

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE NEW YORK STATE COLLEGE OF AGRICULTURE,
CORNELL UNIVERSITY, BEVERLY T. GALLOWAY, DIRECTOR;
E. O. FIPPIN, IN CHARGE SOIL SURVEY.

SOIL SURVEY OF CORTLAND COUNTY,
NEW YORK.

BY

E. T. MAXON, OF THE U. S. DEPARTMENT OF AGRICULTURE, IN
CHARGE, AND G. L. FULLER, OF THE NEW YORK
STATE COLLEGE OF AGRICULTURE.

W. E. McLENDON, INSPECTOR, NORTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1916.]



WASHINGTON:
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., February 6, 1917.

SIR: In the extension of the soil survey in the State of New York during the field season of 1916 a survey was undertaken in Cortland County. This work was done in cooperation with the New York State College of Agriculture, and the selection of the area was made after conference with State officials.

I have the honor to transmit herewith the manuscript report and map covering this work and to request their publication as advance sheets of field operations of the Bureau of Soils for 1916, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

HON. D. F. HOUSTON,
Secretary of Agriculture.

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FIGURE.

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MAP.

Soil map, Cortland County sheet, New York.

SOIL SURVEY OF CORTLAND COUNTY, NEW YORK.

By E. T. MAXON, of the U. S. Department of Agriculture, In Charge, and G. L. FULLER, of the New York State College of Agriculture.—Area Inspected by W. E. McLENDON.

DESCRIPTION OF THE AREA.

Cortland County is situated in the central part of New York, about halfway between the cities of Syracuse and Binghamton. It is bounded on the north by Onondaga County, on the east by Madison and Chenango Counties, on the south by Broome and Tioga Counties, and on the west by Tompkins and Cayuga Counties. The county is rectangular in outline, its dimensions being approximately 25 miles from north to south and 20 miles from east to west. It embraces an area of 503 square miles, or 321,920 acres.

Cortland County lies in the Allegheny Plateau, an elevated area occupying the southern part of the State and extending thence southward. The elevation of this plateau ranges from about 1,500 feet to 4,000 feet above sea level. In Cortland County it lies at about 1,800 feet, the higher points in the northern part of the county lying a little higher than this, and the greater part of the southern end lying a little lower.

The plateau is so thoroughly dissected that no areas of level land unaffected by the erosion of the dissecting cycle remain. The depth of the dissection is much greater than that of the greater part of the area of the United States in the same stage of development. The valleys of the larger streams, those that can be accepted as furnishing a base for measuring the depth of dissection, lie at an elevation ranging from about 1,100 feet or a little less to a little more than 1,200 feet. The depth of dissection, therefore, is about 600 feet. While the dissection is both thorough and deep it is not sharp. Stony cliffs are of very rare occurrence. The slopes are rounded so that the profiles are smooth, flowing curves rather than angular. Access to all parts of the area is possible, though the depth of the valleys makes movement over the region difficult on account of the amount of lift entailed rather than because of the steepness of the slopes. A few

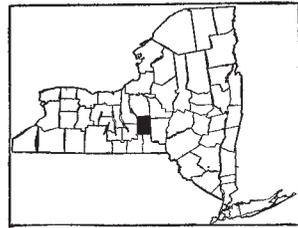


FIG. 1.—Sketch map showing location of the Cortland County area, New York.

miles north of the northern boundary of Cortland County the plateau drops to a level of less than 1,000 feet in a series of steps.

The plateau of Central New York is traversed by a series of relatively broad valleys extending from the lowland north of the plateau southward across or through it to the valley of the Susquehanna River along the southern border of the State. These broad valleys have no relation to the existing drainage except to exercise almost complete control over it rather than being themselves controlled by it. The larger creeks flowing into the Susquehanna and Delaware Rivers, as well as those flowing northward into the Great Lakes, rise within these valleys, the watersheds lying on the valley floors with no visible ridges to mark their location. Cortland County lies immediately south of the watershed in many of these large valleys, the northern boundary lying within a mile or so of some of them. The small streams occupy these large valleys in a wholly misfit way.

The northern part of the county is traversed by several large valleys, all converging into one at Cortland, and six of them extending northward as deep, wide valleys across the watershed into the basins of northward flowing streams. The southeastern part of the county is traversed by three valleys of the same kind though somewhat narrower, each with several branches, most of which extend across the watershed into the drainage basins of the northern part of the county and some extending beyond the county line and north-eastward across the Great Lakes-Susquehanna watershed.

The broadest of these valleys are the Homer Valley in the northern part of the county, running north and south past Cortland; the Otselic, across the southeastern part of the county; and the Harford, across the southwestern part.

Owing to the rolling topography and the numerous draws and small streams, the run-off is large. The larger streams have sufficient gradient to carry all the drainage, except at times of unusually heavy precipitation. The drainage of the central and northern parts of the county is carried by the Tioughnioga River and that of the southeastern corner by the Otselic River. Both of these rivers are tributary to the Susquehanna. The northwestern part of the county drains into Skaneateles Lake, and the region tributary to Virgil Creek in the western part into Cayuga Lake. The drainage of the extreme southwestern corner flows into Owego Creek, also a part of the Susquehanna drainage system. A few poorly drained areas occur in the bottom lands along the streams. Water power for sawmills and gristmills has been developed from many of the swifter flowing streams throughout the county.

The first settlement in the territory embraced in Cortland County was made in 1791, near the site of the present village of Homer, much of the remaining territory being taken up during the ensuing

10 years.¹ The pioneers came from the New England States and from the earlier settled regions to the east. Cortland County was formed from a part of Onondaga County in 1808. At present it comprises 15 townships. The population is densest in the western part of the county, especially along the valleys. The total population, according to the 1910 census, is 29,249, of which 51.5 per cent is classed as rural. The population averages nearly 30 persons to the square mile. Cortland, the county seat and largest city, with a population in 1910 of 11,504, is a growing manufacturing city. Homer, with a population of 2,695; Marathon, with 1,075; and McGraw, with 931, rank next. Other villages of local importance are Cincinnatus, Truxton, Harford, Preble, Willet, Little York, and Cuyler.

Transportation facilities are excellent, all sections of the county being within 7 miles of a steam railroad. The Binghamton, Syracuse, and Oswego division of the Delaware, Lackawanna & Western Railroad traverses the western part of the county from north to south, and the Cincinnatus branch of this line extends easterly from Cortland to Cincinnatus. One branch of the Lehigh Valley Railroad crosses the county in a northeasterly direction from a point southwest of Cortland, and another branch crosses the southwest corner. An electric railroad runs from Cortland to McGraw, in the central part of the county, and from Cortland to Preble, in the northern part. All the railroads in the county, except one branch, pass through Cortland. There are about 100 miles of improved State roads and 1,000 miles of dirt roads. The dirt roads are usually kept in good repair. All parts of the county are well supplied with schools and churches and have telephone and rural mail-delivery service.

