Issued July 1968

SOIL SURVEY

Major fieldwork for this soil survey was done in the period 1952–57. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the

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EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vegas and Eldorado Valley Areas, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series [illegible]

SOIL SURVEY OF DAVIS-WEBER AREA, UTAH

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH UTAH AGRICULTURAL EXPERIMENT STATION

THE DAVIS-WEBER AREA is in the north-central part of Utah (fig. 1). It consists of about 160 square miles, or 102,435 acres, in Davis County and about 185 square miles, or 118,434 acres, in Weber County. This is the greater part of these counties. Ogden is the largest city in the survey area, but Farmington and Bountiful are also important.

*State Agricultural Experiment Station

Farming is of considerable importance and is fairly well diversified, but the acreage farmed has been curtailed by residential and industrial development. Much of this development has occurred since about 1945 as nearby Salt Lake City and Ogden have rapidly expanded. Most of the acreage farmed is irrigated. The principal crops are orchard fruits, grain and truck crops, sugarbeets, and improved pasture and hay crops.

The climate of the Davis-Weber Area is warm and dry in summer and cold but not severe in winter. The growing season is long enough for most crops, especially

precipitation in summer comes in afternoon and evening thundershowers. As is characteristic of thundershowers, the amount of precipitation varies considerably from place to place.

Winters are cold but usually are not severe. The mountains along the eastern and northeastern border act as a barrier to the movement of cold continental air masses, and extended periods of extremely cold weather are rare.

Precipitation is relatively light during summer and early in fall. It is heaviest in spring when storms that move through the area from the Pacific Ocean are more intense. The wettest month usually is April, the month when most parts of the area receive more than 1½ inches of rain. About one-third of the annual precipitation comes as snow that falls during the period from December through March. The average annual snowfall ranges from 40 to 60 inches along the western front of the Wasatch Mountains. Hail, though normally of small size, occasionally causes some damage to crops and property during spring and summer.

Winds are generally light to moderate all year. Normally they are less than 20 miles per hour, but strong damaging winds occur occasionally. The strongest are easterly winds blowing from canyons in the Wasatch Mountains and winds accompanying local thundershow-

this reason, orchard fruits and other tender crops are grown on the slopes, and the hardier crops of grains and vegetables are grown on the lower lake terraces and bottom lands. Temperature and precipitation data at Farmington are given in table 1; data for Ogden are given in table 2.

The length of the growing season, or freeze-free period, over most of the area averages about 156 days. It extends from late in April to about the middle of October. Frosts occur late in spring in much of the area. Frosts that damage fruit crops are less likely to occur along the foothills and near the mouths of canyons where air drainage is good.

Figure 3 shows, in percentages, the probability that temperatures of 16° F. or lower, 20° or lower, 24° or lower, 28° or lower, or 32° or lower will occur at Farmington or at Ogden Power House before any date in fall.

To determine from figure 3 the probability that there will be a temperature of 28° or lower at Farmington before October 21, lay a ruler horizontally on the October 21 line. Look up from the point where the ruler crosses the dashed diagonal 28° line, and read the percentage at the top of the graph. For this example the probability is about 40 percent. To determine the proba-

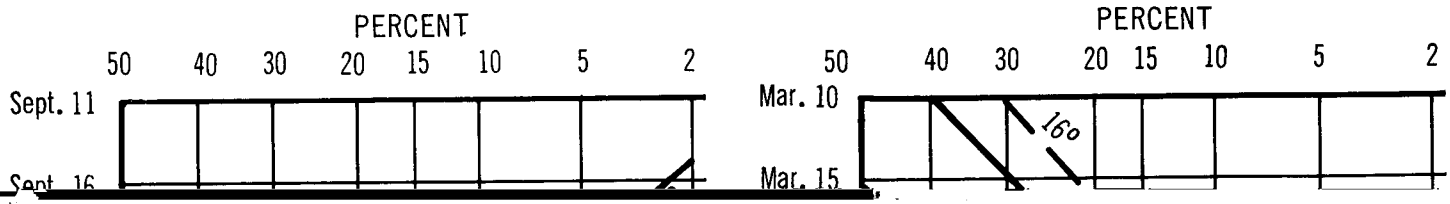
TABLE 2.—*Temperature and precipitation at Ogden Sugar Factory*

[Elevation 4,280 feet]

Month	Temperature					Precipitation		
	Average	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average	One year in 10 will have—	
				Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—
	°F.	°F.	°F.	°F.	°F.	Inches	Inches	Inches
January	25.9	36.1	16.5	50	−2	1.66	0.65	3.17
February	32.4	42.0	22.4	58	5	1.44	.36	2.95
March	40.4	51.2	29.1	65	18	1.54	.55	2.61
April	50.0	62.5	37.3	77	28	2.12	.73	4.25
May	58.5	72.3	44.7	87	34	1.66	.52	3.34
June	66.4	81.5	51.5	94	42	1.23	.04	3.03
July	75.8	91.6	59.4	98	51	.53	.01	1.19
August	73.3	89.1	57.3	97	46	.73	.02	2.54
September	63.1	80.0	47.9	92	37	.82	.04	2.24
October	52.5	66.9	38.2	81	29	1.51	.04	3.27
November	38.8	49.7	27.6	63	15	1.52	.04	3.07
December	29.9	39.8	21.1	52	9	1.68	.68	2.95
Year	50.5	63.6	37.8			16.44	12.46	22.10

How This Survey Was Made

face soil and in slope, stoniness, or some other charac-


PERCENT
50 40 30 20 15 10 5 2
Sept. 11
Sept. 16
PERCENT
50 40 30 20 15 10 5 2
Mar. 10
Mar. 15
160

In preparing some detailed maps, the soil scientists have a problem of delineating units where different kinds of soils are in areas so intricately mixed, and so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soil areas as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Airport-Ford complex.

Some mapping units contain more than one kind of sists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map

alluvial fans, high terraces, and old deltas along the base of the Wasatch Mountains. They are deep or moderately deep, gravelly, cobbly, or stony sandy loams that are well drained to somewhat excessively drained. These soils formed in mixed gravelly residuum or alluvium that weathered from gneiss, schist, or granite. They are moderately permeable to rapidly permeable. Available water capacity is moderate, and natural fertility is moderate to moderately low.

Sterling, Ridd, Francis, and Pleasant View are the minor soils of this association. The Sterling soils are somewhat excessively drained, deep, gravelly, cobbly, or very rocky loams; and the Ridd soils are well-drained rocky and stony sandy loams. Francis soils are deep loamy fine sands, and the Pleasant View are deep loams and gravelly loams.

Elevation in this association ranges from 4,400 to 5,200 feet above sea level. The climate ranges from moist subhumid to dry subhumid. The average annual precipitation ranges from 15 to 20 inches, and average annual temperature ranges from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils in this association are gravelly and cobbly and therefore moderately difficult to till. These soils are used for irrigated farming, community and industrial developments, range, wildlife habitat, and watersheds. Areas used for range and for watersheds are higher than the present sources of irrigation water. Small orchards of peaches, of cherries, and of apricots are the main irrigated areas. Management is needed mainly for con- [illegible] industrial developments. Irrigated areas consist mainly of peach, cherry, or apricot orchards not more than 10 acres in size. Irrigation water is generally applied by sprinklers. Most areas of Preston soils are idle, but some are used for range. Dryfarmed areas of this association produce winter wheat in alternate years, but these soils are poorly suited to dryfarmed crops. Control of soil blowing and efficient use of irrigation water are major concerns in management.

4. Parleys-Timpanogos-Kidman Association

This association consists of well drained and moderately well drained loams, fine sandy loams, and very fine sandy loams on terraces of medium height. It is in four areas scattered from north to south. Two areas are in Weber County in the northeastern part of the survey area, one is near the central part of Davis County, and one is in the extreme southern part of Davis County. This association is mainly on the strongly sloping and steep terrace escarpments that face south. It covers about 14 percent of the survey area.

Parleys soils make up about 40 percent of this association; Timpanogos soils, 20 percent; Kidman soils, 15 percent; and minor soils, 25 percent.

Parleys, Timpanogos, and Kidman soils all are deep and well drained or moderately well drained. The Parleys soils are loams, the Timpanogos are loams and very fine sandy loams, and the Kidman are fine sandy loams. These soils are friable, are easily tilled, and absorb water readily. Permeability is moderately rapid to moderately

The two areas in Weber County are remnants of old lake terraces. This association covers about 8 percent of the survey area.

Kidman soils make up about 60 percent of this association; Layton soils, 35 percent; and minor soils, 5 percent.

The Kidman soils most commonly are on broad, nearly level terraces, and the Layton soils are on nearly level to strongly sloping terraces. Both kinds of soils are deep and well drained or moderately well drained. The Kidman soils are fine sandy loams, and the Layton soils are loamy fine sands. These soils are friable and can be tilled throughout a wide range of moisture content. Permeability is rapid to moderately rapid, and the available water capacity is moderate to high. Natural fertility ranges from high to moderate.

The Preston, Francis, and Timpanogos are minor soils of this association.

Elevations in this association range from 4,350 to 5,100 feet above sea level. The climate is dry subhumid. The average annual precipitation ranges from about 15 to 20 inches, and average annual temperature ranges from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils of this association are used mainly for irrigated alfalfa, corn, small grains, sugarbeets, tomatoes, and potatoes. Cherries, peaches, and apricots are grown in orchards west of Roy and Sunset. Most farms are irrigated and are less than 40 acres in size, but a few are larger. Control of erosion, especially soil blowing on the Layton soils, and efficient use of irrigation water are the main requirements for good management.

6. Sunset-Kirkham-Martini Association

This association consists of somewhat poorly drained and moderately well drained, dark-colored, slightly saline-alkali loams, fine sandy loams, and silty clay loams on flood plains and in depressions on terraces. It is in a single irregularly shaped area on the nearly The average annual precipitation ranges from 13 to 18 inches, and average annual temperature ranges from 47° to 52° F. The frost-free season ranges from 150 to 175 days.

The soils of this association are used mainly for irrigated alfalfa, corn, small grains, and sugarbeets. Improved pasture is also irrigated, and some areas are used for range. Drainage and reclamation are needed.

7. Ironton-Logan-Draper Association

This association consists of moderately well drained to very poorly drained, dark-colored loams, silt loams, and silty clay loams on flood plains and in depressions on terraces. It is in four scattered areas, two in Davis County and two in Weber County. The largest is west of Farmington, Centerville, and Bountiful in the southern part of Davis County; the second, a relatively small area, is about 1 mile west of Kaysville; the third is in the vicinity of North Ogden; and the fourth is northwest of Ogden. This association covers about 8 percent of the survey area.

Ironton soils make up about 40 percent of this association; Logan soils, 20 percent; Draper soils, 20 percent; and minor soils, 20 percent.

The Ironton and the Logan soils developed mainly in lake-laid sediments. The Ironton soils are somewhat poorly drained and moderately well drained, highly calcareous silt loams. The Logan soils are poorly drained and very poorly drained, highly calcareous silty clay loams. The Draper soils are somewhat poorly drained loams that are noncalcareous or slightly calcareous. The soils of this association are deep, black or very dark gray, and moderately high or high in content of organic matter. They contain little, if any, salt or alkali. Permeability is moderate to slow, and available water capacity is high. Natural fertility ranges from moderate to high.

Minor soils of this association are the Roshe Springs, Woods Cross, and Cudahy. The Roshe Springs soils are

low terraces. It is in two areas. The smaller area is of irregular shape and is in the northern part of the survey area. The larger area is slightly inland from Great Salt Lake and extends parallel to the lake in a strip that narrows at its southern end. This association covers about 17 percent of the survey area.

Warm Springs soils make up about 60 percent of this associations; Syracuse soils, 25 percent; and minor soils, 15 percent.

Warm Springs soils are fine sandy loams, and Syracuse

Minor soils of this association are the Syracuse, Airport, Terminal, Saltair, Arave, and Logan. The Syracuse soils are deep, somewhat poorly drained loamy fine sands that are slightly to moderately affected by salt and alkali. Airport soils are somewhat poorly drained and poorly drained silt loams and silty clay loams. The Terminal soils are moderately deep, somewhat poorly drained loams over a lime-cemented pan. Saltair soils are deep, poorly drained and very poorly drained silty clay loams that contain a high concentration of salts. Arave soils are deep, poorly drained silt loams and the

The Saltair, Wayment, and Lakeshore soils are mainly wasteland; the Arave and Refuge soils have only limited use as rangeland. The soils of this association are not suitable for reclamation as farmland.

Use and Management of Soils

The soils of the Davis-Weber Area are used mostly for dryfarmed and irrigated crops, for pasture, and for range. This section explains how the soils may be used for those main purposes, and it gives predicted yields of the principal dryfarmed and irrigated crops. It also

Class I. Soils have few limitations that restrict their use.

Class II. Soils have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III. Soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV. Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V. Soils subject to little or no erosion but have other limitations, impractical to remove

Management by capability units

In this subsection each capability unit in the Davis-Weber Area is described, and use and management are briefly discussed. To find the names of all the soils in [illegible] capability unit, refer to the "Guide to Map

to close-growing crops is the border method of irrigation in which the length of runs ranges from about 300 to 700 feet. In furrow irrigation, runs ranging from about 300 to 600 feet are suitable.

Good tilth is easily maintained by returning organic

runs should range from about 275 to 500 feet; for border irrigation, 450 to 600 feet.

CAPABILITY UNIT IIw-5 (IRRIGATED)

Syracuse loamy fine sand is the only soil in this capa-

In some places the soils in this unit are in native vegetation that consists of cottonwood and boxelder trees, bunch grasses, and cheatgrass brome. In these places the soils are used for grazing, but if they were cleared and leveled, they would be suited to cultivated crops.

improved pasture usually requires additions of nitrogen every year and of phosphate every 2 to 4 years. Trees in orchards are also benefited by additions of nitrogen. If these soils are dryfarmed, practices are needed that leave the maximum amount of crop residue on the surface for protection against erosion.

CAPABILITY UNIT IIIe-3 (IRRIGATED)

This capability unit consists of deep, well drained and moderately well drained, loamy soils on the higher terraces and alluvial fans. Slopes range from 6 to 10 percent.

These loamy soils are friable and easily tilled. The surface layer ranges from silt loam to fine sandy loam and is about 2 to 5 percent organic matter. Permeability

dryfarmed for wheat or are grazed. These soils are well suited to improved pasture plants, to a mixture of grasses and legumes for hay, and to small grains. They are not suited to orchard fruits or to row crops.

The main concerns of management are drainage and the use of irrigation water without causing erosion. Open ditches and tile are commonly used. Before drains are installed, special investigation is needed to insure the best and most economical drainage. If irrigation depends on gravity, intensive practices for controlling water are needed. Irrigation by flooding from cross-slope ditches or corrugations is suitable for pasture and hay crops. The length of runs for flooding ranges from 100 to 125 feet. The soils in this unit are well suited to irri-

a depth of 10 to 20 inches. This soil is in depressions on low lake terraces. Although slopes range from 0 to 3 percent, in most places they are less than 1 percent.

This soil is friable and easily tilled. From 4 to 12 percent of its black surface layer is organic matter. Permeability of the subsoil is moderate to slow. In most places the hardpan is strongly cemented and ranges from about 2 to 12 inches in thickness. Depth to the water table, which is usually below the hardpan, ranges from 20 to 40 inches. This soil holds about 2.2 inches of available water per foot of soil above the hardpan, or about 4 to 6 inches to the depth of the pan. Runoff is slow, and the hazard of erosion is none to slight. In places this soil is moderately affected by salts and alkali, but they are readily leached away after the soil has been drained.

Part of the acreage of this soil is used for irrigated crops, and part is used for irrigated native pasture. Where it is drained, this soil is fairly well suited to irrigation. It produces improved pasture, grass-legume hay crops, and truck crops, particularly cabbage, celery, and onions.

The main concerns of management are draining this soil and leveling it so that irrigation water can be distributed evenly. Special investigations are needed to determine the feasibility of drainage and the design of a suitable drainage system. In land leveling, cuts must not be deep enough to expose the hardpan. Irrigation should be light enough to avoid a perched water table above the pan. For close-growing crops, the border method of irrigation is suitable. Length of runs ranges from about 250 to 400 feet. For row crops, the furrow method is better, and the length of runs ranges from about 200 to 350 feet.

A suitable cropping system for this soil is 4 to 6 years of improved pasture or grass-legume hay crops, followed by 1 year of small grains, and then 2 or 3 years of truck crops.

Crops on this soil respond to added fertilizer. Additions of nitrogen are needed every year on improved pasture, and additions of phosphate are needed every 2 to 4 years. Both nitrogen and phosphate are needed annually on truck crops.

CAPABILITY UNIT IIIs–1 (IRRIGATED)

This capability unit consists of nearly level, somewhat excessively drained to moderately well drained sandy loams and fine sandy loams on terraces, alluvial fans, and flood plains.

Permeability of these soils is moderately rapid to rapid. About 1 to 3 percent of their surface layer is organic matter. These soils have a gravelly sandy loam subsoil and in most places are very gravelly below a depth of 18 to 24 inches. They hold about 1.2 to 1.5 inches of available water per foot to a depth of about 2 feet, but the very gravelly substratum holds only about 0.5 inch per foot. Consequently, the available water

The cultivated soils are well suited to improved pasture plants, and they are also suited to orchard fruits and other crops, including alfalfa, corn, tomatoes, sugarbeets, potatoes, and small grains.

The most needed management is efficient use of irrigation water. Sprinklers give the best results, and the rate of application ranges from 0.7 inch to 1.5 inches per hour. Where the soils are leveled to a uniform grade, the gravity method can be used. Frequent light irrigations are better than less frequent heavy ones. For close-growing crops, the border method of irrigation is suitable, and the length of runs ranges from about 300 to 600 feet. The furrow method is suitable for row crops, and the length of runs ranges from about 225 to 500 feet. Cover crops are needed between trees in orchards. They are also needed on cultivated soils that otherwise would remain bare during the winter. Spring plowing is preferable to fall plowing.

Large applications of fertilizer are needed for above-average yields. Nitrogen is needed every year for all crops except alfalfa, tomatoes, sugarbeets, and truck crops. Phosphate should be added according to the results of soil tests.

CAPABILITY UNIT IIIs–2 (IRRIGATED)

This capability unit consists of nearly level to gently sloping, somewhat excessively drained to moderately well drained loamy fine sands, sandy loams, and gravelly sandy loams on terraces, fans, and deltas.

Permeability of these soils is rapid or very rapid. About 1 to 3 percent of their surface layer is organic matter. The subsoil is gravelly sandy loam or loamy sand. These soils hold about 3.75 to 4.5 inches of available water to a depth of 5 feet. Runoff is slow, and the hazard of erosion by water is slight to moderate. The hazard of soil blowing is slight to severe.

Some of the acreage in this unit is used for irrigated or dryfarmed crops, some is used for grazing, and some is used for community developments. The cultivated soils are well suited to improved pasture plants, but they are also suited to orchard fruits and other crops, including alfalfa, corn, tomatoes, sugarbeets, potatoes, and small grains.

The most needed management is efficient use of irrigation water. Sprinklers give the best results, but if the soils are leveled, border and furrow irrigation can be used. The border method is suitable for close-growing crops, and the furrow method is better for row crops. Cover crops are needed between trees in orchards and on cultivated soils that otherwise would remain bare during winter.

CAPABILITY UNIT IIIs–3 (IRRIGATED)

This capability unit consists of somewhat excessively drained and moderately well drained loamy fine sands, sandy loams, and gravelly sandy loams on terraces and alluvial fans. Slopes range from 3 to 6 percent.

about 4 to 5 inches of available water above the hardpan. Roots rarely penetrate the pan. Runoff is slow, and the hazard of erosion is slight.

Most of the acreage of the soils in this unit is used as irrigated unimproved pasture. The vegetation is domi- partly saltgrass. Where these soils are drained and par-

A suitable cropping system is 4 to 6 years of grass-legume hay crops or pasture, followed by 1 or 2 years of small grains or tomatoes.

Large amounts of fertilizer are needed to maintain above-average yields. For pasture, nitrogen is needed every year early in spring and again about midsummer.

water is 0.3 to 0.5 inch per hour. These soils are too steep for the use of gravity irrigation, except by contour furrows. These soils should be kept under permanent cover most of the time.

Fertilizer is needed to maintain above-average yields. Nitrogen is needed for fruit trees, and both nitrogen and phosphate are needed for improved pasture. The nitrogen is needed every year and phosphate every 2 to 4 years.

CAPABILITY UNIT IVs–4 (IRRIGATED)

This capability unit consists of deep, well-drained and excessively drained loamy fine sands and fine sands. These soils are duned in places.

About 0.3 to 1.5 percent of the surface layer is organic matter. The subsoil is loose fine sand or loamy fine sand and has rapid or very rapid permeability. These soils absorb water readily. They hold about 0.7 inch to 1.2 inches of available water per foot of soil, or about 3.5 to 6 inches to a depth of 5 feet. Water erosion is a slight to moderate hazard, but the hazard of soil blowing is high.

Most of the acreage in this unit is used for grazing. The native vegetation is dominantly sand dropseed and Indian ricegrass. Some areas are cultivated and used for sprinkler irrigated orchards and vineyards. Where sprinkler irrigation is available, these soils are well suited to improved pasture and to orchards.

Controlling soil blowing and using irrigation water efficiently are the main concerns of management. Sprinkler irrigation is generally needed, because land leveling for gravity irrigation is not practical in most areas. The rate at which water can be applied ranges from 0.5 to 1 inch per hour. Light frequent applications are better than heavy applications at longer intervals. Cover crops are needed between the trees in orchards. Vineyards should be planted in rows that are at right

Nearly all the acreage in this unit is used for watersheds or for grazing. Some small areas of Pleasant View soils are used for dryfarmed wheat. The vegetation consists dominantly of brushy Gambel oak, bitterbrush, western wheatgrass, Indian ricegrass, sand dropseed, and Kentucky bluegrass. These soils are suitable for watersheds and for limited use for grazing. Some areas are suitable for community developments.

Controlling erosion is the most needed management. These soils should be kept in permanent vegetation. Seeding and water control are practical management practices.

CAPABILITY UNIT VIw–1

This capability unit consists of loams, silt loams, and fine sandy loams that are strongly affected by salts and alkali. These soils are somewhat poorly drained and have a water table between a depth of 20 and 40 inches in most places. They are generally nearly level, but the Trenton soil has slopes as steep as 10 percent in places.

Most of the soils in this unit are highly calcareous. Permeability of the subsoil ranges from moderate to very slow. The hazard of erosion is slight to moderate on most of these soils, but the Trenton soil is severely eroded. The Croy and Terminal soils have a cemented hardpan at a depth of 20 to 36 inches.

Nearly all the acreage of this unit is used for grazing. The vegetation is dominantly saltgrass, foxtail barley, alkali sacaton, greasewood, Nuttall saltbush, cheatgrass brome, and annual weeds. Small areas of Leland soil are used for improved pasture, grass-legume hay, and an occasional crop of a small grain, but yields are very low. The soils in this unit are suited to grazing or to industrial developments.

