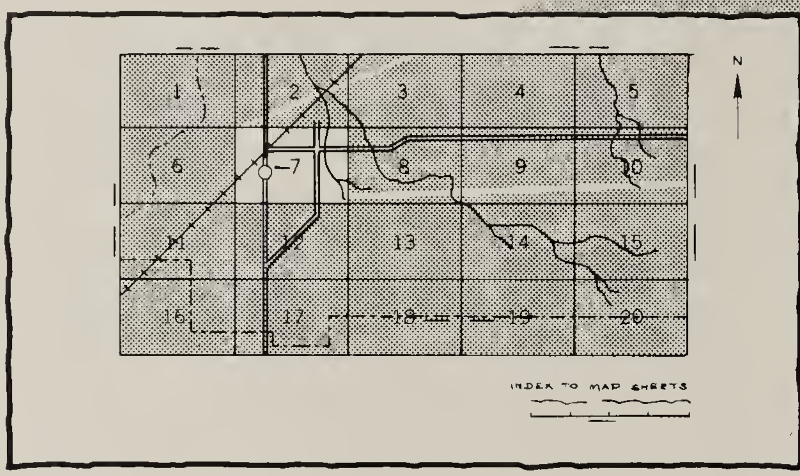
Soil Conservation Service

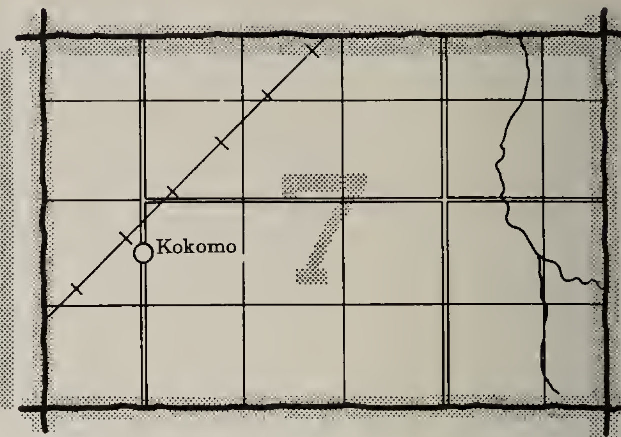
In cooperation with United States Department of the Interior, Bureau of Land Management; Oregon Agricultural Experiment Station; and Lane County

Soil Survey of Lane County Area, Oregon

HOW TO USE

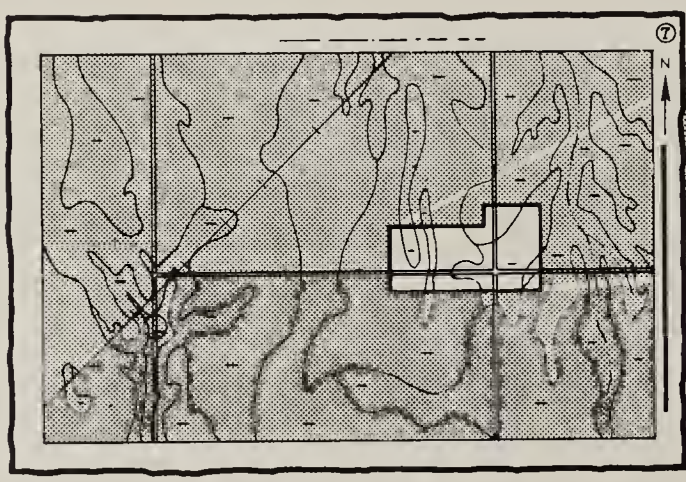
1. Locate your area of interest on the ''Index to Map Sheets''

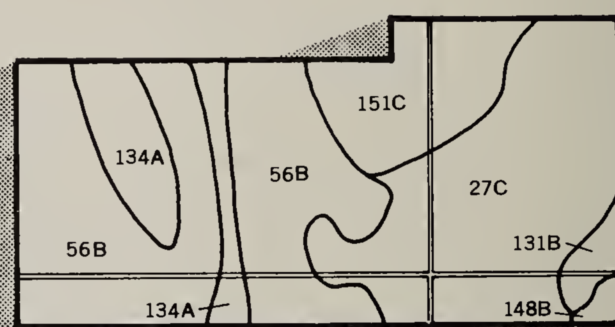




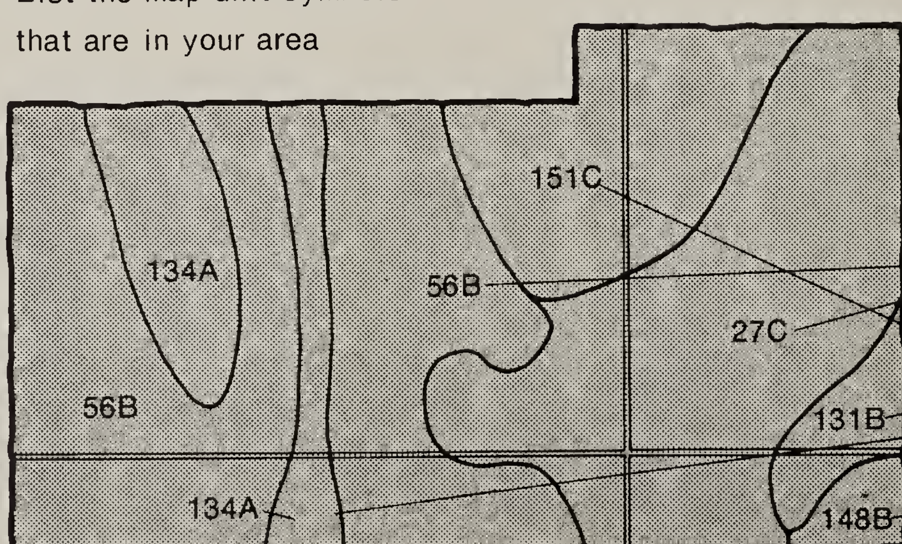
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

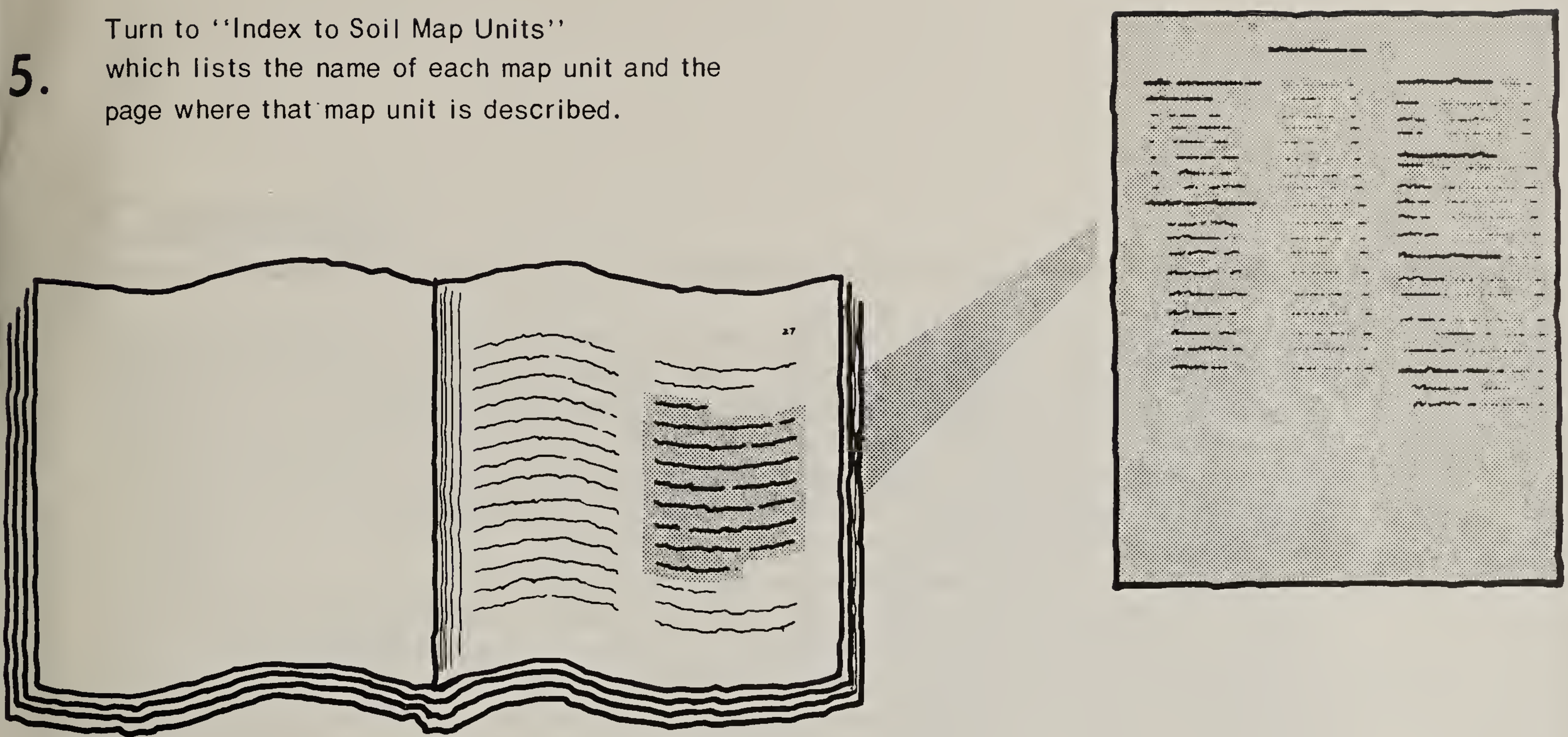


Symbols

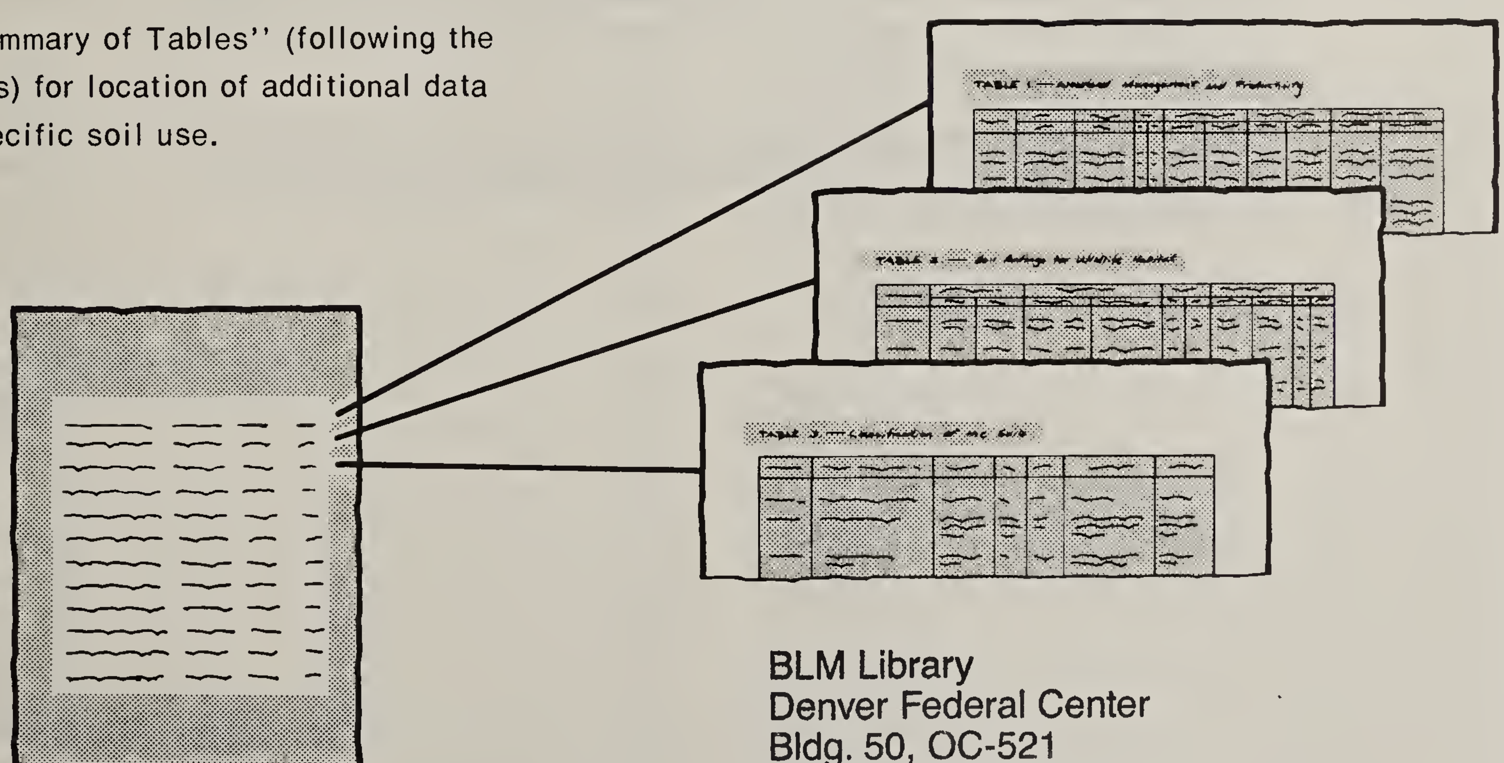
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1981. This survey was made cooperatively by the Soil Conservation Service, the Bureau of Land Management, the Oregon Agricultural Experiment Station, and Lane County. It is part of the technical assistance furnished to the North Lane, Siuslas, and Upper Willamette Soil and Water Conservation Districts. Financial assistance was provided by Willamette Industries.

Cover: Typical area of Yellowstone soils and Rock outcrop in foreground and Keel and Hummington soils in center. Three Sisters Mountains in background mark the western boundary of Lane County.

Contents

Soil Series

Issued September 1987

Index to Map Units

Summary of Tables

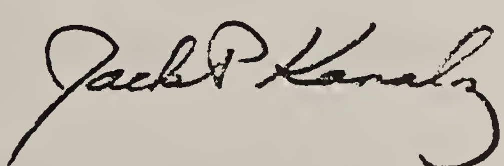
Foreword

This soil survey contains information that can be used in land-planning programs in Lane County Area, Oregon. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

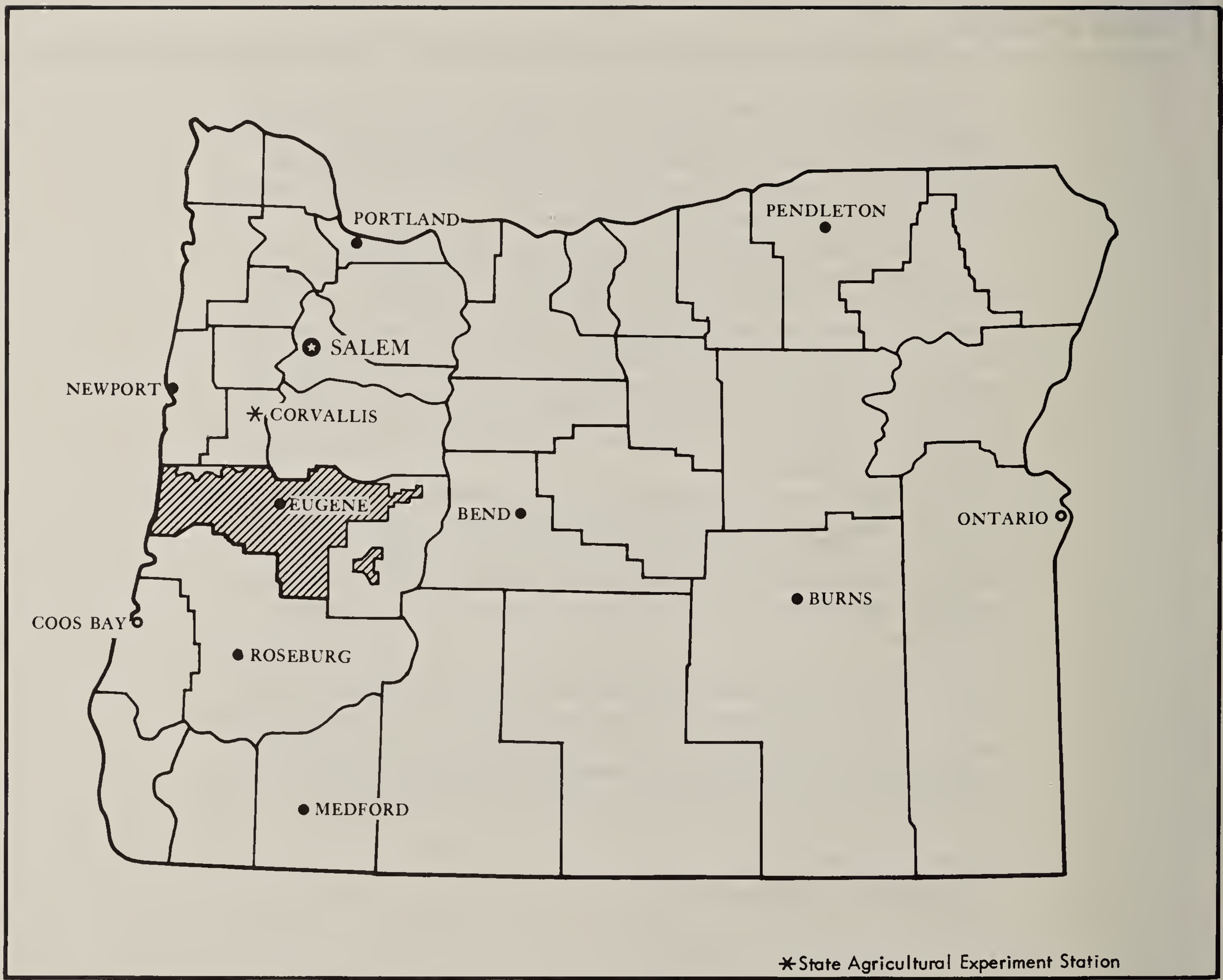
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



Jack P. Kanalz
State Conservationist
Soil Conservation Service



Location of Lane County Area in Oregon.

Soil Survey of Lane County Area, Oregon

By William R. Patching, Soil Conservation Service

Fieldwork by William R. Patching, Philip R. Smith, Craig Garland, Richard C. Herriman, Jay Boynton, Gary Shafer, and Aimee Walker, Soil Conservation Service

United States Department of Agriculture,
Soil Conservation Service
In cooperation with
United States Department of the Interior,
Bureau of Land Management;
Oregon Agricultural Experiment Station;
and Lane County

LANE COUNTY AREA is in the west-central part of Oregon. Eugene, the county seat of Lane County, has a population of about 92,000. The total extent of the survey area is 1,776,545 acres, or about 2,776 square miles. Of this, about 280,000 acres is managed by the Bureau of Land Management and 250,000 by the Forest Service.

The survey area is in three major land resource areas—Northern Pacific Coast Range and Valleys, Willamette Valley, and Western Slope Cascade Mountains. The Willamette River and several tributaries have their confluence near the city of Eugene. The Willamette River flows in a northwesterly direction through the Willamette Valley. The Long Tom River flows along the western side of the valley.

The eastern and southern parts of the survey area consist of rolling and steep mountains that are dissected by tributaries of the Willamette River. The western part of the area consists of sharply dissected mountains of the Coast Range. It is drained by tributaries of the Siuslaw and Long Tom Rivers. Several freshwater lakes are in the valleys of the Coast Range and near the coast. Sand dunes have developed along much of the coastal area.

Elevation ranges from sea level along the coast to 3,700 feet in the Coast Range and from 290 feet near the Willamette River on the northern boundary to more than 5,000 feet on the ridges and peaks in the western part of the Cascade Range.

An older survey, "Soil Survey of Eugene Area, Oregon," was published in 1925 (*15*). This earlier survey covers a part of the present survey. The present survey, however, updates the earlier survey and provides additional information and larger maps that show the soils in greater detail.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent survey areas. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey.

General Nature of the Survey Area

This section briefly discusses the history and development; natural resources; physiography, relief, and drainage; farming; woodland; and climate of the survey area.

History and Development

The Willamette Valley was settled in the mid-1800's. The first settlement in the survey area was established at Pleasant Hill in 1848. The early settlers found the stream valleys inhabited by Indians, who pastured their livestock on patches of open, treeless prairie. The settlers soon populated the valleys and terraces, a few of the more hardy going into the more mountainous areas. On January 28, 1851, Lane County was organized and named in honor of General Joseph Lane, Territorial Governor of Oregon.

For many years the Willamette River afforded water transportation by shallow-draft vessels as far south as Eugene. The Southern Pacific Railroad and the Oregon Electric Railroad furnished transportation to Portland to the north and to California to the south. These railroads have played an important role in the development of agriculture and the timber industry in the county.

Good highways and freeways connect all communities and cities in Lane County. Mahlon Sweet Airport makes Lane County a center for air transportation. The University of Oregon, located in Eugene, has had a positive influence on the education and cultural development of the citizens of Lane County. The more recent establishment of Lane Community College has opened up additional educational opportunities for many citizens.

Natural Resources

The natural resources in Lane County are related to water, minerals, soil, and timber. Clear mountain streams abound with fish and provide water for domestic use and hydroelectric power. Natural and manmade lakes enhance the recreational facilities within the county. The mountainous areas of the Coast Range and the Cascade Range are covered with dense stands of Douglas-fir and western hemlock. Gold has been mined in the mountains north of Blue River and in the Bohemia Mountains to the east of Cottage Grove. Mercury has been mined from a cinnabar mine on Black Butte, south of Cottage Grove. Lava flows and intrusive volcanic outcrops are a good source of rock for highway construction. Streams emptying into the Pacific Ocean have estuaries that provide habitat for many forms of sea life, including several varieties of clam.

Physiography, Relief, and Drainage

The coastal edge of Lane County has many beautiful beaches backed by low fore dunes, flat swampy areas, large sand dunes, steep headwalls, jutting headlands, and old marine terraces. The northern coastal area has steep mountain bluffs that come down to the ocean. They are dissected by several small streams that drain that part of the Coast Range. The city of Florence is built on old marine terraces that are encroached on by shifting sand dunes. There are several lakes in the coastal area that retain much of the water that drains from nearby hills. Several intermittent lakes develop in the sand dune areas in winter and spring. They usually dry up before the rains begin in fall.

The Coast Range averages about 1,200 feet in elevation. It is very deeply dissected by the streams that drain it, so there are very few areas of gently rolling uplands. Prairie Mountain, near the northern boundary of the county, has an elevation of 3,700 feet. The major streams that drain the Coast Range are the Long Tom River, which drains into the Willamette River, and the Siuslaw River and its tributaries, which drain into the Pacific Ocean. The Long Tom River drains from north to south, and then it flows in an easterly direction to the town of Elmira. After it leaves Elmira, it has its confluence with Coyote Creek in Fern Ridge Reservoir and then flows northward along the western side of the Willamette Valley. It has its confluence with the Willamette River a few miles north of the survey area boundary. The nearly level to gently sloping terraces along the Long Tom River and its tributaries are moderately well drained to very poorly drained.

The Siuslaw River has a unique drainage pattern. This river begins in broad valleys, which suggests that a much larger stream may have flowed there at one time. As uplift of the Coast Range occurred, the meandering ancestral stream apparently cut down through the Tyee Formation on its way to the Pacific Ocean. Through the more mountainous part of its course, the river has the appearance of having large meander scrolls, yet the canyon walls are very steep and extend several hundred feet above the present level of the river. The channel valley is narrow and has very few terraces except for those on the points that extend into big oxbows. The Siuslaw River reaches sea level near the town of Mapleton, about 15 miles from the ocean. Ocean tides influence this part of the Siuslaw River. Flooding occurs during periods of high rainfall and high tides. Mapleton has been inundated several times.

Triangle Lake is a significant landmark in the Coast Range. It is in a valley formed by several streams that have their confluence with Lake Creek and is at an elevation of about 700 feet. The soils in the valley are moderately well drained to very poorly drained. The surrounding mountains have steep slopes and rise to elevations of 1,500 to 2,000 feet. From the outlet of Triangle Lake, Lake Creek cascades rapidly for about 2 miles before the valley widens, where it is characterized by well drained and moderately well drained terraces. Lake Creek has its confluence with the Siuslaw River at Swisshome.

In the Willamette Valley, the soils on broad flood plains along the McKenzie and Willamette Rivers in the north-central part of the survey area have good to excessive drainage, except for those soils in sediment-filled remnant channels. The soils on terraces adjacent to the flood plains are well drained and have undulating bar-and-channel relief; however, the terrace surface becomes more nearly level and is characterized by depressional areas toward the Long Tom River to the west, and the soils in this area are more poorly drained. Amazon and Flat Creeks are low-gradient streams that have dissected the valley terrace between the Willamette and Long Tom Rivers. Remnants of older, Pleistocene outwash terraces are extensive in the southwestern part of the Willamette Valley, near Veneta and Elmira, and in the southeastern and southern parts, near Pleasant Hill and Cottage Grove.

The foothills of the Cascade Range have peaks more than 5,000 feet high. The eastern edge of Lane County includes the Three Sisters Mountains, with elevations of 10,354, 10,059, and 10,094 feet. The Cascade Range formed from volcanic material, including very hard basaltic rock and soft pyroclastic material. Volcanic ash and pumice cover the higher areas. The differences in the hardness of these materials have influenced the rates of dissection; thus, these areas are characterized by gently sloping high plateaus as well as very steep canyon walls. Some areas in the Cascades have been subject to severe slumping and are characterized by steep headwalls and rolling slump blocks. All parts of the Cascade Range in this survey area are drained by tributaries of the Willamette River. The upper tributary valleys are narrow and have terraces of recent origin. The streams are characterized by waterfalls and numerous rapids until they reach the nearly level Willamette Valley.

The U.S. Army Corps of Engineers has built flood control dams on the Coast Fork and Middle Fork of the Willamette River, Fall Creek, Blue River, Row River, Hills Creek, and South Fork of the McKenzie River. These structures have controlled flooding in the lower valleys, especially the Willamette Valley. Many areas that were active flood plains a few years ago are now nearly free of flooding.

Farming

Farming within the survey area is limited to the valley areas and lower foothills. The flood plains are used for cash crops, such as snap beans, sweet corn, mint, strawberries, red beets, carrots, and other similar crops. The soils on terraces are used for many of the same crops as are the soils on flood plains, and they are also used for grass seed production. Grass seed has become the main crop on the poorly drained soils in the northern part of the county. Dairy cattle, beef cattle, and sheep are raised on valley terraces, high terraces, and foothills and in stringer valleys. Fruit and nut orchards are mainly on well drained terraces and uplands. Wheat, oats, barley, hay, and pasture are grown on most of the soils in the agricultural areas. Christmas tree farming is expanding on most of the better drained soils in the valleys and on the foothills.

Irrigation water for farm crops commonly is pumped from wells or from nearby streams. There is interest in establishing irrigation companies and providing more water for irrigation from major streams and reservoirs.

Woodland

Approximately 85 percent of the survey area is woodland. Douglas-fir is the most abundant woodland species. Other species that are of importance commercially are western hemlock, Sitka spruce, western redcedar, incense-cedar, red alder, ponderosa pine, grand fir, and noble fir. Occasional stands of Oregon white oak, bigleaf maple, red alder, and golden chinkapin are harvested for specialty purposes such as furniture. Wood products dominate the industrial development in Lane County and are the greatest source of income within the county. Log consumption by all mills in the county was 1,776 million board feet in 1976. This was the largest for any county in the state, and it amounted to 19 percent of the state's total. (*9*)

Most of the woodland in Lane County is under the management of the Forest Service, the Bureau of Land Management, or large private companies. The Oregon State Department of Forestry regulates many of the woodland practices used within the county. Small woodland owners may receive help and guidance in managing their woodland from specialists in the Soil Conservation Service, the Cooperative Extension Service, and the Oregon State Department of Forestry.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

The climate of Lane County is greatly tempered by winds from the Pacific Ocean. Summers are fairly warm, but hot days are rare. Winters are cool, but snow and freezing temperatures are not common except at the higher elevations. During summer, rainfall is extremely light, so crops growing actively during this period need irrigation. Often several weeks pass without precipitation. During the rest of the year, rains are frequent, especially late in fall and in winter.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Canary, Detroit, and Eugene, Oregon, for the period 1951-77. Table 2 shows probable dates of the last freeze in spring and the first freeze in fall. Table 3 provides data on length of the growing season.

In winter, the average temperatures at Canary, Detroit, and Eugene are 45, 37, and 42 degrees F, respectively. The average daily minimum temperature is 38 degrees at Canary, 29 at Detroit, and 35 at Eugene. The lowest temperature, which occurred at Eugene on December 8, 1972, is -12 degrees. In summer, the average temperature is 60 degrees at Canary and 64 degrees at Detroit and Eugene. The average daily maximum temperature is about 76. The highest recorded temperature, which occurred at Detroit on June 17, 1961, is 107 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 81 inches at Canary and Detroit and 46 inches at Eugene. Of this, about 20 percent usually falls in April through September, which includes the growing season for most crops. The heaviest 1-day rainfall during the period of record was 5.37 inches at Detroit on January 28, 1965. Thunderstorms occur on about 5 days each year, and most occur in summer.

The average seasonal snowfall is 4 inches at Canary, 77 inches at Detroit, and 9 inches at Eugene. The greatest snow depth at any one time during the period of record was 22 inches at Canary, 61 inches at Detroit, and 34 inches at Eugene. On an average, Canary has 1 day, Detroit has 23 days, and Eugene has 2 days with at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The percentage of possible sunshine is 60 percent in summer and 25 percent in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 8 miles per hour, in winter.

In most winters, one or two storms over the whole area bring strong and sometimes damaging winds, and in some years the accompanying heavy rains cause serious flooding. Every few years, in winter or summer, a large invasion of a continental airmass from the east causes abnormal temperatures. In winter several consecutive days are well below freezing; in summer a week or longer is sweltering.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

This survey area includes Beaches, Dune land, Pits, Riverwash, and Rock outcrop, which have little or no natural soil. For consistency and clarity, these miscellaneous areas have been described in a manner similar to that of map units that include soils. The areas may be part of a complex, such as the Rock outcrop-Kilchis complex, 30 to 90 percent slopes. Use of these miscellaneous areas for agriculture, as urban land, or as woodland is very limited. Some of the more feasible modifications or uses of these areas have been mentioned. Dune land is unstable drifting sand, but beachgrass has been planted in some areas near roads and buildings to reduce drifting. If other conditions are favorable, areas so stabilized become suitable building sites in a few years.

To show the detail significant to farm planning and to the application of agricultural science to farms, the soils in the survey area have been mapped at a scale of 4 inches to the mile. At this scale, a map unit includes small areas of other soils that must be included because of the limitations imposed by this scale and by the number of points that can be examined in the field.

The soil boundary lines delineated on the aerial photographs encompass the soil identified by the map symbol plus a small proportion of other soils—as much as about 15 percent of contrasting soils (no more than 10 percent of one kind of soil) that cannot be excluded in practical soil cartography. Similar soils that have essentially the same use and management can occupy as much as 45 percent of a delineation as long as no more than 20 percent is one kind of soil. The publication scale of 3.168 inches per mile further restricts the minimum size of any delineation; therefore, even in intensively used and carefully mapped areas, roughly circular included areas as much as 2 acres in size and long, narrow included areas as much as 4 acres in size are present in some delineations because they are smaller than the minimum size recommended at the publication scale.

The total percentage given for included areas refers only to contrasting inclusions that have significant differences in use or management.

Individual soils on the landscape commonly merge gradually onto one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses and under different levels of management. Some interpretations were modified to fit local conditions, and some new interpretations were developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped into general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages.

Map Unit Descriptions

Dominantly nearly level, excessively drained to very poorly drained soils on flood plains

This group consists of seven map units. These units are on flood plains along the major streams throughout the survey area.

1. Chehalis-Cloquato

Deep, well drained, nearly level silty clay loam and silt loam that formed in recent alluvial deposits

This map unit is on broad bottom lands immediately adjacent to the Willamette and McKenzie Rivers. It is subject to occasional flooding in winter. Nearly all of this unit has been cleared and is cropped; where it has not been cleared, however, the vegetation is Douglas-fir, black cottonwood, bigleaf maple, Oregon white oak, Oregon ash, trailing blackberry, western swordfern, and forbs and grasses. Elevation is 290 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 1 percent of the survey area. It is about 65 percent Chehalis and similar soils and 20 percent Cloquato and similar soils. The remaining 15 percent is soils of minor extent.

Chehalis soils are in the areas of the flood plain furthest from the rivers. These soils are deep and well drained. The surface layer and subsoil are dark brown silty clay loam, and the substratum is brown silt loam.

Cloquato soils are in areas of the flood plain between Chehalis and the Newberg and Camas areas. These soils are deep and well drained. The surface layer is very dark grayish brown silt loam, and the substratum is dark brown silt loam over multicolored sand.

Of minor extent in this unit are somewhat excessively drained Newberg soils and excessively drained Camas soils, which occupy positions immediately adjacent to present and recently abandoned river channels. Moderately well drained McBee soils and poorly drained Wapato soils occupy old meander channels away from the active stream channels.

This unit is used mainly for orchard crops, small grain, hay, pasture, and vegetable crops. It is the most intensively cultivated unit in the survey area. Scattered small acreage homesites are in this unit. Soil compaction is a concern on the Chehalis soils when they are disturbed while moist. Some sources of gravel are in this unit.

2. Newberg-Cloquato-Camas

Deep, well drained to excessively drained, nearly level fine sandy loam, silt loam, and gravelly sandy loam that formed in recent alluvial deposits

This map unit is on recent flood plains along the Willamette River and its tributaries. It has an undulating topography characteristic of most flood plains. Vegetation is black cottonwood, willow, bigleaf maple, Oregon white oak, Douglas-fir, trailing blackberry, western brackenfern, and forbs and grasses. Elevation is 290 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 3 percent of the survey area. It is about 40 percent Newberg and similar soils, 20 percent Cloquato and similar soils, and 15 percent Camas and similar soils. The remaining 25 percent is soils of minor extent.

Newberg soils are deep and somewhat excessively drained. The surface layer is dark brown fine sandy loam, and the substratum is dark brown fine sandy loam and coarse sandy loam.

Cloquato soils are deep and well drained. The surface layer is very dark grayish brown silt loam, and the substratum is dark brown silt loam over multicolored sand. These soils occupy slightly lower positions than do the Newberg soils and are in areas that have less pronounced undulating topography.

Camas soils typically occupy some of the highest positions in undulating areas, but in some areas they also are in the lowest positions of the more recently abandoned channels. These soils are deep and excessively drained. The surface layer is very dark grayish brown gravelly sandy loam, and the substratum is dark brown very gravelly sand.

Of minor extent in this unit are Chehalis, Haflinger, Jimbo, McBee, and Wapato soils, Fluvents, and Riverwash. The Fluvents and Riverwash occupy the actively developing flood plains immediately adjacent to and within present stream channels. The McBee and Wapato soils occupy the older depressional areas farther away from the river. In the upper reaches of the McKenzie Valley, excessively drained Haflinger soils and well drained Jimbo soils make up most of the unit. In those areas elevation ranges to 1,500 feet, annual precipitation as much as 90 inches, and the frost-free season is as short as 130 days.

This unit is used mainly for vegetable, specialty, and pasture crops grown under sprinkler irrigation.

Homesites in this unit generally are located on the higher Camas soils to avoid the occasional flooding that occurs on the lower lying Newberg and Cloquato soils and the Camas soils in abandoned channels. The higher lying Camas soils are subject to only rare periods of flooding. Abundant sources of gravel are in this unit.

3. Abiqua-McAlpin

Deep, well drained and moderately well drained, nearly level silty clay loam that formed in recent alluvial deposits

This map unit is on bottom lands and alluvial fans of the tributaries to the Willamette River. Vegetation is Douglas-fir, Oregon white oak, bigleaf maple, black cottonwood, Oregon ash, forbs, and grasses. Elevation is 300 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 1 percent of the survey area. It is about 35 percent Abiqua and similar soils, 30 percent McAlpin and similar soils, and 35 percent soils of minor extent.

Abiqua soils are deep and well drained. The surface layer is dark brown silty clay loam, the subsoil is dark brown silty clay over silty clay loam, and the substratum is dark brown gravelly clay loam. These soils are in the higher lying areas on the landscape.

McAlpin soils are deep and moderately well drained. The surface layer is dark brown silty clay loam, and the subsoil is dark brown silty clay over brown silty clay and clay.

Of minor extent in this unit are Chehalis, Cloquato, Linslaw, McBee, Newberg, Noti, Veneta Variant, Waldo, and Wapato soils, Fluvents, and Riverwash. Small areas of well drained Chehalis, Cloquato, and Newberg soils are immediately adjacent to the streams, as are the Fluvents and Riverwash. Linslaw, Noti, and Veneta Variant soils are on narrow terrace remnants. Poorly drained Waldo and Wapato soils are in low lying areas.

This unit is used mainly for pasture, hay, grass seed, and small grain. Some small areas have been sprinkler irrigated and used for vegetable and specialty crops. Cropping is limited by irregular soil patterns. The McAlpin soils have a high water table and are subject to rare periods of flooding. Small acreage homesites are common in this unit.

4. Waldo-McAlpin

Deep, poorly drained and moderately well drained, nearly level silty clay loam that formed in recent alluvial deposits

This map unit is on bottom lands and alluvial fans of the tributaries of the Willamette River. Vegetation is Douglas-fir, Oregon white oak, bigleaf maple, black cottonwood, Oregon ash, forbs, and grasses. Elevation is 300 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 1 percent of the survey area. It is about 45 percent Waldo and similar soils and 35 percent McAlpin and similar soils. The remaining 20 percent is soils of minor extent.

Waldo soils are in the lower lying areas of the landscape. These soils are deep and poorly drained. The surface layer is very dark brown silty clay loam, and the subsoil is very dark gray, dark gray, and gray silty clay and clay.

McAlpin soils are in the higher lying areas on the landscape. These soils are deep and moderately well drained. The surface layer is dark brown silty clay loam, and the subsoil is dark brown silty clay over brown silty clay and clay.

Of minor extent in this unit are the well drained Abiqua soils, the moderately well drained Coburg and McBee soils, and the poorly drained Bashaw, Conser, and Wapato soils. Small areas of Chehalis, Cloquato, and

Newberg soils are immediately adjacent to the streams, as are Fluvents and Riverwash.

This unit is used mainly for pasture, hay, grass seed, and some small grain. Some small areas have been sprinkler irrigated and are used for vegetable and specialty crops. Cropping is limited by irregular soil patterns. The McAlpin soils have a high water table and are subject to rare periods of flooding. The Waldo soils have a high water table and are subject to occasional periods of flooding.

5. Natroy-Bashaw

Deep, poorly drained, nearly level silty clay, silty clay loam, and clay that formed in alluvial deposits

This map unit is on broad terraces, fans, and bottom lands, most of which are used for producing ryegrass for seed and pasture. In areas not cultivated, the vegetation is Oregon ash, rose, hawthorn, sedges, rushes, and water tolerant grasses. Elevation is 290 to 700 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 2 percent of the survey area. It is about 50 percent Natroy and similar soils and 35 percent Bashaw and similar soils. The remaining 15 percent is soils of minor extent.

Natroy soils are deep and poorly drained. The surface layer is very dark grayish brown silty clay and silty clay loam, and the substratum is dark grayish brown, dark brown, and brown clay and gravelly clay.

Bashaw soils are deep and poorly drained. The surface layer is very dark gray clay, and the substratum is olive brown and light brownish gray silty clay.

Of minor extent in this unit are the poorly drained Waldo and Wapato soils, which do not crack to the surface and are nearer the streams, and the somewhat poorly drained Pengra soils on fans.

The Natroy and Bashaw soils are very sticky and very plastic when wet. They become deeply cracked and extremely hard when dry. The Natroy soils that have a silty clay loam surface layer are somewhat easier to work than are the Bashaw and Natroy soils that have a silty clay surface layer.

This unit is used mainly for ryegrass seed and pasture. The Natroy soils have a high water table and are frequently flooded. Where Urban land is mapped with the Natroy soils, the risk of flooding is rare because flood control measures have been taken. The Bashaw soils have a high water table and are occasionally flooded. Both soils are subject to ponding.

6. Nehalem-Meda-Nestucca

Deep, well drained and somewhat poorly drained, nearly level to strongly sloping silt loam and loam that formed in alluvial deposits

This map unit is on narrow flood plains, terraces, and fans along streams in the Coast Range. The valleys are too narrow in most areas to map the terraces separately from the flood plains. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, western redcedar, red alder, bigleaf maple, black cottonwood, trailing blackberry, Oregon oxalis, and forbs and grasses. Elevation is 10 to 800 feet. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free season is 140 to 220 days.

This unit makes up about 2 percent of the survey area. It is about 40 percent Nehalem and similar soils, 35 percent Meda and similar soils, and 15 percent Nestucca and similar soils. The remaining 10 percent is soils of minor extent.

Nehalem soils are in the broader areas of the flood plains along slower moving parts of the streams. These soils are deep and well drained. The surface layer is very dark brown silt loam, the subsoil is dark yellowish brown silt loam over brown silty clay loam, and the substratum is yellowish brown loam.

Meda soils are on the narrow terraces and fans above the flood plains. These soils are deep and well drained. The surface layer is very dark grayish brown loam, the subsoil is dark brown and brown gravelly clay loam, and the substratum is multicolored very gravelly sandy loam.

Nestucca soils are in depressional areas on flood plains. These soils are deep and somewhat poorly drained. The surface layer is very dark brown silt loam, the subsoil is dark grayish brown and grayish brown silty clay loam, and the substratum is grayish brown and dark gray clay loam and silty clay.

Of minor extent in this unit are well drained Nekoma soils and Fluvents on flood plains near stream channels, poorly drained Brenner and Willanch soils in depressional areas on flood plains, Brallier soils and other very poorly drained organic soils in abandoned channels and low swampy areas, and well drained Eilertsen soils on terraces above the flood plains.

This unit is used mainly for pasture and hay, but some small areas are used for orchards and home gardens. The small size and irregular shape of mapped areas and the distance to market have limited commercial fruit and vegetable production; in addition, the cool, moist summers limit production to cool season crops in most areas. Well drained areas that are not cleared are highly productive sites for Douglas-fir and western hemlock and are used mainly for commercial timber production. The Nehalem and Nestucca soils have a high water table. The Nehalem soils are occasionally flooded, and the Nestucca soils are frequently flooded.

Small acreage homesites are common on this unit. Buildings are located on the narrow terraces of the Meda soils and the minor Eilertsen soils and on elevated foundations in areas of the minor Nekoma soils along the lower reaches of the Siuslaw River. The hazard of flooding in winter is the main limitation for homesite and recreational development on this unit.

7. Brallier-Nestucca

Deep, very poorly drained and somewhat poorly drained, nearly level muck and silt loam that formed in organic material and recent alluvial deposits

This map unit is on low flood plains and tidal bottom lands along the lower reaches of the Siuslaw River. Areas not protected by dikes and drainage ditches support mainly willows, saltgrass, sedges, reeds, rushes, and reed canarygrass. Protected and drained areas support a variety of improved water tolerant grasses. Elevation is sea level to 70 feet. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free season is 150 to 220 days.

This unit makes up about 1 percent of the survey area. It is about 35 percent Brallier and similar soils and 30 percent Nestucca and similar soils. The remaining 35 percent is soils of minor extent.

Brallier soils are on the margins of shallow lakes and tidal basins. They are deep, very poorly drained organic soils. The surface layer is very dark grayish brown muck, and the substratum is dark brown muck.

Nestucca soils are deep and somewhat poorly drained. The surface layer is very dark brown silt loam, the subsoil is dark grayish brown and grayish brown silty clay loam, and the substratum is grayish brown and dark gray clay loam and silty clay. These soils are in low lying areas on the flood plain.

Of minor extent in this unit are very poorly drained Brallier Variant soils in marshy tidal areas along back sloughs, poorly drained Brenner and Willanch soils in depressional areas on flood plains, well drained Nehalem and Nekoma soils in the higher lying areas on flood plains next to the main river channel, and well drained Eilertsen and Meda soils on narrow terraces and fans along the sides of the valley.

This unit is used mainly for pasture in the drained and protected areas and for wildlife habitat in the tidal marsh areas. The frequent flooding, high water table, and cool moist summers restrict the selection of crops and the proper curing of hay on this unit during most years.

Dominantly nearly level, well drained to poorly drained soils on terraces

This group consists of four map units. These units are on terraces in the Willamette Valley.

8. Malabon-Salem

Deep, well drained, nearly level silty clay loam and gravelly silt loam that formed in old alluvial deposits

This map unit is on alluvial terraces along the Willamette and McKenzie Rivers. It extends from Thurston to the northern edge of the survey area. Where this unit has not been cleared for cultivation, the vegetation consists of Douglas-fir, Oregon white oak, hazelnut, trailing blackberry, poison-oak, forbs, and grasses. Elevation is 300 to 800 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 3 percent of the survey area. It is about 50 percent Malabon and similar soils and 25 percent Salem and similar soils. The remaining 25 percent is soils of minor extent.

Malabon soils are deep and well drained. The surface layer is very dark brown and dark brown silty clay loam, the subsoil is dark brown and brown silty clay loam and silty clay, and the substratum is brown clay loam. These soils are in broad, nearly level areas.

Salem soils are deep and well drained. The surface layer is dark brown gravelly silt loam, the subsoil is dark brown gravelly clay loam and gravelly silt loam, and the substratum is multicolored very gravelly sand. These soils generally are on the higher ridges.

Of minor extent in this unit are poorly drained Awbrig, Conser, and Bashaw soils, moderately well drained Coburg soils, and somewhat excessively drained Sifton soils. In the part of the McKenzie Valley extending from above Leaburg to Belknap Springs, well drained Jimbo soils make up most of the unit. The Coburg soils are in positions slightly below the Malabon and Salem soils. The Conser and Bashaw soils are in the lower lying depressional areas or in abandoned channels. The Sifton soils are on the higher ridges and are in positions similar to those of the Salem soils, but they are almost exclusively in the Walterville area.

This unit is used for grass seed, hay, pasture, small grain, vegetables, and specialty crops. Most acreages of vegetables and specialty crops are sprinkler irrigated. The Salem soils need to be irrigated to successfully produce most crops. Soil compaction is a concern on the Malabon soils when they are wet. The soils respond well to commercial fertilizer.

9. Awbrig-Coburg

Deep, poorly drained and moderately well drained, nearly level silty clay loam that formed in old alluvial deposits

This map unit is on broad alluvial terraces in the part of the survey area extending from Eugene and Coburg to the northern edge of the area. In areas not cultivated or cleared for other uses, the vegetation is Oregon ash, Oregon white oak, rose, trailing blackberry, hawthorn, forbs, and grasses. Elevation is 290 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 2 percent of the survey area. It is about 45 percent Awbrig and similar soils and 45 percent Coburg and similar soils. The remaining 10 percent is soils of minor extent.

Awbrig soils are in large, plane to slightly concave areas and in narrow drainageways. These soils are deep and poorly drained. The surface layer is very dark grayish brown silty clay loam, the subsoil is very dark gray clay and silty clay over grayish brown silty clay loam, and the substratum is dark brown clay loam.

Coburg soils are in areas slightly above the Awbrig soils. These soils are deep and moderately well drained. The surface layer is very dark grayish brown silty clay loam, the subsoil is dark brown silty clay loam and silty clay, and the substratum is dark brown fine sandy loam.

Of minor extent in this unit are poorly drained Bashaw and Conser soils in depressional areas and well drained Malabon and Salem soils in the higher lying, convex areas.

This unit is used mainly for ryegrass and small grain. Cropping is limited by the Awbrig soils, which are difficult to drain efficiently because of the very slow permeability of the dense clay subsoil. The Coburg soils respond well to tile drainage. Suitable outlets for drains are not available in all areas of this unit. The soils in this unit respond well to commercial fertilizer. The soils have a high water table. The Awbrig soils are subject to rare periods of flooding.

10. Oxley-Courtney

Deep, somewhat poorly drained and poorly drained, nearly level gravelly silt loam and gravelly silty clay loam that formed in old gravelly and clayey alluvial deposits

This map unit is on broad, slightly concave to plane terraces, mainly in the Springfield, Jasper, Pleasant Hill, and Creswell areas. Native vegetation is Oregon ash, Oregon white oak, rose, trailing blackberry, hawthorn, poison-oak, forbs, and grasses. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 1 percent of the survey area. It is about 35 percent Oxley and similar soils and 35 percent Courtney and similar soils. The remaining 30 percent is soils of minor extent.

Oxley soils are in the slightly higher lying areas on the landscape. These soils are deep and somewhat poorly drained. The surface layer is very dark brown gravelly silt loam, the subsoil is dark grayish brown and brown very gravelly clay loam over grayish brown very gravelly loam, and the substratum is gray extremely gravelly sandy loam.

Courtney soils are in drainageways and depressional areas. These soils are deep and poorly drained. The surface layer is very dark brown gravelly silty clay loam, the subsoil is dark grayish brown gravelly clay over brown very gravelly clay loam, and the substratum is multicolored very gravelly sand.

Of minor extent in the unit are well drained Salem and Malabon soils, moderately well drained Coburg soils, and poorly drained Awbrig soils. The Salem and Malabon soils are in the highest positions on the landscape. The Coburg soils are in positions similar to those of the Oxley soils. The Awbrig soils are in positions similar to those of the Courtney soils.

This unit is used mainly for pasture and hay, but some grass seed crops and small grain are grown in areas that have been drained. The Oxley and Courtney soils have a high water table. The Courtney soils are subject to rare periods of flooding. The gravelly surface layer and seasonal high water table are the main limitations for most uses such as deep rooted crops and closely cultivated or intertilled crops.

11. Dayton-Natroy

Deep, poorly drained, nearly level silt loam, silty clay loam, and silty clay that formed in old alluvial or lake deposits

This map unit is on broad terraces on the western side of the Willamette Valley. It extends from Eugene to the northern edge of the survey area. Native vegetation is Oregon ash, Oregon white oak, rose, trailing blackberry, hawthorn, forbs, and grasses. Elevation is 300 to 400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 1 percent of the survey area. It is about 40 percent Dayton and similar soils and 35 percent Natroy and similar soils. The remaining 25 percent is soils of minor extent.

Dayton soils are in large, plane to slightly concave areas. These soils are deep and poorly drained. The surface layer is dark gray silt loam, the subsurface layer is gray silt loam and silty clay loam, the subsoil is gray clay, and the substratum is grayish brown clay.

Natroy soils are in areas similar to those of the Dayton soils but are mainly in the areas south and east of Fern Ridge Reservoir. These soils are deep and poorly drained. The surface layer is very dark grayish brown silty clay loam and silty clay, and the substratum is dark grayish brown, dark brown, and brown clay and gravelly clay.

Of minor extent in this unit are poorly drained Awbrig and Waldo soils, somewhat poorly drained Pengra soils, and well drained Bellpine and Philomath soils. The Awbrig and Waldo soils are in narrow drainageways. The Pengra soils are in low-lying, convex areas or on toe slope fans. The Bellpine and Philomath soils are on low foothills or ridges.

This unit is used mainly for ryegrass seed and pasture. Some areas have been drained by tile and are used for small grain. The very slow permeability of the subsoil and wetness limit use of these soils for most cultivated crops, as woodland, and for recreational, urban, and homesite development. There are many shallow ponds that provide feeding and resting areas for ducks and geese. The Dayton and Natroy soils have a high water table and are ponded. The Natroy soils are subject to frequent periods of flooding.

Dominantly nearly level to very steep, excessively drained to poorly drained soils on coastal terraces

This group consists of three map units. They are in the coastal dune terrace area.

12. Dune land-Heceta

Deep, excessively drained and poorly drained, nearly level to steep fine sand that formed in eolian beach sand

This map unit is in gently sloping to steep areas of shifting dune sand and on nearly level deflation plains where the dry sand has been blown away. Most of the deflation plain area is just inland from the recently stabilized foredune that forms the landward margin of the ocean beaches (fig. 1). Vegetation in the deflation plain area is mainly sedges, rushes, water tolerant grasses, willows, and Pacific waxmyrtle. Vegetation in the shifting dune areas is limited to occasional clumps of beachgrass. Elevation is sea level to 150 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free season is 200 to 250 days.

This unit makes up about 1 percent of the survey area. It is about 50 percent Dune land and 15 percent Heceta soils. The remaining 35 percent is soils of minor extent.

Dune land is in gently sloping to steep areas of dune sand that is constantly shifted and reshaped by the wind. It is deep, excessively drained fine sand.

Heceta soils are in low-lying areas between dunes. They are mainly in the long, narrow area known as the deflation plain, which is between the foredune along the beach and the higher dune areas further inland. These soils are deep and poorly drained. The surface layer is brown fine sand, and the substratum is grayish brown fine sand.

Of minor extent in this unit are excessively drained Waldport soils; well drained Bandon, Bullards, Ferrelo, and Netarts soils on older, stabilized, vegetated dunes; and smooth sandy beaches immediately adjacent to the ocean.

This unit is mainly a scenic area used for hiking and dune buggy rides. It is also important as a large underground reservoir that supplies freshwater for the coastal area. It has limited use for wildlife habitat. The Heceta soils have a high water table and are subject to ponding and rare periods of flooding. They are capable

Figure 1.—Area of general soil map unit 12 on coastal dune terraces in left background. Neskowin and Salander soils in foreground.

of producing some pasture, but the cool moist onshore winds, salt spray, and blowing sand during high winds limit production and the choice of plants and also inhibit drying of hay or ripening of small grain.

Some areas of this unit have been stabilized with beachgrass and shrubs and have been used as homesites.

13. Bullards-Waldport-Yaquina

Deep, well drained, excessively drained, and somewhat poorly drained, nearly level to very steep loam, fine sand, and loamy fine sand that formed in beach sand deposited by wind

This map unit is on old stabilized dunes, deflation plains, and coastal marine terraces. Except where the unit has been cleared for use as homesites, for agriculture, or for urban uses, the vegetation is an extremely dense stand of adapted trees and shrubs including Sitka spruce, shore pine, Douglas-fir, Pacific rhododendron, salal, evergreen huckleberry, Pacific waxmyrtle, forbs, and grasses. Elevation is 10 to 300 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free season is 180 to 250 days.

This unit makes up about 1 percent of the survey area. It is about 35 percent Bullards and similar soils, 30 percent Waldport and similar soils, and 20 percent Yaquina and similar soils. The remaining 15 percent is soils of minor extent

Bullards soils are on dissected, old, stabilized, dune-covered marine terraces. These soils are deep and well drained. The surface layer is dark grayish brown loam, the subsoil is dark reddish brown gravelly loam over strong brown sandy loam, and the substratum is strong brown and dark brown loamy fine sand.

Waldport soils are on stabilized dunes. These soils are deep and excessively drained. The surface layer is very dark gray and very dark grayish brown fine sand, and the substratum is yellowish brown fine sand.

Yaquina soils are in low-lying areas between old stabilized dunes and are commonly along drainageways and shallow, intermittent lakes or ponds. These soils are deep and somewhat poorly drained. The surface layer is dark gray loamy fine sand, the subsurface layer is light gray fine sand, the subsoil is light brownish gray fine sand, and the substratum is yellowish brown, pale brown, and grayish brown fine sand.

Of minor extent in this unit are well drained Bandon, Ferrelo, and Netarts soils in old stabilized dune areas and poorly drained Willanch soils along some of the larger streams that traverse the area or drain into some of the interdunal lakes.

This unit is used for timber production, homesites, watershed, wildlife habitat, and recreation. Most of the Florence urban area and the Highway 101 fringe developments are in this unit.

There is only limited agriculture on this unit, mostly nurseries, home gardens, and limited pasture areas. There are many well developed campgrounds, parks, picnic areas, and other recreational areas in this unit.

The low fertility, low available water capacity, and the hazard of soil blowing are the main limitations for cultivation, and the cool, moist climate in summer restricts the choice of plants or crops that can be successfully grown in this unit. The Yaquina soils have a high water table and are subject to ponding.

Tree growth is severely retarded in all areas exposed by the onshore winds, so timber production is restricted to the more sheltered parts of this unit.

Homesite and recreational development are restricted mainly by the high water table of the Yaquina soils, the slow permeability of the cemented substratum in the Bullards soils, and the hazard of soil blowing and instability of cutbanks in the steeper areas of the Waldport soils.

14. Lint

Deep, well drained, nearly level to steep silt loam that formed in old marine terrace deposits

This map unit is on deeply dissected, old marine and stream terraces. It is mainly between the higher ridges of the Coast Range and the dune-covered terraces nearer the ocean, but some areas are along the headlands of the northern coast, where the dunes are not present. It is on a remnant terrace along the coastline and at the mouth of small streams. The native vegetation is mainly dense stands of Sitka spruce and western hemlock; but Douglas-fir is present in some of the more sheltered areas further from the coast. Areas that have a limited tree canopy have a dense, vigorous understory of salal, Pacific rhododendron, evergreen huckleberry, western swordfern, forbs, and grasses. Elevation is 30 to 600 feet. The average annual precipitation is 60 to 75 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free season is 180 to 220 days.

This unit makes up about 1 percent of the survey area. It is about 90 percent Lint soils. The remaining 10 percent is soils of minor extent.

Lint soils are on deeply dissected terraces. These soils are deep and well drained. The surface layer is dark brown silt loam, the subsoil is dark brown to yellowish brown silt loam and silty clay loam, and the substratum is yellowish brown silty clay loam.

Of minor extent in this unit are well drained Bandon, Ferrelo, and Netarts soils on old stabilized dunes that have encroached on the terraces in recent times, well drained Fendall and Neskowin soils on adjacent ridges and headlands, and poorly drained Willanch soils and other alluvial soils along drainageways.

Most of the more gently sloping areas of this unit are used as small acreage homesites and for lakeside parks and other recreational areas. The steeper areas are used mainly for timber production, wildlife habitat, and watershed. Some areas have been cleared and are used for pasture and gardens. Areas sheltered from the onshore winds produce vigorous stands of trees, forage plants, and adapted crops.

This unit has few limitations for most uses. It is limited mainly by low strength and susceptibility of the soils to compaction when moist. Buildings and roads need to be properly designed to overcome these limitations, and logging and farming operations should be managed to minimize traffic when the soils are wet.

Dominantly nearly level to steep, deep to shallow, well drained and moderately well drained soils on foothills

This group consists of three map units. They are on old high terrace remnants and low foothills surrounding the southern end of the Willamette Valley and the small valleys of the tributary streams.

15. Veneta-Salkum

Deep, moderately well drained and well drained, nearly level to strongly sloping loam, silty clay loam, and silt loam that formed in old alluvium

This map unit is on dissected terraces around the southern fringe of the Willamette Valley (fig. 2). Vegetation in areas not cleared is Douglas-fir, Oregon white oak, and ponderosa pine; Pacific madrone, poison-oak, trailing blackberry, and other shrubs; and forbs and grasses. Elevation is 300 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 2 percent of the survey area. It is about 40 percent Veneta and similar soils and 35 percent Salkum and similar soils. The remaining 25 percent is soils of minor extent.

Veneta soils are deep and moderately well drained. The surface layer is dark brown and brown loam, the subsoil is dark yellowish brown and strong brown clay loam and clay, and the substratum is yellowish brown, gray, and light olive brown clay. These soils are in nearly plane to convex areas, mainly to the south and west of Fern Ridge Reservoir.

Figure 2.—Windrowed hay crop in an area of general soil map unit 15. Bellpine soils in background on foothills under orchards, grass, and timber.

Salkum silt loam is mainly in the Alvadore area, east of Fern Ridge Reservoir, and on the lower lying terraces in the Creswell area, and Salkum silty clay loam is on the higher lying terraces in the Creswell and Pleasant Hill areas. The Salkum soils are deep and well drained. The surface layer is dark brown silty clay loam and silt loam, the subsoil is dark reddish brown and reddish brown clay, and the substratum is variegated silty clay loam.

Of minor extent in this unit are somewhat poorly drained Linslaw soils in concave areas on terraces, poorly drained Noti soils along drainageways and in other depressional areas, moderately well drained Veneta Variant soils in the smaller valleys extending into the Coast Range, and moderately well drained Hazelair soils and well drained Bellpine soils on adjacent low foothills.

This unit is used for hay, pasture, small grain, orchards, woodland, Christmas trees, homesites, recreation, and wildlife habitat.

The main limitations for crops are low fertility and a lack of irrigation water for late-maturing crops. The use of this unit as small acreage homesites is expanding rapidly. The slow permeability of the subsoil is the main limitation for septic tank absorption fields. The Veneta soils have a high water table.

Deer, quail, and other small animals and birds are plentiful and cause considerable browse damage to unprotected gardens and landscaped areas around homesites, particularly near areas where brush and woodland provide cover for the wildlife.

16. Bellpine-Hazelair-Philomath

Moderately deep and shallow, well drained and moderately well drained, gently sloping to steep silty clay loam, cobbly silty clay loam, and cobbly silty clay that formed in material weathered from sandstone or in mixed material weathered from igneous and sedimentary rock

This map unit is on foothills along the margins of the Willamette Valley. Slopes are dominantly 2 to 30 percent, but some short, steep slopes are as much as 50 percent. The native vegetation is Douglas-fir, Oregon white oak, ponderosa pine, red alder, Pacific madrone, trailing blackberry, poison-oak, salal, and forbs and grasses. Elevation is 300 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 11 percent of the survey area. It is about 40 percent Bellpine and similar soils, 30 percent Hazelair and similar soils, and 15 percent Philomath and similar soils. The remaining 15 percent is soils of minor extent.

Bellpine soils are in the steeper areas. These soils are moderately deep and well drained. The surface layer is dark reddish brown silty clay loam and cobbly silty clay loam, and the subsoil is dark reddish brown and dark red silty clay over bedrock. The depth to weathered bedrock ranges from 20 to 40 inches.

Hazelair soils are in gently sloping areas in drainageways and in concave areas on foot slopes. These soils are moderately deep and moderately well drained. The surface layer is very dark brown silty clay loam, the subsoil is dark brown silty clay, and the substratum is dark brown and light olive brown clay over bedrock. The depth to weathered bedrock ranges from 20 to 40 inches.

Philomath soils are in gently sloping areas on ridgetops and on steep side slopes. These soils are shallow and well drained. The surface layer is very dark brown cobbly silty clay, and the subsoil is very dark brown clay over bedrock. The depth to weathered bedrock ranges from 12 to 20 inches.

Of minor extent in this unit are the well drained Dixonville, Steiwer, and Willakenzie soils; the shallow Chehulpum soils, the cobbly Ritner soils, and the very cobbly Witzel soils on ridges and side slopes; the poorly drained Panther soils and the somewhat poorly drained Dupee soils along drainageways; and Abiqua, McAlpin, and Waldo soils along streams.

This unit is used mainly for pasture, hay, grass seed, Christmas trees, and low yield timber production. Agricultural development is limited by a lack of irrigation water and a complex pattern of shallow soils. Small acreage homesites are an important use in some areas of this unit.

Acceptable quality water for domestic use is limited in most areas of this unit. The Hazelair soils have a high water table. Cutbank stability is a problem in some areas that are clayey. Slow permeability and limited depth to bedrock are major limitations for septic tank absorption fields.

17. Bellpine-Nekia-Ritner

Moderately deep, well drained, gently sloping to steep silty clay loam and cobbly silty clay loam that formed in material weathered from sandstone or basic igneous rock

This map unit consists of low foothills along the margins of the Willamette Valley. Slopes are dominantly 2 to 50 percent, but some short slopes are as much as 60 percent. The native vegetation is mainly Oregon white oak at the lower elevations and Douglas-fir at the higher elevations. Incense-cedar is common in the southern part of the area, and Pacific madrone is scattered throughout the area. Poison-oak, hazelnut, and western brackenfern are the main understory species. Elevation is 350 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free season is 165 to 210 days.

This unit makes up about 12 percent of the survey area. It is about 45 percent Bellpine and similar soils, 25 percent Nekia and similar soils, and 15 percent Ritner and similar soils. The remaining 15 percent is soils of minor extent.

Bellpine soils are moderately deep and well drained. The surface layer is dark reddish brown silty clay loam or cobbly silty clay loam, and the subsoil is dark reddish brown and dark red silty clay over bedrock. Depth to weathered bedrock ranges from 20 to 40 inches.

Nekia soils are moderately deep and well drained. The surface layer is dark reddish brown silty clay loam, and the subsoil is dark reddish brown and reddish brown clay over bedrock. The depth to bedrock ranges from 20 to 40 inches.

Ritner soils are on ridges and the steeper slopes associated with faults or igneous rock masses. These soils are moderately deep and well drained. The surface layer is dark reddish brown cobbly silty clay loam, and the subsoil is dark reddish brown and yellowish red very cobbly silty clay loam over bedrock. Depth to bedrock ranges from 20 to 40 inches.

Of minor extent in this unit are poorly drained Panther soils, moderately well drained Hazelair soils, somewhat poorly drained Dupee soils along drainageways, shallow Philomath and Witzel soils, and well drained Dixonville, Steiwer, and Willakenzie soils on ridges and convex slopes. Small areas of Abiqua, McAlpin, and Waldo soils are along streams and flood plains.

This unit is used mainly for pasture, grass seed, small grain, berries, orchards, Christmas trees, and timber production. Small acreage homesites are common.

The main limitations for use of this unit are the hazard of erosion, low fertility, and moderately slow permeability. Suitable quality water for domestic use is limited in much of the unit.

Dominantly gently sloping to very steep, moderately deep to deep, well drained soils in the Cascade and Coast Ranges

This group consists of four map units. They are in the mountainous areas that receive more than 60 inches of rainfall annually.

18. Peavine-Blachly-Honeygrove

Moderately deep and deep, well drained, gently sloping to very steep silty clay loam and clay loam that formed in material weathered from sandstone or mixed sedimentary and igneous rock

This map unit is on the broader, more stable ridges and side slopes. Slope is dominantly less than 45 percent, but short slopes as steep as 70 percent are in the Coast and Cascade Ranges. Vegetation is mainly Douglas-fir, western hemlock, and western redcedar, but there is some grand fir, red alder, and bigleaf maple. The understory is dominated by salal, vine maple, Pacific rhododendron, Oregon oxalis, forbs, and grasses. Elevation is 200 to 2,600 feet in the Coast Range and 1,200 to 3,000 feet in the Cascade Range. The average annual precipitation is 60 to 120 inches, the average annual air temperature is 47 to 53 degrees F, and the average frost-free season is 140 to 220 days.

The unit makes up about 17 percent of the survey area. It is about 55 percent Peavine and similar soils, 20 percent Blachly and similar soils, and 15 percent Honeygrove and similar soils. The remaining 10 percent is soils of minor extent.

Peavine soils are mainly on the narrower ridgetops and the steeper, more dissected side slopes in the unit. These soils are moderately deep and well drained. The surface is dark reddish brown silty clay loam, and the subsoil is dark reddish brown, yellowish red, and reddish brown clay and silty clay over bedrock. The depth to weathered bedrock ranges from 20 to 40 inches.

Blachly soils are in positions similar to those of the Peavine soils but generally are in the higher rainfall areas. These soils are deep and well drained. The surface layer is dark reddish brown silty clay loam and clay loam, and the subsoil is dark reddish brown clay.

Honeygrove soils are mainly on the broadest ridgetops and on the more stable side slopes. These soils are deep and well drained. The surface layer is dark reddish brown silty clay loam, and the subsoil is yellowish red and dark red clay. These soils have a more strongly developed subsoil than do the Blachly soils.

Of minor extent in this unit are well drained McCully soils, which are associated with the Blachly soils in the Cascade Range but are mainly on north-facing slopes; moderately well drained Cumley soils and somewhat poorly drained to poorly drained Minniece soils along drainageways and in other depressional areas. Also in this unit are small areas of the well drained, stony Klickitat and Kilchis soils on narrow ridgetops and some of the steeper side slopes.

This unit is used mainly for timber production, recreation, watershed, and wildlife habitat. Severe compaction damage occurs if the soils are logged during the wet season. Roads for year-round use require heavy base rock. Recent cutover areas are subject to severe brush competition; they produce large quantities of browse for deer, elk, and other wildlife.

19. Formader-Klickitat-Hembre

Moderately deep and deep, well drained, gently sloping to very steep loam, stony loam, and silt loam that formed in material weathered from basic igneous rock

This map unit consists of broad to narrow ridges and steep canyonsides in the Coast Range. Vegetation is mainly Douglas-fir, western hemlock, and western redcedar, but Sitka spruce dominates the stands near the coast. Red alder is a strong invader in harvested areas, and a vigorous understory of salal, Pacific rhododendron, evergreen huckleberry, thimbleberry, and salmonberry develops if the tree canopy is less than full. Elevation is 200 to 2,800 feet. The average annual precipitation is 60 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free season is 145 to 220 days.

This unit makes up about 4 percent of the survey area. It is about 30 percent Formader and similar soils, 25 percent Klickitat and similar soils, and 20 percent Hembre and similar soils. The remaining 25 percent is soils of minor extent.

Formader soils are in areas of interbedded mudflows, basalt, and pyroclastic material. These soils are moderately deep and well drained. The surface layer is very dark brown and dark brown loam, and the subsoil is brown silty clay loam and gravelly silty clay loam over bedrock. The depth to weathered bedrock ranges from 20 to 40 inches.

Klickitat soils are on the narrowest ridgetops and the steepest side slopes. These soils are deep and well drained. The surface layer is dark brown stony loam, the subsoil is dark brown very cobbly loam, and the substratum is dark brown extremely cobbly loam over bedrock. The depth to bedrock ranges from 40 to 60 inches.

Hembre soils are on the broader ridges and more stable side slopes. These soils are deep and well drained. The surface layer is dark brown silt loam, and the subsoil is dark reddish brown and dark brown silty clay loam over bedrock. The depth to bedrock ranges from 40 to 60 inches.

Of minor extent in this unit are well drained Neskowin and Salander soils on ridges and side slopes near the coast; shallow, stony, well drained Kilchis soils that are on narrow ridgetops and steep side slopes and are underlain by hard basalt; well drained, deep Astoria and Astoria Variant soils on broad ridgetops and benches; well drained Bohannon, Preacher, and Slickrock soils that are underlain by sandstone; and small areas of Nehalem, Nekoma, and Nestucca soils along the major streams.

This unit is used mainly for timber production, recreation, and watershed. Small areas have been cleared for pasture and berry production, but the large deer and elk population creates a severe browse problem. The rugged topography, long rainy season, and high available water capacity of the soils limit trafficability most of the year.

Oceanview homesites are increasing along the coast and small acreage homesites are increasing along Big Creek and Tenmile Creek.

20. Klickitat-Kinney-Bohannon

Moderately deep and deep, well drained, gently sloping to very steep stony loam, cobbly loam, and gravelly loam that formed in material weathered from basic igneous rock or interbedded sedimentary, basic igneous, and pyroclastic rock

This map unit is on the more rugged, hilly uplands and narrow ridges in the Cascade Range (fig. 3). The native vegetation is Douglas-fir, western hemlock, western redcedar, grand fir, red alder, bigleaf maple, western swordfern, forbs, and grasses. Elevation is 1,000 to 3,500 feet. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 46 to 53 degrees F, and the average frost-free season is 120 to 200 days.

This unit makes up about 13 percent of the survey area. It is about 50 percent Klickitat and similar soils, 30 percent Kinney and similar soils, and 10 percent Bohannon and similar soils. The remaining 10 percent is soils of minor extent.

Klickitat soils are on narrow ridgetops and steep side slopes and are underlain by hard basalt. They are deep and well drained. The surface layer is dark brown stony loam, the subsoil is dark brown very cobbly loam, and the substratum is dark brown extremely cobbly loam over bedrock. The depth to bedrock ranges from 40 to 60 inches.

Kinney soils are on broad to narrow ridgetops, in saddles, and on slump benches and side slopes and are underlain by interbedded pyroclastic material and lava flows. These soils are deep and well drained. The surface layer is very dark brown and dark yellowish brown cobbly loam, and the subsoil is dark yellowish brown and dark brown cobbly clay loam that is underlain by dark brown very cobbly clay loam over bedrock. The depth to weathered bedrock ranges from 40 to 60 inches.

Bohannon soils are primarily on the very narrow ridges and steep southerly side slopes. These soils are moderately deep and well drained. The surface layer is dark brown gravelly loam, and the subsoil is dark brown and brown cobbly loam over bedrock. The depth to weathered bedrock ranges from 20 to 40 inches.

Of minor extent in this unit are the moderately well drained Cumley soils and the somewhat poorly drained to poorly drained Minniece soils in depressional areas and the shallow Kilchis soils on narrow ridges and steep canyon walls. Well drained Blachly and Peavine soils are on some of the broader, more stable ridges.

This unit is used mainly for timber production, recreation, wildlife habitat, and watershed. The main limitations for logging are steepness of slope and the winter snow cover at the higher elevations. Seedling mortality and winter browse problems may be severe on south-facing slopes.

21. Bohannon-Preacher-Digger

Moderately deep and deep, well drained, nearly level to very steep gravelly loam and loam that formed in material weathered from interbedded sandstone and siltstone

This map unit is mainly on uplands in the Coast Range. Vegetation is Douglas-fir, western hemlock, western redcedar, bigleaf maple, red alder, golden

Figure 3.—An area of general soil map unit 20.

chinkapin, Pacific rhododendron, red huckleberry, evergreen huckleberry, vine maple, salal, western swordfern, tall Oregon-grape, forbs, and grasses. Elevation is 25 to 2,600 feet. The average annual precipitation is 60 to 120 inches, and very little of it falls as snow. The average annual air temperature is 47 to 52 degrees F, and the average frost-free season is 140 to 220 days.

This unit makes up about 18 percent of the survey area. It is about 40 percent Bohannon and similar soils, 25 percent Preacher and similar soils, and 20 percent Digger and similar soils. The remaining 15 percent is soils of minor extent.

Bohannon soils are on narrow ridgetops and steep side slopes. These soils are moderately deep and well drained. The surface layer is dark brown gravelly loam, and the subsoil is dark brown and brown cobbly loam over bedrock. The depth to weathered bedrock ranges from 20 to 40 inches.

Preacher soils are on the broader ridgetops, in saddles, and on the more stable side slopes. These soils are deep and well drained. The surface layer is very dark grayish brown and very dark gray loam, and the subsoil and substratum are dark yellowish brown loam over bedrock. The depth to weathered bedrock ranges from 40 to 60 inches.

Digger soils are on narrow ridgetops and steep side slopes that have layers of hard sandstone. They are moderately deep and well drained. The surface layer is dark brown gravelly loam, and the subsoil is dark yellowish brown and yellowish brown gravelly and very gravelly loam over bedrock. The depth to weathered bedrock ranges from 20 to 40 inches.

Of minor extent in this unit are the well drained, clayey Blachly, Honeygrove, and Peavine soils on more stable ridgetops and in saddles, the well drained, stony Klickitat and Kilchis soils in areas where intrusive igneous dikes and sills are exposed, and the well drained Slickrock

Figure 4.—Harvesting of timber in an area of general soil map unit 22 has exposed a volcanic rock outcropping.

soils on slump benches and toe slopes. Some areas show influence of volcanic ash, but generally this unit shows the least evidence of ash of any of the upland units in the survey area.

This unit is used mainly for timber production, watershed, wildlife habitat, and recreation. Trafficability is good to fair, but compaction is a problem during the wet season, especially on the nongravelly soils. The steeper areas of the Bohannon and Digger soils have limited accessibility.

Dominantly gently sloping to very steep, moderately deep, well drained soils on high ridges in the western part of the Cascade Range

This group consists of one map unit.

22. Keel-Hummington

Moderately deep, well drained, gently sloping to very steep cobbly clay loam and gravelly loam that formed in material weathered from mixed igneous rock and volcanic ash

This map unit is on the mountain plateaus and rugged uplands of the higher lying areas in the western part of the Cascade Range. Vegetation is Douglas-fir, western hemlock, noble fir, Pacific silver fir, western white pine, Pacific rhododendron, tall blue huckleberry, common beargrass, western swordfern, forbs, and grasses. Elevation is 2,700 to 5,000 feet. The average annual precipitation is 70 to 100 inches, most of which occurs as snow from November to March. The average annual air temperature is 41 to 45 degrees F, and the average frost-free season is 70 to 100 days.

This unit makes up about 2 percent of the survey area. It is about 50 percent Keel and similar soils and 30 percent Hummington and similar soils. The remaining 20 percent is soils of minor extent.

Keel soils are moderately deep and well drained. The surface layer is very dark grayish brown cobbly clay loam, and the subsoil is dark brown clay loam over brown gravelly loam and cobbly loam underlain by bedrock. The depth to weathered bedrock ranges from 20 to 40 inches.

Hummington soils are moderately deep and well drained. The surface layer is very dark brown and dark brown gravelly loam, and the subsoil is dark brown very gravelly loam over bedrock. The depth to bedrock ranges from 20 to 40 inches.

Of minor extent in this unit are well drained Cruiser soils on the broader ridges and the more stable side slopes, generally at the lower elevations in the unit; well drained Mulkey soils and somewhat excessively drained Yellowstone soils on grassy ridgetops and in mountain meadows; and well drained Holderman and Winberry soils on high ridges and steep side slopes in areas of light-colored rhyolitic rock, mainly in the southeastern part of the survey area.

This unit is used for timber production, recreation, and watershed. The main limitations for logging are cold temperatures and prolonged winter snow cover at the higher elevations. Very steep slopes limit accessibility to some areas. Sheer bluffs and escarpments are common in this mountainous area (fig. 4).

Hunting, camping, hiking, and sightseeing are the main recreational uses of this unit. Graveled and asphalt surfaced roads permit access to these areas except when heavy snowfall blocks the roads during winter. Snowmobiling and cross-country skiing are suited to this unit in winter.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavior divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation to precisely define and locate the soils and miscellaneous areas is needed.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Bellpine silty clay loam, 3 to 12 percent slopes, is one of several phases in the Bellpine series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Dixonville-Philomath-Hazelair complex, 3 to 12 percent slopes, is an example.

Most map units include small scattered areas of soils or miscellaneous areas other than those for which the map unit is named. Some of these included areas have properties that differ substantially from those of the major soils or miscellaneous areas. Such differences could significantly affect use and management of the map unit. The included soils as well as miscellaneous areas are identified in each map unit description. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example. Miscellaneous areas are shown on the maps. Some that are too small to be shown are identified by a special symbol on the maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Map Unit Descriptions

1A—Abiqua silty clay loam, 0 to 3 percent slopes. This deep, well drained soil is on high flood plains. It formed in mixed alluvium. Areas are elongated and irregular in shape and are 3 to 70 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, vine maple, salal, and western swordfern. Elevation is 350 to 1,000 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown silty clay loam about 21 inches thick. The upper 10 inches of the subsoil is dark brown silty clay, and the lower 7 inches is dark brown silty clay loam. The substratum to a depth of 60 inches or more is dark brown gravelly clay loam.

Included in this unit are small areas of McAlpin and Waldo soils and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Abiqua soil is moderately slow. Available water capacity is about 9 to 11 inches. Water supplying capacity is 16 to 22 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for pasture, hay, small grain, and row crops such as corn and snap beans. It is also used for timber production and urban development.

This unit is suited to most climatically adapted crops. In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is suited to the production of timber. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 152. The potential production per acre is 9,660 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 88,480 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. If site preparation is not adequate, competition from undesirable plants can prevent natural or artificial reestablishment of trees. Reforestation can be accomplished by planting Douglas-fir seedlings.

The main limitations of this unit for use as homesites are the clayey texture of the soil, moderate shrink-swell potential, and the low strength of the soil when wet.

If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Roads for year-round use need heavy base rock.

If the soil in this unit is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field.

This map unit is in capability class I.

1B—Abiqua silty clay loam, 3 to 5 percent slopes. This deep, well drained soil is on terraces and fans. It formed in mixed alluvium. Areas are fan-shaped or elongated and are 3 to 30 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, vine maple, salal, and western swordfern. Elevation is 350 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown silty clay loam about 21 inches thick. The upper 10 inches of the subsoil is dark brown silty clay, and the lower 7 inches is dark brown silty clay loam. The substratum to a depth of 60 inches or more is dark brown gravelly clay loam. In some areas the subsoil is clay loam or sandy clay loam.

Included in this unit are small areas of McAlpin soils, Fluvents, and Riverwash and areas of Abiqua soils that have slopes of more than 5 percent or less than 3 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Abiqua soil is moderately slow. Available water capacity is about 9 to 11 inches. Water supplying capacity is 16 to 22 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for pasture, hay, small grain, and orchards. It is also used for timber production and urban development.

This unit is suited to irrigated crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep pastures in good condition and to protect the soil from erosion.

This unit is suited to the production of timber. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 152. The potential production per acre is 9,660 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 88,480 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas helps to break up the compacted layer and improves seedling survival and growth. If site preparation is not adequate, competition from undesirable plants can prevent natural or artificial reestablishment of trees. Reforestation can be accomplished by planting Douglas-fir seedlings.

The main limitations of this unit for use as homesites are the clayey texture of the soil, moderate shrink-swell potential, and the low strength of the soil when wet, which may cause foundations to crack and roads to heave or settle.

If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Roads for year-round use need heavy base rock.

If this unit is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field.

This map unit is in capability subclass IIe.

2E—Astoria silt loam, 5 to 30 percent slopes. This deep, well drained soil is on uplands in the Coast Range. It formed mainly in colluvium and residuum derived from sedimentary rock, but in some areas it formed in mixed alluvium and colluvium derived from basic igneous rock. Areas are irregular in shape and are 5 to 50 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, western redcedar, red alder, vine maple, Pacific rhododendron, salmonberry, evergreen huckleberry, and western swordfern. Elevation is 400 to 1,700 feet. The average annual precipitation is 80 to 110 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 150 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, twigs, and moss about 1 inch thick. The surface layer is very dark brown silt loam about 13 inches thick. The upper 16 inches of the subsoil is dark yellowish brown silty clay, and the lower 31 inches is dark brown clay and silty clay.

Included in this unit are small areas of Astoria Variant, Blachly, Hembre, Preacher, and Slickrock soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Astoria soil is moderate. Available water capacity is about 11 to 15 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used mainly for timber production and wildlife habitat and as watershed. It is also used for recreation and pasture.

If this unit is used for hay and pasture, the main limitations are slope and a prolonged, cool, rainy period. Grasses and legumes grow well if adequate fertilizer is used. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 170. The potential production per acre is 10,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 102,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion and susceptibility to compaction. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Highlead or other cable logging systems can be used for harvesting timber. Use of these methods is limited during November through April because of periods of excessive rainfall. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Roads for year-round use need heavy base rock.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand; however, machine planting is sometimes practical in dry years. Among the trees that are suitable for planting are Douglas-fir, western hemlock, and western redcedar.

If this unit is used for recreational development, the main limitations are slope and prolonged rainy periods. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are slope and low soil strength. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Roads for year-round use need heavy base rock.

Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe.

3E—Astoria Variant silt loam, 3 to 30 percent slopes. This deep, well drained soil is on uplands in the Coast Range. It formed in colluvium and residuum derived dominantly from igneous and sedimentary rock and in mixed old alluvium and volcanic ash in most areas. Areas are elongated or irregular in shape and are 5 to 50 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, western redcedar, salal, salmonberry, and western swordfern. Elevation is 400 to 2,200 feet. The average annual precipitation is 80 to 110 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 150 to 220 days.

Typically, the surface is covered with a mat of leaves, twigs, and needles about 3 inches thick. The surface layer is dark brown silt loam about 27 inches thick. The subsoil is dark brown and dark yellowish brown silt loam and silty clay loam about 40 inches thick.

Included in this unit are small areas of Astoria, Bohannon, Formader, Hembre, Klickitat, Preacher, and Salander soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Astoria Variant soil is moderate. Available water capacity is about 10 to 14 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

Most areas of this unit are used for timber production, wildlife habitat, and watershed. A few areas are used for pasture and as homesites.

If this unit is used for hay and pasture, the main limitations are slope, seasonal wetness, and cool, moist summers that inhibit proper curing of hay crops. Seedbed preparation should be on the contour or across the slope where practical. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Use of lime and mixed fertilizer promotes good growth of forage plants. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 170. The potential production per acre is 10,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 102,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir, western hemlock, and western redcedar.

If this unit is used for recreational development, the main limitations are slope and the hazard of erosion. Areas used for recreation can be protected from soil erosion by maintaining plant cover and seeding or mulching cuts and fills. Paths and trails should extend across the slope.

If this unit is used for homesite development, the main limitations are slope and low soil strength. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Access roads should be designed to control surface runoff and help stabilize cut slopes. Preserving the existing plant cover during construction helps to control erosion.

Slope is a concern in installing septic tank absorption fields on this unit. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe.

3G—Astoria Variant silt loam, 30 to 60 percent slopes. This deep, well drained soil is on uplands in the Coast Range. It formed in colluvium and residuum derived from igneous and sedimentary rock and in mixed old alluvium and volcanic ash in some areas. Areas are irregular in shape and are 5 to 50 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, western redcedar, salal, salmonberry, and western swordfern. Elevation is 400 to 2,200 feet. The average annual precipitation is 80 to 110 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 150 to 220 days.

Typically, the surface is covered with a mat of leaves, twigs, and needles about 3 inches thick. The surface layer is dark brown silt loam 27 inches thick. The subsoil is dark brown and dark yellowish brown silt loam and silty clay loam about 40 inches thick.

Included in this unit are small areas of Astoria, Bohannon, Formader, Hembre, Klickitat, and Preacher soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Astoria Variant soil is moderate. Available water capacity is about 10 to 14 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for timber production and wildlife habitat and as watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 170. The potential production per acre is 10,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 102,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir, western hemlock, and western redcedar.

This unit is poorly suited to recreational development. It is limited mainly by slope and the hazard of erosion. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Maintaining plant cover helps to control soil erosion.

This unit is poorly suited to homesite development. The main limitations are slope, low soil strength, and the hazard of erosion.

This map unit is in capability subclass VIe.

4G—Atring-Rock outcrop complex, 30 to 60 percent slopes. This map unit is dominantly on south-facing side slopes of uplands in the Coast Range. Areas commonly are elongated in shape and are 5 to 50 acres in size. The native vegetation is mainly Douglas-fir, Pacific madrone, bigleaf maple, poison-oak, salal, creambush oceanspray, and western brackenfern. Elevation is 500 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 50 percent Atring gravelly loam and 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bellpine, Chehulpum, Hullt, Willakenzie, and Witzel soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Atring soil is moderately deep and well drained. It formed in colluvium derived from sandstone and siltstone. Typically, the surface layer is very dark grayish brown and dark yellowish brown gravelly loam about 15 inches thick. The subsoil is dark brown very gravelly loam about 17 inches thick. Fractured, weathered sandstone is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Atring soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 12 to 16 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of exposures of sandstone. In some areas it occurs as short, nearly vertical escarpments.

This unit is used for wildlife habitat and timber production and as watershed.

The present vegetation in most areas is mainly clumpy stands of Douglas-fir, Pacific madrone, hazelnut, poison-oak, salal, and western swordfern. The production of forage is limited by droughtiness in summer and by poor accessibility because of the steepness of slope, the areas of Rock outcrop, and the remoteness of areas of the unit.

The Atring soil is suited to the production of Douglas-fir for poles or saw logs. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 120. The potential production per acre is 6,900 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 63,900 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old. Because of the areas of Rock outcrop the potential yield for the unit as a whole is limited by at least 25 percent.

The main concerns in producing and harvesting timber are steepness of slope, the hazard of erosion, slumping of roadfills and cutbanks, and reestablishing the stands of timber on the droughty, south-facing side slopes. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the less sloping areas and by using properly designed road drainage systems. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

The steepness of slope limits the kinds of equipment that can be used in forest management. Highlead and other cable logging systems are more efficient than most other methods and are less damaging to the soil surface.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Small stones make planting difficult. In areas on south-facing slopes that are droughty in summer, seedling survival can be improved by providing shade for seedlings. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir and ponderosa pine.

This map unit is in capability subclass VIIs.

5—Awbrig silty clay loam. This deep, poorly drained soil is in plane to concave areas on stream terraces and in drainageways. It formed in mixed clayey and silty alluvium. Slope is 0 to 2 percent. Areas are elongated or irregular in shape and are 3 acres to more than 300 acres in size. The vegetation in areas not cultivated is mainly grasses, sedges, rushes, hawthorn, wild rose, and Oregon ash. Elevation is 290 to 600 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silty clay loam about 7 inches thick. The upper part of the subsoil is very dark gray and very dark grayish brown clay and silty clay about 22 inches thick, and the lower part is grayish brown silty clay loam about 19 inches thick. The substratum is dark brown clay loam to a depth of 60 inches or more. In some areas the surface layer is silt loam.

Included in this unit are small areas of Bashaw, Coburg, Conser, Dayton, and Holcomb soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Awbrig soil is very slow. Available water capacity is about 1.5 to 3.0 inches. Effective rooting depth is limited by a high water table that is at a depth of 0 to 12 inches from November to May. Runoff is very slow, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

This unit is used mainly for hay, pasture, small grain, and grass seed production.

If this unit is used for hay and pasture, wetness limits the choice of plants and the periods of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Fertilizer is needed for optimum growth of grasses and legumes.

Where drained, this unit is suited to grass seed production and small grain. It is limited mainly by wetness and the dense clay layer. Drainage of this unit is difficult and expensive because the dense clay layer requires close spacing of the tile drains; however, long lasting benefits have been observed over a period of 20 years where tiles were properly installed and maintained.

Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Crops respond to lime and nitrogen fertilizer. To prevent damage to crops as well as compaction of the soil, vehicles with large, low pressure tires can be used to apply fertilizer early in spring.

If this unit is used for recreational development, the main limitations are wetness, very slow permeability, and high clay content. Drainage is required if paths and trails are developed.

If this unit is used for homesite development, the main limitations are wetness, high clay content, low soil strength, and high shrink-swell potential. Seasonal wetting and drying can cause foundations and roads to crack and heave. Roads for year-round use need heavy base rock.

This unit is in capability subclass IVw.

6—Awbrig-Urban land complex. This map unit is on stream terraces, mainly in the Eugene-Springfield metropolitan area. Slope is 0 to 2 percent. Areas are elongated in shape and are 3 to 30 acres in size. The native vegetation is mainly grasses, forbs, wild rose, hawthorn, and Oregon ash. Elevation is 300 to 600 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 53 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 45 percent relatively undisturbed Awbrig silty clay loam, 10 percent disturbed Awbrig silty clay loam, and 30 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bashaw, Coburg, Conser, and Holcomb soils. Included areas make up about 15 percent of the total acreage.

The relatively undisturbed Awbrig soil is deep and poorly drained. It formed in clayey and silty alluvium. Typically, the surface layer is very dark grayish brown silty clay loam about 7 inches thick. The upper part of the subsoil is very dark gray and very dark grayish brown clay and silty clay about 22 inches thick, and the lower part is grayish brown silty clay loam about 19 inches thick. The substratum is dark brown clay loam to a depth of 60 inches or more.

Permeability of this Awbrig soil is very slow. Available water capacity is about 1.5 to 3.0 inches. Effective rooting depth is limited by a high water table that is at a depth of 0 to 12 inches from November to May. Runoff is very slow, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

The disturbed Awbrig soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Coburg, Holcomb, Conser, or Bashaw soils that have been cut or graded. The disturbed areas have highly variable properties.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban and homesite development. It is also used for yards and as open areas around and between buildings. The main limitation is the content of clay in the subsoil of the Awbrig soil. The clay has high shrink-swell potential. It tends to heave and cause roadways and foundations to crack during seasonal wetting and drying. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Streets and roads should be designed to reduce heaving and cracking. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is not assigned a capability classification.

7B—Bandon sandy loam, 0 to 7 percent slopes. This moderately deep, well drained soil is on marine terraces. It formed in marine and eolian sand. Areas are irregular in shape and are 3 to 80 acres in size. The native vegetation is mainly shore pine, Douglas-fir, Sitka spruce, western hemlock, red alder, Pacific madrone, evergreen huckleberry, salal, Pacific rhododendron, and western swordfern. Elevation is 25 to 200 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 52 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and moss about 2 inches thick. The surface layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is dark brown and yellowish brown sandy loam and gravelly sandy loam about 32 inches thick. The next layer is a yellowish brown cemented layer about 8 inches thick. The substratum to a depth of 60 inches or more is yellowish brown fine sand.

Included in this unit are small areas of Bandon soils that have slopes of more than 7 percent and Bullards, Ferrelo, Netarts, and Waldport soils. Included areas make up about 15 percent of the total acreage.

Permeability of the Bandon soil is moderate above the cemented layer, slow through the cemented layer, and moderately rapid below the cemented layer. Available water capacity above the cemented layer is about 2 to 4 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 18 to 30 inches. It is limited by the cemented layer. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate to high in areas where the plant cover is removed.

This unit is used mainly as homesites and for recreation and wildlife habitat. It is also used for pasture, watershed, and timber production. The more nearly level areas where adequate water is available are suited to specialty crops such as nursery stock or cranberries.

If this unit is used for hay and pasture, the main limitation is the hazard of soil blowing. Proper stocking rates and pasture rotation help to maintain a good plant cover to reduce soil blowing. Fertilizer and lime are needed to ensure optimum growth of grasses and legumes.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 138. The potential production per acre is 8,520 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 75,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality, plant competition, and the hazards of erosion and windthrow. The growth of trees is retarded in areas near the coast that are exposed to prevailing onshore winds. Minimizing the risk of erosion is essential in harvesting timber. Trees commonly are subject to windthrow during periods when the soil is excessively wet and the winds are strong.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir, Sitka spruce, western hemlock, and shore pine.

This unit is suited to recreational development. It is limited mainly by the hazard of erosion and slow permeability of the cemented layer. Areas used for recreation can be protected from soil blowing and dustiness by maintaining plant cover. Plant cover can be maintained by limiting traffic.

If this unit is used for homesite development, the main limitations are slow permeability of the cemented layer and the hazard of soil blowing in barren areas. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes.

If the soil in this unit is used for septic tank absorption fields, the limitation of slow permeability can be overcome by ripping the cemented layer.

This map unit is in capability subclass IIIe.

