



AGRICULTURAL ENGINEERING NEWS LETTER

AGRICULTURAL EXTENSION DIVISION
UNIVERSITY OF MINNESOTA

UNIVERSITY FARM, ST. PAUL—OCTOBER 15, 1935—No. 43

SELECTING GOOD DRAIN TILE

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There are three natural agencies which must be considered if the tile used in drainage systems in Minnesota are to give service satisfactory enough that the systems will be permanent improvements. These agencies are (1) frost action, (2) soil alkalis, and (3) soil acids. By taking proper precautions when a tile system is installed, little trouble need be experienced because of any of these agencies. Both clay tile and concrete tile are in common use in Minnesota and, as they are distinctly different types of materials, the weak points of each are not necessarily the same. Tile made of the material longest in common use will be first considered.

Clay Tile

Clay tile are resistant to the action of both soil acids and soil alkalis but unless of first class quality will deteriorate through frost action. This is a primary consideration because practically all farm drains of this latitude are laid above the frost line. Furthermore, it is not unusual that tile lie a whole winter on the ground along ditch systems under construction or are held in piles on damp soils by the farmer after purchase, or may have been in piles in the dealers' yards for a number of seasons, with the consequent result that many of poor quality will have seriously deteriorated even before installation. Poor quality tile so exposed will require heavy culling if they are to be safely used. In selecting clay tile for any drainage system it is well to observe the following precautions:

- (1) Buy tile made by concerns known to produce high quality frost resistant products.
- (2) Buy only hard burned tile. Generally speaking, the hardest burned tile from any plant is the most frost resistant of the output from that plant. As a rule the dark colored tile from a given plant

are harder burned than are those of a lighter shade but such is not always the case.

(3) Cull very soft tile or tile that show evidences of checking or spalling or any tile which do not give a clear ring when held in the hand and struck sharply by a piece of metal.

(4) After purchase, pile the tile on high well drained areas until the trench is ready for them. Even fairly soft clay tile will give many years satisfactory service if in first class condition when placed in the ditch.

(5) Completely backfill all ditches in which tile are laid before freezing weather starts. If the tile are laid during cold weather complete the backfilling at the end of each day as near to the work under construction as is practicable. This practice likewise is sound if concrete tile are used.

Concrete Tile

Concrete tile of reasonably good quality are frost resistant but are subject to deterioration in the presence of soil alkalis in excessive quantities such as occur in some localities of western Minnesota. Injurious alkali waters are quite bitter to the taste and ordinarily will be found in the yellow or brownish clays rather than in black loams. Poor quality concrete tile will not satisfactorily resist the action of high acid peats and it is on the side of wisdom not to use concrete tile in such soils. Good quality concrete drain tile laid in most soils will give entirely satisfactory service. When concrete tile are considered for a drainage project it is well to give attention to the following recommendations:

- (1) Buy from concerns known to make high quality products.
- (2) Observe the tile closely and look for water marks on the surfaces. This is important as the tendency in making

concrete tile is to use insufficient mixing water. If such has been the case the tile surfaces will be smooth whereas they should have a stippled appearance caused by the wet mix sticking slightly to the jacket when it was removed.

(3) Install no concrete tile within 30 days of its manufacture, as it is not good practice to lay so-called "green" tile.

(4) Lay no concrete tile which do not give a clear ring when held in the hand and struck sharply with a piece of steel.

(5) In case of questions regarding soil conditions be advised by your county agricultural agent.

When In Doubt Have Tests Made

It is not possible exactly to determine the quality of drain tile except as representative samples are selected and subjected to tests for strength and resistance to frost action and the results are compared with accepted standards. The standards for tile to be used for farm drainage in Minnesota should be those of the American Society for Testing Materials for the class of product designated as "Standard Drain Tile." The required minimum breaking strength is 1200 pounds per foot of length for all sizes of 12 inches, or less, inside diameter and the tile must endure not less than 36 freezings and thawings without visible evidences of failure. Furthermore, as an index of durability of the tile, limits are fixed for the amount of water which may be absorbed by the tile walls.

It is evident that few purchasers of drain tile for individual farms are equipped to make tests as elaborate as these, but upon request the Division of Agricultural Engineering, University Farm, St. Paul, Minnesota will make a limited number of such tests free of charge if 5 tile of the size to be tested are submitted, all transportation charges prepaid.