Cortland is the principal market and distributing center. New York, Philadelphia, Baltimore, Pittsburgh, Scranton, and Wilkes-Barre are the more important outside markets.

CLIMATE.

Cortland County has the characteristic climate of southern New York. The winters are of about 5 months' duration and moderately severe, while the summers are warm, with occasional short periods of high temperature. The mean temperature for the months of November, December, January, February, and March is 27.5° F., and that for the three summer months, June, July, and August, is 65°. The lowest temperature recorded is -29°, in January, and the highest 96°, in July and August. The mean annual temperature is 44.6°.

The rainfall is sufficient for the common crops. April and May have an average precipitation of 2.97 and 3.95 inches, respectively,

¹ History of Cortland County, by H. P. Smith.

while the mean for June, July, and August is 12.84 inches. Usually the summer rainfall is well distributed.

The average dates of the last killing frost in spring and the first in fall are May 18 and October 2. This gives a growing season of 137 days, the grazing season for dairy cattle lasting 3 to 4 weeks longer. The extreme recorded dates of killing frost in the spring and fall are June 6 and September 15.

The following table gives the normal monthly, seasonal, and annual temperature and precipitation as recorded at the Weather Bureau station at Cortland, 1,112 feet above sea level.

Normal monthly, seasonal, and annual temperature and precipitation at Cortland.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	° F.	° F.	° F.	Inches.	Inches.	Inches.
December.....	26.2	60	-13	3.06	3.98	3.29
January.....	22.8	68	-29	2.63	1.88	3.02
February.....	22.0	61	-23	2.35	0.69	2.05
Winter.....	23.7	68	-29	8.04	6.55	8.36
March.....	30.5	80	-12	2.69	1.83	2.58
April.....	42.5	92	10	2.97	0.56	6.78
May.....	54.5	91	23	3.95	2.50	4.38
Spring.....	42.5	92	-12	9.61	4.89	13.74
June.....	62.9	92	31	4.28	2.25	12.55
July.....	67.1	96	36	4.81	4.09	2.39
August.....	65.0	96	35	3.75	2.64	5.40
Summer.....	65.0	96	31	12.84	9.58	20.34
September.....	57.9	92	27	3.42	2.40	4.45
October.....	47.1	85	18	3.86	2.99	4.88
November.....	36.2	70	0	3.09	2.99	3.48
Fall.....	47.1	92	0	10.37	8.38	12.81
Year.....	44.6	96	-29	40.86	29.40	55.25

AGRICULTURE.

The early settlers found this region heavily forested with maple, beech, elm, basswood, pine, hemlock, and cherry, with chestnut, oak, white ash, and birch on the higher hills. Their first efforts were directed toward clearing the land and growing subsistence crops. The most important commercial products were wood ashes or black salts,

maple sugar, and pottery, which were shipped down the Tioughnioga River during periods of high water. The settlers early recognized the adaptability of this section to dairying, which became the most important industry. As early as 1855 the county produced 2,379,257 pounds of butter, as well as a large quantity of cheese.

Dairying continues to be the main industry, although butter and cheese making have been largely displaced by the sale of milk. Most of the milk is sent to New York City, although a considerable quantity is hauled to Cortland for manufacture into milk products. Every railroad station in the county has a milk depot, to which farmers haul their milk daily. The dairy stock is carefully housed and modern equipment is used. The Holstein is the predominating breed of dairy cattle, followed by the Jersey, Guernsey, and Ayrshire. Many herds are composed altogether or in part of purebred stock. According to the census, there were 43,239 cattle in the county in 1910, of which 27,427 were dairy cows. In 1901 there were produced 13,740,015 gallons of milk, 144,343 pounds of butter, and 165 pounds of cheese. Dairy products, excluding milk and cream used at home, were valued at \$1,595,671.

Sheep formerly were kept in large numbers on the hill farms, but owing to the low price of wool and mutton and the difficulty of protecting the animals from dogs, very few are kept at present. In 1910 there were only 3,616 sheep in the county. These were valued at \$20,773. On nearly every farm a few hogs are raised for home consumption. In 1910 the number reported was 5,233, valued at \$43,801. Every farmer keeps some poultry for home use, the excess products being sold. The census reports poultry and eggs to the value of \$233,909 sold in 1909. The total value of domestic animals, poultry, and bees in the county in 1910 was \$2,762,215.

Oats, corn, and hay have been the principal crops since the early settlement of the county. In 1879 oats were grown on 12,439 acres, with a production of 416,175 bushels, and in 1909 on 13,028 acres, with a production of 396,974 bushels, or an average of 30.4 bushels per acre. Most of this crop is utilized on the farm as horse feed.

In 1879 the area devoted to corn amounted to 5,373 acres, from which 185,979 bushels of grain were produced, while in 1909 only 1,852 acres of this crop were grown, with a production of 74,105 bushels. Much of the land formerly used for this grain is now used for producing corn for ensilage. Corn does well throughout the county, although the growing season is sometimes too short to mature the grain. Yields of ensilage corn range from 8 to 17 tons per acre, the largest yields being obtained on the valley farms.

Every farmer devotes a large acreage to hay and forage crops. In 1909 timothy and clover mixed were grown on 51,741 acres, from which 58,370 tons of hay were produced; timothy alone on 9,292 acres,

producing 11,146 tons; and clover on 412 acres, from which 845 tons were produced. Miscellaneous grasses and forage crops, including alfalfa, millet, and other tame or cultivated grasses, grains cut green, and coarse forage, were grown on 19,199 acres, producing 59,503 tons. A large proportion of the hay produced is fed on the farm, the remainder being baled and sold at the local markets. The total value of hay and forage crops produced in 1909 was \$1,118,894.

In 1879 buckwheat was grown on 1,510 acres, producing 22,493 bushels, as compared with an area of 4,625 acres and a production of 110,793 bushels in 1909, averaging 23.9 bushels per acre. This crop is widely grown throughout the county, being especially well adapted to the hill land. It is a cash crop, very little being utilized on the farms.

In 1909 there were 893 acres devoted to barley, producing 24,348 bushels, or an average of 27.2 bushels per acre. Much of this crop is fed on the farm. Very little wheat and rye are grown.

The area in potatoes increased from 2,979 acres in 1879 to 4,961 acres in 1909. In the latter year the production amounted to 750,187 bushels, or an average of 151.2 bushels per acre. Potatoes are one of the important cash crops, and are largely grown on the hill farms, where the soil is well adapted to their production. Most of the crop is shipped outside the county. The principal varieties of potatoes are the Rural New Yorker, World's Superior, Green Mountain, and Number Nine.

