SOIL SURVEY OF DE SOTO PARISH, LOUISIANA.

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LOCATION AND BOUNDARIES OF THE AREA.

De Soto Parish is situated in the northwestern part of the State of Louisiana. It is bounded on the north by Caddo Parish, on the east by Natchitoches and Red River parishes, on the south by Sabine Parish, and on the west by the State of Texas. The parish comprises an area of about 825 square miles and has a population of about

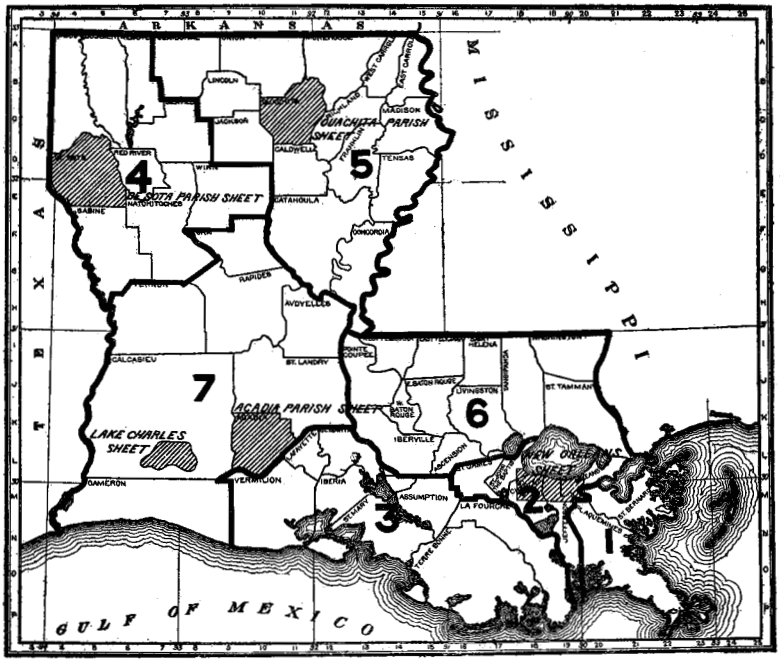

FIG. 15.—Sketch map showing location of the De Soto Parish area, Louisiana.

25,000. The colored population is more than twice as great as the white.

Mansfield, the principal town of the area, is the parish seat. It has a population of nearly 2,000 and is situated near the center of the parish. Logansport, on the Sabine River, Grand Cane, in the north central, and Keatchie, in the northwestern part of the parish, rank next in size and importance.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

De Soto Parish was organized in 1843, with the parish seat at Mansfield. The first permanent settlements had been made some half century earlier, and the population had grown especially fast after the admission of Louisiana as a State. A number of squatters located in this region purchased their holdings of the Government at a nominal price, while some lands were taken up under the homestead entry laws. During the decade 1830–1840 a large number of immigrants came from North and South Carolina, Georgia, and Alabama, and when the parish was established each Congressional township had its full complement of resident landowners.

The early settlers took up lands in the higher sandy parts of the parish, where they found an abundance of timber for fuel and building purposes. The alluvial bottom lands remained in their natural state until comparatively recent years.

Grain, chiefly corn, was the one crop interest during the early development of De Soto Parish, and cattle raising was of probably equal importance. Cotton was introduced later, and its production has steadily increased until it is now the staple crop.

In the early days a little tobacco, solely for home use, was grown, but it is not now a product of the area, although it would seem that the soil and climate were suitable for growing a good type of cigar wrapper or filler. Sugar cane for manufacture of the home supply has also formed one of the products of this area.

As will appear from this report, there is a wide range in the soils of the parish, and although up to the present time there has not been much variety in the crops grown, there is every reason to believe that with growth of population and the resulting greater intensiveness of agricultural practice many special crops will be produced. Already there is some indication of this change in the more thriving parts of the parish.

CLIMATE.

The normal temperature and precipitation of De Soto Parish are given in the appended table, compiled from Weather Bureau records. From its examination a general idea of the climatic conditions of the area may be had.

Mansfield is situated in the central part of the parish, and Oxford in the southern part, while Shreveport lies about 30 miles north of Mansfield, in Caddo Parish.

Normal monthly and annual temperature and precipitation.

Month.	Mansfield.		Oxford.		Shreveport.	
	Temperature.	Precipitation.	Temperature.	Precipitation.	Temperature.	Precipitation.
	°F.	Inches.	°F.	Inches.	°F.	Inches.
January	42.4	1.50	46.6	5.37	46.3	4.75
February	44.0	3.67	45.8	3.92	50.9	3.88
March	56.3	6.22	58.0	5.33	58.3	4.57
April	66.1	3.26	65.7	4.21	66.7	4.85
May	73.9	2.79	71.6	3.88	73.8	3.97
June	79.1	4.85	80.2	3.84	80.5	3.82
July	82.0	2.58	81.2	2.70	83.3	3.29
August	82.0	1.65	81.2	2.87	82.3	2.13
September	76.6	2.85	76.4	1.74	76.5	3.56
October	.....	4.32	64.1	3.30	66.2	3.22
November	55.7	6.10	55.2	4.12	55.4	4.37
December	47.0	4.39	47.8	3.40	49.7	4.37
Year	.....	44.18	64.4	44.68	65.8	46.78

PHYSIOGRAPHY AND GEOLOGY.

The idea is quite common abroad that the State of Louisiana, embracing a little more than 45,000 square miles, is all alluvial, or a low-lying swamp. Such is not the case, as more than half its area may be classed as uplands, with soils of varying character. De Soto Parish is known as one of the "hill" parishes of north Louisiana. It has an undulating surface of hammock, hill, and valley. The elevation at Mansfield is about 375 feet above sea level, and is probably the highest in the State.

