BMPs FOR CROPLAND EROSION CONTROL

Properly designed and located erosion control structures can safely convey excess water to an appropriate outlet. This chapter explains how to verify soil erosion issues, presents different types of erosion control structures, and shows how to plan for their implementation.

Some surface drainage structures are intended to remove ponded water from depressional areas on cropland. However, not all surface water is ponded. In fact, ponded water can become runoff if permitted to overflow into low runs (draws) in unevenly sloped fields.

On sloping cropland, runoff can lead to the erosion of soil particles. Cropland erosion in uniform layers is known as *sheet erosion.* Erosion caused by concentrated flow forms *rills.* When the rills develop into channels large enough to prevent crossing by farm machinery, these channels are known as *gullies.*

Subsurface drainage systems remove excess gravitational waters – making room for precipitation to infiltrate cropland soils. In this regard, subsurface drainage systems are an integral component of soil and water conservation systems.

VERIFYING EROSION CONTROL PROBLEMS

Erosion can be verified on-site by looking for:

- ► eroded knolls ("white-caps") and shoulder slopes (usually the result of tillage erosion)
- ► washouts (rills)
- ► aprons of topsoil in depressional areas after a storm event
- ► off-site (or on-site) movement of runoff and sediment.

In a field with a 5% slope and loamy soils, the rate of soil loss and runoff would be even greater if there were small pathways for water to run downhill. Unchecked, these small pathways can lead to rills and gullies.

Soil erosion problems are more visible if soils are left bare.

Rill erosion can be a serious problem on complex slopes, even when no-till is practised. The remedy is to use erosion control structures to capture surface water and deliver it to the subsurface drainage system.

EROSION CONTROL STRUCTURES

Erosion control structures are designed to control erosion and safely convey surface water to an adequate outlet. Common examples include grassed waterways, terraces, and water and sediment control basins (WASCoBs). In many of these systems, the rate of water removal has been reduced.

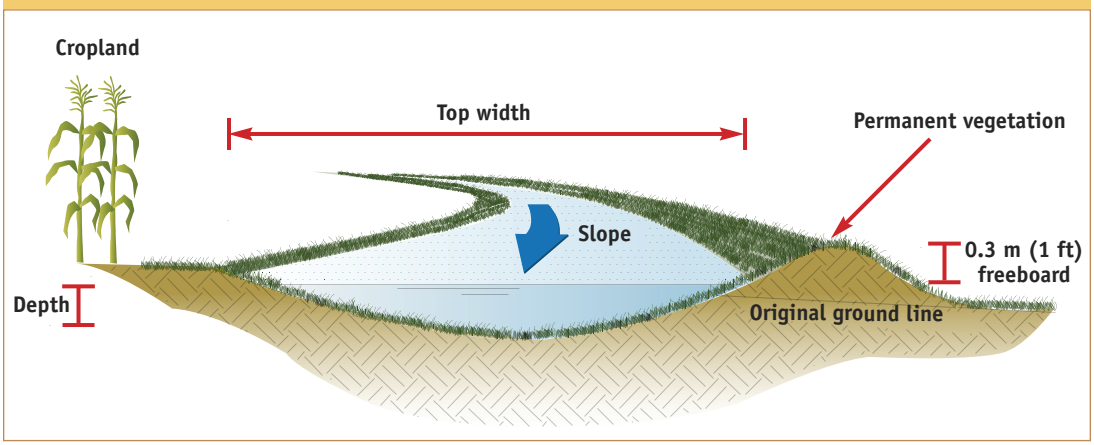
Calibrated stand-pipe inlets (e.g., Hickenbottom inlets) in WASCoBs will limit sediment loading from runoff events by allowing the water to pond for a short period of time and soil particles to settle out before entering the inlet.

Erosion control structures will move surface runoff to subsurface drainage systems and, by strategic placement, will limit the erosive forces of runoff events. This type of erosion control structure includes diversion terraces and narrow-based terraces.