Cabbage is grown extensively, especially in the valleys throughout the northern part of the county, for shipment to the big markets in the fall and winter. Late cabbage of the Danish variety is usually grown. In the western and northwestern parts of the county peas, beans, greens, and sweet corn are grown for canning factories.

The census reports 184,402 maple trees tapped in 1909, with a production of 113,332 pounds of sugar and 41,038 gallons of sirup. The trees are scattered through all parts of the county. Most of the product is sold.

Every farm has a few fruit trees, mainly apple, and there are a few commercial orchards. In 1909 there were 131,575 bushels of apples, 20,316 pounds of grapes, 35,340 quarts of strawberries, 31,691 quarts of raspberries and loganberries, and 52,275 pounds of nuts produced in the county. The value of the fruit and nut production was \$66,385.

The farmers generally recognize the crop adaptation of certain soils. The hardpan soils of the Volusia series are considered best suited to grasses, the well-drained soils of the Lordstown and Wooster series to potatoes, and the gravelly soils of the valleys, embraced in the Fox and Chenango series, to ensilage corn. Buckwheat is

considered the most suitable crop for the poorer soils. Alfalfa does best on the Fox and Ontario soils.

Grain crops usually are thrashed at the barn, the straw being placed under cover or stacked for use during the winter. Hay is generally stored in large barns. The potato crop is either sold directly from the field or stored in cellars to be sold at a later date. Cabbage is harvested in the fall and either stored on the farm or hauled to town for storage or shipment.

The farmhouses usually are large and substantial, with well-kept lawns. On dairy farms there is usually a barn with basement room sufficient to stanchion 10 to 50 or more cows, haymows of 75 to 150 tons capacity, one or two silos of 100 tons or more capacity, granaries, and tool rooms. There are usually additional buildings for housing wagons, implements, hogs, and poultry. Modern machinery is in common use, including two-way riding plows, harrows, corn and grain drills, potato and cabbage planters, sprayers, corn cutters, mowing machines, hay loaders, reapers, binders, ensilage cutters, potato diggers, and milking machines.

The work stock consists almost exclusively of horses. These are medium-sized chunks averaging about 1,150 pounds in weight. Three or more horses are used for the heavier work. Tractor engines are not extensively used. In 1910 the value of all property per farm was \$5,046, of which 37.3 per cent was represented by land, 34.9 per cent by buildings, 6.8 per cent by implements, and 21 per cent by domestic animals.

The rotation most commonly practiced on the dairy farms consists of cabbage or potatoes for one year and corn one year, followed by oats sown with timothy and clover. The sod is mowed from 2 to 10 years, the best farmers turning it under in 2 or 3 years. As a rule the first cutting is clover, with timothy the succeeding years.

In 1909, 1,779 farms used commercial fertilizer at a total cost of \$73,448, or \$41.29 each. Commercial fertilizer is usually applied to corn, potatoes, and cabbage. For corn an acreage application of 250 to 300 pounds of a 3-9-2 mixture is commonly made, and for potatoes from 500 to 1,000 pounds of a 2-8-10 mixture. A 2-8-10 mixture is also used by some farmers for oats. There is much reason to believe that fertilizer containing one-third to one-half as much potash as this formula contains will give quite as good results. Nearly every farmer utilizes the barnyard manure, spreading it either on sod land or on corn stubble. Lime is widely used, the applications ranging from 500 to 2,000 pounds per acre. It is usually applied on plowed land for all crops except potatoes.

Reliable farm laborers are scarce. Monthly wages range from \$25 to \$45, with house and garden, and day wages from \$1.75 to \$2.50.

In 1910 there were 2,610 farms in the county, representing 93.1 per cent of the total land area. The number of farms has been gradually decreasing for many years, the smaller places being absorbed by larger ones. The farms range in size from 3 to over 1,000 acres, the average size being 114.8 acres.

Owners operated 78.3 per cent of the farms in 1910, as compared with 70.8 per cent in 1900. Farms are rented both for cash and on shares, the number of cash renters being slightly in excess of those renting on shares. In share renting the landlord furnishes half the seed and fertilizer and receives half the gross returns.

Land values vary with the location and improvement. The price of hill farms ranges from \$10 to \$45 an acre, with an average of \$25, and that of valley farms from \$35 to \$150 an acre, with an average of about \$75. The valley farms usually have good buildings and fences and are located on good roads.

SOILS.

Cortland County is situated in the glacial region near the northern border of the Allegheny Plateau. The underlying consolidated rocks consist of light-colored shale and sandstone, with occasional lentils or thin layers of limestone.

The material from which nearly all the soils are derived owes its accumulation to the continental glacier which swept over this region in the late Wisconsin stage of glaciation. Upon the final retreat of the great ice sheet, which came from the north, the hills were left thinly mantled with glacial débris, while through the valleys deep morainal deposits, as well as extensive gravel plains, were built up, and fine sediments were deposited in lakes existing at the time. Materials of more recent deposition occupy stream flood plains and marshy and swampy areas where conditions have favored the accumulation of organic remains.

The thin mantle of till of the uplands is derived almost entirely from the local sandstone and shale formations. Only an occasional fragment of granite or other crystalline rock is to be found, and most of the stones are angular, indicating that they are not far removed from their source. The deep morainal deposits in the valleys are of more mixed origin. Some of the areas in the Cortland Valley and in other valleys converging with it from the northwest and northeast are very strongly influenced by limestone. Farther south there is little or no limestone in the till, but there is a greater abundance of crystalline gravel and other foreign rock material present than in the ground moraine blanketing the hills. Generally in the terminal moraine area there is considerable grit and gravel in the soil section and the substratum may be little else than beds of angular and rounded gravel, cobblestones, and sand.

The water-laid deposits now occurring as second bottoms or terraces are derived almost entirely from the local sandstone and shale rocks, except in the northern part of the county, where some important areas carry a high percentage of limestone material. Where the material was deposited under lake conditions it is heavy in texture from the surface downward and there is little or no stone present. The typical gravel terraces, however, consist of beds of gravel and sand, covered with a thin mantle of loamy material.

In the overflow lands no close distinction can be made on the basis of origin. It is probable that the areas associated with the calcareous terraces and morainal deposits are derived in part from limestone material, while those farther south are almost altogether derived from sandstone and shale, but in color, structure, and agricultural characteristics the first-bottom soils seem to be very much the same throughout the county.

The whole area of Cortland County was originally forested. The stand was thick, the trees large, and both pine and hardwoods were represented. The soils developed as podsoles, therefore, with a relatively thin podsolized, or A, horizon. The illuvial, or B, horizon, the horizon in which the downward leached organic and mineral matter was deposited, lay but a few inches beneath the surface, so that on cultivation the brown B horizon, or at least its upper part, became mixed in plowing with the gray of the A horizon. As a result of this the soil as found in cultivated fields is brown. The subsoils are brown to yellowish, lighter in shade than the surface soils. The region is, therefore, a region of brown soils except where drainage is poor. Further differentiation is based on texture of soil and subsoil, drainage, oxidation, and origin of the soil material.