The southeastern part of the parish constitutes the most uneven and broken section of the entire area. It is gullied and ridged by scores of small streams which have their origin in springs in the hills. The erosion of these small streams has in some places imparted to the hills an abrupt, choppy contour. Some parts are even rugged. The greater part of this broken country is known as the "Dolet Hills."

The parish as a whole is well drained, being intersected by numerous small branches and bayous. There are, however, some low areas which have no well-developed stream courses, and where the drainage is consequently poor and the land "crawfishy." Sand mounds of varying size are a characteristic feature of the topography, and are quite generally distributed.

Nearly all the streams have their sources within the boundaries of the parish, and in a general way it may be said that the Texas and Pacific Railroad follows the drainage divide between the Red River and Sabine River systems. Streams on the east side eventually reach the Red River through Bayou Pierre River and its tributaries, while those to the west empty into the Sabine. There are a number of bayous of some importance, but these are sluggish and are prac-

tically dry during the greater part of the year. In the southern part of the area are Bayou San Patrice and Cow Bayou, while Bayou Lavacheria and Bayou La Bonchasse drain the north-central part and empty into Bayou Pierre Lake. Keatchie and Cypress bayous form the northern boundary of the parish until the latter stream reaches Wallace Lake. But little of the drainage water of De Soto Parish finds its way into either of these streams. Castor Bayou, which heads near Keatchie and extends nearly across the parish, together with Grand Cannes Bayou, drains the western section. These two bayous unite near the Sabine River, and empty into it about 3 miles below Logansport.

It is characteristic of the bayous to have narrow, tortuous channels with only a slight fall, and new channels are being continually cut through their level flood plains. These streams are sluggish, are obstructed by driftwood and material washed down from the hills, and consequently overflow their banks during heavy rains.

The stream bottoms are wide, being cut by numerous abandoned channels which serve as outlets or cut-offs only in times of high water. The soils of these bottoms are wash material, and vary from a sandy loam near the uplands to a silty loam or clay in the wet areas.

Bayou Pierre River formerly flowed out of the Red River north of the De Soto Parish line, and emptied into the same river southeast of the parish. In the same way Red Bayou flowed out of Bayou Pierre River and back into it again. The formation of these cut-offs was caused by the obstructed channel of the Red River. For many miles this channel was choked up by undermined trees, logs, stumps, sandbars, etc., thus forming what was known as "the Red River raft." This obstruction impeded the flow of the current, causing new channels to be formed. By backing the water up into the valleys of the tributaries numerous lakes were formed.

A few years after the first Government survey, which was made about 1820, the raft was removed, but later formed again. It was not until 1872–73 that the Government successfully removed this obstruction, and thereby entirely changed the drainage system of this section of the country. A levee was built along the west bank of the Red River, which closed the openings where Bayou Pierre and other streams started, so that at present no water from the Red River enters the former stream.

The numerous lakes formed during the "raft period" have gradually been drained, and areas that fifteen or twenty years ago were submerged are at present under cultivation. This is true of the greater part of Wallace, Cannisnia, and Bayou Pierre lakes. Through these former lake beds run shallow channels, in which the water is confined except in times of flood. This change in drainage has

placed the parish boundary line in dispute, as it is not certainly known what constitutes the "lake." This plane-table survey was made along the boundary lines as established in 1843–1845.

The lake soils are capable of being improved by drainage, and will prove valuable for general farming. Their texture and character depend upon the rate at which they were deposited, which conditions are fully described later in the report.

Springs occur throughout the area, being especially numerous in the rougher sections. Wells whose waters possess curative powers also abound.

As this parish is situated in the Coastal Plain, all of the strata from which the soils have been formed are of Eocene or later age. According to Harris and Veatch,[a] the material forming the upland part of the parish belongs to the lignitic stage of the Eocene. Lignite outcrops occur both in the Dolet Hills and along the Sabine River, while well borings show the presence of this formation underlying the entire parish. Recent experiments have shown this lignite to be of little value for fuel. The deeper strata may, perhaps, prove to be a more mature product, worthy of development. The Pleistocene is represented by at least two divisions. The older of these, from which the Lake Charles fine sandy loam has been formed, probably belongs to the Port Hudson stage, while the later comprises the recent alluvial deposit along the streams.

SOILS.

Ten distinct soil types were recognized and mapped in this area. The following table shows the actual and relative extent of each type:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk fine sandy loam	244,992	46.4	Miller clay	9,152	1.7
Susquehanna fine sandy loam	110,336	20.9	Orangeburg fine sandy loam	6,976	1.3
Meadow	72,448	13.7	Miller silt loam	5,248	1.0
Lake Charles fine sandy loam	62,592	11.9	Swamp	2,048	.4
Susquehanna clay loam	14,080	2.7	Orangeburg sandy loam	192	.0
			Total	528,064	

NORFOLK FINE SANDY LOAM.

The surface soil of the Norfolk fine sandy loam is a gray to grayish-brown loamy fine sand, or light fine sandy loam. In depth it varies from 12 inches to 3 feet or more, with an average depth of about 18 inches. Some areas of this soil contain a small percentage of iron concretions, while on the abrupt slopes as much as 25 per cent of iron concretions and ferruginous sandstone frequently occurs.

[a] Geological Survey of Louisiana, 1899.

The subsoil usually contains a high percentage of sand, and consists of a yellow, sticky, fine sandy loam grading into a yellow or yellowish-red loam or sandy clay. The subsoil is often mottled yellow, white, and gray streaked with red, and presents a beautiful marbled appearance when thus exposed.

