SOIL CONSERVATION SERVICE

ENGINEERING STANDARD

REGULATING WATER IN DRAINAGE SYSTEMS

Definition

Controlling the removal or impoundment of surface or subsurface runoff, primarily through the operation of water control structures.

Scope

This standard is applicable to the regulation of surface and subsurface water inflow and outflow through drainage systems. This frequently involves other allied reportable practices, such as are listed under Design Criteria for this standard.

Purpose

The purpose of the practice is to conserve surface or subsurface water by controlling the outflow from drainage systems to maintain optimum water levels, flow rates, and soil moisture conditions. Such conservation and regulation of water will make it possible to:

1. Establish and encourage the growth of desired field or forest plants.
2. Maintain field laterals, channel banks, side slopes, and bottoms without excessive erosion and reduce maintenance requirements.
3. Reduce subsidence and wind erosion of organic soils.
4. Provide habitat for fish and other aquatic life.
5. Hold water in channels in forest areas to act as ground-fire breaks and provide drinking water for wildlife and a resting and feeding place for waterfowl.
6. Improve environment for recreation use.
7. Improve water quality in streams and ponds by limiting erosion, reducing sediment movement and controlling flow rates.

Conditions Where Practice Applies

This practice applies to areas needing drainage and where it is advantageous to control the outflow or pumping rate at other times. It is applicable especially in organic soils and in highly permeable soils of low available water holding capacity. This practice can be used to improve habitat for fish and wildlife. It also applies to recreational areas.

Regulation of outflow should be undertaken only when soil water salinity or alkalinity is not likely to be a problem.

Design Criteria

Protection of the environment shall be a prime consideration in design. Natural landscape, geology, pastoral and other values should be protected or adequately considered in water management systems.

The water management system must have the depth, spacing, and capacity to provide the necessary drainage relief for the plants when controls are open. Control of outflow shall be by structures or pumps capable of removing or regulating the design flow. The outflow controls shall be related to the amount of water available and the degree of control necessary for soil-plant requirements, fish and wildlife habitat needs, environmental values and water quality control.

Preservation or construction of pools, riffles, springs, natural alignment and blending of works of improvement into the landscape shall be practiced. Efforts must be made to preserve native vegetation, especially valuable woodland corridors.

The design of related water management practices such as Drainage Main or Lateral; Irrigation System, Surface and Subsurface; Pumping Plant for Water Control; Structure for Water Control; Dike; Drainage Land Grading; and Land Smoothing will need to be coordinated with this practice for it to achieve its intended purpose.

For crops which are highly sensitive to both excessive and inadequate soil water conditions, the field surfaces must be smooth and the distance between the soil water level and the ground surface must be as uniform as practical. Fields shall be smoothed or graded as required to achieve this uniformity. Structures and pumps shall be located where they will be accessible and subject to convenient control, however, care must be used when site aesthetics are important to be sure the area visual resources are not damaged.

Plan of Operation

A plan of operation shall be developed for the system which will insure that the objectives are met. The plan of operation shall include such information as time and stage to hold water in ditches, pumping schedules, and coordination of water management operating in the system with rainfall, season, and crop and soil moisture and needs for fish and wildlife management.

Plans and Specifications

Plans and specifications for Regulating Water in Drainage Systems shall be in keeping with this standard and shall describe the requirements for proper installation and operation of the practice to achieve its intended purpose.

Planning considerations for water quantity and quality

Quantity

1. Effects of water budget variations on the water supply either above or below the point of control.
2. Effects of changes in the flow of downstream water courses.

Quality

1. Effects of outflow on erosion in downstream water courses.
2. Effects of possible changes in the yields of sediment and sediment-attached substances.
3. Potential for changes in dissolved chemical loading from nitrates and other salts including managing denitrification.
4. Salinity of soils and of ground and surface waters.
5. Effects on downstream temperatures.
6. Effects of the planned drainage outflow on the visual quality of discharge or downstream water.