Soils similar in all respects except texture are grouped in series. In Cortland County 9 series, embracing 17 distinct types of soil, in addition to Meadow and Muck, are mapped. In the uplands two series, the Lordstown and Volusia, predominate. The deep till deposits in the valleys give rise to the Wooster series where the material is almost entirely of sandstone and shale origin, and to the Ontario series where there is a considerable admixture of limestone material. The gravelly terrace soils are included in the Chenango and Fox series and the heavier lake deposits, which are calcareous and have a peculiar brownish color, in the Schoharie series. The first bottoms are occupied by the Genesee and Holly series, and by Meadow. The organic soils are classed as Muck.

The surface soils of the Lordstown series are grayish brown to yellowish brown, while the subsoils are yellowish brown or light brownish yellow, and of about the same texture as the surface soils. Bedrock, consisting of sandstone and shale, is usually encountered at a depth of 1 to 3 feet and in places at 4 or 5 feet. This series

includes most of the smoothly rolling and steep hill lands of the county, where drainage is well established. In Cortland County the Lordstown series is represented by two types, the stony silt loam and silt loam.

The Volusia series includes types having brownish-gray surface soils and gray and brown mottled, compact subsoils. These soils are level to gently rolling in topography, and are poorly drained. Three types, the stony silt loam, silt loam, and silty clay loam, are mapped in Cortland County.

The soils of the Wooster series are similar to the Lordstown soils in color but differ in being confined to areas of deep till, usually terminal-moraine deposits. The stony silt loam, gravelly silt loam, and silt loam are mapped in the present survey.

The Ontario series includes types having brown, mellow surface soils and yellowish-brown, friable subsoils resting upon grayish, calcareous till at a depth of 2 or 3 feet. The topography is undulating to rolling, or kamy to drumloidal, and the natural drainage is variable. Only one type, the gravelly silt loam, is mapped in Cortland County.

The surface soils of the Fox series are brown and the subsoils are light brown to yellowish brown. Beds of gravel carrying a high percentage of limestone material form the substratum at a depth of 2 or 3 feet. The Fox soils are level to gently undulating and naturally well drained. The gravelly silt loam is the only member of this series mapped in Cortland County.

The surface soils of the Chenango series are grayish brown to brown, and the subsoils are yellowish brown, resting upon beds of noncalcareous gravel and sand at a depth of 2 or 3 feet. The topography is level and drainage is good. The stony silt loam, gravelly silt loam, and silt loam are mapped in this county.

The Schoharie series is characterized by brownish-gray to brown surface soils and brown to slightly reddish brown subsoils, usually somewhat mottled with gray. The soils of this series are derived from calcareous lake sediments with a peculiar reddish tinge and the subsoils are moderately to rather strongly calcareous. The topography ranges from level to very irregularly rolling, and the drainage is fair to good. The silty clay is the only type of this series mapped in Cortland County.

The Genesee series includes types with brown, mellow surface soils and subsoils and having fair to good drainage, except for occasional overflows. One type, the silt loam, represents the series in Cortland County.

The Holly series includes gray surface soils and gray mottled, compact subsoils. The soils of this series are naturally poorly

drained. Two types, the gravelly silt loam and silty clay loam, are mapped in Cortland County.

Muck consists of decayed vegetable matter mixed with some mineral matter. It has accumulated under poor drainage conditions.

Meadow is a term applied to low-lying areas along streams where the material can not practicably be separated into types, owing to its variability in color and texture.

The following table shows the actual and relative areas of the different types of soil in Cortland County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Lordstown silt loam.....	102,208	31.7	Meadow.....	3,200	1.0
Lordstown stony silt loam.....	91,520	28.4	Wooster stony silt loam.....	2,688	.8
Volusia silt loam.....	43,072	13.4	Chenango stony silt loam.....	2,112	.7
Volusia stony silt loam.....	17,728	5.5	Volusia silty clay loam.....	1,600	.5
Wooster silt loam.....	13,248	4.1	Chenango silt loam.....	1,536	.5
Fox gravelly silt loam.....	11,520	3.6	Muck.....	1,024	.3
Wooster gravelly silt loam.....	9,088	2.8	Schoharie silty clay.....	640	.2
Chenango gravelly silt loam.....	5,440	1.7	Holly gravelly silt loam.....	448	.1
Holly silty clay loam.....	5,312	1.7			
Genesee silt loam.....	5,056	1.6	Total.....	321,920
Ontario gravelly silt loam.....	4,480	1.4			

LORDSTOWN STONY SILT LOAM.

The Lordstown stony silt loam consists of a friable, yellowish-brown silt loam, underlain at a depth of 5 to 8 inches by brownish-yellow silt loam which usually rests upon sandstone and shale bedrock at a depth of 1½ to 3 feet. Numerous angular fragments of shaly sandstone and sandy shale occur on the surface and through the soil section, and in places foreign boulders are encountered. Along some of the hillsides small areas of poorly drained material (Volusia stony silt loam) are included with this type.

The Lordstown stony silt loam is extensively developed throughout the county, especially in the northern part. It occupies most of the steep slopes and sharp hilltops, as well as many areas of gently rolling topography. Many of the slopes are too steep for profitable cultivation. Drainage is generally thorough, and in places excessive, so that crops often suffer during dry periods.

The type formerly was covered with a heavy stand of sugar maple, chestnut, white pine, hemlock, and wild cherry, most of which has been removed. Some good stands of second-growth timber are found in sections more remote from the railroads. Most of the cleared land is used for pasturage.

Farms on the Lordstown stony silt loam are devoted to dairying and general farming. The principal crops are timothy and clover, other hay crops, oats, buckwheat, ensilage corn, potatoes, and cabbage. Yields are slightly lower than on the Lordstown silt loam.

Land values range from \$8 to \$35 an acre. Some tracts of this soil are of value only for the pasturage they afford or for the standing timber.

Much of this type should have remained in forest. The pastures can be improved by keeping down the weeds, cutting the brush, and reseeding occasionally.

LORDSTOWN SILT LOAM.

The Lordstown silt loam consists of a yellowish-brown, mellow silt loam, 6 to 8 inches deep, underlain by a somewhat lighter colored, friable silt loam. The subsoil rests upon the unweathered sandstone and shale at a shallow depth, usually at 2 to 4 feet below the surface, although local areas of deeper material are included. Angular fragments of fine-grained sandstone and sandy shale occur on the surface and throughout the soil section, but seldom in sufficient quantity to interfere with cultivation. Included with this type are many small, poorly drained areas that would have been mapped as the Volusia silt loam had they been large enough.