The Norfolk fine sandy loam is the most extensive type of De Soto Parish, and is generally distributed throughout the area. It occupies gently rolling to hilly uplands, and occurs in rather flat, moundy areas near streams. In the vicinity of Oxford this soil is typically developed, and occurs in an unbroken area. Generally speaking, however, the Norfolk fine sandy loam is interrupted by many areas of other soils. While a rolling topography characterizes the greater part of this soil, the surface features vary considerably. In the eastern and southeastern parts of the area this type is found occupying a rather hilly position, and the soil is somewhat looser in texture and the sands coarser. On the tops of these elevations the soil may be a loose sand to a depth of 3 feet or more. Along the Sabine River northwest of Logansport the same condition exists. In this vicinity there is a sprinkling of waterworn quartz pebbles, usually less than 1 inch in diameter. The distribution of this material is irregular, and covers but limited areas.

Where the Norfolk fine sandy loam borders on the Lake Charles fine sandy loam the sand particles are finer, and this may be said to be true of the sands of the entire northern part of the parish. Again, as we approach the streams, the surface is marked by low sand mounds, and the soil is slightly more compact. These moundy areas are inclined to be wet during rainy seasons, but only in a few cases will artificial drainage be found necessary.

The Norfolk fine sandy loam is believed to have a two-fold origin. Where the type is characterized by topography imparting to the hills a rather sharp contour, and where the elevations are high but the slopes are not steep, the soil has been formed directly from the underlying sandy clays, which probably belong to the lignitic stage of the Eocene age. Where the type occurs in level or gently rolling areas, the soil appears to be the result of a water deposit reworked with the transported weathered material of the higher elevations. This reworking of the upland product with the valley material has undoubtedly taken place many times, evidence of the sorting power of water appearing in the different texture and depth of the soil.

There is a larger proportion of this type under cultivation than of any other upland type. It is easily cultivated, has good drainage, and responds readily to fertilization. The principal crops grown are cotton and corn, with an occasional field of oats. For cotton the average yield is one-third bale to the acre where not fertilized. When 200 pounds of fertilizer are used to the acre a bale per acre is not an

uncommon yield. Corn yields from 10 to 20 bushels per acre. While the grain yield of oats is light, the hay makes an excellent winter roughage. Peanuts, sorghum, ribbon cane, and sweet and Irish potatoes are grown for home consumption.

With the practice of clean cultivation given corn and cotton this sandy soil soon becomes deficient in organic matter. A rotation of crops, including cotton for two years and corn one year, followed by cowpeas, would be very beneficial. The soil is said to be deficient in phosphoric acid. It also needs liberal applications of humus to aid in conserving moisture. Through systematic farming and careful management a few farms on the Norfolk fine sandy loam have been brought to a higher state of productiveness than the virgin soil.

Crops requiring a heavy, strong soil are not grown on this type, but any crop adapted to a light, sandy soil does well. The soil is well adapted to early truck and fruit crops, and these industries, established on a systematic basis, could be made profitable. Crab, Bermuda, and carpet grass afford good pasturage and hay.

The timber growth consists of shortleaf pine, sweet gum, ash, hickory, beech, and many varieties of oaks.

The following table gives the results of mechanical analyses of the fine earth of the soil and subsoil of this type:

Mechanical analyses of Norfolk fine sandy loam.

No.	Locality.	Description.	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
11907	Spider	Fine loamy sand, 0 to 18 inches.	0.2	0.5	1.2	42.1	32.0	18.9	4.9
11905	3 miles NE. of Stonewall.	Light fine sandy loam, 0 to 20 inches.	.6	.8	2.3	46.6	24.0	19.4	6.6
10310	1 mile N. of Benson	Light fine sandy loam, 0 to 18 inches.	.2	.3	.8	41.4	23.6	25.3	8.1
11906	Subsoil of 11905	Fine sandy loam, 20 to 36 inches.	.6	1.0	2.2	34.3	20.1	23.2	18.7
11908	Subsoil of 11907	Yellow fine sandy loam, 18 to 36 inches.	.3	.3	.9	32.3	23.8	23.5	19.0
10311	Subsoil of 10310	Fine sandy clay, 18 to 36 inches.	Tr.	.3	.6	28.5	18.4	23.3	28.2

SUSQUEHANNA CLAY LOAM.

The soil of the Susquehanna clay loam is a brown or gray sandy loam with a maximum depth of 8 inches, but varying considerably below this figure. It is composed of fine sands and silt, but varies somewhat in texture and may range in places to a loam or clay loam. There are usually present on the surface and mixed through the soil

many iron concretions and impure sandstone fragments. This is especially true where the type is found occupying the high ridges and hills where the contour is abrupt. In some places silicified wood fragments are thickly scattered upon the surface.

The subsoil consists of a red or reddish-yellow clay, which usually contains sufficient sand and silt to make it friable. Where the more plastic clay occurs the surface soil is usually very shallow and may be entirely absent. The subsoil contains iron concretions and fragments of ferruginous sandstone, and may become quite sandy and friable at about 3 feet. There is no well-defined boundary between this soil and the Susquehanna fine sandy loam.

The surface characteristics of this soil vary considerably. With the exception of the fairly level areas bordering the lakes and streams in the northern and eastern parts of the parish, the Susquehanna clay loam occupies rolling areas. In some parts of the parish the erosion of the numerous small streams has imparted to this type a somewhat rougher surface.

The Susquehanna clay loam probably owes its origin to the weathering in place of the underlying clays. The rolling areas are well drained, while the level areas would be greatly benefited by open drains or underground tile. Being adjacent to streams. these areas could be drained at little expense.

Little of this type of soil has ever been under cultivation. For general farm products it is believed to be one of the best soils in the area, but it is difficult to cultivate and has been neglected for this reason. Some cotton and corn are grown upon it, giving fair yields. It is a strong grass soil and is well adapted to all crops requiring a heavy, strong soil. Peaches can be profitably grown upon the well-drained areas. Most of the type is at present covered with forests of oak, hickory, ash, and sweet gum.

The following table shows the results of mechanical analyses of typical samples of the Susquehanna clay loam:

Mechanical analyses of Susquehanna clay loam.

