

REPORT FOR DRAINAGE WORK FOR FIRST HALF OF

NINETEEN AND FIFTEEN.

(From January 1, 1915 to June 30, 1915)

The drainage work conducted during the first half of year of 1915 has included the actual surveys of farm lands needing drainage and the giving of information to the individual farmers who were not in need of actual surveys, but required some sort of information and advice before going ahead with their small projects.

In view of the fact that drainage is an essential factor in the productive value of farm lands, it is imperative that the best information upon the theory and practice of tile drainage for agriculture should be made available to all those who desire a knowledge of this subject. Personal examinations of conditions throughout the state have convinced me that the average farmer knows very little about the under drainage of his lands and is very grateful for any information and help he may receive from the State. As it is impossible to make surveys for any but a limited number of the farmers throughout the State, it is very necessary that they should have a bulletin on the subject of practical farm drainage dealing with conditions in Virginia, in this way more farmers can be reached and helped on a subject they know practically nothing about.

Surveys for Drainage Systems.

When it comes to planning a general system of drainage for 50 to 100 acres, a system composed of several miles of drains, every part of which must fit in with every other part, the grades of which must be sufficient for effectively draining all low spots, and yet not require too deep digging in knolls, the depths of which, must nevertheless, be great enough in flats to protect the tile from deep plowing, the outlets of which must be ample and free when it comes to the planing of such a system, many of which are imperative in almost every county in the State, if proper drainage is to be secured, few, if any, have been or are now in a position to undertake such work intelligently, and for obvious reasons: Firstly, because some knowledge of surveying and mapping is required, and secondly, because a surveyor's level is essential, neither of which the farmer has. Nor until recently has he been able to obtain assistance in the matter. In May of 1914, however, the farm demonstration department authorized a man who has had special training in drainage problems and surveys, to go through the State, when farmers applied for assistance, and make a general survey of the land, locate the outlets and the drains, determine the grade and the size of tile, and finally send the farmer when ready a map of his farm showing the complete system of drains, the grades, the size of tile, and estimate of cost, etc.

Methods Followed in Surveys.

The first operation consists in taking the levels and working out the elevations every 100 feet square all over the area in ques-

tion. The instrument used in the work is a special drainage level equipped with compass and "stadia". After the survey is made soil borings are taken to ascertain the type of soils and sub-soils. All the surveys possible are made in one section on the same trip, the engineer then goes back to Burkeville where the maps are worked out.

The map is made on the ordinary tracing cloth. A scale of 1 in. in 100 feet is used, the elevations are plotted in the order taken in the field. To render the comparisons of elevations easy and to show at a glance the general slope of the land, "contour lines" are used, which connect all points of the same elevation. These contour lines aid very materially in indicating the general slope of the land, but they show us several things specifically: *de.*

(a) The greatest fall is along the shortest distance from one contour to the next, approximately at right angles to them.

(b) When the contours are far apart and a regular, they indicate flats, or level lands, but when closer together they indicate a steeper slope.

(c) A loop of the contour towards the outlet indicates a knoll at that point.

(d) A loop away from the outlet indicates a flat extending backward toward the higher land, and usually indicates the position for the main drain.

With the contours as a guide, we locate the main drains and the laterals, keeping the main in the lowest land as far as possible and the laterals at the right angles to the contours as nearly as may be. At the same time we endeavor to adopt a system that gives long drains rather than short ones, as there will be lesser junctions, unless such a system is distinctly inferior in some other way. Knowing the character of the soil and the slope of the land, we can now tell the best depths to put the tile and the distance apart of each line of tile.

The size of tile to use is determined by the use of "Kutters Formula", taking in consideration the amount of rain fall, etc. The size and lengths are indicated on the map. The maps are worked out so that the average farmer can understand them and if necessary can go ahead with the construction of the drains himself.

A "Key" or "Legend" explains all the symbols used on the map.

A report is made out to accompany each map, which deals with the location and description, drainage conditions, plan proposed, and an estimate of the cost of installing the system.

These maps are of a great practical value, as they may be retained as a record, giving all the facts about the system, so that any drain may be located if desired. When the farm is sold or handed down to son, the map is especially valuable, as it shows its new occupant what drains there are and just where each may be found.

Surveys made:

R. C. Kent, Portsmouth, Va.	-----	75 acres.
D. A. Slaughter, Mitchells, Va.	-----	200 "
Simon Mahoney, Mitchells, Va.	-----	65 "

E. L. Tessier, Chesterfield Co. - - - - -	25 Acres
Martin Hall, Oak Hall Station, Accomac Co., - - -	76 "
R. C. Hall, Oak Hall Station, Accomac Co., - - -	50 "
Dr. Bowdoin, Bloxom, Va. - - - - -	50 "
C. F. Clark, Culpeper, Va., - - - - -	10 "
R. D. Scott, Culpeper, Va., - - - - -	30 "
George Goodwin, Gordonsville, Va., - - - - -	65 "

Demonstration Systems Installed.

I personally laid about 500 feet of tile for Ben. T. Gunner, Accomac, Va., for demonstration purposes.

I also laid 2000 feet of tile for R. D. Cowherd, Gordonsville, Va., for demonstration purposes.

List of Men Helped on Drainage Problems.

The following is a list of farmers who while not having enough drainage to do to necessitate a survey, had to have advice of some kind before going ahead with their small projects.