The main concerns of management are draining these soils and lowering the water table and then reclaiming them from damage by salt and alkali. Draining is diffi-

Most of these soils are not suited to cultivated crops, because they are too gravelly, cobbly, or stony or have

CAPABILITY UNIT VIIIw-1

This capability unit consists of soils that have no value

TABLE 3.—*Estimated average acre yields of principal*

[Yields in columns A are expected under common management; yields in columns B are expected under a

Soil	Alfalfa		Corn (silage)		Corn (grain)	
	A	B	A	B	A	B
	Tons	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*
Ackmen loam, 1 to 3 percent slopes	4.5	6.0	17	22	100	140
Ackmen loam, 3 to 6 percent slopes	3.5	5.5				
Ackmen loam, 6 to 10 percent slopes	3.0	5.0				
Ackmen loam, 10 to 20 percent slopes, eroded						
Airport silt loam	2.5	3.5	13	18		
Airport silty clay loam	2.0	3.0	10	15		
Chance loam, 0 to 3 percent slopes	3.0	4.5	13	20		
Cudahy silt loam, 0 to 3 percent slopes	2.5	4.5	14	18		
Draper loam, 0 to 1 percent slopes	3.0	4.0	16	22	95	130
Draper loam, 1 to 3 percent slopes	3.0	4.0	14	20	95	125
Draper loam, drained, 0 to 1 percent slopes	3.5	5.0	19	25	100	140
Draper loam, drained, 1 to 3 percent slopes	3.5	5.0	14	20	95	125
Draper loam, drained, 3 to 6 percent slopes	3.0	4.5				
Draper gravelly loam, gravelly subsoil variant, 1 to 3 percent slopes	3.0	4.0	14	20	85	115
Draper gravelly loam, gravelly subsoil variant, 3 to 6 percent slopes	3.0	4.0				
Ford loam	2.0	3.0	10	15		
Ford loam, shallow water table	2.0	3.0	10	15		
Francis loamy fine sand, 0 to 3 percent slopes	3.5	4.5	13	18	80	120
Francis loamy fine sand, 3 to 6 percent slopes	2.5	3.5				
Francis loamy fine sand, 6 to 10 percent slopes	2.0	3.0				
Francis loamy fine sand, 10 to 20 percent slopes, eroded						
Gooch silt loam	2.5	3.5	13	18		
Harrisville silt loam, 0 to 1 percent slopes	3.0	4.5	15	20		
Harrisville silt loam, 1 to 3 percent slopes	3.0	4.5	15	20		
Harrisville silt loam, 3 to 6 percent slopes	3.0	4.0				
Hillfield soils, 6 to 10 percent slopes, eroded	2.5	4.0				
Hillfield soils, 10 to 20 percent slopes, eroded						
Ironton silt loam, 0 to 1 percent slopes	3.5	5.0	19	25	100	140

crops, fruits, and pasture on irrigated soils

moderately high level of management. Absence of yield indicates crop is seldom grown on the soil specified]

Wheat		Barley		Sugarbeets		Tomatoes		Potatoes		Peaches		Apricots		Cherries		Pasture	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cwt.*	*Cwt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
50	75	65	85	17	22	16	22	235	300	230	300	260	350	4. 5	6. 0	265	350
45	70	55	80							200	300	225	325	4. 0	5. 5	225	325
40	65	50	75							140	250	200	300	3. 5	5. 0	180	275
										125	200	180	250	2. 5	4. 0	100	175
		45	65	10	15											200	275
		40	60	8	12											180	250
50	70	55	90	15	20											225	300
35	50	45	65	14	18											200	275
45	65	55	70	14	20	14	20									230	300
40	60	60	80	13	18	12	18									230	300
50	70	60	80	15	22	16	25									250	325
45	65	60	80	13	18	14	20									230	300
40	60	55	80													190	275
45	60	55	75	14	18	14	20									230	300
40	55	50	75													175	250
35	45	45	60													190	250
35	45	45	60													190	250
35	50	50	70	15	20	15	20	150	200	175	250	200	275	3. 0	4. 0	200	275
30	45	40	55							170	225	175	250	3. 0	4. 0	180	250
30	40	35	50							165	225	175	250	3. 0	4. 0	175	225
										165	225	175	250	3. 0	4. 0	110	150
		45	65	10	15											200	275
		50	75	13	18											225	300
		50	75	13	18											225	300
		50	75													200	275
40	50	45	70							125	225	140	250	2. 5	4. 0	180	275

TABLE 3.—*Estimated average acre yields of principal*

crops, fruits, and pasture on irrigated soils—Continued

Wheat		Barley		Sugarbeets		Tomatoes		Potatoes		Peaches		Apricots		Cherries		Pasture	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cwt.*	*Cwt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
45	70	50	80							175	275	225	325	3.5	5.0	225	310
40	55	45	70							150	250	180	275	3.0	4.5	210	290
										125	200	175	250	2.5	4.0	100	175
35	50	45	65							180	250	180	275	3.0	4.0	200	275
35	45	40	55							150	225	175	250	3.0	4.0	175	250
30	45	35	55							150	200	150	200	2.5	3.5	150	225
		40	60													180	250
50	70	55	90	15	20											225	300
45	65	50	75	12	18											200	275
45	65	50	75	12	18											200	275
40	55	55	75	15	20	12	18	150	200	190	250	200	275			200	275
40	55	55	75	13	20					175	225	200	275			200	275
30	40	45	70													200	275
30	40	45	70													200	275
35	45	35	50							165	225	175	250	3.0	4.0	150	250
										165	225	175	250	3.0	4.0	110	150
50	70	60	80	15	22	15	22									250	325
45	65	55	75	15	20	14	20									230	300
40	60	45	70	12	18											180	275
45	75	65	85	15	22	14	22	200	275	190	250	200	220	4.0	5.0	225	250
45	65	50	80	14	22	14	22	175	275							225	300
40	60	45	70	13	20											180	275
55	80	75	90	18	25	18	25	235	300	220	275	260	350	4.5	6.0	265	350
50	75	65	85	17	22	16	22	235	300	200	275	260	350	4.5	6.0	265	350
45	70	55	80							180	260	225	325	4.0	5.5	250	325
40	55	50	75							150	250	200	300	3.5	5.0	200	300
										140	200	180	250	2.5	4.0	100	175
40	50	50	75							140	250	200	300	3.5	5.0	180	275
										125	200	175	250	2.5	4.0	100	175
		40	60													180	250
50	70	60	80	15	22	15	22									250	325
45	65	55	75	15	20	14	18									230	325
40	60	45	70	10	15											160	250
40	60	45	70	12	18											180	275
45	65	50	75	12	18											200	275
45	65	50	80	13	18											200	300
50	70	55	90	15	20											225	300

have a high water table, contain salts or alkali, or lack irrigation water. Also, most of the areas used for range or pasture are interspersed with areas of cultivated soils and are small and of irregular shape. Nevertheless, because the acreage of soils unsuitable for cultivation is so large, range has always had high value in the survey area. It is grazed by large numbers of dairy and beef cattle, sheep, and horses. Good management of the range is of great importance.

In many places excessive grazing has brought changes in the kinds of plants growing on the range and has caused the range to deteriorate. Some of the better forage grasses and forbs have been replaced by plants that have little or no value for grazing. Brushy Gambel oak (commonly called oakbrush), sagebrush, cheatgrass brome, and annual weeds are now the dominant plants in some areas that have been excessively grazed.

Range sites and condition classes

In the Davis-Weber Area, the soils used for range vary widely in characteristics. Well-drained to excessively drained soils occur in many places in the eastern part of the survey area. Somewhat poorly drained or poorly drained soils occupy large, low-lying tracts west of the densely populated places. Some of the soils that have restricted drainage are also affected by salts and alkali. Much of the vegetation growing on those soils differs from that growing on soils in the eastern part of the survey area.

To manage his range well, and to use the range to best advantage, the rancher should know the different kinds of soils in his holdings, the location of each kind of soil, and the kinds and amounts of vegetation that can be grown on each. He can then regulate grazing so that the vigor and abundance of the best plants are increased.

The basic unit on which management of the range is determined is the range site. A range site is an area of range uniform enough in climate, soils, drainage, exposure, and topography that it produces a specific kind and amount of vegetation. The kind of vegetation, in most instances, is the combination of plants that grew

on the site before the range was affected by grazing or cultivation and is called the potential vegetation. Generally, the potential vegetation is the most productive combination of range plants that a site can support. The potential vegetation, or plant community, remains on the site if it is not disturbed by fire, excessive grazing, insects, or plant diseases.

If the range is grazed heavily or at the wrong time, the most valuable forage plants on the range, called *decreasers*, become more scarce and eventually disappear. Their place is taken by *increasers*, or less palatable plants

GRASSES AND GRASSLIKE PLANTS—Continued

Scientific name	*Common name*
Hordeum jubatum	Foxtail (foxtail barley).
Juncus balticus	Wiregrass (baltic rush).
Koeleria cristata	Prairie junegrass (junegrass).
Oryzopsis hymenoides	Indian ricegrass.
Phleum alpinum	Alpine timothy.
Poa ampla	Big bluegrass.
Poa juncifolia	Alkali bluegrass.
P. pratensis	Kentucky bluegrass (bluegrass).
P. secunda	Sandberg bluegrass.
Puccinellia distans	Weeping alkaligrass.
Sitanion hystrix	Squirreltail.

Climatic zones and their effect on range

Plants growing on the range in different parts of the survey area are affected not only by differences in the kinds of soils but also by differences in climate. Three distinct climatic zones are recognized in the survey area. These zones are determined on the basis of differences in the amount of moisture received and on differences in the average annual temperatures and the length of the growing season. They are the Mountain climatic zone, on the slopes of the Wasatch Mountains; the Upland climatic zone, in the eastern, northeastern, and central parts of the survey area; and the Wet and Semiwet climatic zone in the western part.

The average amount of moisture received annually from precipitation in the Mountain climatic zone is 18 to 22 inches. In each of the two other zones, only about 15 to 20 inches is received. Additional moisture, however, is received from runoff or from subirrigation or the water table in the Wet and Semiwet climatic zone. The length of the growing period varies in the different zones. In all three zones, however, summers are warm and dry and winters are cold and snowy. In June, July, August, and September—the driest months—the amount of moisture lost through evapotranspiration exceeds that In summer and fall, however, the soils are generally dry at the surface because the water table is low.

In this zone the growing period for plants begins about April 1 to April 15. It continues to about August 15 for plants growing on the Wet Meadow and Semiwet Meadow range sites, and until the first killing frost, or about October 1 to October 10, for the Salt Meadow and Alkali Bottom range sites. Plants make most of their growth during the period May 1 to July 15.

The average frost-free period in this zone is about 175 days. The Wet Meadow, Semiwet Meadow, Salt Meadow, and Alkali Bottom range sites are in this climatic zone.

Descriptions of the range sites

To help ranchers in the survey area evaluate their range, all of the soils that are still in range have been grouped in range sites. Nine different range sites are recognized in the survey area. They are described alphabetically in the following pages, and the climatic zone is given for each site. The names of the soils in each range site can be found by turning to the "Guide to Mapping Units" in the back of this soil survey.

ALKALI BOTTOM RANGE SITE

1,000 pounds in less favorable years. If the areas are fenced for rotation grazing and are irrigated, a large amount of forage can be produced.

SEMIWET MEADOW RANGE SITE

This range site is on low lake terraces, alluvial fans, and flood plains in the Wet and Semiwet climatic zone

moisture is held per foot of soil, but the soils hold only about 0.5 inch per foot below that depth. To a depth of 5 feet, they hold about 3 to 4.5 inches. All of this moisture is generally used by about June 25. Runoff varies greatly. It ranges from slow to rapid, depending on the slope and on the kind and density of the vegetation. The hazard of erosion is slight to severe

this site ranges from 40 to 50 percent. In the areas ... grasses. Improved grasses are sand dropseed, western

WET MEADOW RANGE SITE

This range site is on flood plains and in slight depressions on alluvial fans and lake terraces in the Wet and Semiwet climatic zone. It is mainly in two general areas. The most extensive of these is west of Farmington and Woods Cross in Davis County. The other is near North Ogden in Weber County. The slopes are mainly between 0 and 3 percent but are as steep as 6 percent in places. The elevations range from about 4,250 to 4,500 feet.

The soils of this range site are mostly deep and poorly drained. They have a surface layer of black or nearly black silty clay loam, silt loam, or loam high in content of organic matter. The textures of their subsoil and

marily for the production of fruits or field crops, practices can be used that encourage the production of wildlife as a secondary use. Field windbreaks, trees, and live fences can be established on soils that are used extensively for cultivated crops. Among these soils are the Parleys, Timpanogos, Kidman, Ironton, Ackmen, Sunset, Kilburn, and Layton. Also, the production of wildlife can be an alternate use in many areas of the poorly drained Logan, Roshe Springs, Croy, Ford, Airport, Cudahy, Kirkham, and Warm Springs soils and on the steeper parts of the Ridd, Kilburn, Sterling, Timpanogos, Hillfield, Parleys, Preston, and Francis soils.

Wildlife production is a suitable [illegible]

Engineering Applications [6]

Some soil properties are of special interest to engineers because they affect the construction, maintenance, and performance of roads, airports, pipelines, building foundations, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. The properties most important to the engineer are permeability to water, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, grain size, plasticity, and reaction. Also important are depth to the water table, to bedrock, or to a hardpan; content of salt and alkali; and topography.

The information in this soil survey can be used by engineers to—

1. Make studies of soil and land use that aid in selecting and developing industrial, business, residential, and recreational sites.
2. Locate probable sources of sand, gravel, clay and other construction materials.
3. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and erosion control structures.
4. Make preliminary evaluations of the soil and

Soils," "Formation, Morphology, and Classification of Soils," and other sections of the survey are useful to engineers. Some of the terms used by soil scientists may be unfamiliar to engineers. These terms, as well as other terms used in this soil survey, are defined in the Glossary.

Engineering classification systems

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly and coarse sandy soils of high bearing capacity, to A–7, consisting of clayey soils having low strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index number. These numbers range from 0 for the best material to 20 for the poorest. The AASHO classification of soils in the Davis-Weber Area is given in table 5.

Some engineers prefer to use the Unified soil classification system (*10*, *19*). In this system the soils are identified according to their texture and plasticity and are grouped according to their performance as engineering construction material. Soil materials are classified as coarse grained, which are gravels (G) and sands (S);

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			

significant to engineering

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
100	100	75–95	<0. 2	0. 16–0. 18	8. 6–9. 5	Moderate to severe	High	High.
100	100	40–60	0. 2–0. 63	0. 15–0. 18	7. 8–8. 5	None	Moderate	Moderate.
100	100	15–20	>6. 3	0. 07–0. 08	7. 8–8. 5	None	None	Low.
90–100	80–100	50–60	0. 63–2. 0	0. 17	7. 0–7. 8	None	Low	Low.
100	100	80–95	<0. 2	0. 16–0. 18	7. 8–9. 6	Slight to severe	Moderate	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Draper (DaA, DaB, DrA, DrB, DrC, DsB, DsC).	Deep, somewhat poorly drained, medium-textured soils; on alluvial fans and flood plains; parent materials were derived mainly from gneiss, schist, and quartzite; depth to the water table is generally 20 to 48 inches.	0–21	Loam	OL or CL	A–4
		21–60	Loam	CL–ML	A–4
Ford (Fa, Fb)	Moderately deep to hardpan, somewhat poorly and poorly drained, medium-textured soils moderately affected by salt and alkali; on low lake terraces; depth to the hardpan ranges from about 20 to 40 inches, and thickness of the pan ranges from 3 to 24 inches; parent materials are mixed lake sediments; depth to the water table is generally 30 to 36 inches.	0–16	Loam	ML, CL, or SM.	A–4
		16–34	Fine sandy loam	SM	A–4 or A–2
		34–44	Cemented hardpan.		
		44–52	Fine sandy loam	SM	A–2
		52–60	Cemented hardpan.		
Francis (FcB, FcC, FcD, FcE2, FcF2, FKG2). (For properties of Kidman soils in mapping unit FKG2, refer to the Kidman series.)	Deep, somewhat excessively drained, coarse-textured soils; on high lake terraces; parent materials are wind-laid deposits; calcareous lake sediments are at depths of 6 feet or more; hazard of soil blowing is high.	0–23	Loamy fine sand	SM	A–2
		23–73	Fine sand	SM or SM–SP.	A–1
Gooch (Go, Gs)	Deep, poorly drained and somewhat poorly drained, medium-textured soils strongly affected by salt and alkali in some places; on low lake terraces; parent materials are mixed lake sediments derived from many kinds of rocks; depth to the water table is generally 20 to 40 inches.	0–30	Clay loam	CL	A–4 or A–6
		30–47	Fine sandy loam	SM	A–2 or A–4
Harrisville (HaA, HaB, HaC, HLA). (For properties of Leland soil in mapping unit HLA, refer to the Leland series.)	Deep, somewhat poorly drained and moderately well drained, medium-textured soils slightly to moderately affected by alkali; strongly calcareous below a depth of about 15 inches; parent materials are mixed lake sediments; depth to the water table is generally 30 to 48 inches.	0–60	Silty clay loam	CL	A–4 or A–6
Hillfield (HMG2, HnD2, HnE2, HTF2, HTG2). (For properties of the Marriott soil in mapping unit HMG2, those of Timpanogos soils in units HTF2 and HTG2, and those of Parleys soils in units HTF2 and HTG2, refer to the Marriott, Timpanogos, and Parleys series, respectively.)	Deep, well-drained, medium-textured soils that are strongly calcareous; on terrace escarpments; parent materials are mixed lake sediments.	0–21	Silt loam	ML	A–4
		21–60	Stratified very fine sandy loam and clay loam.	ML	A–4
Ironton (IaA, IaB, IaC, IcA, IDA). (For properties of Draper soils in mapping unit IDA, refer to the Draper Series.)	Deep, somewhat poorly drained and moderately well drained, medium-textured soils that are strongly calcareous; on low lake terraces and flood plains; parent materials are mixed lake sediments; depth to the water table is generally 24 to 48 inches.	0–60	Silt loam	ML	A–4

See footnote at end of table.

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
90–100	90–100	60–70	0.63–2.0	0.15–0.17	7.4–7.8	None	Low	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Kidman (KaA, KaB, KaC, KaD, KaE2).	Deep, well drained and moderately well drained, coarse-textured soils; on broad lake terraces; parent materials are mixed lakeshore deposits that have been extensively reworked by wind; in the moderately well drained soils, the water table is generally at a depth of 40 to 60 inches.	0–58	Fine sandy loam	ML, CL or ML–CL.	A–4
Kilburn (KbA, KbB, KbC, KcA, KfE2, KfF2, KfG2, KgB, KgC, KgD, KgE2, KlC, KlE2, KmA, KmC). (For properties of Francis soils in mapping units KfE2, KfF2, and KfG2, refer to the Francis series.)	Deep and moderately deep, well-drained and somewhat excessively drained, moderately coarse textured soils that are noncalcareous; on alluvial fans in the uplands; upper part is 10 to 50 percent gravel and cobbles, by volume, and the lower part is 25 to 80 percent gravel and cobbles; parent materials are alluvium and colluvium derived mainly from gneiss, quartzite, and granite.	0–11 11–60	Gravelly sandy loam. Very gravelly sandy loam.	SM or GM GM, GM–GW, or SM.	A–2 A–1
Kirkham (Kr, Ks, Kt, KX) (For properties of Airport soils in mapping unit KX, refer to the Airport series.)	Deep, somewhat poorly drained, moderately fine textured soils slightly to strongly affected by salt and alkali; on flood plains; parent material is mixed alluvium; depth to the water table is generally 20 to 50 inches.	0–34 34–68	Silty clay loam Silt loam and fine sandy loam.	CH ML	A–6 or A–7 A–4
Lakeshore (La, Lb)	Deep, poorly drained and very poorly	0–51	Silt loam	ML	

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
		Inches			
Logan (Lt, Lu, Lw)	Deep, poorly drained and very poorly drained, moderately fine textured soils moderately affected by salt and alkali in places; on low lake terraces; parent materials are mixed alluvium and reworked lake sediments; the water table is at or near the surface.	0–12	Silty clay loam	OL or OH	A–6
		12–29	Silty clay loam	CL or CH	A–6
		29–60	Stratified loam	ML	A–4 or A–6
Marriott (McE2, MgD, MgE2)	Deep, somewhat poorly drained and well-drained, moderately coarse textured soils that are strongly calcareous in places; on lake terrace escarpments and terraces; parent materials are mixed lake sediments; the water table is below a depth of 60 inches.	0–22	Gravelly fine sandy loam.	SM or GM	A–2
		22–61	Gravelly fine sandy loam.	SM or GM	A–2
Martini (MrA, MtA)	Deep, moderately well drained, moderately coarse textured soils that are highly stratified; on river flood plains; depth to the water table is about 32 to 60 inches.	0–70	Fine sandy loam	SM	A–2
Parleys (PaA, PaB, PaC, PaD, PaE2).	Deep, well-drained, medium-textured soils with accumulated lime at a depth of 18 to 38 inches; on intermediate and high lake terraces; parent materials are mixed lake sediments; depth to the water table is 36 to 60 inches.	0–15	Loam	ML or CL	A–4 or A–6
		15–33	Clay loam	CL	A–4 or A–6
		33–60	Silt loam	CL, ML	A–4 or A–6
Payson (PMA, PNA) (For properties of Airport soils in mapping unit PMA, and those of Warm Springs soils in unit PNA, refer to the Airport and Warm Springs series, respectively.)	Deep, somewhat poorly drained and moderately well drained, medium-textured soils slightly to strongly affected by salt and alkali; on low lake terraces; parent materials are mixed lake sediments; depth to the water table is generally between 20 and 48 inches.	0–4	Silt loam	ML	A–4
		4–24	Clay	CH	A–7
		24–30	Silt loam	CL	A–4
Pleasant View (PvB, PvC, PvD, PvE, PvE2, PwC, PwD).	Deep, well-drained, medium-textured and moderately coarse textured soils that are finely gravelly or gravelly in places; on alluvial and colluvial fans in the uplands.	0–25	Loam and sandy loam.	SM or ML	A–4
		25–34	Fine gravelly loam.	SM or ML	A–4
		34–67	Fine gravelly fine sandy loam.	SM	A–2
Preston (PxB, PxE, PyB)	Deep, excessively drained, coarse-textured soils that formed in sands deposited by wind; on upland terraces.	0–65	Fine sand	SP	A–3
Refuge (Ra)	Deep, somewhat poorly drained, medium-textured and moderately coarse textured soil moderately to strongly affected by salt; on the lower flood plains; parent material is alluvium derived from many kinds of rocks; depth to the water table is generally 24 to 60 inches.	0–47	Loam	ML	A–4
		47–71	Fine sand	SM	A–2

See footnote at end of table.