7C—Bandon sandy loam, 7 to 12 percent slopes. This moderately deep, well drained soil is on marine terraces. It formed in marine and eolian sand. Areas are irregular in shape and are 3 to 90 acres in size. The native vegetation is mainly shore pine, Douglas-fir, Sitka spruce, western hemlock, red alder, Pacific madrone, evergreen huckleberry, salal, Pacific rhododendron, and western swordfern. Elevation is 25 to 200 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 52 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and moss about 2 inches thick. The surface layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is dark brown and yellowish brown sandy loam and gravelly sandy loam about 32 inches thick. The next layer is a yellowish brown cemented layer about 8 inches thick. The substratum to a depth of 60 inches or more is yellowish brown fine sand.

Included in this unit are small areas of Bandon soils that have slopes of less than 7 percent or more than 12 percent and Bullards, Ferrelo, Netarts, and Waldport soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Bandon soil is moderate above the cemented layer, slow through the cemented layer, and moderately rapid below the cemented layer. Available water capacity above the cemented layer is about 2 to 4 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 18 to 36 inches. It is limited by the cemented layer. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high in areas where the plant cover is removed.

This unit is used mainly as homesites and for recreation and wildlife habitat. It is also used for pasture, gardens, watershed, and timber production. The unit is suited to specialty crops such as nursery plants.

If this unit is used for hay and pasture, the main limitation is the hazard of soil blowing. Proper stocking rates and pasture rotation help to maintain a good plant cover, which reduces soil blowing on the unit. Fertilizer and lime are needed to ensure optimum growth of grasses and legumes. The cool, humid summer inhibits proper ripening and curing of grain and hay crops.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 138. The potential production per acre is 8,520 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 75,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns for producing and harvesting timber are seedling mortality, plant competition, and the hazards of erosion and windthrow. The growth of trees is severely retarded in areas near the coast that are exposed to the strong, prevailing onshore winds. Minimizing the risk of erosion is essential in harvesting timber.

Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir, Sitka spruce, western hemlock, and shore pine. Trees commonly are subject to windthrow during periods when the soil is excessively wet and winds are strong.

If this unit is used for recreational development, the main limitations are slope, slow permeability through the cemented layer, and the hazard of erosion. Slope limits the use of some areas of this unit mainly to paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched. Plant cover can be established by limiting traffic.

If this unit is used for homesite development, the main limitations are slope, slow permeability through the cemented layer, and the hazard of erosion. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes.

If the soil in this unit is used for septic tank absorption fields, the limitation of slow permeability can be overcome by ripping the cemented layer.

This map unit is in capability subclass IIIe.

7F—Bandon sandy loam, 12 to 50 percent slopes. This moderately deep, well drained soil is on short, sharply incised terrace fronts and along deeply incised drainageways on old marine terraces. It formed in marine and eolian sand. Areas are elongated in shape and are 3 to 20 acres in size. The native vegetation is mainly shore pine, Douglas-fir, Sitka spruce, western hemlock, red alder, Pacific madrone, evergreen huckleberry, salal, Pacific rhododendron, and western swordfern. Elevation is 25 to 200 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 52 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and moss about 2 inches thick. The surface layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is dark brown and yellowish brown sandy loam and gravelly sandy loam about 32 inches thick. The next layer is a yellowish brown cemented layer about 8 inches thick. The substratum to a depth of 60 inches or more is yellowish brown fine sand.

Included in this unit are small areas of Bandon soils that have slopes of less that 12 percent or more than 50 percent and Bullards, Ferrelo, Netarts, and Waldport soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Bandon soil is moderate above the cemented layer, slow through the cemented layer, and moderately rapid below the cemented layer. Available water capacity above the cemented layer is about 2 to 4 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 18 to 36 inches. It is limited by the cemented layer. Runoff is medium, and the hazard or water erosion is moderate. The hazard of soil blowing is high in areas where the plant cover is removed.

This unit is used mainly for recreation and wildlife habitat. It is also used as homesites and watershed and for timber production and pasture.

If this unit is used for pasture, the main limitations are slope and the hazard of erosion. Proper stocking rates and pasture rotation help to maintain a good plant cover, which reduces soil blowing. Lime and fertilizer are needed to ensure optimum growth of grasses and legumes.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 138. The potential production per acre is 8,520 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 75,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, seedling mortality, plant competition, and the hazard of windthrow. The growth of trees is severely retarded in areas near the coast that are exposed to the strong, prevailing onshore winds. Minimizing the risk of erosion is essential in harvesting timber. Cable logging systems are more efficient than other logging systems and are less damaging to the soil surface.

Competing vegetation can be controlled by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir, Sitka spruce, western hemlock, and shore pine. Trees commonly are subject to windthrow during periods when the soil is excessively wet and winds are strong.

If this unit is used for recreational development, the main limitations are slope, slow permeability through the cemented layer, and the hazard of erosion. Slope limits the use of some areas of this unit mainly to paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched. Plant cover can be established by limiting traffic.

If this unit is used for homesite development, the main limitations are slope, slow permeability through the cemented layer, and the hazard of erosion. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes.

This map unit is in capability subclass VIe.

8—Bashaw clay. This deep, poorly drained soil is on flood plains, terraces, and fans. It formed in fine textured alluvium. Slope is 0 to 1 percent. Areas are elongated in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly Oregon ash, hawthorn, rushes, sedges, and grasses. Elevation is 290 to 500 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark gray clay about 7 inches thick. The next layer is black and very dark gray clay about 34 inches thick. The substratum to a depth of 63 inches or more is olive brown and light brownish gray silty clay. In some areas the surface layer is silty clay or silty clay loam.

Included in this unit are small areas of Awbrig, Conser, Courtney, Natroy, and Oxley soils. Included areas make up about 15 percent of the total acreage.

Permeability of the Bashaw soil is very slow. Available water capacity is about 2 to 4 inches. Effective rooting depth is limited by a seasonal high water table that is 12 inches above the surface to 6 inches below the surface from November to May. Runoff is very slow to ponded, and the hazard of water erosion is slight. The soil is subject to occasional, long periods of flooding from December to April.

This unit is used mainly for ryegrass seed, hay, pasture, and wildlife habitat. It is also used for recreational and homesite development.

This unit is suited to hay and pasture. Only those plants that tolerate periodic inundation and a seasonal high water table are suitable for use in undrained areas of the unit. Grazing when this unit is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Open drainage or grassed waterways can be used to remove surface water if a suitable outlet is available. Tile drains can be used with gravel backfill where ditches are undesirable. Tile drains are not efficient for lowering the water table because of the very slow permeability. Use of nitrogen fertilizer promotes good growth of forage plants. Late in summer, cracking of the surface is severe.

If this unit is used for recreational development, the main limitations are the high clay content, wetness, the hazard of flooding, and very slow permeability.

If this unit is used for homesite development, the main limitations are the hazard of flooding, very slow permeability, wetness, high shrink-swell potential, and low soil strength. If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is in capability subclass IVw.

9—Bashaw-Urban land complex. This map unit is on terraces and fans. Slope is 0 to 1 percent. Areas are elongated or irregular in shape and are 3 to 50 acres in size. The native vegetation is mainly Oregon ash, hawthorn, rushes, sedges, and grasses. Elevation is 300 to 500 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 45 percent relatively undisturbed Bashaw clay, 10 percent disturbed Bashaw clay, and 35 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Awbrig, Conser, Courtney, Natroy, and Oxley soils. Included areas make up about 10 percent of the total acreage.

The relatively undisturbed Bashaw soil is deep and poorly drained. It formed in fine textured alluvium. Typically, the surface layer is very dark gray about 7 inches thick. The next layer is black and very dark gray clay about 34 inches thick. The substratum to a depth of 63 inches or more is olive brown and light brownish gray silty clay.

Permeability of this Bashaw soil is very slow. Available water capacity is about 2 to 4 inches. Effective rooting depth is limited by a seasonal high water table that is at a depth of 12 inches above the surface to 6 inches below th surface from November to May. Runoff is slow, and the hazard of water erosion is slight. The soil is subject to occasional, long periods of flooding from December to April.

The disturbed Bashaw soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Awbrig, Natroy, Conser, Courtney, or Oxley soils that have been cut or graded. The disturbed areas have highly variable properties.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards and as open areas around and between buildings.

Where this unit is used for urban development, the main limitations are high shrink-swell potential, wetness, and very slow permeability. Local ponding can occur in depressional areas during rainy periods. Properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Dikes and channels that have outlets to bypass floodwater can be used to protect buildings and onsite sewage disposal systems from flooding. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is not assigned a capability classification.

10—Beaches. This map unit is along most of the coastline of the survey area. It consists of deep deposits of gray fine sand. Slope is 0 to 3 percent. Elevation is 0 to 10 feet. Areas are long and narrow.

This unit is washed and rewashed, at least in part, by the daily tides. The area remaining exposed ranges from about 700 acres at average high tide to about 1,300 acres at very low tide. Very high tides accompanied by large waves wash over the entire unit.

Small areas of gravelly or cobbly sand are near the mouth of small streams that empty onto this unit. The streams do not have sufficient year-round flow to maintain a constant channel through the unit. Small areas of Rock outcrop occur also in some mapped areas. These areas make up less than 5 percent of the total acreage.

This map unit is in capability subclass VIIIw.

11C—Bellpine silty clay loam, 3 to 12 percent slopes. This moderately deep, well drained soil is in convex positions on foothills and uplands in the Willamette Valley. It formed in colluvium and residuum derived from sandstone, siltstone, and volcanic tuff and breccia. Areas are irregular in shape and are 3 to 200 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, poison-oak, salal, and western swordfern. Elevation is 400 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark reddish brown silty clay loam about 13 inches thick. The subsoil is dark reddish brown and dark red silty clay about 21 inches thick. Weathered tuffaceous sandstone is at a depth of 34 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Dupee, Jory, Nekia, and Ritner soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Bellpine soil is slow. Available water capacity is about 3.5 to 6.0 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for timber production, hay and pasture, and homesites. It is also used for Christmas trees, small grain, orchards, recreation, and wildlife habitat.

If this unit is used for hay and pasture, the main limitations are low soil fertility, high acidity, high clay content, susceptibility to compaction when wet, and low precipitation in summer. Use of lime and fertilizer promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil in this unit from erosion. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to cultivated crops. In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Christmas tree plantings need brush, weed, and rodent control and periodic shearing or shaping to ensure growth of a compact tree of uniform shape.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the susceptibility of the soil to compaction and slow permeability, which contribute to a high hazard of erosion during the wet season.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Douglas-fir is suitable for planting.

If this unit is used for recreational development, the main limitations are the high clay content, slow permeability, depth to rock, and slope. Drainage should be provided for paths and trails. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

If this unit is used for homesite development, the main limitations are the high clay content, slow permeability, and depth to rock. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Cuts needed to provide essentially level building sites can expose bedrock. Roads for year-round use need heavy base rock.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

If this unit is used for septic tank absorption fields, the limitation of slow permeability can be overcome by increasing the size of the absorption field. Absorption lines should be installed on the contour.

This map unit is in capability subclass IIIe.

11D—Bellpine silty clay loam, 12 to 20 percent slopes. This moderately deep, well drained soil is on foothills and uplands adjacent to the Willamette Valley. It formed in colluvium and residuum derived from sandstone, siltstone, and volcanic tuff and breccia. Areas are irregular in shape and are 5 to 100 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, poison-oak, salal, and western swordfern. Elevation is 400 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark reddish brown silty clay loam about 13 inches thick. The subsoil is dark reddish brown and dark red silty clay about 21 inches thick. Weathered tuffaceous sandstone is at a depth of 34 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Dupee, Jory, Nekia, and Ritner soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Bellpine soil is slow. Available water capacity is about 3.5 to 6.0 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for timber production, Christmas trees, and orchards. It is also used for small grain, pasture, homesites, wildlife habitat, recreation, and watershed.

This unit is suited to hay and pasture. Grasses and legumes grow well if adequate fertilizer is used. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to cultivated crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff. If the soil in this unit is cultivated, a cover of grass or other vegetation protects the soil from erosion during the wet periods in winter. Christmas tree plantings need brush, weed, and rodent control and periodic shearing to ensure the growth of compact, well-shaped trees.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Cuts and fills should be seeded or mulched.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Douglas-fir is suitable for planting.

If this unit is used for recreational development, the main limitations are slow permeability, the clayey texture of the soil, and slope. Good drainage should be provided for paths and trails. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

This unit is suited to homesite development. The deep cuts needed to provide essentially level building sites can expose bedrock. Roads for year-round use need heavy base rock. Wetness can be reduced by installing drain tile around footings.

This unit is poorly suited to septic tank absorption fields because of slope and depth to bedrock. In some areas of this unit where depth to bedrock is greater and that are less sloping, septic tank absorption fields may be suitable.

This unit is in capability subclass IIIe.

11E—Bellpine silty clay loam, 20 to 30 percent slopes. This moderately deep, well drained soil is on foothills and uplands adjacent to the Willamette Valley. It formed in colluvium and residuum derived from sandstone, siltstone, and volcanic tuff and breccia. Areas are elongated in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, Oregon white oak, poison-oak, salal, and western swordfern. Elevation is 400 to 1,400 feet. The average annual precipitation 40 to 60 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark reddish brown silty clay loam about 13 inches thick. The subsoil is dark reddish brown and dark red silty clay about 21 inches thick. Weathered tuffaceous sandstone is at a depth of 34 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Jory, Nekia, and Ritner soils and small areas of Bellpine soils that have slopes of more than 30 percent or less than 20 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Bellpine soil is slow. Available water capacity is about 3.5 to 6.0 inches. Water supplying capacity is 15 to 22 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production and Christmas trees. It is also used for orchards, pasture, homesites, wildlife habitat, and watershed.

This unit is suited to pasture. Grasses and legumes grow well if adequate fertilizer is used. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index

for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails after logging helps to break up the compacted layer and improves seedling survival and growth. Roads for year-round use need heavy base rock. When wet, the soil is sticky and plastic, which limits trafficability.

Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. In some areas highlead or other cable logging methods may be needed to prevent excessive disturbance of the soil.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Douglas-fir is suitable for planting.

If this unit is used for homesite development, the main limitations are slope, the high content of clay in the subsoil, slow permeability, and depth to bedrock. Seeding cuts and fills and providing properly designed and maintained roadside drains help to reduce erosion. Roads for year-round use need heavy base rock.

This unit is poorly suited to septic tank absorption fields because of slope and depth to bedrock.

This map unit is in capability subclass IVe.

11F—Bellpine silty clay loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on foothills and uplands adjacent to the Willamette Valley. It formed in colluvium and residuum derived from sandstone, siltstone, and volcanic tuff and breccia. Areas are irregular in shape and are 3 to 200 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, poison-oak, salal, and western swordfern. Elevation is 400 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark reddish brown silty clay loam about 13 inches thick. The subsoil is dark reddish brown and dark red silty clay about 21 inches thick. Weathered tuffaceous sandstone is at a depth of 34 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Jory, Nekia, and Ritner soils and small areas of Bellpine soils that have slopes of less than 30 percent or more than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Bellpine soil is slow. Available water capacity is about 3.5 to 6.0 inches. Water supplying capacity is 15 to 22 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production. It is also used for livestock grazing, homesites, wildlife habitat, and watershed.

Grazing when the soil in this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

In the steeper areas, highlead or other cable logging systems may be needed because tractor logging causes excessive disturbance of the soil. If site preparation is not adequate, competition from desirable plants can prevent or prolong natural or artificial reestablishment of trees.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems.

Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Roads for year-round use need heavy base rock.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Douglas-fir is suitable for planting.

If this unit is used for homesite development, the main limitations are slope, the high content of clay in the subsoil, slow permeability, and depth to bedrock. Roads for year-round use need heavy base rock. Cutbanks are not stable and are subject to slumping.

This unit is poorly suited to septic tank absorption fields because of slope.

This map unit is in capability subclass VIe.

12E—Bellpine cobbly silty clay loam, 2 to 30 percent slopes. This moderately deep, well drained soil is on foothills and uplands east and south of the Willamette Valley. It formed in colluvium and residuum derived from basalt and sandstone. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly Douglas-fir, Oregon white oak, poison-oak, salal, and western swordfern. Elevation is 400 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark reddish brown cobbly silty clay loam about 11 inches thick. The upper 9 inches of the subsoil is dark reddish brown clay, and the lower 20 inches is reddish brown silty clay and clay. Weathered bedrock is at a depth of 40 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Dupee, Nekia, and Ritner soils and small areas of Bellpine soils that have slopes of more than 30 percent or less than 2 percent. Included areas make up about 15 percent of the total acreage.

Permeability of the Bellpine soil is slow. Available water capacity is about 3 to 6 inches. Water supplying capacity is 15 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used mainly for timber production, wildlife habitat, and watershed. It is also used for pasture and homesite development.

If the soil in this unit is used for pasture, grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails after logging helps to break up the compacted layer and improves seedling survival and growth. Roads for year-round use need heavy base rock. When wet, the soil is sticky and plastic, which limits trafficability.

Erosion is a concern in disturbed areas, particularly on the steeper slopes. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Highlead logging causes less disturbance and compaction of the soil than does surface logging. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for homesite development, the main limitations are cobbles and stones on the surface, slow permeability, depth to bedrock, the content of clay in the subsoil, and slope. Roads for year-round use need heavy base rock.

This unit is poorly suited to septic tank absorption fields because of slope and depth to bedrock. In some areas of this unit where depth to bedrock is greater and that are less sloping, septic absorption fields may be suitable.

This map unit is in capability subclass IVe.

13F—Blachly clay loam, 30 to 50 percent slopes. This deep, well drained soil is on south- and west-facing side slopes of uplands in the Cascade Range. It formed in colluvium derived from sedimentary and basic igneous rock. Areas are irregular in shape and are 10 to 300 acres or more in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, salal, and western swordfern. Elevation is 1,250 to 3,000 feet. The average annual precipitation is 60 to 110 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 140 to 200 days.

Typically, the surface layer is dark reddish brown clay loam about 9 inches thick. The upper 17 inches of the subsoil is dark red clay, and the lower 26 inches is yellowish red and reddish brown clay. Below this is dark brown clay about 8 inches thick.

Included in this unit are small areas of Bohannon, Cumley, Honeygrove, McCully, Peavine, and Klickitat soils and a soil that is similar to this Blachly soil but has bedrock at a depth of 40 to 60 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Blachly soil is moderately slow. Available water capacity is about 8 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 60 inches or more. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used mainly for timber production. It is also used for wildlife habitat and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 148. The potential production per acre is 9,360 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 84,880 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Tractor logging is difficult on the steeper slopes. Highlead or other cable logging systems are more efficient and are less damaging to the soil surface. If site preparation is not adequate, competition from undesirable plants can prolong natural or artificial reestablishment of trees. Winter browse damage by deer also retards seedling establishment and growth on this unit. Reforestation can be accomplished by planting Douglas-fir seedlings.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Roads for year-round use need heavy base rock.

If this unit is used for recreational or homesite development, the main limitations are slope, moderately slow permeability, and low soil strength. Construction of dwellings, both with and without basements, and of local roads and streets is limited by low soil strength and slope. Roads for year-round use need heavy base rock. Cutbanks are not stable and are subject to slumping.

This map unit is in capability subclass VIe.

13G—Blachly clay loam, 50 to 70 percent slopes. This deep, well drained soil is on south- and west-facing side slopes on uplands in the Cascade Range. It formed in colluvium derived from sedimentary and basic igneous rock. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, salal, and western swordfern. Elevation is 1,250 to 3,000 feet. The average annual precipitation is 60 to 120 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 140 to 200 days.

Typically, the surface layer is dark reddish brown clay loam about 9 inches thick. The upper 17 inches of the subsoil is dark red clay, and the lower 26 inches is yellowish red and reddish brown clay. Below this is dark brown clay about 8 inches thick.

Included in this unit are small areas of Bohannon, Klickitat, Kinney, McCully, and Peavine soils and a soil that is similar to this Blachly soil but has bedrock at a depth of 40 to 60 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Blachly soil is moderately slow. Available water capacity is 8 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production. It is also used for wildlife habitat and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 148. The potential production per acre is 10,560 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 99,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Tree growth generally is slower in the southern part of the survey area.

Highlead or skyline logging is more efficient than most other methods and is less damaging to the soil surface. If site preparation is not adequate, competition from undesirable plants can prevent or retard natural or artificial reestablishment of trees. Winter browse damage by deer also retards seedling establishment and growth on this unit. Reforestation can be accomplished by planting Douglas-fir seedlings.

The soils in this unit are subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using and maintaining properly designed road drainage systems. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Roads for year-round use need heavy base rock.

If this unit is used for recreational or homesite development, the main limitations are slope, moderately slow permeability, and low soil strength. Construction of dwellings, both with and without basements, and of local roads and streets is limited by low soil strength and slope. Roads for year-round use need heavy base rock. Cutbanks are not stable and are subject to slumping.

This map unit is in capability subclass VIIe.

14E—Blachly silty clay loam, 3 to 30 percent slopes. This deep, well drained soil is on uplands in the Coast Range. It formed in colluvium derived from sandstone. Areas are irregular in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, salal, and western swordfern. Elevation is 400 to 2,600 feet. The average annual precipitation is 85 to 110 inches, the average annual air temperature is 49 to 52 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface is covered with a mat of decomposed organic matter and roots about 5 inches thick. The surface layer is dark reddish brown silty clay loam about 5 inches thick. The subsoil is dark reddish brown clay about 58 inches thick.

Included in this unit are small areas of Astoria, Bohannon, Formader, Hembre, Honeygrove, Klickitat, Peavine, and Preacher soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Blachly soil is moderately slow. Available water capacity is about 8 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

Most areas of this unit are used for timber production, wildlife habitat, and watershed. A few areas are used for pasture and Christmas trees.

If this unit is used for pasture, the main limitations are slope, the hazard of erosion, low soil fertility, and soil compaction. Seedbed preparation should be on the contour or across the slope where practical. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Use of lime and fertilizer promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In some years, supplemental irrigation is also needed. Sprinkler irrigation is a suitable method of applying water.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 165. The potential production per acre is 10,560 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 99,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the clayey texture of the soil and prolonged rainy periods in winter and spring. Because the soil in this unit is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Roads for year-round use need heavy base rock.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Machine planting is sometimes practical in dry years. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are slope, the clayey texture of the soil, and moderately slow permeability. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are low soil strength, moderately slow permeability, and slope. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed.

If this unit is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe.

14F—Blachly silty clay loam, 30 to 50 percent slopes. This deep, well drained soil is dominantly on south- and west-facing side slopes on uplands in the Coast Range. It formed in colluvium derived from sandstone. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, salal, and western swordfern. Elevation is 400 to 2,600 feet. The average annual precipitation is 85 to 110 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface is covered with a mat of decomposed organic matter and roots about 5 inches thick. The surface layer is dark reddish brown silty clay loam about 5 inches thick. The subsoil is dark reddish brown clay about 58 inches thick.

Included in this unit are small areas of Astoria, Bohannon, Formader, Hembre, Honeygrove, Klickitat, Peavine, and Preacher soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Blachly soil is moderately slow. Available water capacity is about 8 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 165. The potential production per acre is 10,560 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 99,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are slope, the hazard of erosion, the clayey texture of the soil, and prolonged rainy periods in winter and spring. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

The steepness of slope limits the kinds of equipment that can be used in forest management. Highlead or other cable logging systems can be used for harvesting timber. Use of these methods is limited during November through May because of prolonged rainy periods that leave the soil sticky and highly susceptible to compaction if heavy equipment is used.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is poorly suited to recreational development. Slope limits the use of areas of the unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are slope, low soil strength, and moderately slow permeability. Excavation for roads and buildings increases the risk of erosion. Cutbanks are not stable and are subject to slumping. Access roads should be designed to control surface runoff and to help stabilize cut slopes. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability subclass VIe.

15E—Blachly-McCully clay loams, 3 to 30 percent slopes. This map unit is on ridges and side slopes of uplands in the Cascade Range. Areas are irregular in shape and are 10 to 400 acres in size. The native vegetation is mainly Douglas-fir and western hemlock. Elevation is 1,250 to 2,800 feet. The average annual precipitation is 60 to 120 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 140 to 200 days.

This unit is 50 percent Blachly clay loam and 35 percent McCully clay loam. The components of this unit are so similar and intricately intermingled that is was not practical to map them separately at the scale used.

Included in this unit are small areas of Bohannon, Cumley, Honeygrove, Klickitat, Minniece, and Peavine soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Blachly soil is deep and well drained. It formed in colluvium derived from sedimentary and basic igneous rock. Typically, the surface layer is dark reddish brown clay loam about 9 inches thick. The upper 17 inches of the subsoil is dark red clay, and the lower 26 inches is yellowish red and reddish brown clay. Below this is dark brown clay about 8 inches thick.

Permeability of the Blachly soil is moderately slow. Available water capacity is about 8 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is more than 60 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

The McCully soil is deep and well drained. Typically, the surface layer is dark reddish brown clay loam about 11 inches thick. The subsoil is dark reddish brown and yellowish red clay about 44 inches thick. It is underlain by weathered tuffaceous bedrock. Depth to bedrock is 40 to 60 inches.

Permeability of the McCully soil is moderately slow. Available water capacity is 8 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is slow to medium, and the hazard of erosion is slight.

This unit is used mainly for timber production. It is also used as wildlife habitat and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 148 on the Blachly soil. The potential production per acre is 9,360 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 84,880 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 147 on the McCully soil. The potential production per acre is 9,240 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 83,920 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soils in this unit may be compacted if they are moist when heavy equipment is used. Roads for year-round use need heavy base rock. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Undesirable plants limit natural or artificial reforestation unless intensive site preparation and maintenance are used. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are slope, moderately slow permeability, and clayey soil texture.

If this unit is used for homesite development, the main limitations are moderately slow permeability, slope, low soil strength, and the clay content of the soils. Construction of dwellings and streets is limited by low soil strength and slope. Roads for year-round use need heavy base rock.

Moderately slow permeability and slope are the main limitations for septic tank absorption fields on this unit.

This map unit is in capability subclass VIe.

16D—Bohannon gravelly loam, 3 to 25 percent slopes. This moderately deep, well drained soil is on dissected uplands in the Coast and Cascade Ranges. It formed mainly in colluvium and residuum derived from sedimentary rock, but in the Cascade Range the parent material includes some tuff and breccia. Areas are elongated in shape and are 10 to 80 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, vine maple, salal, evergreen huckleberry, Pacific rhododendron, and western swordfern. Elevation in the Coast Range is 100 to 2,600 feet, and in the Cascade Range it is 1,400 to 3,000 feet. The average annual precipitation is about 60 to 120 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 140 to 220 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark brown gravelly loam about 11 inches thick. The subsoil is dark brown and brown cobbly loam about 13 inches thick. Highly fractured, weathered sandstone is at a depth of 24 inches. Depth to weathered bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Digger soils on crests and shoulders; Kinney soils in the Cascade Range; Preacher soils in the Coast Range; Peavine, Honeygrove, and Blachly soils on the broader ridgetops and in saddles; Klickitat soils along intrusive dikes, sills, and interbedded lava flows that outcrop intermittently; Kilchis soils; and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Bohannon soil is moderately rapid. Available water capacity is about 2.5 to 6.0 inches. Water supplying capacity is 16 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for timber production, wildlife habitat, and watershed. It is also used for recreation.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged fully stocked stand of trees 80 years old.

Areas on sharp ridgetops and on slopes facing the prevailing winds have lower site indexes. Naturally regenerated stands commonly are overstocked and need to be thinned (fig. 5).

The main concerns in producing and harvesting timber are accessibility, stones on the surface and throughout the profile, the hazard of erosion from winter rains in exposed areas, and plant competition. Surface methods of harvesting timber generally can be used, but their use may be limited when the soil is wet. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment.

Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Small stones make planting difficult. Hand planting of nursery stock is sometimes necessary to establish or improve a stand before competing vegetation becomes established. Among the trees that are suitable for planting are Douglas-fir and western hemlock.

If this unit is used for recreational development, the main limitations are the gravel and cobbles on the surface, depth to bedrock, and slope.

If this unit is used for homesite development, the main limitations are the depth to bedrock and gravel and cobbles on the surface and throughout the profile. In some areas steepness of slope interferes with road location. Cuts needed to provide essentially level building sites can expose bedrock. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed.

This map unit is in capability subclass VIe.

16F—Bohannon gravelly loam, 25 to 50 percent slopes. This moderately deep, well drained soil is on uplands in the Coast and Cascade Ranges. It formed mainly in colluvium derived from sedimentary rock, but in the Cascade Range some of the parent material is tuff and breccia. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, salal, evergreen huckleberry, Pacific rhododendron, and western swordfern. Elevation in the Coast Range is 100 to 2,600 feet, and in the Cascade Range it is 1,400 to 3,000 feet. The average annual precipitation is 60 to 120 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 140 to 220 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark brown gravelly loam about 11 inches thick. The subsoil is dark brown and brown cobbly loam about 13 inches thick. Highly fractured, weathered sandstone is at a depth of 24 inches. Depth to weathered bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Digger soils on crests and shoulders; Kinney soils in the Cascade Range; Preacher soils in the Coast Range; Peavine, Honeygrove, and Blachly soils, mainly in saddles and on small benches; Klickitat soils along intrusive dikes, sills, and interbedded basaltic lava flows that outcrop intermittently; and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Bohannon soil is moderately rapid. Available water capacity is about 2.5 to 6.0 inches. Water supplying capacity is 15 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production, wildlife habitat, and watershed. It is also used for recreation.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are accessibility, stones on the surface and throughout the profile, the hazard of erosion from winter rains in exposed areas, and plant competition.

Figure 5.—Overstocked stand of Douglas-fir in an area on Bohannon gravelly loam, 3 to 25 percent slopes.

Surface methods of harvesting timber are difficult to use because of slope. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. The steepness of slope limits the kinds of equipment that can be used in forest management. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment.

Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Small stones make planting difficult. In areas on south-facing side slopes that are droughty in summer, seedling survival can be improved by providing shade for seedlings. Hand planting of nursery stock is sometimes needed to establish or improve a stand before competing vegetation becomes established. Among the trees that are suitable for planting are Douglas-fir and western hemlock.

This unit is poorly suited to recreational development. It is limited mainly by slope, gravel and cobbles on the surface and throughout the profile, and depth to bedrock.

This unit is poorly suited to homesite development. The main limitations are slope, depth to bedrock, and gravel and cobbles on the surface and throughout the profile. Cuts needed to provide essentially level building sites expose bedrock. The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems.

This map unit is in capability subclass VIe.

16H—Bohannon gravelly loam, 50 to 90 percent slopes. This moderately deep, well drained soil is on uplands in the Coast and Cascade Ranges. It commonly is on headwalls of old slump areas. It formed mainly in colluvium derived from sedimentary rock, but in the Cascade Range some of the parent material is tuff and breccia. Areas are irregular in shape and are 10 to 300 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, salal, evergreen huckleberry, Pacific rhododendron, and western swordfern. Elevation in the Coast Range is 50 to 2,600 feet, and in the Cascade Range it is 1,400 to 3,000 feet. The average annual precipitation is about 60 to 120 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 140 to 220 days.

Typically, the surface is covered with a thin mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark brown gravelly loam about 11 inches thick. The subsoil is dark brown and brown cobbly loam about 13 inches thick. Highly fractured, weathered bedrock is at a depth of 24 inches. Depth to sandstone ranges from 20 to 40 inches.

Included in this unit are small areas of Digger soils on spur ridges and shoulders; Kinney soils in the Cascade Range; Preacher soils in the Coast Range; Hembre, Kilchis, Klickitat, Peavine, and Slickrock soils; and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Bohannon soil is moderately rapid. Available water capacity is about 2.5 to 6.0 inches. Water supplying capacity is 14 to 22 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Trees are subject to windthrow because of limited rooting depth.

Brushy plants such as red alder, vine maple, and salmonberry limit natural regeneration of Douglas-fir, especially on north-facing side slopes. Droughtiness caused by coarse fragments in the soil decreases seedling survival on south-facing side slopes. Providing shade can improve survival of hand planted seedlings. Reforestation can be accomplished by planting Douglas-fir or western hemlock seedlings.

This map unit is in capability subclass VIIe.

17—Brallier muck, drained. This deep, very poorly drained, organic soil is in low tidal basins and on stream flood plains near tidelands. It formed in decomposed fibrous organic residue. Slope is 0 to 1 percent. Areas are irregular in shape and are 3 to 90 acres in size. The native vegetation is mainly willow and other water-tolerant shrubs, bullrush, sedges, and scattered spruce. Elevation is 0 to 70 feet. The average annual precipitation is 70 to 100 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 150 to 200 days.

Typically, the surface layer is very dark grayish brown muck about 3 inches thick. The substratum to a depth of 60 inches or more is dark brown, highly decomposed and partly decomposed muck.

Included in this unit are small areas of woody and fibrous peat and small areas of soils that have silt loam or sandy loam below a depth of 30 inches. Also included are small areas of Nestucca and Willanch soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Brallier soil is moderate. Available water capacity is about 10 to 15 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is more than 60 inches for water-tolerant plants, but it is limited for non-water-tolerant plants by a high water table that is 1 foot above the surface to 2 feet below the surface from November to March. Runoff is very slow to ponded, and the hazard of water erosion is slight. This soil is subject to frequent, brief periods of flooding from November to March.

This unit is used mainly for pasture and some hay crops.

This unit is suited to pasture. The main limitations are susceptibility to subsidence, the hazard of soil blowing, and because of the high content of organic matter, difficulty of rewetting the surface layer if it is allowed to become completely dry after tilling for seeding. The extreme acidity of the soil and the hazard of flooding in winter in areas not protected by dikes or levees restricts the selection of plants and the season of use. The cool summer climate, characterized by high humidity and frequent rainy periods, makes curing of hay crops difficult.

If drainage can be carefully controlled and fertilizer is used, this unit has the potential for the production of forage and specialty crops such as cranberries.

This map unit is in capability subclass IVw.

18—Brallier Variant muck. This very deep, very poorly drained soil is in low tidal basins and on flood plains in the lower Siuslaw estuary area. It formed in decomposed organic material over sandy or silty alluvium. Slope is 0 to 2 percent. Areas are irregular in shape and are 3 to 100 acres in size. The native vegetation is mainly brush, willow, and spruce or sedges and bullrush. Elevation is 0 to 6 feet. The average annual precipitation is 70 to 85 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown muck about 13 inches thick. The next layer is very dark brown and dark brown muck about 25 inches thick. The substratum to a depth of 50 inches or more is very dark gray silt loam.

Included in this unit are small areas of woody and fibrous peat and soils that have a clayey substratum within a depth of 30 inches. Also included are small areas of Willanch and Nestucca soils and barren tidal flats. Included areas make up about 15 percent of the total acreage.

Permeability of this Brallier Variant soil is moderate. Available water capacity is about 10 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 38 inches or more for water-tolerant plants, but it is limited for non-water-tolerant plants by a high water table that is 1 foot above the surface to 2 feet below the surface year round. Runoff is very slow to ponded, and internal drainage is slow. The hazard of water erosion mainly is slight from tidal flooding, but it may be high along stream channels during periods of heavy rains and rapid runoff if the vegetation is removed. This soil is subject to frequent, brief periods of flooding by tidal action year round.

This unit is used for wildlife habitat.

This map unit is in capability subclass Vw.

19—Brenner silty clay loam. This deep, poorly drained soil is on flood plains. It formed in recent alluvium. Slopes are 0 to 2 percent. Areas commonly are concave. They are irregular in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly rushes, sedges, and willows. Elevation is 10 to 700 feet. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface layer is very dark gray silty clay loam about 8 inches thick. The subsoil is dark grayish brown, mottled silty clay about 22 inches thick. The substratum to a depth of 55 inches is gray, mottled silty clay. In some areas a mantle of organic matter as much as 20 inches thick is on the surface.

Included in this unit are small areas of Brallier and Nestucca soils. Included areas make up about 30 percent of the total acreage.

Permeability of this Brenner soil is slow. Available water capacity is about 8.5 to 9.5 inches. Water supplying capacity is 23 to 24 inches. Effective rooting depth is limited by a seasonal high water table that is at the surface to a depth of 12 inches from December to April. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to frequent, brief periods of flooding from December to April.

This unit is used mainly for pasture. It is also used for hay, silage crops, and wildlife habitat.

This unit is suited to shallow-rooted cultivated crops. The high water table generally limits the suitability of the unit for deep-rooted crops. Only those hay and pasture plants that tolerate periodic inundation and a seasonal high water table are suitable for use in undrained areas.

This unit can be used for a wider variety of cultivated crops if drainage and protection from flooding are provided. If the soil is plowed in fall, runoff and erosion can be reduced by fertilizing and seeding to a cover crop. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime.

If this unit is used for recreational development, the main limitations are wetness and the hazard of flooding. Protection from flooding is needed for roads and trails.

If this unit is used for homesite development, the main limitations are the hazard of flooding, wetness, slow permeability, and the seasonal high water table. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Roads for year-round use need heavy base rock. Wetness can be reduced by installing drain tile around footings. Flooding can be controlled only by use of major flood control structures such as dikes and dams.

This map unit is in capability subclass IIIw.

20B—Briedwell cobbly loam, 0 to 7 percent slopes. This deep, well drained soil is on terraces in valleys. It formed in mixed alluvium. Areas are elongated in shape and are 20 to 200 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, and grasses. Elevation is 400 to 650 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown and dark brown cobbly loam about 20 inches thick. The subsoil is dark yellowish brown very stony loam 18 inches thick. The upper 6 inches of the substratum is dark brown very cobbly sandy loam, and the lower part is dark brown very gravelly loam to a depth of 60 inches or more.

Included in this unit are small areas of Abiqua, McAlpin, and Oxley soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Briedwell soil is moderate. Available water capacity is about 4 to 6 inches. Water supplying capacity is 17 to 19 inches. Effective rooting depth is 24 to 38 inches. It is limited by the very cobbly or very gravelly substratum. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for small grain, hay and pasture, and grass seed. It is also used for Christmas trees, timber production, recreation, wildlife habitat, and homesites.

If this unit is used for cultivated crops, the main limitations are the cobbles in the surface layer, droughtiness because of the low available water capacity of the soil, and low precipitation in summer. Cultivation of intertilled crops is limited in most areas unless the cobbles are removed from the surface layer. In summer, irrigation is required for the production of most late-season crops. Proper fertilization and irrigation are necessary for maximum production of most crops, including hay and pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 135. The potential production per acre is 8,280 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 72,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Reforestation of the soil in this unit should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir seedlings. Trees are subject to windthrow because of limited rooting depth.

If this unit is used for recreational development, the main limitations are the gravel, cobbles, and stones in the surface layer; droughtiness, which makes irrigation necessary in summer for most landscaping plants and lawns; and rapid permeability in the substratum, which can result in pollution of nearby streams or of ground water by effluent from septic tank absorption fields.

The main limitations of this unit for homesite development are the rapid permeability of the substratum, which presents a hazard of polluting nearby streams and limits use of the unit for sewage lagoons and sanitary landfills, and the cobbles and stones in the surface layer, which make shallow excavation difficult. This unit is a good source of roadfill material, but it is limited by a few large stones. Cutbanks are not stable and are subject to slumping.

This map unit is in capability subclass IIIe.

21B—Bullards-Ferrelo loams, 0 to 7 percent slopes. This map unit is on marine terraces. Areas are irregular in shape and are 3 to 40 acres in size. The native vegetation is mainly Douglas-fir, Sitka spruce, western hemlock, shore pine, salal, Pacific rhododendron, and western swordfern. Elevation is 40 to 400 feet. The average annual precipitation is 65 to 80 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 200 to 250 days.

This unit is 50 percent Bullards loam and 35 percent Ferrelo loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bandon, Lint, Netarts, and Waldport soils. Included areas make up about 15 percent of the total acreage.

The Bullards soil is deep and well drained. It formed in sandy alluvial and eolian material. Typically, the surface is covered with a mat of leaves, twigs, and needles about 2 inches thick. The surface layer is dark grayish brown loam about 4 inches thick. The subsoil is dark reddish brown gravelly loam and strong brown sandy loam about 54 inches thick. The substratum to a depth of 61 inches is strong brown and dark brown loamy fine sand.

Permeability of the Bullards soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is moderate.

The Ferrelo soil is deep and well drained. It formed in marine sediment over eolian sand. Typically, the surface is covered with a mat of leaves, needles, and twigs about 2 inches thick. The surface layer is dark brown loam about 10 inches thick. The subsoil is dark brown and brown loam and silt loam about 37 inches thick. The substratum to a depth of 60 inches or more is brown fine sandy loam over reddish brown, weakly cemented fine sand.

Permeability of the Ferrelo soil is moderately rapid. Available water capacity is about 6 to 8 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 40 to 60 inches. It is limited by the weakly cemented part of the substratum. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used mainly for timber production. It is also used for homesites, watershed, wildlife habitat, and recreation.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on both soils. The potential production per acre is 9,000 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 81,120 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Trees are subject to windthrow. Droughtiness in summer may limit seedling survival. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir, Sitka spruce, and western hemlock seedlings.

This unit is suited to recreational development. It has few limitations. Maintaining plant cover helps to control soil blowing.

This unit is suited to homesite development. The main limitations are the moderate and moderately rapid permeability and the presence of restrictive sand lenses. Preserving the existing plant cover during construction helps to control soil blowing.

If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage. The restrictive sand lenses may cause ponding of effluent in some areas.

This map unit is capability subclass IIIe.

21C—Bullards-Ferrelo loams, 7 to 12 percent slopes. This map unit is on dissected marine terraces. Areas are irregular in shape and are 3 to 100 acres in size. The native vegetation is mainly Douglas-fir, Sitka spruce, western hemlock, shore pine, salal, Pacific rhododendron, and western swordfern. Elevation is 15 to 300 feet. The average annual precipitation is 65 to 80 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 200 to 250 days.

This unit is 50 percent Bullards loam and 35 percent Ferrelo loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bandon, Lint, Netarts, and Waldport soils. Included areas make up about 15 percent of the total acreage.

The Bullards soil is deep and well drained. It formed in eolian material. Typically, the surface is covered with a mat of leaves, twigs, and needles about 2 inches thick. The surface layer is dark grayish brown loam about 4 inches thick. The subsoil is dark reddish brown gravelly loam and strong brown sandy loam about 54 inches thick. The substratum to a depth of 61 inches is strong brown and dark brown loamy fine sand.

Permeability of the Bullards soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazards of water erosion and soil blowing are moderate.

The Ferrelo soil is deep and well drained. It formed in marine sediment over eolian sand. Typically, the surface is covered with a mat of leaves, needles, and twigs about 2 inches thick. The surface layer is dark brown loam about 10 inches thick. The subsoil is dark brown and brown loam and silt loam about 37 inches thick. The substratum to a depth of 60 inches or more is brown fine sandy loam over reddish brown, weakly cemented fine sand.

Permeability of the Ferrelo soil is moderately rapid. Available water capacity is about 6 to 8 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 40 to 60 inches. It is limited by the weakly cemented part of the substratum. Runoff is medium, and the hazards of water erosion and soil blowing are moderate.

This unit is used mainly for timber production. It is also used for homesites, watershed, wildlife habitat, and recreation.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on both soils. The potential production per acre is 9,000 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 81,120 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Trees are subject to windthrow. Droughtiness in summer may limit seedling survival. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir, Sitka spruce, and western hemlock seedlings.

If this unit is used for recreational development, the main limitation is steepness of slope. Areas used for recreation can be protected from soil blowing by maintaining plant cover. Paths and trails should extend across the slope.

If this unit is used for homesite development, the main limitations are steepness of slope, moderate and moderately rapid permeability, and restrictive sand lenses. Preserving the existing plant cover during construction helps to control erosion.

Septic tank absorption lines should be installed on the contour. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage. The restrictive sand lenses and low microbial activity in the substratum may cause ponding or surfacing of effluent in some areas.

This map unit is capability subclass IVe.

21E—Bullards-Ferrelo loams, 12 to 30 percent slopes. This map unit is on deeply dissected marine terraces. Areas are irregular in shape and are 3 to 100 acres or more in size. The native vegetation is mainly

Douglas-fir, Sitka spruce, western hemlock, shore pine, salal, Pacific rhododendron, and western swordfern. Elevation is 15 to 300 feet. The average annual precipitation is 65 to 80 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 200 to 250 days.

This unit is 45 percent Bullards loam and 40 percent Ferrelo loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bandon, Lint, Netarts, and Waldport soils. Included areas make up about 15 percent of the total acreage.

The Bullards soil is deep and well drained. It formed in eolian material. Typically, the surface is covered with a mat of leaves, twigs, and needles about 2 inches thick. The surface layer is dark grayish brown loam about 4 inches thick. The subsoil is dark reddish brown gravelly loam and strong brown sandy loam about 54 inches thick. The substratum to a depth of 61 inches is strong brown and dark brown loamy fine sand.

Permeability of the Bullards soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazards of water erosion and soil blowing are moderate to high.

The Ferrelo soil is deep and well drained. It formed in marine sediment over eolian sand. Typically, the surface is covered with a mat of leaves, needles, and twigs about 2 inches thick. The surface layer is dark brown loam about 10 inches thick. The subsoil is dark brown and brown loam and silt loam about 37 inches thick. The substratum to a depth of 60 inches or more is brown fine sandy loam over reddish brown, weakly cemented fine sand.

Permeability of the Ferrelo soil is moderately rapid. Available water capacity is about 6 to 8 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 40 to 60 inches. It is limited by the weakly cemented part of the substratum. Runoff is medium, and the hazards of water erosion and soil blowing are moderate.

This unit is used mainly for timber production. It is also used for homesites, watershed, wildlife habitat, and recreation.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on both soils. The potential production per acre is 9,000 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 81,120 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Trees are subject to windthrow. Droughtiness in summer may limit seedling survival. Reforestation should be carefully managed to reduce competition from undesirable plants. Reforestation can be accomplished by planting Douglas-fir, Sitka spruce, and western hemlock seedlings.

If this unit is used for recreational development, the main limitation is steepness of slope. Slope limits the use of the unit mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitation is steepness of slope. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion.

The steepness of slope is a concern in installing septic tank absorption lines. Absorption lines should be installed on contour. The restrictive sand lenses may cause seepage of effluent downslope from absorption lines.

This map unit is capability subclass IVe.

21G—Bullards-Ferrelo loams, 30 to 60 percent slopes. This map unit is on deeply dissected marine terraces. Areas are irregular in shape and are 3 to 100 acres in size. The native vegetation is mainly Douglas-fir, Sitka spruce, western hemlock, shore pine, salal, Pacific rhododendron, and western swordfern. Elevation is 15 to 300 feet. The average annual precipitation is 65 to 80 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 200 to 250 days.

This unit is 45 percent Bullards loam and 40 percent Ferrelo loam. The Ferrelo soil is dominantly in the more steeply sloping areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bandon, Lint, and Waldport soils. Included areas make up about 15 percent of the total acreage.

The Bullards soil is deep and well drained. It formed in eolian sand. Typically, the surface is covered with a mat of leaves, twigs, and needles about 2 inches thick. The surface layer is dark grayish brown loam about 4 inches thick. The subsoil is dark reddish brown gravelly loam and strong brown sandy loam about 54 inches thick. The substratum to a depth of 61 inches is strong brown and dark brown loamy fine sand.

Permeability of the Bullards soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

The Ferrelo soil is deep and well drained. It formed in marine sediment over eolian sand. Typically, the surface is covered with a mat of leaves, needles, and twigs about 2 inches thick. The surface layer is dark brown loam about 10 inches thick. The subsoil is dark brown and brown loam and silt loam about 37 inches thick. The substratum to a depth of 60 inches or more is brown fine sandy loam over reddish brown, weakly cemented fine sand.

Permeability of the Ferrelo soil is moderately rapid. Available water capacity is about 6 to 8 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 40 to 60 inches. It is limited by the weakly cemented part of the substratum. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production. It is also used for wildlife habitat and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on both soils. The potential production per acre is 9,000 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 81,120 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding generally is safer and disturbs the soil less.

Trees are subject to windthrow because of limited rooting depth. Droughtiness in summer decreases seedling survival on south-facing side slopes. Reforestation should be carefully managed to reduce competition from undesirable plants. Reforestation can be accomplished by planting Douglas-fir, Sitka spruce, and western hemlock seedlings.

If this unit is used for recreational development, steepness of slope limits use mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitation is steepness of slope. The deep cuts required to provide level building sites may expose the unstable sandy substratum of the soils.

This map unit is capability subclass VIe.

22—Camas gravelly sandy loam, occasionally flooded. This deep, excessively drained soil is on bottom lands. It formed in recent sandy and gravelly alluvium. Slopes are 0 to 3 percent. Areas are irregular or elongated in shape and are 3 to 30 acres in size. The vegetation in areas not cultivated is mainly black cottonwood, bigleaf maple, Oregon ash, blackberry, shrubs, and grasses. Elevation is 290 to 850 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown gravelly sandy loam about 14 inches thick. The substratum to a depth of 60 inches or more is dark brown very gravelly sand.

Included in this unit are small areas of Cloquato and Newberg soils, Fluvents, and Riverwash. Included areas make up about 15 percent of the total acreage.

Permeability of this Camas soil is very rapid. Available water capacity is about 1.5 to 3.5 inches. Water supplying capacity is 10 to 18 inches. Effective rooting depth is 8 to 14 inches. It is limited by the very gravelly substratum. Runoff is slow, and the hazard of water erosion is slight except during periods of overflow from nearby streams. The soil is subject to occasional, brief periods of flooding from November to May.

This unit is used mainly for cereal grain, pasture, hay, and vegetables. It is also used for gravel pits and as homesites.

If this unit is used for crops, the main limitations are low soil fertility, low available water capacity, and the content of gravel. Fertilizer is needed because of the low soil fertility. Irrigation water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. The gravel may interfere with the cultivation of intertilled crops.

If this unit is used for hay and pasture, proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage.

If this unit is used for homesite development, the main limitations are the hazard of flooding and very rapid permeability. Some areas of this unit that are slightly above the general level of the flood plain are rarely flooded. This unit is a good source of gravel and roadfill for farm roads.

This map unit is in capability subclass IVw.

23—Camas-Urban land complex. This map unit is on the higher lying parts of flood plains. Slope is 0 to 3 percent. Areas are elongated to irregular in shape and are 3 to 30 acres in size. The native vegetation is mainly black cottonwood, bigleaf maple, Oregon ash, blackberry, shrubs, and grasses. Elevation is 400 to 1,200 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 40 percent relatively undisturbed Camas gravelly sandy loam, 10 percent disturbed Camas gravelly sandy loam, and 40 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cloquato and Newberg soils. Included areas make up about 10 percent of the total acreage.

The relatively undisturbed Camas soil is deep and excessively drained. It formed in recent sandy and gravelly alluvium. Typically, the surface layer is very dark grayish brown gravelly sandy loam about 14 inches thick. The substratum to a depth of 60 inches or more is dark brown very gravelly sand.

Permeability of this Camas soil is very rapid. Available water capacity is about 1.5 to 3.5 inches. Water supplying capacity is 10 to 18 inches. Effective rooting depth is 8 to 14 inches. It is limited by the very gravelly substratum. Runoff is slow, and the hazard of water erosion is slight except during periods of overflow from flooding of nearby streams. The soil is subject to only rare periods of flooding because of the construction of large dams on the major rivers.

The disturbed Camas soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Camas, Newberg, or Cloquato soils that have been cut or graded. The disturbed areas have highly variable properties.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards and as open areas around and between buildings.

If this unit is used for urban development, the main limitation is the hazard of rare flooding from prolonged, heavy rainfall and snowmelt that fill the large reservoirs upstream and override the effect of the dams. The chance of such an event occurring is about once in 100 years, although the chance of a storm occurring that might cause minor damage and isolation of some areas by water flowing through some of the lower channels in the unit is once in 50 years.

In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate droughtiness should be selected if irrigation is not provided.

This map unit is not assigned a capability classification.

24—Chapman loam. This deep, well drained soil is on low river terraces. It formed in recent mixed alluvium. Slopes are 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, bigleaf maple, Oregon white oak, blackberry, shrubs, and grasses. Elevation is 300 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the upper part of the surface layer is dark brown loam about 8 inches thick and the lower part is very dark grayish brown clay loam about 6 inches thick. The subsoil is dark brown and dark yellowish brown loam about 28 inches thick. The upper part of the substratum is brown gravelly sandy loam about 8 inches thick, and the lower part to a depth of 60 inches or more is dark brown very gravelly sandy loam.

Included in this unit are small areas of Chehalis, Malabon, McBee, and Salem soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Chapman soil is moderate. Available water capacity is about 8 to 12 inches. Water supplying capacity is 19 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

This unit is used mainly for row crops, grass seed, and small grain. It is also used for orchards, recreation, pasture, homesites, and urban development.

This unit is suited to all climatically adapted crops. It is most valued for root crops such as carrots because the surface layer can be easily dug.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit is suited to pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

If this unit is used for homesite development, the main limitation is the hazard of flooding. Flooding can be controlled only by use of major flood control structures. Dikes and channels that have outlets to bypass floodwater can be used to protect buildings and onsite sewage disposal systems from flooding.

In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate droughtiness should be selected if irrigation is not provided.

This unit is in capability class I.

25—Chapman-Urban land complex. This map unit is on low river terraces. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres in size. The native vegetation is mainly Douglas-fir, bigleaf maple, Oregon white oak, blackberry, shrubs, and grasses. Elevation is 300 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 40 percent relatively undisturbed Chapman loam, 5 percent disturbed Chapman loam, and 40 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Chehalis, Salem, McBee, and Malabon soils. Included areas make up about 15 percent of the total acreage.

The relatively undisturbed Chapman soil is deep and well drained. It formed in recent mixed alluvium. Typically, the upper part of the surface layer is dark brown loam about 8 inches thick, and the lower part is very dark grayish brown clay loam about 6 inches thick. The subsoil is dark brown and dark yellowish brown loam about 28 inches thick. The upper part of the substratum is brown gravelly sandy loam about 8 inches thick, and the lower part to a depth of 60 inches or more is dark brown very gravelly sandy loam. Strata of coarse sand and gravel are common below a depth of 40 inches.

Permeability of this Chapman soil is moderate. Available water capacity is about 8 to 12 inches. Water supplying capacity is 19 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

The disturbed Chapman soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Chapman, Chehalis, Salem, McBee, or Malabon soils that have been cut or graded. The characteristics of the disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards and as open areas around and between buildings.

If this unit is used for urban development, the main limitation is the hazard of rare flooding from prolonged, heavy rainfall and snowmelt that fill the large reservoirs upstream and override the effect of the dams.

In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate droughtiness should be selected if irrigation is not provided.

This map unit is not assigned a capability classification.

26—Chehalis silty clay loam, occasionally flooded. This deep, well drained soil is on flood plains. It formed in recent mixed alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, bigleaf maple, Oregon white oak, black cottonwood, shrubs, and grasses. Elevation is 290 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown silty clay loam about 13 inches thick. The subsoil is dark brown and brown silty clay loam about 42 inches thick. The substratum to a depth of 70 inches is brown silt loam.

Included in this unit are small areas of Chapman, Cloquato, McBee, and Newberg soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Chehalis soil is moderate. Available water capacity is about 11 to 13 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is more than 60 inches. Runoff is slow, and the hazard of water erosion is slight. This soil is occasionally flooded for brief periods from November to March.

Most areas of this unit are used for row crops, small grain, hay, pasture, and orchards. A few areas are used as homesites and for recreation.

This unit is suited to all climatically adapted crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

In winter and spring, cover crops help to protect the soil from erosion by flooding. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit is suited to hay and pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to recreational development because of its location near streams. It is limited mainly by the hazard of flooding and the clay content of the surface layer.

If this unit is used for homesite development, the main limitations are the hazard of flooding and the moderate shrink-swell potential. The risk of flooding has been reduced in some areas by the construction of dams and reservoirs on large streams. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

This unit is in capability subclass IIw.

27—Chehalis-Urban land complex. This map unit is on flood plains. Slope is 0 to 3 percent. Areas are elongated in shape and are 2 to 100 acres or more in size. The native vegetation is mainly Douglas-fir, bigleaf maple, Oregon white oak, black cottonwood, shrubs, and grasses. Elevation is 300 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 40 percent relatively undisturbed Chehalis silty clay loam, 10 percent disturbed Chehalis silty clay loam, and 40 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Chapman, Cloquato, McBee, and Newberg soils. Included areas make up about 10 percent of the total acreage.

The relatively undisturbed Chehalis soil is deep and well drained. It formed in recent mixed alluvium. Typically, the surface layer is dark brown silty clay loam about 13 inches thick. The subsoil is dark brown and brown silty clay loam about 42 inches thick. The substratum to a depth of 70 inches is brown silt loam.

Permeability of this Chehalis soil is moderate. Available water capacity is about 11 to 13 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is more than 60 inches. This soil is occasionally flooded for brief periods from November to March.

The disturbed Chehalis soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Chehalis, Chapman, Cloquato, and Newberg soils that have been cut or graded. The characteristics of the disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards and as open areas around and between buildings.

If this unit is used for urban development, the main limitation is the hazard of flooding from prolonged, heavy rainfall and snowmelt that fill the large reservoirs upstream and override the effect of the dams. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling.

In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate droughtiness should be selected if irrigation is not provided.

This map unit is not assigned a capability classification.

28C—Chehulpum silt loam, 3 to 12 percent slopes. This shallow, well drained soil is on low foothills in the Willamette Valley. It formed in colluvium weathered from sedimentary rock. Areas are irregular in shape and are 3 to 70 acres in size. The vegetation in areas not cultivated is mainly annual grasses, wild rose, Oregon white oak, and poison-oak. Elevation is 400 to 1,200 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The next layer is dark brown clay loam about 6 inches thick. Weathered sedimentary rock is at a depth of 13 inches. Depth to bedrock ranges from 10 to 20 inches.

Included in this unit are small areas of Hazelair, Steiwer, Willakenzie, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Chehulpum soil is moderate. Available water capacity is about 2 to 4 inches. Water supplying capacity is 6 to 13 inches. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for pasture, wildlife habitat, and recreation.

If this unit is used for pasture, the main limitations are droughtiness and shallow depth to rock. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Fertilizer is needed to ensure optimum growth of grasses and legumes. Because the soil in this unit is droughty, applications of irrigation water should be light and frequent.

If this unit is used for recreational development, the main limitations are steepness of slope and shallow depth to rock. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are shallow depth to rock and steepness of slope. Cuts needed to provide essentially level building sites can expose bedrock. Topsoil can be stockpiled and used to reclaim areas disturbed during construction.

Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclass VIe.

28E—Chehulpum silt loam, 12 to 40 percent slopes. This shallow, well drained soil is on low foothills in the Willamette Valley. It formed in colluvium derived from sedimentary rock. Areas are irregular in shape and are 3 to 40 acres in size. The vegetation in areas not cultivated is mainly annual grasses, wild rose, Oregon white oak, and poison-oak. Elevation is 400 to 1,200 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The next layer is dark brown clay loam about 6 inches thick. Weathered sedimentary rock is at a depth of 13 inches. Depth to bedrock ranges from 10 to 20 inches.

Included in this unit are small areas of Hazelair, Philomath, Steiwer, Willakenzie, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Chehulpum soil is moderate. Available water capacity is about 2 to 4 inches. Water supplying capacity is 6 to 13 inches. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat and some livestock grazing.

Slope limits access by livestock and results in overgrazing of the less sloping areas. Grazing should be delayed until the soil in this unit is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

If this unit is used for recreational development, the main limitations are steepness of slope and shallow depth to rock. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are shallow depth to rock and steepness of slope. Cuts needed to provide essentially level building sites can expose bedrock. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Only the part of the site that is used for construction should be disturbed. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclass VIe.

29—Cloquato silt loam. This deep, well drained soil is on flood plains. It formed in recent mixed alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, black cottonwood, bigleaf maple, Oregon white oak, western swordfern, and creambush oceanspray. Elevation is 290 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silt loam about 14 inches thick. The next layer is very dark grayish brown silt loam about 19 inches thick. The upper 17 inches of the substratum is dark brown silt loam, and the lower part to a depth of 60 inches or more is multicolored sand.

Included in this unit are small areas of Chapman, Chehalis, McBee, and Newberg soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Cloquato soil is moderate. Available water capacity is about 9 to 14 inches. Water supplying capacity is 19 to 26 inches. Effective rooting depth is 40 to 60 inches or more. It is limited by the sandy substratum. Runoff is slow, and the hazard of water erosion is slight. The soil is subject to occasional, very brief periods of flooding from November to March.

This unit is used mainly for row crops, small grain, hay, and pasture. It is also used as homesites and for recreation.

This unit is suited to all climatically adapted crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Use of this method permits even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Streambank cutting, erosion caused by overflow, and sedimentation can be reduced by maintaining adequate plant cover.

This unit is suited to hay and pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to recreational development. Protection from flooding is needed.

If this unit is used for homesite development, the main limitation is the hazard of occasional flooding. Roads and streets should be located above the expected flood level.

This unit is in capability subclass IIw.

30—Cloquato-Urban land complex. This map unit is on flood plains. Slopes are 0 to 3 percent. Areas are elongated in shape and are 3 to 50 acres in size. The native vegetation is mainly Douglas-fir, black cottonwood, bigleaf maple, Oregon white oak, western swordfern, and creambush oceanspray. Elevation is 300 to 800 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 40 percent undisturbed Cloquato silt loam, 5 percent disturbed Cloquato silt loam, and 40 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Chapman, Chehalis, McBee, and Newberg soils. Included areas make up about 15 percent of the total acreage.

The undisturbed Cloquato soil is deep and well drained. It formed in recent mixed alluvium. Typically, the surface layer is very dark grayish brown silt loam about 14 inches thick. The next layer is very dark grayish brown silt loam about 19 inches thick. The upper 17 inches of the substratum is dark brown silt loam, and the lower part to a depth of 60 inches or more is multicolored sand.

Permeability of this Cloquato soil is moderate. Available water capacity is 9 to 14 inches. Water supplying capacity is 19 to 26 inches. Effective rooting depth is 40 to 60 inches or more. It is limited by the sandy substratum. Runoff is slow, and the hazard of water erosion is moderate. This soil is subject to occasional, very brief periods of flooding from November to March.

The disturbed Cloquato soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Cloquato, Chehalis, Chapman, Newberg, or McBee soils that have been cut or graded. The characteristics of the disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards and as open areas around and between buildings.

If this unit is used for urban development, the main limitation is the hazard of flooding. Roads and streets should be located above the expected flood level.

In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate flooding and droughtiness should be selected if irrigation is not provided.

This map unit is not assigned a capability classification.

31—Coburg silty clay loam. This deep, moderately well drained soil is on low stream terraces. It formed in silty and clayey mixed alluvium. Slope is 0 to 3 percent. Areas are irregular in shape and are 5 to 100 acres in size. The vegetation in areas not cultivated is mainly Oregon ash, Douglas-fir, Oregon white oak, and poison-oak. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silty clay loam about 18 inches thick. The subsoil is dark brown, mottled silty clay loam and silty clay about 35 inches thick. The substratum to a depth of 65 inches is dark brown, mottled fine sandy loam.

Included in this unit are small areas of Conser, Malabon, Oxley, and Salem soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Coburg soil is moderately slow. Available water capacity is about 10 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is more than 60 inches. Runoff is slow, and the hazard of water erosion is slight. A high water table is at a depth of 1.5 to 2.5 feet from November to May.

This unit is used for small grain, grass seed, pasture, orchards, irrigated vegetable crops, recreation, and urban development.

This unit is suited to many kinds of crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Orchards and vegetable crops should have cover crops to help protect the soil. Restricting use of machinery when this unit is wet minimizes compaction.

This unit is suited to pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

If this unit is used for recreational development, the main limitations are the high content of clay and moderately slow permeability.

If this unit is used for urban development, the main limitations are the seasonal high water table, moderately slow permeability, and low soil strength. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Roads and streets can be built if they are designed to compensate for the instability of the subsoil and if a maximum amount of base rock is used. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This unit is in capability subclass IIw.

32—Coburg-Urban land complex. This map unit is on low stream terraces. Slope is 0 to 3 percent. Areas are irregular in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, Oregon white oak, and poison-oak. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 45 percent relatively undisturbed Coburg silty clay loam, 10 percent disturbed Coburg silty clay loam, and 30 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Conser, Malabon, Oxley, and Salem soils. Included areas make up about 15 percent of the total acreage.

The relatively undisturbed Coburg soil is deep and moderately well drained. It formed in silty and clayey mixed alluvium. Typically, the surface layer is very dark grayish brown silty clay loam about 18 inches thick. The subsoil is dark brown, mottled silty clay loam and silty clay about 35 inches thick. The substratum to a depth of 65 inches or more is dark brown, mottled fine sandy loam.

Permeability of this Coburg soil is moderately slow. Available water capacity is about 10 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is more than 60 inches. Runoff is slow, and the hazard of water erosion is slight. A high water table is at a depth of 1.5 to 2.5 feet from November to May.

The disturbed Coburg soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Coburg, Malabon, Salem, Conser, and Oxley soils that have been cut or graded. The characteristics of the disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards, parks, and open areas around and between buildings.

If this unit is used for urban development, the main limitations are the seasonal high water table, moderately slow permeability, and low soil strength. If buildings are constructed on the unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Roads and streets can be built if they are designed to compensate for the instability of the subsoil and if a maximum of base rock is used. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is not assigned a capability classification.

33—Conser silty clay loam. This deep, poorly drained soil is in depressional areas along drainageways. It formed in silty and clayey mixed alluvium. Slopes are 0 to 2 percent. Areas are irregular in shape and are 5 to 100 acres in size. The vegetation in areas not cultivated is mainly Oregon ash, Oregon white oak, hawthorn, rose, sedges, rushes, and grasses. Elevation is 300 to 500 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay loam about 9 inches thick. The upper 5 inches of the subsoil is very dark grayish brown silty clay, and the lower 27 inches is very dark gray and brown, mottled clay and silty clay. The substratum to a depth of 60 inches or more is dark grayish brown, mottled loam and sandy loam. In some areas coarse sand and gravel are below a depth of 40 inches.

Included in this unit are small areas of Awbrig, Bashaw, and Coburg soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Conser soil is slow. Available water capacity is about 9 to 12 inches. Water supplying capacity is 15 to 20 inches. Effective rooting depth is limited by a high water table that is at a depth of 0 to 1.5 feet from November to May. Runoff is slow, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

This unit is used mainly for hay, pasture, and grass seed. Where drainage is provided, it is also used for corn and other cultivated crops.

This unit is suited to water-tolerant or shallow-rooted crops. Deep-rooted crops are suited to areas where an adequate drainage system has been installed. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Crops respond to nitrogen and phosphorus.

Grazing when this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff. A tillage pan forms easily if the soil is tilled when wet. Chiseling or subsoiling can be used to break up the tillage pan.

If this unit is used for recreational development, the main limitations are wetness, slow permeability, and the content of clay in the surface layer and subsoil.

If this unit is used for homesite development, the main limitations are slow permeability, wetness, the content of clay in the surface layer and subsoil, high shrink-swell potential, and low soil strength when wet. Perimeter drains and properly designed footings and foundations help to reduce wetness and prevent structural damage from shrinking and swelling. Roads for year-round use need heavy base rock. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is in capability subclass IIIw.

34—Courtney gravelly silty clay loam. This deep, poorly drained soil is in drainageways and other depressional areas of valley terraces. It formed in gravelly and clayey mixed alluvium. Slopes are 0 to 3 percent. Areas are elongated or irregular in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly grasses, sedges, rose, hawthorn, and Oregon ash. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown gravelly silty clay loam about 15 inches thick. The upper part of the subsoil is dark grayish brown gravelly clay about 13 inches thick, and the lower part is brown very gravelly clay loam about 13 inches thick. The substratum to a depth of 60 inches or more is multicolored very gravelly sand.

Included in this unit are small areas of Awbrig, Bashaw, Natroy, and Oxley soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Courtney soil is very slow. Available water capacity is about 5.0 to 7.5 inches. Water supplying capacity is 12 to 16 inches. Effective rooting depth is limited by a dense clay layer and a high water table that is at a depth of 0 to 1.5 feet from December to May. Runoff is very slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

This unit is used mainly for pasture. Where drained, it is also used for hay, grass seed, and spring grain.

If this unit is used for pasture, the main limitations are wetness and the hazard of compaction. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Tile drainage can be used to lower the water table if a suitable outlet is available. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water.

Grain and grasses on this unit respond to nitrogen, and legumes respond to phosphorus, boron, sulfur, and lime.

If this unit is used for recreational development, the main limitations are the clay content, shrink-swell potential, poor drainage, and the pebbles and cobbles in the surface layer.

This unit is poorly suited to homesite development. The main limitations are poor drainage; the clayey subsoil, which has low strength when wet; and high shrink-swell potential. Using perimeter tile drains and diverting runoff away from buildings help to reduce wetness. Buildings and roads on this unit should be designed to offset the limited ability of the soil to support a load. Roads for year-round use need heavy base rock.

This map unit is in capability subclass IVw.

35D—Cruiser gravelly clay loam, 3 to 25 percent slopes. This deep, well drained soil is on ridgetops in the Cascade Range and on Prairie Mountain in the Coast Range. It formed in colluvium derived from basic igneous rock and volcanic ash. Areas are elongated in shape and are 10 to 75 acres in size. The native vegetation is mainly western hemlock, Douglas-fir, noble fir, Pacific silver fir, tall Oregon-grape, and common beargrass. Elevation is 2,600 to 4,200 feet. The average annual precipitation is 70 to 100 inches, the average annual air temperature is 41 to 45 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface layer is dark reddish brown gravelly clay loam about 15 inches thick. The upper 30 inches of the subsoil is reddish brown, strong brown, and brown gravelly clay loam, and the lower 10 inches is brown gravelly loam. The substratum to a depth of 65 inches is strong brown gravelly loam.

Included in this unit are small areas of Holderman, Hummington, Keel, and Winberry soils and a soil that is similar to this Cruiser soil but is more than 35 percent coarse fragments in the subsoil. Included areas make up about 15 percent of the total acreage.

Permeability of this Cruiser soil is moderate. Available water capacity is about 8 to 10 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 135. The potential production per acre is 8,280 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 72,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Prolonged rainy periods and snow limit use of equipment in winter. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth.

Undesirable plants reduce adequate natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting Douglas-fir, noble fir, western hemlock, and Pacific silver fir seedlings.

If this unit is used for recreational development, the main limitations are slope and small stones. The unit can be used for paths and hiking trails, although the small stones may present some problems for construction.

If this unit is used for homesite development, the main limitations are slope and small stones, which restrict the use of the unit for septic tank absorption fields, dwellings, and roads. Remoteness of areas of this unit and snow cover in winter also limit development.

This map unit is in capability subclass VIe.

35F—Cruiser gravelly clay loam, 25 to 50 percent slopes. This deep, well drained soil is on uplands in the Cascade Range and on Prairie Mountain in the Coast Range. It formed in colluvium weathered from basic igneous rock and volcanic ash. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly western hemlock, Douglas-fir, noble fir, Pacific silver fir, tall Oregon-grape, and common beargrass. Elevation is 2,600 to 4,200 feet. The average annual precipitation is 70 to 100 inches, the average annual air temperature is 41 to 45 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface layer is dark reddish brown gravelly clay loam about 15 inches thick. The upper 30 inches of the subsoil is reddish brown, strong brown, and brown gravelly clay loam, and the lower 10 inches is brown gravelly loam. The substratum to a depth of 65 inches is strong brown gravelly loam.

Included in this unit are small areas of Holderman, Hummington, Keel, and Winberry soils and soils that are similar to this Cruiser soil but have bedrock at a depth of less than 60 inches or have more than 35 percent coarse fragments in the subsoil. Included areas make up about 30 percent of the total acreage.

Permeability of this Cruiser soil is moderate. Available water capacity is about 8 to 10 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir, noble fir, and western hemlock. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 135. The potential production per acre is 8,280 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 72,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. The steepness of slope limits the kinds of equipment that can be used in forest management. Surface methods of harvesting timber can be used, but highlead or other cable logging systems are less damaging to the soil surface. Prolonged rainy periods and winter snow cover limit use of heavy equipment during part of the year. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth.

Undesirable plants limit natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting Douglas-fir, noble fir, western hemlock, and Pacific silver fir seedlings.

This map unit is in capability subclass VIe.

35G—Cruiser gravelly clay loam, 50 to 70 percent slopes. This deep, well drained soil is on uplands in the Cascade Range and on Prairie Mountain in the Coast Range. It formed in colluvium weathered from basic igneous rock and volcanic ash. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly western hemlock, Douglas-fir, noble fir, Pacific silver fir, tall Oregon-grape, and common beargrass. Elevation is 2,600 to 4,200 feet. The average annual precipitation is 70 to 100 inches, the average annual air temperature is 41 to 45 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface layer is dark reddish brown gravelly clay loam about 15 inches thick. The upper 30 inches of the subsoil is reddish brown, strong brown, and brown gravelly clay loam, and the lower 10 inches is brown gravelly loam. The substratum to a depth of 65 inches is strong brown gravelly loam.

Included in this unit are small areas of Holderman, Hummington, Keel, and Winberry soils and soils that are similar to this Cruiser soil but have bedrock at a depth of less than 60 inches or have more than 35 percent coarse fragments in the subsoil. Included areas make up about 30 percent of the total acreage.

Permeability of this Cruiser soil is moderate. Available water capacity is about 8 to 10 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir, noble fir, and western hemlock. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 135. The potential production per acre is 8,280 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 72,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Prolonged rainy periods and winter snow cover also limit use of heavy equipment during part of the year. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth.

Undesirable plants limit natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting Douglas-fir, noble fir, western hemlock, and Pacific silver fir seedlings.

This map unit is in capability subclass VIIe.

36D—Cumley silty clay loam, 2 to 20 percent slopes. This deep, moderately well drained soil is on uplands in the Cascade Range. It formed in colluvium and glacial till material weathered from basic igneous rock. Areas are irregular in shape and are 5 to 100 acres or more in size. The native vegetation is mainly Douglas-fir, western hemlock, western redcedar, salal, western brackenfern, and western swordfern. Elevation is 800 to 2,500 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 46 to 51 degrees F, and the average frost-free period is 140 to 190 days.

Typically, the surface is covered with a layer of twigs, needles, and leaves about 1 inch thick. The surface layer is dark brown silty clay loam about 14 inches thick. The subsoil is brown clay and mottled, dark brown and grayish brown clay about 33 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown clay.

Included in this unit are small areas of Honeygrove, Kinney, McAlpin, Minniece, and Peavine soils. Included areas make up about 20 percent of the total acreage.

Permeability of this Cumley soil is moderately slow. Available water capacity is about 9 to 12 inches. Water supplying capacity is 22 to 26 inches. Effective rooting depth is limited by a high water table that is at a depth of 2 to 3 feet from November to April. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly for timber production. It is also used for pasture and hay, watershed, and small ponds.

If this unit is used for hay and pasture, the main limitations are the seasonal high water table and moderately slow permeability. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. In some years, supplemental irrigation is also needed. Sprinkler irrigation is a suitable method of applying water. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

The draws and drainageways in this unit are suitable for small ponds. Some drainageways are dry late in summer.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 154. The potential production per acre is 9,780 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 90,160 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the saturated subsoil, which limits root growth, and the clayey texture of the soil material, which limits trafficability when the soil is wet.

Because this soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Compaction may cause significant reduction in the productivity of the next generation of trees. Ripping skid trails and landing areas after logging helps to break up the compacted layer.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems. Roads for year-round use need heavy base rock.

Root growth tends to be more horizontal than vertical because of the saturated subsoil. This makes trees highly susceptible to windthrow. Undesirable plants prevent adequate natural or artificial reforestation unless site preparation and maintenance are intensive. Natural stands generally are clumpy. Reforestation can be accomplished by planting Douglas-fir seedlings. Fewer commercial thinnings during the rotation period limit windthrow loss.

If this unit is used for recreational development, the main limitations are the moderately slow permeability, slope, and the seasonal high water table. The more gently sloping areas can be used for camp and picnic areas and playgrounds during the dry months, but the steeper areas are limited to paths and trails.

If this unit is used for homesite development, the main limitations are slope, the seasonal high water table, and the high shrink-swell potential of the clay subsoil. Drainage is needed if roads and building foundations are constructed. Wetness can be reduced by installing drain tile around footings.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems.

The moderately slow permeability and the seasonal high water table increase the possibility of failure of septic tank absorption fields. Interception drains upslope from the absorption fields can be used to lower the water table so that enlarged absorption fields can function properly.

This map unit is in capability subclass VIe.

37C—Cupola cobbly loam, 3 to 12 percent slopes. This deep, well drained soil is on high terraces and foot slopes of the Cascade Range. It formed in glacial outwash and is influenced by volcanic material. Areas are irregular in shape and are 5 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, incense-cedar, red alder, salal, common beargrass, western swordfern, and western brackenfern. Elevation is 1,000 to 2,500 feet. The average annual precipitation is 65 to 85 inches, the average annual air temperature is 46 to 50 degrees F, and the average frost-free period is 120 to 160 days.

Typically, the surface layer is very dark brown and dark brown cobbly loam about 6 inches thick. The subsoil is dark brown very cobbly loam about 26 inches thick. The substratum to a depth of 60 inches is variegated, weakly consolidated very cobbly loam.

Included in this unit are small areas of Haflinger, Jimbo, and Saturn soils and Cupola soils that have slopes of more than 12 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Cupola soil is moderately slow. Available water capacity is about 3 to 4 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 20 to 40 inches. It is limited by the weakly consolidated substratum. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as homesites and for recreation and timber production.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 124. The potential production per acre is 7,260 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 68,580 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Stones on the surface cause breakage of timber and hinder yarding.

Trees on this unit are subject to windthrow because of limited rooting depth. Plant competition and droughtiness caused by coarse fragments in the soil decrease seedling survival. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

This unit generally is suited to recreational development, but some recreational uses are limited by coarse fragments in the surface layer.

If this unit is used for homesite development, the main limitation is the steepness of slope. Cobbles and stones throughout the soil make shallow excavations and landscaping difficult. It is difficult to establish plants in areas that have had the surface layer removed, exposing the cobbly substratum. Mulching and fertilizing cut areas help to establish plants.

This map unit is in capability subclass VIs.

37E—Cupola cobbly loam, 12 to 30 percent slopes. This deep, well drained soil is on high terraces and foot slopes of the Cascade Range. It formed in glacial outwash and is influenced by volcanic material. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, incense-cedar, red alder, salal, common beargrass, western swordfern, and western brackenfern. Elevation is 1,000 to 2,500 feet. The average annual precipitation is 65 to 85 inches, the average annual air temperature is 46 to 50 degrees F, and the average frost-free period is 120 to 160 days.

Typically, the surface layer is very dark brown and dark brown cobbly loam about 6 inches thick. The subsoil is dark brown very cobbly loam about 26 inches thick. The substratum to a depth of 60 inches or more is variegated, weakly consolidated very cobbly loam.

Included in this unit are small areas of Haflinger, Jimbo, Kinney, and Klickitat soils and Cupola soils that have slopes of less than 12 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Cupola soil is moderately slow. Available water capacity is about 3 to 4 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 20 to 40 inches. It is limited by the weakly consolidated substratum. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as homesites and for recreation and timber production.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 124. The potential production per acre is 7,260 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 68,580 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Trees are subject to windthrow because of limited rooting depth. Plant competition and droughtiness caused by coarse fragments in the soil decreases seedling survival. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings. Use of equipment is limited by slope and cobbles on and in the surface layer. Use of water bars on roads and landings and seeding of cuts and fills reduce erosion.

If this unit is used for recreational development, the main limitations are steepness of slope and small stones. The unit is suited to hiking trails and paths.

If this unit is used for homesite development, the main limitations are steepness of slope and cobbles. Cobbles and stones throughout the soil make shallow excavations and landscaping difficult. It is difficult to establish plants in areas that have had the surface layer removed, exposing the cobbly substratum. Mulching and fertilizing cut areas help to establish plants.

This map unit is in capability subclass VIs.

38—Dayton silt loam, clay substratum. This deep, poorly drained soil is in drainageways on broad valley terraces in the Willamette Valley. It formed in stratified, clayey and silty mixed alluvium and lacustrine material. Slope is 0 to 2 percent. Areas are irregular in shape and are 40 to 150 acres in size. The vegetation in areas not cultivated is mainly grasses, wild rose, hawthorn, and Oregon ash. Elevation is 300 to 400 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark gray silt loam about 7 inches thick. The subsurface layer is gray silt loam and silty clay loam about 9 inches thick. The subsoil is gray clay about 29 inches thick. The substratum to a depth of 60 inches or more is grayish brown clay.

Included in this unit are small areas of Awbrig, Bashaw, Conser, Courtney, Holcomb, Linslaw, Natroy, Noti, and Pengra soils. Included areas make up about 20 percent of the total acreage.

Permeability of this Dayton soil is very slow. Available water capacity is about 2 to 5 inches. Water supplying capacity is 14 to 18 inches. Effective rooting depth is limited by a high water table that is 1 foot above the surface to 1.5 feet below the surface from November to May. Runoff is very slow to ponded, and the hazard of water erosion is slight.

This unit is used mainly for ryegrass seed, hay, and pasture. Where drained, it is also used for small grain and corn.

This unit is suited to grass and forage crops. Crops respond to nitrogen and lime. Vehicles with large, low-pressure tires can be used to apply fertilizer early in spring to prevent damaging the crop or compacting the soil.

Grazing when this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Tile drainage can be used to lower the water table if a suitable outlet is available. Lowering the water table improves the productivity of the soil and enables machines to work the soil earlier in spring, thus allowing a wider selection of crops and a longer season of use.

This unit is poorly suited to recreational development. It is limited mainly by wetness and the content of clay in the soil.

This unit is poorly suited to homesite development. The main limitations are wetness, very slow permeability, low soil strength, and high shrink-swell potential in the clay subsoil. Buildings and roads on this unit should be designed to offset the limited ability of the soil to support a load.

This map unit is in capability subclass IVw.

39E—Digger gravelly loam, 10 to 30 percent slopes. This moderately deep, well drained soil is on dissected uplands in the Coast Range. It formed in colluvium and residuum derived from sandstone and siltstone. Areas are elongated in shape and are 5 to 50 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, bigleaf maple, salal, and red huckleberry. Elevation is 200 to 1,800 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and bark about 3 inches thick. The surface layer is dark brown gravelly loam about 4 inches thick. The subsoil is dark yellowish brown and yellowish brown gravelly and very gravelly loam about 33 inches thick. Fractured, weathered sandstone is at 37 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Klickitat soils along dikes, sills, or thin interbedded flows of basalt, Bohannon soils on the more nearly flat slopes, soils that are similar to this Digger soil but are more than 40 inches or less than 20 inches deep to bedrock, and Kilchis soils and Rock outcrop on ridgetops and shoulders along dikes and sills of basalt. Also included are small areas of Blachly, Peavine, and Preacher soils in saddles or on remnants of more stable parts of the ridgetops. These areas generally are less than 2 acres in size. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Digger soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 15 to 22 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for wildlife habitat, timber production, and watershed. It is also used for recreation.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,120 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Trees on the top of narrow ridges and peaks generally are much shorter than those on the side slopes, mainly because of tip and branch damage from wind, snow, and ice. Yield is lowest in these areas.

The main concerns in producing and harvesting timber are the areas of Rock outcrop, the stones on the surface and throughout the profile, the hazard of erosion during winter rains, plant competition, and the hazard of windthrow. Surface methods of harvesting timber generally can be used, but their use may be limited when the soil is wet. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment.

Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Windthrow is a hazard when the soil is wet and winds are strong.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Small stones make planting difficult. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting is Douglas-fir, which is most often used.

If this unit is used for recreational development, the main limitations are the areas of Rock outcrop; gravel, cobbles, and stones on the surface and throughout the profile; depth to bedrock; and slope. The remoteness of most of the areas of this unit from populated areas makes economical feasibility a concern.

If this unit is used for homesite development, the main limitations are the areas of Rock outcrop, cobbles and stones on the surface and throughout the profile, and depth to bedrock. In some areas slope can interfere with road location. Cuts needed to provide essentially level building sites can expose bedrock. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed.

This map unit is in capability subclass VIe.

39F—Digger gravelly loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on dissected uplands. It formed in colluvium and residuum weathered from sandstone and siltstone. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, salal, and red huckleberry. Elevation is 200 to 1,800 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, twigs, and bark about 3 inches thick. The surface layer is dark brown gravelly loam about 4 inches thick. The subsoil is dark yellowish brown and yellowish brown gravelly and very gravelly loam about 33 inches thick. Fractured, weathered sandstone is at a depth of 37 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bohannon, Klickitat, Preacher, and Kilchis soils; Rock outcrop; and a soil that is similar to this Digger soil but has bedrock at a depth of less than 20 inches or more than 40 inches. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Digger soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 14 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for wildlife habitat, timber production, and watershed. It is also used for recreation.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,120 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Some areas of this unit in the southern part of the survey area on the eastern side of the Coast Range have site indexes below that given. This may be the result of a rain shadow effect draining or diverting precipitation from the west by higher ridges in the Coast Range.

The main concerns in producing and harvesting timber are slope, stones on the surface, the hazard of erosion in disturbed areas, plant competition, and the hazard of windthrow. On south-facing side slopes, droughtiness limits reforestation.

Surface methods of harvesting timber are difficult to use because of slope. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. The steepness of slope limits the kinds of equipment that can be used in forest management. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment.

Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Windthrow is a hazard when the soil is wet and the winds are strong.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Small stones make planting difficult. In areas on south-facing side slopes that are droughty in summer, seedling survival can be improved by providing shade for seedlings. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting is Douglas-fir, which is most often used.

This unit is poorly suited to recreational development. It is limited mainly by slope, areas of Rock outcrop, and rock fragments on the surface that make hiking difficult in some areas. Depth to bedrock limits leveling of areas for development.

This unit is poorly suited to homesite development. The main limitations are slope, areas of Rock outcrop, depth to bedrock, rock fragments, the hazard of erosion, and the risk of slumping along roads and around construction sites. Cuts needed to provide essentially level building sites expose bedrock. The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems.

This map unit is in capability subclass VIe.

40H—Digger-Rock outcrop complex, 50 to 85 percent slopes. This map unit is on dissected uplands. Areas are irregular in shape and are 5 to 300 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, salal, and red huckleberry. Elevation is 200 to 1,800 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 160 to 200 days.

This unit is 65 percent Digger gravelly loam and 15 percent Rock outcrop. Some areas south of the Siuslaw River are as much as 20 percent Rock outcrop, and other areas in the Lake Creek area are only 5 to 10 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bohannon soils, commonly on north-facing side slopes; Preacher soils on toe slopes; and soils that are similar to this Digger soil but are more than 40 inches deep to bedrock or less than 20 inches deep to bedrock. Included soils make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Digger soil is moderately deep and well drained. It formed in colluvium and residuum derived from sandstone and siltstone. Typically, the surface is covered with a mat of needles, leaves, twigs, and bark about 3 inches thick. The surface layer is dark brown gravelly loam about 4 inches thick. The subsoil is dark yellowish brown and yellowish brown gravelly and very gravelly loam about 33 inches thick. Fractured, weathered sandstone is at 37 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Digger soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 13 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of exposures of hard sandstone. It commonly occurs as short, nearly vertical escarpments.

This unit is used for wildlife habitat, timber production, and watershed.

The Digger soil is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,120 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. The production given above can be reduced by about 20 percent to allow for the nonproductive areas of Rock outcrop and the shallow included soils.

The main concerns in producing and harvesting timber are poor accessibility because of the steepness of slope; the high hazards of erosion and slumping in disturbed areas; the difficulty of reestablishing the stands of timber, especially on south-facing side slopes; and the hazard of windthrow.

The steepness of slope limits the kinds of equipment that can be used in forest management. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment.

Windthrow is a hazard when the soil is wet and winds are strong.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Small stones make planting difficult. In areas on south-facing side slopes that are droughty in summer, seedling survival can be improved by providing shade for seedlings. Hand planting of nursery stock is usually necessary to establish or improve a stand. Douglas-fir is suitable for planting.

This map unit is in capability subclass VIIe.

41C—Dixonville silty clay loam, 3 to 12 percent slopes. This moderately deep, well drained soil is on low foothills bordering uplands in the Cascade and Coast Ranges. It formed in colluvium and residuum derived from basaltic rock. Areas are irregular in shape and are 4 to 100 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, poison-oak, bigleaf maple, western brackenfern, snowberry, hazelnut, wild rose, and grasses. Elevation is 350 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 49 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay loam about 14 inches thick. The subsoil is dark brown silty clay and cobbly clay about 12 inches thick. Weathered bedrock is at a depth 26 inches. Depth to weathered bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine, Hazelair, Nekia, Philomath, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Dixonville soil is slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for small grain, grass seed, hay, and pasture. It is also used for orchards and timber production and as homesites.

If this unit is used for hay and pasture, the main limitations are droughtiness in summer and wetness in winter and spring. When the soil is wet, the clayey surface layer is subject to compaction from livestock or equipment traffic.

Use of lime and nitrogen fertilizer promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to small grain and row crops. In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

Erosion on this unit can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 120. The potential production per acre is 6,900 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 63,900 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

The main concerns in producing and harvesting timber are the clayey soil, which has high shrink-swell potential and low strength; wetness in winter and spring; and droughtiness in summer, which increases seedling mortality. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth.

Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir and ponderosa pine.

If this unit is used for recreational development, the main limitations are the clayey soil, slow permeability, depth to rock, and slope. These limitations are most restricting for campgrounds and playgrounds for year-round use; they are only slightly restricting for picnic areas and paths and trails for use in summer. Drainage should be provided for paths and trails. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

If this unit is used for homesite development, the main limitations are high shrink-swell potential, depth to rock, slow permeability, droughtiness, slope, and the hazard of erosion. If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Cuts needed to provide essentially level building sites can expose bedrock. Roads for year-round use need heavy base rock.

Erosion is a hazard in the steeper areas of this unit. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion.

This map unit is in capability subclass IIIe.

41E—Dixonville silty clay loam, 12 to 30 percent slopes. This moderately deep, well drained soil is on low foothills bordering the mountainous uplands in the Cascade and Coast Ranges. It formed in colluvium and residuum weathered from basaltic rock. Areas are irregular in shape and are 4 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, poison-oak, bigleaf maple, western brackenfern, snowberry, hazelnut, wild rose, and grasses. Elevation is 350 to 1,800 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is 49 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay loam about 14 inches thick. The subsoil is dark brown silty clay and cobbly clay about 12 inches thick. Weathered bedrock is at a depth of 26 inches. Depth to weathered bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine, Hazelair, Nekia, Philomath, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Dixonville soil is slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for hay and pasture, small grain, grass seed, timber production, and homesites. This unit is dryfarmed because of slope and a limited supply of irrigation water.

If this unit is used for hay and pasture, the main limitations are slope and droughtiness. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion and compaction. Fertilizer is needed for optimum growth of grasses and legumes.

This unit is suited to cultivated crops. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

Practices that can be used to control erosion include seeding early in fall; using minimum tillage or stubble-mulch tillage; constructing terraces, diversions, and grassed waterways; and growing a winter cover crop.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 120. The potential production per acre is 6,900 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 63,900 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Because the soil is droughty in summer, seedling mortality may be high.

If site preparation is not adequate, competition from undesirable plants can prevent natural or artificial reestablishment of trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir and ponderosa pine.

If this unit is used for recreational development, the main limitations are slope, clayey texture, slow permeability, and depth to bedrock. Steepness of slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitations are the slowly permeable subsoil, depth to bedrock, slope, shrink-swell potential, and low soil strength. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Support and stability for buildings can be provided by placing footings below a depth of 36 inches.

Erosion is a hazard on this unit. Only the part of the site that is used for construction should be disturbed. The deep cuts needed to provide essentially level building sites can expose bedrock.

This map unit is in capability subclass IVe.

41F—Dixonville silty clay loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on low foothills bordering the uplands in the Cascade and Coast Ranges. It formed in colluvium and residuum weathered from basaltic rock. Areas are irregular in shape and are 40 to 100 acres in size. The native vegetation is mainly Douglas-fir, Oregon white oak, poison-oak, bigleaf maple, western brackenfern, snowberry, hazelnut, wild rose, and grasses. Elevation is 350 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 49 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay loam about 14 inches thick. The subsoil is dark brown silty clay and cobbly clay about 12 inches thick. Weathered bedrock is at a depth of 26 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Nekia, Philomath, Ritner, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Dixonville soil is slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for pasture, timber production, and wildlife habitat.

The production of forage is limited by the density of the tree canopy and by the droughtiness of the soil during the growing season in summer.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing should be delayed until the soil in this unit is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 120. The potential production per acre is 6,900 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 63,900 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

The main limitations for producing and harvesting timber are steepness of slope; the clayey texture of the soil, which is subject to compaction when moist; plant competition; and seedling mortality. Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems.

The steepness of slope limits the kinds of equipment that can be used in forest management. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Because the soil is droughty in summer, seedling mortality is high in some areas. Shading new seedlings on south-facing side slopes aids survival of seedlings. If site preparation is not adequate, competition from undesirable plants can prevent natural or artificial reestablishment of trees. Reforestation can be accomplished by planting Douglas-fir or ponderosa pine seedlings.

If this unit is used for homesite and recreational development, the main limitations are slope, depth to rock, slow permeability, the hazard of erosion, instability of cutbanks, and shrink-swell potential. Because of the slope, recreational use is limited mainly to a few paths and trails, which should extend across the slope. Access roads should also extend across the slope.

The deep cuts needed to provide essentially level building sites can expose bedrock. Only the part of the site that is used for construction should be disturbed. Access roads should be designed to control surface runoff and help stabilize cut slopes.

This map is in capability subclass VIe.

