REPORT OF AGRICULTURAL ENGINEERING DEPARTMENT.

From July 1, 1918 to June 30, 1919.

1. THE PRINCIPAL FARM AND HOME PROBLEMS ATTACKED.

1. Land drainage.
2. Terracing.
3. Land clearing.
4. Farm buildings.
5. Farm machinery.
7. Domestic Engineering including lighting systems, water works and farm sanitation.
8. Miscellaneous activities along engineering lines.

II. METHODS OF PROCEDURE IN CONNECTION WITH EACH PROBLEM.

1. Land drainage.

Surveys were made of farm lands needing drainage and maps prepared showing the location of tile systems, depth, grade, size of tile and all information necessary to successfully install the drainage systems. A report was prepared in each case dealing with the cost of installing systems and suggestions for the carrying out of the work. When tile was in place on the farm, the Engineer staked out the systems and gave the depth of cuts, etc., and supervised the laying of the tile.

A tile drainage company was organized in King George County by interesting six farmers to subscribe $3000.00 to purchase a ditching machine. This was handled by visiting a number of farmers in that section with the County Agent, talking drainage etc., and telling them of the results obtained by a similar organization in Eastern Virginia.

Articles were written on drainage for farm papers and letters of inquiry answered. Bulletins on drainage were sent out on request.

2. Terracing.

The County Agent locates lands in his county needing terracing and advertises the fact that the Engineer will demonstrate the laying off a terrace to prevent hill-side washing. The engineer lays off the terrace and advises the farmers present how to proceed, etc.
Literature on terracing is distributed through the sections in need of this work, and the County Agent instructed how to lay off a terrace so he can aid the farmers without calling on the Engineer.

3. Land Clearing.

Field demonstrations are held throughout the different counties with the county agents, whereby the different Explosive and Stump-pulling companies cooperate to demonstrate the best and most economical methods of removing stumps, etc.

4. Farm Buildings.

Farm building plans are prepared by the Engineer, of the most improved style of barn structures, etc. These plans are distributed to farmers on request. The County Agent advises his farmers who are going to build, of our plan service. Articles for farm papers are written describing the barn plans. All farmers receiving plans are asked to send this Department suggestions as to what changes he made in plans when building, cost, etc. A record is kept of all plans sent out.

5. Farm Machinery.

Demonstrations on the use of labor-saving farm machinery, in cooperation with farm implement companies. These demonstrations are usually held in connection with our field tractor demonstrations. In some cases the Engineer arranges for demonstrations of certain kinds of farm machinery in the counties with the County Agent. If certain kinds of improved farm machinery are not used in a section, the Engineer arranges with the implement companies to demonstrate these machines throughout that section.

6. Power Farming.

Tractor plowing demonstrations are held in different sections. The Engineer arranges with the tractor manufacturers to demonstrate their machines. He then advertises the demonstration through the papers and by circular letters, etc. The County Agents in all cases are asked to cooperate. The field is laid off in equal sections for each tractor. Tractors are all started plowing at same time and the
farmer is given an opportunity to judge the merits and defects of each tractor in competition. Strict rules for the participants are adhered to so that the demonstration will be educational in value and fair to all.

7. Domestic Engineering.

This Department cooperates with the Home Economics Department in giving farmers advice on the best methods of installing light and water systems in farm homes. The women agents advise their farm women to write this Department for information along these lines. Hundreds of letters are received and answered giving instructions for installing light and water. Bulletins on these subjects are also sent out. In a few cases personal aid is given, but these cases are necessarily limited as the time cannot be spared from other projects.

8. Miscellaneous Engineering subjects.

Many requests are received for information on all kinds of farm problems, which are all handled.

Demonstrations on the efficient arrangement of the farm layout are held in which surveys are made showing proper location of buildings, roads, fields, etc.

III. RESULTS OBTAINED.

1. Land Drainage.

(a) 61 farmers given actual field assistance in drainage. 500 bulletins on Farm Drainage sent to farmers on request. Numerous letters answered, giving advice on cost of drainage, etc.

(b) 61 farms, comprising 1908 acres conducted field demonstrations in drainage. Surveys were made on these farms and maps prepared. Advice on drainage was given on 20 additional farms, comprising 1000 acres of wet lands. A few levels were taken on these farms, but maps were not needed. Total number of acres drained through advice of Department 2908.