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
100	100	80–90	0. 2–0. 63	0. 17–0. 19	7. 5–8. 5	None to slight	None	Moderate.
100	100	80–90	<0. 2	0. 17–0. 19	7. 8–8. 9	None to moderate	None	Moderate.
100	100	80–90	0. 2–0. 63	0. 16–0. 17	8. 0–9. 0	None to slight	Low	Low to moderate.
50–80	60–85	20–30	>6. 3	0. 08–0. 10	7. 4–7. 8	None	None	Low.
30–80	55–90	20–30	>6. 3	0. 06–0. 08	7. 4–7. 8	None	None	Low.
85–100	90–100	20–30	2. 0–6. 3	0. 10–0. 12	7. 4–8. 5	None	Low	Low.
100	95–100	60–70	0. 63–2. 0	0. 16–0. 18	6. 6–7. 3	None	Low	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potentia
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						
			Inches per hr.	*Inches per inch of depth*	*pH*			
60–80	55–75	15–25	2. 0–6. 3	0. 08–0. 10	6. 6–7. 3	None	None	Low.
50–70	40–70	10–20	2. 0–6. 3	0. 06–0. 08	6. 6–7. 3	None	None	Low.
100	100	70–80	0. 63–2. 0	0. 17–0. 20	7. 4–7. 8	None	None	Moderate.
100	100	80–90	<0. 063	0. 16–0. 18	8. 6–10. 0	Severe	High	Moderate.
60–80	50–80	20–30	>6. 3	0. 08–0. 10	7. 8–8. 5	None	None	Low.
25–50	25–50	0–10	>6. 3	0. 04–0. 06	7. 8–8. 5	None	None	Low.
40–70	50–80	25–40	>6.3	0.08–0.10	7.4–7.8	None	None	Low.
30–50	30–50	10–20	>6.3	0.04–0.06	7.8–8.5	None	None	Low.
90–100	90–100	60–70	0.63–2.0	0.16–0.17	7.4–8.5	Moderate to severe.	Low	Low to moderate.
100	100	25–35	2.0–6.3	0.10–0.12	8.5–9.9	Slight to severe	None	Low.
100	100	50–60	0.2–0.63	0.14–0.16	7.9–8.5	Moderate	Moderate	Moderate

TABLE 5.—*Estimated soil properties*

Soil series and symbols [1]	Description of soil and site	Depth from surface	Classification		
			USDA texture	Unified	AASHO
Timpanogos, noncalcareous variant (TcD, TcE, TDD). (For properties of Draper	Deep, well-drained, medium-textured soils that are noncalcareous; on uplands; parent material was derived	*Inches* 0–73	Very fine sandy loam.	SM	A–4

significant to engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Salinity	Dispersion	Shrink-swell potential
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)						

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Ackmen (AbB, AbC, AbD, AbE2)	Good	Not suitable; gravelly and cobbly substratum is good for road subbase.	Fair to good if slopes are flat; easily eroded; moderate shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Water table generally at a depth of 60 inches; low plasticity; medium susceptibility to frost action.
Airport (Ac, Ad, Ae, AF) (For interpretations of Ford soils in mapping unit AF, refer to the Ford series.)	Surface layer fair	Not suitable	Fair if slopes are flat; medium shearing strength; medium to low resistance to cracking; medium compressibility; good to poor compaction.	Water table generally at 20 to 40 inches; slightly to strongly affected by salt and alkali; low plasticity; high susceptibility to frost action.
Arave (AS) (For interpretations of Saltair soils in this mapping unit, refer to the Saltair series.)	Poor	Not suitable	Poor; medium shearing strength; medium to low resistance to cracking; medium compressibility; good to poor compaction.	Water table generally within a depth of 20 inches; moderately to strongly affected by salt and alkali; low plasticity; high susceptibility to frost action.

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Croy (Cr)	Poor	Not suitable	Fair if slopes are flat; easily eroded; high content of salt and alkali; medium shearing strength; medium compressibility; good to poor compaction.	Water table at a depth of 20 to 40 inches; hardpan begins at about 35 inches; low plasticity; high susceptibility to frost action.
Cudahy (CuA)	Surface layer fair	Not suitable	Not suitable	Water table generally within a depth of 20 inches; low plasticity; high susceptibility to frost action.
Draper (DaA, DaB, DrA, DrB, DrC, DsB, DsC).	Surface layer good	Not suitable	Unsuitable in top 20 inches; fair to good below 20 inches if slopes are flat.	Water table generally at a depth of 20 to 40 inches; low plasticity; medium susceptibility to frost action.
Ford (Fa, Fb)	Poor	Not suitable	Fair if slopes are flat; easily eroded; medium shearing strength; low resistance to cracking; good compaction.	Water table within a depth of 40 inches; medium to high susceptibility to frost heaving; low plasticity.
Francis (FcB, FcC, FcD, FcE2, FcF2, FKG2). (For interpretations of Kidman soils in mapping unit FKG2, refer to the Kidman series.)	Good	Poor for sand; silt content too high.	Good; easily eroded; high shearing strength; medium resistance to cracking; slight compressibility; good compaction.	Deep to water table; low plasticity; medium to low susceptibility to frost heaving.
Gooch (Go, Gs)	Poor	Not suitable	Poor; high content of salt and alkali; medium shearing strength; medium compressibility; good to poor compaction.	Water table at a depth of less than 40 inches; subject to seepage and flooding; low to high plasticity; high susceptibility to frost action.

Interpretations of soils—Continued

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Slow and very slow permeability; water table at a depth of 20 to 40 inches; medium to low shearing strength; medium to low resistance to piping and cracking; good to poor compaction.	Moderate seepage; slow and very slow permeability.	Low stability and strength; close control of moisture needed on compaction; slow and very slow permeability; subsoil has low shearing strength and high compressibility; medium to low resistance to piping and cracking.	Seasonally high water table; slow or very slow permeability; moderately affected by salt and alkali; drainage and reclamation needed.	High water-holding capacity; fair intake rate.
Fair stability; moderate to slow permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Slow to moderate seepage; steep slopes; moderate to slow permeability.	Adequate strength and stability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Not needed	High water-holding capacity; steep slopes.
Fair stability; moderate permeability; water table at a depth of 20 to 40 inches; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to slow seepage; moderate permeability.	Low strength and stability; semi-impervious when properly compacted; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains needed.	Moderately deep to water table; moderate to slow permeability; drainage needed for deep-rooted crops.	High water-holding capacity.
Good stability; moderate permeability; water table below a depth of 40 inches; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction.	Rapid seepage; moderate permeability.	Adequate stability and strength; semi-impervious after proper compaction; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction; toe drains needed.	Deep to water table; may require drainage in some areas.	Moderate water-holding capacity.
Good stability; rapid permeability; low shrink-swell potential; high shearing strength: slight compressibility; resistance is low to iping and medium to cracking; good compaction.	Rapid seepage; rapid permeability.	Moderate strength and stability; rapid permeability; high shearing strength; slight compressibility; resistance is low to piping, medium to cracking; good compaction.	Not needed	Low water-holding capacity; good intake rate; frequent irrigation required.
Fair stability; moderate to slow permeability; water table at a depth of 20 to 40 inches; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction.	Moderate seepage; moderate to slow permeability.	Low stability and strength; close moisture control needed; moderate to slow permeability; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction; toe	Moderately deep to water table; slightly to strongly affected by salt and alkali; most areas need drainage.	Good water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Lakeshore (La, Lb)	Not suitable	Not suitable	Poor; very severe salinity; medium shearing strength; medium compressibility; low resistance to cracking; good to	Water table generally within a depth of 20 inches; high content of salt and alkali; high susceptibility to frost action; low

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Fair stability; moderate to slow permeability; water table generally within a depth of 20 inches; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction.	Slow seepage; moderate to slow permeability.	Low stability and strength; medium shearing strength; medium compressibility; low resistance to piping and cracking; good to poor compaction; medium to low permeability; toe drains needed.	Not suitable for cultivation; drainage and reclamation very difficult.	Moderate water-holding capacity.
Good stability; moderate permeability; water table below a depth of 40 inches; high shearing strength; resistance is medium to cracking, low to piping; slight compressibility;	Rapid seepage; rapid permeability.	Moderate permeability; good stability; high shearing strength; medium resistance to piping; slight compressibility; good compaction; toe drains and cutoff	Not generally needed	Low water-holding capacity.

TABLE 6.—*Engineering*

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Good stability; moderate permeability; water table at a depth of 20 to 40 inches; high shearing strength; resistance medium to cracking, low to piping; slight compressibility; good compaction.	Rapid seepage; moderately rapid permeability.	Adequate stability and strength; semi-impervious after proper compaction; moderate permeability; high shearing strength; resistance medium to cracking, low to piping; sligh compressibility; good compaction; toe drains and cutoff needed.	Moderately deep to water table; requires drainage in some areas.	Moderately low water-holding capacity.
Good stability; moderate to slow permeability; medium to low shearing strength; medium to low resistance to piping and cracking; good to poor compaction.	Moderate seepage; moderate to slow permeability.	Low stability and strength; close moisture control needed; moderate to slow permeability; moderate to low shearing strength; high compressibility; medium to low resistance to piping and cracking; good to poor compaction.	Drainage needed in some areas.	High water-holding capacity.
Fair stability; slow or very slow permeability; water table generally at a depth of 20 to 40 inches; medium to low shearing strength; low to high resistance to piping and cracking; good to poor compaction.	Slow seepage; slow or very slow permeability.	Adequate strength and stability; semi-impervious after compaction; slow and very slow permeability; medium shearing strength; medium to high resistance to piping and cracking; good to poor compaction.	Drainage difficult because of slow permeability; few outlets; high content of salt and alkali; not generally suitable for cultivation.	Medium water-holding capacity.
Fair to good stability; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate seepage; moderate permeability.	Adequate stability and strength if slopes are flat; semi-impervious after compaction; moderate permeability; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Not needed	Moderate to high water-holding capacity.
Fair stability; highly [illegible]	Rapid seepage; rapid [illegible]	Adequate strength and [illegible]	Not needed	Low water-holding [illegible]

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Refuge (Ra)	Poor	Not suitable	Fair to poor; moderate	Water table at a depth

interpretations of soils—Continued

	Soil features affecting—Continued			
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Fair stability; moderate to slow permeability; water table at a depth of 20 to 40 inches; medium shearing strength; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to rapid seepage; moderate to slow permeability.	Moderate to slow permeability; adequate strength and stability; semi-impervious after compaction; low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains and cutoff needed.	Seasonally high water table; few outlets; strongly affected by salt below a depth of 20 inches; drainage and reclamation needed for cultivated crops.	High water-holding capacity; strongly affected by salt below a depth of 20 inches.
Good stability; moderate to rapid permeability; high shearing strength; slight compressibility; resistance low to piping, medium to cracking; good compaction.	Moderate to rapid permeability; high shearing strength; slight compressibility; resistance low to piping, medium to cracking; good compaction.	Moderate to rapid permeability; adequate strength and stability after compaction; high shearing strength; slight compressibility; resistance low to piping, medium to cracking; good compaction.	Not needed	Moderate water-holding capacity.
Fair stability; moderate to slow permeability; water table generally within a depth of 20 inches; medium to low shearing strength; low resistance to piping and cracking; medium to high compressibility; good to very poor compaction.	Slow seepage; moderate to slow permeability.	Adequate stability and strength; semi-impervious after compaction; high content of organic matter; medium to low shearing strength; low resistance to piping and cracking; medium to high compressibility; good to very poor compaction.	High water table; drainage needed for cultivated crops; few outlets.	High water-holding capacity.
Poor stability; very slow permeability; water	Slow seepage; very slow permeability.	Low stability and strength; very slow	High water table; ponded in most places; no	Not suitable.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Sunset (SkA, SkB, SmA, SnA)	Good	Not suitable	Fair if slopes are flat; medium shearing strength; medium to low resistance to cracking; slight to medium compressibility; good to poor compaction.	Water table below a depth of 40 inches; low plasticity; medium susceptibility to frost action.
Syracuse (So, Sy)	Fair	Not suitable	Fair to good; high shearing strength; medium resistance to cracking; slight compressibility; good compaction.	Water table generally at a depth of 20 to 40 inches; low plasticity; low susceptibility to frost action.
Terminal (Ta)	Poor	Not suitable	Poor to fair if slopes are flat; medium to low shearing strength; low resistance to cracking; medium to high compressibility; good to poor compaction.	Water table at a depth of 20 to 40 inches; low to high plasticity; high susceptibility to frost action.
Timpanogos (TbA, TbB, TbC, TbD2, TbE2, TDD). (For interpretations of Draper soils in mapping unit TDD, refer to the Draper series.)	Good	Not suitable	Fair if slopes are flat; medium shearing strength; low resistance to cracking; slight to medium compressibility; good to poor compaction.	Moderately deep to water table in some places; low plasticity; medium susceptibility to frost action.
Timpanogos, noncalcareous variant	Good	Not suitable	Fair if slopes are flat;	Moderately deep to

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Fair stability; moderate permeability; water table below a depth of 40 inches; medium shearing strength; medium to low resistance to piping and cracking; slight to medium compressibility; good to poor compaction.	Moderate to rapid seepage; moderate permeability.	Adequate strength and stability; semi-impervious after compaction; moderate permeability; medium shearing strength; medium to low resistance to piping and cracking; slight to medium compressibility; good to poor compaction; toe drains needed.	Deep or moderately deep to water table; drainage needed in places for deep-rooted crops; moderately to strongly affected by salt and alkali in places.	High water-holding capacity.
Fair stability; moderately rapid permeability;	Rapid seepage; moderately rapid permeabil-	Adequate strength and stability; semi-imper-	Moderately deep to water table; most	Low water-holding capacity.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Trenton (TrB2, TrC3)	Poor	Not suitable	Fair if slopes are flat; medium shearing strength; medium compressibility; medium to low resistance to cracking; good to poor compaction.	Water table below a depth of 20 inches; high to low plasticity; high susceptibility to frost action.
Warm Springs (WaA, WaB, WdA,	Fair	Not suitable	Fair to good if slopes	Water table below a

interpretations of soils—Continued

Soil features affecting—Continued				
Dikes or levees	Farm ponds		Agricultural drainage	Irrigation
	Reservoir areas	Embankments		
Fair stability; very slow permeability; water table below a depth of 20 inches; medium to low shearing strength; medium to low resistance to piping and cracking; good to poor compaction.	Moderate to rapid seepage; very slow permeability.	Adequate stability and strength; toe drains and clay blanket may be needed; very slow permeability; medium shearing strength; high compressibility; medium to low resistance to piping and cracking; good to poor compaction.	Drainage and reclamation needed for cultivated crops; seasonally high water table; moderately affected by salt and alkali.	High water-holding capacity.
Fair stability; moderate [illegible]	Moderate to rapid [illegible]	Adequate strength and [illegible]	Many areas have been [illegible]	Medium water-holding [illegible]

TABLE 7.—*Engineering*

[Tests performed by the Bureau of Public Roads (BPR) in accordance with standard

Soil name and location	Depth	Horizon	Mechanical analysis [1]				
			Percentage passing sieve [2]				
			1½-in.	1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)
Kilburn gravelly sandy loam:	*Inches*						
NW¼ of sec. 21, T. 5 N., R. 1 W.	0–9	Ap	100	97	91	75	68
	9–21	B2	100	94	86	73	65
	21–49	C1 and C2	[5] 93	82	72	53	42
NE¼ of sec. 11, T. 5 N., R. 2 W.	0–5	Ap	100	99	96	87	83
	5–17	B1 and B2	100	98	95	85	80
	17–40	C1 and C2	[8] 87	77	66	46	35
SW¼ of sec. 12, T. 5 N., R. 2 W.	0–9	A1	100	97	92	80	75
	9–24	B1 and B2	[9] 99	91	84	68	60
	24–54	C1 and C2	[9] 99	83	74	52	40
Kidman fine sandy loam:							
NW¼ of sec. 17, T. 6 N., R. 2 W.	0–7	Ap and A12					

test data

procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Mechanical analysis [1]—Continued							Liquid limit	Plasticity index	Classification	
Percentage passing sieve [2]—Con.			Percentage smaller than [2]—							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [3]	Unified [4]
65	55	35	31	21	12	8	19	3	A–2–4(0)	SM.
60	49	30	26	18	11	8	21	6	A–2–4(0)	GC–SC.
35	25	8	7	5	3	3	[6] NL	[7] NP	A–1–a(0)	GP–GM.
80	70	34	30	21	12	8	18	3	A–2–4(0)	SM.
76	67	33	30	20	11	8	18	4	A–2–4(0)	SM–SC.
29	24	6	6	5	3	3	NL	NP	A–1–a(0)	GW–GM.
72	65	34	29	18	10	8	18	1	A–2–4(0)	SM.
55	48	24	20	13	8	7	20	3	A–1–b(0)	GM.
33	24	8	6	5	2	2	NL	NP	A–1–a(0)	GW–GM.
	100	59	50	34	19	14	22	5	A–4(5)	ML–CL.
	100	52	45	28	17	13	20	3	A–4(3)	ML.
	100	83	73	42	19	12	24	3	A–4(8)	ML.
100	99	73	67	41	20	13	22	3	A–4(8)	ML.
100	99	79	72	48	28	22	27	10	A–4(8)	CL.
100	99	79	75	51	25	19	25	5	A–4(8)	ML–CL.

TABLE 7.—*Engineering*

Soil name and location	Depth	Horizon	Mechanical analysis [1]				
			Percentage passing sieve [2]				
			1½-in.	1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)
Syracuse loamy fine sand:	*Inches*						
NE¼ of sec. 23, T. 5 N., R. 3 W.	0–18	A1 and C1					
	18–37	C2ca					
	37–66	C3					
SE¼ of sec. 12, T. 5 N., R. 3 W.	0–18	Ap and AC					
	18–38	C1ca and C2ca					
	38–62	C3ca					
SE¼ of sec. 15, T. 5 N., R. 3 W.	0–21	Ap and AC					

test data—Continued

Mechanical analysis [1]—Continued			Classification	
Percentage passing sieve [2]—Con.	Percentage smaller than [2]—	Liquid limit	Plasticity index	

Some of the soil features to consider in evaluating suitability for irrigation are intake rate, permeability, suitability for farming, and water-holding capacity. The steeper slopes of the Chance soils are best irrigated by sprinklers. Frequent irrigations are necessary because

from about 71,500 in 1950 to 174,500 in 1960, or about 240 percent. Approximately 14,000 new homes were built in the area between 1940 and 1960. The increase in population created a demand for schools, parks, playgrounds, golf courses, and other public services and facilities. The

TABLE 8.—*Limitations of soils for use in community development*—Continued

Map symbol	Soil	Low building foundations	Septic tank systems	Untreated steel pipe	Concrete conduits	Landscaping	Recreation areas
AS	Arave-Saltair complex:						
	Arave soil	Severe	Severe	Severe	Severe	Very severe	Very severe.
	Saltair soil	Very severe	Very severe	Very severe	Very severe	Very severe	Very severe
BaE	Barton rocky loams, 5 to 30 percent slopes.	Moderate	Moderate to severe.	Very slight	Slight	Severe	Moderate to severe.
BrG	Barton very rocky loams, 30 to 40 percent slopes.	Very severe	Severe	Very slight	Slight	Severe	Very severe.
CaA	Chance loam, 0 to 3 percent slopes	Very severe	Severe	Moderate	Moderate	Severe	Severe.
ClA	Chance-Ironton complex, 0 to 3 percent slopes:						
	Chance soil	Very severe	Severe	Moderate	Moderate	Severe	Severe.
	Ironton soil	Very severe	Severe	Moderate	Moderate	Moderate	Moderate.
Co	Cobbly alluvial land						
Cr	Croy loam	Severe	Very severe	Severe	Severe	Very severe	Very severe.
CuA	Cudahy silt loam, 0 to 3 percent slopes	Very severe	Very severe	Moderate	Moderate	Severe	Severe.
DaA	Draper loam, 0 to 1 percent slopes	Severe	Severe	Moderate	Slight	Moderate	Moderate.
DaB	Draper loam, 1 to 3 percent slopes	Severe	Severe	Moderate	Slight	Moderate	Moderate.

TABLE 8.—*Limitations of soils for use in community development*—Continued

TABLE 8.—*Limitations of soils for use in community development*—Continued

Map symbol	Soil	Low building foundations	Septic tank systems	Untreated steel pipe	Concrete conduits	Landscaping	Recreation areas
Le	Leland silt loam	Very severe	Very severe	Severe	Severe	Very severe	Very severe.
LHA	Leland-Harrisville silt loams, 0 to 1 per-						

TABLE 8.—*Limitations of soils for use in community development*—Continued

Map symbol	Soil	Low building foundations	Septic tank systems	Untreated steel pipe	Concrete conduits	Landscaping	Recreation

Although the detailed soil map and the table serve as a guide for evaluating most soils, a detailed investiga-

are rated moderate. Poorly drained and very poorly drained soils that have a shallow water table are rated

TABLE 9.—*Approximate acreage and proportionate extent of the soils*

Map symbol	Soil	Area	Extent	Map symbol	Soil	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
Aa	Abbott clay	200	0. 1	IaC	Ironton silt loam, 3 to 6 percent slopes	188	0. 1
AbB	Ackmen loam, 1 to 3 percent slopes	883	. 4	IcA	Ironton silt loam, moderately alkali, 0 to 1 percent slopes	414	. 2
AbC	Ackmen loam, 3 to 6 percent slopes	1, 029	. 5	IDA	Ironton-Draper complex, 0 to 3 percent slopes	879	. 4
AbD	Ackmen loam, 6 to 10 percent slopes	479	. 2	KaA	Kidman fine sandy loam, 0 to 1 percent slopes	12, 150	5. 5
AbE2	Ackmen loam, 10 to 20 percent slopes, eroded	209	. 1	KaB	Kidman fine sandy loam, 1 to 3 percent slopes	6, 625	3. 0
Ac	Airport silt loam	1, 770	. 8	KaC	Kidman fine sandy loam, 3 to 6 percent slopes	899	. 4
Ad	Airport silty clay loam	512	. 2	KaD	Kidman fine sandy loam, 6 to 10 percent slopes	410	. 2
Ae	Airport soils, shallow water table	267	. 1	KaE2	Kidman fine sandy loam, 10 to 20 percent slopes, eroded	307	. 1
AF	Airport-Ford complex	491	. 2	KbA	Kilburn sandy loam, 0 to 1 percent slopes	876	. 4
AS	Arave-Saltair complex	7, 068	3. 2	KbB	Kilburn sandy loam, 1 to 3 percent slopes	79	(1)
BaE	Barton rocky loams, 5 to 30 percent slopes	437	. 2	KbC	Kilburn sandy loam, 3 to 6 percent slopes	89	(1)
BrG	Barton very rocky loams, 30 to 40 percent slopes	1, 104	. 5	KcA	Kilburn stony sandy loam, 0 to 3 percent slopes	264	. 1
CaA	Chance loam, 0 to 3 percent slopes	171	. 1	KFE2	Kilburn-Francis association, 10 to 20 percent slopes, eroded	95	(1)
CIA	Chance-Ironton complex, 0 to 3 percent slopes	50	(1)	KFF2	Kilburn-Francis association, 20 to 30 percent slopes, eroded	539	. 2
Co	Cobbly alluvial land	417	. 2	KFG2	Kilburn-Francis association, 30 to 50 percent slopes, eroded	6, 185	2. 8
Cr	Croy loam	883	. 4	KgB	Kilburn gravelly sandy loam, 1 to 3 percent slopes	289	. 1
CuA	Cudahy silt loam, 0 to 3 percent slopes	660	. 3	KgC	Kilburn gravelly sandy loam, 3 to 6 percent slopes	822	. 4
DaA	Draper loam, 0 to 1 percent slopes	200	. 1	KgD	Kilburn gravelly sandy loam, 6 to 10 percent slopes	1, 774	. 8
DaB	Draper loam, 1 to 3 percent slopes	244	. 1	KgE2	Kilburn gravelly sandy loam, 10 to 20 percent slopes, eroded	1, 550	. 7
DrA	Draper loam, drained, 0 to 1 percent slopes	885	. 4	KIC	Kilburn cobbly sandy loam, 3 to 10 percent slopes	1, 028	. 5
DrB	Draper loam, drained, 1 to 3 percent slopes	1, 325	. 6	KIE2	Kilburn cobbly sandy loam, 10 to 20 percent slopes, eroded	2, 210	1. 0
DrC	Draper loam, drained, 3 to 6 percent slopes	435	. 2	KmA	Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes	2, 172	1. 0
DsB	Draper gravelly loam, gravelly subsoil variant, 1 to 3 percent slopes	116	. 1	KmC	Kilburn gravelly sandy loam, deep over clean sands, 3 to 10 percent slopes	248	. 1
DsC	Draper gravelly loam, gravelly subsoil variant, 3 to 6 percent slopes	233	. 1	Kr	Kirkham loam	204	. 1
Fa	Ford loam	2, 210	1. 0	Ks	Kirkham silty clay loam	886	. 4
Fb	Ford loam, shallow water table	883	. 4	Kt	Kirkham silty clay loam, strongly alkali	765	. 3
FcB	Francis loamy fine sand, 0 to 3 percent slopes	652	. 3	KX	Kirkham-Airport silty clay loams	589	. 3
FcC	Francis loamy fine sand, 3 to 6 percent slopes	615	. 3	La	Lakeshore silt loam	3, 350	1. 5
FcD	Francis loamy fine sand, 6 to 10 percent slopes	850	. 4	Lb	Lakeshore fine sandy loam	4, 650	2. 1
FcE2	Francis loamy fine sand, 10 to 20 percent slopes, eroded	888	. 4	LcB	Layton loamy fine sand, 0 to 3 percent slopes	5, 525	2. 5
FcF2	Francis loamy fine sand, 20 to 30 percent slopes, eroded	73	(1)	LcC	Layton loamy fine sand, 3 to 6 percent slopes	425	. 2
FKG2	Francis-Kidman complex, 20 to 50 percent slopes, eroded	689	. 3	LcD	Layton loamy fine sand, 6 to 10		
Go	Gooch silt loam	718	. 3				
Gs	Gooch silt loam, strongly alkali	800	. 4				
HaA	Harrisville silt loam, 0 to 1 percent slopes	1, 082	. 5				
HaB	Harrisville silt loam, 1 to 3 percent slopes	880	. 4				
HaC	Harrisville silt loam, 3 to 6 percent slopes	118	. 1				
HLA	Harrisville-Leland complex, 0 to 1 percent slopes	1, 101	. 5				
HMG2	Hillfield-Marriott complex, 30 to 60 percent slopes, eroded	496	. 2				
HnD2	Hillfield soils, 6 to 10 percent slopes,						