42E—Dixonville-Hazelair-Urban land complex, 12 to 35 percent slopes. This map unit is mainly on sloping or rolling foothills. It is also on the shorter, steeper slopes and on the more nearly level benches. Areas are irregular in shape and are 4 to 100 acres in size. The native vegetation is mainly Douglas-fir, Oregon white oak, poison-oak, bigleaf maple, western brackenfern, snowberry, hazelnut, wild rose, and grasses. Elevation is 400 to 1,200 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 35 percent relatively undisturbed Dixonville silty clay loam, 25 percent relatively undisturbed Hazelair silty clay loam, and 25 percent Urban land. The Dixonville soil is on convex side slopes of the low foothills, the Hazelair soil is in concave areas and drainageways, and Urban land is in areas throughout the landscape. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Philomath, Ritner, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Dixonville soil is moderately deep and well drained. It formed in colluvium and residuum derived from basaltic rock. Typically, the surface layer is very dark brown silty clay loam about 14 inches thick. The subsoil is dark brown silty clay and cobbly clay about 12 inches thick. Weathered bedrock is at a depth of 26 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Dixonville soil is slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Hazelair soil is moderately deep and moderately well drained. It formed in colluvium overlying sedimentary rock. Typically, the surface layer is very dark brown silty clay loam about 11 inches thick. The subsoil is dark brown silty clay about 4 inches thick. The substratum is dark brown and light olive brown clay about 21 inches thick. Weathered bedrock is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Hazelair soil is very slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is limited by a high water table that is at a depth of 1 foot to 2 feet from December to April. Runoff is rapid, and the hazard of water erosion is high.

The included areas of disturbed Dixonville and Hazelair soils have been covered by as much as 40 inches of fill material or have had as much as 30 inches of the original profile removed by cutting and grading. The fill material is commonly from adjacent areas of Dixonville, Hazelair, and Philomath soils that have been cut or graded. The disturbed areas have highly variable characteristics.

Urban land consists of areas that are covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development and as homesites. It is also used for yards and as open areas around and between buildings.

The Dixonville soil is suited to urban development. Drainage is needed if roads and building foundations are constructed. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Support and stability for buildings can be provided by placing footings below a depth of 36 inches. The deep cuts needed to provide essentially level building sites can expose bedrock.

Erosion is a hazard in the steeper areas of this soil. Only the part of the site that is used for construction should be disturbed. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

If the Hazelair soil is used for urban development, the main limitations are the depth to bedrock, high shrink-swell potential, the highly plastic clay substratum, an accumulation of excess water from winter rains, the hazard of erosion, and instability of cuts and fills. Cutbanks are not stable and are subject to slumping.

Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade. Wetness can be reduced by installing drain tile around footings.

The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Support and stability for buildings can be provided by placing footings below the clay layer. Roads and streets can be maintained if they are designed to compensate for the instability of the clay substratum.

Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. Plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

If this unit is used for recreational development, the main limitations are slope, the clay substratum, and wetness because of slow permeability. Maintaining plant cover helps to control erosion.

This map unit is not assigned a capability classification.

43C—Dixonville-Philomath-Hazelair complex, 3 to 12 percent slopes. This map unit is on rolling foothills and toe slopes. Areas are irregular in shape and are 5 to 200 acres in size. The vegetation in areas not cultivated is mainly scattered, clumpy stands of Oregon white oak, Douglas-fir, and ponderosa pine interspersed with open grassy and brushy areas. Elevation is 300 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 30 percent Dixonville silty clay loam, 30 percent Philomath cobbly silty clay, and 25 percent Hazelair silty clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Panther, Ritner, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

The Dixonville soil is moderately deep and well drained. It formed in colluvium and residuum derived from basaltic rock. Typically, the surface layer is very dark brown silty clay loam about 14 inches thick. The subsoil is dark brown silty clay and cobbly clay about 12 inches thick. Weathered bedrock is at a depth of 26 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Dixonville soil is slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Philomath soil is shallow and well drained. It formed in colluvium and residuum derived dominantly from basic igneous rock. Typically, the surface layer is very dark brown cobbly silty clay about 6 inches thick. The subsoil is very dark brown cobbly silty clay about 8 inches thick. Weathered bedrock is at a depth of 14 inches. Depth to bedrock ranges from 12 to 20 inches.

Permeability of the Philomath soil is slow. Available water capacity is about 2 to 3 inches. Water supplying capacity is 13 to 15 inches. Effective rooting depth is 12 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Hazelair soil is moderately deep and moderately well drained. It formed in colluvium overlying sedimentary rock. Typically, the surface layer is very dark brown silty clay loam about 11 inches thick. The subsoil is dark brown silty clay about 4 inches thick. The substratum is dark brown and light olive brown clay about 21 inches thick. Weathered bedrock is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Hazelair soil is very slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is limited by a high water table that is at a depth of 1 foot to 2 feet from December to April. Runoff is moderate to rapid, and the hazard of water erosion is high.

This unit is used mainly for hay and pasture and as homesites. It is also used for recreation and wildlife habitat.

If this unit is used for hay and pasture, the main limitations are the clayey texture of the soils, droughtiness, depth to rock, and a very limited supply of irrigation water.

Grazing when the soils in this unit are wet results in compaction of the surface layer, poor tilth, and excessive runoff. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soils from erosion and compaction. The use of equipment is limited by cobbles on the surface and by slope.

In most years, supplemental irrigation is needed. Irrigation water can be applied by the sprinkler method. Use of nitrogen and phosphate fertilizer promotes good growth of forage plants.

If this unit is used for recreational development, the main limitations are the susceptibility of the soils to compaction when wet, the sticky surface layer, the susceptibility of the soils to seepage, slope, and depth to rock.

If this unit is used for homesite development, the main limitations are depth to bedrock, wetness, and shrink-swell potential. The Hazelair soil is subject to severe slumping when cutbanks are exposed. Cutbanks in this soil need to be reinforced by providing retaining walls with proper drainage to prevent slumping when the soil is wet.

The deep cuts needed to provide essentially level building sites on this unit can expose bedrock. Wetness can be reduced by installing drain tile around footings.

Excavation for roads and buildings increases the risk of erosion. It is further increased if the soils are left exposed during site development. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed by cutting and filling.

The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Support and stability for buildings can be provided by placing footings on bedrock.

Plans for homesite development should provide for the preservation of as many trees as possible. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Selection of adapted vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens.

This map unit is in capability subclass VIe.

43E—Dixonville-Philomath-Hazelair complex, 12 to 35 percent slopes. This map unit is on rolling foothills and toe slopes. Slopes generally are convex, but swales and drainageways are in some places. Areas are irregular in shape and are 10 to 200 acres in size. The vegetation in areas not cultivated is mainly scattered, clumpy stands of Oregon white oak, Douglas-fir, and ponderosa pine interspersed with open grassy and brushy areas. Elevation is 400 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 35 percent Dixonville silty clay loam, 30 percent Philomath cobbly silty clay, and 20 percent Hazelair silty clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Ritner and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

The Dixonville soil is moderately deep and well drained. It formed in colluvium and residuum derived from basaltic rock. Typically, the surface layer is very dark brown silty clay loam about 14 inches thick. The subsoil is dark brown silty clay and cobbly clay about 12 inches thick. Weathered bedrock is at a depth of 26 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Dixonville soil is slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of erosion is high.

The Philomath soil is shallow and well drained. It formed in colluvium and residuum derived dominantly from basic igneous rock. Typically, the surface layer is very dark brown cobbly silty clay about 6 inches thick. The subsoil is very dark brown cobbly silty clay and clay about 8 inches thick. Weathered bedrock is at a depth of 14 inches. Depth to bedrock ranges from 12 to 20 inches.

Permeability of the Philomath soil is slow. Available water capacity is about 2 to 3 inches. Water supplying capacity is 13 to 15 inches. Effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Hazelair soil is moderately deep and moderately well drained. It formed in colluvium overlying sedimentary rock. Typically, the surface layer is very dark brown silty clay loam about 11 inches thick. The subsoil is dark brown silty clay about 4 inches thick. The substratum is dark brown and light olive brown clay about 21 inches thick. Weathered bedrock is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Hazelair soil is very slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is limited by a high water table that is at a depth of 1 foot to 2 feet from December to April. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as pasture and homesites. It is also used for wildlife habitat.

If this unit is used for pasture, the main limitations are slope, the clayey texture of the soils, depth to rock, droughtiness, and cobbles on the surface, which limit the use of equipment. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion and compaction.

If this unit is used for recreational development, the main limitations are slope, the susceptibility of the soils to compaction when wet, the sticky surface layer, and depth to rock.

If this unit is used for homesite development, the main limitations are slope, depth to rock, and shrink-swell potential. The Hazelair soil is subject to severe slumping when cutbanks are exposed. Cutbanks on this soil need to be reinforced by providing retaining walls with proper drainage to prevent them from slumping when the soil is wet. Wetness of the unit can be reduced by installing drain tile around footings.

Support and stability for buildings can be provided by placing footings on bedrock. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Excavation for roads and buildings increases the risk of erosion. It is also increased if the soils are left exposed during site development. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed by cutting and filling.

Plans for homesite development should provide for the preservation of as many trees as possible. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Selection of adapted vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens.

This map unit is in capability subclass VIe.

44—Dune land. This map unit is on large, deep, excessively drained, active dunes along the coast. The areas of Dune land formed in wind-deposited sand. The sand particles are drifted and piled up by the action of wind. Slopes are gently sloping to steeply undulating and are constantly changing as the dunes shift. Areas are elongated to irregular in shape and are 3 acres to several hundred acres in size. The native vegetation is mainly a few scattered clumps of beachgrass and forbs. Elevation is 10 to 150 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 200 to 250 days.

Typically, this unit consists of variegated, but dominantly light gray, fine sand many feet thick.

Included in this unit are small areas of Waldport, Yaquina, and Heceta soils. Included areas make up about 5 percent of the total acreage.

Permeability is very rapid. Available water capacity is about 2 to 4 inches. Water supplying capacity is about 16 to 20 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for wildlife habitat, recreation, and watershed.

The unstable, drifting sand limits the use of this unit to hiking and picnicking in undeveloped recreational areas. The unit is suited to use by vehicles that have large inflated tires. Beachgrass has been planted in some areas near roads and buildings to reduce drifting. Stabilized areas may become suitable building sites.

This map unit is in capability subclass VIIIe.

45C—Dupee silt loam, 3 to 20 percent slopes. This deep, somewhat poorly drained soil is in drainageways and other depressional areas and on alluvial fans of foothills. It formed in colluvium derived from sandstone. Areas are irregular in shape. They commonly occur as narrow stringers along drainageways and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon ash, Oregon white oak, poison-oak, wild rose, grasses, and sedges. Elevation is 300 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silt loam about 12 inches thick. The subsoil is dark brown and brown, mottled silty clay loam, silty clay, and clay loam about 39 inches thick. The substratum is variegated clay loam about 4 inches. Weathered bedrock is at a depth of 55 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bellpine, Hazelair, Panther, and Willakenzie soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Dupee soil is moderately slow. Available water capacity is about 8 to 14 inches. Water supplying capacity is 24 to 28 inches. Effective rooting depth is limited by a high water table that is at a depth of 2 to 3 feet from December to March. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used mainly for hay and pasture, small grain, and orchards. It is also used for recreation, wildlife habitat, and Christmas trees.

Where drained, this unit is suited to cultivated crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Tile drainage can be used to lower the water table if a suitable outlet is available.

Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit is suited to hay and pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

If this unit is used for recreational development, the main limitations are wetness, slope, and the content of clay.

If this unit is used for homesite development, the main limitations are the seasonal high water table, low soil strength, and slope. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Drainage is needed for roads and building foundations.

Moderately slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. Interceptor drains upslope from absorption lines may lower the water table enough to allow absorption fields to function.

This map unit is in capability subclass IIIe.

46—Eilertsen silt loam. This deep, well drained soil is on stream terraces and fans. It formed in mixed alluvium. Slope is 0 to 3 percent. Areas are elongated or irregular in shape and are 2 to 70 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, western redcedar, red alder, shrubs, and grasses. Elevation is 20 to 800 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 140 to 200 days.

Typically, the surface layer is dark brown silt loam about 11 inches thick. The upper 13 inches of the subsoil is dark brown silt loam, and the lower 36 inches is dark yellowish brown and yellowish brown silty clay loam. The substratum to a depth of 72 inches is mottled, yellowish brown silt loam.

Included in this unit are small areas of Blachly, Meda, Nehalem, Nestucca, and Preacher soils and Eilertsen soils that have slopes of as much as 12 percent and are on short, narrow terrace fronts. Included areas make up about 15 percent of the total acreage.

Permeability of this Eilertsen soil is moderate. Available water capacity is about 11 to 12 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for hay and pasture, timber production, row crops, wildlife habitat, homesites, and recreation.

This unit is suited to hay and pasture. It has few limitations. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. In some years, supplementary irrigation is also needed. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to cool-season row crops. In some years, irrigation is required for maximum production of most crops. Sprinkler irrigation can be used. Applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs to avoid overirrigating and leaching of plant nutrients. A cover crop is needed to control erosion from winter rains.

A tillage pan may form if the soil is tilled when wet. Chiseling or subsoiling can be used to break up the tillage pan. Returning crop residue to the soil helps to maintain tilth. Cool-season crops, vegetables, and berries should be selected for commercial-scale production. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 159. The potential production per acre is 10,140 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 94,400 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are compaction of the surface layer and plant competition. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Excessive soil disturbance should be avoided to prevent silting of nearby streams.

Surface methods of harvesting timber generally are suitable; however, the soil is subject to compaction if it is wet when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up compacted layers and improves seedling survival and growth. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is suited to recreational development. It has few limitations other than susceptibility to compaction from excessive foot or vehicle traffic.

This unit is suited to homesite development. It has few limitations. If buildings are constructed on this unit, properly designing foundations and footings helps to offset its limited ability to support a load. Roads for year-round use need heavy base rock. Selection of climatically adapted plants helps to establish lawns, shrubs, trees, and vegetable gardens.

Septic tank absorption fields are suited to this unit.

This map unit is in capability subclass IIc.

47E—Fendall silt loam, 3 to 30 percent slopes. This moderately deep, well drained soil is on terrace remnants and uplands. It formed in old alluvium, colluvium, and residuum derived from sedimentary rock. Areas are elongated to irregular in shape and are 3 to 50 acres in size. The native vegetation is mainly Douglas-fir, Sitka spruce, western hemlock, western redcedar, Pacific rhododendron, salal, evergreen huckleberry, and western swordfern. Elevation is 50 to 650 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 225 days.

Typically, the surface layer is dark brown silt loam about 12 inches thick. The subsoil is dark yellowish brown and yellowish brown clay loam and clay about 14 inches thick. Weathered bedrock is at a depth of 26 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Astoria, Bohannon, Lint, and Preacher soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Fendall soil is moderately slow. Available water capacity is about 4 to 6 inches. Water supplying capacity is 19 to 22 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for timber production, recreation, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 150. The potential production per acre is 9,480 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 86,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Trees are subject to windthrow because of limited rooting depth. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir, western hemlock, and Sitka spruce seedlings.

If this unit is used for recreational development, the main limitations are slope, moderately slow permeability, and depth to rock. Good drainage should be provided for paths and trails. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

If this unit is used for homesite development, the main limitations are depth to rock, moderately slow permeability, low soil strength, and slope. The deep cuts needed to provide essentially level building sites can expose bedrock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Septic tank absorption fields are severely limited by slope, depth to rock, and moderately slow permeability.

This map unit is in capability subclass VIe.

48—Fluvents, nearly level. These deep, well drained to poorly drained soils are on islands and low flood plains and in overflow channels, oxbows, and sloughs along major rivers and streams. They formed in recently deposited sediment derived from mixed sources. Areas are elongated in shape and are 2 to 200 acres in size. The native vegetation is mainly cottonwood, Douglas-fir, Oregon white oak, Oregon ash, red alder, bigleaf maple, shrubs, and grasses. Elevation is 5 to 1,500 feet. The average annual precipitation is 40 to 90 inches, the average annual air temperature is 47 to 52 degrees F, and the average frost-free period is 150 to 210 days.

Fluvents are brown and dark brown, highly stratified sand, silt, and gravel to a depth of 40 to 60 inches or more. The substratum is loose, open gravel or gravelly loamy sand. Depth to bedrock is 40 to 60 inches or more.

Included in this unit are small areas of Riverwash. In the Willamette Valley are small areas of Camas, Chehalis, Cloquato, McBee, Wapato, Abiqua, McAlpin, and Waldo soils. In the Cascade Range are small areas of Haflinger and Saturn soils. In the Coast Range are small areas of Meda, Nehalem, Nekoma, Nestucca, and Willanch soils.

Permeability of Fluvents is moderate to very rapid. Available water capacity and water supplying capacity are highly variable. Effective rooting depth is 20 to 60 inches or more. Runoff is slow, and the hazard of water erosion is slight except during periods of flooding of adjacent streams. A fluctuating water table rises and falls with stream levels during periods of heavy runoff.

Most areas of this unit are used for wildlife habitat and recreation. A few areas are used for timber production.

This unit supports limited stands of black cottonwood and red alder. The main concerns in producing and harvesting timber are the hazard of flooding and the hazard of water erosion in areas where the protective vegetation has been removed. Among the trees that are suitable for planting are black cottonwood and red alder. Western hemlock, western redcedar, and Douglas-fir can be planted in some areas.

This map unit is in capability subclass VIIw.

49E—Formader loam, 3 to 30 percent slopes. This moderately deep, well drained soil is on uplands in the Coast Range. It formed in colluvium weathered from igneous rock. Areas are irregular or elongated in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, salal, vine maple, red huckleberry, tall Oregon-grape, and western swordfern. Elevation is 400 to 2,400 feet. The average annual precipitation is 80 to 120 inches, the average annual air temperature is 49 to 51 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface is covered with a mat of leaves, roots, twigs, and needles about 0.5 inch thick. The surface layer is very dark brown and dark brown loam about 18 inches thick. The subsoil is brown silty clay loam and gravelly silty clay loam about 15 inches thick. Weathered bedrock is at a depth of 33 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Astoria, Bohannon, Blachly, Hembre, Kilchis, Klickitat, Neskowin, and Salander soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Formader soil is moderate. Available water capacity is about 7 to 11 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index

for Douglas-fir is 162. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Trees are subject to windthrow because of limited rooting depth. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir or western hemlock seedlings.

If this unit is used for recreational development, the main limitations are slope and depth to rock. Paths and trails should extend across the slope. Depth to rock limits installation of septic tank absorption fields for campgrounds in most areas.

If this unit is used for homesite development, the main limitations are depth to rock, slope, and low soil strength. Preserving the existing plant cover during construction helps to control erosion. Buildings and roads should be designed to offset the limited ability of the soil to support a load. The deep cuts needed to provide essentially level building sites can expose bedrock.

This map unit is in capability subclass VIe.

49G—Formader loam, 30 to 60 percent slopes. This moderately deep, well drained soil is on uplands in the Coast Range. It formed in colluvium derived from igneous rock. Areas are irregular in shape and are 10 to 300 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, salal, vine maple, red huckleberry, tall Oregon-grape, and western swordfern. Elevation is 400 to 2,400 feet. The average annual precipitation is 80 to 120 inches, the average annual air temperature is 49 to 51 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface is covered with a mat of leaves, roots, twigs, and needles about 0.5 inch thick. The surface layer is very dark brown and dark brown loam about 18 inches thick. The subsoil is brown silty clay loam and gravelly silty clay loam about 15 inches thick. Weathered bedrock is at a depth of 33 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Astoria, Bohannon, Blachly, Kilchis, Klickitat, Neskowin, and Salander soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Formader soil is moderate. Available water capacity is about 7 to 11 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is l62. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. The soil may be compacted if it is moist when heavy equipment is used. Trees are subject to windthrow because of limited rooting depth. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir or western hemlock seedlings.

If this unit is used for recreational development, the main limitation is slope. Paths and trails should extend across the slope.

If this unit is used for homesite development, the main limitations are slope and depth to rock. The deep cuts needed to provide essentially level building sites and roads can expose bedrock.

This map unit is in capability subclass VIe.

50G—Formader-Hembre-Klickitat complex, 50 to 80 percent slopes. This map unit is on uplands in the Coast Range. Areas are irregular in shape and are 10 to 700 acres or more in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, vine maple, salal, western swordfern, and salmonberry. Elevation is 400 to 2,500 feet. The average annual precipitation is 80 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 155 to 200 days.

This unit is 35 percent Formader loam, 30 percent Hembre silt loam, and 20 percent Klickitat stony loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Astoria Variant, Bohannon, Kilchis, Preacher, and Slickrock soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Formader soil is moderately deep and well drained. It formed in colluvium derived from igneous rock. Typically, the surface is covered with a mat of leaves, roots, twigs, and needles about 0.5 inch thick. The surface layer is very dark brown and dark brown loam about 18 inches thick. The subsoil is brown silty clay loam and gravelly silty clay loam about 15 inches thick. Weathered bedrock is at a depth of 33 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Formader soil is moderate. Available water capacity is about 7 to 11 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Hembre soil is deep and well drained. It formed in colluvium and residuum derived from igneous rock. Typically, the surface is covered with a mat of leaves, needles, roots, and twigs about 4 inches thick. The surface layer is very dark brown silt loam about 12 inches thick. The subsoil is dark reddish brown and dark brown silty clay loam about 32 inches thick. Fractured basalt is at a depth of 44 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Hembre soil is moderate. Available water capacity is about 7 to 10 inches. Water supplying capacity is 22 to 24 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Klickitat soil is deep and well drained. It formed in colluvium and residuum derived from igneous rock. Typically, the surface is covered with a mat of leaves, needles, and twigs about 1.5 inches thick. The surface layer is dark brown stony loam about 13 inches thick. The subsoil is dark brown very cobbly clay loam about 26 inches thick. The substratum, to a depth of 50 inches, is dark brown extremely cobbly loam. Fractured basalt is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Klickitat soil is moderate. Available water capacity is about 2 to 5 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 162 on the Formader soil. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

On the basis of a 100-year site curve, the mean site index for Douglas-fir is 170 on the Hembre soil. The potential production per acre is 10,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 102,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on the Klickitat soil. The potential production per acre is 9,000 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 81,120 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are steepness of slope, the hazard of erosion, seedling mortality, and plant competition. The steepness of slope limits the kinds of equipment that can be used in forest management. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface.

Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Douglas-fir and western hemlock. Seedling mortality may be high in summer on south-facing slopes because of droughtiness. Seedling mortality can be reduced by providing shade for seedlings.

This unit is poorly suited to recreational development. Slope limits the use of areas of the unit mainly to a few paths and trails, which should extend across the slope.

This map unit is in capability subclass VIIe.

51B—Haflinger-Jimbo complex, 0 to 5 percent slopes. This map unit is on low stream terraces of the upper river valleys in the Cascade Range. Areas are elongated in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, incense-cedar, Oregon-grape, salal, and western swordfern. Elevation is 900 to 1,500 feet. The average annual precipitation is 65 to 75 inches, the average annual air temperature is 48 to 50 degrees F, and the average frost-free period is 130 to 180 days.

This unit is 50 percent Haflinger cobbly loam and 35 percent Jimbo fine sandy loam. The Haflinger soil has slopes of 0 to 5 percent and is in the lower lying areas on the landscape. The Jimbo soil has slopes of 3 percent or less and is in the higher lying areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cupola soils, Fluvents, and Riverwash. Included areas make up about 15 percent of the total acreage.

The Haflinger soil is deep and excessively drained. It formed in coarse textured recent alluvium. Typically, the surface layer is very dark brown and dark brown cobbly loam about 17 inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown very cobbly loamy sand over extremely cobbly sand.

Permeability of the Haflinger soil is rapid. Available water capacity is about 2 to 3 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 20 to 40 inches; it is limited by the very cobbly and extremely cobbly substratum. Runoff is slow, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

The Jimbo soil is deep and well drained. It formed in ash and mixed alluvium. Typically, the surface layer is very dark brown and dark brown fine sandy loam about 14 inches thick. The subsoil is dark yellowish brown loam about 29 inches thick. The substratum to a depth of 60 inches or more is multicolored very cobbly sand. The content of gravel in the surface layer and subsoil is as much as 15 percent, and the content increases with depth.

Permeability of the Jimbo soil is moderately rapid. Available water capacity is about 8 to 12 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 40 to 60 inches or more. It is limited by the very cobbly and extremely cobbly substratum. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for timber production. It is also used for recreation and as homesites.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 147 on the Haflinger soil. The potential production per acre is 9,240 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 83,920 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years.

On the basis of a 100-year site curve, the mean site index for Douglas-fir is 162 on the Jimbo soil. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the susceptibility of the soil to compaction on the Jimbo soil, seedling mortality and the hazard of windthrow on the Haflinger soil, and plant competition on both soils.

Using standard wheeled and tracked equipment when the soil is moist causes rutting and compaction on the Jimbo soil. Seedling mortality is a concern on the Haflinger soil because of the low available water capacity, and the hazard of windthrow is a concern because of the restricted rooting depth.

Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is suited to recreational development. The main limitations are the cobbles in the surface layer and the rapidly permeable substratum of the Haflinger soil. The rapid permeability of the substratum creates a hazard of pollution.

If this unit is used as homesites, the main limitations are the hazard of flooding and the hazard of contamination of ground water by effluent from septic tank absorption fields. Streambank erosion commonly undercuts trees, causing them to fall into streams. This creates a hazard of flooding as a result of temporary stream blockage. Removal of pebbles and cobbles in disturbed areas is necessary for best results when landscaping, particularly in areas used for lawns.

If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from septic tank absorption fields.

This map unit is in capability subclass VIs.

52B—Hazelair silty clay loam, 2 to 7 percent slopes. This moderately deep, moderately well drained soil is on convex foot slopes of the Coast and Cascade Ranges. It formed in colluvium overlying sedimentary rock. Areas are irregular in shape and are 5 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Oregon white oak, poison-oak, Douglas-fir, ponderosa pine, Oregon ash, wild rose, and grasses. Elevation is 300 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay loam about 11 inches thick. The subsoil is dark brown silty clay about 4 inches thick. The substratum is dark brown and light olive brown, mottled clay about 21 inches thick. Weathered bedrock is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Dixonville, Dupee, Panther, and Philomath soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Hazelair soil is very slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is limited by a high water table that is at a depth of 1 foot to 2 feet from December to April. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for hay, pasture, small grain, and blackberries. Some areas are used as homesites.

If this unit is used for hay and pasture, the main limitations are the clayey surface layer, the seasonal high water table, very slow permeability, and restricted rooting depth. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from compaction and erosion. Fertilizer is needed to ensure optimum growth of grasses and legumes. In most years, supplemental irrigation is also needed.

If this unit is used for cultivated crops, the main limitations are the clayey surface layer, wetness, and restricted rooting depth. The water table that builds up during the rainy period generally limits the suitability of this unit for deep-rooted crops. Tile systems are not efficient in lowering the water table because of the shallow depth to the claypan. Tile systems can be improved by installing them across the slope, which more efficiently intercepts water moving downslope above the claypan.

In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

If this unit is used for recreational development, the main limitations are wetness and slow permeability. Use is limited to picnic areas, paths, and trails during the dry part of the year. Drainage should be provided for paths and trails.

This unit is poorly suited to homesite development. Drainage is needed if roads and building foundations are constructed. Cutbanks are not stable and are subject to slumping. Reinforced retaining walls with proper drainage are needed to minimize slumping.

If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Support and stability of buildings can be provided by placing footings below the claypan. Roads and streets require the maximum amount of base rock. Access roads should be designed to control surface runoff and help stabilize cut slopes. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected unless drainage and irrigation are provided.

This map unit is in capability subclass IIIe.

52D—Hazelair silty clay loam, 7 to 20 percent slopes. This moderately deep, moderately well drained soil is on foot slopes in the Coast and Cascade Ranges. It formed in colluvium overlying sedimentary rock. Areas are irregular in shape and are 5 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Oregon white oak, poison-oak, Douglas-fir, ponderosa pine, Oregon ash, wild rose, and grasses. Elevation is 300 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay loam about 11 inches thick. The subsoil is dark brown silty clay about 4 inches thick. The substratum is dark brown and light olive brown, mottled clay about 21 inches thick. Weathered bedrock is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Dixonville, Dupee, Panther, and Philomath soils and Hazelair soils that have slopes of more than 20 percent or less than 7 percent. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Hazelair soil is very slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is limited by a high water table that is at a depth of 1 foot to 2 feet from December to April. Runoff is rapid, and the hazard of water erosion is high.

Most areas of this unit are used for hay and pasture.

If this unit is used for hay and pasture, the main limitations are the clayey surface layer, the seasonal high water table, very slow permeability, and restricted rooting depth. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Drainage can be provided by using tile systems to intercept water from higher lying areas. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

Fertilizer is needed to ensure optimum growth of grasses and legumes. In most years, supplemental irrigation is also needed.

If this unit is used for recreational development, the main limitations are slope, wetness, and very slow permeability. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched.

This unit is poorly suited to homesite development. Drainage is needed if roads and building foundations are constructed. Roads for year-round use need heavy base rock. Cutbanks are not stable and are subject to slumping. Reinforced retaining walls with proper drainage are required to minimize slumping.

If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Support and stability for buildings can be provided by placing footings below the clay layer.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control erosion. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate a seasonal high water table and droughtiness should be selected unless drainage and irrigation are provided.

This map unit is in capability subclass IVe.

53—Heceta fine sand. This deep, poorly drained soil is in depressional areas between dunes. It formed in eolian sand derived dominantly from weathered Tyee Sandstone. Slopes are 0 to 2 percent. Areas are elongated in shape and are 5 to 500 acres in size. The native vegetation is mainly sedges, rushes, water-tolerant grasses, willows, and waxmyrtle. Elevation is 0 to 80 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 52 degrees F, and the average frost-free period is 200 to 250 days.

Typically, the surface layer is brown fine sand about 5 inches thick. The substratum to a depth of 60 inches or more is grayish brown, mottled fine sand.

Included in this unit are small areas of Netarts, Waldport, and Yaquina soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Heceta soil is rapid. Available water capacity is 3 to 4 inches. Water supplying capacity is 15 to 18 inches. Effective rooting depth is limited by a high water table that is 1 foot above the surface to 6 inches below the surface from October to May. Runoff is slow to ponded, and the hazard of water erosion is slight. The hazard of soil blowing is high. The soil is subject to rare periods of flooding.

Most areas of this unit are used for wildlife habitat. A few areas are used for pasture and recreation.

If this unit is used for hay and pasture, the main limitations are wetness, the seasonal high water table, and the hazard of soil blowing. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Annual applications of mixed fertilizer are needed to maintain production of high quality pasture. The cool, moist weather in summer inhibits the curing of hay crops.

If this unit is used for recreational development, the main limitations are wetness and the sandy texture of the soil. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic. Only trees, shrubs, and grasses that tolerate wetness should be planted.

This unit generally is not suited to homesite development. The main limitations are wetness, the seasonal high water table, and the hazard of soil blowing. Drainage is needed if roads and building foundations are constructed. It is also needed for best results with most lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

This map unit is capability subclass IVw.

54D—Hembre silt loam, 5 to 25 percent slopes. This deep, well drained soil is on uplands in the Coast Range. It formed in colluvium and residuum derived from igneous rock. Areas are elongated or irregular in shape and are 5 to 50 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, vine maple, salal, western swordfern, and salmonberry. Elevation is 200 to 2,600 feet. The average annual precipitation is 70 to 110 inches, the average annual air temperature is 48 to 51 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, roots, and twigs about 4 inches thick. The surface layer is very dark brown silt loam about 12 inches thick. The subsoil is dark reddish brown and dark brown silty clay loam about 32 inches thick. Fractured basalt is at a depth of 44 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Astoria, Blachly, Formader, and Klickitat soils. Also included are small areas of soils, south and east of Mapleton, that are similar to this Hembre soil but are more than 60 inches deep to granite or quartz-diorite. Included areas make up about 15 percent of the total acreage.

Permeability of this Hembre soil is moderate. Available water capacity is about 7 to 10 inches. Water supplying capacity is 22 to 24 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for timber production. It is also used for pasture, recreation, wildlife habitat, and watershed.

If this unit is used for hay and pasture, the main limitations are the hazard of erosion and prolonged rainy periods. The cool, humid summers inhibit proper curing of hay crops. Grazing when the soil in this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 170. The potential production per acre is 10,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 102,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, susceptibility to compaction, and competition from brush. Minimizing the risk of erosion is essential in harvesting timber. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for homesite or recreational development, the main limitations are slope, depth to rock, and low soil strength. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. The risk of erosion is increased if the soil in this unit is left exposed during site development. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe.

54G—Hembre silt loam, 25 to 60 percent slopes. This deep, well drained soil is on uplands in the Coast Range. It formed in colluvium and residuum derived from igneous rock. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, vine maple, salal, western swordfern, and salmonberry. Elevation is 200 to 2,600 feet. The average annual precipitation is 70 to 110 inches, the average annual air temperature is 48 to 51 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, roots, and twigs about 4 inches thick. The surface layer is very dark brown silt loam about 12 inches thick. The subsoil is dark reddish brown and dark brown silty clay loam about 32 inches thick. Fractured basalt is at a depth of 44 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Astoria, Blachly, Formader, and Klickitat soils. Also included are small areas of soils, south and east of Mapleton, that are similar to this Hembre soil but are more than 60 inches deep to granite or quartz-diorite. Included areas make up about 15 percent of the total acreage.

Permeability of this Hembre soil is moderate. Available water capacity is about 7 to 10 inches. Water supplying capacity is 22 to 24 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production. It is also used for wildlife habitat and as watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 170. The potential production per acre is 10,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 102,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, steepness of slope, and plant competition. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. The steepness of slope limits the kinds of equipment that can be used in forest management. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Among the trees that are suitable for planting are Douglas-fir and western hemlock.

This map unit is in capability subclass VIe.

55E—Hembre-Klickitat complex, 3 to 30 percent slopes. This map unit is on uplands in the Coast Range. Areas are elongated or irregular in shape and are 10 to 50 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, vine maple, salal, western swordfern, and salmonberry. Elevation is 400 to 2,500 feet. The average annual precipitation is 80 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 150 to 200 days.

This unit is 55 percent Hembre silt loam and 30 percent Klickitat stony loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Astoria Variant, Blachly, Bohannon, Formader, Kilchis, Neskowin, and Salander soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Hembre soil is deep and well drained. It formed in colluvium and residuum derived from igneous rock. Typically, the surface layer is very dark brown silt loam about 12 inches thick. The subsoil is dark reddish brown and dark brown silty clay loam about 32 inches thick. Fractured basalt is at a depth of 44 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Hembre soil is moderate. Available water capacity is about 7 to 10 inches. Water supplying capacity is 22 to 24 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Klickitat soil is deep and well drained. It formed in colluvium and residuum derived from igneous rock. Typically, the surface is covered with a mat of leaves, needles, and twigs about 1.5 inches thick. The surface layer is dark brown stony loam about 13 inches thick. The subsoil is dark brown very cobbly clay loam about 26 inches thick. The substratum, to a depth of 50 inches, is dark brown extremely cobbly loam. Fractured basalt is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Klickitat soil is moderate. Available water capacity is about 2 to 5 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 40 to 60 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used mainly for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 170 on the Hembre soil. The potential production per acre is 10,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 102,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on the Klickitat soil. The potential production per acre is 9,000 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 81,120 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the potential for damage to the tops of trees and the hazard of windthrow along ridgetops, the hazard of erosion, and plant competition.

Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Surface methods of harvesting timber generally are suitable, but the soils in this unit may be compacted if they are moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are steepness of slope and small stones.

If this unit is used for homesite development, the main limitations are steepness of slope, stones, depth to rock, and low soil strength. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. Cuts needed to provide essentially level building sites can expose bedrock. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

Preserving the existing plant cover during construction helps to control erosion. Large trees are subject to windthrow because of shallow rooting depth, and they may be a hazard if left standing near buildings. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns.

Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Depth to bedrock may restrict septic tank absorption fields in some areas.

This map unit is in capability subclass VIe.

55G—Hembre-Klickitat complex, 30 to 60 percent slopes. This map unit is on uplands in the Coast Range. Areas are irregular in shape and are 10 to 300 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, vine maple, salal, western swordfern, and salmonberry. Elevation is 400 to 2,500 feet. The average annual precipitation is 80 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 150 to 200 days.

This unit is 50 percent Hembre silt loam and 35 percent Klickitat stony loam. The components of this unit are so intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Astoria Variant, Blachly, Bohannon, Formader, Kilchis, Neskowin, and Salander soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Hembre soil is deep and well drained. It formed in colluvium and residuum derived from igneous rock. Typically, the surface is covered with a mat of leaves, needles, roots, and twigs about 4 inches thick. The surface layer is very dark brown silt loam about 12 inches thick. The subsoil is dark reddish brown and dark brown silty clay loam about 32 inches thick. Fractured basalt is at a depth of 44 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Hembre soil is moderate. Available water capacity is about 7 to 10 inches. Water supplying capacity is 22 to 24 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Klickitat soil is deep and well drained. It formed in colluvium and residuum derived from igneous rock. Typically, the surface is covered with a mat of leaves, needles, and twigs about 1.5 inches thick. The surface layer is dark brown stony loam about 13 inches thick. The subsoil is dark brown very cobbly clay loam about 26 inches thick. The substratum, to a depth of 50 inches, is dark brown extremely cobbly loam. Fractured basalt is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Klickitat soil is moderate. Available water capacity is about 2 to 5 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 170 on the Hembre soil. The potential production per acre is 10,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 102,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144 on the Klickitat soil. The potential production per acre is 9,000 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 81,120 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are steepness of slope, the hazard of erosion, and plant competition. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Highlead or other cable logging methods can be used for harvesting timber. Use of these systems is limited during November to April by periods of high rainfall and wetness.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are steepness of slope and small stones. Slope limits the use of areas of the unit mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitations are steepness of slope, stones, depth to rock, and low soil strength. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. Cuts needed to provide essentially level building sites can expose bedrock. Buildings and roads should be designed to offset the limited ability of the soils in this unit to support a load. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Large trees are subject to windthrow because of shallow rooting depth, and they may be a hazard if left standing near buildings.

This map unit is in capability subclass VIe.

56—Holcomb silty clay loam. This deep, somewhat poorly drained soil is on valley terraces. It formed in stratified, silty and clayey alluvium. Slope is 0 to 3 percent. Areas are irregular in shape and are 4 to 150 acres in size. The vegetation in areas not cultivated is mainly grasses, shrubs, ash, and Oregon white oak. Elevation is 300 to 650 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown and very dark brown silty clay loam about 10 inches thick. The subsurface layer is mottled, very dark grayish brown silty clay loam about 9 inches thick. The upper part of the subsoil is very dark gray and very dark grayish brown clay about 29 inches thick, and the lower part to a depth of 55 inches is dark grayish brown clay. In some small areas the surface layer is gravelly.

Included in this unit are small areas of Awbrig, Coburg, and Dayton soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Holcomb soil is very slow. Available water capacity is about 5 to 8 inches. Water supplying capacity is about 14 to 19 inches. Effective rooting depth is limited by a high water table that is at a depth of 1 foot to 1.5 feet from November to May. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for small grain and grass seed. It is also used for hay and pasture and row crops.

This unit is suited to cultivated crops. Most climatically adapted crops can be grown if artificial drainage is provided; however, providing drainage is difficult because of the very slow permeability of the subsoil and the lack of adequate outlets. In summer, irrigation is required for maximum production of most crops.

A tillage pan forms easily if the soil in this unit is tilled when wet. Chiseling or subsoiling can be used to break up the tillage pan. Vehicles with large, low pressure tires commonly are used to apply fertilizer early in spring to prevent damage to crops and to the soil. Tilth and fertility can be improved by returning crop residue to the soil. Crops respond to lime and nitrogen fertilizer.

This unit is suited to hay and pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

If this unit is used for recreational development, the main limitations are wetness, the content of clay, and very slow permeability. The unit can be used for trails and paths in summer and fall.

If this unit is used as homesites, the main limitations are wetness, very slow permeability, and low strength when the soil is wet. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability subclass IIIw.

57D—Holderman extremely cobbly loam, 5 to 25 percent slopes. This moderately deep, well drained soil is on ridgetops and side slopes in the Cascade Range. It formed in colluvium and residuum derived from dacitic, andesitic, and rhyolitic tuff and breccia. Areas are elongated or irregular in shape and are 10 to 75 acres in size. The native vegetation is mainly Douglas-fir, noble fir, Pacific silver fir, western hemlock, western white pine, Pacific rhododendron, tall blue huckleberry, and common beargrass. Elevation is 3,200 to 4,700 feet. The average annual precipitation is 70 to 90 inches, the average annual air temperature is 42 to 44 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles and twigs about 3 inches thick. The surface layer is dark brown extremely cobbly loam about 5 inches thick. The subsoil is dark yellowish brown and brown extremely cobbly loam about 16 inches thick. The substratum is light yellowish brown extremely cobbly loam about 11 inches thick. Fractured tuff is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Hummington, Keel, and Winberry soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Holderman soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 120. The potential production per acre is 5,880 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 58,100 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Stones on the surface may restrict use of equipment in some areas and hinder falling and yarding. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Droughtiness caused by coarse fragments in the soil decreases seedling survival. Providing shade for seedlings on south-facing side slopes can improve survival. Reforestation can be accomplished by planting Douglas-fir, western hemlock, noble fir, and Pacific silver fir seedlings.

This unit is poorly suited to developed recreational sites such as camp and picnic areas and playgrounds because of slope, small stones, and depth to rock. It has fair suitability for less intensive uses such as paths and hiking trails.

This unit is poorly suited to homesite development. The main limitations are shallow depth to rock, small stones, and slope. Prolonged snow cover in winter and remoteness from populated areas limit accessibility.

This map unit is in capability subclass VIs.

57F—Holderman extremely cobbly loam, 25 to 50 percent slopes. This moderately deep, well drained soil is on ridgetops and side slopes in the Cascade Range. It formed in colluvium weathered from dacitic, andesitic, and rhyolitic tuff and breccia. Areas are irregular in shape and are 10 to 300 acres in size. The native vegetation is mainly Douglas-fir, noble fir, Pacific silver fir, western hemlock, western white pine, Pacific rhododendron, tall blue huckleberry, and beargrass. Elevation is 3,200 to 4,700 feet. The average annual precipitation is 70 to 90 inches, the average annual air temperature is 42 to 44 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles and twigs about 3 inches thick. The surface layer is dark brown extremely cobbly loam about 5 inches thick. The subsoil is dark yellowish brown and brown extremely cobbly loam about 16 inches thick. The substratum is light yellowish brown extremely cobbly loam about 11 inches thick. Fractured tuff is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Hummington, Keel, and Winberry soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Holderman soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 120. The potential production per acre is 5,880 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 58,100 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Surface methods of harvesting trees can be used, but highlead or other cable logging systems are more efficient than surface methods and are less damaging to the soil. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Droughtiness caused by coarse fragments in the soil decreases seedling survival. Providing shade for seedlings on south-facing side slopes improves survival. Reforestation can be accomplished by planting Douglas-fir, western hemlock, noble fir, and Pacific silver fir seedlings.

This unit is poorly suited to recreational or homesite development because of slope, depth to rock, and small stones.

This map unit is in capability subclass VIs.

57G—Holderman extremely cobbly loam, 50 to 75 percent slopes. This moderately deep, well drained soil is on side slopes in the Cascade Range. It formed in colluvium derived from dacitic, andesitic, and rhyolitic tuff and breccia. Areas are irregular in shape and are 10 to 150 acres in size. The native vegetation is mainly Douglas-fir, noble fir, Pacific silver fir, western hemlock, western white pine, Pacific rhododendron, tall blue huckleberry, and beargrass. Elevation is 3,200 to 4,700 feet. The average annual precipitation is 70 to 90 inches, the average annual air temperature is 42 to 44 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles and twigs about 3 inches thick. The surface layer is dark brown extremely cobbly loam about 5 inches thick. The subsoil is dark yellowish brown and brown extremely cobbly loam about 16 inches thick. The substratum is light yellowish brown extremely cobbly loam about 11 inches thick. Fractured tuff is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Hummington, Keel, and Winberry soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Holderman soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 120. The potential production per acre is 5,880 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 58,100 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Surface methods of harvesting trees are difficult to use because of the steepness of slope. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Droughtiness caused by coarse fragments in the soil decreases seedling survival. Providing shade for seedlings on south-facing side slopes improves survival. Reforestation can be accomplished by planting Douglas-fir, western hemlock, noble fir, and Pacific silver fir seedlings.

This unit is poorly suited to recreational or homesite development because of slope, depth to rock, and small stones.

This map unit is in capability subclass VIIs.

58D—Honeygrove silty clay loam, 3 to 25 percent slopes. This deep, well drained soil is on broad ridgetops, in saddles, and on toe slopes in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from sandstone, siltstone, tuff, and basalt. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, vine maple, and western brackenfern. Elevation is 200 to 2,500 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface layer is dark reddish brown silty clay loam about 9 inches thick. The next layer is dark reddish brown clay about 5 inches thick. The subsoil is yellowish red and dark red clay about 46 inches thick.

Included in this unit are small areas of Blachly soils on the steeper slopes in the higher rainfall areas, Cumley and Klickitat soils, McCully soils on north-facing slopes in the Cascade Range, Peavine soils on ridgetops and shoulders, and a soil that is similar to this Honeygrove soil but has bedrock at a depth of 40 to 60 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Honeygrove soil is moderately slow. Available water capacity is about 6 to 10 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for timber production, wildlife habitat, and watershed. It is also used for recreational and homesite development.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 165. The potential production per acre is 10,560 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 99,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Some small areas in the southern part of the survey area and eastern side of the Coast Range have site indexes as much as 10 points below that given above. This is possibly because of a diversion of rainfall by the higher mountains to the west.

Management that minimizes the risk of erosion is essential in harvesting timber. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Compaction reduces the productivity of the next generation of trees. Ripping skid trails and landing areas after logging helps to break up the compacted layer. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are the clayey surface layer and subsoil, which are sticky and are subject to compaction when wet; moderately slow permeability, which limits the proper operation of septic tank absorption fields; and steepness of slope in some areas.

This unit is suited to homesite development. The main limitations are the low strength of the soil when wet, moderately slow permeability, and slope. The deep cuts needed to provide essentially level building sites can cause slumping of the cutbanks. Roads for year-round use need heavy base rock.

The steepness of slope is a concern in installing septic tank absorption fields on this unit. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe.

58F—Honeygrove silty clay loam, 25 to 50 percent slopes. This deep, well drained soil is in saddles and on side slopes in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from sandstone, siltstone, tuff, and basalt. Areas are irregular in shape and are 10 to 300 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, vine maple, and western brackenfern. Elevation is 200 to 2,500 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface layer is dark reddish brown silty clay loam about 9 inches thick. The next layer is dark reddish brown clay about 5 inches thick. The subsoil is yellowish red and dark red clay about 46 inches thick.

Included in this unit are small areas of Blachly soils on the steeper slopes in the higher rainfall areas, Klickitat soils on narrow ridges and headwalls in areas of igneous rock or basalt flows, McCully soils on north-facing side slopes in the Cascade Range, Peavine soils on down-sloping ridges and in convex areas, and a soil that is similar to this Honeygrove soil but has bedrock at a depth of 40 to 60 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Honeygrove soil is moderately slow. Available water capacity is about 6 to 10 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is more than 60 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 165. The potential production per acre is 10,560 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 99,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Small areas on south-facing side slopes in the southern part of the survey area and on the eastern edge of the Coast Range have site indexes as much as 10 points below that listed above. This is possibly because of the local rain shadows from higher mountains to the west.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Compaction can reduce the productivity of the next generation of trees. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Highlead or skyline logging is less damaging to the soil than most other logging methods.

Undesirable plants limit natural or artificial reforestation. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings. Droughtiness on south-facing side slopes in the areas of lower rainfall decreases seedling survival. Providing shade for seedlings on south-facing side slopes increases survival.

If this unit is used for recreational development, the main limitations are slope, low soil strength, and the sticky and plastic clay in the subsoil.

This unit is poorly suited to homesite development. The main limitations are slope, low soil strength, and moderate shrink-swell potential. There is a hazard of failure of cuts and fills along roads and at construction sites.

This map unit is in capability subclass VIe.

59E—Hullt loam, 2 to 30 percent slopes. This deep, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium derived from sandstone and tuff. Areas are irregular in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, vine maple, salal, hazelnut, and western swordfern. Elevation is 600 to 1,400 feet. The average annual precipitation is 45 to 65 inches, the average annual air temperature is 49 to 52 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of moss, leaves, and twigs about 0.5 inch thick. The surface layer is very dark grayish brown and dark brown loam about 13 inches thick. The upper 23 inches of the subsoil is brown loam, and the lower 18 inches is brown clay loam. Fractured, weathered bedrock is at a depth of 54 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bellpine, Nekia, Steiwer, and Willakenzie soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Hullt soil is moderate. Available water capacity is about 8 to 11 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for timber production. A few areas are used for small grain, hay and pasture, and grass seed.

This unit is suited to hay and pasture. Grasses and legumes grow well if adequate fertilizer is used. Legumes respond to lime and phosphorus, and small grain and grasses respond to nitrogen. Irrigation water can be applied by the sprinkler method to increase production of summer forage and fall grain. Restricting grazing when this unit is wet helps to keep pastures in good condition and protects the soil from compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 165. The potential production per acre is 10,560 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 99,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are plant competition and the susceptibility of the soil to compaction. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used when the soil is moist. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir or western hemlock seedlings.

If this unit is used for recreational development, the main limitations are depth to rock and slope. Slope restricts use mainly to paths and trails in most areas.

If this unit is used for homesite development, the main limitations are slope, depth to rock, moderate permeability, moderate shrink-swell potential, and low soil strength. Local roads and streets need heavy base rock for year-round use.

Septic tank absorption lines on this unit should be installed on the contour.

This map unit is in capability subclass IIIe.

59G—Hullt loam, 30 to 60 percent slopes. This deep, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium derived from sandstone and tuff. Areas are irregular in shape and are 5 to 100 acres or more in size. The native vegetation is mainly Douglas-fir, vine maple, salal, hazelnut, and western swordfern. Elevation is 600 to 1,400 feet. The average annual precipitation is 45 to 65 inches, the average annual air temperature is 49 to 52 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of moss, leaves, and twigs about 0.5 inch thick. The surface layer is very dark grayish brown and dark brown loam about 13 inches thick. The upper 23 inches of the subsoil is brown loam, and the lower 18 inches is brown clay loam. Fractured, weathered bedrock is at a depth of 54 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bellpine, Nekia, Steiwer, and Willakenzie soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Hullt soil is moderate. Available water capacity is about 8 to 11 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 165. The potential production per acre is 10,560 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 99,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, plant competition, steepness of slope, and prolonged wet periods in winter. Access roads need heavy base rock for year-round use. Construction and maintenance of roads is difficult because of steepness of slope and the hazard of landslides. Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Highlead or other cable logging systems are less damaging to the soil than most other logging systems. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitation is slope.

If this unit is used for homesite development, the main limitations are slope, depth to rock, and low soil strength. Local roads and streets need heavy base rock for year-round use. Foundations for buildings should be anchored in the underlying bedrock.

This map unit is in capability subclass VIe.

60D—Hummington gravelly loam, 5 to 25 percent slopes. This moderately deep, well drained soil is on narrow to broad ridgetops in the Cascade and Coast Ranges. In most areas it formed in colluvium derived from basic igneous rock. On Prairie Mountain in the Coast Range, however, it formed in material derived from quartz-diorite. Areas are elongated in shape and are 10 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, noble fir, Pacific rhododendron, tall blue huckleberry, vine maple, tall Oregon-grape, and common beargrass. Elevation is 3,000 to 5,000 feet. The average annual precipitation, much of which falls as snow from November to March, is 70 to 100 inches. The average annual air temperature is 42 to 44 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is very dark brown and dark brown gravelly loam about 12 inches thick. The subsoil is dark brown very gravelly loam about 17 inches thick. Fractured bedrock is at a depth of 29 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Cruiser, Holderman, Keel, Winberry, and Yellowstone soils, Rock outcrop, and Hummington soils that have slopes of more than 25 percent. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Hummington soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,120 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the hazard of erosion, seedling mortality, plant competition, and the hazard of windthrow. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Droughtiness caused by coarse fragments in the soil reduces seedling survival. Providing shade for seedlings on south- and west-facing side slopes can improve survival. Undesirable plants limit natural or artificial reforestation unless site preparation is intensive. Reforestation can be accomplished by planting Douglas-fir, western hemlock, noble fir, or Pacific silver fir seedlings. Windthrow is a hazard when the soil is wet and winds are strong.

This soil is poorly suited to recreational uses such as camp and picnic areas and playgrounds because of slope, depth to rock, and small stones. It is better suited to less intensive uses such as paths and trails.

This map unit is in capability subclass VIs.

60F—Hummington gravelly loam, 25 to 50 percent slopes. This moderately deep, well drained soil is on side slopes in the Cascade Range. In most areas it formed in colluvium derived from basic igneous rock. On Prairie Mountain in the Coast Range, however, it formed in material derived from quartz-diorite. Areas are irregular in shape and are 10 to 70 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, noble fir, Pacific rhododendron, tall blue huckleberry, vine maple, tall Oregon-grape, and common beargrass. Elevation is 3,000 to 5,000 feet. The average annual precipitation, much of which falls as snow from November to March, is 70 to 100 inches. The average annual air temperature is 42 to 44 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is very dark brown and dark brown gravelly loam about 12 inches thick. The subsoil is dark brown very gravelly loam about 17 inches thick. Fractured bedrock is at a depth of 29 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Cruiser, Holderman, Keel, Winberry, and Yellowstone soils, Rock outcrop, and Hummington soils that have slopes of more than 50 percent or less than 25 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Hummington soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,120 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the hazard of erosion, steepness of slope, seedling mortality, plant competition, and the hazard of windthrow.

Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding generally is safer and disturbs the soil less. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Droughtiness caused by coarse fragments in the soil reduces seedling survival. Providing shade for seedlings on south- and west-facing side slopes can improve their survival. Undesirable plants limit natural or artificial reforestation unless site preparation is intensive. Reforestation can be accomplished by planting Douglas-fir, western hemlock, noble fir, or Pacific silver fir seedlings. Windthrow is a hazard when the soil is wet and winds are strong.

This map unit is in capability subclass VIs.

60G—Hummington gravelly loam, 50 to 75 percent slopes. This moderately deep, well drained soil is on side slopes in the Cascade Range. In most areas it formed in colluvium derived from basic igneous rock. On Prairie Mountain in the Coast Range, however, it formed in material derived from quartz-diorite. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, noble fir, Pacific rhododendron, tall blue huckleberry, vine maple, tall Oregon-grape, and beargrass. Elevation is 3,000 to 5,000 feet. The average annual precipitation, much of which falls as snow from November to March, is 70 to 100 inches. The average annual air temperature is 42 to 44 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is very dark brown and dark brown gravelly loam about 12 inches thick. The subsoil is dark brown very gravelly loam about 17 inches thick. Fractured bedrock is at a depth of 29 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Cruiser, Holderman, Keel, Winberry, and Yellowstone soils, Rock outcrop, and Hummington soils that have slopes of less than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Hummington soil is moderately rapid. Available water capacity is about 2 to 5 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,120 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,080 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the hazard of erosion, steepness of slope, seedling mortality, plant competition, and the hazard of windthrow.

Harvesting of timber is limited mainly by steepness of slope. Cable yarding systems generally are safer and disturb the soil less. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Droughtiness caused by coarse fragments in the soil reduces seedling survival. Providing shade for seedlings on south- and west-facing side slopes can improve their survival. Undesirable plants limit natural or artificial reforestation unless site preparation is intensive. Reforestation can be accomplished by planting Douglas-fir, western hemlock, noble fir, or Pacific silver fir seedlings. Windthrow is a hazard when the soil is wet and winds are strong.

This map unit is in capability subclass VIIs.

61—Jimbo silt loam. This deep, well drained soil is on terraces, mainly along the McKenzie River from Leaburg to McKenzie Bridge. It formed in ash and mixed alluvium. Slope is 0 to 3 percent. Areas are elongated or irregular in shape and are 3 to 150 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, red alder, bigleaf maple, vine maple, trailing blackberry, and western swordfern. Elevation is 650 to 1,400 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 150 to 210 days.

Typically, the surface layer is very dark brown and dark brown silt loam about 14 inches thick. The subsoil is dark yellowish brown loam about 29 inches thick. The substratum to a depth of 60 inches or more is multicolored very cobbly sand. In some areas it is fine sandy loam.

Included in this unit are small areas of Saturn soils and Jimbo soils that have slopes of more than 3 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Jimbo soil is moderately rapid. Available water capacity is about 10 to 15 inches. Water supplying capacity is 22 to 26 inches. Effective rooting depth is 40 to 60 inches or more. It is limited by the very cobbly substratum. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for filberts and as homesites. It is also used for pasture, recreation, and timber production; however, timber production on this unit is not significant because of the limited acreage.

This unit is suited to most climatically adapted crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to pasture. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index

for Douglas-fir is 162. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the susceptibility of the soil to compaction and plant competition.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir or western hemlock seedlings.

This unit is well suited to recreational development. It has few limitations.

This unit is suited to homesite development. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

Pollution of ground water or streams by effluent from septic tank absorption fields is a hazard in some areas of this unit because the permeability of the substratum is rapid.

This map unit is in capability class I.

62B—Jimbo-Haflinger complex, 0 to 5 percent slopes. This map unit is on low stream terraces in the upper McKenzie River area. Areas are elongated in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, western redcedar, bigleaf maple, red alder, salal, and western swordfern. Elevation is 850 to 1,500 feet. The average annual precipitation is 65 to 80 inches, the average annual air temperature is 48 to 50 degrees F, and the average frost-free period is 130 to 200 days.

This unit is 70 percent Jimbo fine sandy loam and 25 percent Haflinger cobbly loam. The Jimbo soil has slopes of 3 percent or less and is in the higher lying areas on the landscape. The Haflinger soil has slopes of 0 to 5 percent and is in the lower lying areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cupola and Saturn soils and Fluvents. Included areas make up about 5 percent of the total acreage.

The Jimbo soil is deep and well drained. It formed in ash and mixed alluvium. Typically, the surface layer is very dark brown and dark brown fine sandy loam about 14 inches thick. The subsoil is dark yellowish brown loam about 29 inches thick. The substratum to a depth of 60 inches or more is multicolored very cobbly sand. Gravel makes up as much as 15 percent of the profile. It is mostly below a depth of 30 inches.

Permeability of the Jimbo soil is moderately rapid. Available water capacity is about 8 to 12 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 40 to 60 inches or more. It is limited by the very cobbly substratum. Runoff is slow, and the hazard of water erosion is slight.

The Haflinger soil is deep and excessively drained. It formed in coarse textured recent alluvium. Typically, the surface layer is very dark brown and dark brown cobbly loam about 17 inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown very cobbly loamy sand over extremely cobbly sand.

Permeability of the Haflinger soil is rapid. Available water capacity is about 2 to 3 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 20 to 40 inches. It is limited by the very cobbly and extremely cobbly substratum. Runoff is slow, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

This unit is used mainly for filbert orchards and pasture. It is also used for timber production and recreation and as homesites. Because of the limited acreage of this unit, however, it does not contribute significantly to the total timber production of the survey area.

This unit is suited to orchards and pasture. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water.

Fertilizer is needed for optimum growth of grasses and legumes on this unit. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 162 on the Jimbo soil. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged fully stocked stand of trees 80 years old.

On the basis of a 100-year site curve, the mean site index for Douglas-fir is 147 on the Haflinger soil. The potential production per acre is 9,240 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 83,920 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the susceptibility of the Jimbo soil to compaction, plant competition, and the hazard of windthrow on the Haflinger soil. Surface methods of harvesting timber generally are suitable, but the Jimbo soil may be compacted if heavy equipment is used while the soil is moist. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir or western hemlock seedlings.

This unit is suited to recreational development. It has few limitations. Little site preparation is needed for picnic areas and paths and trails, and the proximity of the unit to good fishing and hunting areas makes it desirable for campgrounds.

If this unit is used as homesites, the main limitations are the low strength of the Jimbo soil, rapid permeability of the substratum, and the hazard of flooding. Buildings and roads should be designed to offset the limited ability of the Jimbo soil to support a load.

If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from septic tank absorption fields.

This map unit is in capability subclass VIs.

63C—Jory silty clay loam, 2 to 12 percent slopes. This deep, well drained soil is on low, rolling foothills. It formed in colluvium derived from basic igneous and tuffaceous rock. Areas are irregular or elongated in shape and are 3 to 80 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, poison-oak, tall Oregon-grape, and western swordfern. Elevation is 400 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark reddish brown silty clay loam about 9 inches thick. The subsoil is dark reddish brown silty clay about 51 inches thick.

Included in this unit are small areas of Bellpine, Dupee, and Nekia soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Jory soil is moderately slow. Available water capacity is about 9 to 11 inches. Water supplying capacity is 25 to 28 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for hay and pasture, orchards, berries, and grass seed. It is also used for timber production, homesites, and urban development.

If this unit is used for grass seed, hay, and pasture, the main limitations are erosion in areas seeded late in fall, compaction from equipment and livestock traffic when the soil is wet, low soil fertility, and the very strongly acid subsoil.

Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to berries, grain, and orchard crops. In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur and lime; and orchards, vegetables, and berries respond to nitrogen, phosphorus, sulfur, and potassium. Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

This unit is suited to production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality, plant competition, and the susceptibility of the soil to compaction. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Ripping skid trails and landing areas after logging helps to break up the compacted layer. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are the moderately slow permeability and clayey soil texture. Drainage should be provided for paths and trails. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover, seeding cuts and fills, and providing adequate waterways for runoff of excess water.

If this unit is used for homesite or urban development, the main limitations are low soil strength, slope, the clayey subsoil, and moderately slow permeability. Roads for year-round use need heavy base rock because of the clayey subsoil.

If buildings are constructed on this unit, properly designing foundations and footings helps to overcome the problem of low soil strength and diverting runoff away from buildings helps to prevent structural damage because of shrinking and swelling. Slope may limit construction of some commercial buildings.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

If the unit is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field. Absorption lines should be installed on the contour.

This map unit is in capability subclass IIe.

63D—Jory silty clay loam, 12 to 20 percent slopes. This deep, well drained soil is on low foothills. It formed in colluvium derived from basic igneous and tuffaceous rock. Areas are irregular or elongated in shape and are 5 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir and Oregon white oak; poison-oak, tall Oregon-grape, and other shrubs; and grasses. Elevation is 400 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark reddish brown silty clay loam about 9 inches thick. The subsoil is dark reddish brown silty clay about 51 inches thick.

Included in this unit are small areas of Bellpine, Dupee, and Nekia soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Jory soil is moderately slow. Available water capacity is about 9 to 11 inches. Water supplying capacity is 25 to 28 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for timber and grass seed production. It is also used for hay and pasture, orchards, and berries and as homesites.

If this unit is used for grass seed, hay, and pasture, the main limitations are slope, the hazard of erosion, moderately slow permeability, and the content of clay in the soil. The soil is highly susceptible to compaction when wet. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to berries and orchard crops. In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and orchards, vegetables, and berries respond to nitrogen, phosphorus, sulfur, and potassium. Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

This unit is suited to production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are seedling mortality, plant competition, and the susceptibility of the soil to compaction. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Highlead or other cable logging systems are less damaging to the soil than most other logging methods. Ripping skid trails and landing areas after logging helps to break up the compacted layer.

Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are the moderately slow permeability, the content of clay in the soil, and slope. Drainage should be provided for paths and trails. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover, seeding cuts and fills, and providing adequate waterways for runoff of excess water.

If this unit is used for homesite development, the main limitations are slope and low soil strength. Roads for year-round use need heavy base rock because of the clay subsoil.

If buildings are constructed on this unit, properly designing foundations and footings helps to overcome the problem of low soil strength and diverting runoff away from buildings helps to prevent structural damage because of shrinking and swelling. Slope may limit construction of some commercial buildings.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

The limitation of moderately slow permeability can be overcome by increasing the size of the absorption field. Absorption lines should be installed on the contour.

This map unit is in capability subclass IIIe.

63E—Jory silty clay loam, 20 to 30 percent slopes. This deep, well drained soil is on low foothills. It formed in colluvium derived from basic igneous and tuffaceous rock. Areas are irregular or elongated in shape and are 5 to 60 acres in size. The native vegetation is mainly Douglas-fir, Oregon white oak, poison-oak and other shrubs, and grasses. Elevation is 400 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark reddish brown silty clay loam about 9 inches thick. The subsoil is dark reddish brown silty clay about 51 inches thick.

Included in this unit are small areas of Bellpine, Nekia, and Ritner soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Jory soil is moderately slow. Available water capacity is about 9 to 11 inches. Water supplying capacity is 25 to 28 inches. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production. It is also used for wildlife habitat and as watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the hazard of erosion, plant competition, and the susceptibility of the soil to compaction. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Roads for year-round use need a maximum of heavy base rock. Highlead or other cable logging systems are less damaging to the soil than tractor logging. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for homesite development, the main limitations are steepness of slope and low soil strength. Roads for year-round use need heavy base rock.

If this unit is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field. Absorption lines should be installed on the contour.

This map unit is in capability subclass IVe.

64D—Keel cobbly clay loam, 3 to 25 percent slopes. This moderately deep, well drained soil is on broad upland ridges in the Cascade Range and on Prairie Mountain in the Coast Range. It formed in colluvium derived from basic igneous rock and some volcanic ash. Areas are elongated in shape and are 5 to 400 acres in size. The native vegetation is mainly western hemlock, Douglas-fir, noble fir, Pacific silver fir, Pacific rhododendron, and tall blue huckleberry. Elevation is 2,700 to 4,200 feet. The average annual precipitation, much of which occurs as snow from November to March, is 70 to 100 inches. The average annual air temperature is 41 to 45 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The upper part of the surface layer is very dark grayish brown cobbly clay loam about 6 inches thick, and the lower part is dark brown clay loam 6 inches thick. The upper part of the subsoil is dark brown clay loam 7 inches thick, and the lower part is brown gravelly clay loam and cobbly loam 16 inches thick. Fractured, weathered tuff is at a depth of 35 inches. Depth to bedrock ranges from 20 to 40 inches. In some areas stones and cobbles cover as much as 3 percent of the soil surface.

Included in this unit are small areas of Cruiser, Holderman, Hummington, and Yellowstone soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Keel soil is moderate. Available water capacity is about 3 to 8 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 139. The potential production per acre is 8,640 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 76,240 board feet

(International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Harvesting of timber is limited mainly by heavy snowfall in winter. Prolonged snow cover and rainy periods limit use of heavy equipment during November through April.

Undesirable plants limit natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting Douglas-fir, noble fir, or western hemlock seedlings.

If this unit is used for recreational development, the main limitations are slope and small stones. Restricted access because of prolonged snow cover in winter and remoteness from populated areas are also limitations.

If this unit is used for homesite development, the main limitations are slope, small stones, frost action potential, and depth to rock. Remoteness from populated areas and poor accessibility because of prolonged snow cover in winter are also limitations.

This map unit is in capability subclass VIe.

64F—Keel cobbly clay loam, 25 to 45 percent slopes. This moderately deep, well drained soil is on side slopes in the Cascade Range and on Prairie Mountain in the Coast Range. It formed in colluvium derived from basic igneous rock and some volcanic ash. Areas are irregular in shape and are 10 to 500 acres in size. The native vegetation is mainly western hemlock, Douglas-fir, noble fir, Pacific silver fir, Pacific rhododendron, and tall blue huckleberry. Elevation is 3,000 to 4,200 feet. The average annual precipitation, much of which falls as snow from November to March, is 70 to 100 inches. The average annual air temperature is 41 to 45 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The upper part of the surface layer is very dark grayish brown cobbly clay loam about 6 inches thick, and the lower part is dark brown clay loam 6 inches thick. The upper part of the subsoil is dark brown clay loam 7 inches thick, and the lower part is brown gravelly loam and cobbly loam 16 inches thick. Fractured, weathered tuff is at a depth of 35 inches. Depth to bedrock ranges from 20 to 40 inches. In some areas stones and cobbles cover as much as 3 percent of the soil surface.

Included in this unit are small areas of Cruiser, Holderman, Hummington, and Yellowstone soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Keel soil is moderate. Available water capacity is about 3 to 8 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 139. The potential production per acre is 8,640 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 76,240 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Harvesting of timber is limited mainly by heavy snowfall in winter. Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

The steepness of slope limits the kinds of equipment that can be used in forest management. Surface methods of harvesting trees can be used, but highlead or other cable logging systems are less damaging to the soil surface. Prolonged snow cover and rainy periods limit use of heavy equipmemt during November through April.

Undesirable plants limit natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting Douglas-fir, noble fir, and western hemlock seedlings.

This map unit is in capability subclass VIe.

64G—Keel cobbly clay loam, 45 to 75 percent slopes. This moderately deep, well drained soil is on side slopes in the Cascade Range and on Prairie Mountain in the Coast Range. It formed in colluvium derived from basic igneous rock and some volcanic ash. Areas are irregular in shape and are 10 to 200 acres in size. The native vegetation is mainly western hemlock, Douglas-fir, noble fir, Pacific silver fir, Pacific rhododendron, and tall blue huckleberry. Elevation is 3,000 to 4,200 feet. The average annual precipitation, much of which falls as snow from November to March, is 70 to 100 inches. The average annual air temperature is 41 to 45 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The upper part of the surface layer is very dark grayish brown cobbly clay loam about 6 inches thick, and the lower part is dark brown clay loam 6 inches thick. The upper part of the subsoil is dark brown clay loam 7 inches thick, and the lower part is brown gravelly loam and cobbly loam 16 inches thick. Fractured, weathered tuff is at a depth of 35 inches. Depth to bedrock ranges from 20 to 40 inches. In some areas stones and cobbles cover as much as 3 percent of the soil surface.

Included in this unit are small areas of Cruiser, Holderman, Hummington, and Yellowstone soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Keel soil is moderate. Available water capacity is about 3 to 8 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 139. The potential production per acre is 8,640 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 76,240 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

Harvesting of timber is limited mainly by heavy snowfall in winter and steepness of slope. Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Surface methods of harvesting trees are difficult to use because of the steepness of slope. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Prolonged rainy periods and snow cover limit the use of heavy equipment in winter.

Undesirable plants limit natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting Douglas-fir, noble fir, or western hemlock seedlings.

This map unit is in capability subclass VIIe.

65G—Kilchis stony loam, 30 to 60 percent slopes. This shallow, well drained soil is on narrow ridgetops on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from basalt and breccia. Areas are elongated in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, vine maple, western swordfern, tall Oregon-grape, salal, western brackenfern, and grasses. Elevation is 1,500 to 3,200 feet in the Cascade Range and 500 to 2,600 feet in the Coast Range. The average annual precipitation is 60 to 120 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of needles, twigs, and leaves about 1 inch thick. The surface layer is dark brown stony loam about 4 inches thick. The next layer is dark reddish brown very cobbly loam about 8 inches thick. The subsoil is reddish brown very stony loam about 7 inches thick. Fractured basalt is at a depth of 19 inches. Depth to bedrock ranges from 12 to 20 inches.

Included in this unit are small areas of Bohannon and Klickitat soils, Rock outcrop, and Kilchis soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Kilchis soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production and wildlife habitat. It is also used for recreation and as rock quarries and watershed.

This unit is poorly suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 110. The potential production per acre is 5,880 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 58,100 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 100 years old.

Seedling mortality is an important management concern because of droughtiness. Trees are subject to windthrow because of limited rooting depth. Use of equipment may be limited by slope and stoniness. Roads and skid trails can be protected from erosion by constructing water bars. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This map unit is in capability subclass VIs.

65H—Kilchis stony loam, 60 to 90 percent slopes. This shallow, well drained soil is on side slopes, escarpments, and headwalls of uplands in the Coast and Cascade Ranges. It formed in colluvium derived from basalt and breccia. Areas are irregular in shape and are 5 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, vine maple, western swordfern, tall Oregon-grape, salal, western brackenfern, and grasses. Elevation is 1,300 to 3,400 feet in the Cascade Range and 500 to 2,700 feet in the Coast Range. The average annual precipitation is 60 to 120 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of needles, twigs, and leaves about 1 inch thick. The surface layer is dark brown stony loam about 12 inches thick. The subsoil is dark reddish brown very stony loam about 7 inches thick. Fractured basalt is at a depth of 19 inches. Depth to bedrock ranges from 12 to 20 inches.

Included in this unit are small areas of Bohannon, Digger, and Klickitat soils, Rock outcrop, and Kilchis soils that have slopes of less than 60 percent. Included areas make up about 10 percent of the total acreage.

Permeability of this Kilchis soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 12 to 20 inches. Runoff is very rapid, and the hazard of water erosion is very high.

This unit is used for timber production, recreation, wildlife habitat, watershed, and rock quarries.

This unit is poorly suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 110. The potential production per acre is 5,880 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 58,100 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 100 years old.

The main limitations for the management of timber are steepness of slope, seedling mortality, and the hazard of windthrow. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface.

Seedling mortality because of droughtiness is a severe management concern. Trees are subject to windthrow because of limited rooting depth. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This map unit is in capability subclass VIIs.

66D—Kinney cobbly loam, 3 to 20 percent slopes. This deep, well drained soil is on broad ridgetops on uplands in the Cascade Range. It formed in glacial till over basic igneous rock and tuffaceous breccia. Areas are irregular in shape and are 10 to 50 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, western redcedar, western hemlock, red alder, bigleaf maple, and shrubs. Elevation is 1,400 to 3,300 feet. The average annual precipitation is about 60 to 90 inches, the average annual air temperature is 46 to 52 degrees F, and the average frost-free period is 120 to 165 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 0.5 inch thick. The surface layer is very dark brown and dark yellowish brown cobbly loam about 12 inches thick. The upper 30 inches of the subsoil is dark yellowish brown and dark brown cobbly clay loam, and the lower 8 inches is dark brown very cobbly clay loam. Weathered bedrock is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Kilchis, Klickitat, and McCully soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is about 5 to 10 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly for timber production. It is also used for pasture, hay, and small grain.

This unit is suited to cultivated crops in some areas. It is limited mainly by low soil fertility, extreme acidity in the lower part of the subsoil, and cobbles in the surface layer. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 150. The potential production per acre is 9,480 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 86,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but use of equipment is limited by the long rainy season, low soil strength, and the susceptibility of the soil to compaction. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling growth. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are slope and cobbles.

If this unit is used for homesite development, the main limitations are depth to rock, cobbles, slope, and frost action potential. Slope is the main limitation for dwellings without basements. Cobbles and slope make excavation difficult. The deep cuts needed to provide essentially level building sites can expose bedrock. Building of local roads and streets is limited by slope, cobbles, and frost action potential.

Use of the soil in this unit for septic tank absorption fields and for trench and area sanitary landfills is limited by depth to rock, cobbles, and slope. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe.

67F—Kinney cobbly loam, 20 to 50 percent north slopes. This deep, well drained soil is on north- and east-facing side slopes on uplands in the Cascade Range. It formed in glacial till over basic igneous rock and tuffaceous breccia. Areas are irregular in shape and are 10 to several hundred acres in size. The native vegetation is mainly Douglas-fir, western hemlock, western redcedar, bigleaf maple, red alder, and shrubs. Elevation is 1,000 to 3,200 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 46 to 52 degrees F, and the average frost-free period is 120 to 165 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 0.5 inch thick. The surface layer is very dark brown and dark yellowish brown cobbly loam about 16 inches thick. The upper 34 inches of the subsoil is dark yellowish brown and dark brown cobbly clay loam, and the lower 8 inches is dark brown very cobbly clay loam. Weathered bedrock is at a depth of 58 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Kilchis, Klickitat, and McCully soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is about 6 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

Most areas of this unit are used for timber production. A few areas are used for pasture.

This unit is poorly suited to pasture. It is limited mainly by low natural fertility, extreme acidity in the lower part of the subsoil, cobbles, and slope. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 162. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but use of equipment is limited by low soil strength, the susceptibility of the soil to compaction, and steepness of slope. Highlead or other cable logging systems are more efficient than surface logging and are less damaging to the soil. Ripping skid trails and landings after logging helps to break up the compacted layer and improves seedling survival and growth. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are slope and cobbles.

If this unit is used for homesite development, the main limitations are depth to rock, cobbles, and slope. Slope is the main limitation for construction of dwellings without basements. Cobbles and slope make excavation difficult. The deep cuts needed to provide essentially level building sites can expose bedrock. Construction of local roads and streets is limited by slope and depth to rock.

This map unit is in capability subclass VIe.

67G—Kinney cobbly loam, 50 to 70 percent north slopes. This deep, well drained soil is on north- and east-facing side slopes on uplands in the Cascade Range. It formed in glacial till over basic igneous rock and tuffaceous breccia. Areas are irregular in shape and are 10 to 250 acres or more in size. The native vegetation is mainly Douglas-fir, western redcedar, western hemlock, bigleaf maple, red alder, and shrubs. Elevation is 1,000 to 3,000 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 46 to 52 degrees F, and the average frost-free period is 120 to 165 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 0.5 inch thick. The surface layer is very dark brown and dark yellowish brown cobbly loam about 16 inches thick. The upper 34 inches of the subsoil is dark yellowish brown and dark brown cobbly clay loam, and the lower 8 inches is dark brown very cobbly clay loam. Weathered bedrock is at a depth of 58 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Kilchis, Klickitat, and McCully soils and Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is about 6 to 12 inches. Water supplying capacity is 22 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 162. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Use of equipment is limited by slope and low soil strength. Highlead or other cable logging systems are more efficient than most other logging methods and are less damaging to the soil surface.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems.

Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked stand of trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for homesite or recreational development, the main limitations are depth to rock, cobbles, and slope. Slope is the main limitation for dwellings without basements. Cobbles, depth to rock, and slope make excavation difficult. Local roads and streets are limited by slope and depth to rock.

This map unit is in capability subclass VIIe.

68F—Kinney cobbly loam, 20 to 50 percent south slopes. This deep, well drained soil is on south- and west-facing side slopes on uplands in the Cascade Range. It formed in glacial till over basic igneous rock and tuffaceous breccia. Areas are irregular in shape and are 10 acres to several hundred acres in size. The native vegetation is mainly Douglas-fir, western redcedar, western hemlock, red alder, bigleaf maple, and shrubs. Elevation is 1,300 to 3,500 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 47 to 52 degrees F, and the average frost-free period is 120 to 165 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 0.5 inch thick. The surface layer is very dark brown and dark yellowish brown cobbly loam about 12 inches thick. The upper 30 inches of the subsoil is dark yellowish brown and dark brown cobbly clay loam, and the lower 8 inches is dark brown very cobbly clay loam. Weathered bedrock is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Kilchis, Klickitat, and McCully soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is about 5 to 10 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

Most areas of this unit are used for timber production, wildlife habitat, and watershed. A few small areas are used for pasture.

This unit is poorly suited to pasture. It is limited mainly by slope, cobbles, low soil fertility, and extreme acidity in the lower part of the subsoil. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 150. The potential production per acre is 9,480 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 86,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but they are more difficult to use and more damaging to the soil in the steeper areas. Highlead or other cable logging systems are more efficient and are less damaging to the soil. The soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landings after logging helps to break up the compacted layer and improves seedling survival and growth. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Droughtiness during summer retards reestablishment of trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are slope and cobbles.

If this unit is used for homesite development, the main limitations are depth to rock, cobbles, and slope. Slope is the main limitation for dwellings without basements. Cobbles and slope make excavation difficult. The deep cuts needed to provide essentially level building sites can expose bedrock. Construction of local roads and streets is limited by slope and depth to rock.

This map unit is in capability subclass VIe.

68G—Kinney cobbly loam, 50 to 70 percent south slopes. This deep, well drained soil is on south- and west-facing side slopes on uplands in the Cascade Range. It formed in glacial till over basic igneous rock and tuffaceous breccia. Areas are irregular in shape and are 10 acres to several hundred acres in size. The native vegetation is mainly Douglas-fir, western redcedar, western hemlock, red alder, bigleaf maple, and shrubs. Elevation is 1,300 to 3,500 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 120 to 165 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 0.5 inch thick. The surface layer is very dark brown and dark yellowish brown cobbly loam about 12 inches thick. The upper 30 inches of the subsoil is dark yellowish brown and dark brown cobbly clay loam, and the lower 8 inches is dark brown very cobbly clay loam. Weathered bedrock is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Kilchis, and Klickitat soils and Rock outcrop. Included areas make up about 10 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is about 5 to 10 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is very rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 150. The potential production per acre is 9,480 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 86,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Use of equipment is limited because of slope and low soil strength. Highlead or other cable logging systems are more efficient than most other logging methods and are less damaging to the soil surface.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed drainage systems.

Plant competition delays natural regeneration, but it generally does not prevent the eventual development of a fully stocked stand of trees. Droughtiness during summer retards reestablishment of trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for homesite development, the main limitations are depth to rock, cobbles, and slope. Slope is the main limitation for dwellings without basements. Cobbles, slope, and depth to rock make excavation difficult. Construction of local roads and streets is limited by slope and depth to rock.

This map unit is in capability subclass VIIe.

69E—Kinney cobbly loam, slump, 3 to 30 percent slopes. This deep, well drained soil is in old stabilized slump areas on uplands in the Cascade Range. It formed in glacial till over basic igneous rock and tuffaceous breccia. Areas are irregular in shape and are 5 to 200 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, western redcedar, red alder, bigleaf maple, vine maple, salal, and tall Oregon-grape. Elevation is 1,000 to 3,300 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 120 to 165 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 0.5 inch thick. The surface layer is very dark brown and dark yellowish brown cobbly loam about 16 inches thick. The upper 34 inches of the subsoil is dark yellowish brown and dark brown cobbly clay loam, and the lower 9 inches is dark brown very cobbly clay loam. Weathered bedrock is at a depth of 59 inches. Depth to bedrock ranges from 40 to 60 inches. In some areas the soil is only moderately well drained because of the uneven soil surface and poorly defined drainageways.

Included in this unit are small areas of Cumley, Klickitat, and McCully soils and a soil that is similar to this Kinney soil but is more than 60 inches deep to bedrock. Also included are seep areas and poorly drained areas. Included areas make up about 20 percent of the total acreage.

Permeability of this Kinney soil is moderate. Available water capacity is 6 to 12 inches. Water supplying capacity is 22 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for timber production, wildlife habitat, and watershed, but some small areas are used for pasture, hay, and small grain.

This unit is poorly suited to cultivated crops. It is limited mainly by cobbles, seep areas, low soil fertility, and extreme acidity in the lower part of the subsoil. The soil in this unit is subject to seepage and runoff from adjacent, higher lying areas, and drainageways are not well established; therefore, seep areas and poorly drained areas are common. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 168. The potential production per acre is 10,790 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 101,600 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Highlead or other cable logging systems are less damaging to the soil surface than tractor logging. Ripping skid trails and landings after logging helps to break up the compacted layer and improves seedling growth. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir or western hemlock seedlings.

If this unit is used for recreational or homesite development, the main limitations are depth to rock, cobbles, slope, and seep areas. Construction of dwellings without basements is limited by seep areas and slope. Cobbles and slope make excavation difficult. The deep cuts needed to provide essentially level building sites can expose bedrock and create a hazard of slumping. Slope, cobbles, and frost action potential are limitations for local roads and streets.

This map unit is in capability subclass VIe.

70E—Klickitat stony loam, 3 to 30 percent slopes. This deep, well drained soil is on narrow ridgetops on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from igneous rock. Areas are elongated in shape and are 10 to 80 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, salal, oceanspray, vine maple, western swordfern, wild blackberry, and western brackenfern. Elevation is 500 to 2,600 feet in the Coast Range and 1,200 to 3,100 feet in the Cascade Range. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 46 to 53 degrees F, and the average frost-free period is 150 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 1.5 inches thick. The surface layer is dark brown stony loam about 13 inches thick. The subsoil is dark brown very cobbly clay loam about 26 inches thick. The substratum, to a depth of 50 inches, is dark brown extremely cobbly loam. Fractured basalt is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Kilchis, Kinney, McCully, and Peavine soils, Rock outcrop, and a soil that is similar to this Klickitat soil but is 20 to 40 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Klickitat soil is moderate. Available water capacity is about 2 to 5 inches. Water supplying capacity is 16 to 19 inches. Effective rooting depth is 40 to 60 inches. Runoff is slow to medium, and the hazard of water erosion is slight.

This unit is used for timber production, wildlife habitat, watershed, and recreation and as rock quarries.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 144. The potential production per acre is 9,900 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,840 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Stones on the surface may restrict use of logging and planting equipment. Management that minimizes the risk of erosion is essential in harvesting timber. Trees are subject to windthrow because of limited rooting depth. Brushy plants such as vine maple and red alder limit natural regeneration of Douglas-fir. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are steepness of slope and stones on the surface and throughout the soil.

This unit is suited to homesite development. The main limitations are steepness of slope, stones, and depth to bedrock. Accessibility and distance from urban areas are also limitations for development of most areas of this unit. The deep cuts needed to provide essentially level building sites can expose bedrock. Septic tank absorption lines should be installed on the contour. Increasing the size of the absorption field can overcome the limitation of excessive coarse fragments.

This map unit is in capability subclass VIs.

71F—Klickitat stony loam, 30 to 50 percent north slopes. This deep, well drained soil is on smooth or dissected, north- and east-facing side slopes on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from igneous rock. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, salal, creambush oceanspray, vine maple, western swordfern, wild blackberry, and western brackenfern. Elevation is 500 to 2,600 feet in the Coast Range and 1,100 to 3,200 feet in the Cascade Range. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 46 to 53 degrees F, and the average frost-free period is 150 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 1.5 inches thick. The surface layer is dark brown stony loam about 13 inches thick. The subsoil is dark brown very cobbly clay loam about 26 inches thick. The substratum, to a depth of 50 inches, is dark brown extremely cobbly loam. Fractured basalt is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Kilchis, Kinney, McCully, and Peavine soils, Rock outcrop, and a soil that is similar to this Klickitat soil but is 20 to 40 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Klickitat soil is moderate. Available water capacity is about 2 to 5 inches. Water supplying capacity is 17 to 20 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production, wildlife habitat, watershed, and recreation and as rock quarries.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 156. The potential production per acre is 9,900 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,840 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Use of equipment on this unit is restricted by slope and stones on the surface. Trees are subject to windthrow because of limited rooting depth. Brushy plants such as red alder and vine maple limit natural regeneration of Douglas-fir. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are steepness of slope and stoniness.

This map unit is in capability subclass VIs.

71G—Klickitat stony loam, 50 to 75 percent north slopes. This deep, well drained soil is on smooth or dissected, north- and east-facing side slopes on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from igneous rock. Areas are elongated in shape and are 10 to 100 acres or more in size. The native vegetation is mainly Douglas-fir, western hemlock, salal, creambush oceanspray, vine maple, western swordfern, wild blackberry, and western brackenfern. Elevation is 500 to 2,600 feet in the Coast Range and 1,000 to 3,000 feet in the Cascade Range. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 46 to 52 degrees F, and the average frost-free period is 150 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 1.5 inches thick. The surface layer is dark brown stony loam about 13 inches thick. The subsoil is dark brown very cobbly clay loam about 26 inches thick. The substratum, to a depth of 50 inches, is dark brown extremely cobbly loam. Fractured basalt is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Kilchis, Kinney, and McCully soils, Rock outcrop, and a soil that is similar to this Klickitat soil but is 20 to 40 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Klickitat soil is moderate. Available water capacity is about 2 to 5 inches. Water supplying capacity is 17 to 20 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production, wildlife habitat, watershed, and recreation and as rock quarries.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 156. The potential production per acre is 8,700 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 77,280 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Tractor methods of harvesting trees are difficult to use because of the steepness of slope. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Trees are subject to windthrow because of limited rooting depth. Brushy plants such as red alder and vine maple limit natural regeneration of Douglas-fir. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

This map unit is in capability subclass VIIs.

72F—Klickitat stony loam, 30 to 50 percent south slopes. This deep, well drained soil is on smooth or dissected, south- and west-facing side slopes on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from igneous rock. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, salal, creambush oceanspray, vine maple, western swordfern, wild blackberry, and western brackenfern. Elevation is 500 to 2,700 feet in the Coast Range and 1,200 to 3,400 feet in the Cascade Range. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 46 to 53 degrees F, and the average frost-free period is 150 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 1.5 inches thick. The surface layer is dark brown stony loam about 13 inches thick. The subsoil is dark brown very cobbly clay loam about 26 inches thick. The substratum, to a depth of 50 inches, is dark brown extremely cobbly loam. Fractured basalt is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Blachly, Bohannon, Kilchis, Kinney, and Peavine soils, Rock outcrop, and a soil that is similar to this Klickitat soil but is 20 to 40 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Klickitat soil is moderate. Available water capacity is about 2 to 5 inches. Water supplying capacity is 16 to 19 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, watershed, and recreation and as rock quarries.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 140. The potential production per acre is 8,700 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 77,280 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Tree growth is severely retarded in areas adjacent to the coast that are directly exposed to onshore winds.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Use of equipment on this unit is restricted by slope and stones on the surface. Trees are subject to windthrow because of limited rooting depth. Brushy plants such as red alder and salal limit natural regeneration of Douglas-fir. Droughtiness caused by coarse fragments in the soil and by the presence of the soil on south-facing side slopes decreases seedling survival. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are steepness of slope and stoniness.

This map unit is in capability subclass VIs.

72G—Klickitat stony loam, 50 to 75 percent south slopes. This deep, well drained soil is on smooth or dissected, south- and west-facing side slopes on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from igneous rock. Areas are elongated or irregular in shape and are 20 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, salal, creambush oceanspray, vine maple, western swordfern, wild blackberry, and western brackenfern. Elevation is 500 to 2,800 feet in the Coast Range and 1,400 to 3,500 feet in the Cascade Range. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 46 to 53 degrees F, and the average frost-free period is 150 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 1.5 inches thick. The surface layer is dark brown stony loam about 13 inches thick. The subsoil is dark brown very cobbly clay loam about 26 inches thick. The substratum, to a depth of 50 inches, is dark brown extremely cobbly loam. Fractured basalt is at a depth of 50 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Blachly, Bohannon, Kilchis, Kinney, and Peavine soils, Rock outcrop, and a soil that is similar to this Klickitat soil but is 20 to 40 inches deep to bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Klickitat soil is moderate. Available water capacity is about 2 to 5 inches. Water supplying capacity is 16 to 19 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production, wildlife habitat, and recreation and as rock quarries.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 140. The potential production per acre is 9,000 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 81,120 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting trees are difficult to use because of the steepness of slope. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Trees are subject to windthrow because of limited rooting depth. Brushy plants such as red alder and salal limit natural regeneration of Douglas-fir. Droughtiness caused by coarse fragments in the soil and by the presence of the soil on south-facing side slopes decreases seedling survival. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

This map unit is in capability subclass VIIs.

73—Linslaw loam. This deep, somewhat poorly drained soil is along drainageways dissecting old terraces and colluvial fans. It formed in old mixed alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 80 acres in size. The vegetation in areas not cultivated is mainly grasses, willows, Oregon ash, and scattered Oregon white oak, Douglas-fir, and ponderosa pine. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown and dark brown loam about 16 inches thick. The subsoil is pale brown and grayish brown, mottled clay loam about 26 inches thick. The upper part of the substratum is variegated clay 14 inches thick, and the lower part to a depth of 60 inches or more is grayish brown sandy clay loam.

Included in this unit are small areas of Noti and Veneta soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Linslaw soil is slow. Available water capacity is about 9 to 12 inches. Effective rooting depth is limited by a high water table that is at a depth of 1.5 to 2.5 feet from November to May. Runoff is slow, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

This unit is used mainly for shallow-rooted or water-tolerant crops. It is also used for wildlife habitat and recreation.

This unit is suited to a variety of crops. Tile drainage can be used to lower the water table if a suitable outlet is available. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

If this unit is used for homesite development, the main limitation is wetness. Buildings and roads can be designed to offset the effects of shrinking and swelling. Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is in capability subclass IIIw.

74B—Lint silt loam, 0 to 7 percent slopes. This deep, well drained soil is on marine terraces and on ridgetops in areas of dissected terraces. It formed in mixed alluvium and volcanic ash. Areas are elongated or irregular in shape and are 3 to 160 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Sitka spruce, red alder, western hemlock, vine maple, salal, evergreen huckleberry, and other shrubs. Elevation is 30 to 600 feet. The average annual precipitation is 60 to 75 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface is covered with a mat of needles and roots about 2 inches thick. The surface layer is dark brown silt loam about 16 inches thick. The subsoil is dark brown to yellowish brown silt loam and silty clay loam about 43 inches thick. The substratum to a depth of 69 inches is yellowish brown, mottled silty clay loam.

Included in this unit are small areas of Bullards, Fendall, Ferrelo, Preacher, and Slickrock soils. Also included, in depressional areas along drainageways, is a soil that is similar to this Lint soil but is moderately well drained to poorly drained. Included areas make up about 15 percent of the total acreage.

Permeability of this Lint soil is moderate. Available water capacity is about 12 to 14 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for timber production, homesites, pasture, recreation, and wildlife habitat. Vegetable gardens produce well in most years, but few vegetables are produced for commercial use. The unit is used for the production of Christmas trees in a few areas.

This unit is suited to cool-season crops. In summer, irrigation may be required for maximum production of late-season crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff. Crop residue left on or near the surface helps to maintain tilth and control erosion. Vegetable gardens produce good yields if lime and fertilizer are used. Cool-season vegetables and berries should be selected for commercial production. Grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

If this unit is used for pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 160. The potential production per acre is 10,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 95,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Tree growth is severely retarded in areas adjacent to the coast that are directly exposed to onshore winds.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Reforestation should be carefully managed to reduce competition from undesirable plants. Reforestation can be accomplished by planting Douglas-fir, Sitka spruce, and western hemlock seedlings. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Logging roads need heavy base rock because of the low strength of the soil.

This unit is suited to recreational development. It has few limitations. It can be used for camp and picnic areas, playgrounds, and paths and trails. Plant cover can be maintained by controlling traffic. Areas suitable for small ponds are common along drainageways.

If this unit is used for homesite development, the main limitation is low strength of the soil. If buildings are constructed, properly designing foundations and footings helps to offset the limited ability of the soil to support a load. Roads for year-round use need heavy base rock. The possibility of settlement can be minimized by compacting the building site before construction is begun.

Erosion is a hazard where the soil in this unit is exposed. Only the part of the site that is used for construction should be disturbed. Selection of climatically adapted plants is important for the establishment of lawns, shrubs, trees, and vegetable gardens.

Septic tank absorption lines on this unit should be installed on the contour.

This map unit is in capability subclass IIIe.