No.	Locality.	Description.	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
11915	4 miles NW. of Frierson.	Loam, 0 to 6 inches	3.9	3.3	0.7	4.8	28.0	47.0	12.0
10814	2 miles S. of Pelican.	Very fine sandy loam, 0 to 4 inches.	.4	1.1	.6	12.5	41.6	30.5	13.2
10815	Subsoil of 10814	Red clay, 4 to 36 inches	.1	.3	.1	3.5	23.2	22.4	50.3
11916	Subsoil of 11915	Clay, 6 to 36 inches	.2	.4	.1	.7	9.1	29.3	60.1

SUSQUEHANNA FINE SANDY LOAM.

The Susquehanna fine sandy loam is distributed throughout the parish in areas of varying size. The most extensive areas occur in the eastern and southeastern parts of the survey.

The surface soil consists of a grayish fine sand or light fine sandy loam from 10 to 20 inches deep. The subsoil is a red or yellowish-red sandy clay or loam, which often with greater depth grades into a friable sandy material, but in the main the material is not nearly so porous as the Norfolk fine sandy loam subsoil, and it often becomes a stiff, plastic clay containing but a small percentage of sand. The type differs from the Norfolk fine sandy loam also, in that there is no gradual change from soil to subsoil, but the sandy covering is usually found resting directly upon the red clay foundation. Iron concretions are usually present in both soil and subsoil in varying amounts. The hilly areas are often quite stony on the slopes, while silicified wood fragments are not infrequent.

There is little or no uniformity or regularity of occurrence to this type. Small isolated areas, usually at a slight elevation above the surrounding country, occur within the Norfolk fine sandy loam. These are often too insignificant to map. The type, however, is generally characterized by a rolling topography, while in some sections the contour of the hills is abrupt. Owing to the loose character of the soil and the physiographic position it occupies, there is considerable variation in depth and texture. Two elevations in close proximity to each other and of the same height present entirely different features. The surface soil on one of these hills may be an incoherent sand having a depth of 24 inches, while on the adjacent hill the subsoil may be exposed. A sandy covering of varying depths may occur on one slope, while the opposite side may be void of a covering. This unequal erosion is less pronounced where the contour of the hills is rounded, and here the soil is comparatively uniform. When the rougher sections of the Susquehanna fine sandy loam are cleared and the soil broken up, washing takes place rapidly and the sandy covering is soon removed.

Like the Norfolk fine sandy loam, at least part of this soil has been derived from the underlying clays, while a great deal is reworked material.

The Susquehanna fine sandy loam is well drained for the most part, there being only a few small areas where artificial drainage would be required. The type, as a whole, is considered a stronger soil than the Norfolk fine sandy loam, and cotton, corn, and cowpeas are grown with perhaps a slightly higher average yield than upon the soil last mentioned. The Susquehanna fine sandy loam is also well adapted to the growth of fruit and vegetables, and potatoes do exceptionally well. Some remarkably good results have been obtained from the

many young peach orchards, the soil being admirably adapted to this fruit. The timber growth consists of both hard and soft woods, the former predominating.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Susquehanna fine sandy loam.

No.	Locality.	Description.	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
11901	2 miles S. of Cook	Gray fine sand, 0 to 12 inches.	0.2	0.7	0.4	33.6	43.6	16.2	5.2
10812	2 miles W. of Evelyn.	White fine sand, 0 to 15 inches.	.3	.7	.4	46.6	32.4	12.8	6.9
10308	2½ miles W. of Pelican.	Gray fine sand, 0 to 15 inches.	.6	.4	1.0	44.6	31.4	12.9	8.9
11902	Subsoil of 11901	Red clay, 12 to 36 inches.	.4	1.0	.5	6.9	17.5	35.1	38.7
10309	Subsoil of 10308	Red sandy clay, 15 to 36 inches.	.2	.1	.3	23.5	20.6	11.6	42.7
10813	Subsoil of 10812	Red clay, 15 to 36 inches.	.1	.1	.1	10.7	22.1	13.9	53.0

LAKE CHARLES FINE SANDY LOAM.

The surface soil of the Lake Charles fine sandy loam is a light-gray or grayish-yellow compact fine sandy to silty loam, varying in depth from 6 to 14 inches, and often containing decomposed iron concretions, which stain it a dark-brown color. The subsoil is a yellow, fine sandy to silty loam, grading into mottled yellow and gray clays, often streaked with red. These clays contain an admixture of from 20 to 30 per cent of very fine sand and from 40 to 50 per cent of silt.

This type of soil is found distributed over the entire parish, but usually in areas of limited extent. The largest and most typically developed bodies are found in the northeastern part of the parish, where a neck of land known as "The Point," which extends in a southeasterly direction between Cannisnia Lake and Bayou Pierre Lake, embraces about 15 square miles of this soil.

The Lake Charles fine sandy loam, although 30 or 40 feet above the adjacent drainage systems, has no well developed stream valleys. The water finds no outlet, and is left to evaporate from the little swamps which form between the small mounds or hummocks with which the surface is almost always covered. These mounds vary in height and size, the average elevation being about 4 feet. They are made up of a moderately productive sandy loam or sand, while the intermound spaces consist of a light-gray silt loam underlain by a stiff, ash-colored clay containing a high percentage of silt. This poorly drained intermound soil is known as "post-oak clay," and

the areas embraced by it are known as "post-oak" or "pin-oak flats," depending entirely upon the nature of the timber growth.

The Lake Charles fine sandy loam is believed to be largely derived from the geological formation known as the Port Hudson deposits.

Owing to its peculiar topography the type is naturally wet, and yet its structure is such as to make it very susceptible to drought. During wet seasons crops on the intermound spaces are drowned out, while in droughty times the sand mounds suffer. A very small proportion of this soil is under cultivation, and the yields are only fair. After one or two years the natural productivity of the soil rapidly decreases, nor does the application of fertilizers prove of lasting effect, as the plant food soon leaches out. The soil is also naturally deficient in organic matter, and altogether requires careful treatment. With proper drainage and the liberal application of barnyard manure, together with the growing of legumes, this soil could be made productive.

