



Unmanaged surface drainage can be devastating for topsoil and water quality.

CROPLAND SURFACE DRAINAGE

Outcomes and management

Everyone has a stake in how all surface water is managed. On cropland, surface drainage water must be managed with care because it can contribute to soil erosion, degraded water quality, increased peak flows and flooding.

Ideal surface drainage requires an integrated and properly sequenced water management system. The first step is to install sub-surface drainage wherever it can be effective in reducing the amount of surface drainage that is needed during wet seasons. Next, soil erodability must be reduced and water infiltration improved through soil management that improves soil aggregation. Then, to control the water runoff rate on complex topography during snow melt and storm events, a system of check dams or WASCoBs (Water and Sediment Control Basins) should be placed along concentrated flow paths. Behind the check dams, standpipe inlets with intake control orifices will slow the rate of water intake and will also allow time for sediment and other agricultural products to settle out before they enter sub-surface drain pipes. Water leaving a field from a well-planned surface drainage system will be cleaner and move at a slower rate thus providing real benefit to downstream waterways.

On most soil, surface drainage can be achieved without negative consequences. However, current surface drainage practices can lead to unacceptable consequences and need to be reconsidered. Key examples:

- Surface drains that are plowed through

fields increase the surface water runoff rate and increase sediment and nutrient delivery to receiving waterways. If surface drains feed into a standpipe inlet that is connected to a sub-surface drain, the flow rate to a waterway is further increased. It is always preferable to remove as much surface water as possible by improving water infiltration to sub-surface drains, and avoid use of open inlets.

Ideal surface drainage requires an integrated and properly sequenced water management system.

- Land levelling to accommodate surface water runoff will increase sheet erosion, downstream sedimentation and downstream peak flow. Here the best option is to reduce the need for surface drainage by improving water infiltration through improved soil aggregation. Ensure that sub-surface drainage is adequate and functions properly.
- The installation of catch basins to intercept surface flow adds to downstream water quality degradation and increased peak flow. They should be positioned away from surface water flow where they can provide pressure relief and provide air access to allow water to flow freely in drain pipes.
- Grass waterways have been used to control erosion where there is

concentrated water flow. If the grass is cut short as it should be to avoid sediment buildup, then the waterway will do little to reduce downstream sedimentation and will not reduce peak flows or flooding. The use of check dams; e.g. WASCoBs is almost always a better option than a grass waterway. No-till and cross slope cropping dramatically reduces erosion and sediment build-up in WASCoBs.

On a relatively small amount of extremely dense clay very little water can percolate down into the soil. An example would be on Toledo Clay on the Essex clay plain. Here, surface drainage is the only option, so the cropland surface may be shaped to create regular, usually parallel, drainage swales or shallow ditches. It is important to use appropriate crop management and very minimal tillage to maintain soil organic matter and soil aggregates that minimize sedimentation of receiving waterways. Some soluble phosphorus (P) will be lost in the surface runoff, so in the interest of food production security, society must share in finding other ways to reduce the total phosphorus load.

A surface drainage system plan for cropland needs to consider all consequences so it will meet societal expectations in addition to providing effective drainage for agriculture.

Many LICO (Land Improvement Contractors of Ontario) contractors are trained and equipped to install those systems.

