United States Department of Agriculture

Soil Conservation Service

P. O. Box 648
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TEXAS ENGINEERING TECHNICAL NOTES - NOTICE NO. TX10

This notice transmits Texas Engineering Technical Note No. 210-15-TX1, "Erosion Control Practices". Engineering - Erosion Control Memorandum TX-1 dated August 22, 1967 along with the Texas Engineering Handbook Section 17 - "Erosion Control Practices," Rev. 3-68 are hereby cancelled and should be destroyed.

The attached technical note and transmittal should be filed in your TEXAS ENGINEERING TECHNICAL NOTES binder.

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State Conservationist

Attachment

DIST: AO, AS (Engineers Only), SO (Limited to Principal Staff, includes River Basins (3)), TSS Engineers, Design Section (8), WPS (6), SNTC, NHQ

TEXAS

ENGINEERING TECHNICAL NOTE

Subject : *EROSION CONTROL*

No. : *210-15-TX1*

Reference : *EROSION CONTROL PRACTICES*

Date : *MARCH 1983*

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

TEXAS ENGINEERING TECHNICAL NOTE

NO.: 210-15-TX1

EROSION CONTROL PRACTICES

CHAPTER 1. EROSION CONTROL STRUCTURES

INTRODUCTION

Structures discussed in this technical note under the general term erosion control structure are generally used in gullies, watercourses or channels to provide permanent protection at points that cannot be adequately protected by less costly means and/or to retard runoff and store sediment which is causing harmful deposits on valuable farmland or grassland, drainage or irrigation systems, or in water storage structures. In some cases, they may be used to divert water into waterspreading systems, or into other subwatersheds. Such structures may be constructed of earth, rubble masonry, or concrete and located at places such as:

1. Gullies at or near ends of grassed waterways.
2. Individual terraces or diversions which must be spilled into fairly deep drainageways or gullies.
3. Drainage ditches which must be emptied into deeper ditches, creeks or rivers.
4. Heads of active gullies, overfalls, abrupt changes in gradient; entrances of branch gullies, or other critical points.
5. Gullies or severely eroded areas which carry large amounts of sediment causing damage to valuable land or structures below.

The more common types of permanent erosion control structures are listed as follows:

1. Earth Dams
2. Formless Concrete Chutes
3. Reinforced Concrete Chute Spillways
4. Masonry Drop Spillways
5. Reinforced Concrete Drop Spillways
6. Rubble Masonry Overfall Dams
7. Corrugated Metal Toewall Drop Structures
8. Rock Gabion Chutes

Depending upon the primary purpose and the location with respect to other practices, the above structures may be planned and installed as Grade Stabilization Structures, Structures for Water Control, Sediment Basins or Diversion Dams, or other appropriate practices. (Refer to practice standards and specifications in the National Handbook of Conservation Practices (NHCP)).

Selection of Structures

The selection of the structures to be used for any particular job is largely a problem of determining the type that will provide the necessary capacity and meet other requirements and yet give the most economical construction and maintenance costs. Consideration must be given to alternative practices which would give the desired control at a lesser cost. The maximum limit of cost or damage that can be sustained is the cost of doing nothing and letting the present condition continue. This can be measured in terms of the net value of production, with and without the structure; in the benefited area during the life expectancy of the proposed structure. The life expectancy normally will be ten to fifty years. Aspects of this cost are the inconveniences and expense of farming or ranching gullied areas, and the reduced value of the farm or ranch as a whole when dissected by gullies.

Economic Feasibility

The economic feasibility of permanent erosion control measures should be determined by weighing their costs against the cost limit described above. Items to consider in the cost analysis include the cost of installation, the annual maintenance costs and the value of the production lost by the installation of the control measures. The installation cost can be reduced to the approximate annual cost by dividing the total installation cost by the expected life of the structures. When a detailed analysis is required, the installation cost should be amortized at the appropriate interest rate for a period equal to the expected life of the structure. In some instances, the most feasible treatment for the area is proper land use, protection from grazing or over-use, and letting nature solve the problem.

TYPES

Earth Dams

Description---The earth dam type erosion control structure is an impounding structure that has been located and designed to provide protection against erosion and/or damaging deposition of sediment or debris. The influence of the dam extends over an appreciable area either upstream or downstream or both. This type of structure usually is equipped with a principal spillway and a vegetated emergency spillway.

The principal spillway is generally a closed conduit spillway of one of three types, namely: (1) drop inlet, (2) hood inlet culvert type, or (3) inclined tube type. Sometimes it may consist of a chute or drop spillway type structure. The principal spillway is sized in respect to the routed principal spillway storage as it relates to the desirable frequency of operation of the emergency spillway.

The emergency spillway is designed to pass excess runoff (that not stored or discharged through the principal spillway) around the dam. It is vegetated except when cut in rock or other non-erosive material. The spillway is proportioned so that the routing of the design flood event will pass the spillway at the safe velocity determined for the site.

Functional use---The earth dam erosion control structures are used for any of the following purposes:

1. To control the headward extension and enlargement of gullies.
2. To protect valuable farmland or grassland or water storage from damaging deposition or debris.
3. In connection with a waterspreading system, to divert the water from a stream or watercourse into the spreading area, or to serve as a detention dam to meter the water into the system. If the purpose is to divert water, existing farm pond standards and specifications will apply. Where detention and sediment storage capacity are involved, the structure will be designed according to criteria discussed in this chapter.
4. To provide temporary flood storage in order to reduce flooding below the structure.

Advantages:

1. The earth dam erosion control structure may be used where it is desired to use detention of runoff or sediment to solve the erosion problem.
2. This type of structure may be less costly than other erosion control structures because fill material can be secured at the site and experienced contractors usually are available.
3. It can be used for the dual purpose of controlling erosion and providing water for livestock and/or wildlife, if the location is suitable and there is a need for the water supply.
4. A secondary use may be to serve as a roadway across deep gullies.
5. It is adaptable to a wide variety of site conditions. Detention storage, if available, can be used to reduce frequency of flow through the emergency spillway or the size of the principal spillway.

Disadvantages:

1. The use of earth dams for erosion control is limited to those sites where the required capacity for runoff and sediment storage, suitable fill material and adequate spillways can be economically obtained.
2. Vegetation usually is required to protect the embankment and emergency spillway against erosion, thus requiring such practices as fencing, fertilizing and controlled grazing to insure adequate vegetative cover at all times.
3. The structure may be more expensive than vegetative or other means of control. Its use should be recommended only after exploring other methods.

Site selection---The use of earth dams for erosion control is limited to locations that have suitable terrain. Since this type structure may use detention storage to help solve the erosion or sediment problem and since the safety and successful operation of the structure depend largely upon