TABLE 9.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Soil	Area	Extent	Map symbol	Soil	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
Lw	Logan silty clay loam, shallow water table	543	0. 2	SdA	Steed gravelly fine sandy loam, 0 to 2 percent slopes	484	0. 2
Ma	Made land	225	. 1	SeA	Steed gravelly fine sandy loam, 0 to 2 percent slopes, channeled	414	. 2
McE2	Marriott cobbly sandy loam, 10 to 30 percent slopes, eroded	132	. 1	SfD	Sterling gravelly loam, 6 to 10 percent slopes	269	. 1
MgD	Marriott gravelly sandy loam, calcareous variant, 6 to 10 percent slopes	442	. 2	SgE	Sterling cobbly loam, 8 to 20 percent slopes	467	. 2
MgE2	Marriott gravelly sandy loam, calcareous variant, 10 to 20 percent slopes, eroded	242	. 1	ShF2	Sterling very rocky loam, 6 to 50 percent slopes, eroded	583	. 3
MrA	Martini fine sandy loam, 0 to 1 percent slopes	717	. 3	SkA	Sunset loam, 0 to 1 percent slopes	5, 740	2. 6
MtA	Martini fine sandy loam, 0 to 1 percent slopes, channeled	345	. 2	SkB	Sunset loam, 1 to 3 percent slopes	362	. 2
				SmA	Sunset loam, strongly alkali, 0 to 1 percent slopes	630	. 3
				SnA	Sunset loam, gravelly substratum, 0 to 1 percent slopes	732	. 3

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and range site in which the mapping unit has been placed. The pages on which each capability unit and range site is described can be found by referring to the "Guide to Mapping Units" at the back of this survey.

Soil scientists, engineers, students, and others interested in detailed descriptions of the soils should turn to the section "Formation, Morphology, and Classification of Soils." Many terms used in the soil descriptions and other sections are defined in the Glossary and the "Soil Survey Manual" (*16*).

Abbott Series

Ahe Abbott series consists of deep, poorly drained, fine-textured soils that are in nearly level depressions. These soils formed on low lake terraces in fine-textured sediments. Elevations range from about 4,225 to 4,300 feet above sea level.

The surface layer is gray, very firm clay 2 to 7 inches thick. The subsoil [illegible]

fans and in drainageways of intermittent streams on high lake terraces. Elevations range from 4,400 to 5,300 feet above sea level.

The surface layer is very dark brown or very dark grayish-brown, friable loam that has fine granular structure and ranges from 5 to 18 inches in thickness. The subsoil and substratum are similar to the surface layer but become somewhat lighter in color as depth increases. The deeper layers are stratified.

Ackmen soils are commonly near the Kilburn, Timpanogos, and Parleys soils. The native vegetation consisted mainly of brushy Gambel oaks, bunch grasses, and sagebrush.

The Ackmen soils are used mainly for irrigated crops and orchards. The steeper areas are used for range.

Ackmen loam, 1 to 3 percent slopes (AbB).—This soil occurs mainly on the gently sloping, lower part of alluvial fans. It occurs mainly with Kilburn gravelly sandy loam.

A representative profile:

0 to 6 inches, very dark brown loam; friable; granular structure; neutral.
6 to 32 inches, very dark brown loam; friable; prismatic and fine granular structure; neutral.

[illegible]

Runoff is medium, and the hazard of erosion is moderate.

Almost all of this soil is used for irrigated crops. Well-suited crops are cherries, peaches, apricots, alfalfa, and small grains. Hay crops and improved pastures are also well suited. (Capability unit IIIe–2; not used for range)

Ackmen loam, 6 to 10 percent slopes (AbD).—This moderately extensive soil occurs on the upper part of strongly sloping alluvial fans where generally it is asso-

moderately affected by salts and alkali. These soils formed in moderately fine textured, mixed lake sediments on low lake terraces that are nearly level and gently sloping. Elevations range from about 4,200 to 4,300 feet above sea level.

The surface layer is very dark gray or very dark grayish-brown, friable silt loam or silty clay loam ranging from 7 to 12 inches in thickness. The subsoil is silty clay loam and ranges from very dark gray to olive brown

coarser textured subsoil and substratum. The surface lake sediments. Elevations range from 4,205 to 4,220 feet

The surface layer is very dark grayish-brown, friable, gravelly, cobbly, or stony loam that ranges from about 6 to 16 inches in thickness. The subsoil is also very dark grayish brown and friable, but in most places it contains more pebbles, cobbles, and stones than the surface layer. The substratum is very cobbly or very stony loam or sandy loam.

The soils in this series are used mainly for range that is grazed in spring and in fall.

Barton rocky loams, 5 to 30 percent slopes (BaE).—These soils occur on the rolling foothills in the Little Mountain area in the western part of Weber County. About 45 percent is gravelly loam, 45 percent is stony loam, and about 10 percent is Rock outcrop. These areas are so intermingled that they cannot be shown separately on a publishable map.

A representative profile of Barton gravelly loam:

0 to 13 inches, very dark grayish-brown gravelly loam; friable; granular structure; neutral.
13 to 19 inches, very dark grayish-brown gravelly loam; friable; subangular blocky structure; neutral.
19 to 31 inches, dark grayish-brown, very cobbly loam; friable; massive; neutral.
31 inches +, very cobbly sandy loam.

The surface layer ranges from 8 to 16 inches in thickness. About 20 to 50 percent of its volume is pebbles and cobbles. About 3 percent of the surface of the stony loam is covered by stones; otherwise, the stony loam is similar to the gravelly loam.

Included with these soils in mapping were areas of gravelly sandy loam. Also included were some areas of Rock outcrop.

These soils are well drained and have moderate and moderately rapid permeability. They hold about 1.2 inches of available water per foot, or about 6 inches to a depth of 5 feet. Roots penetrate deeply, and natural fertility is moderate to moderately low. Runoff is medium, and the hazard of erosion is moderate.

These soils are used mainly for range that is grazed in spring, but some areas are used for industrial development. Elevations range from 4,220 to 4,500 feet above sea level.

The surface layer is black, friable loam that ranges from about 8 to 16 inches in thickness. The subsoil is very dark gray, firm, subangular blocky silt loam. In most places the substratum is stratified and ranges from loamy fine sand to silt loam. The water table of these soils is within 30 inches of the surface, and mottling is distinct.

Chance soils are commonly near the Draper, Woods Cross, Ironton, and Roshe Springs soils. The vegetation is wiregrass, sedges, Kentucky bluegrass, and saltgrass.

Chance soils are used for native pasture and hay.

Chance loam, 0 to 3 percent slopes (CaA).—This soil occurs in slight depressions on low lake terraces, mainly about 1 mile west of Farmington. Slopes are dominantly less than 1 percent and are smooth or slightly undulating.

A representative profile:

0 to 8 inches, black loam; friable; granular or subangular blocky structure; moderately calcareous; mildly alkaline.
8 to 19 inches, very dark gray silt loam; firm; subangular blocky structure; noncalcareous; mildly alkaline.
19 to 57 inches, grayish-brown loamy fine sand; very friable; massive; distinct mottles; noncalcareous or slightly calcareous; moderately alkaline.
57 to 72 inches, gray fine sandy loam; very friable; massive; distinct mottles; slightly calcareous; moderately alkaline.

The surface layer normally is noncalcareous, but in places it is moderately calcareous as a result of flooding by limy water. Depth to the water table, which fluctuates seasonally, ranges from about 1 inch to 20 inches.

Included with this soil in mapping were small areas that are permanently ponded.

This soil is poorly drained and has moderate permeability. It holds about 2 inches of available water per foot, or about 10 inches to a depth of 5 feet. Roots penetrate to a depth of 5 feet or more. Natural fertility is high. Runoff is slow, and the hazard of erosion is not

improved pasture, corn, small grains, sugarbeets, and truck crops. (Chance soil is in capability unit IIIw–2 and Wet Meadow range site; Ironton soil is in capability unit IIw–4 and Semiwet Meadow range site)

Cobbly Alluvial Land

Cobbly alluvial land (Co) consists dominantly of cob-

inches but is generally between 30 and 36 inches. Thickness of the hardpan ranges from 3 to 40 inches. In places there are two or more thin layers of hardpan that are separated by lenses of fine sandy loam or silt loam. This soil is moderately affected by salts and alkali. The water table fluctuates seasonally, but it is generally between depths of 30 and 48 inches.

Included with this soil in mapping were small areas

This soil is poorly drained. It is moderately to slowly permeable above the hardpan and very slowly permeable in it. Above the pan, about 2.2 inches of available water per foot of soil is held, or a total of about 4 to 6 inches. Roots penetrate only to the hardpan. Natural fertility is moderately high. Runoff is slow, and the hazard of erosion is not more than slight. This soil is friable and easy to till.

Open drains and tile have been installed in some areas. Cultivated crops are grown on about 55 percent of this soil, and other areas are in native pasture or hay. Where is not more than slight. This soil is friable, is easy to work, and has high natural fertility.

Most of this soil is used for irrigated crops and for community developments. About 25 percent of the acreage is in native pasture or hay. The main crops are alfalfa, corn, small grains, sugarbeets, and tomatoes and other truck crops. Where drainage is adequate, this soil is well suited to irrigation and to many kinds of crops. (Capability unit IIw–3; Semiwet Meadow range site)

Draper loam, drained, 1 to 3 percent slopes (DrB).—This soil occurs mainly on gently sloping fans and flood

improved pasture and to irrigated sugarbeets, corn, small grains, and truck crops. (Capability unit IIw–3; Semiwet Meadow range site)

Draper loam, 1 to 3 percent slopes (DaB).—This soil occurs in slight depressions on flood plains. It is slightly susceptible to erosion. It is more sloping than Draper loam, drained, 0 to 1 percent slopes, and has a water table nearer the surface. The water table is generally at a depth of 25 to 36 inches.

This soil is used mainly for unimproved pasture. A de-

Ford soils are commonly near the Airport, Payson, and Warm Springs soils. The native vegetation is mainly saltgrass, alkali sacaton, and greasewood.

These soils are used mainly as range.

Ford loam (Fa).—This soil occurs on smooth, level or nearly level low lake terraces near the breaks from higher terraces. It is moderately affected by salts and alkali. In most places it occurs with Airport silt loam and Warm Springs fine sandy loam. Slopes are less than 1 percent.

and the salts and alkali removed, it can be used for irrigated improved pasture and an occasional crop of small grain. (Capability unit IVw–3; Salt Meadow range site)

Francis Series

The Francis series consists of deep, well-drained to somewhat excessively drained, nearly level to steep, sandy soils. These soils are on high lake terraces, mainly near

layer ranges from about 7 to 14 inches in thickness. In some places a small amount of fine gravel occurs throughout the profile, and in other places a gravelly substratum is below a depth of 36 inches.

Included with this soil in the mapping were small areas that have slopes of more than 6 percent, areas of sandy loam, and a few small areas of gravelly sandy loam. Also included is a small area that has an overwash of loam 5 to 6 inches thick.

All of this soil is used as range or watersheds. Cultivated crops are not suited. (Capability unit VIs–1; Upland Sand range site)

Francis-Kidman complex, 20 to 50 percent slopes, eroded (FKG2).—The soils in this complex are gently rolling and occur mainly on north-facing terrace escarpments along the south side of the valley of the Weber River. About 70 percent of the complex is Francis loamy fine sand on slopes of 30 to 50 percent, and 30 percent is Kidman fine sandy loam on slopes of 20 to 30 percent.

40 inches, but in some areas the water table is at or near the surface most of the time. The effect of salts and alkali ranges mainly from slight to moderate.

Included with this soil in mapping were small areas of silty clay loam and some areas that are strongly affected by salts and alkali.

This soil is somewhat poorly drained and poorly drained and has slow permeability. It holds about 1.2 to 1.5 inches of available moisture per foot, or about 6 to 8 inches to a depth of 5 feet.

A representative profile:

0 to 8 inches, very dark grayish-brown silt loam; friable; granular structure; slightly calcareous; moderately alkaline.
8 to 14 inches, brown to dark-brown silty clay loam; firm; prismatic structure; moderately calcareous; strongly alkaline.
14 to 33 inches, brown silty clay loam; firm; subangular blocky structure; strongly calcareous; strongly alkaline.

Harrisville-Leland complex, 0 to 1 percent slopes (HLA).—This complex consists of large areas of nearly level and gently undulating soils on low lake terraces in the north-central part of the survey area. It is about 60 percent Harrisville silt loam, 0 to 1 percent slopes, and about 40 percent Leland silt loam. Each of these soils is described in its respective series. Normally, the Harrisville soil is on low knolls, and the Leland soil is in slight

6 to 21 inches, dark-brown silt loam; slightly hard or friable; subangular blocky structure; strongly calcareous; mildly to moderately alkaline.
21 to 60 inches, brown, stratified very fine sandy loam and clay loam; friable; thick platy structure; strongly calcareous; moderately alkaline.

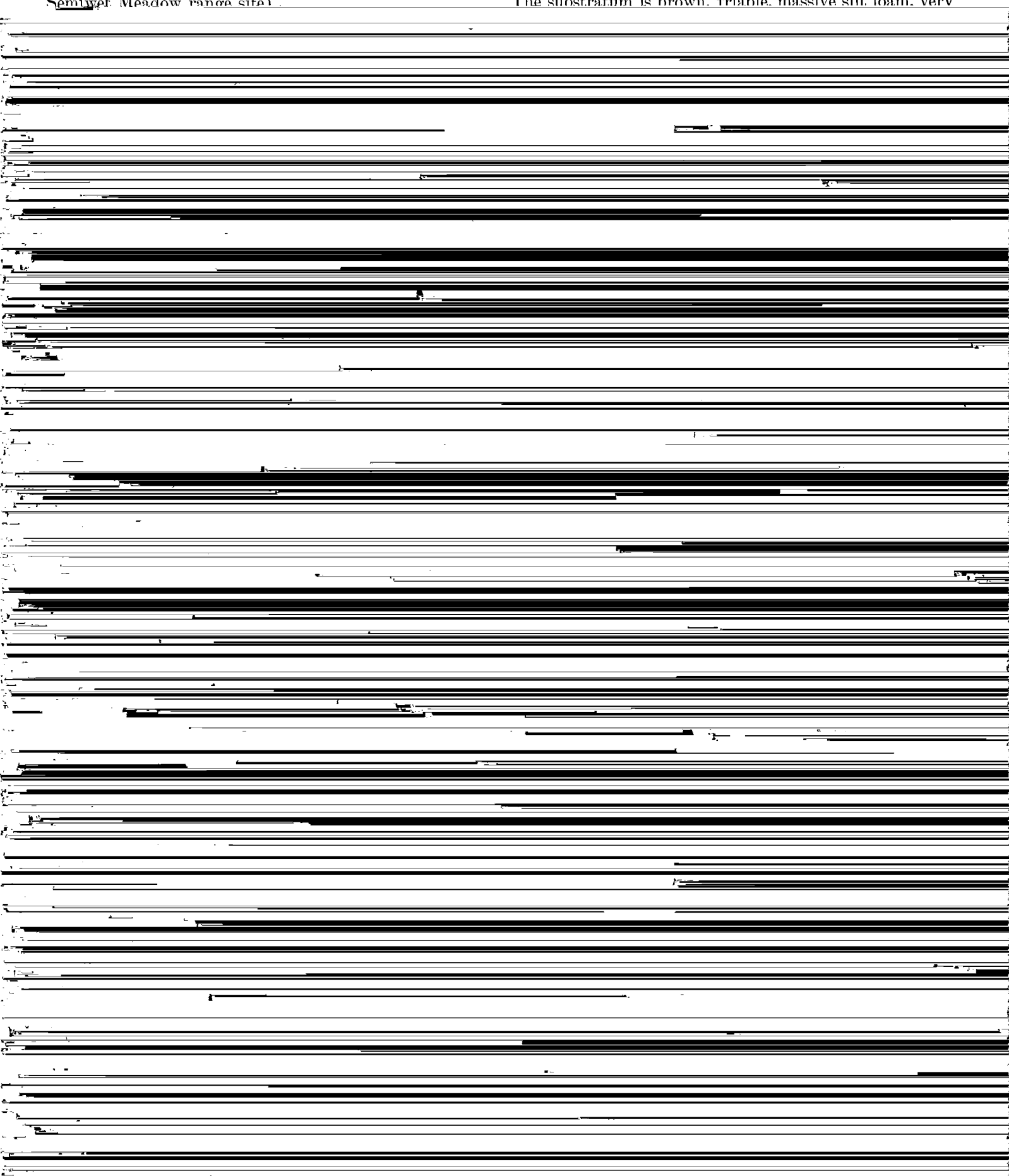
The surface layer of Hillfield soils ranges from about 2 to 6 inches in thickness and from fine sandy loam to silt

orchards and to irrigated improved pasture. (Capability unit IIIe–3; Upland Loam range site)

Hillfield soils, 10 to 20 percent slopes, eroded (HnE2).—These moderately steep, moderately eroded soils occur mainly on the south and west faces of escarpments. About 60 percent of the mapping unit is Hillfield soils that have a silt loam surface layer, and 40 percent is Hillfield

suited after this soil is drained. (Capability unit IIIw–1; Semiwet Meadow range site)

fine sandy loam that has subangular blocky structure. The substratum is brown, friable, massive silt loam, very



erate in areas that are left bare during winter and spring.

Most of this soil is used for irrigated crops. The main crops are alfalfa, sugarbeets, tomatoes, corn, small grains,

Kilburn Series

The Kilburn series consists of deep and moderately deep, well-drained and excessively drained soils that are

Kilburn gravelly sandy loam, 1 to 3 percent slopes (KgB).—This nearly level soil occurs mainly on the lower part of smooth alluvial fans. It is next to Kilburn gravelly sandy loam, 6 to 10 percent slopes, and is similar to that soil but less sloping. Gravel occurs through-

high and depends on the percentage of slope and the kind and amount of vegetation.

Most areas of this soil are higher than the irrigation canals and are used as range and watersheds. Some areas are used for community developments. About 35

35 inches +, dark-brown sand mixed with pebbles and cobbles; loose; single grain; neutral.

The surface layer ranges from about 13 to 18 inches in thickness. From 25 to 40 percent of the surface layer, by volume, is gravel. Below a depth of 20 inches, the soil mass is 50 to 80 percent coarse fragments. Depth to clean sand and gravel ranges from 25 to 45 inches.

Included with this soil in mapping were areas of gravelly sandy loam to gravelly very fine sandy loam. Also included were small areas of nongravelly soils and a few areas of cobbly soils.

This soil absorbs moisture readily and is somewhat excessively drained. Permeability is moderately rapid or rapid. The available water capacity is about 1 inch per

This soil is well drained and rapidly permeable. The available water capacity is about 1.2 inches per foot of soil in the upper 2 feet and about 0.5 to 0.7 inch per foot in the gravelly and cobbly materials below a depth of 2 feet. The total available water capacity to a 5-foot depth is about 3.5 to 4.0 inch. Natural fertility is moderate. Runoff is slow. The hazard of water erosion is none to slight, but the hazard of soil blowing is slight to moderate. This soil is friable and easily tilled.

Most of the acreage is used for cultivated crops, but some is used in community developments. This soil is well suited to cherry, apricot, and peach orchards, to irrigated improved pasture, and to alfalfa and small grains. Sprinklers permit the most efficient use of irrigation

areas that have slopes steeper than 3 percent. Also included were several gravel pits that provide commercial gravel and sand.

This soil is very rapidly permeable and is excessively drained. Runoff is slow to medium, and the hazard of erosion is slight to moderate.

This soil is not suited to cultivated crops. It is used mainly as range, for which it is suited. (Capability unit VIs–1; Upland Gravelly Loam range site)

Kilburn-Francis association, 10 to 20 percent slopes, eroded (KFE2).—This soil association occurs on the foot slopes of the Wasatch Mountains. About 75 percent of the association is Kilburn gravelly sandy loam, 10 to 20 percent slopes, eroded, and about 25 percent is Francis loamy fine sand, 10 to 20 percent slopes, eroded. Each of these soils is described under its respective series.

Included in areas mapped as this association are small areas that have a stony surface layer.

Runoff is medium, and the hazard of erosion is moderate to high.

The soils in this association are used mostly as range and for watersheds. They are generally above the highest irrigation canals, but they are suitable for cherry, apricot, and peach orchards if irrigation water is provided. (Both soils in capability unit IVs–3; Kilburn soil in Upland Gravelly Loam range site; Francis soil in Upland Sand range site)

Kilburn-Francis association, 20 to 30 percent slopes, eroded (KFF2).—This association consists of soils on high, moderately steep alluvial fans along the base of the Wasatch Mountains. About 75 percent of the association is Kilburn soils that have a surface layer of gravelly sandy loam and slopes of 20 to 30 percent; about 25 percent is Francis loamy fine sand, 20 to 30 percent slopes, eroded. The differences between these soils are not great enough to justify mapping the soils as separate units. Except for steeper slopes, the soils in this association are similar to soils of the Kilburn-Francis association, 10 to 20 percent slopes, eroded.