Mr. Ben P. Gay - - - - -	Windsor, Va.
Mr. A. S. Johnson - - - - -	Isle of Wight, Va.
Mr. Jas. M. Branch - - - - -	Smithfield, Va.
Mr. J. R. Jordan - - - - -	Smithfield, Va.
Mr. V. W. Joyner - - - - -	Smithfield, Va.
Mr. Beaver - - - - -	Richmond, Va.
Turkey Island Farm, - - - - -	Richmond, Va.
Henrico County Poor Farm - - - - -	Richmond, Va.
Mr. Nuckols, - - - - -	Henrico County, Va.
Mr. Wilkins Matthews - - - - -	Horsey, Va.
Mr. Taylor - - - - -	Hallwood, Va.
Mr. Powell - - - - -	Onancock, Va.
Mr. Shields, - - - - -	Onancock, Va.
Mr. Sam Ames - - - - -	Puncoteague, Va.
Mr. Mason - - - - -	Harborton, Va.
Mr. Tyler Cowherd - - - - -	Gordonsville, Va.
Mr. W. W. Osborne - - - - -	Gordonsville, Va.
Mr. McElroy - - - - -	Gordonsville, Va.
Mr. T. Atkinson - - - - -	Gordonsville, Va.
Mr. George Crockett - - - - -	Accomac, Va.
Mr. G. S. Walther - - - - -	Onancock, Va.
Mr. A. L. Mathews, - - - - -	Temperanceville, Va.
Mr. J. H. Pruitt - - - - -	Temperanceville, Va.
Mr. Joe Taylor - - - - -	Temperanceville, Va.
Mr. A. W. Bird - - - - -	Temperanceville, Va.
Mr. A. J. McMath - - - - -	Onley, Va.
Mr. J. F. Jacobs, - - - - -	Onley, Va.
Mr. J. C. Core - - - - -	Onley, Va.
Mr. L. Y. Thornton - - - - -	Atlanta, Va.
Mr. Aston Fletcher - - - - -	Jenkins Bridge, Va.

Roy White - - - - -	Parsley, Va.
George Finney - - - - -	Parsley, Va.
George Phillips - - - - -	Melfa, Va.
Richard Tarlington - - - - -	Melfa, Va.
E. O. Kellum - - - - -	Bellehaven, Va.
Sargeant Ward - - - - -	Bellehaven, Va.
N. B. Wescott - - - - -	Mapsburg, Va.
W. S. Nelson, - - - - -	Onancock, Va.
H. W. Nock - - - - -	Onancock, Va.
P. Hopkins - - - - -	Tasley, Va.
A. P. Poole - - - - -	Hoos, Va.
E. J. Dremman - - - - -	Big Stone Gap, Va.
A. W. Hudson - - - - -	Marshall, Va.

Number of Surveys Made - - - - - 10
 Number of acres surveyed - - - - - 646
 Number of men helped - - - - - 43

Report of Each Trip Made.

January 1st. 1915, went to Portsmouth, Va. and made a survey of R. C. Kent's farm.

January 4th 1915, went from Portsmouth to Onancock where I met some 27 farmers and gave them advice on drainage and made arrangements to make surveys later.

January 11th. 1915, went from Onancock to Smithfield where I visited 4 farms and helped them on their drainage problems. Returned to Richmond January 12th. 1915.

January 18th. 1915, went from Richmond to Mitchells, Va. where I made surveys of 2 farms, and returned to Richmond January 30th. 1915.

February 17th. 1915, went to Petersburg to see Alexander Hamilton about his drainage map.

February 18th. 1915, went to E. L. Tessier farm in Chesterfield Co., and looked over the land.

February 19th. 1915, went to Westham with J. C. Hunter and looked over a 6 acre tract of land.

February 25th 1915, went to Petersburg and delivered plans to Alexander Hamilton.

February 27th. 1915, went from Richmond to Burkeville to have conference with T. O. Sandy.

March 9th. 1915, went to Mr. Beaver's farm near Richmond and helped him on drainage.

March 11th. 1915, went to E. L. Tessier's farm, Chesterfield County, and made survey of his farm.

March 19th. 1915, went from Richmond to Burkeville to have conference with T. O. Sandy.

March 30th. 1915, went to Turkey Island Farm near Richmond to give advice on drainage.

April 6th. 1915, went to Mr. Nuckols Farm in Henrico County and showed him how to drain his low lands.

April 8th. 1915, went from Richmond to Windsor and took some levels on Ben P. Gay's farm. Went from Windsor to Norfolk and on to Smithfield where I visited the farms of Mr. Branch and Mr. Joyner and gave them advice on drainage.

April 14th. 1915, went from Smithfield to Onancock where I made 3 surveys and installed some tile for Ben Gunter and helped several men with their drainage problems. Returned to Richmond May 5th. 1915.

May 7th. 1915, went from Richmond to Burkeville to have conference with T. O. Sandy.

June 4th. 1915, went to Gordonsville, Va. to install demonstration tile system for R. Cowherd. Met several men and gave them advice on drainage. Went from Gordonsville to Culpeper where I made 2 surveys. Went from Culpeper to Washington, D. C. to get material for drainage equipment. Went from Washington to Gordonsville and made survey of 1 farm. Returned to Richmond June 23rd. 1915.

June 25th. 1915., went to Burkeville to locate room, preparatory to making headquarters there. Returned to Richmond June 27th. 1915.

Number of trips made - - - - - 19

Number of miles travelled - - - - -

Rail - - - - - 1251

Team or Auto - - - 360

Due to the scarcity of the particular kind of labor needed for doing tile ditching not many of the men for whom I have made surveys have been able to put in all their work. I have tried to help the farmer in every way possible to secure the proper implements needed in doing ditching. Have been trying to get a man with a ditching machine who can follow up my work and do the actual construction of the drainage system. It is the inability of the farmers

to secure the proper kind of labor that is keeping them from a great deal of drainage work.

At the present time I have many requests for work and the work is growing so fast that it will be almost impossible to grant all the requests made for drainage surveys.

Respectfully submitted,

Drainage Engineer.

Burkeville, Virginia.

August 10th, 1915.