

Annual Report of Drainage Work.

For 1914.

The drainage work as conducted during the past year has included the actual surveys of the 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 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 agriculturists 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 underdrainage 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 farms throughout the State, it is very necessary that they should have a bulletin on the subject of practical farm drainage. ^{with conditions} 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 planning 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 surveyors 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 dept. 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.

Method 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 question. 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 Richmond where the maps are worked out.

The map is made on the ordinary tracing cloth. A scale of

1 in. in 10 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: a.

(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 irregular, they indicate flats, level land, but when close together they indicate a steeper slope.

(c) A loop of the contour toward 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 indicate the position for the main drain.

With the contour 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 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 is determined by the use of "kutters formula" taking into consideration the amount of rainfall 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.

These maps are of 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.

List of Farmers receiving Surveys.

Petersburg Normal School.	Petersburg Va.
Collins and Lawson,	South Boston, Halifax Co.
Mr. R. Murray,	" "
H. J. Daniel,	" "
S. Glenn,	" "
W. Wilkins,	Tubbeville, " "
A. E. Wilkins,	" "
MR. Pettus,	Drakes Branch,
MR. Harris,	Sabot, Goochland Co.
T. A. Carey,	" "
MR. Geo. Foster,	Irwin,
Geo. Stoneman,	Varins Farm Richmond
Rod. Cowherd,	Gordonsville,
Mr. Atkinson,	" "
C. Tolliferro,	Orange,
MR Purcell,	Glen Allen,
MR. Milam,	Rah

W.H.Aston,	Meadowview.
Jackson Coal and Coke Co.	Petersburg.
Alexander Hamilton,	"
MR.Schmidt,	Westham.
R.C. Kent,	Portsmouth.
D.A.Slaughter,	Mitchells.
Mahoney Bros.	"

The above list. is of farmers that I have made surveys for, but there are many farmers throughout the State, that, while not requiring actual surveys, needed assistance in their small drainage problems, such as showing them where to lay their tile, size to use, kind, and depths to put them etc.

The following is a list of farmers that I have helped in this way.

MR.Bass,	Tubbeville, Va.	20	
MR.Wade,	"		
MR.Owen,	"	- 15	
MR.Rogers,	"	20	
MR.Macannaly,	Richmond,	30	
MR.Putze,	"	25	
MR.Ellis	"	20	
MR.Millard	"	30	
MR.Starbuck	"	25	
MR.Nuckols	"	50	
MR.Baldwin,	Fredricksburg,	30	
MR.Jordan	Smithfield,	75	
MR.Gay,	"	150	
MR.Jackson,	"	125	
MR.Morgan,	"	100	
MR.Branch,	"	75	
MR.Stewart,	Meadowview,	50	
John L.Roper Lumber Co.	Norfolk,	1000	
Geo. Crocket,	Accomac,	100	
B.T.Gunther,	"	250	
G.S.Walther,	"	75	
DR.J.W.Boudoin,	Bloxom,	75	
A.L.Mathews,	Temperanceville,	50	
J.H.Pruitt,	"	50	
Joe.Taylor,	"	75	
A.W.Bird,	"	50	
A.J.Mc.Math,	Onley,	25	1970
J.P.Jacobs,	"	30	1250
J.C.Core,	"	30	110
Martin Hall	Horsey,	30	330
R.C.Hall,	"	75	
L.Y.Thornton,	Atlanta,	100	
Aston Fletcher,	Jenkins Bridge,	75	
Roy.White	Parksley,	30	
Geo. Finney,	"	35	
Geo. Phillips,	Melfa,	"	
Richard Tarlington	"	25	
E.O.Kellum	Bellehaven	"	
Sargent Ward,	"	50	
N.B.Wescott	Mapesburg	"	
S.Walther	Onancock,	150	
W.S.Nelson	"	75	
	"	25	

W.S.Nelson.
N.W.Nock.
T.Hopkins

Onancock.
"
Tasley.

50
25
35

Number of surveys made.----- 24.
Number of farmers helped on drainage-~~ether~~-than surveys 44
Number of acres surveyed-----apprex. 2000.

I have received and answered many inquiries as yo drainage problems on the farm, questions, such as, What kind of tile to use. What size to use. How deep to put drains. How far apart to put tile. Inquiries anqtarbestafattobist factuyitlleette.

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Due to the extreme dry season last year very little of the actual construction of the drainage systems was carried out but many are going ahead with their work this year.

One of the greatest hindrances to the carying out of the drainage plans, is due to the seacity of the particular kind of labor necessary for this kind of work. After getting the survey it is also very important that the work be surpervised by a competent man so there would be no question of the thoroughness of the work, this would insure success. AS drainage is in its infancy in this State it is very important that the first work be done correctly.

There is a great deal of drainage to be done in the State and when the famers in general are aware that this dept.exists it certain they will take advantage of it.

Drainage Engineer.