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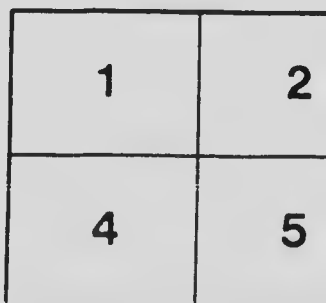
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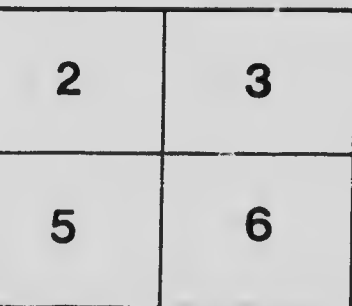
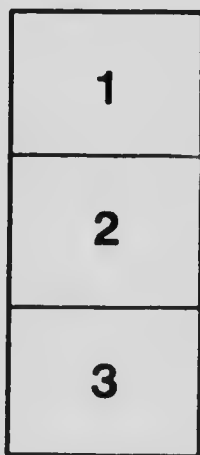
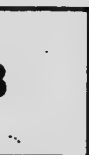
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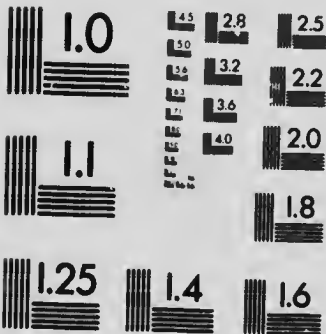
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DOMINION OF CANADA.  
DEPARTMENT OF AGRICULTURE.  
EXPERIMENTAL FARMS.

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TILE DRAINAGE OF THE FARM

BY

W. L. GRAHAM.

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The highest degree of quality as well as quantity of crop is the aim of every progressive farmer. A fairly good yield no longer satisfies. It must be the best that can be produced under the most improved methods of cultivation. In accomplishing this, drainage has come to be recognized as one of the most valuable agents. No improvement which the farmer can make upon his farm is so permanent as drainage, providing the work is properly done.

Why is it that the most enthusiastic advocates of tile drainage are those who have done the most?

Because of the success and gratifying results obtained from the drains installed.

Why is the practice of underdrainage not more general?

1st.—Because the benefits of underdrainage are not generally known.

2nd.—Because the operations of drainage are little understood.

3rd.—Because of the cost.

4th.—Because of the scarcity of labour.

WHAT ARE THE PRACTICAL BENEFITS RESULTING FROM DRAINAGE?

(1) Land is ready for seeding earlier:—As the ground thaws, the water is at once carried down to the drains, together with that from the melting snow and ice on the surface. The soil is much more quickly dried out, with a corresponding increase in temperature and is therefore fit for cultivation from one to three weeks earlier than undrained land.

(2) Crops begin a healthy growth under ideal conditions:—The right amount of moisture and heat to germinate the seed promptly.

An open soil into which they can push their roots with little or no resistance.

(3) Crops are better able to withstand drought:—The greater depth of soil and extended range of roots together with the change in texture of the soil renders it capable of retaining more moisture, which supply is drawn upon during a dry period and carries the crop safely.

(4) Less liability of loss of crops from heavy rains:—A thorough system of drains of proper size and accurately laid will carry off heavy rainfalls so rapidly as to prevent serious injury to the crop.

(5) Frost does less injury to crop:—Grass and autumn-sown grains will not be injured by freezing and heaving of the soil. Much less harm from late spring or early fall frosts.

(6) Sanitary conditions of the farm are improved:—Removal of stagnant water by drainage lessens the danger of disease.

(7) The attractiveness of farm premises is increased:—More vigorous growth, roads and walks are improved and sustain travel much better.

(8) Disease among farm animals is decreased:—Sheep and other animals are less subject to disease when pastured on well drained soil.

(9) Fertilizers are not wasted by surface washing:—By the action of the rains fertilizers are carried directly into the soil instead of passing off over the surface.

(10) Increases the Profits from the land:—Waste lands are made productive, and yields are doubled per acre. Lessens the expense of cultivation and lengthens the life of machinery.

#### WHAT ARE THE MOST IMPORTANT FACTORS OF A PERMANENT TILE DRAINAGE SYSTEM?

(A) The Outlet:—The efficiency of underdrains will depend largely upon the completeness of the outlet provided.

Two Essentials:—(1) Of such capacity that it will not run full more than twenty-four successive hours.

(2) The general plane of the drains discharging into the ditch should be above the average flow line.

(B) The Fall or gradient for the drain:—It should be as much and as uniform as possible and not less than 2 inches in 100 feet if this can be secured.

(C) The Size of tile:—They should be large enough to remove in 24 to 48 hours the excess water of the heaviest rains likely to occur. The greater the fall the smaller the tile that may be used, but it is not advisable to use smaller tile than 3 inches in diameter.

(D) Good Tile:—Should be hard burned giving a clear ring when struck, free from lime, smooth, straight, thick with square cut ends and true circular outline in order that close joints can be made, which will exclude silt.

(E) Depth at which Drains should be laid:—The depth to which water should be lowered by drainage seldom exceeds 4 feet for ordinary farm crops, and often less is sufficient.

It should be kept in mind that the level of the ground water changes with the season. Where fields are underlaid with sandy subsoils it is important not to draw the water down far into the sand.

The depth of drains is usually  $2\frac{1}{2}$  to 3 feet.

(F) Distance between Drains:—Three chief factors determine the proper distance between underdrains.

(1) The freedom with which water may flow through the subsoil towards the drains.

(2) The depth at which the drains are placed.

(3) The interval of time between rainfalls sufficiently heavy to produce considerable percolation.

In general practice, for field crops, it is usually sufficient to place the lines of tile from 50 to 100 feet apart. In favourable cases they may be even further apart and in special cases as close as 30 feet.

(G) Drain Outlets:—Should be turned out of the course of the surface overflow and discharged a few feet farther down stream in order to minimize the danger to the tile from the surface flow.

The outlet of the drain should be substantial and permanent. The hardest tile should be used and the opening protected by a grating.

(H) Silt Basins:—Small wells into which one or more drains discharge, provided with an outlet for the escape of the inflowing water. They are especially useful where the grade is changed or where a soil contains much fine sand.

(I) Joints:—Y and T joints are made at many factories and should be secured when possible. A badly made joint will greatly impair the efficiency of both lateral and main to which it is joined.