The Lordstown silt loam is one of the most widely distributed upland types in the county, being most extensive in the central and southern parts. It usually occupies rolling slopes and narrow hill-tops. Drainage is thorough, and on some of the shallower areas crops are liable to injury by drought.

Because of its wide distribution, this is one of the most important soil types in the county. Nearly all the original forest, consisting of sugar maple, white pine, chestnut, butternut, beech, and wild cherry, has been removed, and the wooded areas now support a second growth.

Dairying and general farming are the main industries on this type. Nearly every farmer keeps from 5 to 50 or more milch cows, practically all the milk being hauled to a railroad for shipment. The principal crops are hay, corn for ensilage, oats, buckwheat, Irish potatoes, and cabbage.

Mixed timothy and clover yield ordinarily 1 to 1½ tons of hay per acre, although yields of 2 or 3 tons are not uncommon, especially where the soil is in a good state of cultivation. Corn yields from 8 to 12 tons of ensilage per acre. Oats do remarkably well, yielding 35 to 50 bushels per acre. Buckwheat is extensively grown on this soil and yields 25 to 30 bushels. Irish potatoes generally yield 150 to 200 bushels per acre, and in some instances 300 to 325 bushels. Cabbage yields from 8 to 12 tons per acre.

Farmers on this type of soil depend largely upon stable manure for fertilizer, although commercial fertilizers are often used for potatoes and cabbage. Ground limestone is used by an increasing number of farmers. It is applied to plowed land for any crop except potatoes at the rate of 500 to 3,000 pounds per acre, the usual application being 1,000 pounds.

Farms on this soil type range in price from \$10 to \$75 an acre, according to location with respect to towns and railroads and the condition of the buildings. Land of this type ordinarily sells for about \$25 or \$30 an acre.

The Lordstown silt loam is deficient in organic matter, which should be added in the form of barnyard or green manure. It also requires lime to correct the acidity. The land should not be mowed for more than three seasons without reseeding. Deeper plowing is necessary on many of the hill farms. Weeds make a remarkable growth on this type, and unless checked soon choke out the better grasses.

VOLUSIA STONY SILT LOAM.

The Volusia stony silt loam consists of a brownish-gray silt loam, 4 to 8 inches deep, underlain by a gray to grayish-yellow silt loam which extends to a depth of 36 inches or more. The subsoil is heavily mottled with brown, yellow, and drab. Both surface soil and subsoil contain a large quantity of angular stones, ranging in diameter from 1 or 2 inches to more than 1 foot, and consisting mainly of sandstone and shale. There is usually encountered in the subsoil at varying depths a rather compact, hard layer which is referred to as hardpan.

The Volusia stony silt loam occurs in widely scattered areas throughout the uplands, being most extensive along the slopes from the hilltops to the valleys and around drainage courses that head in the higher hills. Drainage is poor, seepage waters from the hills frequently flowing through the subsoil the greater part of the year.

This type is largely utilized for pasturage and woodlots. The pastures are usually in fairly good condition. The timber growth consists of beech, maple, elm, and hemlock, with some butternut, basswood, and ash. Very little care is given the woodlots.

Hay crops yield from 1 to 1½ tons per acre, oats 25 to 40 bushels, and buckwheat 15 to 25 bushels. Neither corn nor potatoes do particularly well upon this type.

The price of land of this type ranges from about \$8 to \$30 an acre, depending upon drainage, steepness of slope, and accessibility.

Much of this type should remain in forest. The coarser weeds and small brush should be removed from the pastures. On the cultivated fields lime should be used and stable manure applied more frequently.

VOLUSIA SILT LOAM.

The surface soil of the Volusia silt loam is a grayish-brown or brownish-gray silt loam, with an average depth of about 8 inches. In places gray and rusty-brown mottlings appear in the lower part. The subsoil consists of a pale-yellow to gray silt loam, heavily mottled with gray, drab, orange, and rusty brown, and usually rests upon the bedrock of shale and sandstone at a depth of 3 to 8 feet. Throughout the surface soil and subsoil there are varying quantities of shale and fine-grained sandstone fragments, ranging in size from small chips to slabs 8 or 10 inches long, but in very few places are they sufficiently numerous to interfere materially with cultivation. This type is locally referred to as a hardpan soil, owing to the presence at any depth below 8 inches of a compact layer of partially cemented sand, silt, and rock fragments.

The Volusia silt loam is widely distributed. The largest areas occur in the southern part of the county, especially in the towns of Cincinnatus, Freetown, Virgil, Lapeer, and Marathon. The topography varies from rolling to hilly. Drainage is poor, owing to the hardpan stratum and to the shallow depth at which bedrock is encountered. In many places springs emerge from crevices in the rocks, resulting in semiswampy areas several acres in extent.

Much of the original forest growth, consisting of sugar maple, beech, hemlock, and elm, has been removed. On some of the hills there are now good stands of second-growth maple and beech.

The Volusia silt loam is almost entirely devoted to dairying and general farming. The principal crops are hay, buckwheat, oats, and ensilage corn. The soil is best suited to the production of hay. Mixed clover and timothy yields ordinarily 1 to 1½ tons per acre, and in some cases 2 or 2½ tons, especially where lime has been applied. Buckwheat yields 20 to 30 and oats 30 to 45 bushels per acre. This soil is often too wet to produce good yields of corn, though ordinarily the yields of ensilage range from 6 to 10 tons per acre. Potatoes are grown to only a small extent.

This soil requires more careful handling than most of the other upland types. If plowed too wet it clods and bakes, while during dry periods it must be thoroughly tilled to prevent serious injury to crops by drought. The smaller farms on this type are being combined with larger ones, with the result that many good houses and barns have been abandoned and are fast going to ruin. Agricultural conditions as a whole are unsatisfactory.

Land prices range from \$8 to \$15 an acre for the poorer tracts and from \$20 to \$25 an acre for the better tilled farms.

The Volusia silt loam can be improved by artificial drainage, deeper plowing, and the incorporation of organic matter and lime.

More live stock should be kept in order to make available a larger supply of stable manure. Shorter rotations should be used.

VOLUSIA SILTY CLAY LOAM.

The surface soil of the Volusia silty clay loam is a grayish-brown, compact, heavy silt loam to silty clay loam, 6 to 8 inches deep. The subsoil is a gray, compact silty clay loam, mottled with yellow and brown. Small quantities of shale fragments occur on the surface and throughout the soil section.

The Volusia silty clay loam is not extensively developed in this county. It occurs throughout the uplands in association with other types of this series. The largest areas occur in the towns of Homer and Virgil. The topography is level to gently rolling and drainage is poor.

