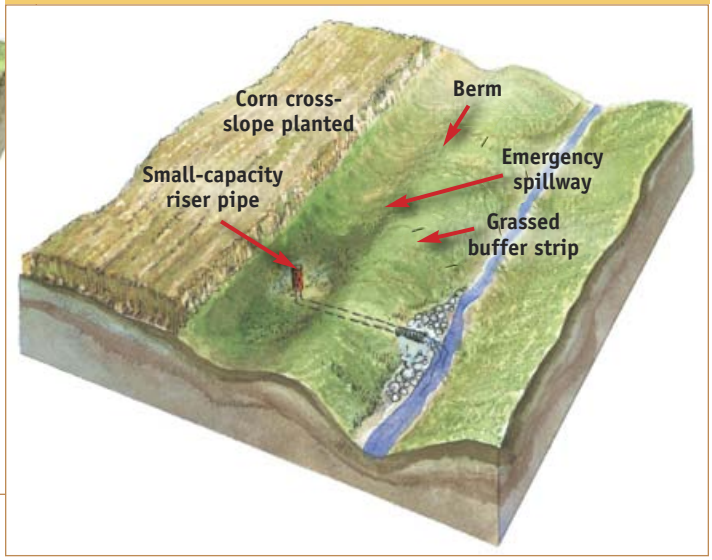
Most methods involve moving soil, creating shallow ditches that can be crossed by machinery, or diversions to subsurface drainage systems.

If not properly designed and constructed, surface inlets and other surface drainage systems can be direct conduits for contaminants to natural waterways. Runoff can carry sediment, nutrients, pesticides and pathogens.

BEFORE SURFACE DRAINAGE



AFTER SURFACE DRAINAGE



PLANNING SURFACE DRAINAGE PROJECTS

BMPs for surface drainage are intended to convey ponded surface waters or concentrated flow to proper outlets.

To be effective, structures require careful problem verification and planning before construction begins.

The soil problems addressed by surface drainage include:

- ► soils in channels or converging slopes
- ► soils in depressional areas
- ► soils with very low to low permeability, e.g., poorly structured (massive, heavy) clay soils, where subsurface drainage may not be feasible
- ► soils in floodplains of natural watercourses or spillover areas around ponds, lakes and wetlands.

Subsurface drainage may be ineffective for some heavy clays (>60% clay content) and some poorly structured clayey soils with very low permeability rates. Soils with these conditions may benefit most from surface drainage.

A professional contractor or drainage engineer should be consulted before any design or in-ground work begins. They will:

- ► verify the surface drainage problem – some infiltration problems are related to soil compaction
- ► estimate the hydrologic properties – size of area, volume of water and removal rates that should be considered
- ► evaluate alternative methods – in some cases, a less expensive grassed channel can adequately remove the ponded surface water
- ► evaluate the impact of various options to overall water movement.
- ✔ Properly design the option that has been selected before taking action on a surface drainage matter.

BMPs FOR SURFACE DRAINAGE

WHAT NOT TO DO

In some areas of the province, the conventional response to flooded or ponded areas has been to create surface features by shallow excavation to route ponded and flooded waters to the nearest drainage channel.

Drainage furrows should only be used to remove surface water in emergency situations or when there is no other drainage alternative. They should be designed and installed to minimize erosion.

Land-levelling is not considered a BMP. The practice removes the high spots, fills the low spots, and doesn't change the overall slope of a field. Water moves downslope with less resistance.

Land-levelling allows producers to access land more quickly in the spring and avoid crop damage from ponding during the growing season. However, it often leads to accelerated cropland erosion and runoff.

These practices, known as land-levelling, bedding, drainage furrows or shallow field ditches, are not BMPs. Here's why:

- ► flooded or ponded waters on bare fields are often sediment-laden
  - ▷ allowing a direct outlet from a surface ditch leads to soil loss and sediment plus nutrient loading of surface waters
- ► there are better choices available
  - ▷ sound soil and crop management practices will improve soil infiltration and percolation rates – reducing the incidence of flooding and ponding
  - ▷ depending on site features and conditions, erosion control structures may do the job better, e.g., water and sediment control basins – see BMP section for erosion control that starts on page 28.

BMP OPTIONS

A surface inlet can deliver water to subsurface drainage systems faster than water travelling through soils. The benefit is the effective prevention of erosion and runoff. Your goal – as a steward of land and water – is not to remove the water as fast as you can. Instead, you want to achieve a rate of water removal that will minimize crop damage and erosion.

Sizing and design of the main collector drain is very important to prevent overloading the subsurface drainage system with excessive volumes of surface water.

The following photos show the various types of surface or drop-pipe inlets.

✔ Riser (stand-pipe) inlets – used for small flows, especially for potential trash problems. To prevent trash from plugging the inlet, be sure the capacity of the holes isn't the limiting factor. Some are metered for erosion control purposes. Inspect surface inlets after storm events to ensure they're functioning properly and not blocked with debris.

✔ Blind inlets – are a type of surface water inlet. Soil is excavated over a length of drainpipe and backfilled with a granular material to within 30.5 cm (12 in.) of the surface. A geotextile filter is then laid and the remainder of the trench is filled with topsoil.

This type of structure allows surface water to enter the drain more easily than through the soil, but less efficiently than a direct surface inlet type. These are used in field locations where small surface drainage problems arise and no obstacle is wanted in the field. It's very important to keep records of where blind inlets are located. They are often not marked, and can be easily forgotten or overlooked when carrying out farming practices.

Blind inlets are direct pathways to the water system – the same as any other surface inlet – and activities and application of material (such as manure) should be managed accordingly.

✔ Catch basins – are covered by a grate, identified by markers, and located in low-lying areas. They intercept surface water and are connected to a subsurface drainpipe for transmitting water to an outlet. Inspect catch basin inlets after major storm events, and remove debris. They should be protected by a vegetative buffer. Take precautions to ensure that flowpaths from potential sources of contamination do not reach catch basins.