74C—Lint silt loam, 7 to 12 percent slopes. This deep, well drained soil is on dissected marine terraces. It formed in mixed alluvium and volcanic ash. Areas are irregular in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Sitka spruce, red alder, western hemlock, vine maple, salal, evergreen huckleberry, and other shrubs. Elevation is 30 to 600 feet. The average annual precipitation is 60 to 75 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface is covered with a mat of needles and roots about 2 inches thick. The surface layer is dark brown silt loam about 16 inches thick. The subsoil is dark brown to yellowish brown silt loam and silty clay loam about 43 inches thick. The substratum, to a depth of 69 inches, is yellowish brown, mottled silty clay loam.

Included in this unit are small areas of Bullards, Fendall, Ferrelo, Preacher, and Slickrock soils. Also included, in depressional areas along drainageways, is a soil that is similar to this Lint soil but is somewhat poorly drained. Included areas make up about 15 percent of the total acreage.

Permeability of this Lint soil is moderate. Available water capacity is about 12 to 14 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for timber production, homesites, pasture, recreation, and wildlife habitat. It is used for the production of Christmas trees in a few areas.

This unit is suited to cool-season crops. In summer, irrigation may be required for maximum production of late-season crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff. Crop residue left on or near the surface helps to maintain tilth and control erosion.

Vegetable gardens produce good yields if lime and fertilizer are used. Cool-season vegetables and berries should be selected for commercial production. Grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

If this unit is used for pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 160. The potential production per acre is 10,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 95,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Tree growth is severely retarded in areas adjacent to the coast that are directly exposed to onshore winds.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir, Sitka spruce, and western hemlock seedlings. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Logging roads need heavy base rock because of the low strength of the soil.

This unit is suited to recreational development. It is limited mainly by steepness of slope. It can be used for camp and picnic areas and paths and trails. Plant cover can be maintained by controlling traffic.

If this unit is used for homesite development, the main limitations are low strength of the soil and steepness of slope. If buildings are constructed, properly designing foundations and footings helps to offset the limited ability of the soil to support a load. Roads for year-round use need heavy base rock. The possibility of settlement can be minimized by compacting the building site before construction is begun. Erosion is a hazard where the soil in this unit is exposed. Only the part of the site that is used for construction should be disturbed.

Selection of climatically adapted plants is important for the establishment of lawns, shrubs, trees, and vegetable gardens.

Septic tank absorption lines on this unit should be installed on the contour.

This map unit is in capability subclass IIIe.

74D—Lint silt loam, 12 to 20 percent slopes. This deep, well drained soil is on dissected marine terraces. It formed in mixed alluvium and volcanic ash. Areas are irregular in shape and are 3 to 100 acres in size. The native vegetation is mainly Douglas-fir, Sitka spruce, red alder, western hemlock, vine maple, salal, evergreen huckleberry, and other shrubs. Elevation is 30 to 600 feet. The average annual precipitation is 60 to 75 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface is covered with a mat of needles and roots about 2 inches thick. The surface layer is dark brown silt loam about 16 inches thick. The subsoil is dark brown to yellowish brown silt loam and silty clay loam about 43 inches thick. The substratum, to a depth of 69 inches, is yellowish brown, mottled silty clay loam.

Included in this unit are small areas of Astoria Variant, Bullards, Fendall, Ferrelo, Preacher, and Slickrock soils and a soil that is similar to this Lint soil but is somewhat poorly drained and is in depressional areas along drainageways. Included areas make up about 15 percent of the total acreage.

Permeability of this Lint soil is moderate. Available water capacity is about 12 to 14 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 60 inches or more. Runoff is moderately rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production, wildlife habitat, recreation, pasture, and homesites. A few areas of the unit are used for Christmas tree production.

This unit is suited to pasture. Grazing when the soil in the unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates and pasture rotation help to maintain the quality of forage.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 160. The potential production per acre is 10,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 95,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Tree growth is severely retarded in areas adjacent to the coast that are directly exposed to onshore winds.

Because the soil in this unit has low strength and is subject to compaction, most planting and harvesting equipment can be used only during dry periods. Highlead or skyline logging is less damaging to the soil than most other methods. Logging roads need heavy base rock because of the low soil strength. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir, Sitka spruce, and western hemlock seedlings.

If this unit is used for recreational development, the main limitation is steepness of slope. Some areas are suited to paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitations are steepness of slope and low soil strength. Preserving the existing plant cover during construction helps to control erosion. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The possibility of settlement can be minimized by compacting the building site before construction is begun.

Steepness of slope is a concern in installing septic tank absorption fields on this unit. Absorption lines should be installed on the contour.

This map unit is in capability subclass IVe.

74E—Lint silt loam, 20 to 40 percent slopes. This deep, well drained soil is on dissected marine terraces. It formed in mixed alluvium and volcanic ash. Areas are irregular in shape and are 3 to 100 acres in size. The native vegetation is mainly Douglas-fir, Sitka spruce, red alder, western hemlock, vine maple, salal, evergreen huckleberry, and other shrubs. Elevation is 30 to 600 feet. The average annual precipitation is 60 to 75 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface is covered with a mat of needles and roots about 2 inches thick. The surface layer is dark brown silt loam about 16 inches thick. The subsoil is dark brown to yellowish brown silt loam and silty clay loam about 43 inches thick. The substratum, to a depth of 69 inches, is yellowish brown, mottled silty clay loam.

Included in this unit are small areas of Astoria Variant, Fendall, Preacher, Salander, and Slickrock soils. Included areas make up about 20 percent of the total acreage.

Permeability of this Lint soil is moderate. Available water capacity is about 12 to 14 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is more than 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 160. The potential production per acre is 10,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 95,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Tree growth is severely retarded in areas adjacent to the coast that are directly exposed to onshore winds.

Steepness of slope limits the kinds of equipment that can be used in forest management. Because the soil in this unit has low strength and is subject to compaction, most planting and harvesting equipment can be used only during dry periods. Highlead and other cable logging systems are less damaging to the soil than surface skidding. Logging roads need heavy base rock because of the low soil strength. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir, Sitka spruce, and western hemlock seedlings.

This unit is limited for recreational development by steepness of slope. Paths and trails should extend across the slope. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are steepness of slope and low soil strength. Cutbanks are not stable and are subject to slumping.

Preserving the existing plant cover during construction helps to control erosion. Buildings and roads should be designed to offset the limited ability of the soil to support a load. The possibility of settlement can be minimized by compacting the building site before construction is begun.

This map unit is in capability subclass VIe.

75—Malabon silty clay loam. This deep, well drained soil is on broad valley terraces. It formed in silty and clayey alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, ponderosa pine, poison-oak and other shrubs, and grasses. Elevation is 300 to 650 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown and dark brown silty clay loam about 12 inches thick. The subsoil is dark brown and brown silty clay loam and silty clay about 30 inches thick. The substratum is brown clay loam to a depth of 60 inches or more. Stratified sand and gravel are at a depth of 40 inches or more in some areas.

Included in this unit are small areas of Chapman, Coburg, and Salem soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Malabon soil is moderately slow. Available water capacity is about 9 to 12 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for row crops, small grain, hay and pasture, orchards, and urban development. It is also used for recreation.

This unit is well suited to all climatically adapted crops. It is potentially one of the most productive units in the survey area. The silty clay loam surface layer is subject to compaction if it is worked when moist. It is subject to puddling if it is left barren during the rainy season.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Grain and grasses grown on this unit respond to nitrogen; legumes respond to phosphorus and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

If this unit is used for hay and pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to recreational development. It is limited mainly by the content of clay in the soil and the moderately slow permeability.

The main limitations of this unit for homesite and urban development are the moderately slow permeability and moderate shrink-swell potential, which may limit the construction of basements and certain other types of structures. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

Septic tank absorption fields are suitable for sewage disposal on this unit.

This map unit is in capability class I.

76—Malabon-Urban land complex. This map unit is on broad valley terraces. Slope is 0 to 3 percent. Areas are irregular in shape and are 3 to 100 acres or more in size. The native vegetation is mainly Douglas-fir, Oregon white oak, ponderosa pine, poison-oak and other shrubs, and grasses. Elevation is 300 to 650 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 40 percent relatively undisturbed Malabon silty clay loam, 10 percent disturbed Malabon silty clay loam, and 45 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Chapman, Coburg, and Salem soils. Included areas make up about 5 percent of the total acreage.

The relatively undisturbed Malabon soil is deep and well drained. It formed in silty and clayey alluvium. Typically, the surface layer is very dark brown and dark brown silty clay loam about 12 inches thick. The subsoil is dark brown and brown silty clay loam and silty clay about 30 inches thick. The substratum is brown clay loam to a depth of 60 inches or more. Stratified sand and gravel are at a depth of 40 inches or more in places.

Permeability of the relatively undisturbed Malabon soil is moderately slow. Available water capacity is about 9 to 12 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

The disturbed Malabon soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Malabon, Coburg, Salem, and Chapman soils that have been cut or graded. The characteristics of the disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards, parks, and open areas around and between buildings.

If this unit is used for urban development, the main limitations are the moderate shrink-swell potential and moderately slow permeability. The moderate shrink-swell potential may limit use of the unit for basements and certain other structures. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

Septic tank absorption fields are suited to this unit.

This map unit is not assigned a capability classification.

77B—Marcola cobbly silty clay loam, 2 to 7 percent slopes. This deep, moderately well drained soil is on fans. It formed in alluvium and colluvium derived from mixed sedimentary and volcanic rock. Areas are fan-shaped and are 3 to 60 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, shrubs, and grasses. Elevation is 400 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown cobbly silty clay loam about 15 inches thick. The upper 18 inches of the subsoil is dark brown very cobbly clay and extremely cobbly clay, and the lower 27 inches is multicolored, mottled extremely cobbly clay.

Included in this unit are small areas of McAlpin and Salem soils and Dixonville, Nekia, and Philomath soils on knobs and toe slopes. Included areas make up about 15 percent of the total acreage.

Permeability of this Marcola soil is slow. Available water capacity is about 6 to 9 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is limited by a high water table that is at a depth of 3.5 to 4.5 feet from November to May. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for small grain, hay, pasture, homesites, and Christmas tree production.

This unit is better suited to pasture and small grain than to most other crops. Erosion can be reduced if fall grain is seeded early, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion and compaction.

Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

If this unit is used for recreational development, the main limitations are cobbles and pebbles in the surface layer, clay content, and slow permeability. The unit is suitable for paths and picnic areas during the drier part of the year.

Population growth has resulted in increased construction of homes on this unit. The main limitations are the slow permeability, moderate to high shrink-swell potential, and low soil strength. If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load. Roads need the maximum amount of base rock to prevent cracking and separation as a result of low soil strength and shrinking and swelling.

Landscaping plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is in capability subclass IVs.

78—McAlpin silty clay loam. This deep, moderately well drained soil is on flood plains and alluvial fans. It formed in fine textured mixed alluvium. Slopes are 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, ponderosa pine, red alder, Oregon ash, shrubs, and grasses. Elevation is 300 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown silty clay loam about 14 inches thick. The upper 8 inches of the subsoil is dark brown silty clay, and the lower 38 inches is brown, mottled silty clay and clay.

Included in this unit are small areas of Abiqua and Waldo soils, Riverwash, and Fluvents. Included areas make up about 15 percent of the total acreage.

Permeability of this McAlpin soil is moderately slow. Available water capacity is about 8 to 20 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is limited by a high water table that is at a depth of 2 to 3 feet from November to March. Runoff is slow, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

This unit is used mainly for cultivated crops. It is also used as woodland and for wildlife habitat and recreation.

This unit is suited to cultivated crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Tile drainage on this unit improves productivity and facilitates management. Good outlets generally are available.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

If this unit is used for hay and pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 159. The potential production per acre is 10,140 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 94,400 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the susceptibility of the soil to compaction and plant competition. Limiting use of heavy equipment for thinning and harvesting to periods when the soil is dry helps to prevent compaction and to maintain the permeability and productivity of the soil. Ripping skid trails and landing areas after logging helps to break up the compacted layer. Undesirable plants prevent adequate natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings.

If this unit is used for recreational development, the main limitations are wetness and clay content.

If this unit is used for homesite development, the main limitations are the moderately slow permeability, high shrink-swell potential of the clayey subsoil, and the hazard of flooding. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Roads for year-round use need heavy base rock.

This map unit is in capability subclass IIw.

79—McBee silty clay loam. This deep, moderately well drained soil is on flood plains. It formed in recent mixed alluvium. Slope is 0 to 3 percent. Areas are elongated and commonly occur as stringers along abandoned channels. The areas are 3 to 75 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, black cottonwood, and willow. Elevation is 290 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silty clay loam about 24 inches thick. The subsoil is dark grayish brown and brown, mottled silt loam about 17 inches thick. The substratum to a depth of 62 inches is dark brown, mottled silt loam.

Included in this unit are small areas of Chehalis, Cloquato, Newberg, and Wapato soils. Included areas make up about 15 percent of the total acreage.

Permeability of this McBee soil is moderate. Available water capacity is about 10 to 12 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is limited by a high water table that is at a depth of 2 to 3 feet from November to April. Runoff is slow, and the hazard of water erosion is moderate. The soil is subject to frequent, brief periods of flooding from November to May.

This unit is used mainly for cultivated crops. It is also used for recreation during the dry period in summer.

This unit is suited to most cultivated crops. Deep-rooted, water-sensitive perennial crops such as alfalfa require deep tile drainage. Good outlets commonly are available for tile drainage, which improves the productivity and manageability of the soil.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

Streambank cutting, erosion caused by overflow, and sedimentation can be reduced by maintaining adequate plant cover.

If this unit is used for hay and pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

If this unit is used for recreational development, the main limitations are wetness and the clay content of the soil.

This unit generally is not suited to homesite development. The main limitations are seasonal flooding and the seasonal high water table. Flooding can be controlled only by use of major flood control structures. Drainage is needed if roads and building foundations are constructed.

This map unit is in capability subclass IIw.

80F—McCully clay loam, 30 to 50 percent slopes. This deep, well drained soil is on north- and east-facing side slopes of uplands in the Cascade Range. It formed in colluvium derived from tuffaceous rock. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, salal, and western swordfern. Elevation is 1,200 to 2,800 feet. The average annual precipitation is 60 to 110 inches, the average annual air temperature is 46 to 51 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark reddish brown clay loam about 11 inches thick. The subsoil is dark reddish brown and yellowish red clay about 44 inches thick. Weathered tuffaceous rock is at a depth of 55 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Blachly, Bohannon, Cumley, Honeygrove, Kinney, Klickitat, and Peavine soils. Included areas make up about 15 percent of the total acreage.

Permeability of this McCully soil is moderately slow. Available water capacity is about 8 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

This unit is used mainly for timber production. It is also used for wildlife habitat and as watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 162. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the clay texture of the soil, steepness of slope, and plant competition. Tractor logging is difficult on the steeper slopes. Highlead logging is more efficient and is less damaging to the soil surface. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Roads for year-round use need heavy base rock.

If this unit is used for homesite or recreational development, the main limitations are moderately slow permeability, steepness of slope, and low soil strength. Construction of dwellings, both with and without basements, and of local roads and streets is limited by low soil strength and slope. Cutbanks are not stable and are subject to slumping. Roads for year-round use need heavy base rock.

This map unit is in capability subclass VIe.

80G—McCully clay loam, 50 to 70 percent slopes. This deep, well drained soil is on north- and east-facing side slopes on uplands in the Cascade Range. It formed in colluvium derived from tuffaceous rock. Areas are irregular in shape and are 10 acres to several hundred acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, western redcedar, western swordfern, and salal. Elevation is 1,200 to 2,800 feet. The average annual precipitation is 60 to 120 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 140 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark reddish brown clay loam about 11 inches thick. The subsoil is dark reddish brown and yellowish red clay about 44 inches thick. Weathered tuffaceous rock is at a depth of 55 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Blachly, Bohannon, Kinney, Klickitat, and Peavine soils. Included areas make up about 15 percent of the total acreage.

Permeability of this McCully soil is moderately slow. Available water capacity is about 8 to 12 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production. It is also used for wildlife habitat and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 162. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the clay texture of the soil, steepness of slope, and plant competition. Highlead logging is more efficient than other methods of harvesting timber and is less damaging to the soil surface. If site preparation is not adequate, competition from undesirable plants can prevent or prolong natural or artificial reestablishment of trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using and maintaining properly designed road drainage systems. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Roads for year-round use need heavy base rock.

If this unit is used for homesite or recreational development, the main limitations are steepness of slope, moderately slow permeability, and low soil strength. Construction of dwellings, both with and without basements, and of local roads and streets is limited by low soil strength and slope. Cutbanks are not stable and are subject to slumping. Roads for year-round use need heavy base rock.

This map unit is in capability subclass VIIe.

81D—McDuff clay loam, 3 to 25 percent slopes. This moderately deep, well drained soil is on broad ridges and slump benches on uplands in the Cascade

Range. It formed in colluvium and residuum derived from volcanic tuff and breccia. Areas are irregular in shape and are 5 to 50 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, western redcedar, bigleaf maple, red alder, salal, tall Oregon-grape, hazelnut, and western brackenfern. Elevation is 1,400 to 3,200 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 45 to 51 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is very dark brown clay loam about 6 inches thick. The upper 8 inches of the subsoil is very dark grayish brown clay loam, and the lower 23 inches is dark brown and brown clay and silty clay. Weathered bedrock is at a depth of 37 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bohannon, Cumley, Honeygrove, Klickitat, and Peavine soils. Included areas make up about 15 percent of the total acreage.

Permeability of this McDuff soil is moderately slow. Available water capacity is about 6 to 8 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 142. The potential production per acre is 8,880 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 79,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Tractor methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Roads need heavy base rock for wet-season use. Cuts and fills should be seeded to control erosion. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are slope and the clay content of the soil, which restricts use of paths and trails when wet.

If this unit is used for homesite development, the main limitations are slope, moderately slow permeability, depth to rock, and low soil strength. Buildings and roads should be designed to offset the effects of shrinking and swelling and the limited ability of the soil in this unit to support a load. Cutbanks are not stable and are subject to slumping.

This map unit is in capability subclass VIe.

81F—McDuff clay loam, 25 to 50 percent slopes. This moderately deep, well drained soil is on uplands in the Cascade Range. It formed in colluvium and residuum derived from volcanic tuff and breccia. Areas are irregular in shape and are 5 to 70 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, salal, tall Oregon-grape, hazelnut, and western brackenfern. Elevation is 1,400 to 3,200 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 45 to 51 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is very dark brown clay loam about 6 inches thick. The upper 8 inches of the subsoil is very dark grayish brown clay loam, and the lower 23 inches is dark brown and brown clay and silty clay. Weathered bedrock is at a depth of 37 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bohannon, Cumley, Klickitat, McCully, and Peavine soils. Included areas make up about 15 percent of the total acreage.

Permeability of this McDuff soil is moderately slow. Available water capacity is about 6 to 8 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 142. The potential production per acre is 8,880 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 79,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Deep cuts are unstable and are subject to slumping. Erosion control and proper maintenance of roadside drainage minimize slumping and mass movement of soil. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

The steepness of slope limits the kinds of equipment that can be used in forest management. Surface methods of logging can be used, but highlead or other cable logging systems are more efficient and are less damaging to the soil surface. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This map unit is in capability subclass VIe.

81G—McDuff clay loam, 50 to 70 percent slopes. This moderately deep, well drained soil is on uplands in the Cascade Range. It formed in colluvium and residuum derived from volcanic tuff and breccia. Areas are irregular in shape and are 5 to 40 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, bigleaf maple, salal, tall Oregon-grape, hazelnut, and western brackenfern. Elevation is 1,400 to 3,200 feet. The average annual precipitation is about 60 to 90 inches, the average annual air temperature is 45 to 51 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is very dark brown clay loam about 6 inches thick. The upper 8 inches of the subsoil is very dark grayish brown clay loam, and the lower 23 inches is dark brown and brown clay and silty clay. Weathered bedrock is at a depth of 37 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bohannon, Kilchis, and Klickitat soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this McDuff soil is moderately slow. Available water capacity is about 5 to 8 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 142. The potential production per acre is 8,880 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 79,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Tractor methods of harvesting timber are difficult to use because of the steepness of slope. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface.

Management that minimizes the risk of erosion is essential in harvesting timber. Deep cuts are unstable. To minimize the risk of mass movement of soil, roads should be located in the more gently sloping areas. Proper maintenance of roadside drainage also helps to minimize the hazard of mass movement of soil or slumping. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This map unit is in capability subclass VIIe.

82C—Meda loam, 2 to 12 percent slopes. This deep, well drained soil is on fans and terraces. It formed in alluvium and colluvium derived from sedimentary and igneous rock. Areas are elongated to fan-shaped and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, western redcedar, red alder, bigleaf maple, vine maple, and western swordfern. Elevation is 20 to 800 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 140 to 200 days.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsoil is dark brown and brown gravelly clay loam about 32 inches thick. The substratum to a depth of 60 inches or more is multicolored, stratified very gravelly sandy loam.

Included in this unit are small areas of Eilertsen, Nehalem, Nekoma, and Preacher soils, Fluvents, and a soil, in the steeper areas, that is similar to this Meda soil but has more than 35 percent rock fragments in the subsoil. Included areas make up about 15 percent of the total acreage.

Permeability of this Meda soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight to moderate.

This unit is used for hay and pasture, timber production, recreation, wildlife habitat, and homesites.

This unit is suited to hay and pasture. In summer, irrigation is required for maximum production of most forage crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. Grass and legumes grow well if adequate fertilizer is used and irrigation is provided. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 161. The potential production per acre is 10,260 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,000 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Proper design of road drainage systems and care in placement of culverts also help to control erosion. Reforestation should be carefully managed to reduce competition from undesirable understory plants. The gravelly texture of the soil may limit use of planting equipment and contribute to seedling mortality in some areas. Among the trees that are suitable for planting are western hemlock and Douglas-fir.

If this unit is used for recreational development, the main limitations are pebbles and slope. The unit is suitable for paths and trails if the seep areas are avoided.

If this unit is used for homesite development, the main limitations are slope and low soil strength. Homesites should be carefully selected to avoid areas that are directly in the path of debris flows that scour drainageways. Onsite investigation is needed to determine the stability of the surrounding upland soils.

If buildings are constructed on this unit, properly designing foundations and footings helps to offset the limited ability of the soil to support a load. Roads for year-round use need heavy base rock. Excavations for houses and access roads may expose material that has a high gravel content. To help control erosion, only the part of the site that is used for construction should be disturbed. Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns.

If this unit is used for septic tank absorption fields, the limitation of moderate permeability can be overcome by increasing the size of the absorption field. Permeability of the substratum is rapid in some areas; therefore, to avoid pollution of streams and ground water, adequate separation must be maintained between the bottom of the disposal trench and the rapidly permeable substratum.

This map unit is in capability subclass IIIe.

83B—Minniece silty clay loam, 0 to 8 percent slopes. This deep, somewhat poorly drained to poorly drained soil is in narrow drainageways and in depressional areas on uplands. It formed in alluvium and colluvium derived from volcanic tuff and breccia. Areas are irregular in shape and are 5 to 30 acres in size. The native vegetation is mainly red alder, willow, sedges, and some western redcedar, western hemlock, and Douglas-fir. Elevation is 1,000 to 3,000 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 45 to 51 degrees F, and the average frost-free period is 145 to 190 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 1 inch thick. The surface layer is very dark brown silty clay loam about 10 inches thick. The subsoil is dark yellowish brown, grayish brown, and gray, mottled silty clay and clay about 29 inches thick. The substratum to a depth of 60 inches or more is variegated gray, mottled clay. In some areas the soil is very poorly drained.

Included in this unit are small areas of Cumley soils and wet seep areas. Included areas make up about 15 percent of the total acreage.

Permeability of this Minniece soil is very slow. Available water capacity is about 3 to 6 inches. Water supplying capacity is 20 to 22 inches. Effective rooting depth is limited by a high water table that is at the surface to a depth of 2 feet from November to May. Runoff is slow to medium, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

This unit is used mainly for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 130. The potential production per acre is 7,740 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 75,690 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 90 years old.

The main concerns in producing and harvesting timber are equipment limitations, seedling mortality, windthrow hazard, and plant competition. Trees should be water tolerant, and they should be planted or harvested during dry periods. Trees are subject to windthrow when the water table is high during periods of heavy rainfall and when strong winds occur. The hazard of windthrow is high for stands of trees 20 to 30 years old. Undesirable plants prevent adequate natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir, western hemlock, and western redcedar seedlings.

If this unit is used for recreational development, the main limitations are the very slow permeability, clayey soil texture, wetness, and the hazard of flooding. Use is limited mainly to paths and trails.

If this unit is used for homesite development, the main limitations are shrink-swell potential, wetness, the hazard of flooding, and very slow permeability.

This map unit is in capability subclass VIw.

84D—Mulkey loam, 5 to 25 percent slopes. This moderately deep, well drained soil is on peaks and ridges on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from igneous rock and volcanic ash. Areas are irregular in shape and are 10 to 40 acres in size. The native vegetation is mainly noble fir, Douglas-fir, western hemlock, Pacific rhododendron, and common beargrass. Elevation is 3,000 to 4,700 feet. The average annual precipitation is 70 to 120 inches, the average annual air temperature is 42 to 45 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface layer is black loam about 15 inches thick. The next layer is dark reddish brown gravelly loam about 8 inches thick. The subsoil is dark brown cobbly loam about 4 inches thick. Fractured bedrock is at a depth of 27 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Hummington, Keel, and Yellowstone soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Mulkey soil is moderately rapid. Available water capacity is about 5 to 10 inches. Water supplying capacity is 15 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is moderate.

This unit is used mainly for recreation and timber production. It is also used for livestock grazing, wildlife habitat, and watershed.

This unit is suited to the production of noble fir. On the basis of a 100-year site curve, the mean site index for noble fir is 143. The potential production per acre is 11,200 cubic feet from an even-aged, fully stocked stand of trees 50 years old or 95,690 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 70 years old.

The main limitations for the management of timber are snowpack in winter, the hazard of windthrow, and seedling mortality. Snowpack limits the use of equipment and restricts access. Careful use of wheeled and tracked equipment reduces disturbance of the protective layer of duff. Because roots are restricted by bedrock, trees commonly are subject to windthrow. Natural reforestation of harvested areas by noble fir occurs if a seed source is present. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting noble fir or Douglas-fir seedlings. Seedling mortality can be reduced by providing shade for seedlings.

This unit is suited to recreational development. It is used for camp and picnic areas. Brush screening is difficult to establish and maintain at campsites. Controlling traffic helps to maintain grasses and prevent erosion. Winter use is limited by snow accumulation. The soil in this unit has a high potential for frost action because of the high content of organic matter.

This unit is suited to use as quarries because of the thin soil mantle and the underlying bedrock that is mostly unweathered.

This map unit is in capability subclass VIe.

85—Natroy silty clay loam. This deep, poorly drained soil is in drainageways and other depressional areas on terraces and fans. It formed in mixed, fine-textured alluvium. Slope is 0 to 2 percent. Areas are irregular in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly rushes, sedges, grasses, and scattered rose, hawthorn, and Oregon ash. Elevation is 300 to 700 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silty clay loam about 5 inches thick. The next layer is very dark gray clay about 21 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown, dark brown, and brown clay and gravelly clay. In some areas the surface layer is silty clay.

Included in this unit are small areas of Bashaw, Courtney, and Dayton soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Natroy soil is very slow. Available water capacity is about 2 to 4 inches. Water supplying capacity is 14 to 20 inches. Effective rooting depth is limited by a high water table that is 1 foot above the surface to 1 foot below the surface from November to May. Runoff is slow to ponded, and the hazard of water erosion is slight. The soil is subject to frequent, long periods of flooding from November to May.

This unit is used for hay, pasture, and grass seed production.

If this unit is used for crops, the main limitations are clay content, wetness, and very slow permeability. Surface cracking is severe late in summer. Excessive water on the surface can be removed by use of open drains and tile drains. Tile drains have limited suitability for removing subsurface water because of the very slow permeability of the soil and lack of suitable outlets.

The soil in this unit generally is dryfarmed because irrigation water is difficult to obtain and because the soil conditions are not favorable for irrigation. Grain and grasses respond to nitrogen, and legumes respond to phosphorus and lime.

If this unit is used for hay and pasture, the main limitations are clay content, wetness, and very slow permeability. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from compaction.

If this unit is used for recreational development, the main limitations are clay content, wetness, and very slow permeability. The unit has fair suitability for picnic areas and paths and trails to be used during the dry season.

This unit is poorly suited to homesite development except in areas that have been built up with landfill and where a public sewer system has been provided. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Roads for year-round use need heavy base rock.

This unit is suited to ponds and sewage lagoons.

This map unit is in capability subclass IVw.

86—Natroy silty clay. This deep, poorly drained soil is in drainageways and other depressional areas on terraces and fans. It formed in fine-textured, mixed alluvium. Slope is 0 to 2 percent. Areas are irregular in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly rushes, sedges, grasses, and scattered rose, hawthorn, and Oregon ash. Elevation is 300 to 700 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silty clay about 5 inches thick. The next layer is very dark gray clay about 21 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown, dark brown, and brown clay and gravelly clay. In some areas the surface layer is silty clay loam.

Included in this unit are small areas of Bashaw, Courtney, and Dayton soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Natroy soil is very slow. Available water capacity is about 2 to 4 inches. Water supplying capacity is 14 to 18 inches. Effective rooting depth is limited by a high water table that is 1 foot above the surface to 1 foot below the surface from November to May. Runoff is very slow to ponded, and the hazard of water erosion is slight. The soil is frequently flooded for long periods from November to May.

This unit is used for pasture and grass seed production.

If this unit is used for crops, the main limitations are clay content, wetness, and very slow permeability. Workability of the surface layer is poor. The period during which this soil can be tilled is short. Ease of tillage depends on the moisture content of the surface layer. Surface cracking is severe late in summer. Excessive water on the surface can be removed by use of open drains and tile drains. Tile drains have limited suitability for removing subsurface water because of the very slow permeability of the soil and lack of suitable outlets.

The soil in this unit generally is dryfarmed because irrigation water is difficult to obtain and soil conditions are not favorable for irrigation. Grain and grasses respond to nitrogen, and legumes respond to phosphorus and lime.

If this unit is used for hay and pasture, the main limitations are clay content, wetness, and very slow permeability. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from compaction.

If this unit is used for recreational development, the main limitations are clay content, wetness, and very slow permeability. The unit has fair suitability for picnic areas and paths and trails for use during the dry season.

This unit is poorly suited to homesite development except in areas that have been built up with landfill and where a public sewer system has been provided. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Roads for year-round use need heavy base rock.

This unit is suited to ponds and sewage lagoons.

This map unit is in capability subclass IVw.

87—Natroy-Urban land complex. This map unit is in concave areas on terraces and fans. Slope is 0 to 2 percent. Areas are elongated or irregular in shape and are 3 to 100 acres in size. The native vegetation is mainly sedges, rushes, grasses, and scattered rose, hawthorn, and Oregon ash. Elevation is 300 to 600 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 50 percent relatively undisturbed Natroy silty clay loam, 10 percent disturbed Natroy silty clay loam, and 30 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Awbrig, Bashaw, Conser, Courtney, and Oxley soils. Included areas make up about 10 percent of the total acreage.

The relatively undisturbed Natroy soil is deep and poorly drained. It formed in mixed, fine-textured alluvium. Typically, the surface layer is very dark grayish brown silty clay loam about 5 inches thick. The next layer is very dark gray clay about 21 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown, dark brown, and brown clay and gravelly clay.

Permeability of this Natroy soil is very slow. Available water capacity is about 2 to 4 inches. Water supplying capacity is 14 to 20 inches. Effective rooting depth is limited by a high water table that is 1 foot above the surface to 1 foot below the surface from November to May. Runoff is very slow to ponded, and the hazard of water erosion is slight. The soil is subject to rare periods of flooding.

The disturbed Natroy soil has been covered by as much as 30 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material commonly is from adjacent areas of Natroy, Awbrig, Bashaw, Conser, Courtney, and Oxley soils that have been cut or graded. The characteristics of the disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development and recreation. Some areas are used for yards and open areas around and between buildings and for parks and greenbelts that are maintained to facilitate rapid removal of surface water by storm drains or floodway channels during periods of heavy rainfall.

Where the unit is used for urban development, the main limitations are high shrink-swell potential, wetness, and very slow permeability. If buildings are constructed on the unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Dikes and channels that have outlets to bypass floodwater can be used to protect buildings from flooding, but local ponding may occur in depressional areas during rainy periods. Plants that tolerate seasonal wetness, high clay content, and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is not assigned a capability classification.

88—Nehalem silt loam. This deep, well drained soil is on bottom lands in the Coast Range. It formed in recent silty alluvium. Slopes are 0 to 3 percent. Areas are elongated in shape and are 3 to 50 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, black cottonwood, red alder, bigleaf maple, vine maple, red huckleberry, and western swordfern. Elevation is 10 to 750 feet. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface layer is very dark brown silt loam about 15 inches thick. The upper 24 inches of the subsoil is dark yellowish brown silt loam, and the lower 9 inches is brown silty clay loam. The substratum to a depth of 60 inches or more is yellowish brown loam. Sandy strata are at a depth of more than 40 inches in some areas.

Included in this unit are small areas of Brenner, Eilertsen, Meda, Nekoma, and Nestucca soils and Fluvents. Included areas make up about 15 percent of the total acreage.

Permeability of this Nehalem soil is moderate. Available water capacity is about 11 to 12 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is limited by a high water table that is at a depth of 3 to 6 feet from December to April. Runoff is slow, and the hazard of water erosion is slight except during periods of flooding by adjacent streams. The soil is occasionally flooded for brief periods from December to April.

This unit is used mainly for hay and pasture. It is also used for gardens, orchards, Christmas trees, timber production, wildlife habitat, and recreation.

If this unit is used for hay and pasture, the main limitations are the hazard of seasonal flooding, the seasonal high water table, low soil fertility, and the very strong acidity of the soil. Grazing when this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. Use of lime and fertilizer promotes good growth of forage plants. In some years, supplemental irrigation is also needed.

This unit is suited to most cool-season crops. It is limited mainly by the hazard of flooding in winter, the seasonal high water table, and the cool, moist summer and fall that inhibit proper maturing of grain during most years. Deep-rooted crops are suited to areas where the natural drainage is adequate or where a drainage system has been installed. Most climatically adapted crops can be grown if the soil is protected from flooding late in winter and early in spring. The water table does not hinder growth of most adapted crops. In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 174. The potential production per acre is 11,160 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 106,280 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of flooding in winter and early in spring and the prolonged rainy season that keeps the soil wet most of the year.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Roads and landings can be protected from erosion by maintaining roadside drainage and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Brushy plants such as red alder, salmonberry, and salal limit natural regeneration of Douglas-fir. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand; however, machine planting is sometimes practical in dry years. Reforestation can be accomplished by planting Douglas-fir, western hemlock, Sitka spruce, and western redcedar seedlings. Additional protection from erosion during periods of flooding can be provided by interplanting with a cover crop.

If this unit is used for recreational development, the main limitation is the hazard of flooding in winter and spring. Drainage should be provided for paths and trails. Cuts and fills should be seeded or mulched.

This unit is poorly suited to homesite development. Protection from flooding is needed.

This map unit is in capability subclass IIc.

89C—Nekia silty clay loam, 2 to 12 percent slopes. This moderately deep, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium and residuum derived from basalt and tuff. Areas are irregular in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, Pacific madrone, and vine maple. Elevation is 350 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 51 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of needles, twigs, and moss about 0.5 inch thick. The surface layer is dark reddish brown silty clay loam about 10 inches thick. The subsoil is dark reddish brown and reddish brown clay about 25 inches thick. Fractured basalt is at a depth of about 35 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine soils, Jory soils in flat areas, Ritner soils on narrow ridges, and a soil that is similar to this Nekia soil but has more than 35 percent rock fragments in the surface layer and subsoil. Included areas make up about 15 percent of the total acreage.

Permeability of this Nekia soil is moderately slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is moderate.

This unit is used for hay, pasture, cultivated crops, timber production, recreation, and homesites.

This unit is suited to hay and pasture. It is also suited to row crops if irrigation water is available. Fertilizer is needed for optimum growth of grasses and legumes. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from compaction and erosion. Areas of this unit used for Christmas tree nurseries may be subject to erosion if clean cultivation is used. If the soil is not protected by cover crops, gullies will form on this unit in a very short time.

This unit is suited to the production of timber. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 151. The potential production per acre is 9,540 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 87,680 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is suited to recreational development. It is limited mainly by slope and the silty clay loam surface layer. When wet, the soil becomes sticky and plastic, which limits its use for hiking paths, trails, and campgrounds in winter.

The main limitations for homesite development are the moderately slow permeability, low soil strength, and depth to rock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. The deep cuts needed to provide essentially level building sites can expose bedrock.

It is difficult to establish plants in areas that have had the surface layer removed. Mulching and fertilizing cut areas help to establish plants.

If the soil in this unit is used for septic tank absorption fields, the moderately slow permeability of the soil can be overcome by increasing the size of the absorption field.

This map unit is in capability subclass IIIe.

89D—Nekia silty clay loam, 12 to 20 percent slopes. This moderately deep, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium and residuum derived from basalt and tuff. Areas are irregular in shape and are 5 to 300 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, Pacific madrone, and vine maple. Elevation is 350 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 51 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of needles, twigs, and moss about 0.5 inch thick. The surface layer is dark reddish brown silty clay loam about 10 inches thick. The subsoil is dark reddish brown and reddish brown clay about 25 inches thick. Fractured basalt is at a depth of 35 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine, Jory, and Ritner soils and a soil that is similar to this Nekia soil but has more than 35 percent rock fragments in the surface layer and subsoil. Included areas make up about 15 percent of the total acreage.

Permeability of this Nekia soil is moderately slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used for hay, pasture, grass seed, timber production, and berries.

If this unit is used for hay and pasture, the main limitations are droughtiness in summer and slope. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

If this unit is used for cultivated crops, the main limitations are slope. The unit is suited to Christmas trees, but the soil needs to be protected from gully erosion by planting winter cover crops or permanent cover crops. Crops respond to lime and fertilizer.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 151. The potential production per acre is 9,540 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 87,680 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Limiting use of heavy equipment to periods when the soil is dry helps to prevent compaction and to maintain tilth and productivity for the next generation of trees. Ripping skid trails and landing areas after logging helps to break up the compacted layer. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are slope and the silty clay loam surface layer that is sticky and plastic when wet. Steepness of slope limits the use of areas of the unit mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitations are steepness of slope, moderately slow permeability, the clay subsoil, and depth to bedrock. These limitations make construction costly. Because of the hazard of erosion, only those areas needed for construction should be disturbed. Revegetating disturbed areas as soon as possible helps to control erosion.

This unit is poorly suited to septic tank absorption fields because of slope and depth to bedrock. In some areas of this unit where the depth to bedrock is greater and that are less sloping, septic tank absorption fields may be suitable.

This map unit is in capability subclass IIIe.

89E—Nekia silty clay loam, 20 to 30 percent slopes. This moderately deep, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium and residuum derived from basalt and tuff. Areas are irregular in shape and are 5 to 300 acres in size. The native vegetation is mainly Douglas-fir, Oregon white oak, Pacific madrone, and vine maple. Elevation is 350 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 51 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of needles, twigs, and moss about 0.5 inch thick. The surface layer is dark reddish brown silty clay loam about 10 inches thick. The subsoil is dark reddish brown and reddish brown clay about 25 inches thick. Fractured basalt is at a depth of 35 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine, Jory, and Ritner soils and a soil that is similar to this Nekia soil but has more than 35 percent rock fragments in the surface layer and subsoil. Included areas make up about 15 percent of the total acreage.

Permeability of this Nekia soil is moderately slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for pasture, timber production, wildlife habitat, and watershed.

If this unit is used for pasture, the main limitations are droughtiness in summer and steepness of slope. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 151. The potential production per acre is 9,540 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 87,680 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Limiting use of heavy equipment to periods when the soil is dry or using highlead or other cable logging systems reduces damage to the soil surface and helps to maintain tilth and productivity for the next generation of trees. Ripping skid trails and landing areas after logging helps to break up the compacted layer. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are slope, depth to bedrock, and the clayey texture of the soil, which is sticky and plastic when wet. Steepness of slope limits the use of this unit mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitations are slope, depth to rock, and the moderately slow permeability. These limitations restrict construction in most areas. Because of the hazard of erosion, only those areas needed for construction should be disturbed and cuts and fills should be seeded as soon as possible.

This unit is poorly suited to septic tank absorption fields because of slope and depth to bedrock.

This map unit is in capability subclass IVe.

89F—Nekia silty clay loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium and residuum derived from basalt and tuff. Areas are irregular in shape and are 5 to 300 acres in size. The native vegetation is mainly Douglas-fir, Oregon white oak, Pacific madrone, and vine maple. Elevation is 350 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 51 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of needles, twigs, and moss about 0.5 inch thick. The surface layer is dark reddish brown silty clay loam about 10 inches thick. The subsoil is dark reddish brown and reddish brown clay about 25 inches thick. Fractured basalt is at a depth of 35 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine soils, Jory soils in concave areas and on toe slopes, Ritner soils on ridges and shoulders, and a soil that is similar to this Nekia soil but has more than 35 percent rock fragments in the surface layer and subsoil. Included areas make up about 15 percent of the total acreage.

Permeability of this Nekia soil is moderately slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 151. The potential production per acre is 9,540 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 87,680 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Surface methods of harvesting trees can be used, but highlead logging is more efficient than most other logging methods and is less damaging to the soil surface. Because the soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is poorly suited to recreational development. It is limited mainly by steepness of slope.

This unit is poorly suited to homesite development. The main limitations are depth to rock and slope, which make construction costly. Access roads should be designed to control surface runoff and to help stabilize cut slopes.

This map unit is in capability subclass VIe.

90—Nekoma silt loam. This deep, well drained soil is on flood plains in the Coast Range. It formed in mixed alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 40 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, western redcedar, and red alder. Elevation is 10 to 750 feet. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface is covered with a mat of moss, needles, and twigs about 0.5 inch thick. The surface layer is very dark brown and very dark grayish brown silt loam about 11 inches thick. The subsoil is brown fine sandy loam about 9 inches thick. The substratum to a depth of 60 inches or more is stratified, brownish yellow loamy fine sand and yellowish brown fine sandy loam. Some areas have strata of very gravelly loamy sand at a depth of more than 40 inches.

Included in this unit are small areas of Eilertsen, Meda, Nehalem, Nestucca, and Willanch soils and Fluvents. Included areas make up about 15 percent of the total acreage.

Permeability of this Nekoma soil is rapid. Available water capacity is about 5.0 to 6.5 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is limited by a high water table that is at a depth of 4 to 6 feet from November to April. Runoff is slow, and the hazard of water erosion is slight except during periods of flooding. All but the higher lying areas of this unit are frequently flooded for brief periods from November to April.

This unit is used mainly for hay and pasture, wildlife habitat, and timber production. It is also used for gardens, orchards, recreation, and homesites.

If this unit is used for hay and pasture, the main limitations are the hazards of seasonal flooding and streambank erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Use of lime and fertilizer promotes good growth of forage plants. In some years, supplemental irrigation is also needed.

This unit is suited to most cool-season crops. It is limited mainly by the hazard of erosion, the periods of flooding in winter and early in spring, and the cool, moist summer and fall that inhibit proper maturing of grain. In summer, irrigation is needed for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 180. The potential production per acre is 11,460 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 110,880 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are the hazard of flooding in winter and early in spring and the prolonged rainy season that keeps the soil wet for about 8 months of the year.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Roads and landings can be protected from erosion by maintaining roadside drainage and by seeding cuts and fills.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Brushy plants such as red alder, salmonberry, vine maple, and salal limit natural regeneration of Douglas-fir. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand; however, machine planting is sometimes practical in dry years. Reforestation can be accomplished by planting Douglas-fir seedlings. Additional protection from flood damage and competing vegetation can be provided by interplanting with a cover crop.

If this unit is used for recreational development, the main limitations are the hazards of flooding in winter and spring and streambank erosion. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are the hazard of flooding and the rapid permeability. Only the sites that are not subject to flooding should be used. Raised foundations, dikes, and other suitable structures should be used to provide protection from flooding.

Septic tank absorption fields on this unit are limited by the hazard of flooding and the rapid permeability, which may result in pollution of ground water and streams by effluent.

This map unit is in capability subclass IIIw.

91D—Neskowin silt loam, 12 to 20 percent slopes. This moderately deep, well drained soil is on uplands in the Coast Range, adjacent to the Pacific Ocean. It formed in colluvium and residuum derived from basic igneous rock and influenced by volcanic ash. Areas are irregular in shape and are 5 to 70 acres in size. The native vegetation is mainly Sitka spruce, western hemlock, red alder, evergreen huckleberry, salal, and western swordfern. Elevation is 50 to 500 feet. The average annual precipitation is 70 to 90 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 200 days.

Typically, the surface layer is black and dark brown silt loam about 12 inches thick. The subsoil is dark brown silt loam about 18 inches thick. Fractured igneous rock is at a depth of 30 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Hembre, Klickitat, Lint, and Salander soils. Also included, on terrace remnants or fans near the mouth of Tenmile and Squaw Creeks, is a soil that is similar to this Neskowin soil but is deep and has a gravelly substratum. Included areas make up about 15 percent of the total acreage.

Permeability of this Neskowin soil is moderate. Available water capacity is about 3.5 to 9.0 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for pasture, recreation, watershed, and wildlife habitat. Areas sheltered from onshore winds are used for timber production.

This unit is suited to pasture. In some years, supplemental irrigation is required for maximum forage production. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff. Seedbed preparation should be on the contour or across the slope where practical. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime.

This unit is suited to the production of Sitka spruce. On the basis of a 100-year site curve, the mean site index for Sitka spruce is 133. The potential production per acre is 10,250 cubic feet from an even-aged, fully stocked stand of trees 50 years old or 86,730 board feet (International rule, one-fourth inch kerf) from an even-aged, fully stocked stand of trees 70 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Salt spray and winds from coastal storms retard the establishment and growth of new seedlings. Reforestation can be accomplished by planting Sitka spruce and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are slope and depth to rock. Steepness of slope limits the use of this unit mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitations are slope, depth to rock, and low soil strength. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. The deep cuts needed to provide essentially level building sites can expose bedrock.

If buildings are constructed on the soil in this unit, properly designing foundations and footings helps to offset the limited ability of the soil to support a load. Roads for year-round use need heavy base rock. Selection of climatically adapted plants is critical for the establishment of lawns, shrubs, trees, and vegetable gardens.

This map unit is in capability subclass VIe.

91E—Neskowin silt loam, 20 to 40 percent slopes. This moderately deep, well drained soil is on uplands in the Coast Range, adjacent to the Pacific Ocean. It formed in colluvium and residuum derived from basic igneous rock and influenced by volcanic ash. Areas are irregular in shape and are 5 to 150 acres in size. The native vegetation is mainly Sitka spruce, western hemlock, red alder, evergreen huckleberry, salal, and western swordfern. Elevation is 50 to 500 feet. The average annual precipitation is 70 to 90 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 200 days.

Typically, the surface layer is black and dark brown silt loam about 12 inches thick. The subsoil is dark brown silt loam about 18 inches thick. Fractured igneous rock is at a depth of 30 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Hembre, Klickitat, Lint, and Salander soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Neskowin soil is moderate. Available water capacity is about 3.5 to 9.0 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for pasture, wildlife habitat, and watershed. Areas sheltered from onshore winds are used for timber production.

This unit is suited to pasture. Seedbed preparation should be on the contour or across the slope where practical. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage.

This unit is suited to the production of Sitka spruce. On the basis of a 100-year site curve, the mean site index for Sitka spruce is 133. The potential production per acre is 10,250 cubic feet from an even-aged, fully stocked stand of trees 50 years old or 86,730 board feet (International rule, one-fourth inch kerf) from an even-aged, fully stocked stand of trees 70 years old.

Because the soil may be compacted when moist, most planting and harvesting equipment can be used only during dry periods. Management that minimizes the risk of erosion is essential in harvesting timber. Highlead logging systems are less damaging to the soil than most other methods. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Salt spray and winds from coastal storms retard the establishment and growth of seedlings. Reforestation can be accomplished by planting Sitka spruce and western hemlock seedlings.

If this unit is used for recreational development, steepness of slope limits its use mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitations are slope, depth to rock, and low soil strength. The deep cuts needed to provide essentially level building sites and roads can expose bedrock. Cuts and fills need to be seeded or protected from erosion by using rock or concrete retaining walls.

This map unit is in capability subclass VIe.

92G—Neskowin-Salander silt loams, 40 to 60 percent slopes. This map unit is on uplands near the coast, from Cape Mountain north to the county line. Areas are elongated or irregular in shape and are 10 to 300 acres in size. The native vegetation is mainly Sitka spruce and an understory of salal, evergreen huckleberry, Pacific rhododendron, and western swordfern. Some shore pine is on slopes immediately adjacent to the coast, and some western hemlock and Douglas-fir are in the more sheltered areas further inland. Elevation is 50 to 1,200 feet. The average annual precipitation is 65 to 90 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 220 days.

This unit is 55 percent Neskowin silt loam and 30 percent Salander silt loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Astoria Variant, Bohannon, Formader, Hembre, Kilchis, Klickitat, and Slickrock soils, Rock outcrop, and a soil that is similar to this Salander soil but has bedrock at a depth of 40 to 60 inches. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Neskowin soil is moderately deep and well drained. It formed in colluvium and residuum derived from basic igneous rock and influenced by volcanic ash. Typically, the surface layer is black and dark brown silt loam about 12 inches thick. The subsoil is dark brown silt loam about 18 inches thick. Fractured igneous rock is at a depth of 30 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Neskowin soil is moderate. Available water capacity is about 3.5 to 9.0 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Salander soil is deep and well drained. It formed in colluvium derived from igneous and sedimentary rock with some volcanic ash. Typically, the surface is covered with a mat of decaying needles, leaves, and twigs about 3 inches thick. The surface layer is very dark brown silt loam about 18 inches thick. The upper part of the subsoil is dark brown silt loam about 35 inches thick, and the lower part to a depth of 70 inches is very dark grayish brown and very dark brown silt loam.

Permeability of the Salander soil is moderate. Available water capacity is about 10 to 15 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Sitka spruce and, in areas sheltered from onshore winds, western hemlock and Douglas-fir. On the basis of a 100-year site curve, the mean site index for Sitka spruce is 133. The potential production per acre is 10,250 cubic feet from an even-aged, fully stocked stand of trees 50 years old or 86,730 board feet (International rule, one-fourth inch kerf) from an even-aged, fully stocked stand of trees 70 years old.

The main concerns in producing and harvesting timber are steepness of slope, the hazard of erosion, and plant competition. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing.

Highlead or other cable logging methods can be used for harvesting timber. Use of these methods is limited during November to April by periods of high rainfall and wetness.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Reforestation can be accomplished by planting Sitka spruce and western hemlock seedlings. Trees commonly are subject to windthrow during periods when the soil is excessively wet and winds are strong.

This unit is poorly suited to homesite or recreational development. The main limitations are steepness of slope, low soil strength, and depth to rock in some areas. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum. Buildings and roads should be designed to offset the limited ability of the soils in this unit to support a load. Preserving the existing plant cover during construction helps to control erosion.

This map unit is in capability subclass VIIe.

93—Nestucca silt loam. This deep, somewhat poorly drained soil is on flood plains in the Coast Range. It formed in recent silty alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly black cottonwood, western hemlock, western redcedar, red alder, willow, grasses, and sedges. Elevation is 10 to 750 feet. The average annual precipitation is 60 to 100 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 160 to 220 days.

Typically, the surface layer is very dark brown silt loam about 17 inches thick. The subsoil is dark grayish brown and grayish brown, mottled silty clay loam about 26 inches thick. The substratum to a depth of 60 inches or more is grayish brown and dark gray, mottled clay loam and silty clay. In some areas strata of coarser textured material are below a depth of 40 inches.

Included in this unit are small areas of Brenner, Meda, Nehalem, and Nekoma soils and soils that are similar to this Nestucca soil but have a highly organic surface layer or have peat or muck below a depth of 20 inches. Included areas make up about 15 percent of the total acreage.

Permeability of this Nestucca soil is moderately slow. Available water capacity is about 11 to 12 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is limited by a high water table that is at a depth of 1 to 2 feet from December to April. Runoff is slow to ponded, and the hazard of water erosion is slight. This soil is frequently flooded for brief periods from December to April.

This unit is used mainly for pasture. It is also used for hay and silage crops.

This unit can be used for cool-season vegetable crops if drainage and proper amounts of fertilizer and lime are provided. The water table that develops during the rainy period in winter and early in spring generally limits the suitability of the unit for deep-rooted crops. Only those hay and pasture plants that tolerate periodic inundation and a seasonal high water table are suitable for use in undrained areas. Proper stocking rates, pasture rotation, and restricted grazing during wet periods can help to keep the pasture in good condition and to protect soil from erosion and compaction.

If the soil in this unit is plowed in fall, runoff and erosion can be reduced by fertilizing and seeding to a cover crop. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, potassium, and lime.

If this unit is used for recreational development, the main limitations are wetness and the hazard of flooding. The unit can be used for paths and trails during the drier months in summer and fall.

This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, wetness, the seasonal high water table, moderately slow permeability, and low soil strength. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Wetness can be reduced by installing drain tile around footings. Roads for year-round use need heavy base rock. Flooding can be controlled only by use of major flood control structures.

This map unit is in capability subclass IIIw.

94C—Netarts fine sand, 3 to 12 percent slopes. This deep, well drained soil is on stabilized sand dunes. It formed in eolian sand deposits. Areas are elongated or irregular in shape and are 5 to 200 acres in size. The native vegetation is mainly shore pine, Sitka spruce, salal, Pacific rhododendron, manzanita, evergreen huckleberry, and scattered Douglas-fir and western hemlock. Elevation is 30 to 300 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 52 degrees F, and the average frost-free period is 180 to 210 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 2 inches thick. The surface layer is light gray fine sand about 6 inches thick. The subsoil is variegated fine sand about 41 inches thick. It has weakly cemented to moderately cemented nodules and lenses. The substratum to a depth of 60 inches or more is light yellowish brown fine sand.

Included in this unit are small areas of Heceta, Waldport, and Yaquina soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Netarts soil is moderately rapid except through the cemented lenses. Available water capacity is about 3 to 5 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high when the vegetation is removed.

Most areas of this unit are used for wildlife habitat, recreation, and watershed. A few areas are used as homesites and for hay and pasture and timber production.

If this unit is used for hay and pasture, the main limitations are the low available water capacity, low soil fertility, and the cool, humid summers that inhibit curing of hay crops. Grasses and legumes grow well if adequate fertilizer is used. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. In summer, irrigation is needed for maximum production of most crops. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

This unit is suited to the production of Douglas-fir in areas that are sheltered from onshore winds. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 80. The potential production per acre is 4,060 cubic feet from an even-aged, fully stocked stand of trees 70 years old or 32,000 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 110 years old.

The main concerns in producing and harvesting timber are the hazards of soil blowing and windthrow, seedling mortality, and plant competition. Because Douglas-fir and western hemlock are more sensitive to the growth-retarding effect of the onshore winds, shore pine and Sitka spruce are more suitable for planting except in the more sheltered areas. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive.

If this unit is used for recreational development, the main limitations are slope and the fine sand texture of the soil, which is droughty and subject to blowing. The unit is used for campgrounds, parks, picnic areas, and hiking or nature trails. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic. Cuts and fills should be seeded or mulched.

If this unit is used for homesite or urban development, the main limitations are droughtiness, slope, and the fine sand texture of the soil, which is very susceptible to blowing and water erosion. Preserving the existing plant cover during construction helps to control erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Cutbanks are not stable and are subject to slumping. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

The potential for pollution of the ground water limits the use of this unit for septic tank absorption fields.

This map unit is in capability subclass VIe.

94E—Netarts fine sand, 12 to 30 percent slopes. This deep, well drained soil is on stabilized sand dunes. It formed in eolian sand deposits. Areas are elongated in shape and are 5 to 50 acres in size. The native vegetation is mainly shore pine, Sitka spruce, salal, Pacific rhododendron, manzanita, evergreen huckleberry, and scattered Douglas-fir and western hemlock. Elevation is 30 to 300 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 52 degrees F, and the average frost-free period is 180 to 210 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 2 inches thick. The surface layer is light gray fine sand about 6 inches thick. The subsoil is variegated fine sand about 41 inches thick. It has weakly cemented to moderately cemented nodules and lenses. The substratum to a depth of 60 inches or more is light yellowish brown fine sand.

Included in this unit are small areas of Bandon, Waldport, and Yaquina soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Netarts soil is moderately rapid except through the cemented lenses. Available water capacity is about 3 to 5 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high when the vegetation is removed.

Most areas of this unit are used for wildlife habitat, recreation, and watershed. A few areas are used as homesites and for hay and pasture and timber production.

If this unit is used for hay and pasture, the main limitations are slope, low soil fertility, and low available water capacity. The cool, humid summers inhibit curing of hay crops. Grasses and legumes grow well if adequate fertilizer is used. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. In summer, irrigation is needed for maximum production of most crops. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

This unit is suited to the production of Douglas-fir in areas that are sheltered from onshore winds. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 80. The potential production per acre is 4,060 cubic feet from an even-aged, fully stocked stand of trees 70 years old or 32,000 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 110 years old.

The main concerns in producing and harvesting timber are the hazards of soil blowing and windthrow, seedling mortality, and plant competition. Since Douglas-fir and western hemlock are more sensitive to damage from the onshore winds, shore pine and Sitka spruce are more suitable for planting except in sheltered areas. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive.

This unit is suited to recreational development. It is limited mainly by slope and the fine sand texture of the soil, which is droughty and subject to blowing and erosion. The unit is used for campgrounds, parks, picnic areas, and paths and trails. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover. Plant cover can be maintained by limiting traffic. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are slope, droughtiness, and the hazards of erosion and soil blowing. The fine sand soil is easily eroded by wind or water when left barren. Cutbanks are not stable and are subject to slumping. Preserving the existing plant cover during construction helps to control erosion. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

The potential for pollution of the ground water limits the use of this unit for septic tank absorption fields.

This map unit is in capability subclass VIe.

95—Newberg fine sandy loam. This deep, somewhat excessively drained soil is on flood plains and bottom lands. It formed in recent alluvium. Slope is 0 to 3 percent. Areas are elongated or irregular in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, grand fir, Oregon white oak, bigleaf maple, black cottonwood, shrubs, and grasses. Elevation is 290 to 850 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown fine sandy loam about 14 inches thick. The substratum to a depth of 65 inches is dark brown fine sandy loam and coarse sandy loam. In some areas the surface layer is loam.

Included in this unit are small areas of Camas, Chehalis, Cloquato, and McBee soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Newberg soil is moderately rapid. Available water capacity is about 5 to 8 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The soil is occasionally flooded for brief periods from December to March.

This unit is used mainly for row crops, hay and pasture, small grain, and orchards. It is also used for urban development and recreation.

This unit is suited to all climatically adapted crops. It is most valued for root crops such as carrots, because the texture of the surface layer permits easy digging, even when the soil is wet, without excessive compaction of the soil.

In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Grain and grasses grown on this unit respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and increase the available water capacity of the surface layer, which aids the establishment of small-seeded crops.

Streambank cutting, erosion caused by overflow, and sedimentation can be reduced by maintaining adequate plant cover.

If this unit is used for hay and pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is well suited to recreational development intended for use during the dry season.

If this unit is used for urban development, the main limitations are the hazard of flooding and the moderately rapid permeability. In some areas flooding can be controlled only by use of major flood control structures.

Septic tank absorption fields are suited to this unit.

This map unit is in capability subclass IIw.

96—Newberg loam. This deep, somewhat excessively drained soil is on flood plains and bottom lands. It formed in recent silty alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, grand fir, Oregon white oak, bigleaf maple, black cottonwood, shrubs, forbs, and grasses. Elevation is 290 to 850 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown loam about 14 inches thick. The substratum to a depth of 65 inches is dark brown fine sandy loam and coarse sandy loam. In some areas the surface layer is fine sandy loam, and in some areas layers of very gravelly sand are below a depth of 24 inches.

Included in this unit are small areas of Camas, Chehalis, Cloquato, and McBee soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Newberg soil is moderately rapid. Available water capacity is about 5 to 8 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The soil is occasionally flooded for brief periods from December to March.

This unit is used mainly for row crops, hay, and pasture. It is also used for urban development and recreation.

This unit is suited to all climatically adapted crops. It is most valued for root crops such as carrots, because the texture of the surface layer permits easy digging; however, this soil is subject to severe compaction damage by equipment if these crops are harvested when the soil is wet.

In summer, irrigation is required for maximum production of most crops. Use of the sprinkler method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion.

Grain and grasses grown on this unit respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Cover crops are needed to protect the soil from erosion during periods of flooding in winter.

If this unit is used for hay and pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect soil from erosion.

This unit is well suited to recreational development intended for use during the dry season.

If this unit is used for urban development, the main limitations are the hazard of flooding and the moderately rapid permeability. In some areas flooding can be controlled only by use of major flood control structures.

In areas of this unit that have a gravelly sand substratum, alternative or community sewage systems are needed to prevent contamination of water supplies as a result of seepage.

This map unit is in capability subclass IIw.

97—Newberg-Urban land complex. This map unit is on flood plains. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 100 acres in size. The native vegetation is mainly Douglas-fir, grand fir, Oregon white oak, bigleaf maple, black cottonwood, shrubs, forbs, and grasses. Elevation is 300 to 850 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 40 percent relatively undisturbed Newberg fine sandy loam, 10 percent disturbed Newberg fine sandy loam, and 35 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Camas, Chehalis, Cloquato, and McBee soils. Included areas make up about 15 percent of the total acreage.

The relatively undisturbed Newberg soil is deep and somewhat excessively drained. It formed in recent silty alluvium. Typically, the surface layer is dark brown fine sandy loam about 14 inches thick. The substratum to a depth of 65 inches is dark brown fine sandy loam and coarse sandy loam. In some areas the surface layer is dark brown loam about 19 inches thick, and in some areas layers of very gravelly sand are below a depth of 40 inches.

Permeability of this Newberg soil is moderately rapid. Available water capacity is 5 to 8 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The soil is occasionally flooded for brief periods from December to March.

The disturbed Newberg soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material commonly is from adjacent areas of Newberg, Chehalis, Cloquato, Camas, and McBee soils that have been cut or graded. The characteristics of the disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards, parks, and open areas around and between buildings. The main limitations are the hazard of flooding and the moderately rapid permeability. Flooding can be controlled only by use of major flood control structures such as dikes or upstream dams. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is not assigned a capability classification.

98—Noti loam. This deep, poorly drained soil is in swales and drainageways on terraces. It formed in mixed alluvium. Slope is 0 to 3 percent. Areas are long and narrow or are irregular in shape. They are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Oregon ash, rose, hazelnut, wild blackberry, sedges, and grasses. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil is grayish brown, mottled loam about 7 inches thick. The upper part of the substratum is light olive gray fine sandy loam about 18 inches thick, the next part is pale brown loamy sand about 10 inches thick, and the lower part is variegated, highly consolidated very gravelly loamy sand to a depth of 60 inches or more.

Included in this unit are small areas of Dayton, Holcomb, Linslaw, Natroy, and Wapato soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Noti soil is slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 22 inches. Effective rooting depth is limited by a high water table that is at the surface to a depth of 1 foot from October to May. Runoff is very slow, and the hazard of water erosion is slight. The soil is frequently flooded for brief periods from October to May.

This unit is used mainly for pasture and hay. It is also used for grass seed, wildlife habitat, and recreation.

This unit is suited to hay and pasture. The main limitations are wetness, the seasonal high water table, and the hazard of flooding. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Only those hay and pasture plants that tolerate periodic inundation and a seasonal high water table are suitable for use in undrained areas. Excessive water on the surface can be removed by open drains. Tile drainage can be used to lower the water table if a suitable outlet is available.

Irrigation water can be applied by the sprinkler and flood methods. Water needs to be applied at a slow rate to prevent runoff.

Fertilizer is needed for optimum growth of grasses and legumes. Grain and grasses respond to nitrogen; legumes respond to phosphorus, sulfur, and lime. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This map unit is in capability subclass IVw.

99H—Ochrepts and Umbrepts, very steep. These moderately deep to deep, well drained soils are along streams that have cut into valley terraces and on terrace fronts above the flood plains of major rivers and streams. The soils formed in stratified silty, loamy, or gravelly alluvium and in some weathered bedrock of mixed origin. Slope is mainly 20 to 60 percent. Areas are elongated in shape and are 5 to 30 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, Oregon white oak, snowberry, poison-oak, and grasses. Elevation is 50 to 1,500 feet. The average annual precipitation is 40 to 90 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 150 to 210 days.

The soils in this unit generally are gravelly, silty, or loamy and are stratified. Depth ranges from 20 to 60 inches or more.

Included in this unit are small areas of Malabon, Salkum, and Veneta soils on adjacent terraces in valleys that receive 40 to 60 inches of rainfall. Also included are small areas of Blachly, Cupola, Jimbo, and Lint soils in mountainous areas that receive more than 60 inches of rainfall and small areas of Rock outcrop. The percentage varies from one area to another.

Permeability, effective rooting depth, available water capacity, and water supplying capacity of these soils are highly variable. Runoff is rapid, and the hazard of water erosion is high.

Most areas of this unit are used for wildlife habitat, timber production, and recreation. A few areas are used for pasture.

If this unit is used for pasture, the main limitations are slope and the hazard of erosion. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

The main concerns in producing and harvesting timber are accessibility and difficulty of operating equipment because of slope. Construction of roads causes slumping, particularly in the steeper areas. Highlead or other cable logging systems generally should be used in the larger areas of this unit. Tractor methods of harvesting timber are difficult to use because of slope.

If this unit is used for homesite or recreational development, the main limitation is steepness of slope. Cutbanks and foundations may be unstable.

This map unit is in capability subclass VIe.

100—Oxley gravelly silt loam. This deep, somewhat poorly drained soil is in concave areas on terraces. It formed in mixed gravelly alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 200 acres in size. The vegetation in areas not cultivated is mainly Oregon ash, Oregon white oak, hazelnut, western brackenfern, rose, forbs, and grasses. Elevation is 300 to 700 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown gravelly silt loam about 17 inches thick. The next layer is dark brown gravelly clay loam about 6 inches thick. The upper 12 inches of the subsoil is dark grayish brown and brown, mottled very gravelly clay loam, and the lower 6 inches is grayish brown, mottled very gravelly loam. The substratum to a depth of 60 inches or more is gray extremely gravelly sandy loam. In small areas near Springfield, the substratum is stratified silty clay loam and fine sandy loam, and in some areas the substratum is gravelly sand and is above a depth of 40 inches.

Included in this unit are small areas of Coburg, Courtney, Salem, and Sifton soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Oxley soil is moderately slow. Available water capacity is about 3.0 to 6.5 inches. Effective rooting depth is 25 to 50 inches. It is limited by the extremely gravelly substratum and a high water table that is at a depth of 6 to 18 inches from November to May. Runoff is slow. The hazard of water erosion generally is slight, but it is moderate along drainageways during periods of heavy runoff from winter storms.

This unit is used mainly for pasture, hay, and grass seed crops. It is also used for small grain, row crops, and homesites. It is used for housing subdivisions in areas where municipal sewers are provided.

If this unit is used for cultivated crops, the main limitations are the gravelly surface layer, which interferes with the close tillage of young row crops, and the seasonal high water table, which limits suitability to shallow-rooted or water-tolerant perennials in undrained areas. Deep open drains or tile drains generally can be used to lower the water table below the root zone quickly enough to permit growth of perennial crops that are less water-tolerant. In some areas, however, the extremely gravelly substratum restricts deep penetration of roots and creates droughtiness in summer. In summer, irrigation is required for maximum production of most crops. Crops respond to nitrogen.

If this unit is used for hay and pasture, the main limitation is the seasonal high water table. Only those hay and pasture plants that tolerate a seasonal high water table are suitable for use in undrained areas. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from compaction.

If this unit is used for homesite development, the main limitations are the seasonal high water table, moderately slow permeability, and wetness. Because of these limitations, buildings need perimeter drains to prevent the accumulation of water, resulting in structural damage. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

This map unit is in capability subclass IIIw.

101—Oxley-Urban land complex. This map unit is in slightly concave areas on terraces. Slope is 0 to 3 percent. Areas are elongated or irregular in shape and are 3 to 40 acres in size. The native vegetation is mainly Oregon white oak, Oregon ash, hazelnut, western brackenfern, rose, and grasses. Elevation is 350 to 700 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 30 percent relatively undisturbed Oxley gravelly silt loam, 15 percent disturbed Oxley gravelly silt loam, and 40 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Coburg, Courtney, and Salem soils. Included areas make up about 15 percent of the total acreage.

The relatively undisturbed Oxley soil is deep and somewhat poorly drained. It formed in mixed gravelly alluvium. Typically, the surface layer is very dark brown gravelly silt loam about 17 inches thick. The next layer is dark brown gravelly clay loam about 6 inches thick. The upper 12 inches of the subsoil is dark grayish brown and brown, mottled very gravelly clay loam, and the lower 6 inches is grayish brown, mottled very gravelly loam. The substratum to a depth of 60 inches or more is gray extremely gravelly sandy loam.

Permeability of the relatively undisturbed Oxley soil is moderately slow. Available water capacity is about 3.0 to 6.5 inches. Effective rooting depth is 25 to 50 inches. It is limited by an extremely gravelly substratum and a high water table that is at a depth of 6 to 18 inches from November to May. Runoff is slow, and the hazard of water erosion is slight.

The disturbed Oxley soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Oxley and Salem soils that have been cut or graded. The characteristics of these disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards and open areas around and between buildings.

If the relatively undisturbed Oxley soil is used for urban development, the main limitation is the seasonal high water table. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided. Buildings need perimeter drains with adequate outlets to prevent the accumulation of water, resulting in structural damage.

This map unit is not assigned a capability classification.

102C—Panther silty clay loam, 2 to 12 percent slopes. This deep, poorly drained soil is in swales and on benches of foothills adjacent to valleys of the Willamette River and its tributaries. It formed in colluvium and residuum derived from sedimentary and basic igneous rock. Areas are elongated or irregular in shape and are 5 to 40 acres in size. The vegetation in areas not cultivated is mainly grasses, sedges, western brackenfern, Oregon ash, Oregon white oak, and occasional Douglas-fir. Elevation is 300 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay loam about 10 inches thick. The subsoil is very dark grayish brown and dark grayish brown clay about 19 inches thick. The substratum is dark grayish brown, mottled clay about 13 inches thick. Weathered bedrock is at a depth of 42 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bashaw, Dupee, Hazelair, and Philomath soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Panther soil is very slow. Available water capacity is about 4 to 9 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 20 to 40 inches or more. It is limited by the content of clay and by a high water table that is at the surface to a depth of 1 foot from December to April. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for hay and pasture and wildlife habitat. A few areas that are adjacent to better drained soils are used for other crops.

If this unit is used for hay and pasture, the main limitations are very slow permeability and the seasonal high water table. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from compaction and erosion. Fertilizer is needed to ensure optimum growth of grasses and legumes. In some years, supplemental irrigation is also needed.

If this unit is used for recreational development, the main limitations are the high content of clay, high potential for shrinking and swelling, and poor drainage. Drainage should be provided for paths and trails.

This unit is poorly suited to homesite and urban development. Drainage is needed if roads and building foundations are constructed. Cutbanks are not stable and are subject to slumping. Roads and streets need heavy base rock.

If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage because of shrinking and swelling. Support and stability for buildings can be provided by placing footings or piers on the underlying stable bedrock. Access roads should be designed to control surface runoff and help stabilize cut slopes. Plants that tolerate a seasonal high water table should be selected for landscaping unless drainage is provided.

This map unit is in capability subclass VIw.

103C—Panther-Urban land complex, 2 to 12 percent slopes. This map unit is in swales and on benches of foothills adjacent to the valleys of the Willamette River and its tributaries. Areas are elongated or irregular in shape and are 5 to 40 acres in size. The native vegetation is mainly grasses, sedges, western brackenfern, Oregon ash, Oregon white oak, and occasional Douglas-fir. Elevation is 300 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 50 percent relatively undisturbed Panther silty clay loam, 10 percent disturbed Panther silty clay loam, and 30 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bashaw, Dupee, Hazelair, and Philomath soils. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The relatively undisturbed Panther soil is deep and poorly drained. It formed in colluvium and residuum weathered from sedimentary and basic igneous rock. Typically, the surface layer is very dark brown silty clay loam about 10 inches thick. The subsoil is very dark grayish brown and dark grayish brown clay about 19 inches thick. The substratum is dark grayish brown, mottled clay about 13 inches thick. Weathered bedrock is at a depth of 42 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of this Panther soil is very slow. Available water capacity is about 4 to 9 inches. Water supplying capacity is 18 to 24 inches. Effective rooting depth is 20 to 40 inches or more. It is limited by the content of clay and by a high water table that is at the surface to a depth of 1 foot from November to April. Runoff is medium, and the hazard of water erosion is moderate.

The disturbed Panther soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material commonly is from adjacent areas of Dupee, Hazelair, Philomath, and Panther soils that have been cut or graded. The characteristics of these disturbed areas are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban and homesite development. It is also used for yards and open areas around and between buildings and as waterways to remove runoff.

The main limitation for homesite development on this unit is the highly plastic clay in the subsoil. The clay has a very high potential for shrinking and swelling. The soil tends to heave, which causes roadways and foundations to crack during seasonal wetting and drying. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade. Wetness can be reduced by installing drain tile around footings.

Support and stability for buildings can be provided by placing footings below a depth of 60 inches or on the underlying bedrock. Roads and streets can be built if they are designed to compensate for the instability of the clay subsoil. Cutbanks are not stable and are subject to slumping.

Revegetating disturbed areas around construction sites as soon as possible helps to control soil erosion. Plants that tolerate a seasonal high water table and droughtiness should be selected for landscaping if drainage and irrigation are not provided.

If this unit is used for recreational development, the main limitations are wetness and very slow permeability. Drainage should be provided for paths and trails.

This map unit is not assigned a capability classification.

104E—Peavine silty clay loam, 3 to 30 percent slopes. This moderately deep, well drained soil is on ridgetops, in narrow saddles, and on toe slopes on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from sedimentary rock and tuff. Areas are irregular in shape and are 5 to 200 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, and shrubs. Elevation is 200 to 2,600 feet in the Coast Range and 1,200 to 2,800 feet in the Cascade Range. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface is covered with a mat of decaying ferns about 0.5 inch thick. The surface layer is dark reddish brown silty clay loam about 8 inches thick. The subsoil is dark reddish brown, yellowish red, and reddish brown clay and silty clay about 30 inches thick. Weathered bedrock is at a depth of 38 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Blachly and McCully soils on side slopes, Bohannon soils on shoulders and slope breaks, Cumley and Minniece soils along streams and in depressional areas, Honeygrove soils on toe slopes and in the more nearly level areas, and Klickitat and Digger soils on narrow ridges and slope breaks. Included areas make up about 15 percent of the total acreage.

Permeability of this Peavine soil is moderately slow. Available water capacity is 4 to 7 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is moderate.

This unit is used for timber production, wildlife habitat, recreation, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Some small areas in the southern part of the survey area and on the east side of the Coast Range have site indexes as much as 20 points below that given above. This is possibly because of a rain shadow effect from higher mountains to the west.

Management that minimizes the risk of erosion is essential in harvesting timber. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Trees are subject to windthrow because of limited rooting depth. Brushy plants such as red alder and vine maple limit natural regeneration of Douglas-fir. Seedling mortality is a problem on south-facing side slopes. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are the clayey surface layer that is sticky and subject to compaction when wet, depth to bedrock, and moderately slow permeability.

This unit is poorly suited to homesite development. The main limitations are depth to bedrock, moderate shrink-swell potential, slope, moderately slow permeability, and low strength of the soil when wet. The deep cuts needed to provide essentially level building sites can expose bedrock. Also, deep cuts and fills may result in uneven settling and landslides.

The steepness of slope and depth to bedrock are concerns in installing septic tank absorption fields. Absorption lines should be installed on the contour. Soil depth may limit proper functioning of septic tank absorption fields in the steeper areas.

This map unit is in capability subclass VIe.

104G—Peavine silty clay loam, 30 to 60 percent slopes. This moderately deep, well drained soil is on side slopes on uplands in the Coast and Cascade Ranges. It formed in colluvium and residuum derived from sedimentary rock and tuff. Areas are irregular in shape and are 5 to 400 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, and shrubs. Elevation is 200 to 2,600 feet in the Coast Range and 1,200 to 2,800 feet in the Cascade Range. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface is covered with a mat of decaying ferns about 0.5 inch thick. The surface layer is dark reddish brown silty clay loam about 8 inches thick. The subsoil is dark reddish brown, yellowish red, and reddish brown clay and silty clay about 30 inches thick. Weathered bedrock is at a depth of 38 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Blachly soils on south-facing side slopes, Bohannon soils on spur ridges and slope breaks, Honeygrove soils in the more nearly level areas and in concave areas, Kilchis and Klickitat soils and Rock outcrop on ridges that have intrusive dikes or sills, and McCully soils on north-facing side slopes. Included areas make up about 15 percent of the total acreage.

Permeability of this Peavine soil is moderately slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Small areas on south-facing side slopes in the southern part of the survey area and on the eastern edge of the Coast Range have site indexes as much as 20 points below that given above. This is possibly because of a rain shadow effect from higher mountains to the west.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting timber can be used in the more gently sloping areas, but the soil may be compacted if it is moist when heavy equipment is used. Highlead or other cable logging systems are more efficient and are less damaging to the soil surface than most other logging methods. Trees are subject to windthrow because of limited rooting depth. Brushy plants such as vine maple and western brackenfern limit natural regeneration of Douglas-fir. Droughtiness caused by exposure to sun limits seedling survival in areas on south-facing side slopes. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are slope, the clayey surface layer that is sticky and slippery when wet, depth to bedrock, and moderately slow permeability.

This unit is poorly suited to homesite development. The main limitations are slope, depth to rock, shrink-swell potential, moderately slow permeability, and low strength of the soil when wet.

This map unit is in capability subclass VIe.

105A—Pengra silt loam, 1 to 4 percent slopes. This deep, somewhat poorly drained soil is on toe slopes and fans. It formed in stratified alluvium. Areas are irregular in shape and are 5 to 40 acres in size. The vegetation in areas not cultivated is mainly Oregon white oak, Oregon ash, wild blackberry, wild rose, poison-oak, grasses, and scattered Douglas-fir. Elevation is 350 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsoil is very dark grayish brown and dark grayish brown, mottled silty clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is very dark grayish brown and dark grayish brown, mottled clay.

Included in this unit are small areas of Courtney, Dupee, Hazelair, Natroy, and Panther soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Pengra soil is very slow. Available water capacity is about 8 to 10 inches. Effective rooting depth is 18 to 30 inches. It is limited by the clay substratum and by the high water table that is at a depth of 1.5 to 2.5 feet from November to May. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for small grain, grass seed, hay, and pasture. It is also used for recreation and as homesites.

If this unit is used for hay and pasture, the main limitation is wetness. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Only those hay and pasture plants that tolerate a seasonal high water table are suitable for use in undrained areas. Fertilizer is needed for optimum growth of grasses and legumes.

This unit is suited to grass seed and small grain. It is limited mainly by wetness. Tile drains and open ditches can be used to lower the water table if a suitable outlet is available. Use of grassed waterways helps to control erosion. Grain and grasses respond to nitrogen, and legumes respond to phosphorus and lime.

If this unit is used for recreational development, the main limitation is wetness during much of the year.

If this unit is used for homesite development, the main limitations are wetness, high shrink-swell potential, very slow permeability, and low soil strength. If buildings are constructed on the soil in this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Buildings and roads should be designed to offset the limited ability of the soil to support a load. The maximum amount of base rock is needed to prevent settling and cracking of roads and streets. If drainage and irrigation are not provided, plants that tolerate a seasonal high water table and droughtiness should be selected for landscaping.

This map unit is in capability subclass IIIw.

106A—Pengra-Urban land complex, 1 to 4 percent slopes. This map unit is in broad, slightly concave areas on fans and toe slopes. Areas are irregular in shape and are 3 to 30 acres in size. The native vegetation is mainly Oregon white oak, Oregon ash, wild blackberry, wild rose, poison-oak, grasses, and scattered Douglas-fir. Elevation is 350 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 50 percent relatively undisturbed Pengra silt loam, 10 percent disturbed Pengra silt loam, and 25 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Dupee, Hazelair, Natroy, and Panther soils. Included areas make up about 15 percent of the total acreage.

The relatively undisturbed Pengra soil is deep and somewhat poorly drained. It formed in stratified alluvium. Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsoil is very dark grayish brown and dark grayish brown, mottled silty clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is very dark grayish brown and dark grayish brown, mottled clay.

Permeability of the relatively undisturbed Pengra soil is very slow. Available water capacity is about 8 to 10 inches. Effective rooting depth is 18 to 30 inches. It is limited by the clay substratum and by the high water table that is at a depth of 1.5 to 2.5 feet from November to May. Runoff is slow, and the hazard of water erosion is slight.

The disturbed Pengra soil has been covered by as much as 30 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material commonly is from adjacent areas of Pengra, Hazalair, Dupee, Natroy, and Panther soils that have been cut or graded. The characteristics of the disturbed Pengra soil are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly for urban development. It is also used for yards and parks or for greenbelts that are maintained to facilitate rapid removal of surface water by storm drains or floodway channels during periods of heavy rainfall.

If the relatively undisturbed Pengra soil is used for urban development, the main limitations are the high shrink-swell potential of the highly plastic clay, low soil strength, and the very slow permeability.

If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling. Roads for year-round use need heavy base rock. The seasonal high water table is perched above the dense clay substratum, and drainage should be provided if buildings with basements and crawl spaces are constructed. Plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is not assigned a capability classification.

107C—Philomath silty clay, 3 to 12 percent slopes. This shallow, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium and residuum derived from basic igneous rock. Areas are irregular in shape and are 5 to 75 acres in size. The vegetation in areas not cultivated is mainly Oregon white oak, wild rose, poison-oak, and grasses. Elevation is 350 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay about 6 inches thick. The subsoil is very dark brown clay about 8 inches thick. Weathered bedrock is at a depth of 14 inches. Depth to bedrock ranges from 12 to 20 inches. In some areas the surface layer is cobbly silty clay.

Included in this unit are small areas of Dixonville and Hazelair soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Philomath soil is slow. Available water capacity is about 2 to 3 inches. Water supplying capacity is 13 to 15 inches. Effective rooting depth is 12 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for pasture. It is also used as homesites and for recreation.

This unit is suited to pasture. Erosion control is a major management concern. Fertilizer is needed for optimum growth of grasses and legumes. It should be applied in spring, when there is adequate soil moisture for plant growth. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion and compaction.

If this unit is used for recreational development, the main limitations are slow permeability, clay content, and depth to rock. Good drainage should be provided for paths and trails.

If this unit is used for homesite development, the main limitations are slow permeability, small stones, and depth to bedrock. The deep cuts needed to provide essentially level building sites can expose bedrock. In most areas the bedrock is rippable; therefore, blasting is not required for excavation of basements. Support and stability for buildings can be provided by placing footings below a depth of 12 to 20 inches. Roads for year-round use need heavy base rock.

This map unit is in capability subclass VIe.

108C—Philomath cobbly silty clay, 3 to 12 percent slopes. This shallow, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium and residuum derived from basic igneous rock. Areas are irregular in shape and are 15 to 30 acres in size. The vegetation in areas not cultivated is mainly Oregon white oak, poison-oak, wild rose, and grasses. Elevation is 350 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown cobbly silty clay about 6 inches thick. The subsoil is very dark brown cobbly silty clay about 8 inches thick. Weathered bedrock is at a depth of 14 inches. Depth to bedrock ranges from 12 to 20 inches. In some areas the surface layer is silty clay.

Included in this unit are small areas of Dixonville, Hazelair, Panther, and Witzel soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Philomath soil is slow. Available water capacity is about 2 to 3 inches. Water supplying capacity is 13 to 15 inches. Effective rooting depth is 12 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for pasture. It is also used for recreation and as homesites.

This unit is suited to pasture. Erosion control is a major management concern. Fertilizer is needed for optimum growth of grasses and legumes. It should be applied early in spring, when there is adequate soil moisture for plant growth. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion and compaction.

If this unit is used for recreational development, the main limitations are the high clay content, slow permeability, and small stones. Use is limited primarily to paths and trails, for which good drainage should be provided.

If this unit is used for homesite development, the main limitations are small stones, shallow depth to bedrock, slow permeability, and shrink-swell potential. Even in areas where sewer systems exist, the unit has low potential for residential development. The deep cuts needed to provide essentially level building sites can expose bedrock. In most locations the bedrock is rippable; therefore, blasting is not required for excavation of basements. Support and stability for buildings can be provided by placing footings below a depth of 12 to 20 inches. Roads for year-round use need heavy base rock.

This map unit is in capability subclass VIe.

108F—Philomath cobbly silty clay, 12 to 45 percent slopes. This shallow, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium and residuum derived from basic igneous rock. Areas are irregular in shape and are 15 to 200 acres in size. The native vegetation is mainly Oregon white oak, poison-oak, wild rose, and grasses. Elevation is 350 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown cobbly silty clay about 6 inches thick. The subsoil is very dark brown cobbly silty clay about 8 inches thick. Weathered bedrock is at a depth of 14 inches. Depth to bedrock ranges from 12 to 20 inches. In some areas the surface layer is silty clay.

Included in this unit are small areas of Dixonville, Hazelair, Ritner, and Witzel soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Philomath soil is slow. Available water capacity is about 2 to 3 inches. Water supplying capacity is 13 to 15 inches. Effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for pasture. It is also used as homesites and for recreation.

If this unit is used for pasture, the main limitations are cobbles on the surface and slope. These limitations make tillage and use of equipment impractical. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion.

If this unit is used for homesite development, the main limitations are slope and depth to rock. The deep cuts needed to provide essentially level building sites can expose bedrock. In summer, irrigation is needed for landscaping plants.

This map unit is in capability subclass VIe.

109F—Philomath-Urban land complex, 12 to 45 percent slopes. This map unit is on foothills adjacent to the Willamette Valley. Areas are irregular in shape and are 3 to 60 acres in size. The native vegetation is mainly Oregon white oak, poison-oak, wild rose, and grasses. Elevation is 350 to 1,200 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 55 percent relatively undisturbed Philomath cobbly silty clay, 5 percent disturbed Philomath cobbly silty clay, and 25 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Dixonville, Hazelair, Ritner, and Witzel soils. Included areas make up about 15 percent of the total acreage.

The relatively undisturbed Philomath soil is shallow and well drained. It formed in colluvium and residuum derived from basic igneous rock. Typically, the surface layer is very dark brown cobbly silty clay about 6 inches thick. The subsoil is very dark brown cobbly silty clay about 8 inches thick. Weathered bedrock is at a depth of 14 inches. Depth to bedrock ranges from 12 to 20 inches. In some areas the surface layer is silty clay.

Permeability of the relatively undisturbed Philomath soil is slow. Available water capacity is about 2 to 3 inches. Effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The disturbed Philomath soil has been covered by as much as 40 inches of fill material or has had as much as 20 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Philomath, Ritner, Dixonville, and Hazelair soils that have been cut or graded. The characteristics of this soil are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly as homesites and for urban development. It is also used for yards and open areas around buildings.

If this unit is used for urban development, the main limitations are slope, stones, and depth to rock. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate droughtiness should be selected if irrigation is not provided. Bark mulch and rockwork are alternatives to landscaping plants where irrigation cannot be provided.

This map unit is not assigned a capability classification.

110—Pits. This map unit consists of open excavations, throughout the survey area, from which the soil and commonly some of the underlying material such as hard rock or gravel have been removed. The pits in upland areas are sources of rock. The ones on terraces or flood plains are sources of gravel or topsoil, or both. Many of these pits are currently being used and enlarged for the extraction of gravel, topsoil, and other fill material. Many of the abandoned gravel pits on flood plains and low terraces have been filled at least partially with water and have been stocked with fish. These are shown on the maps as water areas instead of pits. Many other pits are being filled or will be filled by industrial waste or material from roadside cutbank slumps or ditch-cleaning debris.

This map unit is not assigned a capability classification.

111D—Preacher loam, 0 to 25 percent slopes. This deep, well drained soil is on broad ridgetops, in saddles, and on toe slopes and slump benches of uplands in the Coast Range. It formed in colluvium and residuum weathered from sedimentary rock. Areas are irregular in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, salal, western swordfern, and vine maple. Elevation is 25 to 2,500 feet. The average annual precipitation is 80 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface layer is very dark gray and very dark grayish brown loam about 18 inches thick. The subsoil is dark yellowish brown loam about 34 inches thick. The substratum to a depth of 58 inches is dark yellowish brown loam. Weathered, fractured sandstone is at a depth of 58 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Blachly, Bohannon, Eilertsen, Meda, and Slickrock soils and Preacher soils that have slopes of more than 25 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Preacher soil is moderate. Available water capacity is about 8 to 10 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for timber production, wildlife habitat, and watershed. A few areas are used for pasture and as homesites.

This unit is suited to hay, pasture, and other cool-season crops. In some years, supplemental irrigation is required for maximum production of forage crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. Grain and grasses respond to nitrogen, and legumes respond to phosphorus, boron, sulfur, and lime.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 181. The potential production per acre is 11,520 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 111,600 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Managed stands continue vigorous growth beyond 80 years of age.

Surface methods of harvesting timber generally can be used, but their use may be limited during rainy periods, which are mainly during December to April. The soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Reforestation should be carefully managed to reduce competition from undesirable plants. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitation is slope. Erosion can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Paths and trails should extend across the slope.

If this unit is used for homesite development, the main limitations are slope and low soil strength. Buildings should be designed to offset the limited ability of the soil in this unit to support a load. Roads for year-round use need heavy base rock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed.

This map unit is in capability subclass VIe.

111F—Preacher loam, 25 to 50 percent slopes. This deep, well drained soil is on side slopes of uplands in the Coast Range. It formed in colluvium and residuum derived from sedimentary rock. Areas are irregular in shape and are 3 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, salal, western swordfern, and vine maple. Elevation is 25 to 2,500 feet. The average annual precipitation is 80 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 160 to 200 days.

Typically, the surface layer is very dark gray and very dark grayish brown loam about 18 inches thick. The subsoil is dark yellowish brown loam about 34 inches thick. The substratum to a depth of 58 inches is dark yellowish brown loam. Weathered, fractured sandstone is at a depth of 58 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Blachly, Bohannon, Digger, Klickitat, and Slickrock soils. Also included are Preacher soils that have slopes of more than 50 percent or less than 25 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Preacher soil is moderate. Available water capacity is about 8 to 10 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 181. The potential production per acre is 11,520 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 111,600 board feet

(International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Highlead or other cable logging methods can be used for harvesting trees; however, use of these methods may be limited by rainy periods from December through April. The soil may be compacted if it is moist when heavy equipment is used. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Reforestation should be carefully managed to reduce competition from undesirable plants. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitation is slope. Steepness of slope limits the use of this unit to a few paths and trails, which should extend across the slope. Cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are slope and low soil strength. Buildings should be designed to offset the limited ability of the soil in this unit to support a load. Access roads should be located on gentler slopes where possible to minimize the hazard of slumping on deep cuts and fills. Roads for year-round use need heavy base rock. Erosion is a hazard on this unit. Only the part of the site that is used for construction should be disturbed.

This map unit is in capability subclass VIe.

112G—Preacher-Bohannon-Slickrock complex, 50 to 75 percent slopes. This map unit is on side slopes of uplands in the Coast Range. Areas are irregular in shape and are 10 to 400 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, vine maple, and salal. Elevation is 25 to 2,500 feet. The average annual precipitation is 70 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 150 to 210 days.

This unit is 35 percent Preacher loam, 30 percent Bohannon gravelly loam, and 20 percent Slickrock gravelly loam. The Bohannon soil is mainly on the upper part of downtrending ridges and headwalls. The Slickrock soil is on small slump benches and toe slopes. The Preacher soil is in the intermediate positions. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Blachly, Digger, Formader, Hembre, Kilchis, and Klickitat soils and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Preacher soil is deep and well drained. It formed in colluvium and residuum derived from sedimentary rock. Typically, the surface layer is very dark grayish brown and very dark gray loam about 18 inches thick. The subsoil is dark yellowish brown loam about 34 inches thick. The substratum to a depth of 58 inches is dark yellowish brown loam. Weathered bedrock is at a depth of 58 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Preacher soil is moderate. Available water capacity is about 8 to 10 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Bohannon soil is moderately deep and well drained. It formed in colluvium derived from sedimentary rock. Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark brown gravelly loam about 11 inches thick. The subsoil is dark brown and brown cobbly loam about 13 inches thick. Highly fractured, weathered sedimentary rock is at a depth of 24 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Bohannon soil is moderately rapid. Available water capacity is about 2.5 to 6.0 inches. Water supplying capacity is 16 to 24 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Slickrock soil is deep and well drained. It formed in colluvium and residuum derived from sandstone. Typically, the surface is covered with a mat of leaves, needles, and twigs about 5 inches thick. The surface layer is very dark brown and very dark grayish brown gravelly loam about 13 inches thick. The upper part of the subsoil is dark brown and brown gravelly loam about 27 inches thick, and the lower part is yellowish brown very cobbly loam about 15 inches thick. Weathered, fractured sandstone is at a depth of 55 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Slickrock soil is moderate. Available water capacity is about 7 to 10 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 181 on the Preacher soil. The potential production per acre is 11,520 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 111,600 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

On the basis of a 100-year site curve, the mean site index for Douglas-fir is 155 on the Bohannon soil. The potential production per acre is 9,840 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,040 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

On the basis of a 100-year site curve, the mean site index for Douglas-fir is 195 on the Slickrock soil. The potential production per acre is 12,240 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 121,440 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main concerns in producing and harvesting timber are steepness of slope and the hazard of erosion. Minimizing the risk of erosion is essential in harvesting timber. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Tractor methods of harvesting timber are difficult to use because of slope. Highlead or other cable logging methods can be used; however, use of these methods is limited during November through April because of periods of heavy rainfall that cause excessive erosion and landslides.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

This unit is poorly suited to homesite or recreational development. It is limited mainly by slope and the hazards of erosion and slumping.