Included in areas mapped as this association are small areas of Rock outcrop and some areas that have a stony or very stony surface layer.

Runoff in this association is moderately rapid, and the hazard of erosion is high.

Upland Gravelly Loam range site; Francis soil is in Upland Sand range site)

Kirkham Series

The Kirkham series consists of deep, somewhat poorly drained, medium-textured and moderately fine textured soils. These soils are nearly level and occur on flood plains in the northwestern part of the survey area. They formed in mixed alluvium. Elevations range from 4,210 to 4,500 feet above sea level.

The surface layer is very dark grayish-brown, firm silty clay loam or loam 7 to 18 inches thick. The subsoil and substratum are similar to the surface layer, but their color becomes somewhat lighter as depth increases. Textural stratification is common in the substratum.

Kirkham soils commonly are near the Sunset soils and, in places, are near the Airport soils. The native vegetation is mainly saltgrass, wiregrass, greasewood, and povertyweed.

The Kirkham soils are used mainly for irrigated crops and for pasture.

Kirkham silty clay loam (Ks).—This soil is on the lower part of the flood plain of the Weber River. It is smooth or gently undulating and has slopes of less than 1 percent.

A representative profile:

0 to 13 inches, very dark grayish-brown silty clay loam; firm; granular structure; moderately calcareous; mildly alkaline.
13 to 34 inches, dark-brown silty clay loam; firm; massive; moderately calcareous; moderately alkaline.
34 to 68 inches, brown or dark-brown silt loam and fine sandy loam; friable; massive; common distinct mottles; moderately calcareous; moderately alkaline.

The surface layer is about 7 to 15 inches thick. This soil cracks when it dries. The cracks are ½ inch to 2 inches wide and as much as 18 inches deep. Below a depth of 30 inches the texture ranges mainly from silty clay loam to fine sandy loam. Depth to the water table fluctuates seasonally and is highest during periods when the soil is irrigated. Distinct mottles are common below a depth of 24 inches.

Included with this soil in the mapping were small areas

undulating flood plains of the Weber River. It is next to Refuge and Wayment soils. This soil is similar to

but a few spots are cultivated. Drained and reclaimed areas are well suited to irrigated improved pasture and

All of this soil is used as range, but the yields of herbage are very low. Because it is in low positions where drainage outlets are few, this soil is difficult to drain and reclaim. (Capability unit VIIw–1; Alkali Bottom range site)

Layton Series

The Layton series consists of deep, well-drained and

soil is well suited. Improved pasture is alternated with crops. Sprinklers permit the most efficient use of irrigation water. (Capability unit IIs–2; not used for range)

Layton loamy fine sand, 3 to 6 percent slopes (lcC).—This inextensive soil is on moderately sloping terrace escarpments. It is next to Layton loamy fine sand, 0 to 3 percent slopes, and is similar to that soil but is more sloping. The surface layer is 10 to 14 inches thick. Erosion is a moderate hazard.

Leland soils are used mainly as range. In a few small areas, part of the salts and alkali has been removed, and the soils are used for those irrigated crops that tolerate alkali.

and occur on low lake terraces. The complex occurs in two general areas. One is in the extreme north-central part of the survey area; the other is east of Hooper and extends southward. Leland silt loam makes up about 60

Logan soils are used mainly for native pasture and hay. Some areas that have been drained and reclaimed from damage by salts and alkali are used for irrigated crops.

Logan silty clay loam (Lt).—This soil is on smooth depressions on low lake terraces and flood plains. It occurs in the northern part of the survey area north and northwest of Ogden and in the southwestern part west of Centerville and Bountiful. Slopes range from 1 to 3 percent but are dominantly less than 1 percent.

A representative profile:

0 to 12 inches, black silty clay loam; friable; granular structure; strongly calcareous; moderately alkaline.
12 to 29 inches, olive-gray silty clay loam; firm; subangular blocky structure; strongly calcareous; moderately alkaline.
29 to 46 inches, light brownish-gray silt loam; firm; massive; distinct mottles; strongly calcareous; moderately alkaline.
46 to 60 inches, olive, stratified fine sand, fine sandy loam, and silty clay; firm; distinct mottles; strongly calcareous; moderately alkaline.

The surface layer ranges from about 10 to 18 inches in thickness and has a high content of organic matter. Depth to the water table ranges from about 18 to 40 inches. Some areas of this soil have been drained.

Included with this soil in the mapping were small areas of organic soils that have a layer of peat, as much as 5 inches thick, on the surface. Also included were small areas that range from clay loam to silt loam. Some inclusions have a moderately permeable substratum, and some are slightly affected by salts and alkali.

This soil is poorly drained and is slowly or very slowly permeable. It holds about 2.2 inches of available water per foot of soil, or about 10 to 11 inches to a depth of 5 feet. Roots generally penetrate to the water table. Runoff is slow, and the hazard of erosion is slight. Tillage is moderately difficult.

This soil is used mainly for hay and unimproved pasture. About 25 percent of the acreage is drained and used for irrigated crops, mainly corn, small grains, sugarbeets, and truck crops. This soil is suited to cultivated crops only if it is drained. Drained areas are also suited to irrigated improved pasture. (Capability unit IIIw–2; Wet Meadow range site)

Logan silty clay loam, moderately alkali (Lu).—This soil is mainly in narrow, nearly level drainageways adjacent to Fourmile Creek [illegible] this soil is similar to Logan silty clay loam. Typically, the surface layer is 10 to 16 inches thick.

Included with this soil in the mapping were small areas of silt loam and some areas of organic soils that have a layer of peat, 1 to 5 inches thick, on the surface.

This soil is used for unimproved pasture. It is poorly suited to cultivated crops because it is difficult to drain. Drained areas are suited to irrigated improved pasture and to some kinds of truck crops. (Capability unit IVw–1; Wet Meadow range site)

Made Land

Made land (Ma) consists mainly of areas that have been filled with various kinds of soil material and smoothed. The soil materials are largely from the Timpanogos, Hillfield, and Kidman soils. Made land occurs mainly on the Hill Air Force Base and is used for parking lots, storage lots, and building sites. (Capability unit and range site not assigned)

Marriott Series

The Marriott series consists of deep, somewhat excessively drained, gravelly and cobbly soils that are mainly on moderately steep to very steep south- and east-facing escarpments of deltas and streams. These soils formed in gravelly, moderately coarse textured delta deposits that were derived from many kinds of rocks. Elevations range from 4,300 to 4,900 feet above sea level.

The surface layer is very dark brown to dark-brown, friable gravelly or cobbly sandy loam 4 to 8 inches thick. The subsoil and substratum become lighter colored with increasing depth but otherwise are similar to the surface layer.

Marriott soils are commonly near the Kilburn, Hillfield, and Preston soils. The native vegetation consists mainly of sand dropseed, Indian ricegrass, three-awn, cheatgrass brome, and sagebrush.

Marriott soils are used mainly as range, but a small acreage is used for irrigated orchards.

Marriott cobbly sandy loam, 10 to 30 percent slopes, eroded (McE2).—This inextensive, strongly sloping to steep soil occurs on terraces and on delta escarpments in the east-central part of the survey area.

This soil is somewhat excessively drained and has

This soil is used mainly as range and for irrigated

very fine sandy loam. The surface layer ranges from about 5 to 11 inches in thickness. In places the substratum is gravelly below a depth of 36 inches. Depth to the water table ranges from about 40 to 60 inches.

Included with this soil in the mapping were small areas of somewhat poorly drained loams and some areas of gravelly sandy loams. Also included were some small areas that have slopes of more than 1 percent and some areas that are slightly affected by salts and alkali.

This soil absorbs moisture readily. It is moderately well drained and is moderately rapidly to rapidly perme-

of the most extensive soils in the survey area. It occurs on broad, smooth or gently undulating lake terraces that are moderately high and high. This soil is near Timpanogos loam.

A representative profile:

0 to 15 inches, very dark brown loam; friable; granular structure to a depth of 6 inches, blocky structure below 6 inches; neutral.

15 to 26 inches, dark-brown clay loam; firm; prismatic structure; neutral.

26 to 33 inches, dark-brown silty clay loam; firm; prismatic structure; strongly calcareous; mildly alkaline.

ridges in the east-central part of the survey area. It is similar to Parleys loam, 0 to 1 percent slopes, but has stronger slopes and a surface layer only 10 to 16 inches thick.

Included with this soil in the mapping were a few small areas of deep silt loam and a few small areas of Parleys loam, 3 to 6 percent slopes.

Runoff is medium, and the hazard of erosion is moderate to high. Natural fertility is moderately high.

This soil is used for both irrigated farming and dryfarming. Irrigated crops consist of alfalfa, peaches, cherries, and apricots; dryfarmed crops are winter wheat and alfalfa. This soil is well suited to orchards and to irrigated improved pasture. (Capability unit IIIe–3; not used for range)

Parleys loam, 10 to 20 percent slopes, eroded (PaE2).—This soil is on moderately steep, mainly north-facing lake-terrace escarpments in the east-central part of the survey area. It is similar to Parleys loam, 0 to 1 percent slopes, except that it is steeper, is moderately eroded, and has a surface layer only 7 to 15 inches thick. In places, the strongly calcareous subsoil material has been mixed with the surface layer through tillage.

Included with this soil in the mapping were small areas of deep silt loam.

Runoff is medium to rapid, and the hazard of erosion is high. Natural fertility is moderately high.

This soil is used mainly for dryfarming. Winter wheat and alfalfa are the main crops. If it is irrigated by sprinklers, this soil is well suited to orchards and to improved pasture. (Capability unit IVe–4; Upland Loam range site)

Payson Series

The Payson series consists of deep, somewhat poorly drained and moderately well drained, medium-textured soils. These soils are on nearly level low lake terraces and are affected by salts and alkali. They formed in mixed lake sediments. Elevations range from about 4,200 to 4,600 feet above sea level.

The surface layer is dark grayish-brown, friable silt loam about 2 to 7 inches thick. The subsoil is dark grayish-brown and grayish-brown, firm silty clay loam and clay and has columnar and prismatic structure. The substratum is grayish-brown or olive, firm, massive silt loam or silty clay loam.

Payson soils are commonly near the Airport, Terminal, Warm Springs, Arave, and Saltair soils. In the Davis-Weber Area, Payson soils are mapped only in complexes with the Warm Springs and the Airport soils. The native vegetation is mainly saltgrass, greasewood, and cheatgrass brome.

Payson soils are used only as range.

Payson-Warm Springs complex, 0 to 3 percent slopes (PNA).—This complex is on broad, undulating low lake terraces, mainly in the southwestern part of the survey area. Although slopes range from 0 to 3 percent, they are dominantly less than 1 percent. About 70 percent of this complex is Payson soils, and about 30 percent is Warm Springs soils. The Payson soils are in depressions or swales. The Warm Springs soils, apparently consisting of wind-deposited material, are in small areas on low mounds or ridges. These soils have a fine sandy loam surface layer about 5 to 8 inches thick. They overlie clay at a depth of 20 to 30 inches and are similar to Warm Springs fine sandy loam, deep over clay, 0 to 1 percent slopes.

A representative profile of Payson soils:

0 to 4 inches, dark grayish-brown silt loam; friable; platy structure; neutral.
4 to 9 inches, dark grayish-brown silty clay loam; very firm; strong columnar structure; noncalcareous or slightly calcareous; moderately alkaline.
9 to 24 inches, grayish-brown clay; firm; prismatic structure; strongly calcareous; strongly alkaline.
24 to 30 inches +, olive silt loam; firm; platy structure (laminated); strongly calcareous; very strongly alkaline.

The surface layer of Payson soils ranges from about 1 to 9 inches in thickness. This layer is dominantly silt loam, but ranges from loam to silty clay loam in texture. In places the surface layer is slightly calcareous to strongly calcareous as a result of flooding with water that contains much carbonates.

Included with this complex in the mapping were areas of loam, some small areas of very salty soils, and some areas of silty clay loam that have a lime-cemented hardpan. Also included were some areas that are ponded part of the time.

The soils of this complex are somewhat poorly drained and moderately well drained and are slowly or very slowly permeable. Few roots penetrate the fine-textured subsoil. Runoff is slow. Water erosion is a slight hazard, and soil blowing is a moderate hazard. In most places depth to the water table ranges from about 30 to 48 inches.

All the acreage of this complex is used as range, but vegetation is sparse on most of the Payson soils. The soils in this complex are not suited to cultivated crops. (Both soils are in capability unit VIw–1; both soils are in Alkali Bottom range site)

Payson-Airport silt loams, 0 to 3 percent slopes (PMA).—This extensive complex consists of about equal parts of Payson silt loam and Airport silt loam. These soils occur together in such an intricate pattern that they cannot be shown separately on the soil map. This complex is in the western part of the survey area. It begins about 6 miles west of Kaysville, and narrow, broken strips extend southward to a point about 2 miles west of Bountiful in Davis County. The Payson soil in this complex is similar to the Payson soil described under the Payson-Warm Springs complex, 0 to 3 percent slopes, but has a somewhat darker and thicker surface layer. The Airport silt loam is described under the Airport series. The surface of these nearly level soils is generally smooth and no difference in height is observable. Depth to the water table ranges from 20 to 36 inches.

Included in mapped areas of this complex were a few small areas of deep silt loam that are not affected by alkali and areas of silty clay loam that have a salt crust on the surface.

The soils of this complex are somewhat poorly drained and have very slow permeability. Runoff is slow to ponded, and the hazard of erosion is slight.

This complex is used mainly for unimproved pasture, for which it is suited. (Payson soil is in capability unit VIw–1; Airport soil is in capability unit IIIw–4; both soils are in Alkali Bottom range site)

Pleasant View Series

The Pleasant View series consists of deep, well-drained, gently sloping to moderately steep gravelly soils. These soils are mainly on high alluvium fans in the northeastern part of the survey area. They formed in noncalcareous or slightly calcareous alluvium that was derived from gneiss, schist, shale, and argillite. Elevations range from 4,350 to 4,900 feet above sea level.

The surface layer is very dark grayish-brown or very dark brown, friable loam or gravelly sandy loam that ranges from about 9 to 25 inches in thickness. The subsoil is dark-brown or dark grayish-brown, firm, subangular blocky gravelly light loam. The substratum is

Pleasant View loam, 1 to 3 percent slopes (PvB).—This soil is on the lower part of alluvial fans in the vicinity of North Ogden. Except that it is less sloping and only about 5 to 10 percent of the surface layer is fine gravel, this soil is similar to Pleasant View loam, 6 to 10 percent slopes. The surface layer is about 12 to 15 inches thick.

Included with this soil in the mapping were small areas that have slopes of more than 3 percent.

Runoff is slow, and normally the hazard of erosion is slight. Natural fertility is high.

This soil is used for and is well suited to irrigated general farm crops and orchards. The main irrigated

slopes, but is less sloping and has a gravelly sandy loam ranges from about 1 to 8 inches in thickness. The dunes

Refuge soils are used only as range.

Refuge loam (Ra).—This soil is extensive. It is on nearly level low flood plains in the northwestern part of the [illegible] the Wasatch Mountains above the highest [illegible]

Ridd rocky sandy loam, 30 to 70 percent slopes, eroded (RkG2).—This soil occurs along the steep faces of

Wasatch Mountains in the northeastern part of the survey area. The bedrock is quartzite in most areas but is limestone in small areas. Slopes are mainly very steep. Rock outcrop is barren, except for a few trees and shrubs that grow in crevices. It is essentially worthless for producing plants. (Capability unit VIIIs–1; not suited to range)

Roshe Springs silt loam, deep over clay (Rt).—This soil is on nearly level low lake terraces in the southern part of the survey area about a mile west of Centerville. Except that it is nearly level and overlies very slowly permeable clay below a depth of 3 feet, this soil is similar to Roshe Springs silt loam. In most places the water table is at a depth of about 3 feet. In places this soil is moder-

A representative profile:

included were some areas of loamy fine sand and of light

improvements are costly. Land leveling is difficult because of the large content of pebbles and cobbles, and erosion than other methods. (Capability unit IVs-3; Upland Stony Loam range site)

Sunset loam, 0 to 1 percent slopes (SkA).—This soil is on smooth to very gently undulating flood plains and low river terraces. It occurs near the Weber River, mainly with Martini fine sandy loam and Steed fine sandy loam.

A representative profile:

0 to 18 inches, very dark grayish-brown loam; friable; granular structure; moderately calcareous; mildly alkaline.
18 to 32 inches, dark-brown loam; very friable; moderately calcareous; moderately alkaline.
32 to 68 inches, dark-brown loam; very friable; moderately [illegible]

This soil holds about 5.5 to 6 inches of available water to a depth of 5 feet, but the gravelly substratum holds only about 0.5 inch per foot.

This soil is used for irrigated crops of alfalfa, small grains, corn, and sugarbeets. Yields are somewhat lower than those on Sunset loam, 0 to 1 percent slopes. This soil is well suited to irrigation and to many kinds of crops. Land leveling so that irrigation water can be distributed evenly is the most needed management, but drainage is needed in some areas. (Capability unit IIs–2; Semiwet Meadow range site)

Sunset loam, strongly alkali, 0 to 1 percent slopes

Included with this soil in the mapping were small areas of fine sandy loam and a few small areas that are strongly affected by salts and alkali.

This soil is somewhat poorly drained and has moderately rapid permeability. The water table is below a depth of 3 feet most of the time. This soil holds about 1.3 inches of available water per foot of soil, or about 6.5 inches to a depth of 5 feet. Roots penetrate to the water table. Runoff is slow. The hazard of soil blowing is moderate. Soil blowing is most likely early in spring in freshly plowed areas. Tilth is generally good. This soil is easy to work, and it can be cultivated within a wide range of moisture content.

Most areas of this soil have been drained with either tile or open drains and are used mainly for irrigated farming. Where it is adequately drained, this soil is well suited to irrigation and to many kinds of crops. The main crops are corn, small grains, alfalfa, sugarbeets, and tomatoes. Some leaching is needed at times to keep the content of salts low. (Capability unit IIw–5; not used for range)

Syracuse loamy fine sand, strongly alkali (Sy).—This soil occurs on slightly concave, nearly level low lake terraces in the western part of the survey area. This soil is similar to Syracuse loamy fine sand but is strongly

0 to 10 inches, very dark grayish-brown loam; friable; platy structure; slightly calcareous; mildly alkaline to neutral.
10 to 14 inches, dark grayish-brown sandy clay loam; friable; columnar structure; moderately calcareous; moderately alkaline.
14 to 22 inches, grayish-brown sandy clay loam; firm; platy structure; strongly calcareous; moderately alkaline.
22 to 24 inches, light brownish-gray, lime-cemented hardpan; extremely hard; strongly calcareous; strongly alkaline.
24 to 72 inches, light olive-gray and brown silty clay loam; very firm; massive; strongly and very strongly calcareous; strongly alkaline.

The surface layer is 7 to 12 inches thick. Depth to the hardpan ranges from about 13 to 40 inches, and the thickness of the pan ranges from about 2 to 6 inches. In places there are two separate hardpan layers. This soil is moderately affected by salts and alkali. Depth to the water table generally is 36 to 48 inches.

Included with this soil in the mapping were a few small areas of clay and of fine sandy loam that do not have a hardpan.

This soil is somewhat poorly drained and is very slowly permeable. It holds about 1.8 inches of available water per foot of soil above the hardpan, or about 2.5 to 3 inches to the top of the pan. Roots do not penetrate the pan. Runoff is slow, and the hazard of erosion is none to slight.

fine gravel. In places the substratum is stratified loam, fine sandy loam, and loamy fine sand.

Included with this soil in the mapping were a few small areas of lighter colored silt loam and areas of

31 to 48 inches, dark yellowish-brown light loam; friable; subangular blocky structure; slightly acid.

dryfarmed and irrigated crops. The main crops are alfalfa, cherries, apricots, and peaches. This complex is

This soil is similar to Trenton silt loam, 1 to 3 percent [illegible]

evenness of the surface. Except for this unevenness and the strong concentration of alkali, this soil is similar to Warm Springs fine sandy loam, 0 to 1 percent slopes. The surface layer is 6 to 8 inches thick. Erosion is a moderate hazard.

Included with this soil in the mapping were a few small areas of very salty silty clay loam and silt loam.

The many channels and blowouts make cultivation of this soil impractical. All the acreage is used as range, but yields of herbage are low. (Capability unit VIw–1; Alkali Bottom range site)

Wayment Series

The Wayment series consists of deep, poorly drained, salty soils on nearly level low flood plains. These soils formed in moderately fine textured mixed alluvium. Elevations range from 4,208 to 4,215 feet above sea level.

The surface layer is very dark grayish-brown or dark grayish-brown, firm silty clay loam about 3 to 12 inches thick. The subsoil is brown, dark-brown, or dark grayish-brown, firm silty clay loam or heavy silt loam. The substratum is brown to dark-brown, firm to friable, stratified silty clay loam, silt loam, and loam. A high concentration of soluble salts occurs throughout the profile.

Wayment soils occur near the Refuge soils. Where it occurs, the native vegetation is a scattered growth of

loam. Areas of these soils are so intermingled that they cannot be shown separately on a publishable soil map.

The Wayment soil in this complex is similar to the Wayment silty clay loam described under the Wayment series. This soil generally occurs in depressions. It has a thin crust of salts on the surface and is nearly barren.

The Refuge soil in this complex is similar to Refuge loam described under the Refuge series. This soil is in slightly higher positions and is somewhat poorly drained. It is medium textured, is highly stratified, and has a high concentration of salts below a depth of 20 inches. In most places this soil has a cover consisting mainly of peppergrass, saltgrass, alkali sacaton, and foxtail barley.

The soils of this complex have a high water table and slow to moderately rapid permeability. Runoff is slow to ponded, and the hazard of erosion is none to slight.

These soils have limited use for grazing and as wildlife habitat. The Refuge soil can be made more productive by seeding selected grasses. (Wayment soil is in capability unit VIIIw–1; Refuge soil is in capability unit IVw–3; not suited to range)

Woods Cross Series

The Woods Cross series consists of deep, poorly drained, nearly level to gently sloping soils on flood plains. These soils formed in fine-textured, noncalcareous to slightly calcareous alluvium. Elevations range from

Included with this soil in the mapping were small areas of loam and a few small areas of calcareous silty clay loam.

This soil is poorly drained and is slowly permeable. It holds about 2.2 inches of available water per foot of soil, or about 12 inches to a depth of 5 feet. Roots penetrate to the water table. Natural fertility is moderately high. Runoff is very slow, and the hazard of erosion is none to slight. Tillage of this soil is somewhat difficult. It can be worked only within a narrow range of moisture content and should be plowed in fall.

Much of this soil is used for irrigated crops, mainly sugarbeets, alfalfa, small grains, corn, and truck crops. Where it is adequately drained, this soil is well suited to many kinds of irrigated crops. (Capability unit IIIw–2; not used for range)

Woods Cross silty clay loam (Ws).—This soil occurs in slight depressions on nearly level flood plains. The water table commonly is about 10 to 18 inches from the surface. This soil is similar to Woods Cross silty clay loam, drained, but it has a higher water table. The surface layer is about 6 to 12 inches thick.