When fertilized the soil produces abundant yields of sugar cane, but cotton and corn do not readily respond to the stimulus, there being no appreciable increase shown in the yields. If properly drained and fertilized it is believed this would be a good truck soil, and one especially adapted to the growing of strawberries. It also produces a good growth of grass, and should be sown to some native grass, as Bermuda or crab grass. At present the greater part of the type is undoubtedly better adapted to stock raising than to the growing of crops.

The value of land composed of the Lake Charles fine sandy loam ranges from $3 to $7 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Lake Charles fine sandy loam.

No.	Locality.	Description.	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
10312	3 miles N. of Benson.	Gray silty and fine sandy loam, 0 to 8 inches.	0.3	0.3	0.4	11.9	32.7	43.1	10.3
11909	1 mile NW. of Stonewall.	Gray silty and fine sandy loam, 0 to 9 inches.	2.1	3.3	.8	14.9	22.5	42.9	13.2
11911	8 miles SE. of Frierson.	Loam, 0 to 8 inches.....	.4	.2	.2	4.6	26.6	43.7	24.3
11912	Subsoil of 11911.....	Loam, 8 to 36 inches.....	.2	.7	.3	6.8	27.4	51.3	13.0
10313	Subsoil of 10312.....	Clay loam, 8 to 36 inches.	.2	.3	.2	9.0	25.2	37.6	26.9
11910	Subsoil of 11909.....	Loam to silty clay, 9 to 36 inches.	1.1	1.7	.5	9.2	19.5	40.2	27.4

ORANGEBURG FINE SANDY LOAM.

The soil of the Orangeburg fine sandy loam is a red, fine sandy loam containing a large proportion of fine sand and silt. It ranges in depth from 10 to 15 inches and contains many iron concretions and ferruginous sandstone fragments, which may amount to as much as 40 per cent of the entire soil mass.

The subsoil consists of a heavy red sandy clay with a depth of 3 feet or more. There is usually present in the subsoil sufficient sand to cause it to become friable, though in some areas the material is plastic and somewhat tenacious. As with the soil, there is present in the subsoil a considerable amount of ferruginous gravel, although the proportion is not usually as great. In some small areas the surface is covered with various-sized bowlders of a ferruginous nature. Such areas, though of small extent, are too stony for cultivation and occupy only the highest elevations and steep slopes.

This soil is confined to the southeastern part of the parish, where it occurs as isolated areas usually small in extent. The most extensive areas are located south of Dolette, southwest of Naborton, and west of Pelican. These areas are under cultivation, while the majority of the smaller spots, consisting of irregular knobs and ridges, and on account of their topography seldom under cultivation, are still largely in forest. On the more level areas, however, excellent crops are grown.

This soil is thoroughly drained, as its surface configuration permits the water to run off freely, while the presence of the concretions in the subsoil allows the free movement of the soil water. No areas of this soil require artificial drainage.

The Orangeburg fine sandy loam is locally known as "gravelly land," owing to the abundance of iron concretions. It is a strong, highly productive, and desirable soil for general farming. Cotton and corn are the principal crops and good yields are obtained. From one-half to three-fourths bale per acre is the average for cotton, while of corn from 25 to 35 bushels per acre are produced. Oats and grass do fairly well.

It is believed that this soil is capable of producing a high type of Cuban seed filler leaf tobacco. On the steep, broken areas peaches and apples would undoubtedly prove profitable.

The following table gives the mechanical analyses of the fine earth of this type:

Mechanical analyses of Orangeburg fine sandy loam.

No.	Locality.	Description.	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
10814	3 miles E. of Benson.	Brown fine sandy loam, 0 to 18 inches.	1.6	0.8	1.2	21.3	43.0	19.5	12.3
10816	4 miles S. of Naborton.	Red fine sandy loam, 0 to 15 inches.	5.4	3.4	2.3	29.8	21.3	24.3	13.6
10818	2 miles SE. of Dolette.	Red gravelly fine sandy loam, 0 to 12 inches.	13.0	8.0	3.4	21.2	11.2	23.5	19.7
10815	Subsoil of 10814	Red stiff sandy clay, 18 to 36 inches.	.7	.7	.5	14.2	28.4	12.9	42.1
10819	Subsoil of 10818	Red sandy clay, 12 to 36 inches.	7.2	7.3	3.3	12.4	5.8	14.1	49.8
10817	Subsoil of 10816	Red sandy clay, 15 to 36 inches.	2.5	2.1	1.1	5.3	8.6	19.7	60.6

ORANGEBURG SANDY LOAM.

The soil of the Orangeburg sandy loam is a dark-red sandy loam, 10 to 18 inches in depth and composed mainly of well-rounded medium to coarse quartz sand, embodied in a matrix of fine material. The surface soil contains a large proportion of ferruginous and conglomerate sandstone fragments. The subsoil is a dark-red clay, containing from 30 to 40 per cent of medium sand, which 2 or 3 feet below the surface becomes more sandy and quite friable. Fragments of the sandstone rocks are also scattered through the subsoil.

The Orangeburg sandy loam occurs as a single high ridge in the southeastern part of the parish, and embraces an area of less than 1 square mile. It is a well-drained soil, and crops are apt to suffer in times of drought. Its physiographic position causes it to wash badly, and care must be taken to prevent damage from this source. The type is sedimentary in origin, probably being the weathered product of the Lower Claiborne of Harris and Veatch. The sandstone and conglomerate rock fragments found in the soil have doubtless been formed by the cementing together of the sand and sandy clay particles by iron salts.

Corn and cotton are the principal products on this soil, both giving fairly good yields. Fruit, especially peaches, could be profitably grown; vegetables also do well.