This map unit is in capability subclass VIIe.

113C—Ritner cobbly silty clay loam, 2 to 12 percent slopes. This moderately deep, well drained soil is on foothills. It formed in cobbly colluvium derived from basic igneous rock. Areas are irregular in shape and are 5 to 50 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, bigleaf maple, Oregon white oak, western brackenfern, hazelnut, poison-oak, and grasses. Elevation is 400 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 53 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark reddish brown cobbly silty clay loam about 7 inches thick. The subsoil is dark reddish brown and yellowish red very cobbly silty clay loam about 25 inches thick. Highly fractured basalt is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Jory, Nekia, and Witzel soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Ritner soil is moderately slow. Available water capacity is about 3 to 6 inches. Water supplying capacity is 16 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for pasture, hay, orchards, timber production, wildlife habitat, recreation, and homesites.

This unit is suited to pasture, hay, and orchard crops. It is limited mainly by stoniness. In summer, irrigation is required for maximum production. Sprinkler irrigation is a suitable method of applying water. Fruit trees and grasses respond to nitrogen, and legumes respond to phosphorus and lime. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 131. The potential production per acre is 7,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 76,770 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Seedling mortality may be high in summer because of droughtiness. If site preparation is not adequate, competition from undesirable plants can prevent or retard natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are small stones and clayey soil texture. The unit is suited to limited use as camp and picnic areas and hiking trails and paths.

If this unit is used for homesite development, the main limitations are depth to bedrock, cobbles, and moderately slow permeability. The deep cuts needed to provide essentially level building sites can expose bedrock.

Septic tank absorption lines should be installed on the contour.

This map unit is in capability subclass IVs.

113E—Ritner cobbly silty clay loam, 12 to 30 percent slopes. This moderately deep, well drained soil is on foothills. It formed in cobbly colluvium derived from basic igneous rock. Areas are irregular in shape and are 5 to 100 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, bigleaf maple, Oregon white oak, western brackenfern, hazelnut, poison-oak, and grasses. Elevation is 400 to 1,800 feet.

The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark reddish brown cobbly silty clay loam about 7 inches thick. The subsoil is dark reddish brown and yellowish red very cobbly silty clay loam about 25 inches thick. Highly fractured basalt is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Jory, Nekia, and Witzel soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Ritner soil is moderately slow. Available water capacity is about 3 to 6 inches. Water supplying capability is 16 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for timber production and wildlife habitat. A few areas are used for pasture, orchards, recreation, and homesites.

This unit is suited to pasture and orchard crops. It is limited mainly by stoniness and steepness of slope. In summer, irrigation is required for maximum production. Sprinkler irrigation is a suitable method of applying water. Water needs to be applied slowly to minimize runoff and erosion. Trees and grasses respond to nitrogen, and legumes respond to phosphorus and lime. Proper stocking rates, pasture rotation, and restricted grazing help to keep the pasture in good condition and to protect the soil from erosion.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 131. The potential production per acre is 7,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 76,770 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Because the clayey soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

If site preparation is not adequate, competition from undesirable plants can prevent or retard natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitations are steepness of slope, small stones, and clayey soil texture. Use generally is limited to paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitations are steepness of slope, depth to bedrock, low soil strength, cobbles, and moderately slow permeability. The deep cuts needed to provide essentially level building sites can expose bedrock. Special foundations for dwellings without basements may be needed to overcome the low soil strength.

This map unit is in capability subclass VIs.

113G—Ritner cobbly silty clay loam, 30 to 60 percent slopes. This moderately deep, well drained soil is on side slopes of foothills. It formed in cobbly colluvium derived from basic igneous rock. Areas are irregular in shape and are 5 to 100 acres or more in size. The native vegetation is mainly Douglas-fir, bigleaf maple, Oregon white oak, western brackenfern, hazelnut, poison-oak, and grasses. Elevation is 400 to 1,800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 1 inch thick. The surface layer is dark reddish brown cobbly silty clay loam about 7 inches thick. The subsoil is dark reddish brown and yellowish red very cobbly silty clay loam about 25 inches thick. Highly fractured basalt is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Nekia and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Ritner soil is moderately slow. Available water capacity is about 3 to 6 inches. Water supplying capacity is 16 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, watershed, and wildlife habitat.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 131. The potential production per acre is 7,860 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 76,770 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. In some areas highlead or other cable logging systems may be necessary to avoid the excessive soil disturbance caused by tractor logging. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems.

Because the soil is sticky when wet, most harvesting equipment can be used only during dry periods. After timber is harvested, the hazard of erosion can be reduced by revegetating the site as quickly as possible. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked stand of trees. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for homesite development, the main limitations are steepness of slope, depth to bedrock, low soil strength, cobbles, and moderately slow permeability. Roads and streets built on the soil in this unit are subject to slippage because of the steepness of slope.

This map unit is in capability subclass VIIs.

114—Riverwash. This map unit consists of deep, excessively drained to poorly drained islands or sand and gravel bars in and along major streams and rivers. Riverwash consists of recent deposits of sand and gravel derived dominantly from mixed sedimentary and igneous rock. Slope is 0 to 3 percent. Areas generally are elongated in shape and are 2 to 100 acres in size. The native vegetation is mainly occasional bunches of grass and scattered willows. Elevation is 290 to 1,500 feet. The average annual precipitation is 40 to 100 inches, the average annual air temperature is 47 to 52 degrees F, and the average frost-free period is 150 to 210 days.

Typically, Riverwash is highly stratified sand and gravel to a depth of 60 inches or more.

Included in this unit are small areas of Fluvents and Camas soils. Included areas make up about 15 percent of the total acreage.

Permeability of Riverwash is very rapid. Available water capacity and water supplying capacity are very low. Effective rooting depth is 10 to 40 inches. Runoff is slow, and the hazard of water erosion is very high.

Areas of this unit that do not contain an excess amount of fines can be used for roadfill and as a source of sand and gravel.

Riverwash is subject to overflow when the water level of the rivers and streams is high, and it is extremely droughty when the water level is low. During periods of overflow, material is deposited or eroded away.

This map unit is in capability subclass VIIIw.

115H—Rock outcrop-Kilchis complex, 30 to 90 percent slopes. This map unit is on ridgetops and side slopes of uplands in the Cascade Range. Areas are irregular or elongated in shape and are 5 to 200 acres in size. The native vegetation is mainly vine maple, western swordfern, tall Oregon-grape, western brackenfern, and scattered, slow-growing Douglas-fir. Elevation is 500 to 3,500 feet. The average annual precipitation is 60 to 90 inches, the average annual air temperature is 45 to 52 degrees F, and the average frost-free period is 145 to 200 days.

This unit is 65 percent Rock outcrop and 20 percent Kilchis stony loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bohannon, Digger, and Klickitat soils and a soil that is similar to this Kilchis soil but is less than 12 inches deep to bedrock. Included areas make up as much as 15 percent to the total acreage.

Rock outcrop is mainly exposed areas of barren or moss-covered rock. In some areas are a few inches of weathered rock fragments mixed with a high percentage of organic material consisting of moss, roots, and decaying needles, leaves, twigs, and wood fragments. The rock dominantly is basalt that generally is hard enough to quarry or to serve as a source of rock for roadbuilding.

The Kilchis soil is shallow and well drained. It formed in colluvium and residuum derived from basalt and breccia. Typically, the surface is covered with a mat of needles, twigs, and leaves about 1 inch thick. The surface layer is dark brown stony loam about 4 inches thick. The next layer is dark reddish brown very cobbly loam about 8 inches thick. The subsoil is reddish brown very stony loam about 7 inches thick. Fractured basalt is at a depth of 19 inches. Depth to bedrock ranges from 12 to 20 inches.

Permeability of the Kilchis soil is moderately rapid. Available water capacity is about 1 inch to 2 inches. Water supplying capacity is 13 to 20 inches. Effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for wildlife habitat and as rock quarries. It is also used for recreation.

This unit is not suited to the production of merchantable Douglas-fir. The areas that support vegetation are small and scattered, and the trees in these areas are stunted and twisted. Because of the poor quality and quantity of the trees, it is not economically feasible to use the unit for timber production.

If this unit is used for recreational development, the main limitations are slope and the areas of Rock outcrop. The unit is suited to paths and trails, except in rockfall areas. Paths and trails should extend across the slope in some areas.

This map unit is in capability subclass VIIs.

116G—Rock outcrop-Witzel complex, 10 to 70 percent slopes. This map unit is on ridgetops and side slopes of foothills adjacent to the Willamette Valley. Areas are irregular or elongated in shape and are 3 to 80 acres in size. The native vegetation at lower elevations is mainly annual grasses, forbs, poison-oak, Oregon white oak, and scattered Douglas-fir. Grasses, forbs, and shrubs dominate the plant community at the higher elevations; however, Douglas-fir may be more abundant than at lower elevations. Elevation is 400 to 2,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 49 to 52 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 70 percent Rock outcrop and 20 percent Witzel very cobbly loam. The components of this unit are so intricately intermingled that is was not practical to map them separately at the scale used.

Included in this unit are small areas of Nekia and Ritner soils and a soil that is similar to the Witzel soil but is less than 12 inches deep to bedrock. Included areas make up as much as 10 percent of the total acreage.

Rock outcrop is mainly exposed areas of mostly barren rock. Some areas are covered with a few inches of rock fragments and organic material. These areas support scattered annual grasses. The rock dominantly is basalt, but in some areas it is welded tuff, breccia, andesite, and hard sedimentary rock such as arkosic sandstone or conglomerate. The rock generally is hard enough to quarry or to serve as a source of rock for roadbuilding.

The Witzel soil is shallow and well drained. It formed in residuum and colluvium derived from basic igneous rock. Typically, the surface layer is dark brown very cobbly loam about 4 inches thick. The subsoil is dark reddish brown very cobbly clay loam about 13 inches thick. Fractured basalt is at a depth of 17 inches. Depth to bedrock ranges from 12 to 20 inches.

Permeability of the Witzel soil is moderately slow. Available water capacity is about 1 inch to 3 inches. Water supplying capacity is 13 to 15 inches. Effective rooting depth is 12 to 20 inches. Runoff is medium to very rapid, and the hazard of water erosion is high.

This unit is used mainly for wildlife habitat and as rock quarries and native pasture. It is also used for recreation.

If this unit is used for recreational development, the main limitations are slope, depth to rock, and the areas of Rock outcrop. The unit is suited to paths and trails, except in areas of headwalls and rockfalls. Paths and trails should extend across the slope in some areas.

This map unit is in capability subclass VIIs.

117E—Salander silt loam, 12 to 30 percent slopes. This deep, well drained soil is on ridgetops and side slopes of uplands near the ocean, from Cape Mountain north to the survey area boundary. It formed in colluvium and residuum derived from mixed igneous and sedimentary rock and additions of volcanic ash. Areas are irregular in shape and are 10 to 90 acres in size. The native vegetation is mainly Sitka spruce and western hemlock with shore pine immediately adjacent to the coast and Douglas-fir and western redcedar in more sheltered areas further inland. The understory vegetation is mainly salal, evergreen huckleberry, Pacific rhododendron, and western swordfern. Elevation is 50 to 1,200 feet. The average annual precipitation is 65 to 90 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 220 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 3 inches thick. The surface layer is very dark brown silt loam about 18 inches thick. The upper part of the subsoil is dark brown silt loam about 35 inches thick, and the lower part to a depth of 70 inches is very dark grayish brown and very dark brown silt loam.

Included in this unit are small areas of Astoria Variant, Bohannon, Formader, Klickitat, and Neskowin soils and a soil that is similar to this Salander soil but is 40 to 60 inches deep to weathered bedrock. Included areas make up about 15 percent of the total acreage.

Permeability of this Salander soil is moderate. Available water capacity is about 10 to 15 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is 60 inches or more. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

Most areas of this unit are used for timber production, wildlife habitat, and watershed. A few areas are used as homesites and for hay and pasture.

If this unit is used for hay and pasture, the main limitations are slope, the hazard of erosion, seasonal wetness, and the cool, moist summers that inhibit proper curing of hay crops. Seedbed preparation should be on the contour or across the slope where practical. Grazing when this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Use of lime and mixed fertilizer promotes good growth of forage plants.

This unit is suited to Sitka spruce and to western hemlock and Douglas-fir in areas sheltered from the onshore winds. On the basis of a 100-year site curve, the mean site index for Sitka spruce is 133. The potential production per acre is 10,250 cubic feet from an even-aged, fully stocked stand of trees 50 years old or 86,730 board feet (International rule, one-fourth inch kerf) from an even-aged, fully stocked stand of trees 70 years old.

Minimizing the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is moist. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth.

Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Reforestation can be accomplished by planting Douglas-fir, western hemlock, Sitka spruce, and shore pine seedlings.

If this unit is used for recreational development, the main limitations are slope, the hazard of erosion, and prolonged rainy periods. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

If this unit is used for homesite development, the main limitations are slope, low soil strength, and the hazard of erosion. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Access roads should be designed to control surface runoff and help stabilize cut slopes. Preserving the existing plant cover during construction helps to control erosion.

Slope is a concern in installing septic tank absorption fields on this unit. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe.

118—Salem gravelly silt loam. This deep, well drained soil is on stream terraces. It formed in gravelly mixed alluvium. Slope is 0 to 3 percent. Areas are irregular or elongated in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, ponderosa pine, Oregon white oak, bigleaf maple, wild rose, and grasses. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown gravelly silt loam about 7 inches thick. The subsoil is dark brown gravelly clay loam and gravelly silty clay loam about 19 inches thick. The substratum to a depth of 60 inches or more is multicolored very gravelly sand. In some areas the subsoil is very gravelly.

Included in this unit are small areas of Coburg, Malabon, and Oxley soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Salem soil is moderate. Available water capacity is about 4 to 6 inches. Effective rooting depth is 15 to 40 inches. It is limited by the very gravelly substratum. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for small grain, grass seed, hay, pasture, orchards, and row crops. It is also used for recreation and homesite development.

This unit is well suited to most climatically adapted crops. For most crops high yields can be expected with proper management. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

Crops respond well to fertilizer. A tillage pan forms easily if the soil in this unit is tilled when wet. Chiseling or subsoiling can be used to break up the tillage pan.

This unit is suited to recreational development. Coarse fragments in the surface layer limit the unit for use as playgrounds.

This unit is suited to homesite development. The main limitation for septic tanks is the hazard of polluting ground water.

This map unit is in capability subclass IIs.

119—Salem-Urban land complex. This map unit is on stream terraces. Slope is 0 to 2 percent. Areas are irregular or elongated in shape and are 3 to 100 acres in size. The native vegetation is mainly Oregon white oak, ponderosa pine, Douglas-fir, bigleaf maple, wild rose, and grasses. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 40 percent relatively undisturbed Salem gravelly silt loam, 5 percent disturbed Salem gravelly silt loam, and 45 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Coburg, Malabon, and Oxley soils. Included areas make up about 10 percent of the total acreage.

The relatively undisturbed Salem soil is deep and well drained. It formed in gravelly mixed alluvium. Typically, the surface layer is dark brown gravelly silt loam about 7 inches thick. The subsoil is dark brown gravelly clay loam and gravelly silty clay loam about 19 inches thick. The substratum to a depth of 60 inches or more is multicolored very gravelly sand.

Permeability of the relatively undisturbed Salem soil is moderate. Available water capacity is about 4 to 6 inches. Effective rooting depth is 15 to 40 inches. It is limited by the very gravelly substratum. Runoff is slow, and the hazard of water erosion is slight.

The disturbed Salem soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material commonly is from adjacent areas of Malabon, Salem, Oxley, or Coburg soils that have been cut or graded. The characteristics of the disturbed Salem soil are highly variable.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly as homesites and for urban development. It is also used for yards and open areas between buildings.

In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate droughtiness should be selected if irrigation is not provided.

This map unit is not assigned a capability classification.

120B—Salkum silt loam, 2 to 6 percent slopes. This deep, well drained soil is on old alluvial and glacial outwash terraces. It formed in mixed alluvium. Areas are irregular in shape and are 5 to 200 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, rose, wild blackberry, poison-oak, and grasses. Elevation is 375 to 700 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown silt loam about 11 inches thick. The upper 24 inches of the subsoil is dark reddish brown and dark brown clay, and the lower 10 inches is reddish brown silty clay. The substratum to a depth of 60 inches or more is variegated silty clay loam. In some areas the surface layer is silty clay loam.

Included in this unit are small areas of Bellpine, Linslaw, and Veneta soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Salkum soil is slow. Available water capacity is about 8 to 10 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is mainly used for hay, small grain, pasture, homesites, berries, orchards, and vegetables. Some areas are used for timber production.

This unit is suited to grasses, grain, and truck and orchard crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

This unit can be protected from erosion by planting cover crops and managing crop residue properly. A tillage pan forms easily if the soil is tilled when wet. Chiseling or subsoiling can be used to break up the tillage pan.

Response of crops to fertilizer is good if adequate moisture is present. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

If this unit is used for hay and pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,095 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,000 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Because of the susceptibility of the soil in this unit to compaction, logging should be done in such a way that the soil is not excessively disturbed. Ripping skid trails after logging helps to break up the compacted layer. Roads and landings can be protected from erosion by seeding cuts and fills. Undesirable plants prevent adequate natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is suited to many varieties of Christmas trees and to nursery stock. The major management concerns are the susceptibility of the soil to compaction and the hazard of erosion. Growing annual or perennial cover crops of grass or legumes helps to control erosion.

This unit is suited to recreational development during the dry periods of the year. Slow permeability, the hazard of erosion, and potential damage by compaction are the main limitations for year-round use.

If this unit is used for homesite or urban development, the main limitations are the low soil strength and slow permeability. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling and low soil strength. Roads for year-round use need heavy base rock.

Erosion is a hazard in areas that are barren of vegetation. Only the part of the site that is used for construction should be disturbed. Adequate culverts and ditches should be maintained to control erosion and to prevent waterlogging of roads. Seeding banks helps to control erosion and the siltation of ditches.

If the soil in this unit is used for septic tank absorption fields, the limitation of slow permeability generally can be overcome by increasing the size of the absorption field.

This map unit is in capability subclass IIe.

121B—Salkum silty clay loam, 2 to 8 percent slopes. This deep, well drained soil is on the higher lying, old alluvial and glacial outwash terraces. It formed in mixed alluvium derived from glacial outwash material. Areas are irregular in shape and are 5 to 400 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, rose, wild blackberry, poison-oak, and grasses. Elevation is 500 to 1,000 feet. The average annual precipitation is about 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown silty clay loam about 13 inches thick. The subsoil is dark reddish brown and reddish brown clay about 36 inches thick.

The substratum to a depth of 60 inches or more is variegated silty clay loam. In some areas the surface layer is silt loam.

Included in this unit are small areas of Bellpine, Hazelair, Linslaw, and McAlpin soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Salkum soil is slow. Available water capacity is about 8 to 10 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is more than 60 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for hay, pasture, small grain, berries, homesites, orchards, and timber production.

This unit is suited to grasses and orchard crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

This unit can be protected from erosion by planting cover crops and properly managing crop residue. A tillage pan forms easily if the soil is tilled when wet. Chiseling or subsoiling can be used to break up the tillage pan. Maintaining a high level of organic matter is essential to ensuring good tilth in the silty clay loam surface layer.

Response of crops to fertilizer is good if adequate moisture is present. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,095 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,000 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The major management concerns are control of erosion and compaction of the soil if equipment is used when the soil is moist. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Ripping skid trails after logging helps to break up the compacted layer. Undesirable plants prevent adequate natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is suited to many varieties of Christmas trees.

This unit is suited to recreational development during the dry periods of the year. Slow permeability, the hazard of erosion, and the clayey, sticky surface layer are the main limitations for year-round use.

If this unit is used for homesite or urban development, the main limitations are the moderate shrink-swell potential, low soil strength, and slow permeability. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from buildings help to prevent structural damage as a result of shrinking and swelling and the low soil strength. Roads for year-round use need heavy base rock.

Erosion is a hazard in areas that are barren of vegetation. Only the part of the site that is used for construction should be disturbed. Adequate culverts and ditches should be maintained to control erosion and prevent waterlogging of roads. Seeding cutbanks helps to control erosion and the siltation of ditches.

If this unit is used for septic tank absorption fields, the limitation of slow permeability can be overcome in most areas by increasing the size of the absorption field.

This map unit is in capability subclass IIe.

121C—Salkum silty clay loam, 8 to 16 percent slopes. This deep, well drained soil is on the higher lying, old alluvial and glacial outwash terraces. It formed in mixed alluvium derived from glacial outwash. Areas are irregular in shape and are 5 to 400 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, rose, wild blackberry, poison-oak, and grasses. Elevation is 500 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown silty clay loam about 13 inches thick. The subsoil is dark reddish brown and reddish brown clay about 36 inches thick. The substratum to a depth of 60 inches or more is variegated silty clay loam.

Included in this unit are small areas of Bellpine, Nekia, and Salkum soils that have slopes of more than 16 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Salkum soil is slow. Available water capacity is about 8 to 10 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for hay, pasture, small grain, berries, orchards, timber production, homesites, and gardens.

This unit is suited to grasses, grain, orchards, and some row crops. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation can be used, but water needs to be applied slowly to minimize runoff.

This unit can be protected from erosion by planting cover crops and properly managing crop residue. A tillage pan forms easily if the soil is tilled when wet. Chiseling or subsoiling can be used to break up the tillage pan. Maintaining a high content of organic matter is essential to ensuring good tilth of the silty clay loam surface layer.

Response of crops to fertilizer is good if adequate moisture is present. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 145. The potential production per acre is 9,095 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 82,000 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Tractor methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist while heavy equipment is used. Highlead or other cable logging systems are less damaging to the soil than tractor yarding. Management that minimizes the risk of erosion is important in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Undesirable plants prevent adequate natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is also suited to many varieties of Christmas trees. The main management concern is control of erosion. Growing annual or perennial cover crops of grass or legumes helps to control erosion.

This unit is suited to recreational development during the dry periods of the year. Slope, the hazard of erosion, slow permeability, and clayey soil texture are the main limitations for year-round use.

If this unit is used for homesite or urban development, the main limitations are the moderate shrink-swell potential, low soil strength, slope, and slow permeability. If buildings are constructed on this unit, properly designing foundations and footings and diverting runoff away from the buildings help to prevent structural damage as a result of shrinking and swelling and the low strength of the soil. Slope presents special design problems, which increases the cost of construction. Roads for year-round use need heavy base rock.

Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Adequate culverts and ditches must be maintained to control erosion and to prevent washout of roads. Seeding cutbanks also helps to control erosion and the siltation of ditches.

If this unit is used for septic tank absorption fields, the limitation of slow permeability can be overcome in most areas by increasing the size of the absorption field.

This map unit is in capability subclass IIIe.

122—Saturn clay loam. This deep, well drained soil is in small valleys in the Cascade Range. It formed in poorly sorted alluvium. Slope is 0 to 5 percent. Areas are long and narrow in shape and are 5 to 100 acres or more in size. The native vegetation is mainly Douglas-fir, western hemlock, bigleaf maple, red alder, vine maple, western swordfern, and some incense-cedar and black cottonwood. Elevation is 800 to 1,500 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of grass, ferns, leaves, and twigs about 0.5 inch thick. The surface layer is dark brown clay loam about 10 inches thick. The subsoil is dark brown and dark yellowish brown gravelly loam and clay loam about 22 inches thick. The substratum to a depth of 60 inches or more is multicolored extremely gravelly loamy sand. In some areas the surface layer is cobbly loam.

Included in this unit are small areas of Fluvents and Haflinger, Abiqua, Briedwell, and McAlpin soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Saturn soil is moderate. Available water capacity is about 4 to 6 inches, but recharge is received from adjacent streams through the porous substratum during periods of high streamflow. Effective rooting depth is 20 to 40 inches. It is limited by the extremely gravelly substratum. Water supplying capacity generally is 20 to 24 inches. Runoff is slow, and the hazard of water erosion is slight. A high water table is at a depth of 3.5 to 5.0 feet from December to March. The soil is subject to rare periods of flooding.

This unit is used for timber production, pasture, and recreation.

This unit is suited to pasture. Frost late in spring and early in fall may limit growing of sensitive crops in some areas, particularly at the higher elevations. Gravel bars in some areas cause droughtiness and reduce tilth. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index

for Douglas-fir is 162. The potential production per acre is 10,320 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 96,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Because the soil is sticky when wet, most planting and harvesting equipment can be used only during dry periods. Seedling mortality may be high in summer because of droughtiness. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

This unit is a good source of roadfill. The surface and subsoil should be retained for reclamation of borrow areas.

This unit is suited to recreational development such as camp and picnic areas and paths and trails. Small stones restrict the use of the unit for playgrounds.

If this unit is used for homesite development, the main limitation is the water table that may rise to within 3.5 feet of the surface during periods of high streamflow caused by heavy rainfall. Flooding may occur for brief periods in some areas when runoff is heavy. Dikes and channels that have outlets to bypass floodwater can be used to protect buildings and onsite sewage disposal systems from flooding.

This map unit is in capability subclass IIIs.

123—Sifton gravelly loam. This deep, somewhat excessively drained soil is on terraces. It formed in gravelly alluvium containing volcanic ash in the upper part. Slopes are 0 to 3 percent. Areas are irregular to somewhat oval in shape, are slightly convex, and are 3 to 45 acres in size. The vegetation in areas not cultivated is mainly shrubs, forbs, and grasses. Elevation is 300 to 800 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is black and very dark brown gravelly loam about 15 inches thick. The subsoil is dark yellowish brown very gravelly loamy coarse sand about 7 inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown and very dark grayish brown very gravelly sand. In some areas the surface layer is loam.

Included in this unit are small areas of Salem and Oxley soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Sifton soil is very rapid. Available water capacity is about 3 to 6 inches. Effective rooting depth is 15 to 30 inches. It is limited by the very gravelly substratum. Runoff is very slow, and the hazard of water erosion is slight.

This unit is used mainly for pasture, orchards, small grain, and vegetables. It is also used as small acreage homesites and for urban development.

This unit is suited to a wide variety of irrigated crops. It is limited mainly by droughtiness. In summer, irrigation is required for production of most crops.

Fertilization and irrigation require careful management. Frequent and light applications of fertilizer and water are needed because of the coarse texture of the soil and the low available water capacity. The gravelly surface layer hinders cultivation and harvesting of root crops, but it allows intensive use of the soil for berries, beans, or pasture without damage by compaction.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

The main limitations of this unit for homesite and urban development are small stones and the very rapidly permeable substratum. If the soil in this unit is used as a base for roads and streets, topsoil can be mixed with the underlying very gravelly sand substratum to increase its strength and stability. In summer, irrigation is required for lawns, shrubs, and trees unless drought-tolerant species are selected.

This map unit is in capability subclass IVs.

124D—Slickrock gravelly loam, 3 to 25 percent slopes. This deep, well drained soil is on toe slopes, side slopes, and slump benches on uplands in the Coast Range. It formed in colluvium and residuum derived from sandstone. Areas are irregular in shape and are 3 to 100 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, western hemlock, western redcedar, red alder, vine maple, salal, and western swordfern. Elevation is 50 to 2,500 feet. The average annual precipitation is 70 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 5 inches thick. The surface layer is very dark brown and very dark grayish brown gravelly loam about 13 inches thick. The upper part of the subsoil is dark brown and brown gravelly loam about 27 inches thick, and the lower part is yellowish brown very cobbly loam about 15 inches thick. Weathered, fractured sandstone is at a depth of 55 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Astoria, Blachly, Bohannon, and Preacher soils. Also included are Slickrock soils that have slopes of more than 25 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Slickrock soil is moderate. Available water capacity is about 7 to 10 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is slow to medium, and the hazard of water erosion is moderate.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 194. The potential production per acre is 12,180 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 120,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer and improves seedling survival and growth. Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

If this unit is used for recreational development, the main limitations are slope and small stones. Paths and trails should extend across the slope, and cuts and fills should be seeded or mulched.

If this unit is used for homesite development, the main limitations are slope and small stones. Onsite investigation of potential building sites is needed to determine whether they are old slump areas that might be reactivated by construction or other activities in surrounding areas. Roads for year-round use need heavy base rock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Removal of pebbles and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns.

The steepness of slope is a concern in installing septic tank absorption fields on this unit. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIe.

124F—Slickrock gravelly loam, 25 to 50 percent slopes. This deep, well drained soil is on side slopes of uplands in the Coast Range. It formed in colluvium and residuum derived from sandstone. Areas are irregular in shape and are 3 to 100 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, western redcedar, red alder, vine maple, salal, and western swordfern. Elevation is 50 to 2,500 feet. The average annual precipitation is 70 to 120 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 145 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 5 inches thick. The surface layer is very dark brown and very dark grayish brown gravelly loam about 13 inches thick. The upper part of the subsoil is dark brown and brown gravelly loam about 27 inches thick, and the lower part is yellowish brown very cobbly loam about 15 inches thick. Weathered, fractured sandstone is at a depth of 55 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Astoria, Blachly, Bohannon, Digger, Preacher, and Tahkenitch soils. Also included are areas of Slickrock soils that have slopes of less than 25 percent or more than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Slickrock soil is moderate. Available water capacity is about 7 to 10 inches. Water supplying capacity is 20 to 26 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 194. The potential production per acre is 12,180 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 120,720 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Highlead and other cable logging systems are less damaging to the soil than surface logging methods. The soil may be compacted if it is moist when heavy equipment is used. Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Reforestation can be accomplished by planting Douglas-fir and western hemlock seedlings.

This unit is poorly suited to recreational development because of steepness of slope.

If this unit is used for homesite development, the main limitations are steepness of slope and poor stability of cutbanks. Roads for year-round use need heavy base rock. Erosion is a hazard; therefore, only the part of the site that is used for construction should be disturbed.

This map unit is in capability subclass VIe.

125C—Steiwer loam, 3 to 12 percent slopes. This moderately deep, well drained soil is on low foothills adjacent to terraces in the Willamette Valley. It formed in residuum and colluvium derived from sedimentary or igneous rock. Areas are irregular in shape and are 3 to 200 acres in size. The vegetation in areas not cultivated is mainly annual and perennial grasses, Oregon white oak, wild rose, and poison-oak. Elevation is 300 to 650 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The upper 7 inches of the subsoil is dark brown loam, and the lower 13 inches is dark yellowish brown clay loam. Fractured, weathered sandstone is at a depth of 29 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Chehulpum, Hazelair, and Willakenzie soils. Also included are areas of Steiwer soils that have slopes of less than 3 percent or more than 12 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Steiwer soil is moderately slow. Available water capacity is about 3.5 to 7.0 inches. Water supplying capacity is 14 to 19 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is moderate.

This unit is used mainly for pasture, hay, small grain, orchards, recreation, wildlife habitat, and homesites. Some areas are used for timber production, but yield is low.

If this unit is used for cultivated crops, the main limitations are droughtiness, the hazard of erosion, and depth to rock. Early-maturing crops; pasture in spring, early in summer, and late in fall; and crops that are tolerant of drought are best suited to this unit. The available moisture is not adequate for good growth of most other plants. With irrigation and proper fertilization, the unit is suited to a much wider variety of crops. Suitable irrigation wells and reservoir sites, however, are limited in areas of this unit. If the soil is plowed in fall, runoff and erosion can be reduced by fertilizing and seeding to a cover crop.

If this unit is used for hay and pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

If this unit is used for homesite development, the main limitations are depth to bedrock, moderately slow permeability, and steepness of slope. The deep cuts needed to provide essentially level building sites can expose bedrock. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability subclass IIIe.

125D—Steiwer loam, 12 to 20 percent slopes. This moderately deep, well drained soil is on low foothills adjacent to terraces in the Willamette Valley. It formed in residuum and colluvium derived from sedimentary and igneous rock. Areas are irregular in shape and are 3 to 200 acres in size. The vegetation in areas not cultivated is mainly annual and perennial grasses, Oregon white oak, wild rose, and poison-oak. Elevation is 300 to 650 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The upper 7 inches of the subsoil is dark brown loam, and the lower 13 inches is dark yellowish brown clay loam. Fractured, weathered sandstone is at a depth of 29 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Chehulpum, Hazelair, and Willakenzie soils. Also included are areas of Steiwer soils that have slopes of less than 12 percent or more than 20 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Steiwer soil is moderately slow. Available water capacity is about 3.5 to 7.0 inches. Water supplying capacity is 14 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly for pasture, hay, small grain, recreation, wildlife habitat, and homesites. Some areas are used for timber production and orchards.

If this unit is used for cultivated crops, the main limitations are slope, droughtiness, depth to bedrock, moderately slow permeability, and the hazard of erosion. Early-maturing crops; pasture in spring, early in summer, and late in fall; and crops that are tolerant of drought are best suited to this unit. The available moisture is not adequate for good growth of most late-season crops. With irrigation and proper fertilization, the unit is suited to a much wider variety of crops; however, availability of suitable irrigation wells and reservoir sites is limited. If the soil is plowed in fall, runoff and erosion can be reduced by fertilizing and seeding to a cover crop.

If this unit is used for hay and pasture, proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

If this unit is used for recreational development, the main limitations are steepness of slope, depth to rock, and moderately slow permeability. Paths and trails should extend across the slope.

If this unit is used for homesite development, the main limitations are slope, depth to bedrock, moderately slow permeability, and the hazard of erosion. Only the areas needed for construction should be disturbed. Roads and streets should be built across the slope. Seeding cuts and fills helps to control erosion. The deep cuts needed to provide essentially level building sites can expose bedrock. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability subclass IVe.

125F—Steiwer loam, 20 to 50 percent slopes. This moderately deep, well drained soil is on low foothills adjacent to terraces of the Willamette Valley. It formed in colluvium and residuum derived from sedimentary and igneous rock. Areas are irregular in shape and are 3 to 200 acres in size. The vegetation in areas not cultivated is mainly annual and perennial grasses, Oregon white oak, wild rose, and poison-oak. Douglas-fir is in areas on north-facing side slopes. Elevation is 300 to 650 feet. The average annual percipitation is 40 to 55 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The upper 7 inches of the subsoil is dark brown loam, and the lower 13 inches is dark yellowish brown clay loam. Fractured, weathered sandstone is at a depth of 29 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Chehulpum, Hazelair, and Willakenzie soils, Rock outcrop, and Steiwer soils that have slopes of less than 20 percent or more than 50 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Steiwer soil is moderately slow. Available water capacity is about 3.5 to 7.0 inches. Water supplying capacity is 14 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for pasture, recreation, and wildlife habitat. It is also used as homesites and for some timber production.

If this unit is used for pasture, the main limitation is steepness of slope. Seeding of improved species and fertilizing are restricted to the less sloping areas or to hand or aerial methods. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

Areas on south-facing side slopes generally are restricted to use for pasture; however, scattered Oregon white oak is present, and some areas are used for recreation and wildlife habitat. Steepness of slope limits the recreational use of areas of this unit mainly to a few paths and trails, which should extend across the slope.

If this unit is used for homesite development, the main limitation is steepness of slope. Roads and foundations are expensive to construct, but they generally are stable.

This map unit is in capability subclass VIe.

126F—Tahkenitch loam, 20 to 45 percent slopes. This deep, well drained soil is on uplands in the Coast Range. It formed in colluvium derived from sandstone. Areas are irregular in shape and are 5 to 15 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, vine maple, red huckleberry, salal, and western swordfern. Elevation is 100 to 800 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 52 degrees F, and the average frost-free period is 185 to 220 days.

Typically, the surface is covered with a mat of leaves, needles, twigs, and roots about 1 inch thick. The surface layer is very dark brown and very dark grayish brown loam about 12 inches thick. The subsoil is dark brown and yellowish brown loam and gravelly sandy loam about 30 inches thick. Fractured, weathered sandstone is at a depth of 42 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Digger, Lint, Preacher, and Slickrock soils. Also included are areas of Tahkenitch soils that have slopes of less than 20 percent or more than 45 percent and soils that are similar to this Tahkenitch soil but are less than 40 inches deep to bedrock or are more than 35 percent rock fragments. Included areas make up about 15 percent of the total acreage.

Permeability of this Tahkenitch soil is moderate. Available water capacity is about 6 to 8 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 156. The potential production per acre is 9,900 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,840 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Trees are subject to windthrow when the soil is wet and winds are strong. Brushy plants such as red alder and salmonberry limit natural regeneration of Douglas-fir. Among the trees that are suitable for planting are Douglas-fir and western hemlock.

If this unit is used for homesite development, the main limitation is steepness of slope. The deep cuts needed to provide essentially level building sites can expose bedrock. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Some of the less sloping areas of this unit are suitable for septic tank absorption fields.

This map unit is in capability subclass VIe.

126G—Tahkenitch loam, 45 to 75 percent slopes. This deep, well drained soil is on uplands in the Coast Range. It formed in colluvium derived from sandstone. Areas are irregular in shape and are 5 to 40 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, red alder, vine maple, red huckleberry, salal, and western swordfern. Elevation is 100 to 800 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 52 degrees F, and the average frost-free period is 185 to 220 days.

Typically, the surface is covered with a mat of leaves, twigs, and roots about 1 inch thick. The surface layer is very dark brown and very dark grayish brown loam about 12 inches thick. The subsoil is dark brown and yellowish brown loam and gravelly sandy loam about 30 inches thick. Fractured, weathered sandstone is at a depth of 42 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Bohannon, Digger, Preacher, and Slickrock soils. Also included are areas of Tahkenitch soils that have slopes of less than 45 percent or more than 75 percent; soils that are similar to this Tahkenitch soil but are less than 40 inches or more than 60 inches deep to bedrock; and, in the Fiddle Creek area, soils that are similar to this Tahkenitch soil but are more than 35 percent rock fragments. Included areas make up about 15 percent of the total acreage.

Permeability of this Tahkenitch soil is moderate. Available water capacity is about 6 to 8 inches. Water supplying capacity is 17 to 24 inches. Effective rooting depth is 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production, wildlife habitat, and watershed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 156. The potential production per acre is 9,900 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 91,840 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Management that minimizes the risk of erosion is essential in harvesting timber. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Surface methods of harvesting trees are difficult to use because of the steepness of slope. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Trees are subject to windthrow when the soil is saturated and winds are strong. Brushy plants such as red alder and salmonberry limit natural regeneration of Douglas-fir. Among the trees that are suitable for planting are Douglas-fir and western hemlock.

This unit is poorly suited to recreational or homesite development because of the steepness of slope.

This map unit is in capability subclass VIIe.

127C—Urban land-Hazelair-Dixonville complex, 3 to 12 percent slopes. This map unit is on rolling foothills and toe slopes. Areas are irregular in shape and are 5 to 100 acres in size. The native vegetation is mainly scattered, clumpy stands of Oregon white oak, Douglas-fir, and ponderosa pine interspersed with open grassy and brushy areas. Elevation is 400 to 1,200 feet. The average annual precipitation is about 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

This unit is 35 percent Urban land, 25 percent Hazelair silty clay loam, and 20 percent Dixonville silty clay loam. Urban land is throughout the unit, the Hazelair soil is in somewhat concave areas, and the Dixonville soil is in convex areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Panther, Philomath, Ritner, and Witzel soils and Rock outcrop. Also included are areas of soils that are similar to these Dixonville and Hazelair soils but have been disturbed during urban development. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Urban land consists of areas that are covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification and interpretations are not feasible.

The Hazelair soil is moderately deep and moderately well drained. It formed in colluvium overlying sedimentary rock. Typically, the surface layer is very dark brown silty clay loam about 11 inches thick. The subsoil is dark brown silty clay about 4 inches thick. The substratum is dark brown and light olive brown clay about 21 inches thick. Weathered bedrock is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Hazelair soil is very slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 18 to 22 inches. Effective rooting depth is limited by a high water table that is at a depth of 1 foot to 2 feet from December to April. Runoff is moderate to rapid, and the hazard of water erosion is high.

The Dixonville soil is moderately deep and well drained. It formed in colluvium and residuum derived from basaltic rock. Typically, the surface layer is very dark brown silty clay loam about 14 inches thick. The subsoil is dark brown silty clay and cobbly clay about 12 inches thick. Weathered bedrock is at a depth of 26 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Dixonville soil is slow. Available water capacity is about 4 to 7 inches. Water supplying capacity is 17 to 23 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for urban development. It is also used for parks and other recreational areas.

If the Hazelair soil is used for urban development, the main limitations are the shrink-swell potential and highly plastic clay in the substratum, accumulations of excess water from winter rains, and instability of cuts and fills. Drainage is needed if roads and building foundations are constructed. Excess water can be removed by using shallow ditches and providing the proper grade. Wetness can be reduced by installing drain tiles around footings.

The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Support and stability for buildings can be provided by placing footings below the clay layer. Roads and streets can be built if they are designed to compensate for the instability of the highly plastic clay in the substratum. Cutbanks are not stable and are subject to slumping.

Revegetating disturbed areas of this soil around construction sites as soon as possible helps to control soil erosion. Plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

The Dixonville soil is suited to urban development. The main limitations are depth to rock, shrink-swell potential, the hazard of erosion in winter, and droughtiness in summer. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Support and stability for buildings can be provided by placing footings below a depth of 36 inches. The deep cuts needed to provide essentially level building sites can expose bedrock.

Erosion is a hazard in the steeper areas of this soil. Only the part of the site that is used for construction should be disturbed. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

If this unit is used for recreational development, the main limitations are the clayey surface layer, very slow and slow permeability, and depth to rock. Good drainage should be provided for paths and trails. Establishing and maintaining plant cover can be achieved through proper fertilization, seeding, mulching, and shaping of the slopes. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees. Plants that tolerate a seasonal high water table and droughtiness should be selected if drainage and irrigation are not provided.

This map unit is not assigned a capability classification.

128B—Veneta loam, 0 to 7 percent slopes. This deep, moderately well drained soil is on old alluvial terraces and low foothills. It formed in mixed alluvium. Areas are irregular in shape and are 3 to 400 acres in size. The vegetation in areas not cultivated is mainly Douglas-fir, ponderosa pine, Pacific madrone, Oregon white oak, poison-oak and other shrubs, and grasses. Elevation is 300 to 600 feet. The average annual precipitation is 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown and brown loam about 14 inches thick. The subsoil is dark yellowish brown and strong brown clay loam and clay about 35 inches thick. The substratum to a depth of 60 inches or more is mottled, yellowish brown, gray, and light olive brown clay. Some areas have thin layers of sand in the substratum.

Included in this unit are small areas of Bellpine, Linslaw, Noti, Veneta Variant, and Willakenzie soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Veneta soil is slow. Available water capacity is about 9.5 to 12.0 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is limited by the dense clay substratum and a high water table that is at a depth of 3 to 6 feet from November to May. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for small grain, hay, pasture, orchards, wildlife habitat, recreation, timber production, and homesites. Some areas are used for row crops, mostly in small gardens.

If this unit is used for cultivated crops, the main limitations are low soil fertility and restricted availability of irrigation water from wells. With proper fertilization and irrigation, a wide variety of crops can be grown successfully. Where availability of water for irrigation is limited, late-maturing, shallow-rooted crops are not suitable. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 139. The potential production per acre is 8,640 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 76,240 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are susceptibility of the soil to compaction from harvesting operations during the wet season and the seasonal high water table, which increases seedling mortality. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings.

If this unit is used for recreational development, the main limitations are the slow permeability and the seasonal high water table.

The main limitations for homesite development are slow permeability in the lower part of the subsoil, the seasonal high water table, and the low strength of the soil when wet. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

If this unit is used for septic tank absorption fields, the limitation of slow permeability can be overcome in most areas by increasing the size of the absorption field. In less sloping areas of the unit, septic tank absorption fields may not function properly in winter because of the high water table.

This map unit is in capability subclass IIe.

129B—Veneta Variant silt loam, 0 to 7 percent slopes. This deep, moderately well drained soil is on old alluvial terraces. It formed in mixed alluvium. Areas are elongated in shape and are 3 to 40 acres or more in size. The vegetation in areas not cultivated is mainly Douglas-fir, ponderosa pine, Pacific madrone, Oregon white oak, poison-oak and other shrubs, and grasses. Elevation is 400 to 600 feet. The average annual precipitation is 45 to 60 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark grayish brown and dark brown silt loam about 12 inches thick. The subsoil is dark brown silty clay loam about 40 inches thick. The substratum to a depth of 60 inches or more is silt loam and fine sandy loam.

Included in this unit are small areas of Bellpine, Linslaw, Noti, and Willakenzie soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Veneta Variant soil is moderately slow. Available water capacity is about 9.5 to 12.0 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is limited by a high water table that is at a depth of 3.5 to 6.0 feet from November to May. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for hay, pasture, orchards, wildlife habitat, recreation, timber production, and homesites. Some small areas are used for row crops, mostly in gardens.

If this unit is used for cultivated crops, the main limitation is low soil fertility. The climate also is less favorable in areas of this unit than it is in areas in the main part of the Willamette Valley because of cool periods late in spring and early in fall. Also, fog and unseasonal frosts are more of a concern on this unit than in most other areas used for crops. With proper fertilization, a wide variety of crops can be grown successfully. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Irrigation water, which is needed for the production of late-maturing, shallow-rooted crops, generally is available from nearby perennial streams.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 150. The potential production per acre is 9,480 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 86,800 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

The main limitations for the management of timber are the susceptibility of the soil to compaction from harvesting operations during the wet season and plant competition. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir and ponderosa pine seedlings.

This unit is suited to recreational development. It is limited mainly by moderately slow permeability and slope, which interfere with playground and campsite development.

The main limitations for homesite development on this unit are the high water table and low strength of the soil when wet. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

If this unit is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field.

This map unit is in capability subclass IIe.

130—Waldo silty clay loam. This deep, poorly drained soil is in depressional areas on the flood plains and low terraces of the smaller tributaries to the Willamette Valley and headwaters of the Siuslaw River. The soil formed in silty and clayey mixed alluvium. Slopes are 0 to 3 percent. Areas are elongated or irregular in shape and are 3 to 150 acres in size. The vegetation in areas not cultivated is mainly Oregon ash, black cottonwood, willow, Oregon white oak, sedges, reeds, and grasses. Elevation is 300 to 1,000 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is very dark brown silty clay loam about 11 inches thick. The subsoil is very dark gray, dark gray, and gray, mottled silty clay and clay about 49 inches thick.

Included in this unit are small areas of Bashaw, McAlpin, and Wapato soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Waldo soil is slow. Available water capacity is about 9 to 11 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is limited by a high water table that is at the surface to a depth of 6 inches from November to May. Runoff is slow, and the hazard of water erosion is slight except when nearby streams overflow. The soil is occasionally flooded for brief periods from January to April.

This unit is used mainly for pasture, hay, and grass seed. Areas that have been drained are also used for small grain and corn.

This unit is suited to shallow-rooted crops. It is limited mainly by wetness and the moderately fine textured surface layer. Lack of adequate outlets and slow permeability are the main limitations for installing an effective drainage system. Where drainage has been established, a winter cover crop is needed to maintain tilth and to help control erosion. Crops respond to lime and nitrogen.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

If this unit is used for recreational development, the main limitations are wetness, the hazard of flooding, and the clayey texture of the soil. During the dry months, this unit can be used for picnic areas and paths and trails.

This unit has many natural ponds and areas suitable for developing ponds that can provide habitat for waterfowl, fish, and other wildlife.

If this unit is used for homesite development, the main limitations are the seasonal high water table, the hazard of flooding, the silty clay loam surface layer, slow permeability, wetness, and low soil strength. Flooding can be controlled only by use of major flood control structures. Wetness can be reduced by installing drain tile around footings. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Roads for year-round use need heavy base rock.

This map unit is in capability subclass IIIw.

131C—Waldport fine sand, 0 to 12 percent slopes. This deep, excessively drained soil is on stabilized sand dunes. It formed in eolian sand of mixed origin. Areas are irregular in shape and are 3 to 100 acres or more in size. The native vegetation is mainly shore pine, Sitka spruce, salal, evergreen huckleberry, and Pacific rhododendron. Elevation is 10 to 150 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 200 to 250 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 3 inches thick. The surface layer is very dark gray and very dark grayish brown fine sand about 5 inches thick. The substratum to a depth of 60 inches or more is yellowish brown fine sand.

Included in this unit are small areas of Heceta, Netarts, and Yaquina soils and Waldport soils that have slopes of more than 12 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Waldport soil is very rapid. Available water capacity is about 3 to 4 inches. Water supplying capacity is 18 to 20 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is low. The hazard of soil blowing is high in areas where vegetation is removed.

This unit is used mainly for wildlife habitat and recreation. It is also used as homesites and for pasture and timber production.

If this unit is used for pasture, the main limitations are droughtiness and the hazards of soil blowing and water erosion. Use of lime and frequent, light applications of mixed fertilizer promotes good growth of forage plants. In summer, irrigation is needed for maximum production of most crops. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients. Because the soil is droughty, applications of irrigation water should be light and frequent. Proper stocking rates, pasture rotation, and restricted grazing periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit generally is poorly suited to the production of shore pine. On the basis of a 100-year site curve, the mean site index for shore pine is 92. The potential production per acre is 1,740 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 13,050 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. High winds from the Pacific Ocean may seriously reduce the growth of trees unless they are in a protected area.

The main limitations for the management of timber are the hazard of erosion and seedling mortality. The risk of soil blowing is increased if the timber is harvested or the understory is removed. Conventional methods can be used for harvesting timber, but use of skid trails can accelerate erosion. Cuts and fills need to be seeded to permanent plant cover to reduce the risk of erosion. Reforestation is severely limited because of droughtiness. Seedling mortality can be reduced by providing shade for seedlings. Reforestation can be accomplished by planting shore pine, Sitka spruce, or western hemlock seedlings.

This unit is suited to recreational development. It is limited mainly by slope and the sandy texture of the soil, which is droughty and easily eroded. Recreational uses include campgrounds, parks, and picnic areas. Areas used for recreation can be protected from soil blowing and dustiness by surfacing paths and maintaining plant cover. Cuts and fills should be seeded or mulched. Plant cover can be maintained by controlling traffic.

If this unit is used for homesite development, the main limitations are slope and the sandy texture of the soil. Preserving the existing plant cover during construction helps to control erosion. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Cutbanks are not stable and are subject to slumping. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. The potential for pollution of ground water because of the very rapid permeability and low biological activity of the soil limits the use of this unit for septic tank absorption fields.

This map unit is in capability subclass VIe.

131E—Waldport fine sand, 12 to 30 percent slopes. This deep, excessively drained soil is on stabilized sand dunes. It formed in eolian sand of mixed origin. Areas are irregular in shape and are 3 to 100 acres or more in size. The native vegetation is mainly shore pine, Sitka spruce, salal, evergreen huckleberry, and Pacific rhododendron. Elevation is 10 to 150 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 200 to 250 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 3 inches thick. The surface layer is very dark gray and very dark grayish brown fine sand about 5 inches thick. The substratum to a depth of 60 inches or more is yellowish brown fine sand.

Included in this unit are small areas of Heceta, Netarts, and Yaquina soils and Waldport soils that have a thinner surface layer or have slopes of less than 12 percent or more than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Waldport soil is very rapid. Available water capacity is about 3 to 4 inches. Water supplying capacity is 18 to 20 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is low. The hazard of soil blowing is high.

This unit is used mainly for wildlife habitat and recreation. It is also used as homesites and for pasture and timber production.

If this unit is used for pasture, the main limitations are droughtiness and the hazards of soil blowing and water erosion. Use of lime and frequent, light applications of mixed fertilizer promotes good growth of forage plants. In summer, irrigation is needed for maximum production of most crops. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients. Because the soil in this unit is droughty, applications of irrigation water should be light and frequent. Proper stocking rates and pasture rotation help to keep the pasture in good condition and to protect the soil from erosion.

This unit generally is poorly suited to the production of shore pine. On the basis of a 100-year site curve, the mean site index for shore pine is 92. The potential production per acre is 1,740 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 13,050 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. High winds from the Pacific Ocean may seriously reduce the growth of trees unless they are in a protected area.

The main limitations for the management of timber are the hazard of erosion and seedling mortality. The risk of soil blowing is increased if the timber is harvested or the understory vegetation is removed. Conventional methods can be used for harvesting timber, but use of skid trails can accelerate erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless they are provided with adequate water bars or are protected by plant cover, or both. Cuts and fills need to be seeded to permanent plant cover to reduce the risk of erosion.

Reforestation is severely limited because of droughtiness. Seedling mortality can be reduced by providing shade for seedlings. Reforestation should be carefully managed to reduce competition from undesirable understory plants. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Hand planting of nursery stock is usually necessary to establish or improve a stand. Among the trees that are suitable for planting are Sitka spruce and shore pine. Douglas-fir and western hemlock can be planted in sheltered areas. Trees commonly are subject to windthrow.

This unit is suited to recreational development. It is limited mainly by slope and the sandy texture of the soil, which is droughty and easily eroded. Recreational uses include campgrounds, parks, and picnic areas. Areas used for recreation can be protected from soil blowing and dustiness by surfacing paths and maintaining plant cover. Cuts and fills should be seeded or mulched. Plant cover can be maintained by controlling traffic.

If this unit is used for homesite development, the main limitations are slope and the sandy texture of the soil. Preserving the existing plant cover during construction helps to control erosion. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Cutbanks are not stable and are subject to slumping. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. The potential for pollution of ground water because of the very rapid permeability and low biological activity of the soil limits the use of this unit for septic tank absorption fields.

This map unit is in capability subclass VIIe.

131G—Waldport fine sand, 30 to 70 percent slopes. This deep, excessively drained soil is on stabilized sand dunes. It formed in eolian sand of mixed origin. Areas are irregular in shape and are 3 to 100 acres or more in size. The native vegetation is mainly shore pine, Sitka spruce, salal, evergreen huckleberry, and Pacific rhododendron. Douglas-fir is in areas on east-facing side slopes. Elevation is 10 to 150 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 200 to 250 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 3 inches thick. The surface layer is very dark gray and very dark grayish brown fine sand about 5 inches thick. The substratum to a depth of 60 inches or more is yellowish brown fine sand.

Included in this unit are small areas of Bandon, Netarts, and Yaquina soils and Waldport soils that have slopes of less than 30 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Waldport soil is very rapid. Available water capacity is about 3 to 4 inches. Water supplying capacity is 18 to 20 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used mainly for wildlife habitat and recreation. It is also used as homesites and for pasture and timber production.

If this unit is used for pasture, the main limitations are slope, droughtiness, and the hazards of soil blowing and water erosion. Use of lime and frequent, light applications of mixed fertilizer promotes good growth of forage plants. In summer, irrigation is needed for maximum production of most crops. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients. Proper stocking rates and pasture rotation help to keep the pasture in good condition and to protect the soil from erosion.

This unit generally is poorly suited to the production of shore pine. On the basis of a 100-year site curve, the mean site index for shore pine is 92. The potential production per acre is 1,740 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 13,050 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. High winds from the Pacific Ocean may seriously reduce the growth of trees unless they are in a protected area.

The main limitations for the management of timber are steepness of slope, the hazard of erosion, and seedling mortality. The risk of soil blowing is increased if the timber is harvested or the understory is removed. Harvesting of timber is limited mainly by steepness of slope. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding generally is safer and disturbs the soil less. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless they are provided with adequate water bars or are protected by plant cover, or both. Cuts and fills need to be seeded to permanent plant cover to reduce the risk of erosion. Reforestation is severely limited because of droughtiness. Seedling mortality can be reduced by providing shade for seedlings. Reforestation can be accomplished by planting shore pine, Sitka spruce, or western hemlock seedlings.

This unit is poorly suited to recreational development. It is limited mainly by slope and the sandy texture of the soil, which is droughty, unstable, and easily eroded. Recreation on this unit is limited mainly to a few paths and trails, which should extend across the slopes. Areas used for recreation can be protected from soil blowing and dustiness by maintaining plant cover. Cuts and fills should be seeded or mulched. Plant cover can be maintained by controlling traffic.

If this unit is used for homesite development, the main limitations are slope and the sandy texture of the soil. The stability of the soil is very poor on the steeper side slopes and in areas where the soil and the protective plant cover are disturbed. Preserving the existing plant cover during construction helps to control erosion. Excavation for houses and access roads in places exposes material that is highly unstable and susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Cutbanks are not stable and are subject to slumping. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. The potential for pollution of ground water because of the very rapid permeability and low biological activity of the soil limits the use of this unit for septic tank absorption fields.

This map unit is in capability subclass VIIe.

132E—Waldport fine sand, thin surface, 0 to 30 percent slopes. This deep, excessively drained soil is on recently stabilized sand dunes. It formed in eolian sand of mixed origin. Areas are elongated or irregular in shape and are 3 to 300 acres in size. The vegetation is mainly European beachgrass, Scotch-broom, and scattered shore pine. Elevation is 10 to 150 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 200 to 250 days.

Typically, the surface layer is very dark grayish brown fine sand about 2 inches thick. The substratum to a depth of 60 inches or more is yellowish brown fine sand.

Included in this unit are small areas of Heceta and Netarts soils and Waldport soils that have a thicker surface layer than does this Waldport soil. Included areas make up about 15 percent of the total acreage.

Permeability of this Waldport soil is very rapid. Available water capacity is about 2 to 4 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 40 to 60 inches or more. Runoff is slow, and the hazard of water erosion is low. The hazard of soil blowing is high.

This unit is used mainly for recreation, wildlife habitat, and watershed. It is also used as homesites.

This unit is poorly suited to recreational development. It is limited mainly by slope and the sandy texture of the soil, which is droughty and highly susceptible to soil blowing. Recreational use of the soil in this unit is limited to a few access roads, paths, and picnic areas. Access roads for use by vehicles other than dune buggies and four-wheel drive vehicles must be graveled or blacktopped. Areas used for recreation can be protected from soil blowing and dustiness by mulching and maintaining plant cover. Cuts and fills should be seeded and mulched or planted to European beachgrass.

If this unit is used for homesite development, the main limitations are slope and the sandy texture of the soil. The soil is unstable and highly susceptible to soil blowing. Preserving the existing plant cover during construction helps to control erosion. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Cutbanks are not stable and are subject to slumping. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

The potential for pollution of ground water because of the very rapid permeability and low biological activity of the soil limits the use of this unit for septic tank absorption fields.

This map unit is in capability subclass VIIe.

133C—Waldport-Urban land complex, 0 to 12 percent slopes. This map unit is on stabilized sand dunes. Areas are irregular in shape and are 3 to 100 acres in size. The native vegetation is mainly shore pine, Sitka spruce, salal, evergreen huckleberry, and Pacific rhododendron. Elevation is 10 to 150 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 200 to 250 days.

This unit is 40 percent relatively undisturbed Waldport fine sand, 10 percent disturbed Waldport fine sand, and 40 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Netarts and Yaquina soils. Included areas make up about 10 percent of the total acreage.

The relatively undisturbed Waldport soil is deep and excessively drained. It formed in eolian sand of mixed origin. Typically, the surface is covered with a mat of leaves, needles, and twigs about 3 inches thick. The surface layer is very dark gray and very dark grayish brown fine sand about 5 inches thick. The substratum to a depth of 60 inches or more is yellowish brown fine sand.

Permeability of this Waldport soil is very rapid. Available water capacity is about 3 to 4 inches. Water supplying capacity is 18 to 20 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high in areas where vegetation is removed.

The disturbed Waldport soil has been covered by as much as 40 inches of fill material or has had as much as 30 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Waldport or Netarts soils that have been cut or graded.

Permeability, available water capacity, water supplying capacity, and effective rooting depth are variable in areas of the disturbed Waldport soil. Runoff is slow. The hazard of soil blowing is high in areas where the soil is left barren.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly as homesites and for commercial buildings. Some areas are used for yards and open areas around and between buildings, and some areas are left under a cover of trees and shrubs to reduce the risk of soil blowing on the unit.

This unit is suited to homesite and urban development. The main limitations are slope and the fine sand texture of the soil, which is unstable and is highly susceptible to soil blowing when left barren. Cutbanks are not stable and are subject to slumping. Preserving the existing plant cover during construction helps to control erosion. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plant cover can be established and maintained through proper fertilization, seeding, mulching, and shaping of the slopes.

In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

Selection of adapted vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens.

The potential for pollution of the ground water because of the very rapid permeability and low biological activity of the soil limits the use of this unit for septic tank absorption fields.

This map unit is not assigned a capability classification.

134—Wapato silty clay loam. This deep, poorly drained soil is on bottom lands. It formed in mixed alluvium. Slope is 0 to 3 percent. Areas are long and narrow in shape and are 3 to 20 acres in size. The vegetation in areas not cultivated is mainly Oregon ash, red alder, black cottonwood, willow, wild rose, and sedges. Elevation is 300 to 650 feet. The average annual precipitation is 40 to 55 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface is covered with a mat of roots about 1 inch thick. The surface layer is very dark grayish brown and very dark brown, mottled silty clay loam about 17 inches thick. The subsoil is dark grayish brown and grayish brown, mottled silty clay loam about 16 inches thick. The substratum to a depth of 60 inches or more is gray and dark gray, mottled silty clay. In some areas the substratum is stratified with coarser textured soil material. Some areas are very poorly drained and have gray mottles above a depth of 10 inches.

Included in this unit are small areas of Conser, McAlpin, McBee, and Waldo soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Wapato soil is moderately slow. Available water capacity is about 10 to 12 inches. Effective rooting depth is limited by a high water table that is 1 foot above the surface to 1 foot below the surface from December to April. Runoff is slow to ponded, and the hazard of water erosion is slight except during periods of flooding from nearby streams. The soil is frequently flooded for brief periods from December to April.

This unit is used mainly for ryegrass seed, pasture, and hay. It is also used for small grain and some row crops in areas that have been drained.

This unit is suited to shallow-rooted crops. The water table that develops during the rainy period in winter and spring generally limits the suitability of the unit for deep-rooted crops. Only those hay and pasture plants that tolerate periodic inundation and a seasonal high water table are suitable for use in undrained areas. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit can be used for small grain, corn, and other annual and perennial crops if drainage is provided to lower the water table.

If the soil in this unit is plowed in fall, runoff and erosion can be reduced by fertilizing and seeding to a cover crop. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

If this unit is used for recreational development, the main limitations are the high water table, the hazard of flooding, and the silty clay loam surface layer. Protection from flooding is needed.

If this unit is used for homesite development, the main limitations are the hazard of flooding and wetness. Flooding can be controlled only by use of major flood control structures. Wetness can be reduced by installing drain tile around footings. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Roads for year-round use need heavy base rock.

This map unit is in capability subclass IIIw.

135C—Willakenzie clay loam, 2 to 12 percent slopes. This moderately deep, well drained soil is on foothills. It formed in colluvium and residuum derived from tuffaceous sandstone. Areas are irregular in shape and are 3 to 200 acres in size. The vegetation in areas not cultivated is mainly Oregon white oak, poison-oak, rose, and Douglas-fir. Elevation is 300 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown clay loam about 11 inches thick. The subsoil is dark reddish brown clay loam about 25 inches thick. Weathered sandstone is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine, Hazelair, and Nekia soils and Willakenzie soils that have slopes of more than 12 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Willakenzie soil is moderately slow. Available water capacity is about 5.0 to 7.5 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

This unit is used for hay, pasture, grain, berries, orchard crops, timber production, recreation, wildlife habitat, and homesites.

This unit is suited to cultivated crops. It generally is dryfarmed because it lacks a reliable water supply and suitable reservoir sites. Crops respond to lime and nitrogen, particularly where crop residue has been used to maintain good soil tilth and to control erosion. A suitable cropping system is one that includes 3 years of grain or row crops and 2 years of grass-legume mixtures.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 160. The potential production per acre is 10,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 95,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is well suited to the production of Christmas trees and nursery stock. Cover crops can be used to reduce erosion.

If this unit is used for recreational development, the main limitations are moderately slow permeability, depth to rock, and steepness of slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover.

The main limitations for homesite development on this unit are depth to rock, moderately slow permeability, low soil strength, and steepness of slope. The deep cuts needed to provide essentially level building sites can expose bedrock. Support and stability for buildings can be provided by placing footings or piers on the underlying bedrock. Wetness can be reduced by installing drain tile around footings.

Septic tank absorption lines should be installed on the contour.

This map unit is in capability subclass IIIe.

135D—Willakenzie clay loam, 12 to 20 percent slopes. This moderately deep, well drained soil is on foothills. It formed in colluvium and residuum derived from tuffaceous sandstone. Areas are irregular in shape and are 3 to 200 acres in size. The vegetation in areas not cultivated is mainly Oregon white oak, poison-oak, rose, and Douglas-fir. Elevation is 300 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown clay loam about 11 inches thick. The subsoil is dark reddish brown clay loam about 25 inches thick. Weathered sandstone is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine, Hazelair, Nekia, and Steiwer soils and Willakenzie soils that have slopes of more than 20 percent or less than 12 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Willakenzie soil is moderately slow. Available water capacity is about 5.0 to 7.5 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is moderate.

This unit is used for hay, pasture, grain, berries, orchard crops, timber production, recreation, wildlife habitat, and homesites.

This unit is suited to cultivated crops. It generally is dryfarmed because it lacks a reliable water supply and suitable reservoir sites. Crops respond to lime and nitrogen, particularly where crop residue has been used to maintain good soil tilth and to control erosion. A suitable cropping system is one that includes 2 years of grain or row crops and 3 years of grass-legume mixtures or that includes orchard crops or berries and an annual winter cover crop or perennial cover crop.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 160. The potential production per acre is 10,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 95,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is well suited to the production of Christmas trees and nursery stock. Cover crops can be used to reduce erosion.

Steepness of slope limits the recreational use of areas of this unit mainly to paths and trails, which should extend across the slope.

The main limitations for homesite development on this unit are steepness of slope, depth to rock, and moderately slow permeability. The deep cuts needed to provide essentially level building sites can expose bedrock. Support and stability for buildings can be provided by placing footings or piers on the underlying bedrock, especially where part of the building is on a cut and part is on a fill. This unit is poorly suited to septic tank absorption fields because of slope and depth to bedrock. In some areas of this unit where the depth to bedrock is greater and that are less sloping, septic tank absorption fields may be suitable.

This map unit is in capability subclass IIIe.

135E—Willakenzie clay loam, 20 to 30 percent slopes. This moderately deep, well drained soil is on foothills. It formed in colluvium and residuum derived from tuffaceous sandstone. Areas are irregular in shape and are 5 to 200 acres in size. The vegetation in areas not cultivated is mainly Oregon white oak, poison-oak, rose, and Douglas-fir. Elevation is 300 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown clay loam about 11 inches thick. The subsoil is dark reddish brown clay loam about 25 inches thick. Weathered sandstone is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine, Chehulpum, Hazelair, Nekia, and Steiwer soils and Willakenzie soils that have slopes of more than 30 percent or less than 20 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Willakenzie soil is moderately slow. Available water capacity is about 5.0 to 7.5 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for pasture, small grain, orchard crops, timber production, recreation, wildlife habitat, and homesites.

This unit is suited to cultivated crops. It generally is dryfarmed because it lacks a reliable water supply and suitable reservoir sites. Steepness of slope hinders farming operations and makes it difficult to apply water properly. Crops respond to lime and nitrogen, particularly where crop residue has been used to maintain good soil tilth and to control erosion. A suitable cropping system is one that includes 1 year of grain or row crops and 3 years of grass-legume mixtures.

This unit is suited to hay and pasture. Use of lime, nitrogen, and phosphorus promotes good growth of forage plants. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction. Proper grazing practices, weed control, and fertilizer are needed to ensure maximum quality of forage. In most years, supplemental irrigation is also needed.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 160. The potential production per acre is 10,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 95,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Production is higher on north-facing side slopes where elevation and rainfall are higher and on the lower part of slopes where the soils are deepest and moisture storage is highest.

Surface methods of harvesting timber generally are suitable, but the soil may be compacted if it is moist when heavy equipment is used. Ripping skid trails and landing areas after logging helps to break up the compacted layer. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

Steepness of slope limits the recreational use of this unit mainly to a few paths and trails, which should extend across the slope.

The main limitations for homesite development on this unit are steepness of slope and depth to bedrock. The deep cuts needed to provide essentially level building sites can expose bedrock. Support and stability for buildings can be provided by placing footings or piers on the underlying bedrock. This unit is poorly suited to septic tank absorption fields because of slope and depth to bedrock.

This map unit is in capability subclass IVe.

135F—Willakenzie clay loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on foothills. It formed in colluvium and residuum derived from tuffaceous sandstone. Areas are irregular in shape and are 5 to 400 acres in size. The native vegetation is mainly Oregon white oak, poison-oak, rose, and Douglas-fir. Elevation is 300 to 1,400 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown clay loam about 11 inches thick. The subsoil is dark reddish brown clay loam about 25 inches thick. Weathered sandstone is at a depth of 36 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are small areas of Bellpine and Nekia soils, Willakenzie soils that have slopes of less than 30 percent, Rock outcrop, and shallow, stony soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Willakenzie soil is moderately slow. Available water capacity is 5.0 to 7.5 inches. Water supplying capacity is 16 to 20 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for timber production and wildlife habitat.

This unit is suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 160. The potential production per acre is 10,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 95,200 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 80 years old. Production is higher on north-facing side slopes and in areas where the elevation and rainfall are higher.

Management that minimizes the risk of erosion is essential in harvesting timber. The steepness of slope limits the kinds of equipment that can be used in forest management. Highlead or other cable logging systems are more efficient than most other methods and are less damaging to the soil surface. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

The soil in this unit is subject to slumping, especially where road cuts are made in the steeper areas. Slumping can be minimized by locating roads in the more gently sloping areas and by using properly designed road drainage systems. Undesirable plants limit natural or artificial reforestation unless site preparation and maintenance are intensive. Reforestation can be accomplished by planting Douglas-fir seedlings.

This unit is poorly suited to homesite or recreational development. Slope limits construction and results in failure of cutbanks.

This map unit is in capability subclass VIe.

136—Willanch fine sandy loam. This deep, poorly drained soil is on flood plains of streams in the Coast Range. It formed in mixed alluvium. Slope is 0 to 3 percent. Areas are elongated in shape and are 3 to 40 acres in size. The vegetation in areas not cultivated is mainly willow, red alder, bullrush, sedges, and grasses. Elevation is 5 to 50 feet. The average annual precipitation is 60 to 80 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 180 to 200 days.

Typically, the surface layer is very dark grayish brown, mottled fine sandy loam about 11 inches thick. The upper 23 inches of the substratum is strong brown, light brownish gray, and grayish brown, mottled fine sandy loam, and the lower part to a depth of 60 inches or more is grayish brown and gray loamy sand. Many areas have thin strata of sand or silt throughout the profile.

Included in this unit are small areas of Brallier, Meda, Nehalem, Nekoma, and Nestucca soils and Fluvents. Included areas make up about 15 percent of the total acreage.

Permeability of this Willanch soil is moderately rapid. Available water capacity is about 5 to 7 inches. Recharge generally is readily available from the saturated substratum. Water supplying capacity is 18 to 24 inches. Effective rooting depth is limited by a high water table that is at the surface to a depth of 2 feet from November to March. The soil is frequently flooded for brief periods from November to March.

This unit is used mainly for hay and pasture. It is also used for wildlife habitat and gardens. This unit can also be used for cool-season crops when drained, but cool, moist summers inhibit ripening of grain and curing of hay crops.

If this unit is used for hay and pasture, the main limitations are the hazard of seasonal flooding, the seasonal high water table, low soil fertility, and low available water capacity when drained. Only those hay and pasture plants that tolerate periodic inundation and a seasonal high water table are suitable for use in undrained areas. Fertilizer is needed to ensure optimum growth of grasses and legumes. In some years, supplemental irrigation is also needed. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion.

This unit is poorly suited to recreational or homesite development. The main limitations are the hazard of seasonal flooding and the seasonal high water table. The unit can be used for paths and trails during the drier months in summer and fall. Drainage is needed if roads and building foundations are constructed. Dikes and channels that have outlets for floodwater can be used to protect buildings from flooding, but some areas are so low that they have a perennial water table at a depth of 3 feet or less.

This map unit is in capability subclass IIIw.

137F—Winberry very gravelly loam, 10 to 45 percent slopes. This shallow, somewhat excessively drained soil is on ridgetops on uplands in the Cascade Range. It formed in colluvium weathered from andesite, tuff, and breccia. Areas are elongated in shape and are 10 to 100 acres in size. The native vegetation is mainly western hemlock, Douglas-fir, noble fir, western white pine, Pacific silver fir, Pacific rhododendron, tall blue huckleberry, and common beargrass. Elevation is 3,200 to 4,700 feet. The average annual precipitation is 70 to 100 inches, the average annual air temperature is 42 to

44 degrees F, and the average frost-free period is 70 to 100 days.

Typically, the surface layer is very dark grayish brown very gravelly loam about 4 inches thick. The subsoil is dark brown and brown very cobbly loam about 14 inches thick. Partially fractured bedrock is at a depth of 18 inches. Depth to bedrock ranges from 10 to 20 inches.

Included in this unit are small areas of Holderman, Hummington, and Keel soils, Winberry soils that have slopes of more than 45 percent, and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Winberry soil is moderately rapid. Available water capacity is about 0.5 inch to 2.5 inches. Water supplying capacity is 14 to 18 inches. Effective rooting depth is 10 to 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to high.

Most areas of this unit are used for wildlife habitat and watershed. A few areas are used for timber production.

This unit is poorly suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 70. The potential production per acre is 3,360 cubic feet from an even-aged, fully stocked stand of trees 70 years old or 24,090 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 110 years old.

The main concerns in producing and harvesting timber are the hazard of erosion, steepness of slope, seedling mortality, the hazard of windthrow, and snow damage to trees. The steepness of slope limits the kinds of equipment that can be used in forest management. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills.

Trees are subject to windthrow because of limited rooting depth. Seedling mortality is a concern on south-facing side slopes because of droughtiness and the high temperature of the surface layer in summer. Providing shade for seedlings on south- and west-facing side slopes helps to improve seedling survival. Reforestation can be accomplished by planting Douglas-fir, western hemlock, noble fir, and Pacific silver fir seedlings.

This map unit is in capability subclass VIIs.

138E—Witzel very cobbly loam, 3 to 30 percent slopes. This shallow, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium and residuum derived from basic igneous rock. Areas are irregular in shape and are 5 to 160 acres in size. The vegetation in areas not cultivated is mainly scattered Oregon white oak, Douglas-fir, poison-oak, and forbs and grasses. Elevation is 300 to 1,500 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown very cobbly loam about 4 inches thick. The subsoil is dark reddish brown very cobbly clay loam about 13 inches thick. Fractured basalt is at a depth of 17 inches. Depth to bedrock ranges from 12 to 20 inches.

Included in this unit are small areas of Jory, Nekia, Philomath, and Ritner soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Witzel soil is moderately slow. Available water capacity is about 1 inch to 3 inches. Water supplying capacity is 13 to 15 inches. Effective rooting depth is 12 to 20 inches. Runoff is medium to rapid, and the hazard of water erosion is high.

This unit is used mainly for native pasture and wildlife habitat. It is also used for limited timber production.

This unit is suited to native pasture. Cobbles in the surface layer make tillage impractical, even for the planting of improved pasture. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Response of pasture to nitrogen is fair if it is applied in spring while there is sufficient moisture for plant growth.

This unit is poorly suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 90. The potential production per acre is 4,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 41,030 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 110 years old.

The main limitations for the management of timber are stones on the surface, seedling mortality, and the hazard of windthrow. Stones on the surface cause breakage of timber and hinder yarding. Because roots are restricted by the fractured bedrock, trees commonly are subject to windthrow.

Reforestation is severely limited because of droughtiness. Undesirable plants limit natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting ponderosa pine and Douglas-fir seedlings.

Areas of this unit where sewage systems can be provided are suited to homesite development. The shallow depth to hard bedrock prevents installation of septic tank absorption fields. Blasting generally is required to level areas for foundations and roadways. Such construction is expensive, but foundations and roads are stable after installation.

This map unit is in capability subclass VIs.

138G—Witzel very cobbly loam, 30 to 75 percent slopes. This shallow, well drained soil is on foothills adjacent to the Willamette Valley. It formed in colluvium derived from basic igneous rock. Areas are irregular in shape and are 5 to 160 acres in size. The vegetation in areas not cultivated is mainly scattered Oregon white oak, Douglas-fir, poison-oak, forbs, and grasses. Elevation is 300 to 1,500 feet. The average annual precipitation is 40 to 60 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is dark brown very cobbly loam about 4 inches thick. The subsoil is dark reddish brown very cobbly clay loam about 13 inches thick. Fractured basalt is at a depth of 17 inches. Depth to bedrock ranges from 12 to 20 inches.

Included in this unit are small areas of Nekia and Ritner soils and Rock outcrop. Included areas make up about 15 percent of the total acreage.

Permeability of this Witzel soil is moderately slow. Available water capacity is about 1 to 3 inches. Water supplying capacity is 13 to 15 inches. Effective rooting depth is 12 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for native pasture and wildlife habitat. It is also used for limited timber production.

This unit is suited to native pasture. Cobbles in the surface layer and slope make tillage impractical, even for the planting of improved pasture. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition and to protect the soil from erosion. Grazing when this unit is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Response of pasture to nitrogen is fair if applied in spring while there is sufficient moisture for plant growth; however, slope makes application of fertilizer difficult.

This unit is poorly suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 90. The potential production per acre is 4,200 cubic feet from an even-aged, fully stocked stand of trees 60 years old or 41,030 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 110 years old.

Surface methods of harvesting are difficult to use because of steepness of slope and the areas of Rock outcrop. Stones on the surface cause breakage of timber and hinder yarding. Because roots are restricted by fractured bedrock, trees commonly are subject to windthrow.

Reforestation is severely limited because of droughtiness. Undesirable plants limit natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting ponderosa pine and Douglas-fir seedlings.

This unit is poorly suited to homesite or recreational development. The main limitations are slope and the shallow soil depth. Blasting commonly is required to level areas for foundations and roads. As slope increases, the hazard of landslides and slumps increases.

This map unit is in capability subclass VIs.

139—Woodburn silt loam. This deep, moderately well drained soil is on broad terraces east of the Willamette River, along the northern edge of the survey area. It formed in silty over sandy mixed alluvium. Slope is 0 to 3 percent. Areas are narrow, are slightly convex, and are 3 to 30 acres. The vegetation in areas not cultivated is mainly native grasses, hazelnut, poison-oak, wild blackberry, Douglas-fir, and Oregon white oak. Elevation is 340 to 360 feet. The average annual precipitation is 38 to 44 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 180 to 200 days.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is very dark grayish brown and brown, mottled silty clay loam and silt loam about 17 inches thick. The upper part of the substratum is dark grayish brown, mottled silt loam about 17 inches thick, and the lower part to a depth of 60 inches or more is dark gray, mottled silt loam.

Included in this unit are small areas of Awbrig, Coburg, Holcomb, Oxley, and Salem soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Woodburn soil is slow. Available water capacity is about 8 to 11 inches. Water supplying capacity is 20 to 25 inches. Effective rooting depth is limited by a high water table that is at a depth of 2 to 3 feet from December to April. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for small grain and grass seed. It is also used for pasture in winter and spring and as homesites.

This unit is suited to small grain, grass, and corn and other row crops. It is also suited to the production of a variety of Christmas tree species and nursery stock.

Drainage and irrigation are needed for late-maturing crops. Drainage also improves the trafficability of grass and grain fields and increases early- and late-season production of forage. Sprinkler irrigation is a suitable method of applying water, although furrow or border methods can be used in some places. If the soil in this unit is plowed in fall, runoff and erosion can be reduced by fertilizing and seeding to a cover crop. The soil has moderate fertility, but crops respond well to nitrogen and lime. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion and compaction.

This unit is suited to recreational development. It is limited mainly by seasonal wetness and slow permeability. Septic tank absorption fields do not function properly during periods of wetness. Playgrounds need well designed tile drainage for wet-season use. Good drainage should be provided for paths and trails.

The main limitations for homesite development on this unit are slow permeability and low strength of the soil when wet. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Wetness can be reduced by installing drain tile around footings.

Septic tank absorption fields on this unit may not function properly during rainy periods because of wetness and slow permeability.

This map unit is in capability subclass IIw.

140—Yaquina loamy fine sand. This deep, somewhat poorly drained soil is in low, interdune positions in coastal dune areas. It formed in eolian sand of mixed origin. Slope is 0 to 3 percent. Areas are irregular in shape and are 3 to 100 acres or more in size. The native vegetation is mainly shore pine, scattered Sitka spruce, Pacific rhododendron, salal, and evergreen huckleberry. Elevation is 20 to 130 feet. The average annual precipitation is 70 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 210 days.

Typically, the surface is covered with a mat of needles, twigs, sedges, and grass about 0.5 inch thick. The surface layer is very dark gray loamy fine sand about 2 inches thick. The subsurface layer is light gray fine sand about 6 inches thick. The next layer is grayish brown fine sand about 5 inches thick. The subsoil is light brownish gray, mottled fine sand about 16 inches thick. The substratum to a depth of 60 inches or more is yellowish brown, pale brown, and grayish brown fine sand. In some areas the soils are poorly drained and have a darker colored surface layer. In some areas organic material and finer textured soil material are below a depth of 40 inches.

Included in this unit are small areas of Bandon, Netarts, and Waldport soils. Included areas make up about 15 percent of the total acreage.

Permeability of this Yaquina soil is moderately rapid. Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is limited by a high water table that is 2 feet above the surface to 2 feet below the surface from November to April. Runoff is slow to ponded, and the hazard of water erosion is moderate. The hazard of soil blowing is high if the plant cover is removed.

Most areas of this unit are used for wildlife habitat. A few areas are used for pasture and as homesites.

If this unit is used for pasture, the main limitations are the hazard of soil blowing and wetness. The soil should not be cultivated during dry periods because of the hazard of soil blowing. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Annual applications of lime and mixed fertilizer are needed to maintain production of high-quality irrigated pasture.

This unit is suited to wildlife habitat in areas that are under natural vegetation. Soil blowing is a hazard in areas where the soil is barren.

If this unit is used for recreational development, the main limitations are wetness and the sandy texture of the soil. Drainage is needed if roads and building foundations are constructed. Areas used for recreation can be protected from soil blowing and dustiness by maintaining plant cover. Plant cover can be maintained by limiting traffic. Only trees and shrubs that tolerate wetness should be planted.

If this unit is used for homesite development, the main limitations are wetness and corrosivity to steel and concrete. Building materials should be carefully selected to overcome the corrosivity of the soil. Drainage is needed if roads and building foundations are constructed.

Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plans for homesite development should provide for the preservation of as many trees as possible. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants. Drainage is also needed for best results with most lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens.

This map unit is in capability subclass IVw.

141—Yaquina-Urban land complex. This map unit is in low interdune positions in coastal dune areas. Slope is 0 to 3 percent. Areas are irregular in shape and are 3 to 100 acres or more in size. The native vegetation is mainly shore pine, scattered Sitka spruce, Pacific rhododendron, salal, and evergreen huckleberry. Elevation is 20 to 130 feet. The average annual precipitation is 70 to 80 inches, the average annual air temperature is 50 to 52 degrees F, and the average frost-free period is 180 to 210 days.

This unit is 45 percent relatively undisturbed Yaquina loamy fine sand, 5 percent disturbed Yaquina loamy fine sand, and 40 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bandon, Netarts, and Waldport soils. Included areas make up about 10 percent of the total acreage.

The relatively undisturbed Yaquina soil is deep and somewhat poorly drained. It formed in eolian sand of mixed origin. Typically, the surface is covered with a mat of needles, leaves, sedges, and grasses about 0.5 inch thick. The surface layer is very dark gray loamy fine sand about 2 inches thick. The subsurface layer is light gray fine sand about 6 inches thick. The next layer is grayish brown fine sand about 5 inches thick. The subsoil is light brownish gray, mottled fine sand about 16 inches thick. The substratum to a depth of 60 inches or more is yellowish brown, pale brown, and grayish brown fine sand.

Permeability of the Yaquina soil is moderately rapid. Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 20 to 24 inches. Effective rooting depth is limited by a high water table that is 2 feet above the surface to 2 feet below the surface from November to April. Runoff is slow to ponded, and the hazard of water erosion is moderate. The hazard of soil blowing is high if the vegetation is removed.

The disturbed Yaquina soil has been covered by as much as 40 inches of fill material or has had as much as 20 inches of the original profile removed by cutting or grading. The fill material is commonly from adjacent areas of Yaquina, Netarts, Waldport, or Bandon soils that have been cut or graded.

Permeability, available water capacity, water supplying capacity, and effective rooting depth are variable in areas of the disturbed Yaquina soil. Runoff is slow, and the hazard of soil blowing is high if the soil is barren.

Urban land consists of areas where the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces that obscure or alter the soils so that identification is not feasible.

This unit is used mainly as homesites and for commercial buildings. Some areas are used for yards and open areas around and between buildings and as windbreaks to help control soil blowing.

This unit is poorly suited to homesite and urban development. The main limitations are wetness caused by poor internal drainage, a seasonal high water table, and corrosivity to steel and concrete. Building materials should be carefully selected to compensate for the corrosivity of the soil. Drainage is needed if roads and building foundations are constructed. Ponding in low-lying areas is controlled mainly by use of extensive drainage systems.

Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plans for homesite development should provide for the preservation of as many trees as possible. Plants that tolerate a seasonal high water table and droughtiness should be selected unless drainage and irrigation are provided. Selection of adapted vegetation is critical for the establishment of lawns, shrubs, trees, and vegetable gardens. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other small-seeded plants.

This map unit is not assigned a capability classification.

142G—Yellowstone-Rock outcrop complex, 10 to 60 percent slopes. This map unit is on uplands in the Cascade Range. Areas are elongated or irregular in shape and are 5 to 50 acres in size. The native vegetation is mainly Douglas-fir, western hemlock, noble fir, Pacific silver fir, tall blue huckleberry, common beargrass, Pacific rhododendron, and scattered western white pine. Elevation is 2,600 to 4,700 feet. The average annual precipitation is 70 to 130 inches, the average annual air temperature is 42 to 44 degrees F, and the average frost-free period is 70 to 100 days.

This unit is 65 percent Yellowstone stcny loam and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Holderman, Hummington, Keel, Mulkey, and Winberry soils. Included areas make up about 15 percent of the total acreage.

The Yellowstone soil is shallow and somewhat excessively drained. It formed in colluvium and residuum derived from basic igneous rock. Typically, the surface is covered with a mat of leaves, twigs, and needles about 3 inches thick. The surface layer is very dark grayish brown stony loam about 4 inches thick. The next layer is dark brown very stony sandy loam about 8 inches thick. Fractured basic igneous rock is at a depth of 12 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Yellowstone soil is moderately rapid. Available water capacity is 1.0 to 2.5 inches. Water supplying capacity is 14 to 18 inches. Effective rooting depth is 10 to 20 inches. Runoff is slow to rapid, and the hazard of water erosion is high.

Rock outcrop consists of barren exposures of jagged rock that has short, steep slopes and of generally smooth areas of moss-covered rock that resembles the surface of an old basalt flow.

Most areas of this unit are used for wildlife habitat, recreation, and watershed. A few areas are used as rock quarries; these areas consist of high-quality hard rock with a thin overburden.

The Yellowstone soil is poorly suited to the production of Douglas-fir. On the basis of a 100-year site curve, the mean site index for Douglas-fir is 86. The potential production per acre is 3,500 cubic feet from an even-aged, fully stocked stand of trees 70 years old or 20,160 board feet (International rule, one-eighth-inch kerf) from an even-aged, fully stocked stand of trees 110 years old.

The main limitations for the management of timber are the areas of Rock outcrop, winter snowpack, seedling mortality, and the hazard of windthrow. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding generally is safer and disturbs the soil less. Rock outcrop may cause breakage of timber and hinder yarding. Winter snowpack and wetness restrict the use of equipment to dry periods.

Because roots are restricted by fractured bedrock, trees are subject to windthrow. Reforestation is severely limited because of droughtiness. Undesirable plants limit natural or artificial reforestation. Intensive site preparation and maintenance generally are not needed. Reforestation can be accomplished by planting Douglas-fir, western hemlock, and noble fir seedlings.

If this unit is used for recreational development, the main limitations are stoniness, shallow soil depth, and slope. Esthetic value makes this unit attractive for summer hikes and picnics and for use as campsites. Winter snow cover restricts access for uses other than cross-country skiing. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by limiting traffic.

This map unit is in capability subclass VIIs.

Prime Farmland

In this section, prime farmland is defined and discussed and the prime farmland soils in this survey area are listed.

Prime farmland is of major importance in providing the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, seed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. Adequate moisture and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal units of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland.

Prime farmland soils commonly get an adequate and dependable supply of moisture from precipitation or irrigation. Temperature and growing season are favorable, and level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland soils if the limitations are overcome by drainage, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 160,000 acres, or less than 10 percent of the survey area, meets the soil requirements for prime farmland. Areas are scattered throughout the survey area, but most are in the central part, in and immediately adjacent to the Willamette Valley. These areas are mainly in general soil map units 1, 2, 3, 8, 15, and 17. Approximately 65 percent of the prime farmland is used for crops, and the rest is in forest, nurseries, Christmas trees, or other land uses. The main crops grown on this land are corn, snap beans, wheat, peppermint, and filberts, which account for an estimated 50 percent of the total annual agricultural income in this survey area.

The following map units meet the soil requirements for prime farmland. On some soils included in the list, measures should be used to overcome a hazard or limitation, such as flooding, wetness, or droughtiness. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described in the section 'Detailed Soil Map Units."

1A	Abiqua silty clay loam, 0 to 3 percent slopes
1B	Abiqua silty clay loam, 3 to 5 percent slopes
11C	Bellpine silty clay loam, 3 to 12 percent slopes
24	Chapman loam
26	Chehalis silty clay loam, occasionally flooded
29	Cloquato silt loam
31	Coburg silty clay loam
56	Holcomb silty clay loam (if drained)
61	Jimbo silt loam
62B	Jimbo-Haflinger complex, 0 to 5 percent slopes
63C	Jory silty clay loam, 2 to 12 percent slopes
73	Linslaw loam (if drained)
75	Malabon silty clay loam
78	McAlpin silty clay loam
79	McBee silty clay loam (if protected)
89C	Nekia silty clay loam, 2 to 12 percent slopes
95	Newberg fine sandy loam
96	Newberg loam
105A	Pengra silt loam, 1 to 4 percent slopes (if drained)
118	Salem gravelly silt loam
120B	Salkum silt loam, 2 to 6 percent slopes
121B	Salkum silty clay loam, 2 to 8 percent slopes
123	Sifton gravelly loam (if irrigated)

128B Veneta loam, 0 to 7 percent slopes
129B Veneta Variant silt loam, 0 to 7 percent slopes
135C Willakenzie clay loam, 2 to 12 percent slopes
139 Woodburn silt loam

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Effective management of cropland and pastureland in this survey area must take into consideration the excess rainfall in winter, which causes runoff, erosion, leaching of nutrients, impaired trafficability, ponding, flooding, and a high water table. The finer the texture of the soil, the more severe are the problems except for the leaching of nutrients and flooding. Leaching of nutrients is a more critical problem on coarse-textured soils. Suitable management practices during wet periods are to defer grazing, tillage, and other on-the-ground activities and to protect the soils from erosion and leaching by growing cover crops or practicing minimum tillage.

Long periods of low rainfall in summer necessitate management to overcome the effects of droughtiness either by irrigation or by moisture conservation practices. Irrigation is needed for late-maturing crops in most parts of the survey area, and it increases production in most years throughout the area. Applying lime to the soil to reduce acidity is a suitable practice for some crops, particularly for legumes such as alfalfa. Lime and fertilizer should be applied according to needs as determined by soil tests.

Most of the heavier clay soils, such as those of the Bashaw and Natroy series are very limited with respect to the timing of tillage because of poor drainage and workability, but most of the soils have fair to good workability.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change. Different species or varieties of the same or similar crops may also do better on some soils than others.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small or limited to a few map units. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Peppermint and ryegrass are examples of crops that are grown on fairly large acreages and that contribute significantly to the total crop income for the county; however, they are grown mainly on only a few map units. Therefore, they are not included in table 5.

Peppermint is a high value crop and is generally grown on only the better drained valley soils that have readily available irrigation water. Examples of these soils are those of the Chehalis, Chapman, Cloquato, Newberg, Malabon, and Salem series and some of the moderately well drained soils such as those of the Coburg, McBee, and Woodburn series. Equipment for harvesting the peppermint and distilling of the oil is specialized and expensive, and economical production is closely controlled by the limited market, fluctuating prices for the oil, and disease problems with the mint.

Ryegrass is grown extensively. It is one of only a few crops that grow well on the large, wet terrace areas of Awbrig, Bashaw, Conser, Dayton, and Natroy soils in the Willamette Valley; however, it is grown for seed primarily on the few wet soils listed above and in relatively large operations; therefore, it is not included in table 5. It is an included species in many of the hay and pasture mixes that are used throughout the county and upon which the pasture yields in table 5 are based. Potential hay yields can be estimated by the relative pasture yields on the different map units. Likewise the other crops listed in table 5 are representative of how similar crops can be expected to respond on the different map units; for example, strawberries are representative of other small fruits and caneberries; filberts are representative of other orchard crops.

Christmas trees are grown on the gentler slopes of nearly all the soils that are suited to timber except the cold soils of the high mountainous areas.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

By James F. McClinton, forester, and William R. Patching, soil scientist, Soil Conservation Service.

This survey area is recognized as one of the best timber growing regions in North America. Favorable climate, fertile soils, and well suited timber species account for the high productive capacity of the forest land in much of the area.

The Eugene-Springfield area is recognized as the center of the forest products industry in west-central Oregon. The Eugene-Springfield area is one of the largest wood products processing areas in the world. The county has several large sawmills that produce lumber, plywood, veneer, poles, piling, and wood chips suitable for pulp. Wood chips suitable for use in making both high grade and low grade paper products are processed within the survey area and are shipped to paper mills outside the area. There are several smaller sawmills, as well as various specialty mills. The specialty mills mostly process hardwoods such as red alder, Oregon white oak, and black cottonwood.