Fine-rooted crops do best on this soil. Hay yields 1 to 2 tons, oats 25 to 35 bushels, and buckwheat 15 to 20 bushels per acre. Corn, cabbage, and potatoes do not do well.

Agricultural conditions are relatively poor over this soil type. Land prices range from \$10 to \$15 an acre.

Drainage, deep plowing, and the general use of green and barnyard manures in connection with liberal applications of lime will increase the productiveness of this type of soil.

In the following table are shown the results of the mechanical analyses of samples of the soil and subsoil of the Volusia silty clay loam:

Mechanical analyses of Volusia silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
162313.....	Soil.....	0.6	1.2	1.2	4.0	8.7	55.0	29.4
162314.....	Subsoil.....	1.8	2.7	1.6	4.6	11.8	57.0	20.2

ONTARIO GRAVELLY SILT LOAM.

The surface soil of the Ontario gravelly silt loam is a yellowish-brown to brown, mellow silt loam, about 9 inches deep, containing a large proportion of rounded and subangular gravel and small cobbles. The subsoil is a light-brown to yellowish-brown, gravelly silt loam, little, if any, more compact than the surface soil. The gravel on the surface and throughout the 3-foot section consists largely of sandstones and shale, but from 15 to 50 per cent or more of that in the subsoil consists of limestone. Large, massive boulders of gneiss, quartzite, and limestone occasionally occur on the surface and throughout the lower part of the soil section.

The Ontario gravelly silt loam occurs in narrow morainic belts along the margins of the larger valleys in the northern part of the county. It is typically developed in the valleys northeast of Cortland and between Homer and Scott. The topography is generally characterized by knolls and ridges, intermingled with kettle holes, though in some places the surface is smooth and only gently sloping. Drainage is thorough and in periods of dry weather some of the more gravelly areas are apt to be droughty.

All but the roughest areas of this type are easily tilled and under cultivation. Hay, corn, oats, potatoes, and cabbage do well. Hay crops yield $1\frac{1}{2}$ to 2 tons, corn for ensilage 10 to 14 tons, oats 30 to 40 bushels, potatoes 100 to 150 bushels, and cabbage 8 to 10 tons per acre. Alfalfa is successfully grown on small patches.

The price of farm land of this type ranges from \$20 to \$45 an acre, depending upon the location and improvements.

In other parts of New York peas, clover, and alfalfa are successfully grown on this type and they apparently would do well on the same soil in Cortland County.

WOOSTER STONY SILT LOAM.

The Wooster stony silt loam consists of a yellowish-brown silt loam with an average depth of 6 inches, underlain by a yellowish-brown to yellow silt loam which extends to a depth of 36 inches or more. The entire soil section carries sufficient subangular and waterworn fragments of fine-grained sandstone and shale to interfere materially with cultivation. In places foreign boulders and limestone fragments are present.

The Wooster stony silt loam occupies the roughest parts of a terminal moraine in the valley near South Cortland. The topography is very irregularly morainic and the soil is rather droughty.

Some of this type is under cultivation to general farm crops, and yields are good considering the difficulties in the way of cultivation.

The price of land varies considerably, depending upon the location and improvements.

WOOSTER GRAVELLY SILT LOAM.

The surface soil of the Wooster gravelly silt loam consists of a yellowish-brown, friable silt loam, about 6 inches deep, containing 15 to 40 per cent of fine-grained sandstone fragments, both angular and waterworn. The subsoil is a slightly lighter colored, gravelly silt loam. In places the soil-forming material is a loam or fine sandy loam, and the deep subsoil and the substratum are very gravelly.

The Wooster gravelly silt loam occurs along the larger valleys throughout the county. Extensive areas are mapped in the towns of

Cortlandville, Harford, Lapeer, Marathon, Willett, Cincinnatus, and Taylor. The topography is rather rough and broken, rendering cultivation somewhat difficult. Drainage is good.

This type is used for general farming. Hay, corn, potatoes, and oats are the principal crops. Apples are grown to some extent and do well. The prices of land range from \$30 to \$50 an acre.

WOOSTER SILT LOAM.

The Wooster silt loam consists of a light-brown to yellowish-brown, mellow silt loam, underlain by a yellow to yellowish-brown, friable silt loam. A few small stones, both angular and waterworn, are scattered over the surface and through the entire soil section. Occasionally a few large foreign bowlders are encountered. In places the lower subsoil approaches a loam in texture, carrying much fine sand and very fine sand, and may grade below into beds of stone, gravel, and sand. While this soil is essentially noncalcareous, it is sometimes impossible to determine the character of the underlying till.

The topography ranges from undulating to hummocky. The rougher areas are difficult to till and are more subject to drought than the smoother areas. The type is confined very largely to the deep till deposits occurring at an intermediate elevation between the level terraces and the high hill lands.

The Wooster silt loam is a strong soil and produces good yields of hay, corn, oats, buckwheat, potatoes, and cabbage. Hay crops yield 1½ to 2 tons, corn 12 to 14 tons of ensilage, oats about 45 bushels, buckwheat 20 to 25 bushels, potatoes 175 to 200 bushels, and cabbage 10 to 12 tons per acre. Apples, cherries, and small fruits do very well.

Land of this type sells for \$10 to \$60 an acre, depending upon the location, productiveness, and improvements.

Alfalfa succeeds on this type and could well be grown extensively on dairy farms.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Wooster silt loam:

Mechanical analyses of Wooster silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
162309.....	Soil.....	2.8	3.8	1.6	4.2	10.8	63.8	13.2
162310.....	Subsoil.....	3.2	3.4	1.3	4.0	11.4	62.6	14.0

FOX GRAVELLY SILT LOAM.

The Fox gravelly silt loam consists of a brown to light chocolate brown gravelly silt loam, 8 to 12 inches deep, underlain by a slightly lighter colored gravelly silt loam, which rests upon beds of gravel at a depth of 2 to 3 feet. The gravel on the surface and in the soil and subsoil consists largely of sandstone and shale, but the underlying beds contain a large percentage of limestone. In some places the entire soil section is relatively free from gravel, while in other places small areas approach a gravelly loam in texture.

This type is extensively developed throughout the larger valleys in the northern part of the county. The principal areas occur in the towns of Preble, Scott, Homer, and Cortlandville. The type occupies terraces or benches above normal overflow and has a gently undulating to slightly rolling surface. Its elevation is approximately 1,100 to 1,200 feet above sea level. Owing to the porous substratum, the drainage is excellent.