Erosion control structures are designed and constructed to convey overland flow safely to a proper outlet.

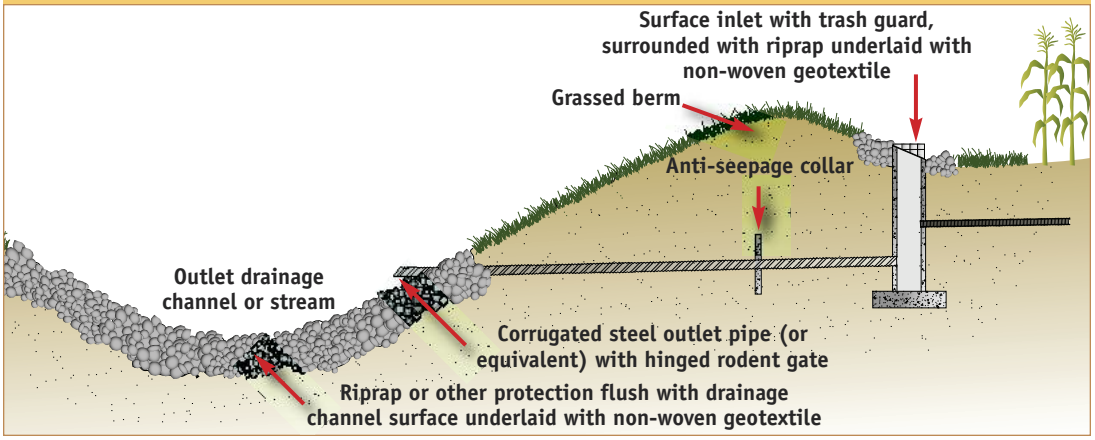
✔ **Grassed waterways are graded and grassed channels placed in low draws with subsurface drainpipe, intended to divert and transfer runoff to a properly protected outlet. They work best when established as part of an erosion control system that includes soil conservation BMPs such as no-till and mulch tillage.**

DIVERSION TERRACE CROSS-SECTION



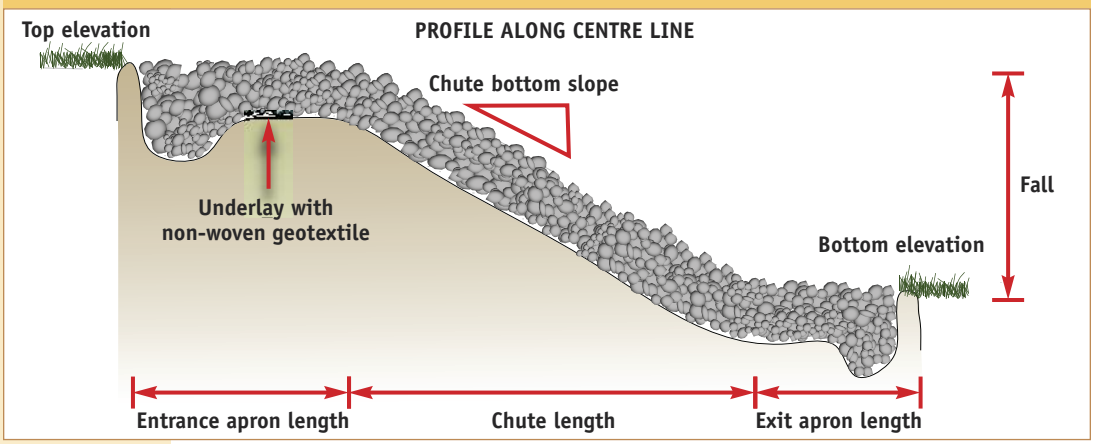
✔ **A diversion is a combination of channels and berms placed across slopes to slow down runoff and reduce erosion. The water is conveyed to a surface inlet where the water is then carried via an underground drainpipe to a proper outlet.**