This soil is used only for native pasture and hay. It is not suited to irrigated crops, unless it is adequately drained. (Capability unit IIIw–2; Wet Meadow range site)

Formation, Morphology, and Classification of Soils

This section consists of two main parts. In the first part, the important factors of soil formation are discussed. In the second part, the soil series are first classified in table 10 according to the current system of classification; then the soils are placed in the order and great soil group of the older system that was adopted in 1938 and later revised, and the profile of a soil representative of that group is described.

degree of horizonation of soils. Distinct soil horizons occur in the soils on lake terraces and other of the older landforms, but young soils on the flood plains of the Weber River show only a darkening of the surface layer and little horizon development. The effect of vegetation on soil formation, though important, has been controlled in the survey area largely by drainage and the climate.

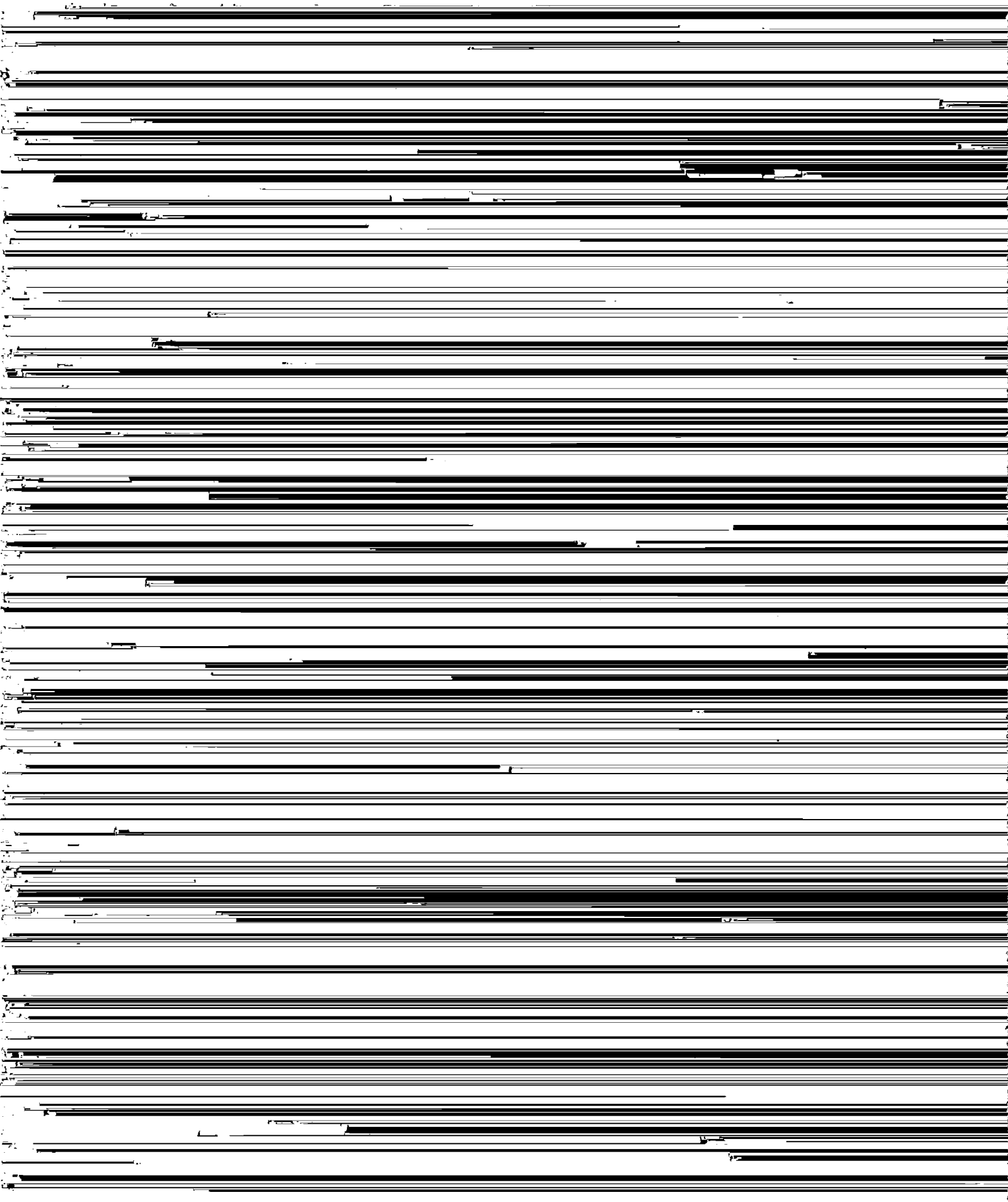
Climate

The climate of the Davis-Weber Area ranges from dry subhumid to moist subhumid. The western part of the area is the driest. Rainfall increases toward the east, and the area is wettest along the mountains in the eastern part. The average annual temperature is fairly uniform throughout the survey area. A uniform, moderately long, frost-free period is a result of air drainage from the canyons and down the front of the mountains and the moderating effect of Great Salt Lake.

The climate is characterized by warm dry summers, cold moist winters, and cool moist springs. The mean annual precipitation at Farmington station in Davis County is about 20 inches, and at the Ogden Sugar Factory station in Weber County it is about 16 inches. The heaviest rainfall occurs during winter and spring; the lightest is during summer. June, July, and August are the driest months.

Recorded frost data show a fairly uniform frost-free period for the survey area. At Farmington this period is 157 days; at the Riverdale Power House in Weber County, 160 days; and at Ogden Power House, 155 days. In the western part of the area near Great Salt Lake, the frost-free period is at least as long as it is in other parts of the area.

Much of the rain and snow that falls during winter and early in spring can be stored in the soil because evapotranspiration is very low during this period. Records at Farmington show that the average annual precipitation during 5 months of this period is about 10 inches. If all of this water entered the soil, it would be enough during average years to fill the medium-textured soils to field capacity to a depth of about 5 feet. During



lake terraces and deltas that were built during the Pleistocene geologic period when Lake Bonneville occupied most of the area; (2) the post-Bonneville flood plain of the Weber River; (3) the coalescing and, in many places, overlapping alluvial and colluvial fans adjacent to the mountains; and (4) the lake plain of the Great Salt Lake.

The lake terraces are mainly nearly level to gently sloping, but moderate and strong slopes are common on terraces of medium height and on high terraces. Terrace breaks and escarpments are mainly strongly sloping to steep. The Timpanogos, Parleys, and Kidman soils commonly occur on the broad, nearly level to gently sloping lake terraces; some of the Kilburn soils occur on the stream terraces and deltas; and the Hillfield and Marriott soils occur on the terrace escarpments.

On the lake terraces, soil drainage is closely associated with the height of the terrace. The soils on the medium and high terraces are mainly well drained or moderately well drained, and soils on low terraces are mainly somewhat poorly drained or poorly drained. Timpanogos loam, 1 to 3 percent slopes, is an example of well-drained soils on the high lake terraces, and Warm Springs fine sandy loam, 0 to 1 percent slopes, of somewhat poorly drained soils on low lake terraces.

The soils on the flood plain of the Weber River are mainly nearly level, but some areas near the river channel are undulating. These soils range from moderately well drained to poorly drained, and in places they are affected by a high water table. The Steed soils are well drained and moderately well drained. They occur near the river channel in the upper part of the river flood plain. Wayment soils are poorly drained. They occur on the lower portions of the stream flood plains.

The coalescing fans adjacent to the mountains are mainly sloping to steep. Kilburn soils are extensive on these fans. These soils are well drained to somewhat excessively drained.

The lake plain is level or nearly level. Saltair and Lakeshore soils are extensive on the lake plain. These soils are poorly drained and very poorly drained and are strongly affected by salts and alkali.

Tima

the Steed and Martini soils. These soils occur on flood plains of the Weber River, and they periodically receive additional sediments from floodwaters. The time has been too short for genetic horizons to form in these soils, but some organic matter has accumulated in the surface layer to form an A1 horizon. No further development of horizons has occurred.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationships to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First, through classification and then through use of soil maps, we can apply our knowledge to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and ranches; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*14*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continued study (*12, 18*). Therefore, readers interested in developments of this system should search the latest literature available. In this subsection some of the classes in the current system and the great soil groups of the older system are given for each soil series in table 10. The classes in the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Utisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic group-

TABLE 10.—*Soil series classified according to the current system of classification and the revised 1938 system*

Series	Current classification [1]			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Abbott	Fine, mixed, calcareous, mesic	Fluentic Haplaquepts	Inceptisols	Alluvial soils	Azonal soils.
Ackmen	Fine-loamy, mixed, mesic	Cumulic Haplustolls	Mollisols	Alluvial soils	Azonal soils.
Airport	Fine-silty, calcareous, mesic	Typic Natraquolls	Mollisols	Solonetz soils	Intrazonal soils.
Arave	Fine-loamy, mixed, mesic	Aquic Natrustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Barton	Coarse-loamy, mixed, mesic	Typic Argiustolls	Mollisols	Chestnut soils	Zonal soils.
Chance	Coarse-loamy, mixed, non-calcareous, mesic.	Typic Haplaquolls	Mollisols	Humic Gley soils	Intrazonal soils.
Croy	Fine-loamy, mixed, mesic	Typic Nadurustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Cudahy	Fine-silty, carbonatic, mesic	Petrocalcic Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Draper	Fine-loamy, mixed, mesic	Aquic Cumulic Haplustolls.	Mollisols	Alluvial soils	Azonal soils.
Ford	Coarse-loamy, mixed, mesic	Aeric Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Francis	Sandy, mixed, mesic	Entic Haploxerolls	Mollsiols	Regosols	Azonal soils.
Gooch	Fine-loamy, mixed, mesic	Aquic Calciorthids	Aridisols	Solonchak soils [2]	Intrazonal soils.
Harrisville	Fine-silty, mixed, mesic	Mollic Natrustalfs	Alfisols	Solonetz soils	Intrazonal soils.
Hillfield	Coarse-silty, mixed, mesic	Mollic Calciorthids	Aridisols	Calcisols	Intrazonal soils.
Ironton	Coarse-loamy, mixed, mesic	Cumulic Calciaquolls	Mollisols	Solonchak soils [2]	Intrazonal soils.
Kidman	Coarse-loamy, mixed, mesic	Typic Haplustolls	Mollisols	Chestnut soils	Zonal soils.
Kilburn	Loamy-skeletal, mixed, mesic	Typic Haploxerolls	Mollisols	Brunizems	Zonal soils.

growth of plants, or behavior of soils where used for out of the profile. The less soluble carbonates were moved

have been almost completely removed from the A and B2t horizons and have accumulated in the B3ca and Cca horizons at a depth of about 20 to 30 inches. Organic matter has accumulated mainly in the upper 12 to 15 inches of the A horizons. Generally, the B2t horizon has redder hues, higher values, and brighter chromas than have the A horizons. The reddish color of the B2t is the result of an increase in the content of free iron oxide and of the accompanying formation of secondary clay minerals from the primary minerals of the parent materials. About 5 to 8 percent clay has been moved from the A horizons to the B2t horizon and has formed films, or coatings, on ped faces and in pores. Alkalinity generally shows a slight increase with depth. This soil is generally about neutral to mildly alkaline in the surface layer and ranges from mildly alkaline to strongly alkaline in the Cca and C horizons.

Barton, Kidman, Layton, and Marriott soils are other Chestnut soils in the survey area that have minimal profile development. Barton soils have a somewhat weaker development than Timpanogos soils, probably because rainfall is somewhat less where Barton soils occur. The Barton soils developed in gravelly, cobbly, and stony, medium-textured colluvium and residuum, dominantly from tillite. The differences in color between Timpanogos and Barton soils are less pronounced, and the Barton soils are very dark grayish brown or dark grayish brown. The Barton soils lack prominent horizons of carbonate accumulation, although the C horizons are generally calcareous below a depth of 30 inches.

Kidman, Layton, and Marriott soils are Chestnut soils that show the least profile development. These soils have noncalcareous A and B horizons but have an accumulation of lime in the Cca horizon. Kidman soils formed in moderately coarse textured lake sediments, and Layton soils formed in coarse textured sediments. Marriott soils are gravelly and moderately coarse textured. They formed on steep delta escarpments. A detailed description of a profile of Barton, Kidman, Layton, and Marriott soils is given under "Descriptions of Soil Series and Profiles" at the back of this survey.

Chestnut soils with medial development.—This stage is shown by a profile of Parleys loam, 0 to 1 percent slopes, 850 feet north and 700 feet west of the south quarter corner of section 14, T. 4 N., R. 1 W.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) loam, very dark brown (10YR 2/2) when moist; weak, fine, granular structure; soft, friable, slightly sticky and slightly plastic; plentiful fine roots; many fine pores; noncalcareous; neutral (pH 7.2); abrupt, smooth boundary; horizon 6 to 12 inches thick.

B3ca—26 to 33 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) when moist; weak, medium, prismatic structure that breaks to strong, fine, subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; lime, disseminated and in veins; mildly alkaline (pH 8.0); gradual, wavy boundary; horizon 0 to 14 inches thick.

C1ca—33 to 48 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) when moist; few, medium, distinct mottles of strong brown (7.5YR 5/6, dry); massive; hard, firm, sticky and plastic; few fine roots; common fine pores; strongly calcareous; mildly alkaline (pH 8.0); diffuse, wavy boundary; horizon 8 to 16 inches thick.

C2—48 to 60 inches, light-brown (7.5YR 6/4), stratified silty clay loam, very fine sandy loam, silty clay, and fine sand, brown (7.5YR 5/4) when moist; common, coarse, faint mottles of strong brown (7.5YR 5/6, dry); massive; hard, firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; mildly alkaline (pH 8.0).

Loam is the only type of Parleys soil mapped in the survey area. The A horizons are typically noncalcareous but are slightly calcareous in places. The content of organic matter in the A1 horizon ranges from about 2 to 6 percent. The texture of the B2t horizon is generally clay loam, but it ranges from sandy clay loam to silty clay loam.

Thin, continuous clay films are on ped faces in the B2t horizon. The calcium carbonate equivalent in the B3ca and C1ca horizons ranges from about 20 to 45 percent.

More clay has been moved from the A horizons into the B2t horizons in Parleys soils than in Timpanogos soils. Also Parleys soils have stronger structure in the B horizons. About 12 to 16 percent more clay is in the B2t horizon in Parleys loam than is in the A horizon, and continuous clay films are generally on peds. Soil structure is generally moderate prismatic.

Timpanogos and Parleys soils occur close together, and they have been in place about the same length of time. Differences in the texture of their parent materials have made a significant difference in the degree of profile development.

In the survey area, Parleys soils are the only soils in the Chestnut great soil group that have medial profile development.

BRUNIZEMS

These are zonal soils having a very dark brown or very dark grayish-brown surface horizon that grades to a brown or dark-brown B horizon overlying lighter colored parent material at a depth of 2 to 5 feet. These soils developed under grasses, forbs, scattered shrubs, bushes and vines.

a depth below 60 inches. Some of the bases have been leached from the upper layers and have been replaced by hydrogen. Base saturation is as much as 80 percent. The profile is slightly acid to neutral throughout. The A horizon averages about 9 inches in thickness, and the solum about 24 inches. Organic matter has accumulated in the upper 8 to 12 inches. Some clay has been transported from the A horizon to the B horizon or has of free iron oxides and in the formation of clay. The clay films and coatings on sand grains indicate slight downward movement of clay. The B2 horizon generally shows only 2 to 3 percent more clay than the A horizon. Structure in the B2 horizon is mainly weak to moderate and subangular blocky. The reaction is constant.

The Timpanogos, noncalcareous variant, is another soil in the Brunizem great soil group in this survey area

Coarse fragments make up about 30 to 50 percent of the A1 and B2t horizons, by volume, and from 50 to 90 percent of the C horizon. Depth to underlying bedrock ranges from 25 to 40 inches. The pH ranges from about 6.6 to 7.3 and changes little with depth.

Base saturation of Ridd soils is about 70 to 80 percent, and base-exchange data indicate that bases are being removed from the surface layer. A textural B2t horizon has formed, and the structure of this horizon

line (pH 9.2); clear, smooth boundary; horizon 2 to 20 inches thick.

C2sa—4 to 9 inches, light-gray (5Y 7/2) silty clay loam, light olive gray (5Y 6/2) when moist; massive; hard, firm, sticky and plastic; common fine and medium pores; few, medium, distinct mottles of brown; moderately calcareous; very strongly alkaline (pH 9.2); clear, wavy boundary; horizon 0 to 10 inches thick.

C3sa—9 to 20 inches, white (5Y 8/2) silty clay loam, light olive gray (5Y 6/2) when moist; massive; hard, firm, sticky and plastic; common fine and medium

Refuge soils have an A1 horizon of very dark grayish-brown or dark-brown loam, fine sandy loam, or silt loam that ranges in thickness from about 6 to 21 inches. Organic matter has accumulated in the upper 8 to 10 inches of the surface layer. The C horizons consist of brown stratified fine sand, fine sandy loam, and light loam. The most salt occurs generally between a depth of 20 and 40 inches.

For a detailed description of a profile of Lakeshore, Wayment, and Refuge soils, refer to "Descriptions of Soil Series and Profiles" in the back of this survey.

Eight of the soil series in this area that have been classified as Solonchaks have a higher content of calcium carbonate but a lower content of the more soluble salts than the other Solonchaks. These soil series are the Cudahy, Ford, Gooch, Ironton, Logan, Roshe, Springs, Syra-

and 2.5Y. The content of organic matter in this horizon ranges from 1 to 2.5 percent. The control section is mainly heavy fine sandy loam, but it ranges to light loam or light silt loam. When moist, the Cca horizons range from dark grayish brown to light gray in color. The calcium carbonate equivalent of these horizons ranges from 15 to 30 percent. Depth to the water table in most places is 20 to 40 inches. The parent materials are high in alkaline earth carbonates, and the formation and movement of clay has been inhibited or retarded. The only horizon differentiation is carbonate enrichment. The horizon of carbonate accumulation generally occurs at a depth of 12 to 16 inches. These soils are calcareous from the surface downward, and the content of soluble salts is highly variable.

As mentioned earlier, other Solonchak soils that [illegible]

and alkali than the Warm Springs soils. Poor drainage is indicated by mottles and by gleying. Gleying occurs when the oxygen needed for oxidation is excluded by a high water table. Then, reduction of iron compounds in the soil occurs. These compounds lose oxygen, and the soil becomes gray or green.

Logan, Roshe Springs, and Cudahy soils have a black or very dark gray A horizon that contains much organic matter. Because of gleying, these soils have been placed at times, in the Humic Gley great soil group. In places, a peaty layer, as much as 5 inches thick, occurs on the surface, but the content of organic matter in the A horizon ranges mainly from 4 to 20 percent. All these soils are poorly drained, and undrained areas have a water

nal, and Croy; those that have maximal development are the Leland, Payson, and Trenton soils.

Solonetz soils with medial development.—This stage of development is shown by a profile of Arave silt loam, 1.5 miles north and 0.5 mile west of Hooper School in the northeast quarter of section 12, T. 5 N., R. 3 W.:

A1—0 to 8 inches, light brownish-gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) when moist; weak, medium, platy structure; soft, friable, nonsticky and nonplastic; abundant medium roots; common medium pores; slightly calcareous; strongly alkaline (pH 8.6); clear, smooth boundary; horizon 6 to 10 inches thick.

B1ca—8 to 12 inches, light gray (10YR 7/2) heavy loam, grayish brown (2.5Y 5/2) when moist; weak,

contains 10 to 20 percent more clay than the A horizon. There is some color differentiation and slight evidence of gleying, or reduction of iron, similar to that of soils in the Humic Gley great soil group.

Airport soils are slightly better drained than Arave soils and have a thicker A horizon that is very dark gray

7.5YR and has strong columnar structure. The surface of the columns are generally noncalcareous, but the interior is moderately and strongly calcareous. Thick continuous clay films are on ped surfaces. The B2t horizon contains a high concentration of exchangeable sodium, and their pH ranges from 9.2 to 10.0 or more

8 inches. The electrical conductivity generally is about 2 to 4 millimhos near the surface and increases fairly gradually to about 20 to 25 millimhos in the C horizon. The carbonate equivalent increases rather abruptly in the strongly calcareous B2tca and B3ca horizons at a depth of 8 to 12 inches. Only a small amount of organic matter, generally less than 1 percent, has accumulated in the surface horizon. The B2t horizon has a redder hue and a brighter chroma than the A2 horizon. This redder, brighter color indicates an increase in free iron oxide and the formation or accumulation of clay. The B2t horizon contains 20 to 30 percent more clay than the A horizon.

Payson soils are similar to Leland soils but appear to be somewhat reclaimed or solodized. They occur at about the same elevation as the Leland soils and receive about the same amount of precipitation, but leaching appears to have been more effective. The upper part of the B2t horizon is leached of lime, and the highest concentration of exchangeable sodium is in the lower part of the B3ca horizon. The parent material of the Payson soils is mainly fine-textured lake sediments that have hues of 2.5Y and 10YR. The B2t horizon has strong columnar structure, and the peds have thick continuous clay films. In the B3ca horizon, the clay films on peds are usually thin and patchy. When moist, the B horizon ranges from very

cause surface runoff is rapid and only a small part of the total precipitation enters the soil, soil formation is retarded.

Calcisols with minimal development.—This stage of development is shown by a profile of Hillfield silt loam, 20 to 30 percent slopes, eroded, 850 feet north and 500 feet east of the south quarter corner of section 14, T. 4 N., R. 1 W.:

Ap—0 to 6 inches, brown (10YR 5/3) light silt loam, dark brown (10YR 4/3) when moist; moderate, medium and fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; plentiful medium and fine roots; many medium pores; strongly calcareous; mildly alkaline (pH 7.8); gradual, wavy boundary; horizon 2 to 8 inches thick.

C1ca—6 to 12 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; weak, medium and fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful medium and fine roots; many medium pores; strongly calcareous; mildly alkaline (pH 7.8); gradual, wavy boundary; horizon 6 to 25 inches thick.

C2—12 to 21 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; strongly calcareous; moderately alkaline (pH 7.9); gradual, wavy boundary; horizon 6 to 18 inches thick.

C3—21 to 60 inches +, pale-brown (10YR 6/3) stratified

In the Davis-Weber Area, the Woods Cross soils are ALLUVIAL SOILS

noticeable in these soils is a slight accumulation of organic matter in the A1 horizon. These soils are strongly calcareous.

For a detailed description of a profile of Pleasant View, Steed and Marriott, calcareous variant, soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

In addition to the four well-drained soils in the Allu[redacted]

For a detailed description of a profile of Sunset, Martini, and Kirkham soils, refer to "Descriptions of Soil Series and Profiles" at the back of this survey.

REGOSOLS

These are excessively drained and somewhat excessively drained azonal soils that have little profile development. They formed in unconsolidated material. These soils are similar in development to those in the Alluvial

given. The color is given for both dry and wet soil. Slightly hard, friable, sticky and plastic, and like terms used in that order, means slightly hard when dry, friable when moist, and sticky when wet.

ABBOTT SERIES: The Abbott series consists of deep, fine-textured, poorly drained, calcareous Alluvial soils. They formed in depressions on lake terraces from mixed alluvium.

Profile of Abbott clay 1,100 feet south and 280 feet east of the north quarter corner of section 34, T. 6 N., R. 2 W., Salt Lake base meridian:

A1—0 to 6 inches, gray (5Y 6/1) clay, gray (5Y 5/1) when moist; massive; extremely hard, very firm, very sticky and very plastic; plentiful medium roots; few fine pores; strongly calcareous; very strongly alkaline (pH 9.9); clear, smooth boundary; horizon 2 to 7 inches thick.