The following table gives the results of mechanical analyses of the fine earth of typical samples of the Orangeburg sandy loam:

Mechanical analyses of Orangeburg sandy loam.

No.	Locality.	Description.	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			P.ct.	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*	*P.ct.*
10826	4½ miles SE. of Dolette.	Red sand, 0 to 15 inches..	2.0	10.5	45.2	16.5	12.0	8.0	5.8
10828	4½ miles SE. of Dolette.	Red sandy loam, 0 to 18 inches.	1.1	11.3	42.8	14.9	11.8	12.3	5.8
10829	Subsoil of 10828.....	Red sandy clay, 18 to 36 inches.	1.1	11.0	36.5	11.5	8.9	10.5	20.4
10827	Subsoil of 10826.....	Red sandy clay, 15 to 30 inches.	.8	6.9	33.5	11.6	7.8	6.8	32.5

MILLER CLAY.

The Miller clay consists of a brownish-red or dark chocolate-colored waxy clay, with a depth of 10 inches, underlain by a subsoil of a stiff, tenacious clay, resembling the soil both in color and texture. In some cases a yellow sandy loam is found at a depth of 3 feet, while in depressions and areas which are subject to frequent and long-continued overflows a drab or blue clay forms the deeper subsoil.

The overflow water, after depositing the heavier sandy material near the stream courses, still holds in suspension the finest sediments. These are carried back into the lower parts of the bottoms, where they are gradually deposited from still water, forming the stiff clay soil mapped as Miller clay. From well borings the deposit is found to attain in places a depth of 30 feet or more, where it usually rests on a fine, light-yellow quartz sand.

The Miller clay extends in an unbroken area from Bayou Pierre River east to the Red River, a distance of 7 to 9 miles beyond the De Soto Parish line. The area lying west of Bayou Pierre River and embraced in De Soto Parish has been formed by deposition of materials from this stream and Red Bayou. The latter stream is a cut-off leaving the main river channel about 3 miles north of Evelyn, and after a circuitous route entering Dolet Bayou about 2 miles south of the same town. Dolet Bayou in turn finds its way to the main channel of Bayou Pierre River and unites with it to form the James River. The alluvial area thus inclosed embraces over 15 square miles of the most valuable and productive farming land of De Soto Parish.

While much of this type is still subject to annual overflow, the situation was greatly relieved when, a number of years ago, the opening where Red Bayou started was closed and the bulk of the water was confined to Bayou Pierre River. In this manner the flood waters are

confined principally to the lower areas in the vicinity of the larger stream.

Numerous abandoned channels and old lake beds act as catchment basins for both rain and flood water, and hold it for long periods. Open ditches leading to bayous drain the farm portions, and little difficulty is experienced from excessive moisture during cropping seasons.

The Miller clay is covered with a heavy timber growth of oak, gum, whitewood, and cypress, with a dense undergrowth of shrubs, vines, and briars. But a small proportion, usually the naturally better-drained areas of this soil, is cultivated, and while the areas could be greatly extended by drainage, little effort is being made in this direction.

The Miller clay is a strong soil for corn, cotton, and sugar cane. Corn yields on an average from 40 to 50 bushels per acre, while as much as 70 bushels per acre is not an uncommon yield. Cotton produces from 1 to 1½ bales per acre in favorable seasons. Sugar cane also produces very satisfactory yields, but is not extensively grown. On the well-drained portions alfalfa has been successfully grown, as many as five cuttings being made annually. The yield varies from 5 to 12 tons per acre for the year.

Although at first this clay is very difficult to plow, after a few years of cultivation it becomes quite mellow and loamy. Deeper cultivation and the plowing under of leguminous plants are recommended as valuable aids in the improvement of the tilth. Puddling and cracking, which follow shallow cultivation, would be greatly reduced by the first expedient and rapid evaporation by capillarity materially checked, both by deepening the soil and by mixing organic matter with it.

The Miller clay sells for from $15 to $25 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Miller clay.

No.	Locality.	Description.	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
10820	1 mile SE. of Evelyn.	Stiff clay, 0 to 10 inches ..	0.1	0.4	0.4	1.5	2.4	32.0	63.0
11919	3½ miles E. of Frierson.	Brownish red clay, 0 to 12 inches.	.0	.1	.2	1.4	1.4	30.7	66.1
10821	Subsoil of 10820	Brownish red stiff clay, 10 to 36 inches.	.1	.4	.3	.9	1.3	38.1	58.8
11920	Subsoil of 11919	Brownish red stiff clay, 12 to 28 inches.	.0	.1	.2	.9	1.0	12.8	85.0

MILLER SILT LOAM.

The Miller silt loam is the second of the two alluvial soils of the area, and occupies nearly the same physiographic position as the Miller clay. The soil consists of a brown or light chocolate colored silty loam, varying in depth from 8 to 18 inches. The subsoil is composed of a heavy red silt loam, often grading into a coarser and much lighter colored fine sandy loam at about 2 feet. The Miller silt loam occupies the highest portions of the bottoms along the immediate banks of Red Bayou, and in some few places along Bayou Pierre River.

In times of high water the velocity of the current is greatly checked when the water flows over the banks, and the heavier material is deposited on the immediate banks of the stream. In this manner the "front land" is formed, while the finer material is held in suspension to be later deposited on the more remote parts of the bottoms. As the distance from the streams increases, the amount of very fine sand in the soil decreases, and at a short distance from the channel the silty soil has given place to a much heavier type, the Miller clay.

Upon the immediate bank of the stream the Miller silt loam is extremely loesslike in texture and appearance, and may attain a depth of 24 to 36 inches. Back a few yards from the channel the soil becomes more loamy, thinning out to a feather edge where it joins the Miller clay. There are therefore no extensive areas of this soil type, and no sharp line of demarcation exists between it and the Miller clay.