The main conifer species are Douglas-fir, western hemlock, western redcedar, and Sitka spruce. The main hardwood species are red alder, Oregon white oak, big leaf maple, Pacific madrone, and black cottonwood.

Sawmill capacity in the area exceeds current growth rates; however, growth rates can be increased significantly by applying intensive management practices. Thinning overstocked stands and applying nitrogen fertilizer to stand growing on soils that will respond can greatly increase timber yields. Both public and private land managers have begun applying intensive management practices in recent years.

The forest land in the survey area is protected from fire by the State Department of Forestry, by the Forest Service, and by local fire districts. The increasing population and increased recreational activities in the area make accidental fires a constant threat, especially during dry summers.

Many diseases and insects are present in the forest, and they can be serious in individual stands of trees. Damage varies from year to year. Douglas-fir has several natural enemies. The principal insect that attacks Douglas-fir is the Douglas-fir beetle (*Dendroctonus pseudotsugae*). Laminated root rot (*Phylinius weirii*) is the most serious fungus enemy of Douglas-fir. The Sitka spruce weevil (*Dissodes sitchensis*) kills the terminal shoots of spruce and, along with the spruce aphid (*Aphis abientina*), causes the greatest amount of damage to Sitka spruce. Western hemlock is attacked by several trunk, butt, and root rots, as well as by the hemlock looper (*Lambdina fiscellaria*), which presents the most serious threat of damage by insects. The balsam woolly aphid (*Chermes piceae*) is the most dangerous insect attacking Pacific silver fir and noble fir. Several types of rot also attack these two species.

The principal forest cover type is the Pacific Douglas-fir type, which typically includes small amounts of western hemlock and western redcedar. The other dominant forest cover types are the Douglas-fir-western hemlock type at intermediate elevations, the Pacific silver fir-hemlock type at higher elevations, and the Sitka spruce-western hemlock type, which is associated with the Pacific coast fog belt. A unique but small forest type of shore pine is present along the coastal areas.

Most of the forest land in the survey area does not provide suitable forage for livestock grazing, but it does provide forage for many species of wildlife. Elk and deer commonly use the forage available in recently harvested areas, and they use dense stands of timber for cover. The most common understory plants are listed in the map unit descriptions in the section "General Soil Map Units."

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, soils, and climate determine the kinds of trees that can be expected to grow on any site. Available water capacity and the depth of the root zone are of major importance. Elevation and aspect are of particular importance in mountainous areas. The forested soils in the survey area range from shallow to very deep, from nongravelly to extremely gravelly, and from fine textured to coarse textured. Because of differences among the soils, as well as differences in climate, topography, and geology, the forests vary in composition and productivity.

Soil surveys are important to forest land managers as they seek ways to increase the productivity of forest land. Some soils respond better to fertilizer than do others, some are more susceptible to landsliding and erosion after roads are built and timber is harvested, and some require special effort when harvesting timber and reforesting. Each map unit in this survey suitable for producing timber presents information concerning forest land productivity and limitations for harvesting timber and names common forest understory plants. Table 6 summarizes the forestry information given in the detailed map unit descriptions. The soils are rated for a number of factors to be considered in management. In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Equipment limitations ratings refer to the limits placed upon the use of equipment, year-round or seasonally, as a result of soil characteristics. A rating of *slight* indicates that use of equipment is not normally restricted in kind or time of year because of soil factors; *moderate* indicates a seasonal limitation (usually less than 4 months) because of soil wetness, a fluctuating water table, susceptibility to compaction, or some other factor, and *severe* indicates a seasonal limitation, a need for special equipment (such as a cable-yarding logging system), or a hazard in the use of equipment. Steepness of slope, wetness, and susceptibility of the soil to compaction are the main factors that cause equipment limitations. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. Where slopes are even steeper, tracked equipment cannot be operated safely and more sophisticated systems must be used. Soil wetness, especially in combination with fine soil texture, can severely limit the use of equipment, making harvesting practical only during dry periods.

Seedling mortality ratings refer to the probability of mortality of naturally occurring or planted tree seedlings as influenced by kinds of soil or topography. Plant competition is not considered in this rating. The ratings apply to seedlings from good stock that is planted properly during a period of sufficient soil moisture. *Slight* indicates that no problem is expected under usual conditions; *moderate* indicates that some problems of mortality can be expected and that extra precautions are advisable; and *severe* indicates that mortality will be high and extra precautions are essential for successful reforestation. Wetness of the soil, droughtiness of the surface layer (especially on south- and southwest-facing side slopes), or position on ridgetops account for seedling mortality problems. To offset these limitations, larger than usual planting stock, special site preparation, surface drainage, or reinforcement plantings may be needed.

Ratings of *windthrow hazard* consider the soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees normally are not blown down by wind (strong winds may break trees but not uproot them); *moderate* indicates that an occasional tree may blow down during periods of excessive wetness combined with strong winds; and *severe* indicates that many trees may be expected to be blown down during periods of soil wetness and moderate or strong winds.

Restricted rooting depth as a result of a high water table, underlying bedrock, an impervious layer, and poor anchoring of roots because the surface layer and subsoil are loose makes trees more subject to windthrow or tipover. *Moderate* and *severe* ratings indicate the need for more care in thinning the edges of timber stands, a plan calling for periodic salvage of windthrown trees, and an adequate road and trail system to allow for salvage operations.

Ratings of *plant competition* refer to the likelihood of invasion of brushy plants when openings are made in the tree canopy. A rating of *slight* indicates that unwanted brushy plants are not likely to delay the establishment of natural reforestation and that planted seedlings have good prospects for development without undue competition; *moderate* indicates that competition can be expected to reduce the establishment of natural or planted seedlings in the absence of intensive site preparation and maintenance; and *severe* indicates that competition can be expected to prevent establishment of adequate natural or planted seedlings unless intensive site preparation and maintenance are provided. Favorable climate and productive soils encourage plant competition. Generally, brush invades less as elevation increases. The key to predicting brush competition problems commonly is the quantity and proximity of seed sources of undesirable plants. Moderate and severe ratings indicate the need for careful and thorough postharvest cleanup in preparation for reforestation and the possibility of mechanically or chemically treating brush to retard the growth and allow seedlings to develop.

The *potential productivity* of important trees on a soil is expressed as a *site index*. This index is determined by taking height and age measurements on selected trees within stands of a given species. The procedure and technique for doing this are given in the site index tables used for the survey area (*1, 8, 10, 11*). Each map unit in this soil survey that is commonly used to produce timber has the yield predicted in both cubic feet and board feet. The yield is predicted at the point where the mean annual increment culminates. Curtis site index curves were used to estimate timber yields (*8*). The productivity of the soils in this survey area generally is based on Douglas-fir. On soils where western hemlock or Sitka spruce are listed as trees to plant, however, these species may produce greater volumes of wood than Douglas-fir. Important trees are listed in the same order as that of their general occurrence, as observed on the soil. Usually, only one or two tree species are dominant.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. Species listed are suited to the soils and will produce a commercial wood crop. Desired product, topographic position, and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in table 8 and interpretations for septic tank absorption fields in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

This survey area is characterized by varied climatic conditions, topography, land uses, and vegetation. These varied environmental conditions provide many kinds of wildlife habitat and therefore, an abundance of wildlife species. The conditions in the survey area include those of warm areas of the river bottoms in the main part of the Willamette Valley, those of maritime areas along the coast, and those of the cold mountainous areas at high elevations in the Cascade Range.

Urbanization, industrial development, and intensive agriculture have had an adverse influence on wildlife populations in the Willamette Valley part of the survey area.

Water resources are abundant in the lakes, reservoirs, rivers, and streams, which provide high quality habitat for many species of fish. Species of anadromous fish using the rivers and streams in the survey area include chinook salmon, coho salmon, steelhead trout, cutthroat trout, and sturgeon. Warmwater species of fish include largemouth bass, bluegill, crappie, and bullhead.

The map units shown on the general soil map in the back of this survey have been grouped according to their potential to provide similar kinds of wildlife habitat. The seven groups are described below, along with the kinds of wildlife and fish in them.

Group 1 (general soil map units 1, 2, 3, 4, and 5).—This group makes up about 8 percent of the survey area. It is along the flood plains of the Willamette River and its tributaries. Wildlife habitat is provided by riparian vegetation and cultivated crops. The vegetation in areas not cultivated is mainly black cottonwood, willow, Oregon white oak, bigleaf maple, some Douglas-fir, Oregon ash, trailing blackberry, and sedges. Cultivated areas are used for crops such as vegetables, hay, and pasture. These cultivated areas comprise a major part of the group.

This group is inhabited by black-tailed deer, beaver, otter, raccoon, nutria, skunk, coyote, ring-necked pheasant, California quail, band-tailed pigeon, dove, and numerous songbirds, which are seasonally abundant. Waterfowl are seasonally present on the rivers and adjoining wetlands.

Anadromous fish as well as rainbow trout and some warmwater species of fish are in the rivers and streams.

Coho salmon are few in number and are much more abundant in the coastal streams.

Group 2 (general soil map units 6 and 7).—This group makes up about 3 percent of the survey area. It is on the tidal bottom lands and along the flood plains of the coastal streams. Wildlife habitat is provided by riparian vegetation, and small scattered areas are used for pasture or hay. The native vegetation in the areas not cleared and cultivated is mainly Sitka spruce, Douglas-fir, western hemlock, bigleaf maple, red alder, salal, and western swordfern on the soils along the flood plains and saltgrass, sedges, rushes, and reeds on the soils of the tidal bottom lands.

This group is inhabited by black-tailed deer, Roosevelt elk, black bear, beaver, otter, raccoon, skunk, coyote, mountain quail, blue and ruffed grouse, band-tailed pigeon, and songbirds, which are seasonally abundant. Waterfowl, including shore and wading birds, are seasonally present and are most abundant on the tidal bottom lands.

Anadromous fish are present in all rivers and other streams.

Group 3 (general soil map units 8, 9, 10, and 11).—This group makes up about 7 percent of the survey area. It is on terraces in the Willamette Valley. Most of the soils in this group are used for cultivated crops, which include pasture, sweet corn, snap beans, winter wheat, filberts, and strawberries. The native vegetation that is intermingled with areas of cropland includes Oregon white oak, Oregon ash, Douglas-fir, trailing blackberry, hawthorn, rose, and poison-oak.

Wildlife populations are abundant in areas that are not adversely influenced by suburban development. Species present in this group include black-tailed deer, ring-necked pheasant, California quail, dove, band-tailed pigeon, raccoon, nutria, skunk, coyote, and numerous songbirds, which are seasonally abundant. Waterfowl are seasonally abundant and inhabit ponded fields and adjacent rivers and streams. Ponds constructed on this group can be stocked with rainbow trout and other warmwater species of fish.

Group 4 (general soil map units 12, 13, and 14).—This group makes up about 3 percent of the survey area. It is on the coastal marine terraces and sand dunes. The native vegetation is shore pine, Sitka spruce, western hemlock, red alder, Pacific rhododendron, salal, evergreen huckleberry, and beachgrass. Homesite development is rapidly increasing on the soils in this group, which adversely affects the abundance of some species.

This group is inhabited by black-tailed deer, Roosevelt elk, black bear, raccoon, skunk, coyote, band-tailed pigeon, and numerous songbirds, which are seasonally abundant. Waterfowl are seasonally abundant and inhabit the coastal lakes and wet interdunal areas within this group.

Rainbow trout and other warmwater species of fish are present in the coastal lakes.

Group 5 (general soil map units 15, 16, and 17).—This group makes up about 25 percent of the survey area. It is on rolling foothills along the margins of the Willamette Valley. The vegetation in areas not cleared is mainly Douglas-fir, Oregon white oak, Oregon ash, poison-oak, and trailing blackberry. Cleared areas are used for small grain, hay, and pasture. Homesite development is increasing on the soils immediately adjacent to the terraces.

This group is inhabited by black-tailed deer, black bear, raccoon, skunk, coyote, California and mountain quail, blue and ruffed grouse, band-tailed pigeon, dove, and songbirds.

The streams in this group support a fair population of rainbow trout. Ponds constructed on this group can be stocked with rainbow trout and other warmwater species of fish.

Group 6 (general soil map units 18, 19, 20, and 21).—This group makes up about 52 percent of the survey area. It comprises the majority of the mountainous areas in the Coast and Cascade Ranges. It receives adequate precipitation in summer so that the soils are dry for only a short time. The native vegetation is mainly Douglas-fir, western hemlock, red alder, bigleaf maple, salal, and western swordfern. In areas lacking a full canopy, a dense stand of salal, evergreen huckleberry, thimbleberry, and salmonberry develop. Some of the bottom lands are cleared and are in pasture.

This group is inhabited by black-tailed deer, Roosevelt elk, black bear, beaver, raccoon, skunk, coyote, mountain quail, blue and ruffed grouse, and band-tailed pigeon.

Rainbow trout and some brook trout inhabit the streams and lakes at the higher elevations within this group.

Group 7 (general soil map unit 22).—This group makes up about 2 percent of the survey area. It consists of the high-elevation plateaus and mountains in the Cascade Range. The native vegetation is Douglas-fir, noble fir, Pacific rhododendron, tall blue huckleberry, and common beargrass.

This group is inhabited by black-tailed deer, some Roosevelt elk, black bear, beaver, raccoon, skunk, coyote, and blue grouse.

Brook and rainbow trout inhabit the lakes and streams within this group.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building Site Development, Sanitary Facilities, Construction Materials, and Water

Management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps and soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 9 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 9 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage because of rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 10, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an *improbable* source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, cobbles, or stones, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials (*3*) and the Unified soil classification system (*4*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 13 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (up to 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 13, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 14 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 14 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table are the depth to the seasonal high water table; the kind of water table—that is, perched, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*17*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 15 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Haplaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*16*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*17*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Abiqua Series

The Abiqua series consists of deep, well drained soils on fans, terraces, and high flood plains in valleys of tributaries of the Willamette River. These soils formed in mixed alluvium. Slopes are 0 to 5 percent. The average annual precipitation is about 50 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Abiqua silty clay loam, about 2.5 miles northeast of Mabel, in the Mohawk River Valley; in the NE1/4SW1/4 of sec. 27, T. 15 S., R. 1 W.

Ap—0 to 7 inches; dark brown (7.5YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure and weak fine granular structure; slightly hard, friable, sticky and plastic; many fine roots; many fine irregular pores and few fine tubular pores; medium acid (pH 5.6); clear smooth boundary.

A12—7 to 21 inches; dark brown (7.5YR 3/2) silty clay loam, brown (7.5YR 4/2) dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many very fine and fine tubular pores; medium acid (pH 5.6); gradual smooth boundary.

B21—21 to 31 inches; dark brown (7.5YR 3/4) silty clay, brown (7.5YR 5/4) dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many very fine and few fine tubular pores; strongly acid (pH 5.3); gradual smooth boundary.

B3—31 to 38 inches; dark brown (7.5YR 4/4) silty clay loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many very fine and few fine tubular pores; common black manganese stains and concretions; strongly acid (pH 5.1); clear wavy boundary.

C—38 to 60 inches; dark brown (7.5YR 4/4) gravelly clay loam, light brown (7.5YR 6/4) dry; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; 20 percent pebbles; strongly acid (pH 5.1).

Depth to the gravelly substratum ranges from 38 to 60 inches or more. Coarse fragments make up 0 to 10 percent of the solum.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 or 3 when moist or dry.

The B horizon has hue of 5YR or 7.5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 3 or 4 when moist or dry. It is silty clay loam, silty clay, or clay.

The C horizon is silty clay loam, gravelly clay loam, or clay. It is 0 to 25 percent coarse fragments.

Astoria Series

The Astoria series consists of deep, well drained soils on uplands in the Coast Range. These soils formed in colluvium and residuum derived from sedimentary rock. Slopes are 5 to 30 percent. The average annual precipitation is about 100 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Astoria silt loam, 5 to 30 percent slopes, in cutbank along Forest Service Road 21, in the SE1/4SE1/4 of sec. 34, T. 17 S., R. 11 W.

O1—1 inch to 0; duff of leaves, needles, moss, roots, and twigs.

A11—0 to 7 inches; very dark brown (10YR 2/2) silt loam, brown (10YR 5/3) dry; strong fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots and common fine and coarse roots; many very fine and fine irregular pores; many fine concretions; strongly acid (pH 5.3); clear smooth boundary.

A12—7 to 13 inches; very dark brown (10YR 2/2) silt loam, brown (10YR 4/3) dry; weak fine subangular blocky structure parting to moderate fine and very fine granular; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots and few coarse roots; many very fine and common fine irregular pores; strongly acid (pH 5.2); gradual wavy boundary.

B21—13 to 29 inches; dark yellowish brown (10YR 3/4) silty clay, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine, fine, and coarse roots; many very fine irregular pores and common fine and medium irregular and tubular pores; very strongly acid (pH 5.0); gradual wavy boundary.

B22—29 to 41 inches; dark brown (7.5YR 4/4) clay, light yellowish brown (10YR 6/4) dry; moderate coarse and medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots and few fine and coarse roots; many very fine irregular pores and common fine and medium irregular and tubular pores; very strongly acid (pH 5.0); gradual wavy boundary.

B23—41 to 60 inches; dark brown (7.5YR 4/4) silty clay, yellowish brown (10YR 5/4) dry; moderate coarse and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine irregular pores and few fine and medium irregular and tubular pores; very strongly acid (pH 5.0).

Thickness of the solum and depth to bedrock are more than 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 1 to 3 when moist and 2 or 3 when dry, and chroma of 2 or 3 when moist and 3 or 4 when dry.

The B horizon has hue of 10YR or 7.5YR, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 4 to 6 when moist and 4 to 8 when dry. It is silty clay or clay and is 0 to 20 percent soft pebbles that are easily crushed.

Astoria Variant

The Astoria Variant consists of deep, well drained soils on uplands in the Coast Range. These soils formed in colluvium and residuum derived from igneous and sedimentary rock. Slopes are 3 to 60 percent. The average annual precipitation is about 100 inches, and the average annual air temperature is 50 degrees F.

Typical pedon of Astoria Variant silt loam, 3 to 30 percent slopes, in cutbank along Forest Service Road 1764, in the SW1/4 of sec. 34, T. 16 S., R. 11 W.

O1—3 inches to 0; duff layer of leaves, twigs, and needles.

A11—0 to 14 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 4/2) dry; moderate fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and few medium roots; many very fine irregular pores; strongly acid (pH 5.4); gradual wavy boundary.

A3—14 to 27 inches; dark brown (7.5YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and few medium roots; many very fine irregular pores; few reddish stains; strongly acid (pH 5.2); clear smooth boundary.

B2—27 to 33 inches; dark brown (7.5YR 4/4) silt loam, light brown (7.5YR 6/4) dry; moderate medium subangular blocky structure parting to fine and very fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots and few medium roots; many very fine and few fine irregular pores; very strongly acid (pH 5.0); clear wavy boundary.

B31—33 to 57 inches; dark yellowish brown (10YR 4/4) silty clay loam, light brown (10YR 6/4) dry; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few medium, fine, and very fine roots; common very fine and few fine irregular pores; very strongly acid (pH 4.6); gradual wavy boundary.

B32—57 to 67 inches; dark yellowish brown (10YR 3/4) silt loam, brown (10YR 5/3) dry; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and very fine roots; common very fine tubular pores; very strongly acid (pH 4.8).

Thickness of the solum and depth to bedrock are more than 60 inches.

The A horizon has hue of 5YR to 10YR, value of 2 or 3 when moist, and chroma of 2 or 3 when moist and 2 to 4 when dry. Fine concretions are in many pedons.

The B horizon has hue of 7.5YR or 10YR, value of 3 or 4 when moist, and chroma of 3 or 4 when moist. It is silt loam, clay loam, or silty clay loam and is 25 to 35 percent clay. Soft fragments that are easily crushed are in some pedons.

Atring Series

The Atring series consists of moderately deep, well drained soils on uplands in the Coast Range. These soils formed in colluvium weathered from sandstone and siltstone. Slopes are 30 to 60 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is about 52 degrees F.

Typical pedon of an Atring gravelly loam in an area of Atring-Rock outcrop complex, 30 to 60 percent slopes, on the north side of Siuslaw River Road, about 3/4 mile northwest of Letz Creek Junction, in the NE1/4SE1/4 of sec. 18, T. 20 S., R. 5 W.

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam, light gray (10YR 7/2) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine roots; many fine and few medium irregular pores; about 25 percent pebbles and 5 percent cobbles; slightly acid (pH 6.4); clear smooth boundary.

B1—7 to 15 inches; dark yellowish brown (10YR 3/4) gravelly loam, very pale grown (10YR 7/3) dry; moderate fine subangular blocky structure and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many very fine tubular and irregular pores; 20 percent pebbles and 10 percent cobbles and stones; slightly acid (pH 6.2); clear smooth boundary.

B2—15 to 26 inches; dark brown (7.5YR 4/4) very gravelly loam, very pale brown (10YR 7/3, 6/4) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; many very fine tubular pores; 30 percent pebbles, 10 percent cobbles, and 10 percent stones; slightly acid (pH 6.2); clear smooth boundary.

B3—26 to 32 inches; dark brown (7.5YR 4/4) and brown (10YR 5/3) very gravelly loam, pink (7.5YR 7/4) and light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many very fine tubular pores; 30 percent pebbles, 15 percent cobbles, and 10 percent stones; medium acid (pH 6.0); abrupt wavy boundary.

Cr—32 inches; weathered fractured sandstone.

Depth to bedrock is 20 to 40 inches. The textural control section averages more than 35 percent coarse fragments.

The B horizon has hue of 10YR or 7.5YR. It is gravelly loam, very gravelly loam, or very gravelly silt loam and is 25 to 60 percent coarse fragments.

Awbrig Series

The Awbrig series consists of deep, poorly drained soils on stream terraces and in drainageways. These soils formed in clayey and silty alluvium. Slopes are 0 to 2 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Awbrig silty clay loam, about 120 feet west of the centerline of U.S. Highway 99 and 40 feet north of the centerline of Awbrey Lane-Bond Road, in the SW1/4SE1/4 of sec. 32, T. 16 S., R. 4 W.

Ap1—0 to 2 inches; very dark grayish brown (10YR 3/2) silty clay loam, light brownish gray (10YR 6/2) dry; few fine distinct yellowish brown (10YR 5/6) mottles in root channels; moderate very fine subangular blocky structure and fine granular structure; hard, friable, sticky and plastic; many very fine roots; many fine irregular pores; strongly acid (pH 5.4); clear smooth boundary.

Ap2—2 to 7 inches; very dark grayish brown (10YR 3/2) silty clay loam, light brownish gray (10YR 6/2) dry; common fine distinct dark brown and yellowish brown (10YR 4/3, 4/4) mottles; moderate fine subangular blocky structure; hard, friable, sticky and plastic; many very fine and common fine roots; many very fine tubular and irregular pores; common fine black concretions; medium acid (pH 6.5); abrupt irregular boundary.

IIB21t—7 to 18 inches; very dark gray (10YR 3/1) clay, gray (10YR 5/1) dry; weak coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine tubular pores; few fine yellowish brown and black concretions; vertical cracks 1/2 inch wide or more when dry; common thin clay films; common slickensides and pressure faces; slightly acid (pH 6.3); clear wavy boundary.

IIB22t—18 to 29 inches; mottled, very dark grayish brown (10YR 3/2) and yellowish brown (10YR 5/4) silty clay, dark grayish brown (10YR 4/2) dry; moderate medium and coarse prismatic structure parting to weak medium and fine subangular blocky; extremely hard, firm, very sticky and very plastic; common very fine tubular pores; many thin and moderately thick clay films; many pressure faces; few slickensides; slightly acid (pH 6.5); gradual smooth boundary.

IIB23t—29 to 48 inches; grayish brown (10YR 5/2) silty clay loam, pale brown (10YR 6/3) dry; many distinct fine yellowish brown (10YR 5/6), brown (7.5YR 4/4), and gray (10YR 7/2) mottles; weak medium prismatic structure; hard, firm, sticky and plastic; many very fine tubular pores; many moderately thick clay films on peds and in pores; neutral (pH 6.6); abrupt smooth boundary.

IIC1—48 to 60 inches; dark brown (10YR 4/3) clay loam, pale brown (10YR 6/3) dry; dark gray (10YR 4/1) coatings; massive; hard, firm, sticky and plastic; common very fine tubular pores; neutral (pH 7.0).

The solum is 35 to 50 inches thick. Depth to the IIBt horizon is 5 to 12 inches. Depth to bedrock is more than 60 inches. In some uncultivated areas, the Ap horizon is as much as 12 inches thick and there is an intermittent A2 horizon that has value of 4 or 5 when moist and 6 or 7 when dry.

The Ap horizon has chroma of 2 or less. In cultivated areas, the Ap horizon has value of 3 to 5 when moist and 6 or 7 when dry.

The IIBt horizon is very dense and massive when moist, but it cracks to a depth of more than 20 inches when dry. The horizon is clay or silty clay and is 50 to 60 percent clay.

The IIC horizon is silty clay loam or clay loam.

Bandon Series

The Bandon series consists of moderately deep, well drained soils on marine terraces. These soils formed in marine and eolian sand. Slopes are 0 to 50 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Bandon sandy loam, 12 to 50 percent slopes, north of Canary Road and Woahink Park, in the SE1/4SW1/4 of sec. 11, T. 19 S., R. 12 W.

O1—2 inches to 0; layer of needles, leaves, twigs, and moss.

A2—0 to 3 inches; dark grayish brown (10YR 4/2) sandy loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine roots; strongly acid (pH 5.4); clear wavy boundary.

B21ir—3 to 8 inches; dark brown (7.5YR 3/4) sandy loam, dark brown (7.5YR 4/4) dry; moderate fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine roots; 10 percent iron nodules; medium acid (pH 6.0); clear smooth boundary.

B22ir—8 to 26 inches; dark brown (7.5YR 4/4) gravelly sandy loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common fine roots; 30 percent iron nodules; medium acid (pH 6.0); gradual smooth boundary.

B23ir—26 to 35 inches; yellowish brown (10YR 5/4) sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; 10 percent iron nodules; medium acid (pH 6.0); clear smooth boundary.

B24irm—35 to 43 inches; yellowish brown (10YR 5/6) and pale brown (10YR 6/3) loamy fine sand, reddish yellow (7.5YR 6/6) and pale brown (10YR 6/3) dry; massive; hard, firm, nonsticky and nonplastic; weakly cemented when moist and strongly cemented when dry; medium acid (pH 6.0); clear wavy boundary.

C—43 to 60 inches; yellowish brown (10YR 5/6) fine sand, yellow (10YR 7/6) dry; massive; soft, very friable, nonsticky and nonplastic; medium acid (pH 6.0).

Depth to the weakly cemented to strongly cemented ortstein layer is 18 to 36 inches. Depth to bedrock is more than 60 inches. The solum has hue of 10YR to 5YR.

The A horizon has value of 2 to 4 when moist and 4 to 6 when dry, and it has chroma of 1 or 2.

The upper part of the Bir horizon has value of 3 or 4, and it has chroma of 4 to 6. It is gravelly sandy loam, sandy loam, or loam and is 5 to 30 percent pebble-sized, iron-cemented nodules. The Birm horizon has value of 4 or 5 when moist and 5 or 6 when dry, and it has chroma of 4 to 8 when moist and 3 to 6 when dry.

The C horizon has value of 4 or 5 when moist and 6 to 8 when dry, and it has chroma of 2 to 6. It is stratified loam to fine sand. It is generally massive and compact, but in some pedons it is single grained and loose and has a strong brown, brown, or light yellowish brown weakly cemented layer as much as 2 inches thick.

Bashaw Series

The Bashaw series consists of deep, poorly drained soils on terraces, fans, and flood plains. These soils formed in fine textured alluvium. Slopes are 0 to 1 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Bashaw clay, off Meadowview Road, approximately 6 miles northwest of Eugene, in the NE1/4SW1/4 of sec. 25, T. 16 S., R. 5 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; strong fine granular structure; extremely hard, very firm, very sticky and very plastic; many fine roots; common irregular pores; medium acid (pH 5.8); abrupt smooth boundary.

A12—7 to 26 inches; black (10YR 2/1) clay, very dark gray (10YR 3/1) dry; weak coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; common fine roots; few very fine tubular pores; few slickensides; medium acid (pH 5.8); clear wavy boundary.

A13—26 to 41 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; massive; extremely hard, very firm, very sticky and very plastic; few fine roots; few very fine tubular pores; common intersecting slickensides; slightly acid (pH 6.2); clear wavy boundary.

C1—41 to 63 inches; variegated olive brown (2.5Y 4/4) and light brownish gray (10YR 6/2) silty clay, light gray (2.5Y 7/2) dry; many medium distinct strong brown (7.5YR 5/6) mottles and common fine distinct black (10YR 2/1) mottles; massive; extremely hard, firm, very sticky and very plastic; few fine tubular pores; neutral (pH 7.0).

Depth to bedrock is more than 60 inches. Intersecting slickensides are between depths of 10 and 40 inches; some pedons have slickensides below a depth of 40 inches. The upper 30 inches of the profile has hue of 10YR to 5Y, and it has value of 2 or 3 when moist and 3 or 4 when dry. Below a depth of 30 inches, the profile has value of 2 to 6 when moist and 3 to 6 when dry. Chroma is 1 or less between depths of 30 and 40 inches, and it ranges to 4 below a depth of 40 inches.

The profile is clay, silty clay, or sandy clay below a depth of 40 inches.

Bellpine Series

The Bellpine series consists of moderately deep, well drained soils in convex areas on foothills and uplands adjacent to the Willamette Valley. These soils formed in colluvium and residuum derived from sandstone, siltstone, volcanic tuff, and breccia. Slopes are 2 to 50 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Bellpine silty clay loam, 3 to 12 percent slopes, in a woodland area north of U.S. Highway 36, in the SW1/4NW1/4 of sec. 34, T. 16 S., R. 6 W.

A1—0 to 6 inches; dark reddish brown (5YR 3/3) silty clay loam, reddish brown (5YR 4/4) dry; moderate fine and very fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; common medium and fine irregular pores; strongly acid (pH 5.4); clear smooth boundary.

A3—6 to 13 inches; reddish brown and dark reddish brown (5YR 3/3, 3/4) silty clay loam, reddish brown (5YR 4/4) dry; moderate fine and very fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; common medium and fine irregular pores; strongly acid (pH 5.2); clear smooth boundary.

B21t—13 to 19 inches; dark reddish brown (2.5YR 3/4) silty clay, yellowish red (5YR 4/6) dry; moderate fine subangular blocky structure; hard, friable, sticky and plastic; many fine roots; common very fine tubular pores and common medium and fine irregular pores; few thin clay films on peds and in pores; strongly acid (pH 5.3); clear smooth boundary.

B22t—19 to 26 inches; dark red (2.5YR 3/6) silty clay, yellowish red (5YR 4/6) dry; moderate medium and very fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; many fine and very fine tubular pores; many moderately thick clay films in pores and on peds; medium acid (pH 5.8); clear smooth boundary.

B23t—26 to 34 inches; dark red (2.5YR 3/6) silty clay, yellowish red (5YR 5/6) and red (2.5YR 5/6) dry; moderate medium and fine subangular blocky structure; very hard, very firm, sticky and plastic; few fine roots; many very fine and fine tubular pores; many moderately thick clay films in pores and on peds; medium acid (pH 5.6); abrupt wavy boundary.

Cr—34 inches; weathered tuffaceous sandstone; thick clay films in fractures.

Depth to bedrock is 20 to 40 inches. The profile is as much as 35 percent coarse fragments in some pedons, but it commonly is less than 10 percent.

The A horizon has hue of 7.5YR or 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 to 4 when moist and 3 or 4 when dry. It is silty clay loam or cobbly silty clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 4 to 6 when moist or dry. It is silty clay to clay. The horizon has common or many, thin or moderately thick clay films.

Blachly Series

The Blachly series consists of deep, well drained soils on broad ridges and side slopes of uplands in the Coast and Cascade Ranges. These soils formed in colluvium weathered from sandstone. Slopes are 3 to 70 percent. The average annual precipitation is about 95 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Blachly silty clay loam, 3 to 30 percent slopes, in cutbank along logging road, in the NW1/4SW1/4 of sec. 7, T. 18 S., R. 9 W.

O1—5 inches to 0; mat of roots and highly decomposed organic matter.

A1—0 to 5 inches; dark reddish brown (5YR 3/3) silty clay loam, dark brown (7.5YR 4/4) dry; strong medium and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine and very fine and common medium irregular pores; 10 percent concretions; strongly acid (pH 5.5); clear wavy boundary.

B1—5 to 11 inches; dark reddish brown (5YR 3/4) clay, dark brown (7.5YR 4/4) dry; moderate medium and fine subangular blocky structure parting to strong very fine granular; hard, friable, sticky and plastic; common fine and very fine roots; many fine and very fine and few medium irregular pores; 5 percent concretions; medium acid (pH 5.7); clear wavy boundary.

B21—11 to 38 inches; dark reddish brown (2.5YR 3/4) clay, yellowish red (5YR 4/6) dry; moderate medium, fine, and very fine subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots and few medium roots; many fine and very fine and few medium irregular pores; very strongly acid (pH 5.0); gradual wavy boundary.

B22—38 to 63 inches; dark reddish brown (2.5YR 3/4) clay, reddish brown (5YR 4/4) dry; weak coarse subangular blocky structure parting to moderate medium and fine subangular blocky; hard, friable, sticky and plastic; common very fine and fine roots and few medium roots; many very fine, common fine, and few medium irregular pores; very strongly acid (pH 5.0).

Thickness of the solum and depth to bedrock are more than 60 inches.

The A horizon has hue of 7.5YR or 5YR, and it has chroma of 3 or 4 when moist. It is clay loam or silty clay loam.

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4 when moist and 4 to 6 when dry, and chroma of 4 to 6 when moist and 4 to 8 when dry. It is silty clay or clay and is 40 to 50 percent clay. The B horizon is 0 to 20 percent soft pebbles that are easily crushed.

Bohannon Series

The Bohannon series consists of moderately deep, well drained soils on dissected uplands in the Coast and Cascade Ranges. These soils formed in colluvium weathered from sedimentary and igneous rock. Slopes are 3 to 90 percent. The average annual precipitation is about 85 inches, and the average annual air temperature is 48 degrees F.

Typical pedon of Bohannon gravelly loam, 3 to 25 percent slopes, in the NW1/4SW1/4 of sec. 22, T. 15 S., R. 8 W.

O1—1 inch to 0; litter of leaves, twigs, and needles.

A1—0 to 4 inches; dark brown (10YR 3/3) gravelly loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; 15 percent concretions and pebbles and 5 percent cobbles; medium acid (pH 5.5); clear smooth boundary.

A3—4 to 11 inches; dark brown (10YR 3/3) gravelly loam, brown (10YR 4/3) dry; weak fine subangular blocky structure parting to moderate fine and very fine granular; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine irregular pores; 15 percent pebbles and 5 percent cobbles; medium acid (pH 5.6); gradual smooth boundary.

B21—11 to 17 inches; dark brown (10YR 3/4) cobbly loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; 10 percent pebbles and 20 percent cobbles; medium acid (pH 6.0); gradual smooth boundary.

B22—17 to 24 inches; brown (10YR 4/4) cobbly loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; hard, friable, slightly sticky and

slightly plastic; common fine roots; many fine tubular pores; 10 percent pebbles and 20 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.
Cr—24 inches; weathered, fractured sedimentary rock with soil material extending into fractures.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It is 15 to 30 percent coarse fragments, dominantly pebbles.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 4 to 6 when dry, and chroma of 3 or 4 when moist or dry. It is cobbly loam, gravelly loam, or cobbly clay loam and is 15 to 35 percent coarse fragments.

Brallier Series

The Brallier series consists of deep, very poorly drained, organic soils in low tidal basins and on stream flood plains near tidelands. These soils formed in decomposed, fibrous organic material. Slopes are 0 to 1 percent. The average annual precipitation is about 85 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Brallier muck, drained, in the NW1/4NE1/4 of sec. 31, T. 18 S., R. 11 W.

Oe1—0 to 3 inches; very dark grayish brown (10YR 3/2) muck, grayish brown (10YR 5/2) dry; about 40 percent fibers, 20 percent rubbed; about 20 percent mineral soil material; nonsticky and nonplastic; many very fine roots; many very fine irregular pores; medium acid (pH 6.0); clear smooth boundary.
Oe2—3 to 21 inches; dark brown (7.5YR 3/2, broken) and very dark gray (10YR 3/1, rubbed) muck, dark grayish brown (10YR 4/2) dry; about 70 percent fibers, 15 percent rubbed; about 10 percent mineral soil material; nonsticky and nonplastic; few fine and very fine roots; very strongly acid (pH 5.0); clear smooth boundary.
Oe3—21 to 46 inches; dark brown (10YR 3/3, broken) and very dark grayish brown (10YR 3/2, rubbed) muck, dark grayish brown (10YR 4/2) dry; about 80 percent fibers, 20 percent rubbed; less than 10 percent mineral soil material; very smooth, smeary; slightly sticky and slightly plastic when rubbed; extremely acid (pH 4.4); clear smooth boundary.
IIOe4—46 to 60 inches; dark grayish brown (10YR 4/2, broken and rubbed) muck, grayish brown (10YR 5/2) dry; about 60 percent fibers, 15 percent rubbed; about 30 percent mineral soil material; slightly sticky and slightly plastic; very strongly acid (pH 4.6).

Thickness of the organic material is more than 53 inches. The profile is very strongly acid or extremely acid. Fibers are primarily from sedges, reeds, and moss, but limbs, logs, and woody roots make up much of the subsurface tier in some areas.

The surface tier has hue of 10YR to 5YR, value of 2 or 3 when moist and 3 to 5 when dry, and chroma of 1 to 3. It is 20 to 70 percent fibers where undisturbed and is less than 10 percent when rubbed.

The subsurface tier has hue of 10YR to 5YR, and it has value and chroma of 2 to 4 when moist and cut or broken. It is 30 to 90 percent fibers where undisturbed and is 15 to 30 percent when rubbed.

Brallier Variant

The Brallier Variant consists of deep, very poorly drained, organic soils in low tidal basins and on flood plains of the Siuslaw estuary. These soils formed in decomposed, fiberous organic material overlying sandy or silty alluvium. Slopes are 0 to 2 percent. The average annual precipitation is about 80 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Brallier Variant muck, on the edge of slough bank, in the NW1/4NE1/4 of sec. 31, T. 18 S., R. 11 W.

Oe1—0 to 13 inches; dark brown (7.5YR 3/2) muck, grayish brown (10YR 5/2) dry; prominent reddish brown (5YR 4/4) and yellowish red (5YR 5/6) stains along root channels; about 60 percent identifiable plant parts or fibers, 20 percent rubbed; nonsticky and nonplastic; many fine and common very fine roots; spongy and porous; medium acid (pH 6.0); strong odor of sulfur dioxide; gradual wavy boundary.
Oe2—13 to 25 inches; very dark brown (10YR 2/2) muck, gray (10YR 5/2) dry; about 50 percent identifiable plant parts or fibers, 15 percent rubbed; visible flecks of mica; nonsticky and nonplastic; common fine and medium roots; spongy and porous; neutral (pH 6.6); strong odor of sulfur dioxide; abrupt wavy boundary.
Oa1—25 to 38 inches; dark brown (7.5YR 3/2) and very dark grayish brown (10YR 3/2) muck, gray (10YR 5/1) dry; visible flecks of mica; nonsticky and nonplastic; common fine and few medium roots; neutral (pH 6.8); odor of sulfur dioxide; abrupt wavy boundary.
IIC1—38 to 50 inches; very dark gray (5Y 3/1) silt loam; highly micaceous; massive; very hard, friable, nonsticky and nonplastic; neutral (pH 7.3).

These soils are saturated with water throughout the year and are inundated daily by brackish tidewater. Thickness of the organic material ranges from 16 to 50 inches. The profile is neutral to medium acid.

The surface tier commonly has chroma of 1, but chroma ranges to 3 in some pedons. Intermittent lenses of muck or peat as much as 6 inches thick are on the surface and at a depth of more than 18 inches in some areas.

The IIC horizon is stratified silt loam to fine sandy loam.

Brenner Series

The Brenner series consists of deep, poorly drained soils on flood plains. These soils formed in recent silty and fine textured alluvium. Slopes are 0 to 2 percent. The average annual precipitation is about 80 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Brenner silty clay loam, in the SW1/4NE1/4 of sec. 17, T. 16 S., R. 7 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) and black (10YR 2/1) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many fine roots; many very fine irregular pores; very strongly acid (pH 4.8); abrupt smooth boundary.

B2g—8 to 18 inches; dark grayish brown (10YR 4/2) silty clay, grayish brown (10YR 5/2) dry; many distinct gray, brown, and yellowish brown mottles; moderate medium prismatic structure; hard, firm, very sticky and very plastic; common fine roots; common very fine tubular pores; very strongly acid (pH 5.0); gradual smooth boundary.

B3g—18 to 30 inches; dark grayish brown (10YR 4/2) silty clay, grayish brown (10YR 5/2) dry; many prominent light brownish gray and yellowish red mottles; weak medium subangular blocky structure; hard, firm, very sticky and very plastic; common very fine tubular pores; very strongly acid (pH 5.0); clear smooth boundary.

Cg—30 to 55 inches; gray (10YR 5/1) silty clay, light grayish brown (10YR 6/2) dry; many distinct light brownish gray and yellowish red mottles; massive; hard, firm, sticky and plastic; very strongly acid (pH 5.0).

The umbric epipedon is more than 10 inches to 24 inches thick. In some areas are thin layers of coarse textured material has been deposited on the surface by overflow water.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 1 or 2 when moist or dry. Mottles are faint to prominent.

The B horizon has hue of 10YR or 2.5Y, value of 4 or 5 when moist and 5 or 6 when dry, and chroma of 1 or 2 when moist or dry. Chroma of 1 is below a depth of 30 inches when the soil is moist. Mottles are distinct or prominent. The horizon is mainly silty clay, but thin lenses of coarser textured material are in some pedons. The B horizon is 40 to 50 percent clay.

The C horizon has hue of 5GY to 10YR, value of 3 to 5 when moist and 4 to 7 when dry, and chroma of 2 or less. It is mainly silty clay, but occasional thin strata of coarser textured material are at a depth of more than 40 inches. The horizon is 40 to 50 percent clay.

Some of the Brenner soils in this survey area are taxadjunct to the Brenner series because they have a slightly wider range between the mean summer soil temperature and the mean winter soil temperature than is allowed for the series. This difference, however, does not significantly affect use and management.

Briedwell Series

The Briedwell series consists of deep, well drained soils on terraces in valleys of tributaries to the Willamette River. These soils formed in mixed alluvium. Slopes are 0 to 7 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Briedwell cobbly loam, 0 to 7 percent slopes, about 800 feet north of the junction of Sharps Creek Road and Row River Road, in the SW1/4SE1/4 of sec. 32, T. 21 S., R. 1 W.

A1—0 to 10 inches; very dark grayish brown (10YR 3/2) cobbly loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; about 15 percent cobbles and 10 percent pebbles; slightly acid (pH 6.4); clear wavy boundary.

A3—10 to 20 inches; dark brown (10YR 3/3) cobbly loam, brown (10YR 5/3) dry; weak medium subangular blocky structure parting to moderate very fine granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine irregular pores; 20 percent cobbles and 15 percent pebbles; slightly acid (pH 6.3); gradual smooth boundary.

B2—20 to 38 inches; dark yellowish brown (10YR 3/4) very stony loam, light yellowish brown (10YR 6/4) dry; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine irregular and tubular pores; 15 percent stones, 10 percent cobbles, and 25 percent pebbles; slightly acid (pH 6.4); clear wavy boundary.

IIC1—38 to 44 inches; dark brown (7.5YR 4/4) very cobbly sandy loam, light yellowish brown (10YR 6/4) dry; massive; hard, friable, nonsticky and nonplastic; common fine irregular pores; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; slightly acid (pH 6.2); gradual wavy boundary.

IIC2—44 to 60 inches; dark brown (7.5YR 4/4) very gravelly loam, pale brown (10YR 6/3) dry; single grain; hard, friable, nonsticky and nonplastic; 5 percent stones, 10 percent cobbles, and 40 percent pebbles; slightly acid (pH 6.3).

Thickness of the solum is 36 to 48 inches. Depth to bedrock is more than 60 inches.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It is 15 to 35 percent coarse fragments, dominantly cobbles.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist, and chroma of 3 or 4 when moist. It is very stony loam, very cobbly loam, or very gravelly clay loam and is 35 to 60 percent coarse fragments.

The IIC horizon commonly has colors similar to those of the B horizon. It is very gravelly sandy loam, very cobbly sandy loam, or very gravelly loam and is 35 to 60 percent coarse fragments.

Bullards Series

The Bullards series consists of deep, well drained soils on dissected marine terraces. These soils formed in sandy alluvial and eolian material on old sand dune deposits. Slopes are 0 to 60 percent. The average annual precipitation is about 78 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of a Bullards loam in an area of Bullards-Ferrelo loams, 0 to 7 percent slopes, in the NE1/4NE1/4 of sec. 15, T. 19 S., R. 12 W.

O1—2 inches to 1 inch; leaves, needles, and twigs.

O2—1 inch to 0; decomposed needles, leaves, twigs, and moss.

A2—0 to 4 inches; dark grayish brown (10YR 4/2) and gray (10YR 5/1) loam, light gray (10YR 6/1) and light brownish gray (10YR 6/2) dry; massive parting to weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common medium and fine roots; many very fine irregular pores; many fine black charcoal fragments; very strongly acid (pH 4.8); clear smooth boundary.

B21ir—4 to 14 inches; dark reddish brown (5YR 3/4) gravelly loam, brown (7.5YR 5/4) dry; moderate coarse, medium, and fine granular structure; soft, friable, nonsticky and slightly plastic; common very fine and fine roots and few medium roots; common fine and very fine irregular pores; 25 percent strongly cemented iron nodules 2 to 10 millimeters in diameter; strongly acid (pH 5.2); clear smooth boundary.

B22ir—14 to 36 inches; dark reddish brown (5YR 3/4) gravelly loam, brown (7.5YR 5/4) dry; weak coarse subangular blocky structure parting to moderate fine subangular blocky and granular; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; many very fine irregular pores and few fine irregular and tubular pores; about 30 percent strongly cemented iron nodules 2 to 20 millimeters in diameter; medium acid (pH 5.6); clear irregular boundary.

B3ir—36 to 58 inches; strong brown (7.5YR 4/6, 5/6) sandy loam, very pale brown (10YR 7/4) and yellow (10YR 7/6) dry; moderate medium and fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few medium and fine roots; many very fine irregular pores; about 20 percent weakly cemented iron nodules and 10 percent strongly cemented iron nodules 2 to 20 millimeters in diameter; strongly acid (pH 5.4); clear wavy boundary.

C—58 to 61 inches; dark brown (7.5YR 4/4), strong brown (7.5YR 5/6), yellowish red (5YR 4/6), and brown (10YR 5/3) loamy fine sand, very pale brown (10YR 7/3) dry; massive; soft, firm, nonsticky and nonplastic; few very fine roots; many very fine irregular pores; medium acid (pH 5.6).

Thickness of the solum is 40 inches to more than 60 inches. Depth to bedrock is more than 60 inches. The solum has hue of 7.5YR or 5YR.

The A horizon has value of 2 to 5 when moist and 5 or 6 when dry, and it has chroma of 1 to 3 when moist or dry.

The B horizon has value of 3 to 5 when moist and 5 to 7 when dry, and it has chroma of 4 to 8 when moist or dry. It is gravelly loam or gravelly sandy loam and is 15 to 35 percent cemented iron nodules.

The C horizon has hue of 10YR to 5YR, value of 4 to 7 when moist or dry, and chroma of 2 to 6 when moist or dry. It is loamy fine sand or sand and has a few thin, weakly cemented lenses.

Camas Series

The Camas series consists of deep, excessively drained soils on bottom lands. These soils formed in recent sandy and gravelly alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Camas gravelly sandy loam, occasionally flooded, 1/2 mile west of Noraton School, in the SW1/4NW1/4 of sec. 7, T. 15 S., R. 4 W.

Ap—0 to 8 inches; very dark brown (10YR 3/2) gravelly sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; few fine tubular pores; 20 percent pebbles; medium acid (pH 5.6); abrupt smooth boundary.

A3—8 to 14 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam, brown (10YR 4/3) dry; single grain; loose, nonsticky and nonplastic; common fine roots; many fine irregular pores; 30 percent pebbles; medium acid (pH 5.6); clear wavy boundary.

C—14 to 60 inches; dark brown (10YR 3/3) very gravelly sand, brown (10YR 5/3) dry; single grain; loose, nonsticky and nonplastic; few fine roots; many fine irregular pores; weakly stratified; 5 percent cobbles and 50 percent pebbles; slightly acid (pH 6.2).

Thickness of the solum is 8 to 14 inches. Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It is 20 to 35 percent coarse fragments, dominantly pebbles.

The C horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 4 to 6 when dry, and chroma of 2 to 4 when moist or dry. It is very gravelly loamy sand or very gravelly sand and is 35 to 60 percent coarse fragments.

Chapman Series

The Chapman series consists of deep, well drained soils on low river terraces. These soils formed in recent mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Chapman loam, about 0.9 mile north of Junction City, 120 feet west of centerline of U.S. Highway 99E, in the NE1/4SE1/4NW1/4 of sec. 29, T. 15 S., R. 4 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure and moderate very fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine irregular pores; medium acid (pH 5.6); abrupt smooth boundary.

A12—8 to 14 inches; very dark grayish brown (10YR 3/2) clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many very fine roots; many medium, fine, and very fine tubular pores; medium acid (pH 5.8); clear wavy boundary.

B1—14 to 23 inches; dark brown (7.5YR 3/4) loam, brown (10YR 5/3) dry; weak fine prismatic structure parting to moderate fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots; many medium, fine, and very fine tubular pores; medium acid (pH 6.0); gradual smooth boundary.

B2—23 to 33 inches; dark yellowish brown (10YR 4/3) loam, brown (10YR 5/3) dry; weak medium prismatic structure and moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; few medium and many very fine tubular pores; common dark brown (7.5YR 3/2) coatings in larger pores; slightly acid (pH 6.3); clear wavy boundary.

B3—33 to 42 inches; dark yellowish brown (10YR 3/4) loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few medium tubular pores and many fine and very fine tubular pores; few dark brown (7.5YR 3/2) coatings in pores; 10 percent pebbles; slightly acid (pH 6.4); clear wavy boundary.

C1—42 to 50 inches; brown (10YR 4/3) gravelly sandy loam, yellowish brown (10YR 5/4) dry; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine pores; 25 percent pebbles; neutral (pH 6.6); clear wavy boundary.

C2—50 to 60 inches; dark brown (10YR 3/3) very gravelly sandy loam, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; 50 percent pebbles; neutral (pH 6.8).

Depth to bedrock is more than 60 inches. The mollic epipedon is 20 to 30 inches thick. The textural control section averages 20 to 35 percent clay, 15 to 30 percent sand that is coarser than very fine sand, and 0 to 10 percent pebbles.

The A horizon has value of 2 or 3 when moist, and it has chroma of 2 or 3 when moist.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It generally is loam or clay loam, but some pedons have layers of silt loam or silty clay loam.

The C horizon is gravelly loam, gravelly sandy loam, or very gravelly sandy loam and is 20 to 50 percent pebbles.

Chehalis Series

The Chehalis series consists of deep, well drained soils on flood plains. These soils formed in recent mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Chehalis silty clay loam, occasionally flooded; west of Ayres Lane, in the SW1/4SE1/4SE1/4 of sec. 20, T. 15 S., R. 4 W.

Ap—0 to 7 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 4/3) dry; moderate fine granular structure and weak medium subangular blocky; hard friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; many fine and few medium tubular pores; slightly acid (pH 6.1); abrupt smooth boundary.

A3—7 to 13 inches; dark brown (10YR 3/3) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots;

common fine tubular pores; slightly acid (pH 6.2); clear wavy boundary.

B21—13 to 24 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 4/3) dry; moderate fine subangular blocky structure; hard, friable, sticky and plastic; many fine roots; many fine and few medium tubular pores; many thick dark brown (7.5YR 3/2) organic coatings in pores and few thin dark brown (7.5YR 3/2) organic coatings on peds; neutral (pH 6.6); clear wavy boundary.

B22—24 to 30 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 5/3) dry; moderate fine granular structure and moderate fine subangular blocky; hard, friable, slightly sticky and slightly plastic; many fine roots; common medium and fine tubular pores; many thick dark brown (7.5YR 3/2) organic coatings in pores and on peds; neutral (pH 6.6); clear wavy boundary.

B3—30 to 55 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; many fine and common medium tubular pores; many thin dark brown (7.5YR 3/2) organic coatings in pores; neutral (pH 6.8); gradual wavy boundary.

C—55 to 70 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; slightly acid (pH 6.5).

Depth to bedrock is more than 60 inches. Coarse sand and gravel commonly are below a depth of 60 inches. The profile has hue of 10YR or 7.5YR.

The Ap horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The B horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry. It is silty clay loam or silt loam.

The C horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 3 or 4 when moist or dry. It is silt loam or silty clay loam.

Chehulpum Series

The Chehulpum series consists of shallow, well drained soils on low foothills of the Willamette Valley. These soils formed in colluvium weathered from sedimentary rock. Slopes are 3 to 40 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Chehulpum silt loam, 3 to 12 percent slopes, in a field north of Lorane Highway, in the SE1/4SW1/4 of sec. 21, T. 18 S., R. 4 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium and fine granular structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine and very fine irregular pores; 5 percent pebbles; medium acid (pH 5.8); abrupt smooth boundary.

A3—7 to 13 inches; dark brown (10YR 3/3) clay loam, yellowish brown (10YR 5/3) dry; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; 10 percent pebbles; medium acid (pH 6.0); abrupt wavy boundary.

IICr—13 inches; weathered, highly fractured sedimentary rock.

Depth to bedrock is 10 to 20 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. The lower part is clay loam, silt loam, or gravelly silt loam and is 5 to 30 percent coarse fragments.

Cloquato Series

The Cloquato series consists of deep, well drained soils on flood plains. These soils formed in recent mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Cloquato silt loam, in the SE1/4NW1/4 of sec. 20, T. 15 S., R. 4 W.

A11—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 4/3) dry; weak medium subangular blocky structure; hard, friable, nonsticky and nonplastic; many fine roots; common fine tubular pores; medium acid (pH 6.0); abrupt smooth boundary.

A12—6 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 4/3) dry; weak coarse subangular blocky structure; hard, friable, nonsticky and nonplastic; many fine roots; few fine tubular pores; thin very dark brown (10YR 2/2) coatings on peds; slightly acid (pH 6.2); clear smooth boundary.

A13—14 to 33 inches; very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 4/3) dry; weak very fine subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine roots; many very fine and fine tubular pores; thin very dark brown (10YR 2/2) coatings in pores; slightly acid (pH 6.4); gradual wavy boundary.

C1—33 to 50 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; massive; hard, friable, nonsticky and nonplastic; few fine roots; many fine and common medium tubular pores; neutral (pH 6.6); clear wavy boundary.

IIC2—50 to 60 inches; multicolored sand; single grain; loose; neutral (pH 6.6).

Depth to stratified sand is 40 inches to 60 inches or more. The mollic epipedon is 20 inches to more than 40 inches thick. The profile has hue of 10YR or 2.5Y when moist or dry.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The C horizon has value of 3 to 6 when moist or dry, and it has chroma of 2 to 4 when moist or dry. It is silt loam, loam, sandy loam, loamy sand, or sand below a depth of 40 inches.

Coburg Series

The Coburg series consists of deep, moderately well drained soils on low stream terraces. These soils formed in silty and clayey alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Coburg silty clay loam, 3 miles south of Junction City, in the NW1/4NE1/4 of sec. 19, T. 16 S., R. 4 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to moderate medium granular; hard, friable, sticky and plastic; many fine roots; common very fine tubular pores and few fine and medium tubular pores; medium acid (pH 5.6); abrupt smooth boundary.

A3—7 to 18 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak coarse subangular blocky structure parting to moderate fine subangular blocky; hard, friable, sticky and plastic; many fine roots; many very fine and fine tubular pores; slightly acid (pH 6.2); gradual smooth boundary.

B21t—18 to 28 inches; dark brown (10YR 3/3) silty clay, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to moderate fine subangular blocky; very hard, firm, sticky and plastic; few fine roots; many very fine and fine tubular pores; common moderately thick clay films on peds and in pores; few black concretions 1 to 3 millimeters in diameter; slightly acid (pH 6.2); clear wavy boundary.

B22t—28 to 41 inches; dark brown (10YR 3/3) silty clay loam, dark brown (10YR 4/3) dry; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure parting to moderate fine subangular blocky; very hard, firm, sticky and plastic; few fine roots; many very fine and fine tubular pores; continuous thick clay films in pores and few moderately thick clay films on peds; few small black stains on peds; slightly acid (pH 6.3); clear wavy boundary.

B3t—41 to 53 inches; dark brown (10YR 3/3) silty clay, dark brown (10YR 4/3) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; many very fine and fine tubular pores; continuous thick clay films in pores; few small black stains on peds; neutral (pH 6.6); clear wavy boundary.

IIC—53 to 65 inches; dark brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; common medium distinct strong brown (7.5YR 5/6, 5/8) mottles; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; many very fine and common fine tubular pores; neutral (pH 6.8).

Thickness of the solum is 40 to 60 inches, and depth to bedrock is more than 60 inches. The solum has hue of 10YR or 7.5YR.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry. It is 12 to 18 inches thick.

The B horizon has value of 3 or 4 when moist and 4 or 5 when dry, and it has chroma of 2 to 4 when moist or dry. It is silty clay loam or silty clay that is more than 35 percent clay.

The IIC horizon is fine sandy loam, loam, or clay loam.

Conser Series

The Conser series consists of deep, poorly drained soils in depressional areas along drainageways. These soils formed in silty and clayey alluvium. Slopes are 0 to 2 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon on Conser silty clay loam, about 1/2 mile northeast of Irving, in the SE1/4NW1/4 of sec. 3, T. 17 S., R. 4 W.

A1—0 to 9 inches; very dark brown (10YR 2/2) silty clay loam, grayish brown (10YR 5/2) dry; few fine distinct strong brown (7.5YR 5/6) mottles; strong fine granular structure; hard, friable, sticky and plastic; many very fine and few fine roots; many fine irregular pores; slightly acid (pH 6.2); clear smooth boundary.

B1—9 to 14 inches; very dark grayish brown (10YR 3/2) silty clay, grayish brown (10YR 5/2) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure and moderate medium subangular blocky; hard, firm, very sticky and very plastic; common very fine and fine roots; many very fine tubular pores and few fine and medium tubular pores; slightly acid (pH 6.2); clear smooth boundary.

B2tg—14 to 27 inches; very dark gray (10YR 3/1) clay, grayish brown (10YR 5/2) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure and moderate medium and fine subangular blocky; very hard, firm, very sticky and very plastic; common very fine and fine roots; many very fine tubular pores and few fine and medium tubular pores; common moderately thick clay films in pores and on peds; slightly acid (pH 6.4); clear smooth boundary.

B3tg—27 to 41 inches; brown (10YR 4/3) and grayish brown (10YR 4/2) silty clay, pale brown (10YR 6/3) and light brownish gray (10YR 6/2) dry; common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; many very fine and common fine tubular pores; continuous moderately thick clay films in pores; slightly acid (pH 6.4); clear wavy boundary.

IIC1g—41 to 49 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; many medium distinct strong brown (7.5YR 5/6) mottles; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine tubular pores; slightly acid (pH 6.4); clear wavy boundary.

IICg—49 to 60 inches; dark grayish brown (10YR 4/2) sandy loam, grayish brown (10YR 5/2) dry; many medium distinct brown (7.5YR 4/4) mottles; massive; slightly hard, very friable, nonsticky and nonplastic; neutral (pH 6.8).

Depth to bedrock is more than 60 inches. The solum is 40 to 60 inches thick.

The A horizon has value of 2 or 3 when moist and 3 to 5 when dry, and it has chroma of 1 or 2 when moist or dry. Mottles are none to common and faint or distinct.

The Bt horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist, and chroma of 1 to 3 when moist. It is silty clay or clay. The horizon is 40 to 50 percent clay.

The IIC horizon is loam, sandy loam, or clay loam.

Courtney Series

The Courtney series consists of deep, poorly drained soils in depressional areas and drainageways on valley terraces. These soils formed in gravelly and clayey alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Courtney gravelly silty clay loam, near Pleasant Hill in the NW1/4SW1/4NW1/4 of sec. 27, T. 18 S., R. 2 W.

Ap—0 to 7 inches; very dark brown (10YR 2/2) gravelly silty clay loam, dark gray (10YR 4/1) dry; few fine faint very dark brown (7.5YR 2/2) mottles; weak medium subangular blocky structure and moderate fine granular; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; 15 percent pebbles and 5 percent cobbles; strongly acid (pH 5.4); abrupt smooth boundary.

A12—7 to 15 inches; very dark brown (10YR 2/2) gravelly silty clay loam, dark grayish brown (10YR 4/2) dry; many fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure and moderate fine granular; hard, friable, sticky and plastic; many fine roots; many medium tubular pores; few black stains; 20 percent pebbles; medium acid (pH 5.6); abrupt smooth boundary.

IIB2t—15 to 28 inches; dark grayish brown (10YR 4/2) and (2.5Y 4/2) gravelly clay, gray (10YR 5/1) dry; weak coarse prismatic structure and weak medium angular blocky; very hard, very firm, very sticky and very plastic; few fine and very fine tubular pores; few thin clay films on vertical peds; few small slickensides; 20 percent pebbles and 5 percent cobbles; many concretions 1 millimeter to 3 millimeters in diameter; slightly acid (pH 6.3); clear smooth boundary.

IIB3t—28 to 41 inches; brown (10YR 5/3) very gravelly clay loam, pale brown (10YR 6/3) dry; many fine distinct strong brown (7.5YR 5/8) mottles and few fine distinct gray (10YR 5/1) mottles; weak medium subangular blocky structure; hard, friable, sticky and plastic; many fine tubular pores; common thick clay films in pores; 40 percent pebbles and 10 percent cobbles; weakly consolidated; slightly acid (pH 6.5); gradual wavy boundary.

IIIC—41 to 60 inches; multicolored very gravelly sand; massive; soft, friable; 55 percent pebbles; neutral (pH 6.8)

Depth to bedrock is more than 60 inches.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or less when moist or dry. It is 15 to 25 percent coarse fragments, dominantly pebbles. Some pedons have an intermittent A2 horizon that is as much as 3 inches thick and has chroma of 2 or less when moist or dry.

The IIB2t horizon has hue of 10YR to 2.5Y, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 2 or less. It is gravelly silty clay or gravelly clay and is 15 to 30 percent coarse fragments. The IIB3 horizon is very gravelly clay loam or extremely gravelly clay loam and is 50 to 80 percent coarse fragments.

The IIIC horizon is very gravelly sand or extremely gravelly sand and is 50 to 80 percent coarse fragments.

Cruiser Series

The Cruiser series consists of deep, well drained soils on uplands in the Cascade Range and on Prairie Mountain in the Coast Range. These soils formed in colluvium weathered from basic igneous rock and volcanic ash. Slopes are 3 to 70 percent. The average annual precipitation is about 85 inches, and the average annual air temperature is 43 degrees F.

Typical pedon of Cruiser gravelly clay loam, 3 to 25 percent slopes, above a logging road in the NE1/4 of sec. 8, T. 16 S., R. 2 E.

A1—0 to 6 inches; dark reddish brown (5YR 3/3) gravelly clay loam, brown (7.5YR 5/4) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine irregular pores; 15 percent pebbles and concretions; strongly acid (pH 5.1); clear smooth boundary.

A3—6 to 15 inches; dark reddish brown (5YR 3/4) gravelly clay loam, brown (7.5YR 5/4) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots, common medium roots, and few coarse roots; many very fine tubular pores; 20 percent pebbles and 10 percent cobbles; strongly acid (pH 5.2); clear wavy boundary.

B21—15 to 28 inches; reddish brown (5YR 4/4) gravelly clay loam, reddish yellow (7.5YR 6/6) dry; weak coarse subangular blocky structure parting to weak fine subangular blocky; hard, friable, sticky and plastic; common very fine, fine, medium, and coarse roots; many very fine tubular pores; 20 percent pebbles and 5 percent cobbles; strongly acid (pH 5.4); gradual wavy boundary.

B22—28 to 37 inches; strong brown (7.5YR 4/6) gravelly clay loam, reddish yellow (7.5YR 6/6) dry; weak fine subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, medium, and coarse roots; many very fine tubular pores; 20 percent pebbles and 5 percent cobbles; strongly acid (pH 5.3); gradual wavy boundary.

B23—37 to 45 inches; brown (7.5YR 4/4) gravelly clay loam, light brown (7.5YR 6/4) dry; weak coarse and fine subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine, fine, medium, and coarse roots; many very fine tubular pores; 15 percent pebbles and 5 percent cobbles; strongly acid (pH 5.3); gradual wavy boundary.

B24—45 to 55 inches; brown (7.5YR 4/4) gravelly loam, light brown (7.5YR 6/4) dry; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; many very fine tubular pores; 20 percent pebbles and 10 percent cobbles; strongly acid (pH 5.3); clear wavy boundary.

C—55 to 65 inches; strong brown (7.5YR 5/6) gravelly loam, light brown (7.5YR 6/4) dry; massive; hard, friable, slightly sticky and slightly plastic; many very fine tubular pores; 20 percent pebbles and 10 percent cobbles; strongly acid (pH 5.4).

Depth to bedrock is more than 60 inches. The content of pebbles and cobbles in the profile generally increases with depth, but it averages less than 35 percent in the control section.

The A horizon has hue of 10YR to 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 3 or 4 when moist or dry. It has chroma of more than 3.5 at a depth of less than 10 inches. The horizon is 15 to 30 percent coarse fragments, dominantly pebbles.

The B horizon has hue of 5YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 4 to 6 when moist or dry. It is gravelly loam or gravelly clay loam and is 15 to 35 percent coarse fragments.

The C horizon has hue of 7.5YR or 5YR, and it has chroma of 4 to 6 when moist or dry. It is gravelly loam, cobbly loam, or very cobbly clay loam and is 30 to 60 percent coarse fragments.

Cumley Series

The Cumley series consists of deep, moderately well drained soils on uplands in the Cascade Range. These soils formed in colluvium and glacial till derived from weathered basic igneous rock. Slopes are 2 to 20 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 49 degrees F.

Typical pedon of Cumley silty clay loam, 2 to 20 percent slopes, in the SW1/4NE1/4NW1/4 of sec. 9, T. 16 S., R. 2 W.

O1—1 inch to 0; duff layer of partly decomposed twigs, leaves, and needles.

A11—0 to 4 inches; dark brown (7.5YR 3/2) silty clay loam, brown (7.5YR 5/2) dry; moderate medium granular structure; slightly hard, friable, sticky and plastic; many fine roots; many fine interstitial pores; 5 percent fine rounded concretions; slightly acid (pH 6.2); clear wavy boundary.

A12—4 to 14 inches; dark brown (7.5YR 3/4) silty clay loam, pinkish gray (7.5YR 5/2) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, very sticky and very plastic; many fine roots; common fine tubular pores; 5 percent fine rounded concretions; medium acid (pH 6.0); gradual smooth boundary.

B1—14 to 20 inches; brown (7.5YR 4/4) clay, pinkish gray (7.5YR 6/2) dry; weak medium and moderate fine subangular blocky structure; hard, firm, very sticky and very plastic; many fine roots; many fine tubular pores; few fine reddish brown stains; medium acid (pH 6.0); clear smooth boundary.

B21t—20 to 33 inches; dark brown (10YR 4/3) clay, brown (10YR 5/3) dry; common faint yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure and moderate coarse and medium subangular blocky; hard, firm, very sticky and very plastic; common fine roots; few fine tubular pores; common thin and moderately thick clay films on peds; strongly acid (pH 5.4); clear smooth boundary.

B22t—33 to 47 inches; grayish brown (2.5Y 5/2) clay, pale brown (10YR 6/3) dry; common distinct yellowish brown and dark gray (10YR 5/6, 4/1) mottles; strong medium subangular blocky structure; hard, firm, very sticky and very plastic; few fine roots; few fine tubular pores; continuous moderately thick clay films on peds; strongly acid (pH 5.2); clear smooth boundary.

C—47 to 60 inches; light yellowish brown (2.5Y 6/3) clay, light yellowish brown (10YR 6/4) dry; weak medium and fine subangular blocky structure; hard, firm, very sticky and very plastic; few fine roots; few very fine tubular pores; strongly acid (pH 5.2).

Depth to bedrock is more than 60 inches. The profile is 0 to 10 percent coarse fragments.

The A horizon has hue of 10YR to 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry.

The B2t horizon has hue of 10YR or 2.5Y, value of 3 to 5 when moist and 5 or 6 when dry, and chroma of 2 to 4 when moist or dry. It has faint to prominent mottles below the upper 10 inches of the horizon. The B2t horizon is silty clay or clay. It is 40 to 55 percent clay.

Cupola Series

The Cupola series consists of deep, well drained soils on high terraces and foot slopes in the Cascade Range. These soils formed in glacial outwash with an influence of volcanic material. Slopes are 3 to 30 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 48 degrees F.

Typical pedon of Cupola cobbly loam, 3 to 12 percent slopes, 2 miles east of Blue River, in the SE1/4SE1/4 of sec. 14, T. 16 S., R. 4 E.

A1—0 to 2 inches; very dark brown (10YR 2/2) cobbly loam, dark grayish brown (10YR 4/2) dry; strong fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; many concretions; 20 percent cobbles; strongly acid (pH 5.4); abrupt smooth boundary.

A3—2 to 6 inches; dark brown (7.5YR 3/4) cobbly loam, brown (7.5YR 5/4) dry; moderate very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many very fine irregular pores; 10 percent concretions and pebbles and 20 percent cobbles; medium acid (pH 6.0); gradual wavy boundary.

B21—6 to 18 inches; dark brown (7.5YR 4/4) very cobbly loam, light brown (7.5YR 6/4) dry; weak very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many very fine and fine irregular pores; 15 percent concretions and pebbles and 25 percent cobbles; slightly acid (pH 6.1); gradual wavy boundary.

B22—18 to 32 inches; dark brown (7.5YR 4/4) very cobbly loam, light brown (7.5YR 6/4) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many very fine irregular pores and common fine tubular pores; 30 percent cobbles and 25 percent pebbles; slightly acid (pH 6.4); abrupt wavy boundary.

C1—32 to 60 inches; variegated yellowish brown and brownish yellow (10YR 5/6, 6/6, 5/8) weakly consolidated very cobbly loam; massive; very hard, firm, slightly sticky and slightly plastic; 20 percent pebbles and 30 percent cobbles; slightly acid (pH 6.2).

Thickness of the solum is 20 to 40 inches. Depth to bedrock is more than 60 inches. The textural control section is 35 to 70 percent coarse fragments.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 to 4 when moist or dry. It is 20 to 35 percent coarse fragments, dominantly cobbles.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It is very cobbly loam to very cobbly sandy loam and is 5 to 18 percent clay. The horizon is 40 to 60 percent coarse fragments.

The C horizon is very cobbly loam, very cobbly sandy loam, or extremely cobbly loam and is 40 to 70 percent coarse fragments. It is weakly consolidated or moderately consolidated.

Dayton Series

The Dayton series consists of deep, poorly drained soils in drainageways on broad stream terraces in the Willamette Valley. These soils formed in stratified clayey and silty alluvium and lacustrine material. Slopes are 0 to 2 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Dayton silt loam, clay substratum, 50 feet north and 100 feet east of the junction of Territorial and Cox Butte Roads, in the SE1/4SW1/4SW1/4 of sec. 27, T. 15 S., R. 5 W.

Ap—0 to 7 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine and very fine tubular pores; common reddish brown concretions 1 millimeter to 3 millimeters in diameter; medium acid (pH 5.6); abrupt smooth boundary.

A21—7 to 12 inches; gray (10YR 5/1) silt loam, light gray (10YR 7/1) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many very fine tubular pores; many reddish brown concretions 1 millimeter to 3 millimeters in diameter; medium acid (pH 5.6); clear smooth boundary.

A22—12 to 16 inches; gray (10YR 5/1) silty clay loam, light gray (10YR 7/1) dry; common distinct strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure parting to weak medium subangular blocky; hard, friable, sticky and plastic; common fine roots; many fine and very fine tubular pores; many reddish brown concretions 1 millimeter to 3 millimeters in diameter; medium acid (pH 5.6); abrupt smooth boundary.

IIB2t—16 to 30 inches; gray (2.5Y 5/1) clay, gray (2.5Y 6/1) dry; weak coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few fine roots; few fine and very fine pores; few thin clay films on peds; many reddish brown concretions 1 millimeter to 3 millimeters in diameter; medium acid (pH 5.6); clear smooth boundary.

IIB3t—30 to 45 inches; gray (2.5Y 5/1) clay, gray (2.5Y 6/1) dry; weak medium prismatic structure parting to weak medium subangular blocky; extremely hard, very firm, very sticky and very plastic; few fine roots; few fine and very fine tubular pores; few thin clay films on peds; many reddish brown concretions 1 millimeter to 3 millimeters in diameter; medium acid (pH 5.6); clear smooth boundary.

IIC1—45 to 60 inches; grayish brown (2.5Y 5/2) clay, gray (2.5Y 6/1) dry; many fine distinct strong brown (7.5YR 5/6) mottles; massive; very hard, very firm, very sticky and very plastic; few fine roots; few fine tubular pores; few reddish brown concretions 1 millimeter to 3 millimeters in diameter; slightly acid (pH 6.4).

Depth to bedrock is more than 60 inches. Thickness of the solum is 30 to 48 inches. Depth to the subsoil is 12 to 24 inches.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 1 or 2 when moist or dry. The A2 horizon has hue of 2.5Y or 5Y, value of 4 or 5 when moist and 6 or 7 when dry, and chroma of 1 or 2 when moist or dry. It is silt loam or silty clay loam.

The IIB2t horizon has hue of 2.5Y or 5Y, value of 4 or 5 when moist, and chroma of 2 or less when moist or dry. It is clay or silty clay. It is 40 to 50 percent clay.

The IIC horizon has hue of 10YR or 2.5Y, and it has chroma of 2 or 3 when moist.

Digger Series

The Digger series consists of moderately deep, well drained soils on dissected uplands in the Coast Range. These soils formed in colluvium and residuum derived from sandstone and siltstone. Slopes are 10 to 85 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 50 degrees F.

Typical pedon of a Digger gravelly loam in an area of Digger-Rock outcrop complex, 50 to 85 percent slopes; on the east side of a logging road about 200 yards north of U.S. Highway 36, at the bottom base of the hill on the west side of Low Pass; in the SW1/4SE1/4 of sec. 11, T. 16 S., R. 7 W.

O1—3 inches to 0; litter of decomposing needles, leaves, twigs, and bark.

A1—0 to 4 inches; dark brown (10YR 3/3) gravelly loam, pale brown (10YR 6/3) dry; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine irregular pores; 25 percent pebbles and concretions and 5 percent cobbles; slightly acid (pH 6.1); clear wavy boundary.

B21—4 to 10 inches; dark yellowish brown (10YR 3/4) gravelly loam, light yellowish brown (10YR 6/4) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few coarse roots; many very fine tubular and irregular pores; 20 percent pebbles and 5 percent cobbles; medium acid (pH 6.0); clear wavy boundary.

B22—10 to 17 inches; dark yellowish brown (10YR 4/4) gravelly loam, light yellowish brown (10YR 6/4) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few coarse roots; many very fine tubular pores; 25 percent pebbles and 5 percent cobbles; medium acid (pH 5.9); clear wavy boundary.

B3—17 to 27 inches; yellowish brown (10YR 5/4) very gravelly loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine tubular pores; 35 percent pebbles and 5 percent cobbles; medium acid (pH 5.8); gradual wavy boundary.

C1—27 to 37 inches; yellowish brown (10YR 5/4) very gravelly loam, very pale brown (10YR 7/3) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine tubular and irregular pores; 50 percent pebbles and 5 percent cobbles and stones; strongly acid (pH 5.3); gradual wavy boundary.

C—37 inches; grayish brown (2.5Y 5/2) weathered and fractured sandstone, light gray (2.5Y 7/2) dry.

Depth to bedrock is 20 to 40 inches. The textural control section averages more than 35 percent coarse fragments.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 5 or 6 when dry, and chroma of 2 or 3 when moist or dry. It is 20 to 35 percent coarse fragments, dominantly pebbles.

The B horizon has hue of 10YR or 7.5YR, value of 3 to 5 when moist and 6 or 7 when dry, and chroma of 3 or 4 when moist or dry. It is 15 to 25 percent clay and 20 to 60 percent coarse fragments. The lower part of the B horizon is very gravelly loam or very cobbly loam.

Dixonville Series

The Dixonville series consists of moderately deep, well drained soils on low foothills bordering uplands in the Cascade and Coast Ranges. These soils formed in colluvium and residuum derived from basaltic rock. Slopes are 3 to 50 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Dixonville silty clay loam, 3 to 12 percent slopes, along the Bonneville Power Administration right-of-way road, about 1 mile northwest from the Camp Creek-McKenzie Highway, in the SE1/NE1/4 of sec. 20, T. 17 S., R. 2 W.

A11—0 to 3 inches; very dark brown (7.5YR 2/2) silty clay loam, dark brown (7.5YR 3/2) dry; moderate medium and very fine granular structure; slightly hard, friable, slightly sticky and plastic; many fine roots; many fine and medium irregular pores; slightly acid (pH 6.2); gradual smooth boundary.

A12—3 to 14 inches; very dark brown (7.5YR 2/2) silty clay loam, dark brown (7.5YR 3/2) dry; moderate medium subangular blocky structure and moderate fine granular; hard, friable, sticky and plastic; many fine roots; many fine irregular pores and few fine tubular pores; slightly acid (pH 6.4); gradual smooth boundary.

B21—14 to 23 inches; dark brown (7.5YR 3/2) silty clay, dark brown (7.5YR 4/4) dry; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine roots; many very fine tubular pores; 10 percent pebbles; slightly acid (pH 6.4); clear wavy boundary.

B22t—23 to 26 inches; dark brown (7.5YR 3/4) cobbly clay, brown (7.5YR 4/4) dry; moderate medium subangular blocky structure; hard, firm, sticky and very plastic; common fine roots; many fine tubular pores; common moderately thick clay films; 20 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

Cr—26 inches; weathered bedrock.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 10YR to 5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 or 3 when moist or dry. It is 0 to 10 percent coarse fragments.

The B horizon has hue of 7.5YR or 5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 to 4 when moist or dry. It is silty clay, clay, or cobbly clay and is 0 to 35 percent coarse fragments.

Dupee Series

The Dupee series consists of deep, somewhat poorly drained soils in depressional areas and drainageways and on alluvial fans of foothills. These soils formed in colluvium derived from sandstone. Slopes are 3 to 20 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Dupee silt loam, 3 to 20 percent slopes, about 4 miles west-northwest of Cheshire, 200 feet west of Smyth Road, in the NW1/4NE1/4 of sec. 7, T. 16 S., R. 5 W.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; strongly acid (pH 5.2); clear smooth boundary.

A3—5 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 6/3) dry; moderate coarse and fine subangular blocky structure; hard, friable, sticky and slightly plastic; many fine roots; many very fine tubular pores; strongly acid (pH 5.2); gradual smooth boundary.

B1—12 to 17 inches; dark brown (10YR 3/3) silty clay loam, pale brown (10YR 6/3) dry; few fine faint brown (7.5YR 4/2) and dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine roots; common fine and many very fine tubular pores; strongly acid (pH 5.4); clear smooth boundary.

B21t—17 to 23 inches; dark brown (10YR 4/3) silty clay, pale brown (10YR 6/3) dry; common fine distinct light brownish gray (10YR 6/2) and yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; many very fine tubular pores; few moderately thick clay films on peds; strongly acid (pH 5.4); clear smooth boundary.

B22t—23 to 40 inches; brown (7.5YR 4/4) silty clay, light brown (7.5YR 6/4) dry; common fine distinct pinkish gray (7.5YR 6/2) and yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many very fine tubular pores; common moderately thick clay films on peds; strongly acid (pH 5.4); clear smooth boundary.

B3—40 to 51 inches; brown (7.5YR 5/4) clay loam, pink (7.5YR 7/4) dry; common medium prominent pinkish gray (7.5YR 6/2) and yellowish red (5YR 5/6) mottles; weak fine prismatic structure; very hard, firm, sticky and plastic; few fine roots; many very fine tubular pores; thin light gray (10YR 7/1) very fine sand and silt coatings on peds; strongly acid (pH 5.5); clear smooth boundary.

C—51 to 55 inches; variegated dark brown (7.5YR 3/2) pinkish gray (7.5YR 6/2), strong brown (7.5YR 5/6) and light gray (10YR 7/1) clay loam; massive; very hard, firm, slightly sticky and slightly plastic; very few fine roots; many very fine tubular pores; strongly acid (pH 5.5); abrupt wavy boundary.

Cr—55 inches; weathered sandstone.

Depth to bedrock is 40 to 60 inches. The solum is 30 to 54 inches thick. It has hue of 10YR or 7.5YR. Mottles are in the Bt horizon or at a depth of less than 30 inches.

The A horizon has value of 4 to 6 when dry, and it has chroma of 2 to 4 when moist or dry.

The Bt horizon has value of 4 or 5 when moist, and it has chroma of 3 or 4 when moist or dry. It is silty clay loam, silty clay, or clay loam.

Eilertsen Series

The Eilertsen series consists of deep, well drained soils on stream terraces and fans. These soils formed in mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Eilertsen silt loam, about 20 feet north of logging road, in the SW1/4NE1/4 of sec. 27, T. 19 S., R. 7 W.

A11—0 to 6 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many medium, fine, and very fine roots; many fine irregular pores; very strongly acid (pH 5.0); clear wavy boundary.

A12—6 to 11 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium and fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; many very fine roots and common medium roots; many very fine irregular pores; very strongly acid (pH 5.0); clear wavy boundary.

B1—11 to 24 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium and fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; many very fine roots; many very fine tubular and irregular pores; very strongly acid (pH 4.8); gradual wavy boundary.

B21t—24 to 41 inches; dark yellowish brown (10YR 4/4) silty clay loam, very pale brown (10YR 7/4) dry; moderate fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and very fine roots; common very fine tubular and irregular pores; few thin clay films on peds and in pores; very strongly acid (pH 5.0); gradual smooth boundary.

B22t—41 to 60 inches; yellowish brown (10YR 5/4) silty clay loam, very pale brown (10YR 7/4) dry; moderate coarse subangular blocky structure parting to strong fine subangular blocky; very hard, firm, sticky and plastic; few very fine roots; common very fine tubular and irregular pores; many thin clay films and few moderately thick clay films on peds and in pores; very strongly acid (pH 5.0); gradual smooth boundary.

C—60 to 72 inches; yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 6/4) dry; few distinct strong brown (7.5YR 5/8) mottles; moderate medium and fine subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; very strongly acid (pH 5.0).

Depth to bedrock is more than 60 inches.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The B horizon has value of 4 or 5 when moist and 5 to 7 when dry, and it has chroma of 3 to 6 when moist or dry. It is silt loam, clay loam, or silty clay loam.

Fendall Series

The Fendall series consists of moderately deep, well drained soils on terrace remnants and uplands. These soils formed in old alluvium, colluvium, and residuum derived from sedimentary rock. Slopes are 3 to 30 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Fendall silt loam, 3 to 30 percent slopes, along Canary Road, in the NE1/4NW1/4 of sec. 17, T. 19 W., R. 11 W.

A1—0 to 12 inches; dark brown (10YR 3/2, 3/3) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky and granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; very strongly acid (pH 5.0); clear wavy boundary.

B1—12 to 16 inches; dark yellowish brown and yellowish brown (10YR 4/4, 5/6) clay loam, light yellowish brown (10YR 6/4) dry; moderate fine subangular blocky structure; hard, friable, sticky and plastic; common medium and fine roots; many fine irregular and tubular pores; 10 percent pebbles; very strongly acid (pH 4.6); clear wavy boundary.

B2—16 to 26 inches; yellowish brown (10YR 5/6) clay, yellow (10YR 7/6) dry; moderate fine subangular blocky structure; hard, firm, sticky and plastic; few medium and fine roots; many very fine tubular pores; 10 percent pebbles; very strongly acid (pH 4.6); abrupt wavy boundary.

Cr—26 inches; weathered, fractured, siltstone.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, value is 2 or 3 when moist and 4 or 5 when dry, and chroma of 1 or 2 when dry and 1 to 3 when moist.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6 when moist and 6 or 7 when dry, and chroma of 3 to 6 when moist or dry. It is clay loam, clay, gravelly clay loam, or gravelly clay and is 10 to 20 percent pebbles.

Ferrelo Series

The Ferrelo series consists of deep, well drained soils on dissected marine terraces. These soils formed in marine sediment overlying eolian sand. Slopes are 0 to 60 percent. The average annual precipitation is about 67 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Ferrelo loam in an area of Bullards-Ferrelo loams, 7 to 12 percent slopes, at the intersection of U.S. Highway 101 and South Jetty Road, in the NE1/4NE1/4 of sec. 3, T. 19 S., R. 12 W.

O1—2 inches to 0; partially decomposed leaves, needles, and twigs.

A1—0 to 10 inches; dark brown (7.5YR 3/2) loam, brown (7.5YR 4/2) dry; moderate fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine roots; many fine and very fine irregular pores; medium acid (pH 5.8); clear smooth boundary.

B1—10 to 19 inches; dark brown (7.5YR 3/4) loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, nonsticky and slightly plastic; many fine roots; many fine and very fine irregular pores; medium acid (pH 5.6); gradual smooth boundary.

B21—19 to 47 inches; brown (7.5YR 4/4) silt loam, light yellowish brown (7.5YR 6/4) dry; weak fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common fine roots; many fine tubular and irregular pores; 5 percent weakly cemented reddish brown nodules; medium acid (pH 6.0); gradual smooth boundary.

C1—47 to 60 inches; brown (7.5YR 4/4) fine sandy loam, light yellowish brown (7.5YR 6/4) dry; weak coarse subangular blocky structure; loose, friable, nonsticky and nonplastic; few fine roots; few fine irregular pores; medium acid (pH 5.8); abrupt wavy boundary.

C2—60 inches; reddish brown (2.5YR 4/4) fine sand; massive and weakly cemented.

Depth to weakly cemented sand is 40 to 60 inches. Depth to bedrock is more than 60 inches. The profile typically is stratified with thin, discontinuous, dark reddish brown lenses that are firm or very firm and are weakly cemented.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when dry.

The B horizon has hue of 7.5YR or 10YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 4 to 6 when moist or dry. It is fine sandy loam, loam, or silt loam and is 10 to 18 percent clay and more than 15 percent material that is coarser than very fine sand. The horizon is 0 to 10 percent cemented nodules.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6 when moist and 6 to 8 when dry, and chroma of 2 to 6 when moist or dry. It is fine sandy loam, loamy fine sand, or fine sand.

Formader Series

The Formader series consists of moderately deep, well drained soils on uplands in the Coast Range. These soils formed in colluvium weathered from igneous rock. Slopes are 3 to 80 percent. The average annual precipitation is about 100 inches, and the average annual air temperature is 50 degrees F.

Typical pedon of Formader loam, 3 to 30 percent slopes, in cutbank north of logging road off main road of Formader Ridge, in the NW1/4SE1/4 of sec. 14, T. 16 S., R. 11 W.

O1—0.5 inch to 0; duff layer of decomposing leaves, roots, twigs, and needles.

A11—0 to 7 inches; very dark brown (7.5YR 2/2) loam, dark brown (7.5YR 4/2) dry; strong very fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine irregular pores; 5 percent soft pebbles; strongly acid (pH 5.2); clear smooth boundary.

A12—7 to 18 inches; dark brown (7.5YR 3/2) loam, brown (7.5YR 4/4) dry; weak medium and fine subangular blocky structure parting to strong very fine granular; soft, friable, slightly sticky and slightly plastic; common fine and very fine roots; many very fine irregular pores; 5 percent soft pebbles; very strongly acid (pH 5.0); clear smooth boundary.

B2—18 to 29 inches; brown (7.5YR 4/4) silty clay loam, brown (7.5YR 5/4) dry; moderate medium, fine, and very fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; many fine and very fine tubular pores; 15 percent soft pebbles and 5 percent hard pebbles; very strongly acid (pH 4.6); clear wavy boundary.

B3—29 to 33 inches; brown (7.5YR 4/4) gravelly silty clay loam, brown (7.5YR 5/4) dry; moderate medium, fine, and very fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; many very fine and fine tubular pores; 20 percent hard pebbles and 25 percent soft pebbles; extremely acid (pH 4.4); clear wavy boundary.

Cr—33 inches; weathered basic igneous rock.

Thickness of the solum and depth to bedrock are 20 to 40 inches. The underlying bedrock generally is basalt or gabbro with interbedded mudflows in some areas.

The A horizon has hue of 10YR to 5YR when moist and 10YR or 7.5YR when dry, value of 2 or 3 when moist or dry, and chroma of 2 or 3 when moist and 2 to 4 when dry. The apparent clay content is 15 to 20 percent.

The B horizon has hue of 7.5YR or 5YR when moist and 10YR or 7.5YR when dry, value of 3 or 4 when moist, and chroma of 2 to 4 when moist or dry. It is gravelly silty clay loam or silty clay loam and has an apparent clay content of 20 to 35 percent. The horizon is 5 to 35 percent coarse fragments.

Haflinger Series

The Haflinger series consists of deep, excessively drained soils on terraces of the upper river valleys in the Cascade Range. These soils formed in coarse textured recent alluvium. Slopes are 0 to 5 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 49 degrees F.

Typical pedon of a Haflinger cobbly loam in an area of Haflinger-Jimbo complex, 0 to 5 percent slopes; east of the road to Cougar Reservoir, about 50 miles east of Eugene; in the SW1/4NW1/4 of sec. 19, T. 16 S., R. 5 E.

A11—0 to 8 inches; very dark brown (10YR 2/2) cobbly loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine irregular pores; 20 percent cobbles and 10 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

A12—8 to 17 inches; dark brown (10YR 3/3) cobbly loam, brown (10YR 5/3) dry; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; many very fine irregular pores; 20 percent cobbles and 10 percent pebbles; medium acid (pH 5.8); gradual smooth boundary.

C1—17 to 24 inches; dark yellowish brown (10YR 4/4) very cobbly loamy sand, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; common fine roots; common very fine irregular pores; 30 percent cobbles and 20 percent pebbles; medium acid (pH 5.6); abrupt wavy boundary.

C2—24 to 60 inches; dark yellowish brown (10YR 4/4) extremely cobbly sand, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; few very fine roots; 50 percent cobbles and 25 percent pebbles; medium acid (pH 5.6).

Thickness of the solum is 10 to 20 inches. Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It is 25 to 35 percent coarse fragments, dominantly cobbles.

The C horizon has value of 4 or 5 when moist and 5 or 6 when dry, and it has chroma of 3 or 4 when moist or dry. It is very cobbly loamy sand, sand, or extremely cobbly sand and is 50 to 80 percent coarse fragments.

Hazelair Series

The Hazelair series consists of moderately deep, moderately well drained soils on foot slopes in the Coast and Cascade Ranges. These soils formed in colluvium overlying sedimentary rock. Slopes are 2 to 35 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of a Hazelair silty clay loam in an area of Dixonville-Philomath-Hazelair complex, 3 to 12 percent slopes, 1,000 yards south of Lane Community College parking lot, in the SE1/4NE1/4 of sec. 15, T. 18 S., R. 3 W.

A1—0 to 4 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium and fine granular structure; hard, friable, sticky and slightly plastic; common fine and medium roots; common fine irregular pores and few very fine tubular pores; slightly acid (pH 6.3); clear smooth boundary.

A3—4 to 11 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; hard, friable, sticky and plastic; common fine and medium roots; many fine tubular pores; slightly acid (pH 6.1); clear smooth boundary.

B2—11 to 15 inches; dark brown (10YR 3/3) silty clay, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; very hard, firm, very sticky and plastic; common medium roots; many fine tubular pores; slightly acid (pH 6.1); abrupt smooth boundary.

IIC1—15 to 21 inches; dark brown (10YR 4/3) clay, pale brown (10YR 6/3) dry; few fine distinct gray (10YR 5/1) mottles; massive; very hard, very firm, very sticky and very plastic; common medium and few coarse roots; few very fine tubular pores; 10 percent soft pebbles 2 to 4 millimeters in diameter; medium acid (pH 5.8); clear smooth boundary.

IIC2—21 to 36 inches; light olive brown (2.5Y 5/4) clay, pale yellow (2.5Y 7/4) dry; many fine faint mottles; massive; very hard, very firm, very sticky and very plastic; few medium and coarse roots; few very fine and fine tubular pores; 20 percent soft pebbles 2 to

4 millimeters in diameter; medium acid (pH 5.6); clear wavy boundary.

IIICr—36 inches; weathered tuff.

Depth to bedrock is 20 to 40 inches. Mottles are distinct or prominent and are at a depth of less than 20 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry.

The B horizon has hue of 7.5YR to 2.5Y, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 2 to 4 when moist or dry. It is silty clay loam or silty clay. Few fine siltstone and sandstone pebbles are in the lower part of the B horizon in some pedons.

The IIC horizon dominantly has hue of 2.5Y, but it ranges to 7.5YR. The horizon has value of 4 to 6 when moist and 5 to 7 when dry, and it has chroma of 2 to 4 when moist or dry.

Heceta Series

The Heceta series consists of deep, poorly drained soils on terraces in depressional areas between dunes. Slopes are 0 to 2 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Heceta fine sand, south of South Jetty Road, near the quarter corner between sec. 33 and sec. 4, T. 18 and 19 S., R. 12 W.

A1—0 to 5 inches; brown (10YR 5/3) fine sand, light gray (10YR 7/2) dry; single grain; loose, nonsticky and nonplastic; many fine roots; many fine irregular pores; slightly acid (pH 6.5); clear smooth boundary.