In practically every case where the tile has been laid long enough for a crop, wonderful results are seen. As an example, on the farm of Jas. Twyman,
Fincastle, Virginia, the entire piece of land of about 35 acres was rendered useless for crops on account of wetness. After drainage, he can get on this land to work it three days after the hardest rain, which is better than he can do on his so-called dry land, which is not tile drained. Mr. Twigan states that he will harvest 75 bushels of corn on this land this year—more than paying for the cost of drainage.

Many requests for assistance on drainage could not be met due to the lack of time and men for this work. One man could easily be kept busy throughout the year on this work alone.

A conservative estimate of the value of this work for the year would be $20.00 an acre annually added to the productive value of the land drained. (This estimate of $20.00 per acre is based on research by the Canadian Agricultural College and National Drainage Congress.) 200 acres at $20.00 per acre equals $56,000. increased production value due to drainage as a result of Extension work for the year.

Since these projects are demonstrations, and many other farms are drained as result of these demonstrations, the value to the State is many times this amount.

During the year two brick companies were persuaded to put in drain tile plants. This will enable farmers to get tile much cheaper than what they have to pay for tile shipped in from outside states. Approximately 2,000,000 feet of tile was used in the State during the year. The home tile plants can save at least $5.00 per thousand feet to the farmers for tile. This would mean, at the rate of 2,000,000 feet of tile used per year, a saving of $10,000 to the farmers of the State.

One ditching machine organization was started in King George County. Several farmers bought stock in the organization and a $3000.00 ditching machine was bought.

Another ditching machine was bought in Eastern Virginia and both machines are now working full time.
Farmers in Prince Edward county were interviewed and interested in forming a drainage district for the purpose of cleaning out one of the rivers. This will reclaim thousands of acres of rich river bottom land in that county. They are ready to proceed just as soon as an adequate drainage law is adopted for the State. We have had a good drainage law drawn which is now being discussed and rearranged by several committees in the State. An adequate drainage law will furnish the means of draining thousands of acres of our swamp lands.

2. Terracing.

(a) 35 farmers given assistance on terracing. 500 bulletins sent out on terracing.

(b) Work on terracing has merely been started. About 220 acres have actually been terraced under the supervision of the Engineer. About 1000 more acres have been planned for terracing.

In the counties of Halifax, Pittsylvania, Mecklenburg, Lunenburg, Charlotte, Brunswick, Greensville, Southampton, Sussex, Surry, Prince George and Dinwiddie there are over 3,000,000 acres of lands in farms. Conservatively 5 percent of this land needs terracing, or at least 150,000 acres. The value of terracing is easily $10.00 per acre so that the value of this work to the State if all this land were terraced would be $1,500,000.

3. Land Clearing.

(a) 2000 farmers assisted in their land clearing problems.

(b) 26 land clearing demonstrations were held in seven counties with a total attendance of 2000 farmers.

It developed that the farmers were paying double the price for dynamite to the local dealers. They were shown how they could save 50% of this cost by applying direct to the manufacturers. The demonstrations showed that the combination of stump-puller and dynamite was the cheapest means of clearing land.
4. Farm buildings.

(a) 15 farmers given personal assistance in erection of their farm buildings.

(b) Several hundred blue prints and working specifications of buildings have been sent out to farmers, on their request, including all kinds of farm buildings, such as barns, tool sheds, poultry houses, dairy barns, hog houses, etc.

Two elaborate dairy barns were constructed from our plans, each costing around $15,000.

Assistance and supervision was given at Eporia in constructing and erecting three silos. A great number of specifications and blue prints of silos were sent out.

Plans were made in Lynchburg for a city market.

County Fair building was planned and has recently been built in Caroline county.

The Department gave assistance in planning a very elaborate set of barns on Curles Neck Farm, which were constructed.

Thousands of self feeders have been built from the plans sent out by this Department. Some County Agents report that it is now hard to find a farmer in their county who does not have a self feeder.