The Miller silt loam is a friable, easily cultivated soil. It is naturally well drained, and is one of the most productive and desirable soils in the area. It can be cultivated immediately after a rain or the subsidence of the overflow water.

All of the Miller silt loam mapped was found to be under cultivation, and the greater part has been farmed for a number of years. It was the first of the bottom lands to be cleared. Chiefly cotton and corn are grown and splendid yields are secured. When first cleared the average yield of corn ranges from 50 to 75 bushels per acre, and of cotton about 1 bale per acre. Successive cropping without rotation has lowered these yields somewhat.

Alfalfa and sugar cane do well. Vegetables of splendid quality are produced, and the loose, loamy texture, thorough drainage, and close proximity to water make this an admirable type of soil for trucking. Its present remoteness from markets and railroad facilities is the only disadvantage to its use for this purpose.

Cottonwood predominates in the timber growth, but ash, hickory, red oak, and sweet gum occur.

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

Mechanical analyses of Miller silt loam.

No.	Locality.	Description.	Fine gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
11917	10½ miles E. of Kingston.	Dark-brown loam, 0 to 15 inches.	0.1	0.2	0.3	1.2	12.7	74.8	10.6
10824	¼ mile NW. of Evelyn.	Brown loam, 0 to 10 inches	.0	.1	.1	.3	9.4	77.8	12.2
10822	2 miles SE. of Evelyn.	Brown loam, 0 to 8 inches.	.1	.3	.2	.8	2.6	73.8	21.9
11918	Subsoil of 11917	Red sandy loam, 15 to 36 inches.	.0	.4	.2	.4	18.5	70.2	9.8
10825	Subsoil of 10824	Red heavy loam, 10 to 36 inches.	.0	.2	.1	.2	8.6	71.5	19.1
10823	Subsoil of 10822	Loam to sandy loam, 8 to 36 inches.	.0	.1	.1	.3	5.8	71.0	22.6

MEADOW.

Along all the smaller and some of the larger streams of De Soto Parish occur relatively narrow areas of light-brown or gray sandy or silty loam soils, the texture depending upon the character of the eroded areas and the sorting power of the water. These variable soils, usually underlain by mottled sandy or silty clays, have been classified as Meadow. The areas first form but a narrow strip along the streams where they originate, but gradually broaden until they may become nearly a mile in width.

In the wetter areas a phase consisting of a gray clayey silt or fine sand, streaked with iron stains, with a subsoil usually of mottled silty clay to a depth of 3 feet or more is found. This phase is usually too wet for cultivation.

As may be inferred, the Meadow is alluvial in origin and generally occupies low, flat, level flood plains, although the topography in some instances is hummocky and in some areas are high lying. On account of its position much of it is poorly drained and subject to overflow several times each year.

The more sandy and better drained Meadow soil occurs along the upper parts of many of the branches of the larger bayous and along the smaller streams of the area; it is found also between the flood plain proper and the upland escarpments. It forms an important agricultural soil, and is used for the production of cotton, corn, and sugar cane, all of which give very satisfactory yields. A bale of cotton per acre and 40 to 50 bushels of corn per acre are not uncommon yields. Sugar cane is grown only for home consumption.

These narrow strips of Meadow land are nearly always under cultivation, and are considered the best of the sandy soils. Especially during a dry season is a farmer fortunate who has a few acres of Meadow land under cultivation.

The timber growth consists of several varieties of oak, sweet gum, ash, hickory, and a few magnolias, while on the wet areas the cypress and other water-loving trees are found. These latter areas, too, afford excellent pasture, and during the winter months support a luxuriant growth of cane, upon which stock thrives.

SWAMP.

Along Wallace and Dolet bayous and their tributaries are swampy areas that are but slightly elevated above the stream level, and upon which water stands during the greater part of the year.

The soil is composed of silts, sands, and clays, and is covered with a dense growth of cypress, gum, and other water-loving vegetation. Besides the areas along the streams in the southeastern corner of the parish there are bodies of varying size in the Miller clay in the form of small lake beds and abandoned channels.

These areas could be drained, and if properly cultivated would doubtless prove very productive.

AGRICULTURAL CONDITIONS.

There is not much diversity in the agricultural products of De Soto Parish. Cotton is the one important staple—the money crop—and it is grown almost to the exclusion of the subsistence crops. Corn, oats, and hay in large quantities are annually shipped into the parish, while these products could and should be produced at home.

It can be said, however, that the one-crop idea is gradually losing favor, and farmers are beginning to realize that crops other than cotton can be profitably grown. This change has been brought about chiefly by the advent of the boll weevil, but partly through the example of a few progressive farmers who have attempted and made a success of a more diversified and of specialized systems of farming. For example, the fruit industry is being developed quite extensively in some sections of the parish. Peaches are preferred, but apples do well, and some handsome profits have been realized already from the young orchards. A great deal of attention is being paid at present to this comparatively new industry, and the outlook is quite promising. Figs also produce abundantly and could be profitably grown. Both the Susquehanna fine sandy loam and the Orangeburg fine sandy loam are recommended particularly for this purpose.

The light sandy soils of the area are admirably adapted to trucking and market gardening. Little attention, however, has been paid to the trucking industry, owing principally to the fact that there is

no home market and that freight rates to more distant markets are high. If enough persons were to embark in this business to enable shipments in carload lots, trucking would be found a very profitable industry.

Melons, Irish and sweet potatoes, peanuts, and vegetables do very well upon these sandy soils. In fact, any crop adapted to a light sandy soil will produce abundantly upon these sandy hill types and yield much larger profits than are obtained from the crops now grown, provided only a market can be found for the products.

In general, these light sandy soils are deficient in organic matter, and do not retain sufficient moisture in the drier seasons fully to mature the general farm crops. This condition, however, can be greatly alleviated by the liberal use of barnyard manure, cowpea vines, or other green manuring crops. At present very little barnyard manure is used in the area, as few cattle are kept.