C—5 to 60 inches; grayish brown (10YR 5/2) fine sand, light gray (10YR 7/1) dry; few distinct brown (7.5YR 4/4) mottles; single grain; loose, nonsticky and nonplastic; common very fine and medium roots, decreasing with increasing depth; many very fine irregular pores; slightly acid (pH 6.5).

Depth to bedrock is more than 60 inches.

The A horizon has value of 2 to 5 when moist and 4 to 7 when dry, and it has chroma of 1 to 3 when moist or dry.

In some pedons the C horizon has few mottles that are faint or distinct. The horizon is sand, fine sand, or loamy sand.

Hembre Series

The Hembre series consists of deep, well drained soils on uplands in the Coast Range. These soils formed in colluvium and residuum derived from igneous rock. Slopes are 5 to 80 percent. The average annual precipitation is about 100 inches, and the average annual air temperature is 50 degrees F.

Typical pedon of Hembre silt loam, 5 to 25 percent slopes, from a cut back above Forest Service road number 58, in the NW1/4SW1/4 of sec. 13, T. 16 S., R. 11 W.

O1—4 inches to 0; duff layer of decomposed leaves, needles, roots, and twigs.

A1—0 to 12 inches; very dark brown (10YR 2/2) silt loam, dark brown (10YR 4/3) dry; strong very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine irregular pores; 5 percent pebbles; strongly acid (pH 5.2); abrupt smooth boundary.

B1—12 to 18 inches; dark reddish brown (5YR 3/3) silty clay loam, brown (7.5YR 5/4) dry; strong fine granular structure; soft, very friable, slightly sticky and plastic; common fine and few medium roots; many fine and very fine irregular pores; 5 percent pebbles and 5 percent cobbles; strongly acid (pH 5.2); abrupt smooth boundary.

B2—18 to 29 inches; dark reddish brown (5YR 3/4) silty clay loam, brown (7.5YR 5/4) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine and medium roots; many very fine irregular pores; 5 percent pebbles and 5 percent cobbles; very strongly acid (pH 5.0); gradual wavy boundary.

B3—29 to 44 inches; dark brown (7.5YR 4/4) gravelly silty clay loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common coarse and few fine roots; common fine and very fine irregular pores; common krotovinas; 30 percent pebbles and cobbles; very strongly acid (pH 4.8); abrupt irregular boundary.

R—44 inches; fractured basalt.

Depth to bedrock is 40 to 60 inches.

The A horizon has hue of 10YR to 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist and 3 or 4 when dry. It is 5 to 10 percent coarse fragments.

The B horizon dominantly has hue of 5YR, but it ranges to 7.5YR in the lower part. The horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 4 to 6 when moist or dry. It is silt loam, silty clay loam, or gravelly silty clay loam and is 10 to 30 percent coarse fragments, dominantly pebbles.

Holcomb Series

The Holcomb series consists of deep, somewhat poorly drained soils on valley terraces. These soils formed in stratified silty and clayey alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about

45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Holcomb silty clay loam, near the intersection of Meadowview and Greenhill Roads, in the NW1/4SW1/4 of sec. 29, T. 16 S., R. 4 W.

A11—0 to 5 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to moderate fine granular; hard, friable, sticky and plastic; many fine roots; many fine tubular pores and common fine irregular pores; medium acid (pH 5.6); abrupt smooth boundary.

A12—5 to 10 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; medium acid (pH 6.0); clear smooth boundary.

A2—10 to 19 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; hard, friable, very sticky and very plastic; common fine and medium roots; many fine and common medium tubular pores; medium acid (pH 6.0); abrupt smooth boundary.

IIB21t—19 to 34 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few fine roots; many very fine tubular pores; few thin clay films in pores; 5 percent concretions; neutral (pH 6.8); gradual smooth boundary.

IIB22t—34 to 48 inches; very dark grayish brown (2.5Y 3/2) clay, grayish brown (2.5Y 5/2) dry; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; many very fine tubular pores; few thin clay films in pores; 5 percent concretions; neutral (pH 6.8); gradual smooth boundary.

IIB3t—48 to 55 inches; dark grayish brown (10YR 4/2) clay, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; many very fine tubular pores; few thin clay films in pores; 5 percent concretions; neutral (pH 6.6).

Thickness of the solum is 36 to 60 inches, and depth to bedrock is more than 60 inches. Black or reddish brown concretions are throughout the profile. A gravelly IIIC horizon is below a depth of 55 inches in some pedons.

The A1 horizon has value of 2 or 3 when moist, and it has chroma of 2 or 3 when moist or dry. The A2 horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma of 2 or 3 when moist. It is silt loam or silty clay loam.

The IIB2t horizon has hue of 10YR to 5Y, and it has value of 3 to 5 when moist and 4 to 6 when dry. It is silty clay or clay and is 0 to 10 percent pebbles and concretions.

Holderman Series

The Holderman series consists of moderately deep, well drained soils on ridgetops and side slopes in the Cascade Range. These soils formed in colluvium weathered from dacite and andesitic and rhyolitic tuff and breccia. Slopes are 5 to 75 percent. The average annual precipitation is about 80 inches, and the average annual air temperature is 43 degrees F.

Typical pedon of Holderman extremely cobbly loam, 25 to 50 percent slopes, along a fire trail, in the NW1/4NW1/4 of sec. 27, T. 23 S., R. 1 W.

O1—3 inches to 0; litter of charred and decomposing needles and twigs.

A1—0 to 5 inches; dark brown (10YR 4/3) and dark yellowish brown (10YR 4/4) extremely cobbly loam, light brownish gray (10YR 6/2) dry; black organic coatings and charcoal chips; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine irregular pores; 40 percent pebbles and 30 percent cobbles; strongly acid (pH 5.2); clear wavy boundary.

B21—5 to 13 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) extremely cobbly loam, light gray (10YR 7/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine irregular pores; 40 percent pebbles and 30 percent cobbles; strongly acid (pH 5.4); gradual wavy boundary.

B22—13 to 21 inches; brown (7.5YR 5/4) extremely cobbly loam, very pale brown (10YR 7/3) dry; moderate fine subangular blocky and granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and common fine irregular pores; about 30 percent pebbles and 30 percent cobbles; medium acid (pH 5.6); clear wavy boundary.

C—21 to 32 inches; light yellowish brown (10YR 6/4) extremely cobbly loam, light gray (10YR 7/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common coarse roots; many very fine and common fine irregular pores; 35 percent pebbles, 30 percent cobbles, and 10 percent stones; strongly acid (pH 5.4); abrupt irregular boundary.

R—32 inches; fractured, welded rhyolitic tuff.

Depth to bedrock is 20 to 40 inches. The bedrock is slightly fractured to highly fractured.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 4 when moist and more than 5.5 when dry, and chroma of 2 or 3. It is 60 to 70 percent coarse fragments, dominantly cobbles.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 6 or 7 when dry, and chroma of 3 or 4 when moist or dry. It is very gravelly loam or extremely cobbly loam and is 50 to 70 percent coarse fragments.

The C horizon, where present, has hue of 10YR or 7.5YR, value of 4 to 6 when moist and 6 to 8 when dry, and chroma of 2 to 4 when moist or dry. It is 60 to 80 percent coarse fragments.

Honeygrove Series

The Honeygrove series consists of deep, well drained soils on uplands in the Coast and Cascade Ranges. These soils formed in colluvium and residuum derived from sandstone, siltstone, tuff, and basalt. Slopes are 3 to 50 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Honeygrove silty clay loam, 3 to 25 percent slopes, in cutbank above junction of logging roads, in the NW1/4NW1/4SE1/4 of sec. 25, T. 18 S., R. 9 W.

A1—0 to 9 inches; dark reddish brown (5YR 3/3) silty clay loam, reddish brown (5YR 4/4) dry; strong very fine, fine, and medium granular structure; slightly hard, friable, slightly sticky and plastic; common medium, fine, and very fine roots; many very fine and common fine irregular pores; medium acid (pH 5.8); gradual wavy boundary.

A3—9 to 14 inches; dark reddish brown (5YR 3/4) clay, reddish brown (5YR 4/4) dry; moderate fine subangular blocky structure and moderate medium and fine granular structure; slightly hard, friable, sticky and plastic; common very fine and fine roots and few medium roots; common very fine and fine and few medium irregular pores; 5 percent pebbles and concretions; medium acid (pH 5.6); clear wavy boundary.

B1—14 to 20 inches; yellowish red (5YR 3/6) clay, reddish brown (5YR 5/4) dry; moderate fine and very fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; common fine and medium roots and few coarse roots; common very fine and fine and few medium irregular pores; strongly acid (pH 5.5); clear wavy boundary.

B21t—20 to 30 inches; dark red (2.5YR 3/6) clay, yellowish red (5YR 5/6) dry; weak coarse subangular blocky structure and moderate medium and fine subangular blocky; hard, firm, sticky and plastic; few very fine, fine, and medium roots; many very fine and common fine irregular pores and few very fine tubular pores; many thin continuous clay films on peds and in pores; strongly acid (pH 5.3); gradual wavy boundary.

B22t—30 to 47 inches; dark red (2.5YR 3/6) clay, yellowish red (5YR 5/8) dry; moderate medium and fine subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine and fine roots; many very fine and common fine irregular pores and few very fine and fine tubular pores; many thin continuous clay films on peds and in pores; 5 percent soft sandstone fragments; strongly acid (pH 5.2); gradual wavy boundary.

B23t—47 to 60 inches, dark red (2.5YR 3/6) clay, yellowish red (5YR 5/8) dry; moderate medium and fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine and common fine irregular pores; many moderately thick clay films on peds and in pores; 5 percent soft sandstone fragments; strongly acid (pH 5.1).

Depth to bedrock is more than 60 inches. Content of coarse fragments is as much as 15 percent in the lower part of the solum.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 to 4 when moist or dry. It is slightly acid to strongly acid.

The Bt horizon has hue of 2.5YR or 5YR, and it has chroma of 4 to 6 when moist. It is clay or silty clay. The horizon is 50 to 60 percent clay. It is strongly acid or very strongly acid.

Hullt Series

The Hullt series consists of deep, well drained soils on foot slopes adjacent to the Willamette Valley. These soils formed in colluvium weathered from sandstone and tuff. Slopes are 2 to 60 percent. The average annual precipitation is about 55 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Hullt loam, 30 to 60 percent slopes, on a steep, north-facing side slope; in the SW1/4SW1/4 of sec. 8, T. 17 S., R. 2 W.

O1—0.5 inch to 0; layer of moss, leaves, and twigs.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 5 percent concretions and soft pebbles; strongly acid (pH 5.4); clear wavy boundary.

A3—4 to 13 inches; dark brown (7.5YR 3/2) loam, brown (7.5YR 4/4) dry; moderate fine subangular blocky and granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots;

many fine irregular pores and many fine tubular pores; 5 percent concretions and soft pebbles; strongly acid (pH 5.2); clear wavy boundary.

B21—13 to 26 inches; brown (7.5YR 4/4) loam, light brown (7.5YR 6/4) dry; weak coarse subangular blocky structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many fine and very fine tubular pores; 10 percent soft pebbles; very strongly acid (pH 4.8); clear wavy boundary.

B22—26 to 36 inches; brown (7.5YR 4/4) loam, light brown (7.5YR 6/4) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few medium and fine roots; many fine and very fine tubular pores; 10 percent soft pebbles and 5 percent soft cobbles; very strongly acid (pH 4.6); gradual irregular boundary.

B23—36 to 54 inches; brown (7.5YR 4/4) clay loam, light brown (7.5YR 6/4) dry; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few medium and fine roots; many fine and very fine tubular pores; 15 percent soft pebbles and 20 percent soft cobbles; very strongly acid (pH 4.5); abrupt irregular boundary.

Cr—54 inches; fractured, weathered bedrock; tongues of soil material in fractures.

Thickness of the solum and depth to bedrock are 40 to 60 inches.

The A horizon has hue of 7.5YR to 10YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 to 4 when moist or dry. It is 0 to 10 percent soft pebbles and cobbles.

The B horizon has hue of 7.5YR to 5YR, value of 3 or 4 when moist, and chroma of 4 to 6 when moist or dry. It generally is loam, clay loam, or silty clay loam, but in some pedons it is silty clay or clay a few inches just above the bedrock. The horizon is 5 to 20 percent soft pebbles and cobbles that are easily crushed.

Hummington Series

The Hummington series consists of moderately deep, well drained soils on ridgetops and side slopes in the Cascade Range and on Prairie Mountain in the Coast Range. These soils formed in colluvium weathered from basic igneous rock. Slopes are 5 to 75 percent. The average annual precipitation is about 80 inches, and the average annual air temperature is 43 degrees F.

Typical pedon of Hummington gravelly loam, 5 to 25 percent slopes, in cutbank of logging road, in the NW1/4SW1/4 of sec. 24, T. 15 S., R.1 E.

O1—1.5 inches to 0; litter of decomposing needles, leaves, and twigs.

A11—0 to 6 inches; very dark brown (10YR 2/2) gravelly loam, grayish brown (10YR 5/2) dry; moderate fine and very fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and medium roots; many very fine and fine irregular pores; 25 percent pebbles and concretions and 5 percent cobbles; strongly acid (pH 5.4); clear smooth boundary.

A12—6 to 12 inches; dark brown (7.5YR 3/2) gravelly loam, brown (10YR 5/3) dry; moderate medium and fine subangular blocky structure parting to moderate very fine granular; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine tubular and irregular pores; 25 percent pebbles and concretions and 5 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

B21—12 to 19 inches; dark brown (7.5YR 3/2) very gravelly loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many fine and common medium roots; many very fine tubular pores; 15 percent cobbles and 35 percent pebbles; strongly acid (pH 5.5); clear wavy boundary.

B22—19 to 29 inches; dark brown (7.5YR 3/2) very gravelly loam, brown (7.5YR 5/2) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine and medium roots; many very fine tubular pores; 35 percent pebbles, 10 percent cobbles, and 5 percent stones; strongly acid (pH 5.4); abrupt irregular boundary.

R—29 inches; fractured basalt.

Depth to bedrock is 20 to 40 inches. The umbric epipedon is 20 to 30 inches thick. The underlying bedrock is dominantly basalt, but in some areas on Prairie Mountain it is underlain by quartz-diorite.

The A horizon has value and chroma of 2 or 3. It is 20 to 35 percent coarse fragments, dominantly pebbles.

The B horizon has chroma of 2 or 3 when moist or dry. It is very cobbly loam, very gravelly loam, or extremely cobbly loam and is 35 to 70 percent coarse fragments.

Jimbo Series

The Jimbo series consists of deep, well drained soils on terraces along streams in the Cascade Range. These soils formed in ash and mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 48 degrees F.

Typical pedon of Jimbo silt loam, 40 feet north of Goodpasture Road, in the NW1/4SW1/4SW1/4 of sec. 32, T. 16 S., R. 3 E.

A1—0 to 8 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak very fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; 10 percent fine concretions; medium acid (pH 5.8); clear smooth boundary.

A3—8 to 14 inches; dark brown (7.5YR 3/2) silt loam, brown (10YR 5/3) dry; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; 10 percent fine concretions; medium acid (pH 5.9); clear smooth boundary.

B2—14 to 22 inches; dark yellowish brown (10YR 3/4) loam, brown (10YR 5/3) dry; weak very fine subangular blocky and granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many fine irregular pores; 5 percent fine concretions; strongly acid (pH 5.4); clear smooth boundary.

B3—22 to 31 inches; dark yellowish brown (10YR 3/4) loam, light yellowish brown (10YR 6/4) dry; massive; soft, very friable, nonsticky and nonplastic; many very fine pores; common very fine roots and few fine and medium roots; few fine irregular pores; strongly acid (pH 5.4); clear smooth boundary.

C1—31 to 43 inches; dark yellowish brown (10YR 4/4) loam, yellowish brown (10YR 5/4) dry; massive; soft, very friable, nonsticky and nonplastic; few fine irregular pores; strongly acid (pH 5.2); abrupt wavy boundary.

IIC2—43 to 60 inches; multicolored very cobbly sand; single grain; loose, nonsticky and nonplastic; many fine, medium, and coarse irregular pores; 30 percent pebbles and 25 percent cobbles; strongly acid (pH 5.2).

Depth to the very cobbly substratum is 40 inches to more than 60 inches. Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It is silt loam or fine sandy loam and is 5 to 10 percent hard concretions.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It is loam or fine sandy loam and is 10 to 18 percent clay and 0 to 5 percent hard concretions.

The IIC horizon is 50 to 60 percent coarse fragments, dominantly cobbles.

Jory Series

The Jory series consists of deep, well drained soils on low rolling foothills. These soils formed in colluvium derived from basic igneous and tuffaceous rock. Slopes are 2 to 30 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Jory silty clay loam, 2 to 12 percent slopes, in the NE1/4NE1/4NW1/4 of sec. 33, T. 15 S., R. 1 W.

A1—0 to 9 inches; dark reddish brown (5YR 3/3) silty clay loam, brown (7.5YR 4/4) dry; weak coarse subangular blocky structure and strong medium granular; slightly hard, friable, sticky and plastic; many fine roots; many fine irregular pores; 5 percent rounded concretions; medium acid (pH 6.0); clear wavy boundary.

A3—9 to 17 inches; dark reddish brown (5YR 3/4) silty clay, reddish brown (5YR 4/4) dry; weak coarse and strong fine subangular blocky structure; hard, friable, sticky and plastic; many fine and medium roots; many very fine tubular pores; thin organic coatings on peds; very strongly acid (pH 4.6); gradual smooth boundary.

B21t—17 to 28 inches; dark reddish brown (5YR 3/4) silty clay, reddish brown (5YR 4/4) dry; weak coarse subangular blocky structure; hard, firm, sticky and plastic; common fine roots; many fine tubular pores; few thin clay films on peds and in pores; very strongly acid (pH 4.6); gradual smooth boundary.

B22t—28 to 47 inches; dark reddish brown (5YR 3/4) silty clay, reddish brown (5YR 4/4) dry; moderate medium and fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; few fine tubular pores; many moderately thick clay films on peds and in pores; common black manganese stains; very strongly acid (pH 4.5); clear smooth boundary.

B23t—47 to 60 inches; dark reddish brown (5YR 3/4) silty clay, reddish brown (5YR 4/4) dry; strong fine subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; common fine and very fine tubular pores; many thick clay films on peds and in pores; large prominent black manganese stains; very strongly acid (pH 4.5).

Depth to bedrock is more than 60 inches. The profile is 0 to 5 percent pebbles and rounded concretions.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 3 or 4 when moist and 3 to 6 when dry.

The B2t horizon has hue of 2.5YR or 5YR, value of 3 or 4 when moist or dry, and chroma of 4 to 6 when moist or dry. It is silty clay or clay. The horizon is 50 to 60 percent clay.

Keel Series

The Keel series consists of moderately deep, well drained soils on uplands in the Cascade Range and on Prairie Mountain in the Coast Range. These soils formed in colluvium weathered from basic igneous rock and mixed with some volcanic ash. Slopes are 3 to 75 percent. The average annual precipitation is about 85 inches, and the average annual air temperature is 43 degrees F.

Typical pedon of Keel cobbly clay loam, 3 to 25 percent slopes, on Ryan Ridge, in the NW1/4NW1/4 of sec. 33, T. 15 S., R. 2 E.

O1—2 inches to 0; litter of decaying needles, leaves, twigs, and rotten log fragments; scattered cobbles and stones.

A11—0 to 6 inches; very dark grayish brown (10YR 3/2) cobbly clay loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium roots; many very fine irregular pores; 15 percent cobbles and 10 percent pebbles; strongly acid (pH 5.1); clear smooth boundary.

A12—6 to 12 inches; dark brown (10YR 3/3) clay loam, brown (10YR 4/3) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine, fine, and medium roots; many very fine tubular pores; 5 percent cobbles and 5 percent pebbles; very strongly acid (pH 5.0); clear smooth boundary.

B1—12 to 19 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine tubular pores; 10 percent soft pebbles and cobbles; very strongly acid (pH 5.0); clear wavy boundary.

B2—19 to 28 inches; brown (10YR 4/3, 5/3) and yellowish brown (10YR 5/4) gravelly loam, pale brown (10YR 6/3) dry; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine tubular pores; 20 percent soft pebbles and cobbles and 30 percent hard pebbles and cobbles; very strongly acid (pH 4.9); gradual wavy boundary.

B3—28 to 35 inches; variegated brown (10YR 5/3) and yellowish brown (10YR 5/4) cobbly loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many very fine pores; 30 percent soft pebbles and cobbles and 30 percent hard pebbles and cobbles; very strongly acid (pH 4.9) clear wavy boundary.

Cr—35 inches; weathered, fractured tuffaceous bedrock; some soil material in fractures.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist, and chroma of 2 or 3 when moist or dry. It is 5 to 30 percent coarse fragments.

The B horizon has hue of 10YR or 7.5YR, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 3 or 4 when moist or dry. It is clay loam, cobbly loam, and gravelly loam and is 5 to 35 percent coarse fragments.

Kilchis Series

The Kilchis series consists of shallow, well drained soils on ridges and smooth or dissected side slopes of uplands in the Cascade and Coast Ranges. These soils formed in colluvium and residuum derived from basalt and breccia. Slopes are 30 to 90 percent. The average annual precipitation is about 100 inches, and the average annual air temperature is 49 degrees F.

Typical pedon of Kilchis stony loam, 30 to 60 percent slopes, on Scorpion Butte, in the SW1/4SW1/4SW1/4 of sec. 15, T. 23 S., R. 3 W.

O1—1 inch to 0; organic litter of needles, twigs, and leaves.

A11—0 to 4 inches; dark brown (7.5YR 3/2) stony loam, brown (7.5YR 4/2) dry; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 30 percent pebbles, cobbles, and stones; strongly acid (pH 5.5); clear irregular boundary.

A12—4 to 12 inches; dark reddish brown (5YR 3/3) very cobbly loam, reddish brown (5YR 4/3) dry; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 55 percent pebbles, cobbles, and stones; strongly acid (pH 5.5); gradual smooth boundary.

B1—12 to 16 inches; reddish brown (5YR 4/4) very stony loam, reddish brown (5YR 5/4) dry; weak fine subangular blocky structure and moderate medium granular; slightly hard, friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 50 percent pebbles, cobbles, and stones; very strongly acid (pH 4.8); clear wavy boundary.

B2—16 to 19 inches; reddish brown (5YR 4/6) very stony loam, light reddish brown (5YR 6/4) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; 55 percent pebbles, cobbles, and stones; very strongly acid (pH 4.8); abrupt irregular boundary.

R—19 inches; fractured basalt.

Depth to bedrock is 12 to 20 inches. The umbric epipedon is 7 to 20 inches thick.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist and 2 to 4 when dry. It is 25 to 55 percent coarse fragments, dominantly cobbles and stones.

The B horizon has hue of 5YR or 7.5YR, value of 3 or 4 when moist and 4 to 6 when dry, and chroma of 4 to 6 when moist or dry. It is very stony or very cobbly loam and is 45 to 60 percent coarse fragments.

Kinney Series

The Kinney series consists of deep, well drained soils on uplands in the Cascade Range. These soils formed in glacial till overlying basic igneous rock and tuffaceous breccia. Slopes are 3 to 70 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 50 degrees F.

Typical pedon of Kinney cobbly loam, 50 to 70 percent north slopes, near the center of sec. 7, T. 16 S., R. 2 W.

O1—0.5 inch to 0; partially decomposed leaves, needles, and twigs.

A1—0 to 9 inches; very dark brown (10YR 2/2) cobbly loam, dark grayish brown (10YR 5/2) dry; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 10 percent shot; 20 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

A3—9 to 16 inches; dark yellowish brown (10YR 3/3) cobbly loam, brown (10YR 5/3) dry; weak fine subangular blocky structure and moderate medium and fine granular; soft, very friable, nonsticky and nonplastic; many fine roots; many fine irregular pores and many fine tubular pores; 20 percent cobbles; medium acid (pH 6.0); diffuse wavy boundary.

B21—16 to 38 inches; dark yellowish brown (10YR 3/4) cobbly clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many fine roots; many fine tubular pores; 25 percent cobbles; very strongly acid (pH 4.6); clear smooth boundary.

B22—38 to 50 inches; dark brown (7.5YR 3/4) cobbly clay loam, brown (10YR 5/3) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; 30 percent cobbles; very strongly acid (pH 4.5); gradual irregular boundary.

B3—50 to 58 inches; dark brown (7.5YR 3/4) very cobbly loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many fine roots; common medium tubular pores; common thin cutans in pores; 50 percent pebbles, cobbles, and stones; extremely acid (pH 4.4); clear wavy boundary.

Cr—58 inches; weathered tuffaceous breccia.

Depth to bedrock is 40 to 60 inches. The umbric epipedon is 10 to 20 inches thick.

The A horizon has chroma of 2 or 3 when moist or dry. It generally is thicker on the north-facing side slopes than it is on the south-facing side slopes. The horizon is 15 to 35 percent coarse fragments, dominantly cobbles.

The B2 horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist, and chroma of 3 or 4 when moist or dry. It is cobbly clay loam or cobbly loam and is 20 to 35 percent coarse fragments. It is strongly acid or very strongly acid.

The B3 horizon, or the C horizon where present, is cobbly loam or very cobbly loam and is 25 to 50 percent coarse fragments.

Klickitat Series

The Klickitat series consists of deep, well drained soils on ridges and smooth or dissected side slopes of uplands in the Cascade and Coast Ranges. These soils formed in colluvium and residuum derived from igneous rock. Slopes are 3 to 75 percent. The average annual precipitation is about 80 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Klickitat stony loam, 50 to 75 percent north slopes, on a north-facing side slope along Cash Creek, south of rock quarry off Dollar Road, in the NE1/4NE1/4 of sec. 36, T. 15 S., R. 2 W.

O1—1.5 inches to 0; litter of leaves, fir needles, and twigs.

A11—0 to 6 inches; dark brown (7.5YR 3/2) stony loam, brown (7.5YR 4/4) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; 10 percent pebbles, 15 percent cobbles, and 5 percent stones; medium acid (pH 6.0); clear irregular boundary.

A12—6 to 13 inches; dark brown (7.5YR 3/2) stony loam, brown (7.5YR 4/4) dry; moderate medium and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine irregular pores; 10 percent pebbles, 10 percent cobbles, and 10 percent stones; strongly acid (pH 5.2); clear wavy boundary.

B21—13 to 24 inches; dark brown (7.5YR 4/4) very cobbly clay loam, brown (7.5YR 5/4) dry; moderate fine subangular blocky structure; 25 percent pebbles and 25 percent cobbles; very strongly acid (pH 4.8); gradual wavy boundary.

B22—24 to 39 inches; dark brown (7.5YR 4/4) very cobbly clay loam, brownish yellow (10YR 6/6) dry; strong coarse subangular blocky structure; very hard, friable, sticky and plastic; common fine roots; common fine tubular pores; 25 percent pebbles and 25 percent cobbles; very strongly acid (pH 4.5); abrupt irregular boundary.

C1—39 to 50 inches; dark brown (7.5YR 4/4) extremely cobbly loam, brownish yellow (10YR 6/6) dry;

massive; hard, friable, slightly sticky and plastic; few fine roots; many fine tubular pores; 35 percent pebbles and 25 percent cobbles; very strongly acid (pH 4.5); abrupt irregular boundary.
R—50 inches; slightly fractured basalt.

Thickness of the solum is 20 to 40 inches. Depth to bedrock is 40 to 60 inches. The A horizon is 15 to 50 percent pebbles and cobbles, and the B horizon is 35 to 70 percent, increasing with depth. The solum is as much as 20 percent stones in some pedons. The umbric epipedon is 10 to 20 inches thick.

The A horizon has hue of 7.5YR or 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist and 3 or 4 when dry. It is 15 to 35 percent coarse fragments.

The B horizon has hue of 10YR to 5YR, value of 3 or 4 when moist and 4 to 6 when dry, and chroma of 4 to 6 when moist or dry. It is very gravelly loam, very cobbly loam, or extremely cobbly clay loam and is 40 to 65 percent coarse fragments.

The C horizon has hue of 10YR to 5YR, and it has value of 5 or 6 when dry. It is very cobbly loam or extremely cobbly loam and is 50 to 75 percent coarse fragments.

Linslaw Series

The Linslaw series consists of deep, somewhat poorly drained soils along drainageways dissecting old terraces and colluvial fans. These soils formed in old mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Linslaw loam, 1,200 feet south and 2,200 feet east of the northwest corner of sec. 5, T. 18 S., R. 5 W.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common fine irregular pores; strongly acid (pH 5.4); abrupt smooth boundary.
A12—5 to 16 inches; dark grown (10YR 3/3) loam, pale brown (10YR 6/3) dry; common fine distinct brown (10YR 5/3) mottles; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many very fine tubular pores; common black stains in pores; strongly acid (pH 5.4); clear smooth boundary.
B2t—16 to 28 inches; pale brown (10YR 6/3) clay loam, very pale brown (10YR 7/3) dry; common medium distinct yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many very fine tubular pores; few moderately thick clay films on peds and in pores; strongly acid (pH 5.3); clear wavy boundary.
B3—28 to 42 inches; grayish brown (2.5Y 5/3) clay loam, pale yellow (2.5Y 7/4) dry; many medium distinct light grayish brown (2.5Y 6/2) and yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure; hard, friable, sticky and slightly plastic; few fine roots; many fine and very fine tubular pores; light gray (2.5Y 7/2) coatings of silt and sand on peds; strongly acid (pH 5.3); abrupt wavy boundary.
IIC1—42 to 56 inches; variegated yellowish red (5YR 5/6), yellowish brown (10YR 5/6), and gray (10YR 6/1) clay, reddish yellow (5YR 6/6) and light gray (10YR 7/1) dry; massive; very hard, firm, sticky and very plastic; few fine roots; common very fine tubular pores; strongly acid (pH 5.4); clear wavy boundary.
IIC2—56 to 60 inches; grayish brown (2.5Y 5/2) sandy clay loam, light gray (2.5Y 7/2) dry; many large strong brown (7.5YR 5/6) mottles; massive; hard, friable, slightly sticky and slightly plastic; common very fine tubular pores; medium acid (pH 5.6).

Depth to bedrock is more than 60 inches. Thickness of the solum is 30 to 48 inches. The profile is as much as 5 percent gravel throughout.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist, and chroma of 2 or 3 when moist or dry.

The B horizon has hue of 2.5Y to 10YR, and it has value of 4 to 6 when moist and 6 or 7 when dry. It is clay loam or clay.

The IIC horizon is variegated yellowish red to light gray when moist or dry. It is clay in the upper part and sandy loam or sandy clay loam in the lower part.

Lint Series

The Lint series consists of deep, well drained soils on marine terraces. These soils formed in mixed alluvium and some volcanic ash. Slopes are 0 to 40 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Lint silt loam, 0 to 7 percent slopes, at the edge of a borrow pit southeast of Woahink Lake, in the NE1/4SW1/4SW1/4 of sec. 23, T. 19 S., R. 12 W.

O1—2 inches to 0; litter of needles and roots.
A11—0 to 3 inches; dark brown (7.5YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine and fine irregular pores; 5 percent extremely firm silt concretions 0.5 to 2 millimeters in diameter; extremely acid (pH 4.2); abrupt wavy boundary.

A12—3 to 6 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; strong medium granular structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine irregular pores and common very fine tubular pores; 5 percent extremely firm silt concretions 0.5 to 2 millimeters in diameter; very strongly acid (pH 4.6); abrupt wavy boundary.

A3—6 to 16 inches; dark brown (7.5YR 3/3) silt loam, brown (7.5YR 5/2) dry; moderate fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common very fine and fine irregular pores; 10 percent extremely firm silt concretions 0.5 to 3 millimeters in diameter; very strongly acid (pH 4.8); clear wavy boundary.

B21—16 to 25 inches; dark brown (7.5YR 4/4) silt loam, light brown (7.5YR 6/4) dry; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and fine tubular pores and common very fine and fine irregular pores; strongly acid (pH 5.1); clear wavy boundary.

B22—25 to 42 inches; dark yellowish brown (10YR 4/4) silty clay loam, light yellowish brown (10YR 6/4) dry; common medium distinct grayish brown (10YR 5/2) mottles; weak medium and coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and fine tubular and irregular pores; strongly acid (pH 5.1); clear wavy boundary.

B3—42 to 59 inches; yellowish brown (10YR 5/4) silty clay loam, very pale brown (10YR 7/4) dry; few medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine tubular pores; strongly acid (pH 5.2); clear wavy boundary.

C—59 to 69 inches; yellowish brown (10YR 5/4) silty clay loam, very pale brown (10YR 7/4) dry; massive; hard, firm, slightly sticky and plastic; few very fine tubular pores; strongly acid (pH 5.2).

Depth to bedrock is more than 60 inches. The umbric epipedon is 10 to 20 inches thick. The solum is 40 to 60 inches thick, and it has hue of 10YR or 7.5YR.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The B horizon has value of 4 or 5 when moist and 6 or 7 when dry, and it has chroma of 3 or 4 when moist or dry. It is silt loam or silty clay loam.

The C horizon has value of 4 or 5 when moist and 6 or 7 when dry, and it has chroma of 3 or 4 when moist or dry. It is silt loam or silty clay loam.

Malabon Series

The Malabon series consists of deep, well drained soils on valley terraces. These soils formed in silty and clayey alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Malabon silty clay loam, in the NE1/4SE1/4 of sec. 12, T. 15 S., R. 5 W.

Ap—0 to 7 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; strong very fine granular structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many irregular pores; medium acid (pH 5.6); clear smooth boundary.

A3—7 to 12 inches; dark brown (7.5YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure and strong very fine granular; hard, friable, sticky and plastic; many very fine roots; many very fine and few fine tubular pores; slightly acid (pH 6.1); clear wavy boundary.

B21t—12 to 19 inches; dark brown (10YR 3/3) silty clay, dark brown (10YR 4/2) dry; moderate medium subangular blocky structure and moderate very fine granular; hard, firm, sticky and plastic; common very fine roots; common fine and very fine and few medium tubular pores; many thick very dark grayish brown (10YR 3/2) clay films; slightly acid (pH 6.3); clear wavy boundary.

B22t—19 to 29 inches; dark brown (10YR 3/3) silty clay, brown (10YR 5/3) dry; moderate medium and very fine subangular blocky structure; very hard, firm, sticky and plastic; common very fine roots; common very fine and few medium tubular pores; many thick dark brown (7.5YR 3/2) clay films; slightly acid (pH 6.5); clear wavy boundary.

B3t—29 to 42 inches; brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; weak coarse subangular blocky structure; very hard, firm, slightly sticky and plastic; common very fine roots; common fine and medium tubular pores; common thick dark brown (7.5YR 3/2) clay films; neutral (pH 6.8); clear wavy boundary.

IIC—42 to 60 inches; brown (10YR 4/3) clay loam, brown (10YR 4/3) dry; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine tubular pores; neutral (pH 6.9).

Depth to bedrock is more than 60 inches. The solum is 40 to 60 inches thick, and it has hue of 10YR or 7.5YR. The solum is 0 to 10 percent pebbles.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

When moist, the B horizon has value of 3 to a depth of 20 inches and 3 or 4 below that depth; when dry, the horizon has value of 4 or 5. The horizon has chroma of 2 or 3 when moist and 3 or 4 when dry. It is silty clay loam or silty clay.

The IIC horizon is clay loam or loam.

Marcola Series

The Marcola series consists of deep, moderately well drained soils on fans. These soils formed in alluvium and colluvium weathered from mixed sedimentary and volcanic rock. Slopes are 2 to 7 percent. The average annual precipitation is about 50 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Marcola cobbly silty clay loam, 2 to 7 percent slopes, east of Hill Road, in the SW1/4SW1/4 of sec. 8, T. 17 S., R. 2 W.

Ap—0 to 9 inches; very dark brown (10YR 2/2) cobbly silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine and very fine subangular blocky structure and moderate fine granular; very hard, friable, sticky and plastic; many very fine roots; many very fine tubular and irregular pores; 20 percent cobbles and 10 percent pebbles; slightly acid (pH 6.4); abrupt smooth boundary.

A3—9 to 15 inches; very dark brown (10YR 2/2) cobbly silty clay loam, very dark gray (10YR 3/1) dry; moderate medium and fine subangular blocky structure; very hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; 15 percent pebbles and 15 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

B21t—15 to 23 inches; dark brown (10YR 3/3) very cobbly clay, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; few thin clay films; 35 percent cobbles and 20 percent pebbles; neutral (pH 6.6); clear wavy boundary.

B22t—23 to 33 inches; dark brown (10YR 4/3) extremely cobbly clay, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; extremely hard, firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; common moderately thick clay films bridging mineral grains; 45 percent cobbles and 30 percent pebbles; neutral (pH 6.6); clear wavy boundary.

B23t—33 to 60 inches; multicolored dark grayish brown (10YR 4/2), dark brown (10YR 4/3), and yellowish brown (10YR 5/4) extremely cobbly clay, light brownish gray (10YR 6/2) dry; common distinct light gray (10YR 7/1) and yellowish brown (10YR 5/8) mottles; massive; extremely hard, very firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films in pores; 40 percent cobbles and 30 percent pebbles; neutral (pH 6.8).

Depth to bedrock is more than 60 inches. The umbric epipedon is more than 20 inches thick.

The A horizon has chroma of 1 or 2 when moist. It is 25 to 35 percent coarse fragments, dominantly cobbles.

The B horizon has hue of 7.5YR or 10YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It is very gravelly clay, very cobbly clay, or extremely cobbly clay and is 40 to 80 percent coarse fragments.

McAlpin Series

The McAlpin series consists of deep, moderately well drained soils on flood plains and alluvial fans. These soils formed in fine textured, mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is abou 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of McAlpin silty clay loam, in the SW1/4SW1/4SE1/4 of sec. 7, T. 19 S., R. 2 W.

Ap—0 to 5 inches; dark brown (7.5YR 3/2) silty clay loam, brown (7.5YR 4/2) dry; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; many fine roots; common fine irregular pores and few very fine tubular pores; medium acid (pH 5.6); abrupt wavy boundary.

A12—5 to 14 inches; dark brown (7.5YR 3/2) silty clay loam, brown (7.5YR 4/2) dry; moderate medium anc coarse subangular blocky structure; hard, firm, stick and plastic; common fine roots; few very fine tubula pores; 5 percent pebbles; medium acid (pH 5.6); gradual wavy boundary.

B1—14 to 22 inches; dark brown (7.5YR 4/2) silty clay, brown (7.5YR 4/4) dry; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; common fine and very fine tubular pores; 5 percent pebbles; medium acid (pH 6.0); abrupt smooth boundary.

B21—22 to 31 inches; brown (7.5YR 4/4) silty clay, brown (7.5YR 5/4) dry; few faint mottles; moderate medium and fine subangular blocky structure; hard, firm, sticky and plastic; few fine roots; common fine and very fine tubular pores; few thin clay films; common fine manganese stains; 5 percent pebbles; slightly acid (pH 6.2); clear smooth boundary.

B22—31 to 54 inches; brown (7.5YR 4/4) clay, brown (7.5YR 5/4) dry; common distinct dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; hard, firm, sticky and plastic; prominent strong brown (7.5YR 5/6) iron stains; few moderately thick clay films; slightly acid (pH 6.4); gradual boundary.

B3—54 to 60 inches; dark grayish brown, brown, and dark yellowish brown (10YR 4/2, 4/3, 3/4) silty clay pale brown (10YR 6/3) dry; common prominent strong brown (7.5YR 5/6) iron stains; weak medium subangular blocky structure; hard, firm, sticky and plastic; 5 percent pebbles; slightly acid (pH 6.4).

Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR to 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist and 2 to 4 when dry.

The B2 horizon has hue of 7.5YR or 5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 2 to 4 when moist or dry. The B3 horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 2 to 4 when moist or dry. The B horizon is silty clay or clay.

McBee Series

The McBee series consists of deep, moderately well drained soils on flood plains. These soils formed in recent mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the mean annual temperature is 53 degrees F.

Typical pedon of McBee silty clay loam, 1/4 mile east of gravel pit, in the NW1/4NW1/4 of sec. 18, T. 15 S., R. 4 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; common fine and medium and few coarse tubular pores; slightly acid (pH 6.1); abrupt smooth boundary.

A3—7 to 24 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; common fine and very fine tubular pores; slightly acid (pH 6.1); clear smooth boundary.

B2—24 to 41 inches; dark grayish brown and brown (10YR 4/2, 4/3) silt loam, grayish brown (10YR 5/2) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine, common medium, and few coarse tubular pores; slightly acid (pH 6.4); clear smooth boundary.

C—41 to 62 inches; dark brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; many medium distinct reddish brown (5YR 4/3) mottles; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine and medium and few coarse tubular pores; neutral (pH 6.6).

Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist, and chroma of 2 or 3 when moist or dry.

The B horizon has hue of 10YR or 7.5YR, value of 2 to 4 when moist and 4 to 6 when dry, and chroma of 2 to 4 when moist or dry. It is silt loam, silty clay loam, or clay loam and is 25 to 35 percent clay.

The C horizon is silt loam, silty clay, or gravelly loam and is 0 to 25 percent pebbles.

McCully Series

The McCully series consists of deep, well drained soils on uplands in the Cascade Range. These soils formed in colluvium overlying basic igneous rock and tuffaceous breccia. Slopes are 3 to 70 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 48 degrees F.

Typical pedon of a McCully clay loam in an area of Blachly and McCully clay loams, 3 to 30 percent slopes, in the NE1/4NW1/4NW1/4 of sec. 35, T. 16 S., R. 1 W.

O1—1 inch to 0; litter of partially decomposed needles, leaves, and twigs.

A1—0 to 11 inches; dark reddish brown (5YR 3/2) clay loam, dark brown (7.5YR 4/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; many fine concretions; strongly acid (pH 5.5); clear smooth boundary.

B1—11 to 18 inches; dark reddish brown (5YR 3/4) clay, reddish brown (5YR 4/3) dry; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable, sticky and slightly plastic; many fine roots; many very fine tubular pores; strongly acid (pH 5.2); gradual smooth boundary.

B21—18 to 33 inches; dark reddish brown (5YR 3/4) clay, reddish brown (5YR 4/4) dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many very fine tubular pores; very strongly acid (pH 4.8); gradual smooth boundary.

B22—33 to 45 inches; yellowish red (5YR 3/6) clay, yellowish red (5YR 4/6) dry; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; many very fine tubular pores; very strongly acid (pH 4.6); clear wavy boundary.

B3—45 to 55 inches; yellowish red (5YR 4/6) clay, strong brown (7.5YR 5/6) dry; moderate very fine angular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; very strongly acid (pH 4.6); clear wavy boundary.

Cr—55 inches; weathered tuffaceous bedrock.

Depth to bedrock is 40 to 60 inches. The umbric epipedon is 10 to 20 inches thick.

The A horizon has hue of 7.5YR or 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry.

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 4 to 6 when moist or dry. It is clay or silty clay.

McDuff Series

The McDuff series consists of moderately deep, well drained soils on uplands in the Cascade Range. These soils formed in colluvium and residuum derived from volcanic tuff and breccia. Slopes are 3 to 70 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 49 degrees F.

Typical pedon of McDuff clay loam, 25 to 50 percent slopes; from a cutbank above a logging road, in the NE1/4SE1/4SW1/4 of sec. 23, T. 19 S., R. 2 W.

O1—2 inches to 0; litter of decaying needles, leaves, and twigs.

A1—0 to 6 inches; very dark brown (10YR 2/2) clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure and moderate fine granular; slightly hard, friable, sticky and plastic; many very fine, fine, and medium roots; many very fine tubular and irregular pores; 10 percent pebbles and cobbles; strongly acid (pH 5.4); clear smooth boundary.

B1—6 to 14 inches; very dark grayish brown (10YR 3/2) clay loam, brown (10YR 4/3) dry; moderate medium and fine subangular blocky structure; hard, firm, sticky and plastic; common fine, medium, and coarse roots; many very fine tubular pores; 10 percent pebbles and cobbles; strongly acid (pH 5.1); clear smooth boundary.

B21t—14 to 24 inches; dark brown (10YR 3/3) clay, brown (10YR 4/3) dry; moderate medium and fine subangular blocky structure; very hard, firm, very sticky and very plastic; common fine, medium, and coarse roots; many very fine tubular pores; few thin clay films on peds and in pores; 5 percent pebbles; extremely acid (pH 4.3); gradual smooth boundary.

B22t—24 to 33 inches; dark brown (10YR 3/3) clay, brown (7.5YR 5/4) dry; moderate medium and fine subangular blocky structure; extremely hard, firm, very sticky and very plastic; few fine, medium, and coarse roots; many very fine tubular pores; common moderately thick clay films on peds and in pores; 10 percent soft pebbles; very strongly acid (pH 4.5); gradual smooth boundary.

B3t—33 to 37 inches; brown (10YR 4/3) and dark yellowish brown (10YR 3/4) silty clay, pale brown (10YR 6/3) dry; moderate coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few fine, medium, and coarse roots; many moderately thick clay films on peds; 10 percent soft pebbles; extremely acid (pH 4.4); clear wavy boundary.

Cr—37 inches; light olive brown (2.5Y 5/4), weathered and fractured tuffaceous bedrock; thick clay films in fractures.

Thickness of the solum and depth to bedrock are 24 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, and it has value and chroma of 2 or 3 when moist. The horizon is 0 to 10 percent coarse fragments.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 3 or 4 when moist and 4 to 7 when dry, and chroma of 3 to 6 when moist or dry. It is clay or silty clay.

The Cr horizon is weathered tuff, breccia, or sedimentary rock.

Meda Series

The Meda series consists of deep, well drained soils on fans and terraces. These soils formed in alluvium and colluvium derived from sedimentary and igneous rock. Slopes are 2 to 12 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Meda loam, 2 to 12 percent slopes, south of U.S. Highway 36, 0.2 mile east of Horton Junction, in the NW1/4SW1/4SW1/4 of sec. 10, T. 16 S., R. 7 W.

A11—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine tubular and irregular pores; 10 percent pebbles; strongly acid (pH 5.4); clear smooth boundary.

B1—8 to 19 inches; dark brown (10YR 3/3) gravelly clay loam, brown (10YR 5/3) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; 20 percent pebbles; strongly acid (pH 5.4); clear wavy boundary.

B21—19 to 27 inches; brown (10YR 4/3) gravelly clay loam, pale brown (10YR 6/4) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; 25 percent pebbles; strongly acid (pH 5.2); clear wavy boundary.

B22—27 to 40 inches; brown (10YR 4/3) gravelly clay loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; 20 percent pebbles; strongly acid (pH 5.1); clear wavy boundary.

C1—40 to 60 inches; multicolored, stratified very gravelly sandy loam; massive; slightly hard, friable, nonsticky and nonplastic; 40 percent pebbles; strongly acid (pH 5.2).

Depth to bedrock is more than 60 inches.

Thickness of the A horizon is variable, depending on recent local deposition.

The B horizon is 15 to 30 percent pebbles.

The C horizon is very gravelly sandy loam, gravelly loam, or gravelly sandy loam and commonly is stratified. It is 30 to 50 percent coarse fragments.

Minniece Series

The Minniece series consists of deep, somewhat poorly drained and poorly drained soils in narrow drainageways or depressional areas on uplands. These soils formed in alluvium and colluvium derived from volcanic tuff and breccia. Slopes are 0 to 8 percent. The average annual precipitation is about 75 inches, and the mean annual temperature is 48 degrees F.

Typical pedon of Minniece silty clay loam, 0 to 8 percent slopes, near a logging road, in the SW1/4 of sec 4, T. 20 S., R. 1 W.

O1—1 inch to 0; litter of leaves, needles, and twigs.

A1—0 to 10 inches; very dark brown (10YR 2/2) silty clay loam, brown (7.5YR 5/2) dry; moderate fine subangular blocky structure; hard, friable, sticky and plastic; many fine and common medium roots; many fine and very fine irregular pores; slightly acid (pH 6.5); clear smooth boundary.

B1—10 to 19 inches; dark yellowish brown (10YR 4/4) silty clay, brown (10YR 5/3) dry; many fine distinct reddish yellow (7.5YR 6/6) mottles; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common medium roots; many fine and very fine irregular pores; slightly acid (pH 6.4); clear smooth boundary.

B21tg—19 to 30 inches; grayish brown (10YR 5/2) clay, light gray (10YR 7/2) dry; many large distinct reddish yellow (7.5YR 6/8) and common large distinct brown (7.5YR 4/4) mottles; weak coarse prismatic structure; very hard, firm, very sticky and very plastic; common medium roots; common very fine tubular pores; common moderately thick clay films in pores; many small slickensides; slightly acid (pH 6.2); clear smooth boundary.

B22g—30 to 39 inches; gray (10YR 6/1) clay, light gray (10YR 7/1) dry; many large distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; very hard, very firm, very sticky and very plastic; few medium roots in cracks; many large slickensides; medium acid (pH 6.0); clear smooth boundary.

Cg—39 to 60 inches; variegated gray (10YR 6/1) and yellowish red (7.5YR 5/6) clay; massive; very hard, very firm, very sticky and very plastic; few medium roots in cracks; many fine slickensides; medium acid (pH 6.0).

Depth to bedrock is more than 60 inches. The profile is 0 to 10 percent coarse fragments. Mottles in the B and C horizons are distinct or prominent.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 1 or 2 when moist or dry.

The B2 horizon has hue of 10YR to 5Y, value of 4 to 6 when moist and 6 or 7 when dry, and chroma of 1 or 2 when moist or dry. It is clay or silty clay.

The C horizon has colors similar to those of the B2 horizon. The C horizon is clay, clay loam, or silty clay loam.

Mulkey Series

The Mulkey series consists of moderately deep, well drained soils on uplands in the Coast Range. These soils formed in residuum and colluvium derived from igneous rock and volcanic ash. Slopes are 5 to 25 percent. The average annual precipitation is about 100 inches, and the average annual air temperature is 44 degrees F.

Typical pedon of Mulkey loam, 5 to 25 percent slopes, in the NE1/4 of sec. 9, T. 15 S., R. 7 W.

A11—0 to 15 inches; black (5YR 2/1) loam, very dark brown (7.5YR 2/2) dry; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine and very fine irregular pores; 10 percent pebbles; very strongly acid (pH 5.0); clear smooth boundary.

A12—15 to 23 inches; dark reddish brown (5YR 2/2) gravelly loam, dark brown (7.5YR 3/2) dry; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine and very fine irregular and tubular pores; 25 percent pebbles; very strongly acid (pH 4.8); clear wavy boundary.

B2—23 to 27 inches; dark brown (7.5YR 3/2) cobbly loam, dark brown (7.5YR 4/2) dry; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine root; few fine irregular pores and few very fine tubular pores; 20 percent cobbles and 10 percent pebbles; very strongly acid (pH 4.6); abrupt irregular boundary.

IIR—27 inches; fractured quartz-diorite; tongues of soil material in fractures.

Depth to bedrock is 20 to 40 inches.

The upper part of the A horizon has hue of 10YR to 5YR, value of 2 or 3 when moist or dry, and chroma of 1 or 2 when moist or dry. It is 0 to 10 percent coarse fragments. The lower part has hue of 10YR to 5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 1 to 3 when moist or dry. It is 15 to 35 percent coarse fragments, dominantly pebbles.

The B horizon has hue of 10YR to 5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 2 to 4 when moist or dry. It is cobbly loam or cobbly sandy loam and is 25 to 35 percent coarse fragments.

Natroy Series

The Natroy series consists of deep, poorly drained soils on terraces and fans. These soils formed in mixed fine alluvium. Slopes are 0 to 2 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is about 53 degrees F.

Typical pedon of Natroy silty clay, north of Camas Swale Creek and about 1,000 feet east of gas pipeline, in the SE1/4NE1/4SW1/4 of sec. 9, T. 19 S., R. 3 W.

A11—0 to 5 inches; very dark grayish brown (10YR 3/2) silty clay, dark grayish brown (10YR 4/2) dry; common fine faint dark gray (10YR 4/1) mottles and common fine prominent strong brown (7.5YR 5/8) mottles; moderate very fine granular structure and fine subangular blocky; extremely hard, very firm, very sticky and very plastic; many fine and very fine roots; many fine and very fine irregular pores; few fine concretions; medium acid (pH 5.8); clear smooth boundary.

A12—5 to 15 inches; very dark gray (10YR 3/1) clay, dark gray (10YR 4/1) dry; common fine faint dark gray (10YR 4/1) mottles and common fine prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; common fine roots; few very fine tubular pores; few fine slickensides; strongly acid (pH 5.4); gradual smooth boundary.

A13—15 to 26 inches; very dark gray (10YR 3/1) clay, dark grayish brown (10YR 4/2) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles and concretions; weak coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few fine roots; few very fine tubular pores; common fine slickensides; medium acid (pH 5.6); gradual smooth boundary.

C1—26 to 42 inches; dark grayish brown (10YR 4/2) clay, grayish brown (10YR 5/2) dry; common fine distinct yellowish brown (10YR 5/6) mottles and concretions; massive; extremely hard, very firm, very sticky and very plastic; few fine roots; few very fine tubular pores; common intersecting slickensides; 5 percent pebbles; slightly acid (pH 6.5); clear smooth boundary.

C2—42 to 57 inches; dark brown (10YR 4/3) clay, dark grayish brown (10YR 4/2) dry; common fine distinct yellowish brown (10YR 5/6) mottles and concretions; massive; extremely hard, very firm, very sticky and very plastic; common fine slickensides and pressure faces; 5 percent pebbles; neutral (pH 6.6); abrupt wavy boundary.

C3—57 to 60 inches; brown (10YR 4/3) gravelly clay, dark grayish brown (10YR 4/2) dry; common yellowish brown, reddish brown, and black mottles, concretions, and stains; massive; very hard, firm, very sticky and very plastic; few very fine tubular pores; common thin pressure faces; 20 percent fine pebbles; neutral (pH 6.8).

Depth to bedrock is more than 60 inches. In summer the soil cracks, and the cracks remain for 60 days or more. The profile has hue of 7.5YR to 2.5Y.

The A horizon, to a depth of 12 inches, has value of 2 or 3 when moist and 3 or 4 when dry, and it has chroma of 1 or 2. It is silty clay or silty clay loam and is 30 to 60 percent clay. The part of the A horizon below a depth of 12 inches has chroma of 1 to 3 when moist and 2 or 3 when dry. Mottles in the A horizon are faint to prominent.

The C horizon has value of 3 to 5 when moist and 4 to 6 when dry, and it has chroma of 2 or 3 when moist or dry. It is clay to a depth of less than 40 inches and is gravelly clay, clay, or sandy clay below that depth. The C horizon is 0 to 35 percent pebbles.

Nehalem Series

The Nehalem series consists of deep, well drained soils on bottom lands in the Coast Range. These soils formed in recent silty alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 80 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Nehalem silt loam, 100 feet west of a gravel road, 0.1 mile south of U.S. Highway 36, in the SE1/4NE1/4NE1/4 of sec. 17, T. 16 S., R. 7 W.

A11—0 to 8 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure and moderate very fine granular; soft, very friable, nonsticky and nonplastic; many fine roots; common very fine tubular and irregular pores; very strongly acid (pH 5.0); clear smooth boundary.

A12—8 to 15 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; common very fine tubular and irregular pores; very strongly acid (pH 4.8); clear wavy boundary.

B1—15 to 22 inches; dark yellowish brown (10YR 3/4) silt loam, pale brown (10YR 6/3) dry; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common fine roots; many very fine tubular pores; few thin dark grayish brown (10YR 3/2) coatings of silt on faces of peds; very strongly acid (pH 4.8); gradual irregular boundary.

B21—22 to 31 inches; dark yellowish brown (10YR 3/4) and brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; few faint mottles; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine roots; many very fine tubular pores; very strongly acid (pH 4.8); gradual smooth boundary.

B3—31 to 39 inches; dark yellowish brown (10YR 3/4) silt loam, pale brown (10YR 6/3) dry; common faint mottles; moderate coarse and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many fine and very fine tubular pores; very strongly acid (pH 4.6); clear smooth boundary.

B3—39 to 48 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 7/3) dry; weak fine subangular blocky structure; slightly hard, friable, sticky and plastic; very strongly acid (pH 4.6); clear smooth boundary.

IIC1—48 to 60 inches; yellowish brown (10YR 5/4) loam, very pale brown (10YR 7/3) dry; massive; soft, friable, slightly sticky and slightly plastic; strongly acid (pH 5.1).

Depth to bedrock is more than 60 inches.

The A horizon has value of 2 or 3 when moist and 3 to 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It is silt loam or silty clay loam.

The IIC horizon is loam, silt loam, or silty clay loam and has sandy or gravelly strata in some pedons.

Some of the Nehalem soils in this survey area are taxadjunct to the Nehalem series because they have a slightly wider range between the mean summer soil temperature and the mean winter soil temperature. This difference, however, does not significantly affect use and management.

Nekia Series

The Nekia series consists of moderately deep, well drained soils on foothills adjacent to the Willamette Valley. These soils formed in residuum and colluvium derived from basalt and tuff. Slopes are 2 to 50 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Nekia silty clay loam, 12 to 20 percent slopes, in the SE1/4NW1/4 of sec. 4, T. 19 S., R. 1 W.

O1—0.5 inch to 0; duff layer of needles, twigs, and moss.

A11—0 to 6 inches; dark reddish brown (5YR 3/3) silty clay loam, reddish brown (5YR 4/3) dry; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; medium acid (pH 6.0); gradual smooth boundary.

A12—6 to 10 inches; dark reddish brown (5YR 3/3) silty clay loam, reddish brown (5YR 4/3) dry; weak medium subangular blocky structure and moderate medium granular; slightly hard, friable, sticky and plastic; many fine roots; common fine tubular pores; medium acid (pH 5.6); clear wavy boundary.

B1—10 to 14 inches; dark reddish brown (5YR 3/3) clay, reddish brown (5YR 4/4) dry; moderate medium subangular blocky structure and weak very fine granular; slightly hard, friable, sticky and plastic; common fine roots; many very fine tubular pores; strongly acid (pH 5.5): clear smooth boundary.

B2t—14 to 28 inches; dark reddish brown (5YR 3/4) clay, reddish brown (5YR 4/4) dry; moderate fine and very fine subangular blocky structure; hard, firm, very sticky and very plastic; common fine roots; many very fine tubular pores; common moderately thick clay films in pores and on peds; strongly acid (pH 5.3); gradual smooth boundary.

B3t—28 to 35 inches; reddish brown (5YR 4/4) clay, yellowish red (5YR 5/6) dry; moderate fine and very fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; many fine tubular pores; few moderately thick clay films in pores and on peds; strongly acid (pH 5.3); clear wavy boundary.

R—35 inches; fractured basalt.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 7.5YR or 5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 or 3 when moist or dry. An A3 horizon is present in some pedons.

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 3 or 4 when moist and 4 to 6 when dry. It is silty clay, clay, or gravelly clay and is 40 to 50 percent clay and 0 to 35 percent coarse fragments.

Nekoma Series

The Nekoma series consists of deep, well drained soils on flood plains in the Coast Range. These soils formed in mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Nekoma silt loam, about 200 feet south of the Siuslaw River Road, about 600 feet north and 200 feet west of the southeast corner of sec. 20, T. 19 S., R. 7 W.

O1—0.5 inch to 0; duff layer of moss, needles, and twigs.

A11—0 to 5 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to moderate very fine granular; slightly hard, very friable, nonsticky and slightly plastic; few medium and fine roots and common very fine roots; many very fine irregular pores; medium acid (pH 5.8); clear smooth boundary.

A12—5 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown and brown (10YR 5/2, 5/3) dry; moderate medium and fine subangular blocky and granular structure; soft, very friable, nonsticky and nonplastic; common medium, fine, and very fine roots; many very fine irregular pores; medium acid (pH 6.0); clear wavy boundary.

B2—11 to 20 inches; brown (10YR 4/3) fine sandy loam, very pale brown (10YR 7/4) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few medium, fine, and very fine roots; many very fine irregular pores; medium acid (pH 5.8); gradual wavy boundary.

C1—20 to 33 inches; brownish yellow (10YR 6/6) loamy fine sand, very pale brown (10YR 7/4) dry; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine irregular pores; medium acid (pH 5.6); abrupt wavy boundary.

C2—33 to 41 inches; yellowish brown (10YR 5/6) fine sandy loam, very pale brown (10YR 7/3) dry; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine irregular pores; strongly acid (pH 5.4); abrupt smooth boundary.

C3—41 to 60 inches; brownish yellow (10YR 6/6) loamy fine sand, very pale brown (10YR 7/4) dry; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine irregular pores; very strongly acid (pH 5.0).

Depth to bedrock is more than 60 inches. The profile has hue of 10YR or 7.5YR.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The B horizon has value of 3 to 5 when moist and 5 to 7 when dry, and it has chroma of 3 to 6 when moist or dry.

The C horizon has value of 3 to 6 when moist and 5 to 7 when dry, and it has chroma of 3 to 6 when moist or dry. It is stratified very fine sandy loam to loamy fine sand.

Neskowin Series

The Neskowin series consists of moderately deep, well drained soils on uplands in the Coast Range. These soils formed in residuum and colluvium derived from basic igneous rock with an influence of volcanic ash. Slopes are 12 to 60 percent. The average annual precipitation is about 85 inches, and the average annual air temperature is about 51 degrees F.

Typical pedon of Neskowin silt loam, 12 to 20 percent slopes, north of Big Creek, in the NW1/4NW1/4SE1/4 of sec. 15, T. 16 S., R. 12 W.

A1—0 to 5 inches; black (10YR 2/1) silt loam, very dark grayish brown (10YR 3/2) dry; moderate very fine granular structure; soft, friable, nonsticky and nonplastic; many fine and very fine roots; many very fine irregular pores; 5 percent pebbles; very strongly acid (pH 5.1); clear wavy boundary.

A3—5 to 12 inches; dark brown (7.5YR 2/2) silt loam, dark brown (7.5YR 3/2) dry; strong fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many very fine tubular and irregular pores; 5 percent pebbles; strongly acid (pH 5.3); clear wavy boundary.

B21—12 to 22 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 4/2) dry; weak coarse subangular blocky structure parting to moderate fine and very fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many very fine tubular pores; 10 percent pebbles; strongly acid (pH 5.5); gradual wavy boundary.

B22—22 to 30 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/4) dry; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common fine and very fine irregular pores; 10 percent pebbles; strongly acid (pH 5.5); abrupt wavy boundary.

R—30 inches; fractured igneous rock.

Depth to bedrock and thickness of the solum are 20 to 40 inches.

The A horizon has hue of 10YR to 5YR, and it has chroma and value of 2 or 3 when dry.

The B horizon dominantly has hue of 7.5YR, but it ranges to 5YR in some pedons. The horizon has value of 2 to 4 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist and 2 to 4 when dry. It is silty clay loam, silt loam, or clay loam.

Nestucca Series

The Nestucca series consists of deep, somewhat poorly drained soils on flood plains in the Coast Range. These soils formed in recent silty alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 80 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Nestucca silt loam, in the SW1/4NE1/4 of sec. 17, T. 16 S., R. 7 W.

Ap—0 to 8 inches; very dark brown (10YR 2/2) silt loam, dark gray (10YR 4/1) dry; moderate very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine irregular pores; very strongly acid (pH 4.6); abrupt smooth boundary.
A3—8 to 17 inches; very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many very fine tubular pores; very strongly acid (pH 4.8); clear smooth boundary.
B21—17 to 29 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; common distinct dark gray and brown (10YR 4/1, 4/3) mottles; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; many very fine tubular pores; very strongly acid (pH 4.8); clear smooth boundary.
B22g—29 to 43 inches; grayish brown (10YR 5/2) silty clay loam, light brownish gray (10YR 6/2) dry; common distinct reddish brown (5YR 4/4) mottles in root channels; weak medium subangular blocky structure; hard, firm, sticky and plastic; many fine tubular pores; very strongly acid (pH 4.6); gradual smooth boundary.
B3g—43 to 51 inches; grayish brown (2.5Y 5/2) silty clay, light gray (10YR 7/2) dry; common distinct reddish brown (5YR 4/4) mottles; weak medium subangular blocky structure; hard, firm, very sticky and plastic; common very fine tubular pores; very strongly acid (pH 4.6); clear smooth boundary.
Cg—51 to 60 inches; dark gray (10YR 4/1) clay loam, light gray (10YR 7/2) dry; massive; hard, firm, sticky and plastic; very strongly acid (pH 4.6).

Depth to bedrock is more than 60 inches.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 to 3 when moist or dry.

The B horizon has hue of 10YR to 5Y, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 1 or 2 when moist or dry. Chroma of 1 occurs below a depth of 30 inches when the horizon is moist. Mottles are common to many and faint to prominent. The horizon is silt loam or silty clay loam.

The C horizon is loam, clay loam, or silty clay. Thin strata of sandy loam are below a depth of 40 inches in some pedons.

Some of the Nestucca soils in this survey area are taxadjunct to the Nestucca series because they have a slightly wider range between the mean summer soil temperature and the mean winter soil temperature. This difference, however, does not significantly affect use and management.

Netarts Series

The Netarts series consists of deep, well drained soils on stabilized sand dunes. These soils formed in eolian sand deposits. Slopes are 3 to 30 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Netarts fine sand, 3 to 12 percent slopes; at the east end of the north parking lot of the Washburn Park picnic area, west of U.S. Highway 101, in the SW1/4 of sec. 22, T. 16 S., R. 12 W.

O1—2 inches to 0; mat of needles, leaves, and twigs.
A2—0 to 6 inches; light gray (10YR 6/1) fine sand, light gray (N 7/1) dry; single grain; loose, nonsticky and nonplastic; many fine roots; many very fine and fine irregular pores; small specks of organic material; extremely acid (pH 4.4); abrupt wavy boundary.
B1ir—6 to 15 inches; light yellowish brown (10YR 6/4) fine sand, very pale brown (10YR 8/3) dry; single grain; loose; nonsticky and nonplastic; many fine roots; many very fine and fine irregular pores; few iron nodules; extremely acid (pH 4.2); clear wavy boundary.
B21ir—15 to 26 inches; variegated dark reddish brown (5YR 3/4), dark brown (7.5YR 4/4), and light yellowish brown (2.5Y 6/4) fine sand, reddish brown (5YR 5/4) and pale yellow (2.5Y 7/4) dry; single grain; loose, nonsticky and nonplastic; few fine roots; many very fine and fine irregular pores; few iron nodules; strongly acid (pH 5.2); clear wavy boundary.
B22ir—26 to 34 inches; variegated dark brown (7.5YR 4/4), reddish brown (5YR 4/4), and light yellowish brown (2.5Y 6/4) fine sand; massive; few fine roots; many very fine irregular pores; few thin hard lenses of sand; strongly acid (pH 5.4); gradual wavy boundary.
B3ir—34 to 47 inches; yellowish brown (10YR 5/4) fine sand, very pale yellow (10YR 7/4) dry; massive; few fine roots; many very fine irregular pores; few iron nodules; strongly acid (pH 5.5); gradual wavy boundary.
C—47 to 60 inches; light yellowish brown (2.5Y 6/4) fine sand, pale yellow (2.5Y 7/4) dry; single grain; loose, nonsticky and nonplastic; strongly acid (pH 5.1).

Depth to bedrock is more than 60 inches.

The B horizon is loamy fine sand or fine sand. It has thin to thick, hard lenses of sand and few to common iron nodules.

Newberg Series

The Newberg series consists of deep, somewhat excessively drained soils on flood plains and bottom lands. These soils formed in recent silty alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Newberg fine sandy loam, between the Coastal Fork and the Middle Fork of the Willamette River, in the NE1/4NE1/4 of sec. 12, T. 18 S., R. 3 W.

Ap—0 to 6 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 4/3) dry; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; common fine tubular pores and few fine irregular pores; medium acid (pH 5.8); abrupt smooth boundary.

AC—6 to 14 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 4/3) dry; weak coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; few fine and very fine tubular pores; slightly acid (pH 6.2); clear smooth boundary.

C1—14 to 22 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 4/3) dry; massive; slightly hard, friable, nonsticky and nonplastic; common fine roots; common fine and medium tubular pores; slightly acid (pH 6.2); clear wavy boundary.

C2—22 to 46 inches; dark brown (10YR 3/3) coarse sandy loam, brown (10YR 5/3) dry; massive; soft, very friable, nonsticky and nonplastic; few fine roots; common fine and medium tubular pores; slightly acid (pH 6.4); clear wavy boundary.

C3—46 to 65 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; few faint strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many fine and common medium tubular pores; neutral (pH 6.6).

Depth to bedrock is more than 60 inches. The mollic epipedon is 7 to 20 inches thick.

The upper 10 inches of the A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry. Below a depth of 10 inches the horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. Chroma is 2 to 4 below a depth of 24 to 36 inches. The A horizon is fine sandy loam or loam.

The C horizon is fine sandy loam, sandy loam, or coarse sandy loam and is 0 to 15 percent pebbles.

Noti Series

The Noti series consists of deep, poorly drained soils in swales and drainageways on terraces. These soils formed in mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Noti loam, about 0.3 mile northwest of Elmira High School, in the NW1/4NW1/4 of sec. 24, T. 17 S., R. 6 W.

A1—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; common fine faint and distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; moderate fine granular structure; slightly hard, friable, slightly sticky and plastic; many fine and very fine roots; few very fine tubular pores and common fine irregular pores; very strongly acid (pH 5.0); clear wavy boundary.

B2—9 to 16 inches; grayish brown (10YR 5/2) loam, light gray (10YR 7/2) dry; many medium faint and distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; hard, friable, slightly sticky and plastic; common fine and very fine roots; common very fine tubular pores; very strongly acid (pH 4.8); gradual wavy boundary.

C1—16 to 34 inches; light olive gray (5Y 6/2) fine sandy loam, light gray (10YR 7/2) dry; many medium distinct yellowish brown (10YR 5/6) mottles; massive; hard, very friable, slightly sticky and nonplastic; common very fine roots; common very fine tubular pores; very strongly acid (pH 4.6); clear wavy boundary.

IIC2—34 to 44 inches; pale brown (10YR 6/2) loamy sand, light gray (10YR 7/2) dry; many medium distinct yellowish brown (10YR 5/6, 5/8) mottles; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores and many fine and medium irregular pores; very strongly acid (pH 4.6); abrupt wavy boundary.

IIIC3—44 to 60 inches; variegated gray (10YR 5/2), light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), and yellow (10YR 7/8) very gravelly loamy sand, light gray (10YR 7/2) and yellow (10YR 7/8) dry; massive; very hard, very firm, nonsticky and nonplastic; 40 percent pebbles and 5 percent cobbles; strongly consolidated; very strongly acid (pH 4.6).

Depth to bedrock is more than 60 inches. Depth to loamy sand is 24 to 36 inches, and depth to the IIIC3 horizon is 40 to 60 inches.

The A horizon has value or 2 or 3 when moist and 4 or 5 when dry.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 6 or 7 when dry, and chroma of 1 or 2 when moist or dry. It is loam or fine sandy loam.

The upper part of the C horizon has hue of 10YR to 5Y, value of 6 or 7 when moist or dry, and chroma of 2 or 3 when moist or dry. It is fine sandy loam or loam and is 10 to 18 percent clay. The next part is 0 to 10 percent pebbles. The lower part is variegated very gravelly loamy sand or very gravelly sandy loam and is 35 to 60 percent coarse fragments.

Oxley Series

The Oxley series consists of deep, somewhat poorly drained soils in concave areas on terraces. These soils formed in mixed gravelly alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Oxley gravelly silt loam, 100 yards south of the intersection of Valley and Edenvale Roads and 15 feet west of Edenvale Road, in the SE1/4NE1/4 of sec. 28, T. 18 S., R. 2 W.

A11—0 to 10 inches; very dark brown (10YR 2/2) gravelly silt loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky and granular structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine and very fine tubular and irregular pores; 15 percent pebbles; medium acid (pH 5.8); clear smooth boundary.

A12—10 to 17 inches; very dark brown (10YR 2/2) gravelly silt loam, very dark grayish brown (10YR 3/2) dry; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many fine and very fine tubular pores; 15 percent pebbles; medium acid (pH 5.6); clear smooth boundary.

A3—17 to 23 inches; dark brown (7.5YR 3/2) gravelly clay loam, very dark grayish brown (10YR 3/2) dry; weak fine prismatic structure parting to moderate medium and fine subangular blocky; hard, friable, sticky and plastic; common very fine roots; many medium and fine tubular pores; 20 percent pebbles; medium acid (pH 5.8); abrupt smooth boundary.

B2t—23 to 35 inches; dark grayish brown (10YR 4/2) and brown (10YR 5/3) very gravelly clay loam, grayish brown (10YR 5/2) dry; common medium prominent strong brown (7.5YR 5/6) mottles; weak fine and very fine subangular blocky structure; very hard, firm, sticky and plastic; few fine roots; common fine tubular pores; 55 percent pebbles; common black manganese stains and yellowish red (5YR 5/6) stains; continuous moderately thick clay films in pores and on pebbles; medium acid (pH 5.9); clear smooth boundary.

B3t—35 to 41 inches; grayish brown (10YR 5/2) very gravelly loam, brown (10YR 5/3) dry; many large prominent strong brown (7.5YR 5/6) mottles; weak fine and very fine subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine roots; many medium, fine, and very fine tubular pores; 55 percent pebbles; many moderately thick clay films in pores and on peds and coarse fragments; slightly acid (pH 6.4); clear wavy boundary.

C—41 to 60 inches; gray (10YR 6/1) extremely gravelly sandy loam, grayish brown (10YR 5/2) and brown (10YR 5/3) dry; massive; hard, friable, nonsticky and nonplastic; few fine tubular pores; 60 percent pebbles and 10 percent cobbles; light yellowish brown (10YR 6/4) pockets of clay in pores and cavities under some of the larger pebbles and cobbles; neutral (pH 6.9).

Depth to bedrock is more than 60 inches. The mollic epipedon is 12 to 24 inches thick.

The A horizon has hue of 10YR or 7.5YR, value or 2 or 3 when moist or dry, and chroma of 1 or 2 when moist or dry. It is 15 to 25 percent pebbles.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6 when moist or dry, and chroma of 2 or 3 when moist or dry. Mottles are small to large and are strong brown and yellowish brown. The horizon is very gravelly loam or very gravelly clay loam and is 35 to 60 percent coarse fragments.

The C horizon is weakly stratified extremely gravelly sandy loam, very gravelly loam, or extremely gravelly loam. It is 55 to 80 percent coarse fragments.

Panther Series

The Panther series consists of deep, poorly drained soils in swales and on small benches of foothills adjacent to the valleys of the Willamette River and its tributaries. These soils formed in colluvium and residuum derived from sedimentary and basic igneous rock. Slopes are 2 to 12 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Panther silty clay loam, 2 to 12 percent slopes, about 1.5 miles northwest of Marcola, in the NW1/4NE1/4SW1/4 of sec. 12, T. 16 S., R. 2 W.

A1—0 to 10 inches; very dark brown (10YR 2/2) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; hard, firm, sticky and plastic; many fine roots; many fine irregular pores; medium acid (pH 5.6); abrupt smooth boundary.

B21g—10 to 16 inches; very dark grayish brown (10YR 3/2) clay, dark gray (10YR 4/1) dry; moderate medium prismatic structure; very hard, very firm, very sticky and very plastic; common fine roots; common fine tubular pores; few pressure faces; medium acid (pH 5.8); gradual smooth boundary.

B22g—16 to 29 inches; dark grayish brown (2.5Y 4/2) clay, grayish brown (2.5Y 5/2) dry; common fine distinct strong brown (7.5YR 5/6) mottles; weak fine prismatic structure and weak medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common fine tubular pores; common pressure faces; few slickensides; slightly acid (pH 6.2); gradual smooth boundary.

C1g—29 to 42 inches; dark grayish brown (2.5Y 4/2) clay, grayish brown (2.5Y 5/2) dry; common medium distinct light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; common fine tubular pores; common pressure faces; slightly acid (pH 6.5); clear wavy boundary.
Cr—42 inches; weathered sedimentary rock.

Depth to bedrock is 40 to 60 inches.

The A horizon has value of 2 or 3 when moist, and it has chroma of 1 or 2 when moist or dry. It has none to many, fine, distinct, dark reddish brown or dark yellowish brown mottles in the lower part of the horizon.

The B horizon generally has hue of 2.5Y, but it ranges to 5Y and 10YR. The horizon has value of 3 to 5 when moist and chroma of 1 to 3 when moist or dry. It is 60 to 70 percent clay.

The C horizon is 0 to 50 percent soft rock fragments that are highly weathered and are easily crushed.

Peavine Series

The Peavine series consists of moderately deep, well drained soils on uplands of the Coast and Cascade Ranges. These soils formed in colluvium and residuum derived from sedimentary rock and tuff. Slopes are 3 to 60 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is about 50 degrees F.

Typical pedon of Peavine silty clay loam, 3 to 30 percent slopes, about 900 feet north and 500 feet east of the southwest corner of sec. 17, T. 16 S., R. 2 W.

O1—0.5 inch to 0; brackenfern duff.
All—0 to 2 inches; dark reddish brown (5YR 3/2) silty clay loam, brown (7.5YR 4/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine irregular pores; medium acid (pH 6.0); clear smooth boundary.
A12—2 to 8 inches; dark reddish brown (5YR 3/3) silty clay loam, reddish brown (5YR 4/3) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and very fine roots; common very fine tubular pores; medium acid (pH 5.6); clear smooth boundary.
B1—8 to 15 inches; dark reddish brown (5YR 3/4) clay, reddish brown (5YR 4/4) dry; strong medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common fine and few very fine roots; common very fine tubular pores; few thin clay films; very strongly acid (pH 5.0); clear wavy boundary.
B21t—15 to 25 inches; yellowish red (5YR 3/6) clay, yellowish red (5YR 4/6) dry; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; very hard, friable, sticky and plastic; common fine roots; common fine and very fine tubular pores; common moderately thick clay films; very strongly acid (pH 4.6); gradual wavy boundary.
B22t—25 to 38 inches; reddish brown (5YR 4/4) and yellowish red (5YR 4/6) silty clay, reddish brown (5YR 5/4) dry; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine and very fine tubular pores; common thick clay films; prominent black manganese stains; very strongly acid (pH 4.6); abrupt wavy boundary.
Cr—38 inches; variegated, weathered bedrock.

Thickness of the solum and depth to bedrock are 20 to 40 inches.

The A horizon has hue of 7.5 or 5YR, and it has value and chroma of 2 or 3 when moist. The horizon is medium acid or strongly acid.

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4 when moist, and chroma of 4 to 6 when moist. It is silty clay or clay and is strongly acid or very strongly acid.

Pengra Series

The Pengra series consists of deep, somewhat poorly drained soils on toe slopes and fans. These soils formed in stratified alluvium. Slopes are 1 to 4 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Pengra silt loam, 1 to 4 percent slopes, south of Neilson Road, in the NW1/4NW1/4 of sec. 31, T. 17 S., R. 4 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (2.5Y 5/2) dry; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; many fine tubular pores; medium acid (pH 5.8); abrupt smooth boundary.
B1—6 to 13 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (2.5Y 5/2) dry; few fine distinct yellowish brown (10YR 5/6, 5/8) mottles; weak coarse subangular blocky structure parting to moderate fine subangular blocky; hard, friable, slightly sticky and plastic; common very fine roots; many very fine tubular pores; medium acid (pH 5.6); clear wavy boundary.
B2—13 to 21 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light brownish gray (2.5Y 6/2) dry; many distinct yellowish brown (10YR 5/6, 5/8) mottles; moderate coarse prismatic structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; medium acid (pH 5.8); abrupt wavy boundary.

IIC1—21 to 36 inches; very dark grayish brown (2.5Y 3/2) clay, dark gray (5Y 4/1) dry; massive; extremely hard, very firm, very sticky and very plastic; few very fine tubular pores; common small pressure faces; slightly acid (pH 6.4); gradual wavy boundary.

IIC2—36 to 60 inches; dark grayish brown (2.5Y 4/2) clay, gray (5Y 5/1) dry; massive; extremely hard, very firm, very sticky and very plastic; few very fine tubular pores; common small pressure faces; neutral (pH 6.6).

Depth to bedrock is more than 60 inches. Distinct mottles are at a depth of 12 inches or less.

The B2 horizon has hue of 5Y to 10YR, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 2 or 3 when moist or dry.

The IIC horizon has hue of 2.5Y or 5Y, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 1 to 3 when moist or dry. Below a depth of 16 to 30 inches, the horizon is 60 to 70 percent clay.

Philomath Series

The Philomath series consists of shallow, well drained soils on foothills adjacent to the Willamette Valley. These soils formed in colluvium and residuum derived from basic igneous rock. Slopes are 3 to 45 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Philomath cobbly silty clay, 12 to 45 percent slopes, 2 miles east of Hayden Bridge, in the SE1/4 NE1/4 NW1/4 of sec. 21, T. 17 S., R. 2 W.

A11—0 to 6 inches; very dark brown (10YR 2/2) cobbly silty clay, very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, sticky and plastic; many fine roots; many fine irregular pores; 20 percent cobbles; medium acid (pH 5.6); gradual smooth boundary.

A12—6 to 14 inches; very dark brown (7.5YR 2/2) cobbly silty clay, dark brown (7.5YR 4/2) dry; moderate fine subangular blocky structure; hard, firm, very sticky and plastic; common fine roots; common very fine tubular pores; 20 percent cobbles; medium acid (pH 5.8); clear wavy boundary.

IICr—14 inches; weathered andesitic bedrock.

Depth to bedrock is 12 to 20 inches. The profile is medium acid or slightly acid.

The A horizon has value of 2 or 3 when moist, and it has chroma of 1 or 2 when moist or dry. It is clay, silty clay, or cobbly silty clay and is 0 to 30 percent coarse fragments.

Preacher Series

The Preacher series consists of deep, well drained soils on uplands in the Coast Range. These soils formed in colluvium and residuum derived from sedimentary rock. Slopes are 0 to 75 percent. The average annual precipitation is about 100 inches, and the average annual air temperature is 49 degrees F.

Typical pedon of a Preacher loam in an area of Preacher-Bohannon-Slickrock complex, 50 to 75 percent slopes, near South Inlet, in the NW1/4SW1/4 of sec. 31, T. 18 S., R. 11 W.

A11—0 to 4 inches; very dark gray (10YR 3/1) loam, dark brown (7.5YR 4/2) dry; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 10 percent pebbles; very strongly acid (pH 4.4); clear smooth boundary.

A12—4 to 18 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate very fine subangular blocky and granular structure; slightly hard, friable, nonsticky and nonplastic; many fine roots; many fine tubular and irregular pores; 10 percent pebbles; very strongly acid (pH 4.6); clear wavy boundary.

B2—18 to 38 inches; dark yellowish brown (10YR 4/6) loam, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; 10 percent soft pebbles and 10 percent hard pebbles; very strongly acid (pH 4.6); gradual smooth boundary.

B3—38 to 52 inches; dark yellowish brown (10YR 4/6) loam, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; 20 percent soft pebbles; very strongly acid (pH 4.6); clear wavy boundary.

C1—52 to 58 inches; dark yellowish brown (10YR 4/4) loam, yellowish brown (10YR 5/6) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; 40 percent soft pebbles; very strongly acid (pH 4.6); clear wavy boundary.

Cr—58 inches; weathered, fractured sandstone.

The solum is 36 to 54 inches thick. Depth to bedrock is 40 to 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 1 to 3 when moist or dry. It is 0 to 10 percent coarse fragments.

The B horizon has hue of 10YR or 7.5YR, value of 3 to 5 when moist and 4 to 6 when dry, and chroma of 3 to 6 when moist or dry. It is loam or clay loam that is 25 to 35 percent clay. The horizon is 0 to 25 percent pebbles, of which less than 15 percent is hard and is not easily crushed.

The C horizon has colors similar to those of the B horizon. The C horizon is sandy loam, loam, or clay loam. It is 0 to 50 percent pebbles, of which less than 15 percent is hard and is not easily crushed.

Ritner Series

The Ritner series consists of moderately deep, well drained soils on foothills. These soils formed in cobbly colluvium derived from basic igneous rock. Slopes are 2 to 60 percent. The average annual precipitation is about 50 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Ritner cobbly silty clay loam, 30 to 60 percent slopes, south of Wallace Creek Road, in the SE1/4 of sec. 12, T. 18 S., R. 2 W.

O1—1 inch to 0; undecomposed litter of needles, leaves, and twigs.

A1—0 to 7 inches; dark reddish brown (5YR 3/3) cobbly silty clay loam, reddish brown (5YR 4/3) dry; moderate and strong fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and medium roots; many fine tubular pores; 20 percent cobbles and pebbles; medium acid (pH 6.0); clear wavy boundary.

B21—7 to 21 inches; dark reddish brown (5YR 3/4) very cobbly silty clay loam, reddish brown (5YR 4/4) dry; weak coarse subangular blocky structure parting to moderate very fine subangular blocky; hard, friable, sticky and plastic; many medium and few fine roots; many fine tubular pores; 45 percent cobbles and pebbles; medium acid (pH 5.8); clear wavy boundary.

B22—21 to 32 inches; yellowish red (5YR 4/6) very cobbly silty clay loam (5YR 4/6) dry; moderate very fine subangular blocky structure; hard, firm, sticky and plastic; common medium and fine roots; many fine irregular and tubular pores; 55 percent cobbles and pebbles; medium acid (pH5.6); abrupt irregular boundary.

R—32 inches; highly fractured basalt; few thin tongues of soil material in fractures; red clay films on fractures; roots along some fractures to a depth of about 60 inches.

Depth to bedrock is 20 to 40 inches.

The A horizon has hue of 10YR to 5YR, value of 2 or 3 when moist and 3 or 4 when dry, and chroma of 2 to 4 when moist or dry. It is 15 to 35 percent coarse fragments, dominantly cobbles.

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 4 to 6 when moist or dry. It is very gravelly silty clay or very cobbly silty clay loam and is 35 to 50 percent clay. The horizon is 35 to 60 percent coarse fragments.

Salander Series

The Salander series consists of deep, well drained soils on ridgetops and side slopes on uplands in the Coast Range. They formed in colluvium and residuum weathered from igneous and sedimentary rocks with additions of volcanic ash. Slopes are 12 to 60 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 51 degrees.

Typical pedon of Salander silt loam, 12 to 30 percent slopes, in a cutbank of a private road, in the NW1/4NW1/4 of sec. 10, T. 17 S., R. 12 W.

O1—3 inches to 0; litter of decaying needles, leaves, and twigs.

A11—0 to 8 inches; very dark brown (7.5YR 2/2) silt loam, dark brown (7.5YR 4/2) dry; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine irregular pores; 10 percent pebbles and concretions; strongly acid (pH 5.5); clear wavy boundary.

A12—8 to 18 inches; very dark brown (7.5YR 2/2) silt loam, dark brown (7.5YR 4/2) dry; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many very fine irregular pores; 10 percent pebbles; dark brown (7.5YR 3/2) coatings on some peds; strongly acid (pH 5.4); clear wavy boundary.

B21—18 to 28 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 4/2) dry; weak medium and coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots, common fine roots, and few coarse roots; many very fine tubular pores; 5 percent pebbles; very strongly acid (pH 5.0); gradual wavy boundary.

B22—28 to 41 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; weak coarse and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots and common medium and coarse roots; many very fine tubular pores; 5 percent pebbles; very strongly acid (pH 5.0); gradual wavy boundary.

B23—41 to 53 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots and few medium and coarse roots; many very fine tubular pores; 5 percent pebbles; very strongly acid (pH 4.9); clear wavy boundary.

IIB24—53 to 62 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/2) dry; weak coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots and few medium roots; many very fine tubular pores; 5 percent pebbles; very strongly acid (pH 4.9); gradual wavy boundary.

IIB3—62 to 70 inches; very dark brown (7.5YR 3/2) silt loam, brown (7.5YR 5/2) dry; weak coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few medium and fine roots; many very fine tubular pores; 5 percent pebbles; very strongly acid (pH 4.8).

The umbric epipedon is more than 20 inches thick. Depth to bedrock is more than 60 inches. The profile generally has hue of 7.5YR or 5YR, but it is 10YR below a depth of 40 inches in some pedons.

The B horizon is silt loam or silty clay loam.

Salem Series

The Salem series consists of deep, well drained soils on stream terraces. These soils formed in gravelly mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Salem gravelly silt loam, in the SE1/4NW1/4 of sec. 21, T. 18 S., R. 2 W.

Ap—0 to 7 inches; dark brown (7.5YR 3/2) gravelly silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; 15 percent pebbles; medium acid (pH 5.6); abrupt smooth boundary.

B1—7 to 13 inches; dark brown (7.5YR 3/2) gravelly silty clay loam, brown (10YR 4/3) dry; moderate fine granular structure; hard, friable, sticky and plastic; many fine roots; many fine irregular pores and few fine tubular pores; 15 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B21t—13 to 18 inches; dark brown (7.5YR 3/2) gravelly clay loam, brown (10YR 4/3) dry; weak medium and fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many fine and common medium tubular pores; common moderately thick clay films; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.1); abrupt wavy boundary.

IIB22t—18 to 26 inches; dark brown (7.5YR 3/2) gravelly clay loam, brown (10YR 4/3) dry; massive; hard, firm, sticky and plastic; few fine roots; common fine tubular and few fine irregular pores; 30 percent pebbles; many moderately thick clay films on pebbles and peds; common black stains; slightly acid (pH 6.1); clear smooth boundary.

IIIC—26 to 60 inches; multicolored very gravelly sand; single grain; loose, nonsticky and nonplastic; few fine roots; many fine, and medium irregular pores; 45 percent pebbles; slightly acid (pH 6.1).

Depth to gravelly sand is 15 to 40 inches. Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. It is 15 to 30 percent pebbles.

The B2t horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 to a depth of 20 inches and 2 to 4 below that depth. The horizon is gravelly clay loam, gravelly silty clay loam, or gravelly sandy clay loam and is 15 to 35 percent pebbles.

The IIIC horizon is very gravelly sand or very gravelly loamy sand and is 35 to 60 percent pebbles.

Salkum Series

The Salkum series consists of deep, well drained soils on old alluvial or glacial outwash terraces. These soils formed in mixed alluvium. Slopes are 2 to 16 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Salkum silty clay loam, 2 to 8 percent slopes, 1 mile north of Pleasant Hill, in the SW1/4SW1/4 of sec. 21, T. 18 S., R. 2 W.

Ap—0 to 6 inches; dark brown (7.5YR 3/2) silty clay loam, dark brown (7.5YR 4/2) dry; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; common irregular pores and few fine tubular pores; few fine concretions; medium acid (pH 5.6); abrupt smooth boundary.

A12—6 to 13 inches; dark brown (7.5YR 3/2) silty clay loam, dark brown (7.5YR 4/2) dry; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; few fine concretions; medium acid (pH 5.6); clear smooth boundary.

B21t—13 to 21 inches; dark reddish brown (5YR 3/4) clay, reddish brown (5YR 4/4) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many fine and few medium tubular pores; few thin clay films in pores; few fine concretions; strongly acid (pH 5.4); clear smooth boundary.

B22t—21 to 29 inches; dark reddish brown (5YR 3/4) clay, reddish brown (5YR 4/4) dry; moderate fine subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many very fine tubular pores; common thin clay films on peds and in pores; strongly acid (pH 5.4); clear wavy boundary.

B23t—29 to 35 inches; reddish brown (5YR 4/4) clay, yellowish red (5YR 4/6) dry; moderate fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; common medium and few coarse roots; many fine tubular pores; common moderately thick clay films on peds and in pores;

common black stains on peds; few small concretions; strongly acid (pH 5.2); clear smooth boundary.

IIB3t—35 to 49 inches; reddish brown (5YR 4/4) silty clay, yellowish red (5YR 4/6) dry; weak medium and fine subangular blocky structure; hard, firm, sticky and plastic; few fine roots; many fine tubular pores; continuous moderately thick dark reddish brown (5YR 3/4) clay films on peds; many black stains on peds; few fine concretions; 30 percent soft pebbles; very strongly acid (pH 5.0); clear wavy boundary.

IIC1—49 to 60 inches; variegated red (2.5YR 4/6) and dark red (2.5YR 3/6) silty clay loam, light red (2.5YR 6/6) dry; massive; very hard, very firm, very sticky and very plastic; common clay films in narrow fractures; 40 percent soft pebbles; very strongly acid (pH 5.0).

Depth to bedrock is more than 60 inches. Depth to mottles that have chroma of 2 or less is more than 36 inches.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 to 4 when moist or dry. It is silt loam or silty clay loam.

The B2 horizon has hue of 5YR to 10YR, value of 3 to 5 when moist and 4 or 5 when dry, and chroma of 4 to 6 when moist or dry. It is silty clay or clay. It averages 40 to 55 percent clay.

The IIC horizon, where present, has hue of 2.5YR to 10YR, value of 3 to 7 when moist or dry, and chroma of 2 to 6 when moist or dry. It is clay, silty clay loam, or silty clay and is 30 to 50 percent soft pebbles that are easily crushed.

Saturn Series

The Saturn series consists of deep, well drained soils in small valleys in the Cascade Range. These soils formed in alluvium. Slopes are 0 to 5 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 50 degrees F.

Typical pedon of Saturn clay loam, south of the Big River Road, at the junction of the rock quarry road, in the SW1/4NW1/4 of sec. 12, T. 23 S., R. 3 W.

O1—0.5 inch to 0; layer of grasses, ferns, leaves, and twigs.

A1—0 to 6 inches; dark brown (7.5YR 3/2) clay loam, brown (10YR 5/3) dry; weak medium subangular blocky structure and moderate fine granular; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; 10 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

A3—6 to 10 inches; dark brown (7.5YR 3/2) clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many fine and very fine tubular pores; 5 percent pebbles; medium acid (pH 5.8); gradual smooth boundary.

B21—10 to 23 inches; dark brown (7.5YR 4/4) clay loam, brown (10YR 5/3) dry; weak medium and coarse subangular blocky structure; hard, friable, sticky and plastic; few fine roots; common very fine tubular pores and many fine irregular pores; 5 percent pebbles; very strongly acid (pH 4.8); clear wavy boundary.