The Fox gravelly silt loam is more highly developed agriculturally than any other soil type in the county. About 85 or 90 per cent of it is under cultivation. Dairying and general farming are the main industries. Every farmer keeps from 10 to 50 or more cows, the milk being made into butter or hauled to a shipping station. The most important crops are clover and timothy hay, ensilage corn, oats, and cabbage. Alfalfa, potatoes, and peas also are grown. Clover yields from $1\frac{3}{4}$ to $2\frac{1}{2}$ tons and timothy $1\frac{1}{2}$ to 2 tons of hay per acre. Corn does remarkably well, producing 12 to 17 tons of ensilage per acre. Oats yield 45 to 60 bushels, potatoes 100 to 150 bushels, and cabbage 12 to 15 tons per acre. Alfalfa is not extensively grown, but the acreage is increasing. It yields $2\frac{1}{2}$ to 3 tons of hay in a season. There are numerous small orchards of apples, plums, cherries, and plantings of small fruits.

A common rotation on this type consists of corn one year and potatoes or cabbage the next year, followed by oats sown with clover and timothy, the field remaining in grass from 3 to 5 years. Stable manure is applied to the sod land for corn, and an acreage application of about 250 to 300 pounds of a 3-9-2 fertilizer mixture is made when the corn is planted. For potatoes and cabbage an acreage application of 500 to 1,000 pounds of a 2-8-10 mixture is made. Some farmers obtain good results by top-dressing their mowing land with chemicals. Some form of limestone is commonly used by the more successful farmers.

The price of land of this type ranges from \$45 to \$150 an acre, depending upon the location and improvements. The average price is about \$75 an acre.

CHENANGO STONY SILT LOAM.

The Chenango stony silt loam consists of a light-brown silt loam, 7 to 10 inches deep, underlain by a light-brown to yellowish-brown silt loam which rests upon beds of gravel and stone at a depth of 2 to 3 feet. Angular and waterworn fragments of sandstone, ranging in diameter from 2 to 6 inches, are thickly strewn over the surface and scattered throughout the soil section. In places the interstitial material is coarser in texture than usual.

This type occurs on the terraces extending in a westerly direction from Cortland. The topography is nearly level to undulating. Drainage is excessive in dry seasons.

The Chenango stony silt loam can be worked early in the season and is considered a warm soil. The large content of stones, however, interferes with cultivation to some extent. The principal crops are hay, mainly timothy and clover; oats, rye, beans, and cabbage. Both ensilage and sweet corn are grown, the latter being used mainly for canning. All these crops make good yields.

Much of the Chenango stony silt loam is low in organic matter and requires the addition of stable manure, green manures, and lime.

CHENANGO GRAVELLY SILT LOAM.

The Chenango gravelly silt loam consists of a light-brown to yellowish-brown, gravelly silt loam, from 7 to 10 inches deep, underlain by a yellowish-brown to yellow, gravelly silt loam, which extends to a depth of 36 inches or more. As a rule the subsoil rests upon stratified deposits of sand and gravel. In places the interstitial material approaches a loam in texture. The gravel consists of fine to relatively large, angular, and waterworn fragments of sandstone and shale.

The Chenango gravelly silt loam is a well-drained terrace soil. It is distributed throughout the county, the largest areas occurring in the Harford Valley. The soil consists largely of noncalcareous sandstone and shale materials and was laid down during glacial times as alluvial plains. Along the Truxton Valley the type consists of material derived from local noncalcareous shale and sandstone, although it is closely associated with limestone material. The topography is undulating.

Most of the type is cleared and under cultivation. Timothy, clover, alfalfa, corn, oats, potatoes, truck crops, and small fruits do well. Mixed timothy and clover yields from $1\frac{1}{2}$ to 2 tons of hay per acre, corn 12 to 14 tons of ensilage, oats 40 to 50 bushels, and potatoes 150 to 175 bushels.

The price of the land depends largely upon the location and the character of the adjacent soil.

CHENANGO SILT LOAM.

The Chenango silt loam consists of a light-brown silt loam, about 8 inches deep, underlain by a yellowish-brown to yellow, friable silt loam, which extends to a depth of 36 inches or more. Both the soil and subsoil may carry a small percentage of small, waterworn gravel. The substratum is usually coarse textured, varying from a loam to a sandy loam.

This type is widely distributed throughout the valleys in relatively small areas. The largest bodies occur near Tripoli, Truxton, Willett, and Cincinnatus. The topography is undulating to nearly level, and typical of the terrace formations. The drainage is thorough.

Most of this type has been cleared and is either under cultivation or utilized for pasturage. Hay, corn, oats, and potatoes are the principal crops.

The price of land of the Chenango silt loam varies according to the location and the character of the adjacent soil types.

GENESEE SILT LOAM.

The surface soil of the Genesee silt loam is a brown to light-brown, mellow silt loam, about 8 to 10 inches deep. The subsoil is a light-brown to yellow, friable silt loam, slightly mottled in the lower part, and extending to a depth of 36 inches or more. This type is quite uniformly free from stones or gravel.

The Genesee silt loam occurs throughout the larger valleys and represents first-bottom sediment derived mainly from sandstones and shales, with some limestone influence. Some of the most typical areas occur along the Tioughnioga River through the towns of Cuyler, Truxton, Homer, Cortlandville, Marathon, and Cincinnatus. Smaller areas occur in some of the other towns.

The topography is gently undulating to level but drainage usually is good except during periods of high water.

Most of this type has been cleared and put under cultivation. Part of it is utilized for pasturage. Hay is the most important crop grown, and yields of $1\frac{1}{2}$ to $2\frac{1}{2}$ tons per acre are obtained. Corn does well in dry seasons, making 10 to 12 tons of ensilage per acre. Potatoes, cabbage, and oats are grown to a small extent.

The price of land of the Genesee silt loam ranges from \$25 to \$75 an acre, depending upon the location and the adjoining soils.

HOLLY GRAVELLY SILT LOAM.

The Holly gravelly silt loam consists of a yellowish-gray to gray, gravelly silt loam, 4 to 8 inches deep, underlain by gray and brown mottled, gravelly silt loam. The type contains from 15 to 50 per cent of angular and waterworn fragments of light-colored sandstone

and shale. In color and texture the type shows wide variations, even in small areas.

The Holly gravelly silt loam occurs in small, widely distributed areas throughout the county. It is of alluvial origin and subject to overflow at every period of high water. Drainage is poor.

Very little of this type is under cultivation. It is utilized mainly for pasturage.

HOLLY SILTY CLAY LOAM.

The surface soil of the Holly silty clay loam is a gray to brownish-gray heavy silt loam, from 4 to 8 inches deep. The subsoil consists of a gray silty clay, mottled yellow and brown, changing at a depth of 15 to 18 inches to a mottled gray or drab clay.