The use of commercial fertilizers is not general, and it is only within the last few years that the average farmer of De Soto Parish has practiced this method of enriching the soil. The profitable results are beginning to be appreciated, and the opportunity for permanent improvement of the land is also recognized. However, while the soils respond quite readily to the application of fertilizers, they are of such a nature that barnyard manure and green manuring will be found even more beneficial in increasing and maintaining their productivity. In view of the present scarcity of barnyard manure, cowpeas, which form an excellent substitute, should be more extensively used, and they can not be too strongly recommended to the progressive farmer as a means of building up his farm.

The rotation of crops is not generally practiced, but year after year the same fields are planted to the same crop, thus exhausting the soils. The land should be planted in cotton for one or two years and then sown to corn and cowpeas. The latter may be planted in the rows at the time of the last cultivation and the vines cut and dried for hay after the corn is harvested. The " Ironclad " is said to be one of the best varieties of cowpea for this region.

After reaping oats, which are sown in the fall and harvested in June, the ground can be sown to June corn and cowpeas. Crimson clover sown in October and harvested in April has produced excellent returns, while upon ground prepared in May the first cutting of a self-seeded stand of crab grass can be made in August. Another cutting can be made in October. This grass produces from 1 to 1½ tons per acre, and cures quickly and easily.

Within the last few years a few fields of alfalfa have been successfully started on the alluvial soils, and remarkably good yields have been obtained. In order to secure the best results alfalfa should be planted on a rich, well-drained soil, with the ground water

at least 4 feet below the surface. These alluvial soils need no fertilizer, and at present good stands of the seedlings are obtained without artificial soil inoculation. The preparation of the soil should be deep and thorough, in order to secure a pulverulent seed bed. This can best be accomplished by disking the land both ways, which should give good tilth to a depth of 3 inches. From 15 to 20 pounds of alfalfa seed to the acre should be sown broadcast, after which the ground should be rolled and the smooth surface broken with a smoothing harrow. If the plants are thriving they should appear green, while the roots should show the presence of bacteria by the little nodules on them.

No attempts to grow alfalfa on the uplands on a commercial scale have been successful, but it is believed that this crop can be grown on some of the better-drained Meadow land and the deeper phases of both the Norfolk fine sandy loam and the Susquehanna fine sandy loam. The upland soils would require the same thorough preparation as the bottom lands, and in addition liberal applications of barnyard manure would be necessary. Artificial inoculation would doubtless be required for the upland soils. This may be done either with soil from some field that has successfully grown alfalfa, and which is known to be free from weeds and diseases, or with artificial culture, which may be secured from different seedsmen or from the Department of Agriculture.

Alfalfa yields from 6 to 10 tons per acre annually, and may be cut from five to eight times. Each cutting yields from $1\frac{1}{2}$ to 2 tons per acre, and the hay is worth locally from $15 to $20 a ton. The growing of alfalfa is earnestly recommended, so that a valuable product which is at present being shipped into the parish may be produced within its boundaries.

Generally speaking, the farming class of De Soto Parish is not at present in a particularly prosperous condition. The improvements on the majority of the farms are inexpensive, consisting of small frame and log houses and a few outbuildings. There are, however, some exceptions to this rule, and well-kept and highly improved farms are seen here and there. The fences are for the most part rail, though barbed wire usually incloses the larger areas.

Of the 3,865 farms in the parish the owners operate but 32.5 per cent. The farms vary in size from 40 to several hundred acres, the average farm containing about 90 acres. About one-third of the land of the parish is under cultivation. On the larger farms negro labor is universally employed, but in recent years has been rather difficult to secure.

By planting crops at intervals a great deal of expense for labor can be saved. One farmer with three negro plow hands raised 66 bales of cotton and 1,500 bushels of corn during one season. Im-

proved farming implements are being more and more extensively used, and to great advantage.

A few farmers have found it profitable to feed their stock, rather than let it depend exclusively upon the range for subsistence, and it is only a question of time until stock raising and dairying will develop into important industries. The bottom lands are especially adapted to this purpose, the thick underbrush and luxuriant growth of cane affording both protection and food for stock even during the winter months. Many farmers brand their stock, which roam the woods and find their own living the year round.

At present some dairying is being done in the vicinity of Stonewall, where several herds of fine Jersey cattle were seen. There are no creameries in the area, and the butter is made at home and shipped to the larger markets, where it is always in demand.

De Soto Parish contains little or no longleaf pine, but has an abundance of valuable shortleaf pine and deciduous forests. The oaks, consisting of several varieties, are most numerous. Hickory, sweet gum, ash, beech, cottonwood, cypress, and walnut occur in varying quantities. There are a few well-equipped sawmills and a number of smaller ones scattered throughout the area. Large tracts of timbered land are being held for speculative purposes, and it is impossible in some localities to purchase a small farm. The average price for unimproved upland at present is about $8 an acre. The alluvial land ranges in price from $15 to $25 an acre.

Three lines of railroad cross De Soto Parish, thus affording ample transportation facilities to the greater part of the area. The Houston, East and West Texas Railroad crosses the western part, while both the Texas and Pacific and the Kansas City Southern railroads pass through the central portion. A small line, owned and operated by a local company, connects Mansfield with the Texas and Pacific Railroad, $1\frac{3}{4}$ miles to the south. The Kansas City Southern runs half a mile east of the town.

Both the Sabine and Bayou Pierre rivers are navigable at times of high water, but are very little used for freighting purposes. Several years ago, however, boats came up the Sabine River as far as Logansport.

The wagon roads are of dirt and are generally poor. Very little work is done upon the main highways which traverse the area. These roads were extensively used for freighting purposes before the construction of the railroads. There is no good road-making material in the parish. The sandy roads are often steep, and in dry weather deep, making hauling difficult, while roads crossing the alluvial soils become almost impassable during wet weather.

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