Another set of plans drawn by the Department for Poultry houses have found wide use in the State. While it would be impossible to give the exact number of poultry houses built and re-ordered according to our plans, on the suggestion of Talcott and Treakle, the value to the State in the better housing of its poultry would be thousands of dollars.

These plans have been incorporated into bulletins, one by Mr. Talcott and the Agricultural Engineer and the other by Mr. Treakle. Many thousands of these have been sent out.

Following plans were drawn during the year:
1. General purpose barn,
2. Dairy barn plans,
3. Machine shed plans,
4. County Fair building,
5. Marketing center,
6. Water warmer for hogs,
7. Septic tank for sewage disposal,

5. Farm Machinery.

(a) 148 demonstrations given in 25 counties to show the proper use of soil fitting tools in connection with the sowing of spring crops and top dressing wheat.

Improved farm machinery such as the cultipacker, disk harrow, etc., was demonstrated at all the tractor demonstrations. In this way 14,000 farmers were given an opportunity of seeing these tools in actual field work.

Many cultipackers have been sold in the State as a result of the demonstrations.

6. Power Farming.

(a) 14,000 farmers attended three power farming or tractor demonstrations held during the year.

1,000 farmers attended weekly tractor school at Roanoke.

(b) The tractor demonstrations held were a wonderful success and the attendance at these demonstrations show the interest that there is in tractor farming. The 14,000 farmers who attended these demonstrations were given an opportunity of judging and comparing the better makes of tractors sold in Virginia working in competition, under actual field conditions.

Tractor dealers report large numbers of tractors sold in the State as a result of the demonstrations.

At the Tractor school in Roanoke which was attended by 1,000 farmers, practical instruction was given in the operation, selection and care of tractors. 15 tractors were at the school with an expert of each tractor to instruct the farmer. The College furnished lecturers for the various subjects.
7. **Domestic Engineering.**

(a) Hundreds of letters have been answered giving advice on water supply and lighting systems for farm homes.

Actual assistance was given in eight cases in the installing of water systems. Eight septic tanks or sewage disposal systems installed.

(b) This work is of great value and importance to the State, but due to lack of assistance it is impossible for the Department to adequately handle it.

8. **Miscellaneous Activities.**

The Engineer spent a couple of weeks preparing an exhibit for the Fair at Richmond and assisting the State Fair management in erecting buildings and making plans to care for the Agricultural exhibits.

A bulletin on the farm poultry house was published.

Many letters of inquiry on various farm engineering problems have been answered.

Assistance was given in the planning and laying out of two farm homesteads.

Assistance was given in laying out a small town water supply.

**IV.** The most important piece of Extension work accomplished during the year was the organization of the Rappahannock Valley Tile Drainage Company.

With the assistance of the County Agent, several farmers of King George county were persuaded to form a ditching company for the purpose of digging ditches for tile drainage work. The lack of labor for this type of work makes it practically impossible to do any tile drainage without a power ditcher.

A Buckeye Traction ditcher was purchased and put to work in the county. This machine cost $2800.00. It will ditch easily 2000 feet a day. The machine is doing splendid work and has created a great interest in tile drainage in King George County. The farmers who belong to the organization, or who hold stock in the machine have great faith in it and believe it will do more for King George and adjoining counties than anything started in that section.
The Agricultural Engineer believes this to be the most important piece of Extension work accomplished because it will furnish the means of draining any thousands of the wet lands in that section of the State and thereby bring into cultivation what will be the best land in that section when drained.

As a result of the organization formed by this Department some years ago on the Eastern Shore, over one half million feet of tile have been laid in the past year, and two machines are now in full operation in that section with the possibility of two more at an early date.

Wherever ditching machines can be located in the State, thousands of acres of land will be drained. There are now five of the latest models of Farm ditching machines in the State, all of them being bought at the suggestion of this Department.

V. Power farming is exerting a great influence on the methods of farming in the State. Most of the farmers who are using tractors have had to completely change their system of farming. They are re-arranging their fields, changing their crop rotation and adjusting their farming operations on a more business-like basis.

The tractor is necessitating the tiling of wet places on the farm, covering up of open ditches, straightening of fences and making the farm much more attractive. Above all, it is going a long way toward solving the labor problem on the farm and exerting a great influence for keeping the boy on the farm.