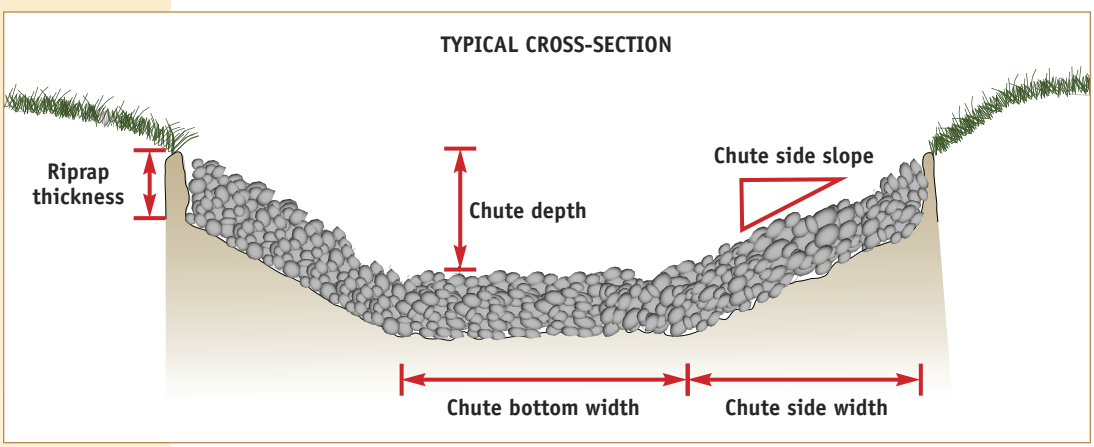
DROP-PIPE INLET AND OUTLET FOR SUBSURFACE DRAINAGE SYSTEM



✔ A large-diameter pipe (drop pipe) is installed to convey water down steep slopes or high drops to prevent ponded water or concentrated flow from forming large rills or gullies.

ROCK CHUTE SPILLWAY





✔ A rock chute spillway is a constructed chute using angular stone (riprap) and underlaid with filter cloth. Rock chutes are often placed in riparian areas to convey concentrated surface flows safely to watercourses. As with all erosion control structures, rock chute spillways are most effective when managed as part of a soil conservation system.

✔ **WASCoBs are earthen embankments across draws, with retention basins and calibrated stand-pipe inlets (drop-pipe inlets) to convey water to an adequate pipe outlet. These structures reduce downslope erosion. The duration of temporary ponding is carefully engineered to reduce the risk of damaging the crop. Inspect after major storm events and ensure that the inlet pipe is not blocked by sediment or crop debris.**

PLANNING FOR EROSION CONTROL STRUCTURES

✔ Seek technical advice for design and construction from professionals and trained contractors.

✔ Consider the following factors in the planning process:

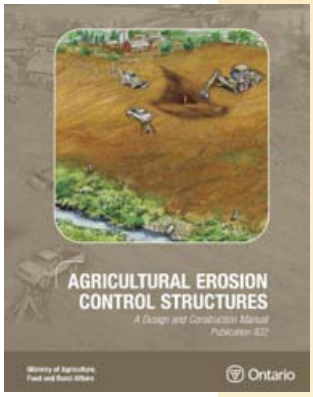
- **future land use** – whether the land will remain in its current land use
- **slope, slope length, soil type, upslope (in-field) watershed size** – must be considered when designing structures for size and safety
- **cropping and tillage practices** – how compatible a particular structure would be for current crop types, field operations
- **cost of options** – which option provides the most value for the investment required
- **potential improvements or changes to downstream water system.**

✔ To manage concentrated flow and reduce potential risks, you could:

- protect the low draw
- reduce the length of eroding section by segmenting into smaller units
- divert the flow below the surface.

In fact, most erosion control structures are designed to attain one or more of these goals. For example, WASCoBs reduce the length of eroding section and divert the flow below the surface. Multiple units can be installed.

For more on cropland conservation structures, see the Best Management Practices book, *Controlling Soil Erosion on the Farm*.



For more information, please see OMAFRA Publication 832, *Agricultural Erosion Control Structures – A Design and Construction Manual*.