C1—6 to 37 inches, light-gray (5Y 7/1) clay, gray (5Y 6/1) when moist; massive; extremely hard, very firm, very sticky and plastic; few medium and few fine roots; few very fine pores; few, fine, distinct mottles of light olive brown; strongly calcareous; strongly alkaline (pH 8.7); clear, wavy boundary; horizon 24 to 36 inches thick.

IIC2—37 to 46 inches, white (2.5Y 8/2) very fine sandy clay loam, light gray (2.5Y 7/2) when moist; massive; slightly hard, friable, sticky and plastic; few medium roots; few fine pores; few, medium, distinct mottles of olive; strongly calcareous; moderately alkaline (pH 8.3); gradual, wavy boundary; horizon 8 to 12 inches thick.

IIIC3—46 to 61 inches +, light-gray (5Y 7/1) loamy very fine sand, light gray (5Y 6/1) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine pores; moderately calcareous; moderately alkaline (pH 8.4).

Clay is the only soil type mapped in [illegible]

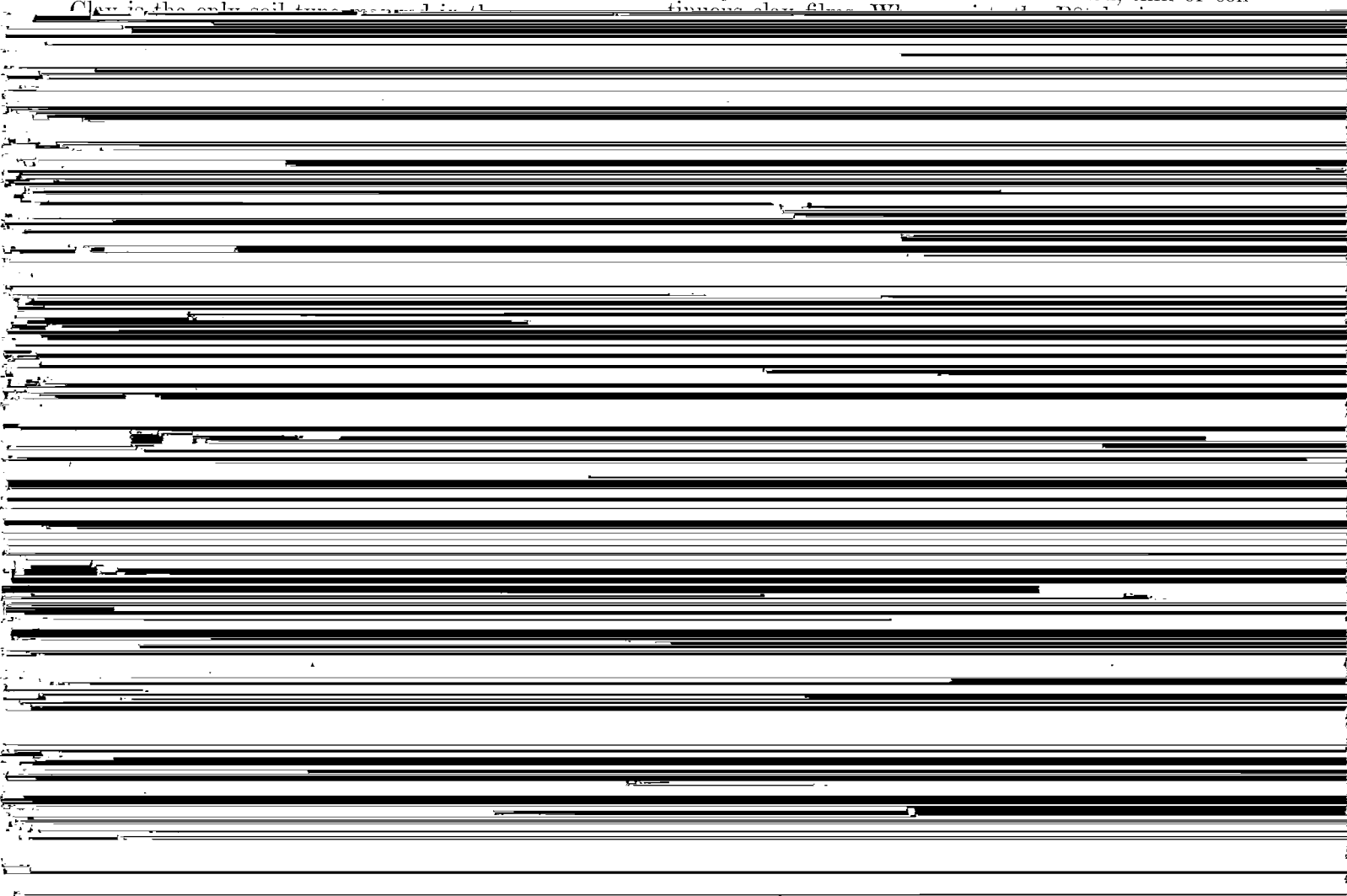
moderate, medium and fine, blocky structure; hard, firm, sticky and plastic; few fine roots; few fine pores; common thin clay films on peds; strongly calcareous; distinct white splotches of lime; strongly alkaline (pH 8.5); clear, smooth boundary; horizon 6 to 15 inches thick.

B3cag—19 to 32 inches, light-gray (5Y 7/2) silty clay loam, olive gray (5Y 5/2) when moist; moderate, medium, blocky structure; extremely hard, very firm, sticky and very plastic; few fine roots; few fine pores; cleavage planes stained dark with coating of organic matter; very strongly calcareous; distinct white splotches of lime; strongly alkaline (pH 8.8); clear, smooth boundary; horizon 9 to 16 inches thick.

C1g—32 to 40 inches, light-gray (5Y 7/2) silty clay loam, olive gray (5Y 5/2) when moist; weak, medium, subangular blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; distinct white splotches of lime; strongly alkaline (pH 8.8); clear, smooth boundary; horizon 0 to 30 inches thick.

C2g—40 to 60 inches, very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) when moist; massive; very hard, firm, sticky and plastic; few fine pores; many, faint, medium mottles of yellowish brown (10YR 5/4); strongly calcareous; strongly alkaline (pH 8.5).

Silt loam and silty clay loam soil types have been mapped in the survey area. When moist, the A1 horizon ranges from very dark gray to very dark grayish brown in color. The content of organic matter ranges from 1.5 to 6 percent. The A1 horizon is moderately to strongly calcareous, and in most places is less than 15 percent exchangeable sodium. Structure of the B2t horizon ranges from moderate to strong and from prismatic to blocky. Peds in this horizon have common, thin or con-



moist; weak, medium, subangular blocky and granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; common fine pores; common thin clay films; noncalcareous; neutral (pH 7.0); clear, wavy boundary; horizon 4 to 8 inches thick.

C1—19 to 31 inches, brown (10YR 5/3) very cobbly loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, slightly sticky and nonplastic;

Texture of the A1 horizon is loam, but it is nearly silty clay loam in places. The content of organic matter ranges from 4 to 20 percent. The A1 horizons are normally noncalcareous, but in places they are slightly to moderately calcareous because calcareous sediments have been deposited by wind or by floodwaters high in carbonate. Texture to a depth of 10 to 40 inches is dominantly fine sandy loam but ranges to loamy fine sand

blocky structure and thin, patchy to continuous clay films on the peds. In texture, the B2t horizons range from loam to sandy clay loam or silty clay loam. The B2t horizons are moderately calcareous to strongly calcareous. They have a hue of 7.5YR, and when moist their color ranges from dark brown to brown. Exchangeable sodium in the B2t horizons ranges from 13 to 40 percent. The indurated pan is insoluble in either hot or cold acid or alkali and does not break down under alternate treatment. Depth to the hardpan ranges from 20 to 42 inches. This layer ranges from about 3 to 40 inches in thickness. The water table fluctuates seasonally, but it is dominantly at a depth of 24 to 48 inches.

CUDAHY SERIES: The Cudahy series consists of medium-textured, very strongly calcareous, poorly drained Solonchak soils that are moderately deep over a lime-cemented pan. These soils occur on nearly level low lake terraces. They formed in mixed calcareous lake sediments that were derived from a mixture of many kinds of rocks. Ground water containing much lime has strongly influenced these soils.

Profile of Cudahy silt loam, 0 to 3 percent slopes, one-eighth of a mile south of the center of section 26, T. 2 N., R. 1 W.:

A1—0 to 6 inches, dark-gray (10YR 4/1) silt loam, black (10YR 2/1) when moist; moderate, thin, platy structure that breaks readily to moderate, fine, granular structure; hard, friable, slightly sticky and slightly plastic; abundant, fine and medium roots; many medium and fine pores; very strongly calcareous; moderately alkaline (pH 8.1); abrupt, smooth boundary; horizon 3 to 12 inches thick.

A12ca—6 to 16 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; moderate, medium, seasonally, but it is dominantly at a depth of 18 to 40 inches.

FORD SERIES: The Ford series consists of medium-textured, somewhat poorly drained Solonchak soils that are 20 to 40 inches deep over a lime-cemented hardpan. In most places these soils are in nearly level depressions in low lake terraces immediately below the terrace breaks. Parent materials were derived from mixed lake sediments.

Profile of Ford loam (0 to 1 percent slopes) 600 feet north and 200 feet west of the east quarter corner of section 17, T. 4 N., R. 2 W.:

A1—0 to 9 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, medium and fine, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; moderately calcareous; very strongly alkaline (pH 9.9); clear, smooth boundary; horizon 5 to 12 inches thick.

C1ca—9 to 16 inches, light brownish-gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) when moist; weak, medium, blocky structure; hard, friable, slightly sticky and slightly plastic; strongly calcareous; very strongly alkaline (pH 9.4); clear, smooth boundary; horizon 5 to 12 inches thick.

C2ca—16 to 34 inches, pinkish-gray (7.5YR 6/2) fine sandy loam, brown (7.5YR 4.5/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; strongly calcareous; very strongly alkaline (pH 9.1); abrupt, smooth boundary; horizon 0 to 20 inches thick.

C3cam—34 to 44 inches, light-gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) when moist; strongly cemented; hard, brittle; strongly calcareous; strongly alkaline (pH 8.8); abrupt, wavy boundary; horizon 6 to 12 inches thick.

C4ca—44 to 52 inches, pinkish-gray (7.5YR 6.5/2) fine sandy

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; slightly hard, friable, nonsticky and nonplastic; plentiful fine roots; few fine and medium pores; noncalcareous; mildly alkaline (pH 7.8); clear, smooth boundary; horizon 5 to 8 inches thick.

A12—7 to 13 inches, brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) when moist; weak, fine, granular structure; soft, friable, nonsticky and nonplastic; plentiful fine roots; few, fine and medium pores; noncalcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 4 to 8 inches thick.

C1—13 to 23 inches, brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine pores; noncalcareous; moderately alkaline (pH 7.9); clear, smooth boundary; horizon

sodium in the A1 horizon ranges from 10 to 40 percent. When moist, the Cca horizons range from gray to light gray in hues of 2.5Y and 5Y. The Cca horizons are loam, silt loam, or light silty clay loam in texture. The content of calcium carbonate in these horizons ranges from 25 to 75 percent, and the exchangeable sodium ranges from 10 to 45 percent. Faint to distinct mottles occur in or immediately below the A1 horizon. In undrained Gooch soils, the water table is at or near the surface most of the time.

HARRISVILLE SERIES: The Harrisville series consists of deep, medium-textured, somewhat poorly drained and moderately well drained medial Solonetz soils. These soils occur on intermediate lake terraces. They formed

dark brown to brown in hues of 7.5YR and 10YR. Faint to distinct mottles occur at a depth ranging from 30 to 42 inches. The water table fluctuates seasonally, but it is commonly within a depth of 40 inches.

IRONTON SERIES: The Ironton series consists of medium-textured, somewhat poorly drained and moderately well drained Solonchak soils. These soils occur on low lake terraces, alluvial fans, and flood plains. They formed in medium-textured alluvium and lake sediments that were derived from a mixture of many kinds of rocks, dominantly limestone, quartzite, and gneiss.

Profile of moderately well drained Ironton silt loam, 0 to 1 percent slopes, 300 feet north and 100 feet east of the southwest corner of section 6, T. 2 N., R. 1 E.:

A11—0 to 6 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; moderate, medium and fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; few medium pores; strongly calcareous; moderately alkaline (pH 8.3); gradual, smooth boundary; horizon 4 to 8 inches thick.

A12—6 to 16 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; moderate, medium and coarse, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant

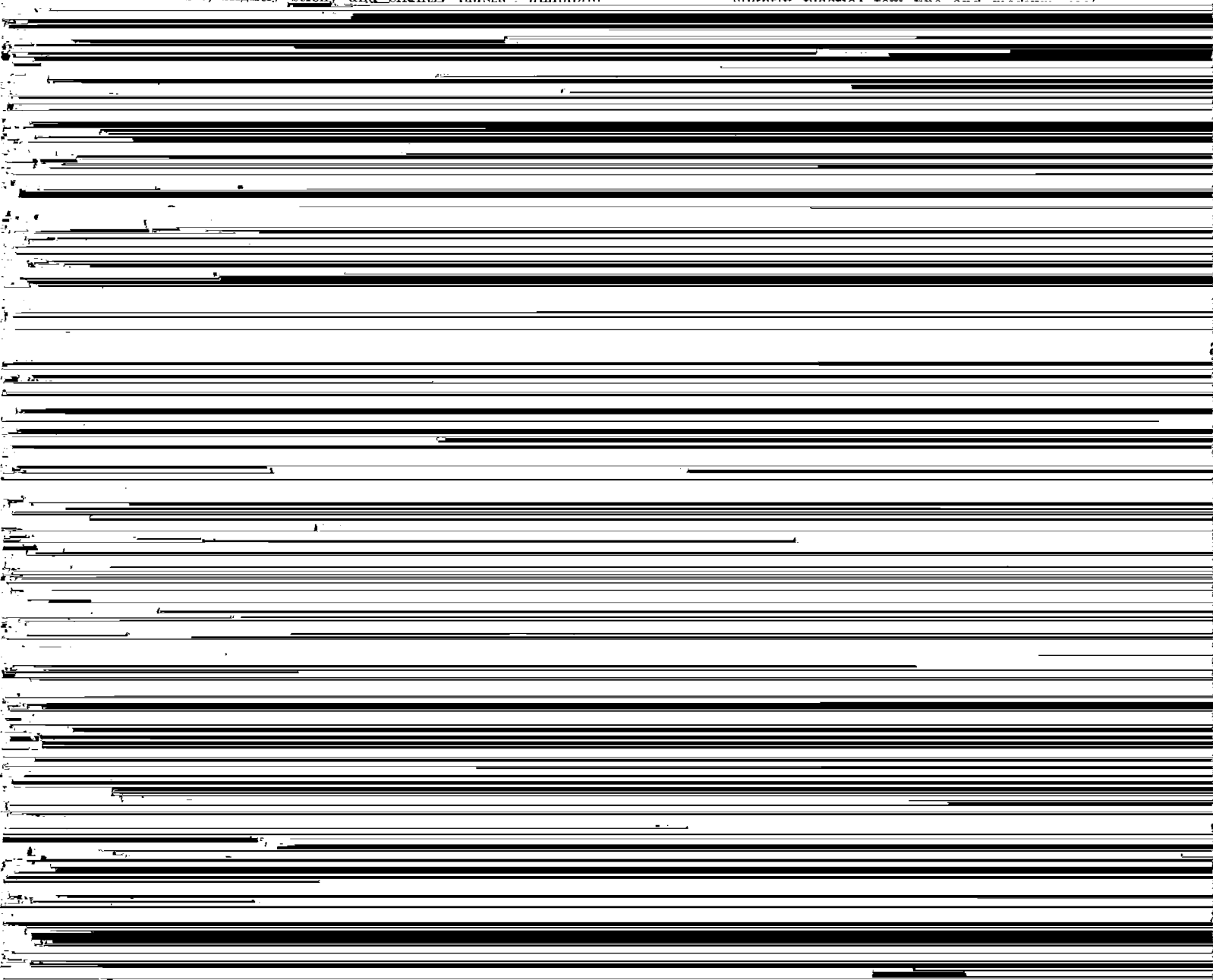
Profile of Kidman fine sandy loam, 0 to 1 percent slopes, 750 feet west and 1,400 feet north of the southeast corner of section 3, T. 3 N., R. 1 W.:

Ap—0 to 11 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; few fine and medium pores; noncalcareous; mildly alkaline (pH 7.5); clear, smooth boundary; horizon 8 to 12 inches thick.

A12—11 to 17 inches, brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; few fine and medium pores; noncalcareous; neutral (pH 7.3); clear, wavy boundary; horizon 5 to 8 inches thick.

B2—17 to 27 inches, yellowish-brown (10YR 5/4) fine sandy loam, brown (7.5YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common fine pores; noncalcareous; neutral (pH 7.3); clear, wavy boundary; horizon 8 to 14 inches thick.

C1ca—27 to 37 inches, light yellowish-brown (10YR 6/4) fine sandy loam, brown (7.5YR 5/4) when moist; massive; slightly hard, friable, slightly sticky and



Ap—0 to 7 inches, grayish-brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; weak, fine and medium, granular structure; very hard, firm, slightly sticky and plastic; plentiful fine roots; few fine and medium pores; moderately calcareous; mildly alkaline (pH 7.6); abrupt, smooth boundary; horizon 4 to 8 inches thick.

C2sa—8 to 13 inches, pale-yellow (5Y 7/3) very fine sandy loam, olive (5Y 5/3) when moist; massive; soft, very friable, nonsticky and nonplastic; common medium and fine pores; common, fine, distinct mottles of light olive brown (2.5Y 5/6); moderately calcareous; moderately alkaline (pH 8.1); clear, wavy boundary; horizon 0 to 8 inches thick.

C3—13 to 19 inches, pale-yellow (5Y 7/3) loam, olive (5Y

C3ca—29 to 66 inches, very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine pores; few, medium, faint mottles of yellowish brown (10YR 5/6); moderately calcareous; strongly alkaline (pH 8.8)

escarpments. Their parent materials were derived from mixed rocks, dominantly quartzite, sandstone, and granite.

Profile of eroded Marriott gravelly sandy loam (in Hillfield-Marriott complex), 20 to 60 percent slopes

roots; common fine pores; strongly calcareous; many filaments of lime; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 7 to 10 inches thick.

AC—18 to 25 inches, grayish-brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) when moist; weak, fine and medium, subangular blocky and fine and medium, granular structure; slightly hard, friable, nonsticky and nonplastic; few, medium and common, fine pores; strongly calcareous; many filaments of lime; moderately alkaline (pH 7.9); clear, smooth boundary; horizon 0 to 10 inches thick.

C1—25 to 33 inches, light grayish-brown (10YR 6/2) gravelly sandy loam, brown to dark brown (10YR 4/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; many fine pores; strongly calcareous; moderately alkaline (pH 8.1); gradual, wavy

of organic matter ranges from 1.5 to 6 percent. Texture of the control section is dominantly a fine sandy loam. Faint to distinct mottles occur between a depth of 32 and 40 inches. The depth to water table ranges from 40 inches to more than 60 inches. The pH values range from 7.5 to 8.6.

PAYSON SERIES: The Payson series consists of deep, medium-textured, somewhat poorly drained and moderately well drained Solonetz soils. These soils formed in mixed lake sediments on nearly level low lake terraces.

Profile of Payson silt loam, 860 feet east and 550 feet north of the south quarter corner of section 3, T. 1 N., R. 1 W.:

A21—0 to 2 inches, light-gray (2.5Y 6/2) silt loam, dark

soils occur on alluvial and colluvial fans deposited on

7.6); clear smooth boundary; horizon 2 to 5 inches

and large pores; very strongly calcareous; weakly cemented; many fine nodules of lime; mildly alkaline (pH 7.8); clear, smooth boundary; horizon 16 to 24 inches thick.

C3g—52 to 80 inches, gray (5Y 6/1) sandy loam, dark gray

loam or gravelly loamy fine sand. Faint to distinct mottles are common in some places.

STERLING SERIES: The Sterling series consists of very gravelly, cobbly, or very stony, medium-textured Calci-

A12—7 to 18 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; common, fine and few, medium pores; moderately calcareous; mildly alkaline (pH 7.8); clear, smooth boundary; horizon 2 to 16 inches thick.

AC—18 to 32 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 3/3) when moist; weak, fine, subangu-

Loamy fine sand is the only soil type mapped in the survey area. The content of organic matter in the A1 horizon ranges from 1 to 2 percent. Texture of the control section is dominantly loamy fine sand. Depth to the Cca horizon ranges from 16 to 30 inches, and the calcium carbonate equivalent in this horizon ranges from 15 to 30 percent. The water table commonly occurs at a depth

TIMPANOGOS, NONCALCAREOUS VARIANT: Noncalcareous variants from the Timpanogos series consist of deep, well-drained, medium-textured Brunizems. These soils formed in alluvium that was derived dominantly from gneiss, schist, argillite, and quartzite and deposited on high lake terraces.

Profile of Timpanogos very fine sandy loam, noncalcareous variant, 10 to 20 percent slopes, 750 feet north and 700 feet east from the northwest corner of section 18, T. 7 N., R. 1 W.:

A1—0 to 7 inches, grayish-brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, medium and fine, granular structure; slightly hard, friable, nonsticky and nonplastic; plentiful fine roots; few fine pores; neutral (pH 6.9); clear, smooth boundary; horizon 7 to 13 inches thick.

B1—7 to 12 inches, brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) when moist; moderate, medium and coarse, subangular blocky structure; hard, friable, nonsticky and slightly plastic; plentiful fine roots; few medium pores; slightly acid (pH 6.5); clear, smooth boundary; horizon 5 to 8 inches thick.

B21t—12 to 19 inches, yellowish-brown (10YR 5/4) heavy very fine sandy loam, dark yellowish brown (10YR 3/4) when moist; moderate, coarse, subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few fine roots; common medium pores; thin continuous clay films; neutral (pH 6.6); clear, smooth boundary; horizon 7 to 13 inches thick.

B22t—19 to 31 inches, light yellowish-brown (10YR 6/4) very fine sandy loam, dark yellowish brown (10YR 4/4) when moist; moderate, medium and coarse, sub-

eroded, 500 feet south and 100 feet west of the northeast corner of section 17, T. 4 N., R. 1 W.:

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) when moist; very weak, medium, platy structure that breaks easily to weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine roots; few fine pores; noncalcareous; neutral (pH 7.3); abrupt, smooth boundary; horizon 4 to 10 inches thick.

B21t—4 to 7 inches, brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2) when moist; moderate, medium, prismatic structure that breaks to fine, angular blocky structure; very hard, firm, sticky and very plastic; patches of dark organic stains on vertical faces of peds; thin patchy clay films, mainly in channels; abundant fine pores; few fine roots; noncalcareous; mildly alkaline (pH 7.5); clear, smooth boundary; horizon 2 to 6 inches thick.

B22t—7 to 13 inches, brown (7.5YR 5/4) silty clay, dark brown (7.5YR 3/4) when moist; moderate, medium, prismatic structure; extremely hard, very firm, sticky and very plastic; plentiful fine roots in cleavage planes; few fine pores; thin nearly continuous clay films; noncalcareous; mildly alkaline (pH 7.7); clear, smooth boundary; horizon 5 to 10 inches thick.