This type varies considerably in both color and texture. In low, slightly depressed areas it may have a 2 or 3 inch covering of peaty or mucky material, or the surface material may be dark gray to black, resembling the Papakating series. In other places the color tends toward a light brown like that of the Genesee silt loam. The texture may vary from a silt loam to clay, while strata of different grades of sand and silt may be encountered in places. Small scattered areas have a silty clay surface soil 3 to 6 inches deep, and a bluish-gray mottled stiff silty clay subsoil.

The Holly silty clay loam is not extensively developed in this county. The largest areas occur along the Otselic and Tioughnioga Rivers. It usually occurs in narrow strips along the larger streams. Some of the most important of the silty clay areas occur in the Chenango Valley. The topography is undulating to nearly level.

The type is of alluvial origin and is composed of wash from the sandstone, shale, and limestone soils of the region. It is subject to overflows in seasons of high water, and this, together with seepage and run-off from the uplands, keeps the soil almost continually saturated. Underdrainage is necessary before cultivated crops can be grown.

Much of this type is covered with coarse grass and water-loving plants. It affords some pasturage and, in the drier places, some hay.

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Holly silty clay loam:

Mechanical analyses of Holly silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
162317.....	Soil.....	0.1	0.4	0.6	2.5	15.5	60.4	20.5
162318.....	Subsoil.....	.0	.4	1.0	7.7	21.4	51.4	18.0

SCHOHARIE SILTY CLAY.

The surface soil of the Schoharie silty clay consists of a brown to grayish-brown silty clay, with an average depth of about 9 inches. The subsoil is a heavy, tenacious, light-brown to brown silty clay, with occasional mottlings in the lower part. In places fragments of sandstone and limestone are scattered in small quantities over the surface. The subsoil is moderately to highly calcareous.

This type occurs in small areas at the head of Skaneateles Lake in the town of Scott and along the northeastern boundary of the county. The topography varies from nearly level to rolling and hilly. The area in the town of Scott has been badly eroded, and consists of small hills and ridges. Drainage is fair, except in depressed areas.

The Schoharie silty clay is mainly utilized for the production of hay and oats and as pasture land. It is not considered a particularly desirable soil.

The following table gives the results of the mechanical analyses of samples of the soil and subsoil of the Schoharie silty clay:

Mechanical analyses of Schoharie silty clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
162323.....	Soil.....	0.4	1.4	1.0	5.7	6.8	59.4	25.2
162324.....	Subsoil.....	.2	.6	.6	2.2	3.2	34.1	59.1

MUCK.

Muck consists of dark-brown to black, finely divided organic matter in an advanced state of decomposition, mixed with some mineral matter, and existing under poor drainage conditions. It ranges in depth from 10 inches to 3 feet or more. In the smaller areas the muck rests upon bluish, claylike material, while in most of the larger areas it is underlain by white marl, consisting of small shells mixed with calcium salts from such plants as chara, and in places has a thickness of 15 to 20 feet. In the areas underlain by marl the type closely resembles the Warners series as mapped in this State. Such areas are situated near Preble, Homer, Labrador Pond, and Che-ningo. Smaller areas are encountered throughout the uplands in other parts of the county.

The topography is level or nearly level. In most instances the land is in a swampy condition throughout the year.

The forest growth consists of hemlock, elm, ash, cedar, and swamp maple, with an undergrowth of rushes, ferns, and other aquatic plants. None of the type is under cultivation at the present time.

The price of this land in its present condition ranges from \$10 to \$30 an acre.

MEADOW.

Meadow is a term applied to low, poorly drained areas along the smaller streams where the soil material is so variable in color and texture that it can not practicably be separated into types. In general the surface soil is dark gray to black in color and a silt loam to loam in texture, while the subsoil is gray to light brown in color and a gravelly loam or sandy loam to clay loam in texture. Meadow contains varying quantities of small gravel, as well as stones ranging up to 8 inches in diameter. Large, flat, angular sandstone fragments also are common. Some of this land is utilized for pasturage, to which it is best adapted.

SUMMARY.

Cortland County is situated a little south of the center of New York State. It has an area of 503 square miles, or 321,920 acres.

The topography varies from nearly level in the valleys to rolling and hilly in the uplands. Elevations range from approximately 1,000 to 2,000 feet above sea level.

The county is well drained, the drainage for the most part flowing south into Chesapeake Bay. Water-power resources are abundant.

Settlement was begun in 1791, and the county was formed in 1808. The 1910 census reports the population as 29,249, of which 51.5 per cent is classed as rural. Cortland is the county seat and largest town, with a population in 1910 of 11,504. The rural population is gradually decreasing.

Transportation facilities are excellent. The county roads are usually in good condition. All parts of the county have telephones and rural mail-delivery service.

The mean annual temperature is 44.6° F. and the mean annual precipitation 40.86 inches. The rainfall is well distributed. There is a normal growing season of 137 days, the grazing season for cattle lasting three or four weeks longer.

Dairying and general farming are the main agricultural industries. The principal crops are hay, oats, potatoes, buckwheat, and corn. In 1910 there were 2,610 farms in the county, of an average size of 114.8 acres, and 78.3 per cent of the farms were operated by owners. Buildings and farm equipment are in general good throughout the county. The price of farm land in the upland ranges from \$10 to \$45 an acre, and in the valleys from \$35 to \$150 an acre, with an average of \$75.

The soils of the county have all been derived from glacial debris, composed largely of local sandstone and shale material, with the ad-

mixture of some foreign material brought in from the north by the ice. Nine series, embracing 17 distinct soil types, in addition to Meadow and Muck, are mapped.

The principal upland soils are those of the Lordstown and Volusia series. These are shallow till soils, derived almost entirely from noncalcareous shales and sandstones. They are devoted mainly to dairying and general farming.

The deep till deposits in the valleys give rise to the Wooster series, where the material is almost entirely of sandstone and shale origin, and to the Ontario series, where there is a considerable admixture of limestone material. The soils of these series are best suited to general farming.

The gravelly terrace soils are included in the Fox and Chenango series and the heavier lake deposits in the Schoharie series. The first bottoms are occupied by the Genesee and Holly series and by Meadow. The subsoils of the Fox series are calcareous, while those of the Chenango series are noncalcareous. The Fox gravelly silt loam is the most highly developed soil type in the county.

The Genesee series includes types having brown, mellow surface soils and subsoils and fair to good drainage, except for occasional overflows. Most of the Genesee silt loam is under cultivation, hay being the most important crop. A part of the type is used for pasturage.

The Holly gravelly silt loam and silty clay loam are light-colored, poorly drained soils, used mainly for pasturage.

The Schoharie silty clay, the only type mapped in this series, is unimportant in the agriculture of the county.

Meadow consists of poorly drained material that it is impracticable to separate into types, owing to its variability in color and texture.

Muck consists of decayed vegetable remains mixed with some mineral matter and accumulated under poor drainage conditions.



[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

"That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture."

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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