B3ca—13 to 33 inches, pink (7.5YR 7/4) silty clay loam, brown (7.5YR 5/4) when moist; weak, medium, prismatic structure that breaks to weak, medium, subangular blocky structure; hard, friable, slightly sticky and plastic; thin patchy clay films on ped surfaces and in pores; few fine roots along cleavage planes; few fine pores; strongly calcareous; white splotches of lime; moderately alkaline (pH 8.4); clear, smooth boundary; horizon 15 to 22 inches thick.

C—33 to 60 inches, pink (7.5YR 7/4) stratified silty clay

ACsa—3 to 9 inches, light brownish-gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) when moist; massive; hard, firm, slightly sticky and plastic; common fine pores; few, fine, faint mottles of dark yellowish brown (10YR 3/4); moderately calcareous; moderately alkaline (pH 7.9); clear, smooth boundary; horizon 0 to 8 inches thick.

C1sa—9 to 24 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; massive; hard, firm, slightly sticky and plastic; common fine pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 8 to 15 inches thick.

C2sa—24 to 46 inches, very pale brown (10YR 7/3) silty clay loam, brown (10YR 4/3) when moist; massive; very hard, firm, sticky and plastic; few fine pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.0); clear, smooth boundary; horizon 18 to 32 inches thick.

C3sa—46 to 63 inches, very pale brown (10YR 7/3) loam, brown (10YR 5/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine pores; common, fine, faint mottles of dark yellowish brown (10YR 4/4); moderately calcareous; moderately alkaline (pH 8.0).

Silty clay loam is the only soil type mapped in the survey area. When moist, the upper horizons range from very dark grayish brown to dark grayish brown. In places, the surface is crusted with a salt that is mostly sodium chloride. Texture of the control section ranges from silt loam to silty clay loam. The Wayment soils are slightly to moderately calcareous and their exchange-

Laboratory Analyses

The results of laboratory analyses of samples taken, by horizons, from selected soil profiles are shown in table 11. The analyses were made by the Soil Conservation Service and Utah State University Cooperative Soils Laboratory, Logan, Utah.

Methods of Analyses

All samples were air dried in the laboratory. Then they were sieved by hand using sieves 8 inches in diameter with round openings 2 millimeters in diameter. Samples that appeared to have no appreciable amount of pebbles or stones, less than 5 percent, were poured through a mechanical crusher that has openings of about 4 millimeters. Samples that had appreciable amounts of pebbles or stones were broken up in an iron mortar without crushing the pebbles or stones. If it were necessary to reduce the size of the sample, a Riffle sampler was used. Each laboratory sample was mixed thoroughly to insure uniformity, and all subsequent analyses were made on the fraction of less than 2 millimeters in diameter. The percentage of material greater than 2 millimeters in diameter was calculated by dividing the weight of the fraction retained on the 2-millimeter sieve by the initial weight of the air-dry sample. Using a porcelain

The official pipette method of analysis was used to determine particle-size distribution. Organic matter was destroyed by using hydrogen peroxide, but lime was not removed, except where specifically stated in the survey. Sodium hexametaphosphate was used as a dispersing agent. The sand fractions were determined by mechanical sieving through a series of sieves 2 inches in diameter. Except for glassware, all equipment used in making

and new coccine. The ammonia was then titrated with standard solution (1/14 N) of sulfuric acid, and the total amount of nitrogen was determined.

To determine the calcium carbonate equivalent, the technician allowed variable weights of the sample to react in constant glass containers with 2 N hydrochloric acid. The percentage of calcium carbonate equivalent was determined by referring manometer readings to a

TABLE 11.—*Physical and chemical*

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)

properties of selected soils—Continued

TABLE 11.—*Physical and chemical*

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Kidman fine sandy loam.	0–11	Ap	60	27	13	0	1	3	21	36
	11–17	A12	59	27	14	0	1	3	18	37
	17–21	B21	58	26	16	0	0	3	18	37
	21–27	B22	56	28	16	0	1	2	14	39
	27–37	C1ca	49	39	12	0	0	1	7	41
	37–49	C2ca	53	34	13	0	1	1	9	42
	49–58	C3ca	57	33	10	0	0	1	11	45
Kirkham silty clay loam.	0–7	Ap	4	57	39	0	0	0	2	2
	7–13	A12	3	55	42	0	0	0	2	1
	13–18	C1	4	65	31	0	0	0	3	1
	18–34	C1	1	60	39	0	0	0	0	1
	34–52	C2	33	51	16	0	0	0	5	28
	52–68	C3	53	35	12	0	0	0	34	19
Lakeshore silt loam.	0–4	A1sa	28	54	18	0	0	0	5	23
	4–8	C1sa	35	55	10	0	1	1	4	29
	8–13	C2sa	52	41	7	0	0	0	9	43
	13–19	C3sa	43	49	8	0	0	0	5	38
	19–41	C4sa	32	56	12	0	0	0	3	29
	41–51	C4sa	32	56	12	0	0	0	8	24
	51–64	C5g	22	65	13	0	0	0	2	20
Layton loamy fine sand.	0–7	Ap	78	17	5	0	1	14	58	5
	7–15	A12	77	17	6	0	1	13	59	4
	15–23	C1	76	17	7	0	2	11	59	4
	23–29	C2	78	17	5	0	1	9	65	3
	29–41	C3ca	82	14	4	0	2	12	64	4
	41–66	C4ca	91	9	0	0	3	29	56	3
Leland silt loam.	0–8	A2	34	57	9	0	0	1	0	24
	8–14	B2ca	34	34	32	1	1	1	10	21
	14–19	B3ca	64	17	18	0	0	1	34	29
	19–31	C1	78	17	5	0	1	0	18	59
	31–38	C2	29	54	17	0	0	0	5	24
	38–58	C3	51	43	6	0	0	0	7	44
Marriott gravelly sandy loam.	0–2	A11	66	27	7	1	5	8	27	25
	2–7	A12	69	21	10	1	5	9	30	24
	7–11	B21	69	21	10	1	5	9	31	23
	11–22	B22	70	20	10	2	5	8	31	24
	22–38	C1ca	69	21	10	1	4	7	32	25
	38–61	C1ca	70	20	10	2	4	9	31	24
Marriott gravelly sandy loam, calcareous variant.	0–9	Ap	72	20	8	21	19	10	15	7
	9–18	A12	70	19	11	18	20	10	16	6
	18–25	AC	69	21	10	20	18	10	15	6
	25–33	C1	67	23	10	17	16	10	17	7
	33–49	C2	73	20	7	16	16	10	21	10
	49–61	C2	76	19	5	14	16	11	24	11
Martini fine sandy loam.	0–5	A1	61	30	9	0	0	2	40	19
	5–15	A12	72	20	8	0	0	4	56	12
	15–19	C1	89	6	5	0	0	9	72	8
	19–45	C2	64	26	10	0	0	1	38	25
	45–70	C2	74	17	9	0	0	1	55	18
Parleys loam.	0–6	Ap	41	41	18	2	1	2	19	17
	6–15	A12	40	35	25	2	1	2	18	17
	15–26	B2t	28	37	35	1	1	1	11	14
	26–33	B3ca	14	54	32	0	0	1	2	11
	33–48	C1ca	17	57	26	0	1	3	4	9
	48–60	C2	18	54	28	0	0	2	2	14

See footnotes at end of table.

properties of selected soils—Continued

Coarse fragments	Organic	Total	Calcium carbonate	Water content	Reaction (pH)	Cation-	Extractable bases (meq. per 100 gm. of soil)	Soluble salt	Electrical conductivity

TABLE 11.—*Physical and chemical*

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand	Silt	Clay	Very	Coarse	Medium	Fine	Very

properties of selected soils—Continued

Coarse fragments (larger than 2 mm.)	Organic carbon	Total nitrogen	Calcium carbonate equivalent	Water content at 15 atmospheres	Reaction (pH)		Cation-exchange capacity	Extractable bases (meq. per 100 gm. of soil)		Soluble salt (Bureau cup)	Electrical conductivity (millimhos per cm. at 25° C.)
					Saturated paste	1:5 H_2O		Na	K		
Percent	*Percent*	*Percent*	*Percent*	*Percent*			*Meq./100 gm. of soil*			*Percent*	
----------	1.6	0.14	0	6.9	7.0	7.3	15.7	----------	----------	0.04	1.7
----------	1.0	.11	0	6.7	7.3	8.1	12.1	0.6	1.4	.02	.6
----------	.5	.04	9	17.1	8.1	9.5	20.8	4.2	2.6	.1	1.0
----------	.4	.04	38	23.3	8.9	10.0	20.5	10.3	1.9	.2	2.3
----------	.2	----------	16	16.4	9.1	10.0	14.0	11.8	1.3	.6	6.8
12	1.2	.12	0	----------	7.6	8.4	12.8	.5	2.6	----------	1.0
18	1.2	.11	(2)	----------	7.2	8.0	15.0	.3	1.0	----------	.6
15	.9	.10	(2)	8.5	7.2	7.9	13.9	.3	.7	----------	.6
15	.8	----------	(2)	----------	7.4	8.0	12.7	.4	.7	----------	1.0
18	.8	----------	10	----------	8.0	8.8	----------	----------	----------	.03	.8
21	.6	----------	14	----------	8.0	9.0	----------	----------	----------	.03	.6
24	.4	----------	13	----------	8.1	9.0	----------	----------	----------	.03	.7
----------	.2	.02	0	1.8	7.0	7.6	2.8	.1	.2	<.02	.2
----------	.1	.01	0	1.7	6.9	7.2	2.9	.1	.2	.02	.2
----------	.1	----------	0	1.6	7.0	7.1	2.4	.1	.2	.02	.2
----------	.1	----------	0	1.5	7.4	7.3	2.3	.2	.2	.02	.3
----------	1.3	.11	8	5.7	7.6	8.5	8.8	3.5	1.7	.8	25
----------	.6	.05	14	9.3	8.6	9.7	7.1	6.9	1.8	1.1	23
----------	.4	----------	13	6.9	8.6	9.8	10.6	5.9	.9	1.8	34
----------	.6	----------	12	8.5	8.3	9.4	10.1	9.8	1.0	>2.2	49
----------	.5	----------	11	6.7	8.2	9.4	10.7	3.3	.8	>2.2	52
----------	.2	----------	7	2.1	8.3	9.3	9.2	.6	.3	1.6	47
21	1.0	.07	0	3.9	6.7	7.0	----------	.2	.4	.02	.7
13	.9	.06	0	6.1	7.3	7.4	10.4	.3	.6	.02	.4
[illegible]	[illegible]	[illegible]	0	[illegible]	7.0	7.4	16.3	[illegible]	[illegible]	.02	.4

TABLE 11.—*Physical and chemical*

Soil	Depth	Horizon	Size class and diameter of particles							
			Total			Sand fraction				
			Sand (2–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.1 mm.)	Very fine sand (0.1–0.05 mm.)
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Sunset loam.	0–7	Ap	44	38	18	0	1	2	30	11
	7–18	A12	43	39	18	0	0	1	29	13
	18–32	AC	45	40	15	0	0	0	29	16
	32–44	C1	24	46	20	0	0	0	19	15
	44–68	C2	34	49	17	0	0	0	21	13
Syracuse loamy fine sand. [1]	0–11	A11	85	6	9					
	11–21	AC	78	10	12					
	21–30	C1ca	75	11	14					
	30–60	C2ca	75	9	16					
Terminal loam. [1]	0–4	A11	47	38	15					
	4–10	A12	49	37	14					
	10–14	B2t	51	19	30					
	14–22	C1ca	61	14	25					
	22–24	C2cam (Hardpan)								
	24–35	C3g	2	59	39					
	35–72	C4	13	55	32					
Timpanogos loam.	0–6	Ap	42	40	18	1	1	5	11	24
	6–15	A12								

properties of selected soils—Continued

Coarse					Reaction (pH)		Extractable bases (meq. per 100 gm. of soil)		Electrical

by three consecutive washings with neutral normal ammonium acetate. The amount of sodium was then measured on the flame photometer.

Extractable bases, sodium and potassium, are reported

part of the land formerly used for orchards is now used for housing developments. Such areas near Roy City in Weber County, and on uplands near North

TABLE 12.—*Acreage of the principal crops and number of fruit trees and grapevines of all ages in Davis and Weber Counties, Utah*

Crop	Davis County		Weber County	
	1954	1959	1954	1959
	Acres	*Acres*	*Acres*	*Acres*
Alfalfa	12, 587	9, 385	17, 673	14, 879
Barley	3, 177	3, 935	4, 181	4, 896
Corn grown for all purposes	4, 188	5, 306	2, 695	3, 538
Oats	408	438	1, 515	1, 092
Potatoes (Irish)	334	413	515	391
Sugar beets	1, 756	2, 064	2, 659	2, 971
Wheat	3, 706	2, 725	3, 112	3, 811
Wild hay	1, 566	1, 240	388	340
Vegetables (mainly tomatoes)	2, 701	1, 782	2, 504	1, 817
	Number	*Number*	*Number*	*Number*
Apple trees	10, 009	7, 952	10, 691	4, 982
Apricot trees	31, 952	16, 966	37, 314	27, 616
Cherry trees	37, 402	26, 118	47, 996	35, 331
Peach trees	62, 285	21, 541	43, 309	19, 142
Pear trees	8, 101	1, 729	6, 358	4, 724
Plum and prune trees	3, 314	1, 256	1, 228	644
Grapevines	30, 602	16, 984	4, 701	6, 659

Although vegetables, field crops, and fruit are important sources of income in the survey area, about 69 percent of the income from the sale of farm products in these two counties was derived from the sale of livestock and livestock products in 1959. Table 13 shows the kinds and numbers of livestock raised in the two counties for the years 1954 and 1959. Among the main sources of farm income are feeder cattle. The average size of the herds of beef cattle fed for market has increased during the past few years, and the size of the average herd of dairy cattle has also increased. The average-sized herd of dairy cattle consists of about 38 cows, but 100 or more cows are in some herds.

TABLE 13.—*Numbers and kinds of livestock on farms*

Kind of livestock	Davis County		Weber County	
	1954	1959	1954	1959
	Number	*Number*	*Number*	*Number*
Horses and mules	1, 205	1, 103	1, 674	1, 588
Cattle and calves	23, 209	23, 019	31, 204	24, 392
Milk cows	3, 870	3, 420	6, 855	6, 554
Hogs	2, 549	2, 839	2, 216	3, 317
Sheep and lambs	51, 542	33, 819	24, 509	19, 131
Chickens [1]	48, 553	18, 764	95, 086	58, 967
Turkeys raised	94, 258	160, 057	25, 130	149, 035

[1] More than 4 months old.

Industrial Development

Food-processing plants, meatpacking plants, and shops for electromotive repair are among the larger industries in the Davis-Weber Area. Also, large plants where oil is brought in by pipeline and is refined are located in the survey area. More than 2 million head of livestock are sold annually from the local stockyards.

About 185 industrial, manufacturing, and wholesale establishments are located in the city of Ogden alone. Also located in or near that city are large stockyards and canning factories, as well as many large elevators where grain is stored for use in the grain, feed, and milling industries. Employment offered by these industries, as well as by other establishments, has added greatly to the farm income and has had a great effect on the economy of the area.

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	pH		*pH*
Extremely acid	below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline.	9.1 and higher

Reclamation, soil. In this area, the removal of excess water, salts, and alkali from the soil profile in order to make it suitable for crops.

Relief. The elevations or inequalities of a land surface, considered collectively.

Saline soil. A soil containing soluble salts in quantities that [illegible]

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Subsoil. That part of the soil profile commonly below plow depth and above the parent material.

Substratum. Any layer lying beneath the solum, or true soil; the C or R horizon.

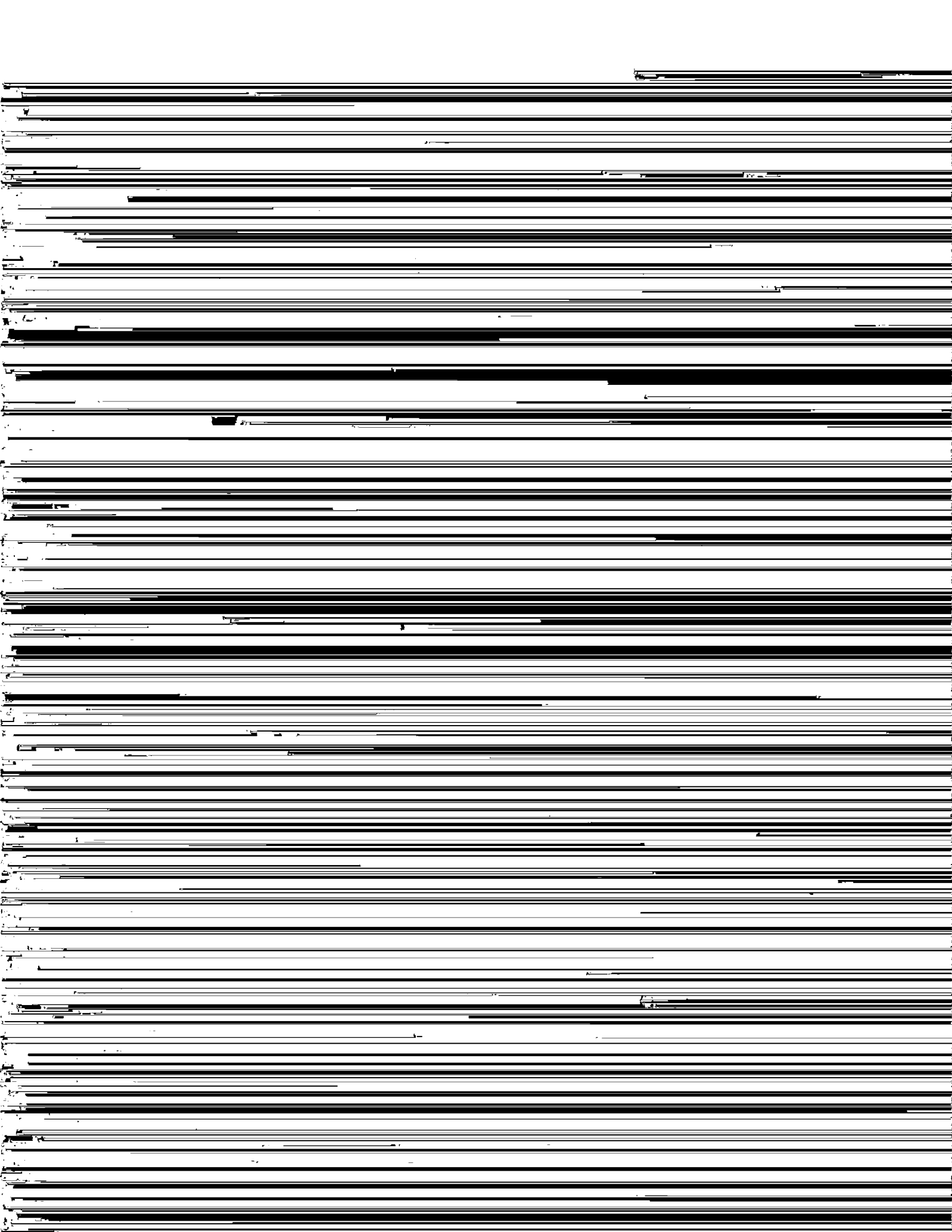
Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches thick. The

GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs.

[See table 3, page 22, for estimated yields of each irrigated unit; table 4, page 24, for estimated yields of each dryfarmed unit; and table 9, page 72, for approximate acreage and proportionate extent of the soils. See pages 33 to 66 for information on engineering properties of the soils. Dashed lines indicate soil was not assigned to a capability unit or is not used for nor suited to range]

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
Aa	Abbott clay	74	VIIw-1	21	Salt Meadow	28
AbB	Ackmen loam, 1 to 3 percent slopes	74	IIe-2	11	----------	--
AbC	Ackmen loam, 3 to 6 percent slopes	74	IIIe-2	14	----------	--
AbD	Ackmen loam, 6 to 10 percent slopes	75	IIIe-3	15	Upland Loam	30
AbE2	Ackmen loam, 10 to 20 percent slopes, eroded	75	IVe-4	18	Upland Loam	30
Ac	Airport silt loam	75	IIIw-4	15	Alkali Bottom	27
Ad	Airport silty clay loam	75	IVw-3	18	Alkali Bottom	27
Ae	Airport soils, shallow water table	76	VIIw-1	21	Salt Meadow	28
AF	Airport-Ford complex	76				
	Airport soil	--	IIIw-4	15	Alkali Bottom	27
	Ford soil	--	IVw-3	18	Alkali Bottom	27



GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
KlC	Kilburn cobbly sandy loam, 3 to 10 percent slopes	88	IVs-2	19	Upland Gravelly Loam	30
KlE2	Kilburn cobbly sandy loam, 10 to 20 percent slopes, eroded	88	VIs-1	20	Upland Gravelly Loam	30
KmA	Kilburn gravelly sandy loam, deep over clean sands, 0 to 3 percent slopes	88	IVs-1	19	Upland Gravelly Loam	30
KmC	Kilburn gravelly sandy loam, deep over clean sands, 3 to 10 percent slopes	89	IVs-2	19	Upland Gravelly Loam	30
Kr	Kirkham loam	91	IIw-3	13	Semiwet Meadow	30
Ks	Kirkham silty clay loam	90	IIw-1	12	Semiwet Meadow	30
Kt	Kirkham silty clay loam, strongly alkali	90	IVw-3	18	Alkali Bottom	27
KX	Kirkham-Airport silty clay loams	91	IVw-3	18	Alkali Bottom	27
La	Lakeshore silt loam	91	VIIIw-1	21	----------	--
Lb	Lakeshore fine sandy loam	91	VIIw-1	21	Alkali Bottom	27
LcB	Layton loamy fine sand, 0 to 3 percent	92	IIs-2	14	----------	--

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
PvD	Pleasant View loam, 6 to 10 percent slopes---	98	IIIe-3	15	Upland Loam	30
PvE	Pleasant View loam, 10 to 20 percent slopes--	98	IVe-4	18	----------	--
PvE2	Pleasant View loam, 10 to 20 percent slopes, eroded----------	98	VIe-1	20	Upland Loam	30
PvC	Pleasant View gravelly sandy loam, 3 to 6					

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Range site	
			Symbol	Page	Name	Page
TrB2	Trenton silt loam, 1 to 3 percent slopes, eroded	107	IVw-3	18	Alkali Bottom	27
TrC3	Trenton silt loam, 3 to 10 percent slopes, severely eroded	107	VIw-1	20	Alkali Bottom	27
WaA	Warm Springs fine sandy loam, 0 to 1 percent slopes	108	IIw-3	13	----------	--
WaB	Warm Springs fine sandy loam, 1 to 3 percent slopes	108	IIw-4	13	----------	--
WdA	Warm Springs fine sandy loam, deep over clay, 0 to 1 percent slopes	108	IIIw-6	16	----------	--
WgA	Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes	108	IIIw-6	16	Alkali Bottom	27
WhA	Warm Springs fine sandy loam, strongly alkali, 0 to 1 percent slopes, channeled	108	VIw-1	20	Alkali Bottom	27
WlA	Warm Springs fine sandy loam, shallow water table, 0 to 1 percent slopes	108	IVw-1	18	Salt Meadow	28
Wm	Wayment silty clay loam	109	VIIIw-1	21	----------	--
WR	Wayment-Refuge complex	109				
	Wayment soil	---	VIIIw-1	21	----------	--
	Refuge soil	---	IVw-3	18	----------	--
Ws	Woods Cross silty clay loam	110	IIIw-2	15	Wet Meadow	32
Wt	Woods Cross silty clay loam, drained	109	IIIw-2	15	----------	--