B22—23 to 32 inches; dark yellowish brown (10YR 3/4) gravelly loam, yellowish brown (10YR 5/4) dry; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine tubular pores; 20 percent pebbles and cobbles; very strongly acid (pH 4.6); abrupt wavy boundary.

IIC1—32 to 38 inches; dark brown (10YR 3/3) extremely gravelly loamy sand, yellowish brown (10YR 5/4) dry; massive; loose, friable, nonsticky and nonplastic; few fine roots; many fine and medium irregular pores; 70 percent pebbles and cobbles; very strongly acid (pH 4.6); abrupt wavy boundary.

IIC2—38 to 60 inches; multicolored extremely gravelly loamy sand; single grain; loose, nonsticky and nonplastic; many fine medium, and coarse irregular pores; 65 percent pebbles and cobbles; very strongly acid (pH 4.6).

Depth to the IIC horizon is 20 to 40 inches. Depth to bedrock is more than 60 inches. Thickness of the umbric epipedon ranges from 10 to 20 inches. The coarse fragments are dominantly less than 3 inches in diameter.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist, and chroma of 2 or 3 when moist or dry. It is 5 to 10 percent pebbles.

The B horizon has hue of 10YR to 7.5YR, and it has value of 3 or 4 when moist and 5 or 6 when dry. It is gravelly loam, clay loam, or gravelly clay loam and is 18 to 30 percent clay and 5 to 20 percent coarse fragments.

The IIC horizon is extremely gravelly loamy sand, very gravelly loamy sand, or very gravelly sand and is 50 to 75 percent coarse fragments.

Sifton Series

The Sifton series consists of deep, somewhat excessively drained soils on terraces. These soils formed in alluvium that has an influence of volcanic ash. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Sifton gravelly loam, about 200 feet south of the weigh station at Walterville, in the SE1/4NE1/4NE1/4 of sec. 28, T. 17 S., R. 1 W.

A11—0 to 8 inches; black (10YR 2/1) gravelly loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure and weak fine granular; soft, very friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 15 percent pebbles; strongly acid (pH 5.4); clear smooth boundary.

A12—8 to 15 inches; very dark brown (10YR 2/2) gravelly loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine roots; many very fine tubular and irregular pores; 25 percent pebbles and cobbles; medium acid (pH 5.6); clear wavy boundary.

B2—15 to 22 inches; dark yellowish brown (10YR 3/4) very gravelly loamy coarse sand, brown (10YR 5/3) dry; weak fine subangular blocky structure; hard, friable, nonsticky and nonplastic; common fine roots; many fine irregular pores; 35 percent pebbles; medium acid (pH 6.0); abrupt wavy boundary.

IIC1—22 to 36 inches; dark yellowish brown (10YR 3/4) very gravelly sand, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; 30 percent pebbles and 10 percent cobbles; medium acid (pH 6.0); abrupt wavy boundary.

IIC2—36 to 60 inches; very dark grayish brown (10YR 3/2) very gravelly coarse sand, grayish brown (10YR 5/2) dry; loose, nonsticky and nonplastic; 45 percent pebbles and 10 percent cobbles.

Depth to the IIC horizon is 15 to 30 inches. Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR to 7.5YR, value or 2 or 3 when dry, and chroma of 1 or 2. It is 15 to 35 percent pebbles.

The B horizon has value of 3 or 4 when moist and 4 or 5 when dry, and it has chroma of 3 or 4. It is 35 to 45 percent pebbles.

The IIC horizon has hue of 10YR or 7.5YR, value or 3 or 4 when moist and 4 to 6 when dry, and chroma of 2 to 4. It is very gravelly loamy coarse sand, gravelly coarse sand, or very gravelly sand and is 35 to 60 percent coarse fragments.

Slickrock Series

The Slickrock series consists of deep, well drained soils on ridgetops, side slopes, and slump benches on uplands in the Coast Range. These soils formed in colluvium and residuum derived from sandstone. Slopes are 3 to 75 percent. The average annual precipitation is about 90 inches, and the average annual air temperature is 50 degrees F.

Typical pedon of Slickrock gravelly loam, 25 to 50 percent slopes, in the NE1/4SW1/4 of sec. 36, T. 18 S., R. 12 W.

O1—5 inches to 0; litter of decomposing leaves, needles, and twigs.

A11—0 to 5 inches; very dark brown (10YR 2/2) gravelly loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; soft, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine irregular pores; 15 percent pebbles; very strongly acid (pH 5.0); clear wavy boundary.

A12—5 to 13 inches; very dark grayish brown (10YR 3/2) gravelly loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; slightly hard, friable, nonsticky and nonplastic; many fine and medium roots; many very fine and fine irregular pores; 15 percent pebbles; very strongly acid (pH 4.8); clear wavy boundary.

B1—13 to 25 inches; dark brown (10YR 3/3) gravelly loam, dark brown (10YR 4/3) dry; moderate very fine granular structure; slightly hard, friable, nonsticky and nonplastic; common fine and medium roots; many very fine and fine irregular pores; 15 percent pebbles; very strongly acid (pH 5.0); clear wavy boundary.

B2—25 to 40 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 5/3) dry; moderate medium and fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; many very fine and fine irregular pores; 25 percent pebbles; strongly acid (pH 5.2); clear wavy boundary.

B3—40 to 55 inches; yellowish brown (10YR 5/4) very cobbly loam, light yellowish brown (10YR 6/4) dry; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; many fine, medium, and coarse irregular pores; 30 percent cobbles and 20 percent pebbles, many of which are soft; strongly acid (pH 5.4); clear wavy boundary.

Cr—55 inches; weathered, fractured sandstone.

Depth to bedrock is 40 to 60 inches. The 10- to 40-inch control section is 15 to 40 percent coarse fragments, but it averages less than 35 percent. The umbric epipedon is over 20 inches thick. The profile generally has hue of 10YR throughout, but it ranges to 7.5YR in some pedons.

The B2 horizon is gravelly clay loam or cobbly clay loam and is 15 to 30 percent coarse fragments. The B3 horizon is very cobbly loam or very cobbly clay loam and is 35 to 60 percent coarse fragments.

Steiwer Series

The Steiwer series consists of moderately deep, well drained soils on low foothills adjacent to terraces in the Willamette Valley. These soils formed in colluvium and residuum derived from sedimentary or igneous rock. Slopes are 3 to 50 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Steiwer gravelly loam, 3 to 12 percent slopes, 150 feet north of Dillard Road, in the SE1/4SE1/4 of sec. 27, T. 18 S., R. 3 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure and moderate medium granular; hard, friable, slightly sticky and slightly plastic; many fine roots; common fine irregular pores; medium acid (pH 5.6); clear smooth boundary.

B1—9 to 16 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many fine tubular pores; medium acid (pH 5.8); gradual smooth boundary.

B21—16 to 26 inches; dark yellowish brown (10YR 3/4) clay loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common fine and medium tubular pores; medium acid (pH 5.8); clear smooth boundary.

B22—26 to 29 inches; dark yellowish brown (10YR 4/4) clay loam, yellowish brown (10YR 5/4) dry; moderate fine subangular blocky structure; hard, firm, sticky and plastic; few fine roots; 10 percent soft pebbles; medium acid (pH 5.8); abrupt smooth boundary.

IICr—29 inches; weathered, fractured sandstone.

Depth to bedrock is 20 to 40 inches.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The B horizon has value of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 3 or 4 when moist or dry. It is clay loam or silty clay loam.

Tahkenitch Series

The Tahkenitch series consists of deep, well drained soils on uplands in the Coast Range. These soils formed in colluvium weathered from sandstone. Slopes are 20 to 75 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Tahkenitch loam, 20 to 45 percent slopes, in the NW1/4NE1/4 of sec. 24, T. 19 S., R. 12 W.

O1—1 inch to 0; litter of leaves, needles, twigs, and roots.

A11—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; many fine and very fine irregular pores; 3 percent fine concretions; strongly acid (pH 5.5); clear wavy boundary.

A12—6 to 12 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; moderate fine and very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine and very fine roots; many fine and very fine irregular pores; 10 percent concretions and pebbles; strongly acid (pH 5.5); clear wavy boundary.

B1—12 to 19 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many fine irregular pores; 10 percent pebbles; very strongly acid (pH 5.0); gradual smooth boundary.

B2—19 to 31 inches; yellowish brown (10YR 5/6) gravelly sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; hard, friable, nonsticky and nonplastic; common fine and medium roots; many fine irregular pores; 20 percent pebbles; very strongly acid (pH 5.0); gradual wavy boundary.

B3—31 to 42 inches; yellowish brown (10YR 5/4) gravelly sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; hard, friable, nonsticky and nonplastic; common fine roots; many fine irregular pores; 20 percent pebbles; very strongly acid (pH 5.0); irregular wavy boundary.

Cr—42 inches; weathered, fractured sandstone.

Depth to bedrock is 40 to 60 inches. The umbric epipedon is 10 to 20 inches thick.

The B horizon is loam, sandy loam, or gravelly sandy loam and is 5 to 25 percent coarse fragments.

Veneta Series

The Veneta series consists of deep, moderately well drained soils on old alluvial terraces and low foothills. These soils formed in mixed alluvium. Slopes are 0 to 7 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Veneta loam, 0 to 7 percent slopes, about 3 miles southeast of Veneta, 70 feet south of Fleck Road, in the NW1/4NE1/4NW1/4 of sec. 8, T. 18 S., R. 5 W.

Ap—0 to 6 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; hard, friable, sticky and plastic; many fine roots; common fine tubular and irregular pores; medium acid (pH 5.6); clear smooth boundary.

A12—6 to 14 inches; brown (10YR 4/2) loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; hard, friable, sticky and plastic;

many fine roots; many very fine and few fine tubular pores; strongly acid (pH 5.4); clear smooth boundary.

31—14 to 22 inches; strong brown (7.5YR 5/6) clay loam, light yellowish brown (10YR 6/4) dry; common dark yellowish brown (10YR 4/4) coatings on vertical ped faces; moderate coarse and medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots; many very fine and fine tubular pores; strongly acid (pH 5.2); clear smooth boundary.

321t—22 to 30 inches; dark yellowish brown (10YR 4/6) clay loam, yellowish brown (10YR 5/6) dry; moderate fine subangular blocky structure; hard, firm, very sticky and plastic; common fine roots; many very fine and few fine tubular pores; few moderately thick dark brown (7.5YR 4/4) clay films; strongly acid (pH 5.2); clear wavy boundary.

322t—30 to 39 inches; dark yellowish brown (10YR 4/6) clay, yellowish brown (10YR 5/4) dry; moderate fine subangular blocky structure; hard, firm, very sticky and plastic; few fine roots; many very fine and fine tubular pores; common moderately thick dark brown (7.5YR 4/4) clay films; strongly acid (pH 5.4); clear smooth boundary.

IB23t—39 to 49 inches; strong brown (7.5YR 5/6) clay, very pale brown (10YR 7/3) and pale brown (10YR 6/3) dry; moderate coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few fine roots; common very fine tubular pores; common moderately thick dark brown (7.5YR 4/4) clay films; strongly acid (pH 5.4); abrupt smooth boundary.

IC1—49 to 60 inches; mottled, yellowish brown (10YR 5/6, 5/8), gray (10YR 6/1), and light olive brown (2.5YR 5/4) clay, yellow (10YR 7/6) and light gray (10YR 7/1) dry; massive; extremely hard, very firm, very sticky and very plastic; few very fine tubular pores; few medium slickensides; strongly acid (pH 5.4).

The solum is 40 to 60 inches thick. It has hue of 10YR or 7.5YR. Depth to bedrock is more than 60 inches.

The A horizon has value of 3 or 4 when moist and 5 or 6 when dry, and it has chroma or 2 to 4 when moist or dry. Some parts of the upper 10 inches have value of more than 3.5 when moist, and more than 5.5 when dry, and they have chroma of more than 3.5.

The Bt horizon has value of 4 or 5 when moist and 5 to 7 when dry, and it has chroma of 3 to 6 when moist or dry. It is clay loam, silty clay, or clay. It averages 35 to 45 percent clay in the upper part and 60 percent in the lower part.

Veneta Variant

The Veneta Variant consists of deep, moderately well drained soils on old alluvial terraces. These soils formed in mixed alluvium. Slopes are 0 to 7 percent. The average annual precipitation is about 50 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Veneta Variant silt loam, 0 to 7 percent slopes, in roadcut on east side of Siuslaw River Road, adjacent to a pasture, in the SW1/4SE1/4 of sec. 12, T. 20 S., R. 6 W.

Ap1—0 to 7 inches; very dark grayish brown and dark brown (10YR 3/2, 3/3) silt loam, pale brown (10YR 6/3) dry; moderate fine subangular blocky and granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine irregular pores; medium acid (pH 5.8); abrupt smooth boundary.

Ap2—7 to 12 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate very fine subangular structure; hard, friable, slightly sticky and slightly plastic; few medium roots; many very fine irregular and tubular pores; medium acid (pH 5.6); clear smooth boundary.

B1—12 to 20 inches; dark brown (7.5YR 4/4) silty clay loam, light yellowish brown (10YR 6/4) and yellow (10YR 7/6) dry; moderate medium and fine subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; strongly acid (pH 5.2); gradual wavy boundary.

B21t—20 to 30 inches; dark brown (7.5YR 4/4) silty clay loam, very pale brown (10YR 7/4) dry; few fine distinct brown (10YR 5/3) mottles; moderate fine and very fine subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; common thin clay films; strongly acid (pH 5.2); clear wavy boundary.

B22t—30 to 44 inches; dark brown (7.5YR 4/4) silty clay loam, very pale brown (10YR 7/4) dry; common distinct grayish brown (2.5YR 5/2) mottles; strong moderate and fine subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; common very fine tubular pores; common moderately thick clay films; strongly acid (pH 4.8); clear smooth boundary.

B23t—44 to 52 inches; dark brown (7.5YR 4/4) silty clay loam, very pale brown (10YR 7/4) dry; many medium and fine grayish brown (2.5Y 5/2) mottles; moderate medium and fine subangular blocky structure; brittle, firm, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; common thin and moderately thick clay films; strongly acid (pH 4.8); gradual wavy boundary.

B3—52 to 58 inches; brown (7.5YR 4/4) and yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 7/4) dry; many medium and fine distinct grayish brown (2.5Y 5/2) mottles; weak fine subangular blocky structure; hard, friable, nonsticky and nonplastic; common fine tubular and irregular pores; very strongly acid (pH 5.0); clear smooth boundary.

C—58 to 60 inches; variegated dark brown (7.5YR 4/4) and yellowish brown (10YR 5/4) fine sandy loam; many very fine distinct grayish brown (2.5Y 5/2) mottles; massive; hard, friable, nonsticky and nonplastic; common fine irregular pores; strongly acid (pH 5.0).

The solum is 40 to 60 inches thick, and it has hue of 10YR or 7.5YR. Depth to bedrock is more than 60 inches. Faint to distinct, grayish brown mottles are common below a depth of 30 inches in most pedons.

The A horizon has value of 2 to 4 when moist and 5 or 6 when dry, and it has chroma or 2 to 4 when moist or dry. Some parts of the upper 10 inches have value of more than 5.5 when dry.

The Bt horizon has value of 4 or 5 when moist and 6 or 7 when dry, and it has chroma or 4 to 6 when moist or dry. It is silt loam or clay loam in the lower part. The horizon is 25 to 35 percent clay and less than 15 percent sand that is coarser than very fine sand.

The C horizon commonly is mottled and variegated. It is silt loam or fine sandy loam and has lenses of coarser or finer textured material in some pedons.

Waldo Series

The Waldo series consists of deep, poorly drained soils in depressional areas on flood plains and low terraces of smaller tributaries to the Willamette River and headwaters of the Siuslaw River. These soils formed in silty and clayey mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Waldo silty clay loam, near the center of sec. 27, T. 15 S., R. 1 W.

Ap—0 to 11 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (2.5Y 4/2) dry; weak coarse and moderate medium and fine subangular blocky structure; hard, friable, very sticky and very plastic; many fine roots; common fine irregular and very fine tubular pores; medium acid (pH 5.8); abrupt wavy boundary.

B1—11 to 17 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; common medium prominent dark yellowish brown (10YR 4/4) mottles; strong medium subangular blocky structure; very hard, firm, sticky and very plastic; common fine roots; few very fine tubular pores; medium acid (pH 5.8); clear smooth boundary.

B21g—17 to 21 inches; dark gray (10YR 4/1) silty clay, gray (10YR 5/1) dry; common medium prominent dark yellowish brown (10YR 4/4) mottles; moderate medium and fine subangular blocky structure; very hard, firm, sticky and very plastic; common fine roots; common very fine tubular pores; many strong brown and black iron and manganese stains; medium acid (pH 5.6); gradual smooth boundary.

B3g—21 to 60 inches; gray (2.5Y 5/1) clay, gray (N 6/0) dry; many medium prominent dark yellowish brown (10YR 4/4) and yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few fine roots; few very fine tubular pores; medium acid (pH 5.6).

Thickness of the solum is 40 to 60 inches. Depth to bedrock is more than 60 inches. The profile is mottled below a depth of 15 inches. The mollic epipedon is 10 to 20 inches thick.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma or 1 or 2 when moist or dry.

The Bg horizon has hue of 10YR or 2.5Y. The upper part of the horizon has value of 3 or 4 when moist, and the lower part has value of 4 or 5 when moist. The horizon has value of 4 to 7 when dry, and it has chroma of 1 or less when moist or dry. It is silty loam or clay. Mottles are distinct to prominent.

Waldport Series

The Waldport series consists of deep, excessively drained soils on stabilized sand dunes. These soils formed in eolian sand of mixed origin. Slopes are 0 to 70 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Waldport fine sand, 30 to 70 percent slopes, west of road at entrance to Honeyman Park Campground, in the NW1/4NE1/4 of sec. 15, T. 19 S., R. 12 W.

O1—3 to 2 inches; undecomposed litter of leaves, needles, and twigs.

O2—2 inches to 0; decomposed and partially decomposed leaves, needles, and twigs.

A11—0 to 2 inches; very dark gray (10YR 3/1) fine sand, light gray (10YR 5/1) dry; weak very fine granular structure; loose, very friable, nonsticky and nonplastic; many fine and common medium roots; many fine irregular pores; strongly acid (pH 5.4); clear smooth boundary.

A12—2 to 5 inches; very dark grayish brown (10YR 3/2) fine sand, light gray (10YR 6/1) dry; single grain; loose, very friable, nonsticky and nonplastic; many fine and common medium roots; many fine irregular pores; strongly acid (pH 5.4); clear smooth boundary.

AC—5 to 20 inches; yellowish brown (10YR 5/4) fine sand, light brownish gray (10YR 6/2) dry; single grain; loose, nonsticky and nonplastic; common fine and few medium roots; many fine irregular pores; few black organic stains in thin bands; few reddish brown and yellow stains along root channels; medium acid (pH 5.8); diffuse smooth boundary.

C—20 to 60 inches; yellowish brown (10YR 5/4) fine sand, light gray (10YR 7/2) dry; single grain; loose, nonsticky and nonplastic; few fine and medium roots; many fine irregular pores; few black stains in thin bands; slightly acid (pH 6.2).

Depth to bedrock is more than 60 inches. The solum is 5 to 20 inches thick. A few weakly cemented nodules are throughout the solum in some pedons.

The A horizon has value of 2 or 3 when moist and 5 or 6 when dry, and it has chroma or 1 or 2 when moist or dry.

Wapato Series

The Wapato series consists of deep, poorly drained soils on bottom lands. These soils formed in mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Wapato silty clay loam, in Applegate Park, north of Veneta, in the SW1/4SW1/4 of sec. 30, T. 17 S., R. 5 W.

O1—1 inch to 0; mat of fine and very fine roots, leaves and twigs.

A11—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay, dark grayish brown (10YR 5/2) dry; many fine distinct reddish brown (5YR 4/6) mottles; weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; strongly acid (pH 5.2); clear smooth boundary.

A12—6 to 17 inches; very dark brown (10YR 2/2) silty clay, dark grayish brown (10YR 4/2) dry; many fine distinct strong brown (7.5YR 5/8) mottles; moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; many fine and very fine roots; many very fine and fine tubular pores; strongly acid (pH 5.2); clear wavy boundary.

B21—17 to 27 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; many medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure and weak coarse prismatic; hard, firm, sticky and plastic; few fine roots; many fine and very fine tubular pores; strongly acid (pH 5.4); clear wavy boundary.

B22—27 to 33 inches; grayish brown (10YR 5/2) silty clay loam, light grayish brown (10YR 6/2) dry; many medium distinct yellowish brown (7.5YR 5/6) mottles; weak coarse prismatic structure and moderate medium and coarse subangular blocky; very hard, firm, very sticky and very plastic; common coatings of silt; many fine and very fine tubular pores; medium acid (pH 5.8); clear wavy boundary.

C1g—33 to 51 inches; gray (10YR 5/1) silty clay, gray (10YR 5/1) dry; many large distinct dark yellowish brown and yellowish brown (10YR 4/4, 5/6) mottles; weak coarse prismatic structure; extremely hard, firm, very sticky and very plastic; many fine tubular pores; medium acid (pH 6.0); gradual smooth boundary.

C2g—51 to 60 inches; dark gray (N 4/0) silty clay, gray (10YR 6/1) dry; many large distinct yellowish brown, gray, grayish brown (10YR 5/8, 6/1, 5/2) and strong brown (7.5YR 5/6) mottles; massive; very hard, firm, very sticky and very plastic; slightly acid (pH 6.4).

Depth to bedrock is more than 60 inches. The textural control section averages 27 to 35 percent clay.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma or 2 or 3 when dry.

The B2 horizon has hue of 10YR to 5Y, value of 4 or 5 when moist and 5 or 6 when dry, and chroma of 1 or 2 when moist or dry. It has distinct to prominent mottles. The horizon is silt loam or silty clay loam.

Willakenzie Series

The Willakenzie series consists of moderately deep, well drained soils on foothills. These soils formed in colluvium and residuum derived from tuffaceous sandstone. Slopes are 2 to 50 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Willakenzie clay loam, 12 to 20 percent slopes, on Oak Hill, in the SE1/4NE1/4 of sec. 25, T. 17 S., R. 5 W.

A11—0 to 3 inches; dark brown (7.5YR 3/2) clay loam, brown (7.5YR 5/4) dry; moderate fine granular structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine and medium irregular pores; slightly acid (pH 6.3); abrupt wavy boundary.

A12—3 to 11 inches; dark brown (7.5YR 2/2) clay loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure; hard, friable, sticky and plastic; many fine roots; many fine tubular pores; slightly acid (pH 6.1); clear smooth boundary.

B1t—11 to 19 inches; dark reddish brown (5YR 3/3) clay loam, reddish brown (5YR 5/4) dry; weak medium and moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine roots; many very fine tubular pores; few thin clay films in pores and on peds; medium acid (pH 5.9); gradual wavy boundary.

B21t—19 to 28 inches; dark reddish brown (5YR 3/4) clay loam, reddish brown (5YR 5/4) dry; weak medium and moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine roots; many very fine tubular pores; few moderately thick clay films in pores and on peds; medium acid (pH 5.9); gradual wavy boundary.

B22t—28 to 36 inches; dark reddish brown (5YR 3/4) clay loam, reddish brown (5YR 3/4) dry; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine roots; many very fine and fine tubular pores; few moderately thick clay films in pores and on peds; medium acid (pH 5.7); gradual wavy boundary.

Cr—36 inches; weathered, fractured sandstone; clay films and black stains in fractures.

Depth to bedrock is 20 to 40 inches. The solum generally has hue of 7.5YR, but it ranges to 5YR in the B horizon and 10YR in the A horizon.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma or 2 to 4 when moist or dry.

The B2t horizon has value of 3 or 4 when moist and 5 or 6 when dry. The upper part of the horizon has chroma of 3 or 4 when moist, and the lower part has chroma of 4 to 6 when moist. The horizon has chroma of 4 to 6 when dry. The horizon is clay loam or silty clay loam and is 27 to 35 percent clay and 0 to 25 percent soft pebbles that are easily crushed. It has few to many thin clay films and few moderately thick clay films.

Willanch Series

The Willanch series consists of deep, poorly drained soils on flood plains of streams in the Coast Range. These soils formed in mixed alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 70 inches, and the average annual air temperature is 52 degrees F.

Typical pedon of Willanch fine sandy loam, in a pasture along Maple Creek, in the NE1/4SE1/4SE1/4 of sec. 19, T. 19 S., R. 11 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam, brown (10YR 5/3) dry; common distinct dark grayish brown (10YR 4/2) and dark reddish brown (5YR 3/4) mottles; weak medium and fine subangular blocky structure; slightly hard, firm, nonsticky and nonplastic; many fine roots; many fine irregular pores; medium acid (pH 5.6); abrupt smooth boundary.

A12—6 to 11 inches; very dark grayish brown (10YR 3/2) fine sandy loam, brown (10YR 5/3) dry; common distinct dark grayish brown (10YR 4/2) and dark reddish brown (5YR 3/4) mottles; weak medium and fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; many fine irregular pores; medium acid (pH 5.8); abrupt smooth boundary.

AC—11 to 24 inches; strong brown (7.5YR 5/6) and yellowish red (5YR 4/8) fine sandy loam, light brown (7.5YR 6/4) dry; many large prominent light gray (10YR 7/2), pale brown (10YR 6/3), and dark red (2.5YR 3/6) mottles; single grain; loose, nonsticky and nonplastic; few fine roots; many very fine irregular pores; medium acid (pH 5.8); abrupt smooth boundary.

C1—24 to 28 inches; light brownish gray (10YR 6/2) and dark grayish brown (10YR 4/2) sandy loam, light gray (10YR 7/2) dry; many large prominent yellowish red (5YR 4/8) mottles; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; common very fine tubular pores; small flakes of charcoal; medium acid (pH 6.0); abrupt smooth boundary.

C2—28 to 34 inches; grayish brown (10YR 5/2) fine sandy loam, light gray (10YR 7/2) dry; many large prominent reddish brown (5YR 4/4) and yellowish red (5YR 4/8) mottles; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; common very fine tubular pores; medium acid (pH 6.0); abrupt smooth boundary.

C3—34 to 50 inches; grayish brown (10YR 5/2) loamy sand, light gray (10YR 7/1) dry; common medium distinct strong brown (7.5YR 5/6, 5/8) mottles; single grain; loose, nonsticky and nonplastic; small flakes of charcoal and wood fragments; medium acid (pH 6.0); abrupt smooth boundary.

C4—50 to 60 inches; gray (N 5/0) loamy sand, light gray (N 7/0) dry; single grain; loose, nonsticky and nonplastic; slightly acid (pH 6.2).

Mottles range from common to many and distinct to prominent throughout the solum. Depth to bedrock is more than 60 inches.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma of 2 or 3 when moist or dry.

The AC horizon has hue of 2.5Y to 7.5YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 3 to 8 when moist and 2 to 4 when dry.

The C horizon has hue of 2.5Y to 10YR, value of 4 to 6 when moist and 5 to 7 when dry, and chroma of 2 or less when dry. Chroma of 1 or less is below a depth of 30 inches. The upper part of the horizon is sandy loam or fine sandy loam, and the lower part is loamy fine sand or loamy sand.

Winberry Series

The Winberry series consists of shallow, somewhat excessively drained soils on flood plains of streams in the Coast Range. These soils formed in colluvium weathered from andesite, tuff, and breccia. Slopes are 10 to 45 percent. The average annual precipitation is about 85 inches, and the average annual air temperature is 43 degrees F.

Typical pedon of Winberry very gravelly loam, 10 to 45 percent slopes, along Holderman Mountain Road, in the SW1/4SW1/4 of sec. 22, T. 23 S., R. 1 W.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) very gravelly loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 55 percent pebbles; medium acid (pH 6.0); clear smooth boundary.

B21—4 to 9 inches; dark brown (7.5YR 4/3) very cobbly loam, pinkish gray (7.5YR 7/3) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine irregular pores; 20 percent pebbles and 15 percent angular cobbles; medium acid (pH 6.0); gradual wavy boundary.

B22—9 to 18 inches; brown (7.5YR 5/4) very cobbly loam, pink (7.5YR 7/4) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine and common medium irregular pores; 20 percent pebbles and 35 percent angular cobbles; medium acid (pH 5.8); irregular boundary.

R—18 inches; slightly fractured bedrock.

Depth to bedrock is 10 to 20 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 when moist and more than 5.5 when dry, and chroma of 2 or 3 when moist or dry. It is 50 to 60 percent coarse fragments, dominantly pebbles.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5 when moist and 5 to 7 when dry, and chroma of 3 or 4 when moist or dry. It is 35 to 60 percent coarse fragments.

Witzel Series

The Witzel series consists of shallow, well drained soils on foothills adjacent to the Willamette Valley. These soils formed in colluvium and residuum derived from basic igneous rock. Slopes are 3 to 75 percent. The average annual precipitation is about 45 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Witzel very cobbly loam, 3 to 30 percent slopes, about 2.5 miles north of Hayden Bridge, in the NW1/4NE1/4NE1/4 of sec. 8, T. 17 S., R. 2 W.

A1—0 to 4 inches; dark brown (7.5YR 3/2) very cobbly loam, brown (7.5YR 4/2) dry; moderate fine granular structure; hard, friable, slightly sticky and plastic; many fine roots; many fine irregular and tubular pores; 25 percent cobbles, 5 percent stones, and 20 percent pebbles; slightly acid (pH 6.4); gradual smooth boundary.

B21—4 to 11 inches; dark reddish brown (5YR 3/2) very cobbly clay loam, dark reddish gray (5YR 4/2) dry; moderate medium granular structure; hard, friable, sticky and plastic; common fine roots; many very fine tubular and irregular pores; 30 percent cobbles, 15 percent pebbles, and 10 percent stones; slightly acid (pH 6.2); gradual smooth boundary.

B22—11 to 17 inches; dark reddish brown (5YR 3/3) very cobbly clay loam, reddish brown (5YR 5/3) dry; moderate very fine subangular blocky structure and moderate medium granular; hard, firm, sticky and very plastic; few fine roots; many very fine tubular pores; 15 percent pebbles and 40 percent cobbles and stones; slightly acid (pH 6.2); abrupt wavy boundary.

IIR—17 inches; fractured basalt.

Depth to bedrock is 12 to 20 inches. The textural control section is 45 to 70 percent coarse fragments.

The A horizon has hue of 7.5YR or 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3 when moist and 2 to 4 when dry. It is 35 to 60 percent coarse fragments, dominantly cobbles.

The B horizon has hue of 7.5YR or 5YR, value of 4 or 5 when dry, and chroma of 2 to 4 when moist or dry. It is very stony silty clay loam or very cobbly clay loam and is 40 to 60 percent coarse fragments.

The bedrock commonly is fractured. Thin tongues of soil material are in the fractures in some pedons.

Woodburn Series

The Woodburn series consists of deep, moderately well drained soils on terraces in the Willamette Valley. These soils formed in silty alluvium overlying sandy alluvium. Slopes are 0 to 3 percent. The average annual precipitation is about 40 inches, and the average annual air temperature is 53 degrees F.

Typical pedon of Woodburn silt loam, east of Coburg-Harrisburg Road, north of Crossroads Lane, in the NE1/4SW1/4 of sec. 12, T. 16 S., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to fine granular; hard, friable, sticky and plastic; many fine roots; many fine irregular pores; medium acid (pH 5.8); abrupt smooth boundary.

B2t—9 to 18 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; few fine strong brown (7.5YR 5/6) mottles; weak medium and coarse subangular blocky structure parting to moderate fine granular; hard, friable, sticky and plastic; many fine roots; many fine and very fine tubular pores; common fine concretions; few thin clay films in pores; medium acid (pH 5.8); abrupt wavy boundary.

B3t—18 to 26 inches; brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; many fine distinct strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; common fine concretions; few thin clay films in pores; some pockets of silty clay 3 to 6 inches in diameter; neutral (pH 6.6); clear wavy boundary.

IIC1—26 to 43 inches; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; many prominent strong brown and brown (7.5YR 5/6, 5/2) mottles; massive; brittle; hard, firm, nonsticky and nonplastic; thin strata of very fine sandy loam; neutral (pH 6.6); gradual wavy boundary.

IIC2—43 to 60 inches; dark gray (10YR 4/1) fine sandy loam, gray (10YR 5/1) dry; many fine strong brown (7.5YR 5/6) mottles; massive; slightly brittle; firm, nonsticky and nonplastic; few very fine irregular pores; weakly stratified; neutral (pH 6.6).

Depth to the IIC horizon is 20 to 30 inches. Depth to bedrock is more than 60 inches.

The A horizon has value of 2 or 3 when moist and 4 or 5 when dry, and it has chroma or 2 or 3 when moist or dry. Mottles are at a depth of 12 to 20 inches.

The B horizon has hue of 10YR or 7.5YR, value of 3 or 4 when moist and 5 or 6 when dry, and chroma of 2 to 4 when moist or dry. It is mottled silty clay loam or silt loam.

The IIC horizon is stratified silt loam or fine sandy loam. It has lenses of gravelly loamy sand below a depth of 40 inches in some pedons.

The Woodburn soils in this survey area are taxadjunct to the Woodburn series because they have a slightly thinner solum. This difference, however, does not significantly affect use and management.

Yaquina Series

The Yaquina series consists of deep, somewhat poorly drained soils in low interdune areas along the Pacific Coast. These soils formed in eolian sand of mixed origin. Slopes are 0 to 3 percent. The average annual precipitation is about 75 inches, and the average annual air temperature is 51 degrees F.

Typical pedon of Yaquina loamy fine sand, about 200 feet south of Mercer Lake Road, in the NW1/4 of sec. 35, T. 17 S., R. 12 W.

O1—0.5 inch to 0; duff layer of needles, twigs, sedges, and grass.

A1—0 to 2 inches; very dark gray (10YR 2/1, 2/2) loamy fine sand, light gray (10YR 7/1, 5/2) dry; single grain; loose, nonsticky and nonplastic; many fine roots; many very fine irregular pores; very strongly acid (pH 4.8); clear wavy boundary.

A2—2 to 8 inches; light gray (10YR 6/1) loamy fine sand, light gray (10YR 7/1) dry; single grain; loose, nonsticky and nonplastic; many fine roots; many very fine irregular pores; strongly acid (pH 5.3); clear wavy boundary.

A3—8 to 13 inches; grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) fine sand, light gray (10YR 7/2) dry; single grain; loose, very friable, nonsticky and nonplastic; few fine roots; many very fine irregular pores; strongly acid (pH 6.6); clear wavy boundary.

B2ir—13 to 29 inches; mottled light brownish gray (10YR 4/4), light gray (N 7/0), dark brown (7.5YR 4/4), and light yellowish brown (10YR 5/6) fine sand, light yellowish brown (10YR 6/4) and light brown (7.5YR 4/4) dry; massive; hard, friable, nonsticky and nonplastic; few fine roots; many very fine irregular pores; 10 percent yellowish red iron nodules; medium acid (pH 5.7); gradual wavy boundary.

C—29 to 60 inches; yellowish brown (2.5Y 6/4), pale brown (10YR 6/3), and grayish brown (2.5Y 5/2) fine sand, pale yellow (2.5Y 7/4) dry; single grain; loose, nonsticky and nonplastic; many very fine irregular pores; medium acid (pH 5.8).

Depth to bedrock is more than 60 inches. A dark surface layer occurs only where the overstory vegetation has been thin enough to allow grass and sedges to grow. Cementation in the B2ir horizon varies from a few cemented nodules to firm, moderately cemented lenses in a weakly cemented horizon.

Yellowstone Series

The Yellowstone series consists of shallow, somewhat excessively drained soils on uplands in the Cascade Range. These soils formed in colluvium and residuum derived from basic igneous rock. Slopes are 10 to 60 percent. The average annual precipitation is 100 inches, and the average annual air temperature is 43 degrees.

Typical pedon of a Yellowstone stony loam in an area of Yellowstone-Rock outcrop complex, 10 to 60 percent slopes, about 50 feet north of road, in the NW1/4NW1/4 of sec. 1, T. 16 S., R. 3 E.

O1—3 inches to 0; mat of leaves, twigs, and needles.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) stony loam, very dark gray (10YR 3/1) and grayish brown (10YR 5/2) dry; weak fine subangular blocky structure and very fine granular; soft, very friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; about 10 percent stones and 15 percent pebbles and cobbles; very strongly acid (pH 5.0); gradual smooth boundary.

AC—4 to 12 inches; dark brown (10YR 3/3) very stony sandy loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; many very fine tubular and irregular pores; about 45 percent cobbles and stones; very strongly acid (pH 4.8); abrupt irregular boundary.

R—12 inches; fractured igneous rock; soil material in fractures.

Depth to bedrock is 10 to 20 inches. The umbric epipedon generally is more than 10 inches thick, and it extends to the bedrock in many pedons. The profile averages 35 to 60 percent coarse fragments, dominantly cobbles and stones.

The A and AC horizons have hue of 10YR to 5YR, value of 2 or 3 when moist and 3 to 5 when dry, and chroma of 2 or 3 when moist or dry. The AC horizon is extremely stony sandy loam, very stony sandy loam, or extremely cobbly loam.

The C horizon, where present, has value and chroma of 3 or 4 when moist.

Formation of the Soils

By Dr. William R. Patching and Dr. R. B. Parsons, soil scientists.

Soil is a natural, three-dimensional body on the earth's surface. It supports plants. Its characteristics and properties have been determined by physical and chemical processes that result from the interaction of five factors of soil formation—climate, living organisms, time, topography, and parent material. The influence of any one of these factors varies from place to place, but the interaction of all the factors determines the kind of soil that forms.

The soils in this survey area have been greatly influenced by such factors as the very cold, wet, short growing season high in the Cascade Range; the warm, dry, long growing season at lower elevations along the Willamette River; and the cool, wet, long growing season of the Coast Range and valleys. The age and type of parent material have greatly influenced the soil development in areas of recent alluvium along the river flood plains and old alluvium on terraces. In the higher areas of the eastern part of the survey area, colluvium and glacial till derived from andesite and basalt mixed with volcanic ash have imparted special characteristics to the soils. Mixed volcanic material has also influenced the soils in the part of the Coast Range extending from Cape Mountain north to the county line and east to Klickitat Mountain. The soils of the coastal dune terraces have been strongly influenced by the sandy parent material from the old stabilized dunes in which they have formed.

In this section the soil-forming factors of climate and living organisms are discussed separately. Factors of time, topography, and parent material are grouped and discussed under the heading "Geomorphic Surfaces and Soil Development."

Climate

Climate has a strong influence on soil formation. Heat and moisture greatly influence the kind of vegetation that grows and the rate at which organic matter decomposes and minerals weather. Heat and moisture also influence the rate of removal of material from some soil horizons and the rate of accumulation in others.

In this survey area there are four major climatic areas that significantly influence soil genesis: (1) Areas characterized by warm, dry summers and cool, moist winters; (2) areas characterized by warm, moist summers and cool, moist winters; (3) areas characterized by cool, moist summers and cool, wet winters; and (4) areas characterized by cool, moist summers and cold, moist winters.

In the Willamette Valley, the summers are warm and dry and the growing season is long. The winters are cool and moist. Plant growth begins early in spring and continues through midsummer. This has given rise to soils that have a xeric moisture regime and are on terraces of various ages. On young surfaces the accumulation of organic matter and limited leaching of bases have produced Xerolls such as Chapman, Coburg, and Malabon soils. On older surfaces, where soil forming factors have been active for long periods of time, Xeralfs such as Linslaw and Veneta soils have developed. On the oldest surfaces, Xeric Haplohumults, such as Salkum soils, have developed.

In the lower foothills on the western and eastern sides of the Willamette Valley and around its south end, summers are warm and dry and the growing season is slightly shorter than that on the terraces at lower elevations. The winters are cool and moist. Plant growth begins late in spring and continues until midsummer for soils that have a xeric moisture regime. On younger surfaces the accumulation of organic matter and rapid leaching of bases have given rise to the development of Ochrepts and Umbrepts such as Ritner, Atring, and Hullt soils. On older surfaces an argillic horizon is evident in Haplohumults such as Bellpine, Jory, and Nekia soils.

Along the coast the summers are cool and moist and winters are cool and wet. The growing season is long, and accumulation of large amounts of organic matter is common. Some well drained soils in stable upland positions, such as the Neskowin and Salander soils, have as much as 15 percent organic matter in the surface layer and more than 3 percent throughout the control section, but their profile has been strongly leached so that base saturation in the subsoil commonly is less than 10 percent.

On the slopes of the western part of the Cascade Range and throughout most of the Coast Range, summers are cool and moist and the growing season is short to medium. The winters are cold and moist, and there are short periods of snow cover. Plant growth and the kinds of plants that are included in the climax plant community are quite varied. This area is within the Olympic and Cascade Mountains and the Northern

Pacific Coast Range, Foothills, and Valleys Major Land Resource Areas of Oregon. The area is divided further into two plant zones in which there are major differences in the soils. At elevations of 200 to 2,600 feet in the Coast Range and 1,700 to 3,000 feet in the Cascade Range, the soils are developing under a native plant community that is within the Douglas-fir-western hemlock zone. This environment produces enough plant growth for the development of an umbric epipedon. Leaching has been such that base saturation is not excessively low and there is not sufficient accumulation of aluminum, iron, and organic carbon for spodic horizons to have developed. On younger surfaces, Umbrepts such as Bohannon, Kinney, and Klickitat soils have developed. In some areas where the iron content of the parent material is high, the soils have developed reddish hues and have high chroma; therefore, they are classified as Ochrepts even though the organic matter content otherwise is high enough for them to be classified as Umbrepts. Others, which formed in light-colored parent material, have high value when dry and are also classified as Ochrepts. Blachly and Digger soils are examples of such soils. On older, more stable surfaces, Humults, such as Honeygrove and Peavine soils, have developed (*12*).

At elevations above 3,000 feet in the Cascade Range and 2,600 feet in the Coast Range, the plant composition changes to include noble fir. An umbric epipedon has developed at these elevations, and leaching has not produced albic and spodic horizons in soils that have reaction of more than 4.5. Soils common to these areas are Dystric Cryandepts, which are represented by the Keel and Hummington soils, and Andic Cryochrepts, which are represented by the Cruiser and Holderman soils.

Living organisms, especially the higher plants, are an active factor in soil formation. The nature of the changes they bring about depends mainly on the life processes peculiar to each kind of organism. The kinds of organisms that live on and in the soil are determined in turn by climate and by the parent material, topography, and age of the soil.

Plants provide a cover that reduces erosion and stabilizes the soil surface. Leaves, twigs, roots, and remains of entire plants accumulate on the surface of forest soils and are decomposed by microorganisms, earthworms, and other soil fauna. Plant roots widen cracks in the underlying rock, permitting water to penetrate. The uprooting of trees by wind also mixes soil layers and loosens the underlying material.

Soils have formed under three major types of plant cover. In the xeric soil zone, grass is a prominent member of the plant community, along with mixed conifer and deciduous forest of Oregon white oak, bigleaf maple, and Douglas-fir. The annual dieback of grass roots provides large amounts of organic material. The deciduous trees absorb calcium and other bases and return them to the soil surface annually by leaf fall, thus reducing the effects of leaching. Under these conditions Mollisols such as Malabon soils developed. In the udic soil zone, the proportion of grasses and deciduous trees decreased and the proportion of conifers increased. Organic matter still accumulated; however, bases were absorbed by the conifers and not so readily returned to the soil. Also, the greater precipitation in the udic soil zone has resulted in more leaching of bases.

In this zone soils that have an umbric epipedon, such as Bohannon soils, have formed. In coastal dune terrace areas where the parent material is sandy and where precipitation exceeds 60 inches annually, the plant communities contain primarily conifers such as Sitka spruce, shore pine, and western hemlock. In these areas the presence of large amounts of organic matter and the leaching of bases have produced a high concentration of hydrogen ions and chelation of iron, resulting in the formation of Typic Haplorthods, such as the Bullards soils, on the older surfaces and Entic Haplorthods, such as Netarts soils, on the younger surfaces.

Small animals, earthworms, insects, and microorganisms influence the formation of soils in several ways. They mix organic matter into the mineral soil material and accelerate the decomposition of organic matter by breaking down the remains of plants. Small animals burrow into the soils and mix their layers. Earthworms and other small invertebrates feed on the organic matter in the upper few inches of soil material. They slowly but continually mix the soil material and can alter its chemistry. Bacteria, fungi, and other microorganisms hasten the weathering of rock and the decomposition of organic matter.

In this survey area, conditions generally are favorable for most organisms to function. Earthworms are very common in all areas except the cryic soil zones. Small animals such as gophers and moles are common in the lower, warmer areas, and they are abundant in areas of Kinney and Bohannon soils and in areas of most other medium textured and moderately coarse textured soils as well.

Geomorphic Surfaces and Soil Development

The geomorphic surfaces in the north-central part of the survey area were mapped on high-altitude aerial photographs by Balster and Parsons (*5*).

The surfaces were visually traced throughout part of the survey area that is in the Willamette Valley. Sequential relations among surfaces, stereoscopic observations, and elevation, as well as photo interpretation of tonal patterns, were used to map the surfaces. Each geomorphic surface is named for a locality where that specific surface is well expressed.

The geomorphic surfaces fit a time sequence, but there are exceptions that are noted in the discussion of individual surfaces. Following is a list of the geomorphic surfaces in chronological order, beginning with the youngest: Horseshoe; Ingram; Luckiamute; Winkle; Senecal; Calapooyia; Dolph; Eola.

Steep, broken topography that has some slopes of more than 100 percent characterize the Looney unit. Because of variable stability of the landscape, the soils and surfaces of the Looney unit fit no particular span of time (*5, 14*).

Horseshoe surface.—The Horseshoe surface is the lower of the two flood plains in the area. The Horseshoe surface has low relief and includes the stream channel and associated features such as point bar deposits, channel fillings, and abandoned meanders. The surface generally is underlain by coarse textured or moderately coarse textured alluvium. Many areas of the Horseshoe surface are not vegetated, but some areas support young stands of willows or cottonwoods. In this area elevation is dominantly 10 feet above the normal stream level. Annual flooding inundates the Horseshoe surface. Rapid changes in the Horseshoe landscape result from cutting of new channels, abandonment of older channels, lateral migration of meanders, and downstream movement of alluvial deposits. In some third order valleys, there are not two identifiable flood plains (Horseshoe and Ingram), which attests to the recent age of the surface. The Horseshoe surface began to form only a short time ago, as is shown by the presence of metallic artifacts in the alluvium; therefore, a post-settlement age, since the middle of the 19th century, is reasonable.

The Horseshoe surface is characterized by Fluventic Haploxerolls and Fluventic Haplumbrepts, which formed on dynamic surfaces such as flood plains and consist of unweathered gravelly or sandy sediment. They exhibit little evidence of soil development. Since large dams were built on the upper tributaries, farming has begun in the higher lying areas of this surface. The soils on this surface exhibit some darkening from organic matter in the A horizon and have weak subangular blocky structure in the AC horizon. These soils are so young that they have no diagnostic horizons other than a minimal umbric or mollic epipedons. Among the soils on this surface are those of the Nekoma and Newberg series.

Ingram surface.—The Ingram surface is the higher of the two flood plains in the area. The topography of the Ingram surface is typically undulating. As much as 10 feet of relief is produced by overbank channeling at flood stage (*14*). The bars and channels have an approximate orientation parallel to the stream. The expression of microrelief on the surface is related to the competence of the stream that flowed through the area. Longitudinal stream profiles with segmented gradients also add to the complexity of the Ingram surface as a flood plain. Elevations generally are 10 to 20 feet above the usual level of the stream. The texture of the soils generally is gravelly loam, silt loam, or silty clay loam, although some sandy strata are common.

Radiocarbon dating assigns ages for the sediment associated with the Ingram surface as 550 to 3,290 years old; therefore, the change in the stream system that caused abandonment of the Winkle surface as a flood plain occurred 3,290 to 5,250 years ago, as the latter date is the earliest established for the Winkle surface (*14, 5*). The partial abandonment of the Ingram surface as a flood plain occurred less than 550 years ago, which indicates the dynamic nature of the soil landscape.

Soils that formed in the alluvial sediment of the Ingram surface include Fluvaquentic Haplaquolls, such as Wapato soils; Ultic Haploxerolls, such as Chehalis and Chapman soils; and Fluventic Haploxerolls, such as Newberg and Camas soils. These soils have a mollic epipedon, presumably in part inherited from the alluvial parent material, that has an irregular decrease in organic matter content with depth. Wapato soils have weak to strong structure and have been in place long enough to exhibit evidence of gleying and the oxidation of ferrous iron to ferric iron along a redox gradient to form distinct mottles. Camas and Newberg soils show little development other than accumulation of organic matter in the surface layer. The Chapman and Chehalis soils have a cambic horizon with some evidence of movement of clay but not in amounts sufficient to qualify it as an argillic horizon.

Luckiamute surface.—This surface is on flood plains of small drainageways that contain local alluvium derived from the erosion of material associated with the Bethel, Dolph, Eola, and Looney surfaces. As defined, the concept of the Luckiamute surface includes areas of Horseshoe, Ingram, and Winkle surfaces that are too small to separate at the scale used in mapping.

The topography of the Luckiamute surface is typical of that of flood plains of small streams. Relief is absent except for minor corrugations produced by channeling. A few small alluvial fans that extend out of small valleys are included with the Luckiamute surface and contain sediment composed of material eroded in the immediate source area. As the Luckiamute surface can be directly traced to the Horseshoe and Ingram surfaces, it is assumed that the age of the surface brackets the age of the latter two surfaces where they occur in the larger valleys.

The soils of the Luckiamute surface are discussed along with the description of the Horseshoe and Ingram surfaces, but they include the Linslaw and Noti soils and, in the part of the Coast Range along the Siuslaw River and its tributaries, the Nekoma, Nehalem, and Nestucca soils.

Winkle surface.—The middle to early Holocene Winkle surface is the oldest surface related to the present drainage systems of western Oregon. Most of the Winkle surface has the morphology typical of abandoned flood plains of aggrading streams. The difference in elevation between bars and channels is due largely to the competence of the stream. The braided, overloaded stream channel that deposited sediment associated with the Winkle surface reflects the size of the stream responsible for the formation of the bars and channels. The elevation of the Winkle surface in this area generally is 15 to 30 feet above the usual flow level of the present streams. The sediment is dominated by silt and clay and commonly is underlain by stratified sand and gravel at a depth of 4 to 6 feet.

Sifton soils are gravel bars of the Winkle surface on which ash, deposited either as ashfall or alluvium, filled the interstices between the pebbles. Among the other soils on the Winkle surface are those of the Coburg, Conser, and Salem series.

In the McKenzie Valley the Jimbo soils occur as a nongravelly mantle of ashy and silty alluvium 3 to 6 feet thick uniformly overlying 2 or 3 gravel deposits, indicating that there may have been temporary blockages of the McKenzie River associated with the eruption of Mt. Mazama and subsequent erosion and alluvial redeposition of the ash.

The well drained Malabon and Salem soils are typical of soils that formed in sediment associated with the Winkle surface. This surface has been stable for a sufficient period of time for the Malabon soils to have developed a mollic epipedon with an organic matter profile resulting from pedogenesis rather than from organic matter deposited with the alluvial parent material. Similar terraces along the Siuslaw River and its tributaries in the Coast Range include areas of Eilertsen soils. The nature of the parent material of these soils over time has facilitated the eluviation of clay from the surface to form a fine-textured argillic horizon and the leaching of bases to less than 75 percent base saturation since the early Holocene. Areas of Malabon soils have a gentle bar and channel microrelief, which suggests that the parent material was frequently scoured by overflow during the early stages of soil development.

The Sifton soils, Andic Xerumbrepts, have an umbric epipedon and contain pyroclastic material derived from the eruption of Mt. Mazama. Carbon-14 dates obtained for the Winkle surface span the time of the Mazama eruption. Areas of the sediment are dominated by silt and clay, which commonly are underlain by stratified sand and gravel at a depth of 4 to 6 feet.

The age of the sediment of the Winkle surface, obtained by the carbon-14 method, ranges from a minimum of 5,250 years to a maximum of 10,850 years (*5*). A number of areas of the Winkle surface in the Willamette Valley contain strata of volcanic ash from the eruption of Mt. Mazama.

Senecal surface.—The Senecal surface in the Willamette Valley has been derived from minor incision, with integration of drainage, of the Calapooyia surface, which is the main valley floor (*5*). The stratigraphy of the deposits associated with the Calapooyia and Senecal surfaces has been extensively studied in the southern part of the Willamette Valley. The deposits are considered to be silty and clayey sediment of the Willamette Sound, described by Condon in 1871 (*6,7*). The Senecal episode is preserved as a few terrace remnants along the eastern side of the Willamette Valley, extending from the county line south for about 2 miles to where it converges with and is either replaced or capped by Winkle sediment. Elevation generally is in the range of 340 to 355 feet.

Typical soils of the Senecal surface are those of the Willamette, Woodburn, and Dayton series, but because of a thinning of the Irish Bend silt deposits in this area, only a taxadjunct of the Woodburn series is mapped in the survey area and it is on the better drained relict natural levees (*6*). Subsequently, there are a few remnants of Dayton soils in some of the smaller channels and backswamps that were not scoured and capped with Winkle sediment to form Awbrig and Conser soils.

Calapooyia surface.—The Calapooyia surface in the north-central part of the survey area is at an elevation of 320 to 400 feet. The Calapooyia surface is characterized by low local relief. This nearly flat remnant of the main valley floor declines in a northwesterly direction at about 5 feet per mile. This surface is mantled with the silty late Pleistocene Irish Bend Member of the Willamette Formation (*6*) and in some places by sediment associated with the Winkle and Luckiamute surfaces. This surface contains most of the glacial erratics described by Allison as having been ice-rafted into the Willamette Valley (*2*). Alluvial toe slopes of valley side alluvium, probably of Holocene age, also help to merge the Calapooyia surface with the next higher surface. The Calapooyia surface is considered to be late Pleistocene (*14*).

Dayton soils (Typic Albaqualfs), and Holcomb soils (Mollic Albaqualfs) are extensive on the Calapooyia surface. Holcomb soils, which have a mollic epipedon and a dense clay argillic horizon formed in the Malpass Member of the Willamette Formation. These soils have been stable long enough to be somewhat depleted of bases (*6*). Similar terrace surfaces in coastal areas of Lane County are at elevations of 50 to 600 feet and are occupied by Lint soils.

Dayton soils have an ochric epipedon, a prominent A2 horizon, and a dense silty clay argillic horizon. The master horizons of the Dayton and Holcomb soils are contrasting strata of the Greenback, Malpass, and Irish Band Members of the Willamette Formation. Pedogenic features formed across the lithologic discontinuities include organic matter, clay films, iron mottles and concretions, base eluviation, and structural development (*13*).

Dolph surface.—The Dolph surface is next to the oldest group of landforms in the survey area. Topography of the Dolph surface varies, but the surface is well above the general level of the valley floors. The Dolph surface occurs as remnants of extensive flats that have been dissected to form a rolling topography composed of a complex group of landforms that could be further divided into terraces, pediments, and upland remnants for detailed study (*5*). The shoulders of the valleys that grade to the Luckiamute surface, which is equivalent to the Ingram surface but is underlain by local alluvium, are included in the Dolph surface, while the back slopes, foot slopes, and alluvial toe slopes of the small tributary valleys are included in the concept of the Luckiamute surface and its local alluvium. The Dolph surface is underlain by bedrock, weathered gravel, saprolite, or clay deposits. The weathered gravel under areas of the Dolph surface in this area is derived from Lacomb and Leffler Gravels (*14*). The Dolph surface is considered to be middle Pleistocene on the basis of its position on the landscape and the degree of weathering of the underlying material (*5*). Elevation commonly is 360 to 650 feet in the Veneta, Creswell, and Pleasant Hill areas. Remnants of similar terraces diverge with present stream elevations upstream along the McKenzie River. Most of these are too small to be shown, but areas large enough to be mapped are at an elevation of 1,000 to 1,200 feet in the vicinity of Vida; these are probably remnants of glacial outwash or a lateral moraine from a valley glacier.

The soils representative of those on Dolph surface in the central part of the survey area are the Veneta soils, Ultic Haploxeralfs, and Salkum soils, Xeric Haplohumults, Honeygrove soils, Typic Haplohumults are on the terrace remnants in the Vida area.

Eola surface—The Eola surface consists of erosional remnants of the oldest stable geomorphic surface in the survey area. The crests and saddles of low foothills around the Willamette, lower McKenzie, and Mohawk Valleys are representative of the Eola surface. Relief of the Eola surface is moderate. Typical erosional remnants have rounded hill and valley topography. Local relief is as much as 150 feet. Hanging valleys are common. Slope ranges from 2 to 20 percent, and elevation generally exceeds 550 feet except in the Coast Range.

The Eola surface is considered to be middle to early Pleistocene and was undoubtedly quite extensive; however, late Pleistocene and Holocene erosion, as discussed previously, removed much of this surface so that only small remnants remain. Landforms of the Looney surface generally adjoin the Eola surface and join it to younger, lower lying surfaces.

The Eola surface in the survey area is typified by Jory, Nekia, and Bellpine soils at elevations of less than 1,400 feet in the area adjacent to the Willamette Valley and by Honeygrove and Peavine soils at elevations of 1,200 to 2,800 feet on foothills on the west side of the Cascade Range and 200 to 2,600 feet in the Coast Range. These soils are all Ultisols, and they therefore represent the most advanced stage of weathering and leaching of bases in the survey area. They differ only in that the Jory, Nekia, and Bellpine soils have a xeric moisture regime while the Honeygrove and Peavine soils have an udic moisture regime.

Looney unit—The Looney unit as mapped has no particular age connotation; therefore, it is not considered to be a geomorphic surface (*14*). The terrain of the Looney unit is completely dissected and is predominantly steeply sloping; however, slope exceeds 100 percent in places. Steep, broken topography mapped as the Looney unit can join any other two surfaces, or it can make up large areas of mountainous terrain that is so thoroughly dissected that it contains no recognizable geomorphic surfaces. Erosion is active on much of the Looney unit, and there are some areas of mass movement; however, occasional remnants of some of the oldest geomorphic surfaces in the survey area are present.

The variability in age makes the Looney unit a useful one for mapping areas of mountainous terrain. The mountainous parts of the survey area in the Coast and Cascade Ranges are considered to be of the Looney unit. The Looney unit could be subdivided into several smaller geomorphic units if it were mapped at a larger scale. Three significant gradient breaks are apparent, and these correspond to stable, metastable, and active slopes. Valley floors and small alluvial cones include areas of the Luckiamute surface in the Looney unit. The soils in these areas formed in glacial till and colluvium derived from sandstone, andesite, and basalt mixed with volcanic ash.

Soils representative of the Looney unit in the western part of the survey area are the Bohannon, Digger, Preacher, and Slickrock soils. The Bohannon and Preacher soils (Typic Haplumbrepts), have an umbric epipedon and a cambic horizon. The Slickrock soils are Pachic Haplumbrepts that have an umbric epipedon more than 20 inches thick. The Digger soils are Dystric Eutrochrepts and have only a thin dark-colored surface layer or one that has dry colors too light to qualify it as an umbric epipedon. These soils are on narrow ridgetops and side slopes, where the slope of the surface has cut across the plane of the underlying sandstone strata.

In areas where the surface of the unit roughly parallels the plane of the underlying sandstone and the dip is less than 20 degrees, the surface is more stable; Honeygrove and Peavine soils have formed in these areas where annual precipitation is less than 90 inches. The Blachly and Astoria soils are more common on the surfaces where precipitation ranges from 85 to 120 inches, because the development of an argillic horizon within the control section appears to be inhibited in areas of tuffaceous parent material that has a probable component of surficial volcanic ash weathered under high rainfall, udic conditions. Lint soils on coastal terraces merge with Astoria, Blachly, and Astoria Variant soils on terrace remnants that range from 400 to 1,700 feet in elevation, so a Dolph surface is not readily identifiable on the soil maps in the western part of the survey area.

The soils in the Cascade Range part of the survey area include the Hummington, Keel, Cruiser, and Holderman soils generally above 3,000 feet and the Kinney, Klickitat, and Bohannon soils at 1,100 to 3,500 feet. The characteristics of these soils were discussed in the sections on climate and vegetation.

In xeric areas below 1,200 feet the Looney unit is represented by the Ritner, Steiwer, and Witzel soils. The Ritner soils are moderately deep Dystric Xerochrepts, have high chroma in the epipedon, and have developed on active and metastable slopes of the Looney unit. Steiwer soils are Ultic Haploxerolls that formed on metastable slopes, and the Witzel soils are Ultic Haploxerolls that formed on active slopes of the Looney unit.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Na, K), expressed as a percentage of the exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose. —Noncoherent when dry or moist; does not hold together in a mass.

Friable. —When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm. —When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic. —When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky. —When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard. —When dry, moderatly resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft. —When dry, breaks into powder or individual grains under very slight pressure.

Cemented. —Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Debris flow (mudflow). A mass movement process involving rapid flowage of highly viscous mixtures of debris, water, and entrapped air.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diameter at breast height (DBH). The diameter of a tree 4.5 feet above ground level.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained. —Water is removed from the soil very rapidly. Excessively drained soils are commonly very course textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained. —Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained. —Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained. —Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained. —Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained. —Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained. — Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion. —(geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion. —(accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons having yellow and gray mottles as a result of intermittent waterlogging.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 millimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

0 horizon. —An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon. —The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

A2 horizon. —A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon. —The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of those; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon. —The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A and B horizon. The material of a C horizon may be either like or unlike that in which the solum, the Roman numeral II precedes the letter C.

R layer. —Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below and A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors of predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border. —Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding. —Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation. —Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow. —Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler. —Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation. —Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to premit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity. (soil). The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

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

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

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil science, saprolite is any consolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site curve. A curve or table developed to determine site index.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 100 years is 150 feet, the site index is 150 feet.

Skid trails. Trail or furrow made by log skidding over ground surface.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of 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 plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water supplying capacity. Water stored in the soil at the beginning of plant growth in the spring, plus rainfall not in excess of evapotranspiration, during the growing season, unless runoff.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Yarding. A logging term meaning to move a log from the area it was cut to a landing or loading area.

Yarding, cable. Yarding a log by a suspended cable rather than behind a wheeled or tracked vehicle.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-71 at Canary, OR]

Month	Temperature (degrees F)						Precipitation (inches)				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
January--	50.9	37.0	44.0	66	19	165	14.99	8.84	20.48	21	3.3
February-	54.5	37.8	46.2	71	24	198	10.06	6.88	12.96	15	0.6
March----	55.1	37.2	46.2	75	25	198	10.00	6.00	13.58	17	0.6
April----	58.7	39.0	48.9	79	28	267	5.66	2.91	8.05	12	0.0
May------	63.2	42.7	53.0	87	30	403	3.93	1.84	5.72	10	0.0
June-----	68.0	47.5	57.8	86	35	534	2.29	1.07	3.34	6	0.0
July-----	72.6	48.7	60.7	91	38	642	0.70	0.06	1.18	3	0.0
August---	73.5	49.7	61.6	89	38	670	1.35	0.11	2.24	4	0.0
September	72.3	47.9	60.1	96	33	603	2.77	1.35	3.99	6	0.0
October--	65.8	44.2	55.0	87	30	465	7.34	4.25	10.08	11	0.0
November-	57.4	39.9	48.7	73	25	264	11.39	6.02	16.09	16	0.2
December-	52.2	38.0	45.1	65	24	168	13.64	8.70	18.10	19	1.6
Yearly:											
Average	62.0	42.5	52.3	---	---	---	---	---	---	---	---
Extreme	---	---	---	98	18	---	---	---	---	---	---
Total--	---	---	---	---	---	4577	84.12	74.55	93.38	140	6.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded in the period 1951-72 at Detroit, OR]

Month	Temperature (degrees F)					Average number of growing degree days*	Precipitation (inches)				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--		Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
January--	41.3	27.9	34.6	55	6	32	14.44	7.49	20.51	19	27.4
February-	47.4	30.0	38.7	64	15	66	9.47	5.74	12.81	15	13.0
March----	50.6	30.5	40.6	74	19	88	9.04	5.27	12.40	16	16.1
April----	57.8	34.1	46.0	82	25	198	5.35	3.21	7.26	12	2.6
May------	65.6	40.2	52.9	92	29	400	3.65	2.14	4.98	10	0.2
June-----	72.4	45.9	59.2	96	34	576	2.34	0.78	3.62	7	0.0
July-----	82.1	48.4	65.3	102	38	784	0.47	0.04	0.79	2	0.0
August---	81.4	47.9	64.7	102	37	766	1.26	0.13	2.09	3	0.0
September	75.2	43.2	59.2	98	31	576	2.90	1.10	4.40	5	0.0
October--	63.0	38.0	50.5	87	26	330	7.25	3.47	10.51	11	0.3
November-	50.6	32.9	41.8	69	18	106	11.60	6.20	16.34	15	3.0
December-	42.9	29.6	36.3	58	12	33	14.28	8.74	19.25	18	17.5
Yearly:											
Average	60.9	37.4	49.2	---	---	---	---	---	---	---	---
Extreme	---	---	---	104	3	---	---	---	---	---	---
Total--	---	---	---	---	---	3955	82.05	71.66	92.70	133	80.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded in the period 1951-77 at Eugene, OR]

Month	Temperature (degrees F)					Average number of growing degree days*	Precipitation (inches)				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--		Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
January--	46.6	34.4	40.5	64	15	118	8.89	4.82	12.47	14	5.0
February-	51.4	35.5	43.5	67	23	132	5.05	2.57	7.20	11	0.4
March----	54.7	36.5	45.6	70	25	184	5.34	2.73	7.61	12	1.1
April----	60.3	38.8	49.6	78	29	291	2.53	1.23	3.65	8	0.0
May------	67.5	43.2	55.4	88	32	477	1.93	0.82	2.86	6	0.0
June-----	74.2	48.2	61.2	95	36	636	1.26	0.37	1.99	4	0.0
July-----	82.7	51.1	66.9	101	41	834	0.25	0.00	0.42	1	0.0
August---	81.3	51.1	66.2	99	41	812	0.81	0.02	1.38	2	0.0
September	76.8	47.7	62.3	97	35	669	1.33	0.55	2.01	4	0.0
October--	64.4	42.0	53.2	85	29	409	3.50	1.69	5.05	8	0.0
November-	53.0	38.3	45.7	68	22	192	6.70	2.92	9.91	11	0.6
December-	47.2	35.4	41.3	63	18	107	8.28	3.95	12.00	14	2.0
Yearly:											
Average	63.3	41.9	52.6	---	---	---	---	---	---	---	---
Extreme	---	---	---	101	9	---	---	---	---	---	---
Total--	---	---	---	---	---	4861	45.87	37.93	53.44	95	9.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature (degrees F)		
	24 or lower	28 or lower	32 or lower
[Recorded in the period 1951-71 at Canary, OR]			
Last freezing temperature in spring:			
1 year in 10 later than	February 27	April 20	May 19
2 years in 10 later than	February 13	April 6	May 13
5 years in 10 later than	January 15	March 10	May 2
First freezing temperature in fall:			
1 year in 10 earlier than	November 29	October 23	September 28
2 years in 10 earlier than	December 13	November 6	October 8
5 years in 10 earlier than	January 13	December 1	October 27
[Recorded in the period 1951-72 at Detroit, OR]			
Last freezing temperature in spring:			
1 year in 10 later than	April 11	May 5	May 30
2 years in 10 later than	April 1	April 27	May 24
5 years in 10 later than	March 14	April 13	May 11
First freezing temperature in fall:			
1 year in 10 earlier than	October 27	October 15	September 17
2 years in 10 earlier than	November 8	October 22	September 23
5 years in 10 earlier than	December 1	November 5	October 6

TABLE 2.--FREEZE DATES IN SPRING AND FALL--Continued

Probability	Temperature (degrees F)		
	24 or lower	28 or lower	32 or lower
[Recorded in the period 1951-77 at Eugene, OR]			
Last freezing temperature in spring:			
1 year in 10 later than	March 3	April 14	May 18
2 years in 10 later than	February 18	April 5	May 9
5 years in 10 later than	January 23	March 18	April 21
First freezing temperature in fall:			
1 year in 10 earlier than	November 6	October 21	September 30
2 years in 10 earlier than	November 18	November 2	October 8
5 years in 10 earlier than	December 10	November 26	October 24

TABLE 3.--GROWING SEASON

[The symbol < means less than; > means more than]

Probability	Daily minimum temperature during growing season (degrees F)		
	Higher than 24	Higher than 28	Higher than 32
[Recorded in the period 1951-71 at Canary, OR]			
	Days	Days	Days
9 years in 10	296	210	141
8 years in 10	317	228	154
5 years in 10	>365	263	178
2 years in 10	>365	300	202
1 year in 10	>365	323	214
[Recorded in the period 1951-72 at Detroit, OR]			
	Days	Days	Days
9 years in 10	220	172	120
8 years in 10	235	184	129
5 years in 10	264	206	147
2 years in 10	296	230	164
1 year in 10	315	246	174
[Recorded in the period 1951-77 at Eugene, OR]			
	Days	Days	Days
9 years in 10	266	211	153
8 years in 10	281	224	164
5 years in 10	314	250	185
2 years in 10	>365	276	207
1 year in 10	>365	293	218

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1A	Abiqua silty clay loam, 0 to 3 percent slopes	5,210	0.3
1B	Abiqua silty clay loam, 3 to 5 percent slopes	1,230	0.1
2E	Astoria silt loam, 5 to 30 percent slopes	3,380	0.2
3E	Astoria Variant silt loam, 3 to 30 percent slopes	800	*
3G	Astoria Variant silt loam, 30 to 60 percent slopes	1,500	0.1
4G	Atring-Rock outcrop complex, 30 to 60 percent slopes	1,140	0.1
5	Awbrig silty clay loam	9,890	0.6
6	Awbrig-Urban land complex	350	*
7B	Bandon sandy loam, 0 to 7 percent slopes	240	*
7C	Bandon sandy loam, 7 to 12 percent slopes	220	*
7F	Bandon sandy loam, 12 to 50 percent slopes	270	*
8	Bashaw clay	9,650	0.5
9	Bashaw-Urban land complex	350	*
10	Beaches	1,000	0.1
11C	Bellpine silty clay loam, 3 to 12 percent slopes	15,850	1.0
11D	Bellpine silty clay loam, 12 to 20 percent slopes	58,600	3.3
11E	Bellpine silty clay loam, 20 to 30 percent slopes	38,110	2.1
11F	Bellpine silty clay loam, 30 to 50 percent slopes	27,100	1.5
12E	Bellpine cobbly silty clay loam, 2 to 30 percent slopes	4,230	0.2
13F	Blachly clay loam, 30 to 50 percent slopes	13,400	0.8
13G	Blachly clay loam, 50 to 70 percent slopes	2,960	0.2
14E	Blachly silty clay loam, 3 to 30 percent slopes	7,030	0.4
14F	Blachly silty clay loam, 30 to 50 percent slopes	8,520	0.5
15E	Blachly-McCully clay loams, 3 to 30 percent slopes	23,000	1.3
16D	Bohannon gravelly loam, 3 to 25 percent slopes	15,800	1.0
16F	Bohannon gravelly loam, 25 to 50 percent slopes	27,770	1.6
16H	Bohannon gravelly loam, 50 to 90 percent slopes	92,000	5.2
17	Brallier muck, drained	1,160	0.1
18	Brallier Variant muck	930	0.1
19	Brenner silty clay loam	860	*
20B	Briedwell cobbly loam, 0 to 7 percent slopes	1,780	0.1
21B	Bullards-Ferrelo loams, 0 to 7 percent slopes	510	*
21C	Bullards-Ferrelo loams, 7 to 12 percent slopes	1,560	0.1
21E	Bullards-Ferrelo loams, 12 to 30 percent slopes	1,210	0.1
21G	Bullards-Ferrelo loams, 30 to 60 percent slopes	850	*
22	Camas gravelly sandy loam, occasionally flooded	6,370	0.4
23	Camas-Urban land complex	600	*
24	Chapman loam	3,800	0.2
25	Chapman-Urban land complex	1,070	0.1
26	Chehalis silty clay loam, occasionally flooded	9,300	0.5
27	Chehalis-Urban land complex	710	*
28C	Chehulpum silt loam, 3 to 12 percent slopes	1,870	0.1
28E	Chehulpum silt loam, 12 to 40 percent slopes	440	*
29	Cloquato silt loam	5,170	0.3
30	Cloquato-Urban land complex	230	*
31	Coburg silty clay loam	13,480	0.8
32	Coburg-Urban land complex	2,740	0.2
33	Conser silty clay loam	4,200	0.2
34	Courtney gravelly silty clay loam	2,820	0.2
35D	Cruiser gravelly clay loam, 3 to 25 percent slopes	2,670	0.2
35F	Cruiser gravelly clay loam, 25 to 50 percent slopes	1,710	0.1
35G	Cruiser gravelly clay loam, 50 to 70 percent slopes	360	*
36D	Cumley silty clay loam, 2 to 20 percent slopes	34,000	2.0
37C	Cupola cobbly loam, 3 to 12 percent slopes	2,530	0.1
37E	Cupola cobbly loam, 12 to 30 percent slopes	1,110	0.1
38	Dayton silt loam, clay substratum	4,280	0.2
39E	Digger gravelly loam, 10 to 30 percent slopes	970	0.1
39F	Digger gravelly loam, 30 to 50 percent slopes	3,730	0.2
40H	Digger-Rock outcrop complex, 50 to 85 percent slopes	62,140	3.5
41C	Dixonville silty clay loam, 3 to 12 percent slopes	3,360	0.2
41E	Dixonville silty clay loam, 12 to 30 percent slopes	3,670	0.2
41F	Dixonville silty clay loam, 30 to 50 percent slopes	3,280	0.2
42E	Dixonville-Hazelair-Urban land complex, 12 to 35 percent slopes	640	*
43C	Dixonville-Philomath-Hazelair complex, 3 to 12 percent slopes	11,480	0.6
43E	Dixonville-Philomath-Hazelair complex, 12 to 35 percent slopes	22,890	1.3
44	Dune land	5,870	0.3
45C	Dupee silt loam, 3 to 20 percent slopes	20,190	1.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
46	Eilertsen silt loam	1,590	0.1
47E	Fendall silt loam, 3 to 30 percent slopes	720	*
48	Fluvents, nearly level	9,580	0.5
49E	Formader loam, 3 to 30 percent slopes	4,690	0.3
49G	Formader loam, 30 to 60 percent slopes	5,130	0.3
50G	Formader-Hembre-Klickitat complex, 50 to 80 percent slopes	24,510	1.4
51B	Haflinger-Jimbo complex, 0 to 5 percent slopes	1,890	0.1
52B	Hazelair silty clay loam, 2 to 7 percent slopes	5,680	0.3
52D	Hazelair silty clay loam, 7 to 20 percent slopes	41,510	2.3
53	Heceta fine sand	2,010	0.1
54D	Hembre silt loam, 5 to 25 percent slopes	650	*
54G	Hembre silt loam, 25 to 60 percent slopes	1,030	0.1
55E	Hembre-Klickitat complex, 3 to 30 percent slopes	1,920	0.1
55G	Hembre-Klickitat complex, 30 to 60 percent slopes	1,760	0.1
56	Holcomb silty clay loam	1,560	0.1
57D	Holderman extremely cobbly loam, 5 to 25 percent slopes	490	*
57F	Holderman extremely cobbly loam, 25 to 50 percent slopes	1,900	0.1
57G	Holderman extremely cobbly loam, 50 to 75 percent slopes	1,600	0.1
58D	Honeygrove silty clay loam, 3 to 25 percent slopes	31,050	1.7
58F	Honeygrove silty clay loam, 25 to 50 percent slopes	10,430	0.6
59E	Hullt loam, 2 to 30 percent slopes	480	*
59G	Hullt loam, 30 to 60 percent slopes	400	*
60D	Hummington gravelly loam, 5 to 25 percent slopes	840	*
60F	Hummington gravelly loam, 25 to 50 percent slopes	1,620	0.1
60G	Hummington gravelly loam, 50 to 75 percent slopes	7,530	0.4
61	Jimbo silt loam	2,550	0.1
62B	Jimbo-Haflinger complex, 0 to 5 percent slopes	590	*
63C	Jory silty clay loam, 2 to 12 percent slopes	4,560	0.3
63D	Jory silty clay loam, 12 to 20 percent slopes	6,940	0.4
63E	Jory silty clay loam, 20 to 30 percent slopes	3,130	0.2
64D	Keel cobbly clay loam, 3 to 25 percent slopes	6,390	0.4
64F	Keel cobbly clay loam, 25 to 45 percent slopes	9,300	0.5
64G	Keel cobbly clay loam, 45 to 75 percent slopes	5,060	0.3
65G	Kilchis stony loam, 30 to 60 percent slopes	2,370	0.1
65H	Kilchis stony loam, 60 to 90 percent slopes	7,920	0.4
66D	Kinney cobbly loam, 3 to 20 percent slopes	6,970	0.4
67F	Kinney cobbly loam, 20 to 50 percent north slopes	9,010	0.5
67G	Kinney cobbly loam, 50 to 70 percent north slopes	18,220	1.0
68F	Kinney cobbly loam, 20 to 50 percent south slopes	13,710	0.8
68G	Kinney cobbly loam, 50 to 70 percent south slopes	7,780	0.4
69E	Kinney cobbly loam, slump, 3 to 30 percent slopes	15,530	1.0
70E	Klickitat stony loam, 3 to 30 percent slopes	10,050	0.6
71F	Klickitat stony loam, 30 to 50 percent north slopes	8,350	0.5
71G	Klickitat stony loam, 50 to 75 percent north slopes	37,150	2.1
72F	Klickitat stony loam, 30 to 50 percent south slopes	25,900	1.5
72G	Klickitat stony loam, 50 to 75 percent south slopes	68,800	3.9
73	Linslaw loam	5,700	0.3
74B	Lint silt loam, 0 to 7 percent slopes	1,120	0.1
74C	Lint silt loam, 7 to 12 percent slopes	1,510	0.1
74D	Lint silt loam, 12 to 20 percent slopes	1,860	0.1
74E	Lint silt loam, 20 to 40 percent slopes	1,920	0.1
75	Malabon silty clay loam	15,350	1.0
76	Malabon-Urban land complex	6,420	0.4
77B	Marcola cobbly silty clay loam, 2 to 7 percent slopes	680	*
78	McAlpin silty clay loam	11,860	0.7
79	McBee silty clay loam	5,200	0.3
80F	McCully clay loam, 30 to 50 percent slopes	7,730	0.4
80G	McCully clay loam, 50 to 70 percent slopes	4,210	0.2
81D	McDuff clay loam, 3 to 25 percent slopes	3,010	0.2
81F	McDuff clay loam, 25 to 50 percent slopes	3,000	0.2
81G	McDuff clay loam, 50 to 70 percent slopes	950	0.1
82C	Meda loam, 2 to 12 percent slopes	10,650	0.6
83B	Minniece silty clay loam, 0 to 8 percent slopes	1,420	0.1
84D	Mulkey loam, 5 to 25 percent slopes	230	*
85	Natroy silty clay loam	15,170	1.0
86	Natroy silty clay	2,100	0.1
87	Natroy-Urban land complex	610	*
88	Nehalem silt loam	5,950	0.3
89C	Nekia silty clay loam, 2 to 12 percent slopes	4,860	0.3

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
89D	Nekia silty clay loam, 12 to 20 percent slopes	15,520	1.0
89E	Nekia silty clay loam, 20 to 30 percent slopes	9,760	0.5
89F	Nekia silty clay loam, 30 to 50 percent slopes	7,580	0.4
90	Nekoma silt loam	7,170	0.4
91D	Neskowin silt loam, 12 to 20 percent slopes	560	*
91E	Neskowin silt loam, 20 to 40 percent slopes	830	*
92G	Neskowin-Salander silt loams, 40 to 60 percent slopes	4,350	0.2
93	Nestucca silt loam	5,830	0.3
94C	Netarts fine sand, 3 to 12 percent slopes	1,060	0.1
94E	Netarts fine sand, 12 to 30 percent slopes	420	*
95	Newberg fine sandy loam	8,970	0.5
96	Newberg loam	9,490	0.5
97	Newberg-Urban land complex	930	0.1
98	Noti loam	3,860	0.2
99H	Ochrepts and Umbrepts, very steep	1,070	0.1
100	Oxley gravelly silt loam	2,010	0.1
101	Oxley-Urban land complex	870	*
102C	Panther silty clay loam, 2 to 12 percent slopes	8,400	0.5
103C	Panther-Urban land complex, 2 to 12 percent slopes	440	*
104E	Peavine silty clay loam, 3 to 30 percent slopes	68,800	3.9
104G	Peavine silty clay loam, 30 to 60 percent slopes	124,810	7.0
105A	Pengra silt loam, 1 to 4 percent slopes	5,070	0.3
106A	Pengra-Urban land complex, 1 to 4 percent slopes	780	*
107C	Philomath silty clay, 3 to 12 percent slopes	2,280	0.1
108C	Philomath cobbly silty clay, 3 to 12 percent slopes	2,280	0.1
108F	Philomath cobbly silty clay, 12 to 45 percent slopes	7,090	0.4
109F	Philomath-Urban land complex, 12 to 45 percent slopes	270	*
110	Pits	700	*
111D	Preacher loam, 0 to 25 percent slopes	10,950	0.6
111F	Preacher loam, 25 to 50 percent slopes	25,600	1.4
112G	Preacher-Bohannon-Slickrock complex, 50 to 75 percent slopes	113,500	6.4
113C	Ritner cobbly silty clay loam, 2 to 12 percent slopes	2,940	0.2
113E	Ritner cobbly silty clay loam, 12 to 30 percent slopes	14,880	0.8
113G	Ritner cobbly silty clay loam, 30 to 60 percent slopes	21,340	1.2
114	Riverwash	2,050	0.1
115H	Rock outcrop-Kilchis complex, 30 to 90 percent slopes	3,950	0.2
116G	Rock outcrop-Witzel complex, 10 to 70 percent slopes	1,480	0.1
117E	Salander silt loam, 12 to 30 percent slopes	770	*
118	Salem gravelly silt loam	7,550	0.4
119	Salem-Urban land complex	2,300	0.1
120B	Salkum silt loam, 2 to 6 percent slopes	5,060	0.3
121B	Salkum silty clay loam, 2 to 8 percent slopes	5,160	0.3
121C	Salkum silty clay loam, 8 to 16 percent slopes	2,160	0.1
122	Saturn clay loam	4,210	0.2
123	Sifton gravelly loam	650	*
124D	Slickrock gravelly loam, 3 to 25 percent slopes	1,850	0.1
124F	Slickrock gravelly loam, 25 to 50 percent slopes	1,500	0.1
125C	Steiwer loam, 3 to 12 percent slopes	2,790	0.2
125D	Steiwer loam, 12 to 20 percent slopes	1,000	0.1
125F	Steiwer loam, 20 to 50 percent slopes	1,240	0.1
126F	Tahkenitch loam, 20 to 45 percent slopes	390	*
126G	Tahkenitch loam, 45 to 75 percent slopes	500	*
127C	Urban land-Hazelair-Dixonville complex, 3 to 12 percent slopes	1,450	0.1
128B	Veneta loam, 0 to 7 percent slopes	11,930	0.7
129B	Veneta Variant silt loam, 0 to 7 percent slopes	1,320	0.1
130	Waldo silty clay loam	7,550	0.4
131C	Waldport fine sand, 0 to 12 percent slopes	1,700	0.1
131E	Waldport fine sand, 12 to 30 percent slopes	1,000	0.1
131G	Waldport fine sand, 30 to 70 percent slopes	650	*
132E	Waldport fine sand, thin surface, 0 to 30 percent slopes	2,110	0.1
133C	Waldport-Urban land complex, 0 to 12 percent slopes	250	*
134	Wapato silty clay loam	2,320	0.1
135C	Willakenzie clay loam, 2 to 12 percent slopes	2,500	0.1
135D	Willakenzie clay loam, 12 to 20 percent slopes	7,320	0.4
135E	Willakenzie clay loam, 20 to 30 percent slopes	6,490	0.4
135F	Willakenzie clay loam, 30 to 50 percent slopes	10,610	0.6
136	Willanch fine sandy loam	870	*
137F	Winberry very gravelly loam, 10 to 45 percent slopes	560	*

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
138E	Witzel very cobbly loam, 3 to 30 percent slopes	5,780	0.3
138G	Witzel very cobbly loam, 30 to 75 percent slopes	6,680	0.4
139	Woodburn silt loam	215	*
140	Yaquina loamy fine sand	2,400	0.1
141	Yaquina-Urban land complex	260	*
142G	Yellowstone-Rock outcrop complex, 10 to 60 percent slopes	1,560	0.1
	Bodies of water less than 40 acres in size	7,500	0.4
	Total	1,776,545	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only the soils suited to crops and pasture are listed]

Soil name and map symbol	Pasture		Sweet corn		Snap beans		Winter wheat		Filberts		Strawberries	
	N	I	N	I	N	I	N	I	N	I	N	I
	AUM*	AUM*	Ton	Ton	Bu	Bu	Bu	Bu	Ton	Ton	Crate	Crate
1A------------------------ Abiqua	10	18	---	9	---	330	85	---	0.8	---	---	27
1B------------------------ Abiqua	10	18	---	9	---	330	85	---	0.8	---	---	27
2E------------------------ Astoria	12	17	---	---	---	---	---	---	---	---	---	--
4G------------------------ Atring-Rock outcrop	4	---	---	---	---	---	---	---	---	---	---	--
5------------------------- Awbrig	8	12	---	4.5	---	200	---	---	---	---	---	--
7B, 7C-------------------- Bandon	7	10	---	---	---	---	---	---	---	---	---	--
7F------------------------ Bandon	3	---	---	---	---	---	---	---	---	---	---	--
8------------------------- Bashaw	8	12	---	---	---	---	---	---	---	---	---	--
11C----------------------- Bellpine	6	15	---	7	---	---	65	---	0.6	---	---	23
11D----------------------- Bellpine	6	14	---	6	---	---	65	---	0.6	---	---	23
11E----------------------- Bellpine	6	---	---	---	---	---	60	---	0.6	---	---	--
11F----------------------- Bellpine	4	---	---	---	---	---	40	---	---	---	---	--
12E----------------------- Bellpine	6	---	---	---	---	---	---	---	---	---	---	--
13F----------------------- Blachly	9	---	---	---	---	---	---	---	---	---	---	--
13G----------------------- Blachly	6	---	---	---	---	---	---	---	---	---	---	--
15E----------------------- Blachly-McCully	10	16	---	---	---	---	---	---	0.6	---	---	--
16D, 16F------------------ Bohannon	7	---	---	---	---	---	---	---	---	---	---	--
16H----------------------- Bohannon	4	---	---	---	---	---	---	---	---	---	---	--
17------------------------ Brallier	12	12										
19------------------------ Brenner	7	14	---	---	---	---	---	---	---	---	---	--
20B----------------------- Briedwell	8	14	---	6	---	267	60	---	0.6	---	---	--

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Pasture		Sweet corn		Snap beans		Winter wheat		Filberts		Strawberries	
	N	I	N	I	N	I	N	I	N	I	N	I
	AUM*	AUM*	Ton	Ton	Bu	Bu	Bu	Bu	Ton	Ton	Crate	Crate
21B----------------------- Bullards-Ferrelo	8	12	---	---	---	---	---	---	---	---	---	---
21C----------------------- Bullards-Ferrelo	8	12	---	---	---	---	---	---	---	---	---	---
21E----------------------- Bullards-Ferrelo	8	---	---	---	---	---	---	---	---	---	---	---
21G----------------------- Bullards-Ferrelo	6	---	---	---	---	---	---	---	---	---	---	---
22------------------------ Camas	5	12	---	6	---	200	20	---	---	---	---	---
24------------------------ Chapman	10	16	---	9	---	330	100	---	0.8	---	---	335
26------------------------ Chehalis	12	18	---	9.0	---	400	100	---	0.8	---	---	330
28C----------------------- Chehulpum	3	6	---	---	---	---	---	45	---	---	---	---
28E----------------------- Chehulpum	2	---	---	---	---	---	---	---	---	---	---	---
29------------------------ Cloquato	12	18	---	9	---	400	100	---	0.8	---	---	335
31------------------------ Coburg	10	15	---	9	---	330	80	---	0.8	---	---	250
33------------------------ Conser	10	15	---	8	---	270	55	---	0.6	---	---	170
34------------------------ Courtney	8	12	---	4	---	270	---	---	---	---	---	---
35D, 35F------------------ Cruiser	3	---	---	---	---	---	---	---	---	---	---	---
35G----------------------- Cruiser	2	---	---	---	---	---	---	---	---	---	---	---
36D----------------------- Cumley	12	17	---	---	---	---	---	---	0.5	---	---	---
37C, 37E------------------ Cupola	6	10	---	---	---	---	---	---	---	---	---	---
38------------------------ Dayton	8	12	---	---	---	---	---	---	---	---	---	---
39E, 39F------------------ Digger	5	---	---	---	---	---	---	---	---	---	---	---
40H----------------------- Digger-Rock outcrop	2	---	---	---	---	---	---	---	---	---	---	---
41C----------------------- Dixonville	6	14	---	6	---	220	50	---	0.5	---	---	220
41E----------------------- Dixonville	6	14	---	---	---	---	50	---	0.5	---	---	220

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Pasture		Sweet corn		Snap beans		Winter wheat		Filberts		Strawberries	
	N	I	N	I	N	I	N	I	N	I	N	I
	AUM*	AUM*	Ton	Ton	Bu	Bu	Bu	Bu	Ton	Ton	Crate	Crate
41F----------------------- Dixonville	6	---	---	---	---	---	---	---	---	---	---	---
43C----------------------- Dixonville-Philomath-Hazelair	4	---	---	---	---	---	---	---	---	---	---	---
43E----------------------- Dixonville-Philomath-Hazelair	4	---	---	---	---	---	---	---	---	---	---	---
45C----------------------- Dupee	8	15	---	8	---	---	40	---	0.6	---	---	250
46------------------------ Eilertsen	12	18	---	---	---	270	---	---	---	---	---	---
49E----------------------- Formader	6	---	---	---	---	---	---	---	---	---	---	---
49G----------------------- Formader	5	---	---	---	---	---	---	---	---	---	---	---
51B----------------------- Haflinger-Jimbo	5	10	---	---	---	---	---	---	---	---	---	---
52B----------------------- Hazelair	6	15	---	---	---	---	40	---	---	---	---	---
52D----------------------- Hazelair	7	15	---	---	---	---	40	---	---	---	---	---
53------------------------ Heceta	2	4	---	---	---	---	---	---	---	---	---	---
56------------------------ Holcomb	10	16	---	7	---	330	65	---	---	---	---	---
57D, 57F------------------ Holderman	2	---	---	---	---	---	---	---	---	---	---	---
57G----------------------- Holderman	1	---	---	---	---	---	---	---	---	---	---	---
58D, 58F------------------ Honeygrove	12	17	---	---	---	---	---	---	0.8	---	---	---
59E----------------------- Hullt	8	16	---	---	---	---	50	---	---	---	---	---
60D, 60F------------------ Hummington	2	---	---	---	---	---	---	---	---	---	---	---
60G----------------------- Hummington	1	---	---	---	---	---	---	---	---	---	---	---
61------------------------ Jimbo	10	18	---	9	---	330	85	---	1.1	1.3	---	280
62B----------------------- Jimbo-Haflinger	6	15	---	---	---	270	50	---	0.8	---	---	220
63C----------------------- Jory	8	15	---	8	---	330	75	---	0.7	---	---	235

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Pasture		Sweet corn		Snap beans		Winter wheat		Filberts		Strawberries	
	N	I	N	I	N	I	N	I	N	I	N	I
	AUM*	AUM*	Ton	Ton	Bu	Bu	Bu	Bu	Ton	Ton	Crate	Crate
63D Jory	8	15	---	7	---	270	75	---	0.6	---	---	235
63E Jory	8	15	---	5	---	---	60	---	0.6	---	---	220
64D, 64F Keel	3	---	---	---	---	---	---	---	---	---	---	---
64G Keel	2	---	---	---	---	---	---	---	---	---	---	---
65G Kilchis	2	---	---	---	---	---	---	---	---	---	---	---
65H Kilchis	1	---	---	---	---	---	---	---	---	---	---	---
66D, 67F Kinney	8	---	---	---	---	---	---	---	---	---	---	---
67G Kinney	6	---	---	---	---	---	---	---	---	---	---	---
68F Kinney	8	---	---	---	---	---	---	---	---	---	---	---
68G Kinney	6	---	---	---	---	---	---	---	---	---	---	---
69E Kinney	10	15	---	---	---	---	---	---	---	---	---	---
70E Klickitat	6	---	---	---	---	---	---	---	---	---	---	---
71F Klickitat	4	---	---	---	---	---	---	---	---	---	---	---
71G Klickitat	2	---	---	---	---	---	---	---	---	---	---	---
72F Klickitat	4	---	---	---	---	---	---	---	---	---	---	---
72G Klickitat	2	---	---	---	---	---	---	---	---	---	---	---
73 Linslaw	8	16	---	8	---	330	60	---	0.6	---	---	220
74B, 74C Lint	12	18	---	---	---	---	---	---	---	---	---	280
74D Lint	10	---	---	---	---	---	---	---	---	---	---	---
74E Lint	8	---	---	---	---	---	---	---	---	---	---	---
75 Malabon	10	18	---	9	---	400	100	---	1.0	---	---	335
77B Marcola	8	12	---	6	---	270	50	---	0.6	---	---	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Pasture		Sweet corn		Snap beans		Winter wheat		Filberts		Strawberries	
	N	I	N	I	N	I	N	I	N	I	N	I
	AUM*	AUM*	Ton	Ton	Bu	Bu	Bu	Bu	Ton	Ton	Crate	Crate
78 McAlpin	9	15	---	8	---	270	65	---	0.8	---	---	170
79 McBee	10	16	---	9	---	400	65	---	0.8	---	---	170
80F McCully	9	---	---	---	---	---	---	---	---	---	---	---
80G McCully	6	---	---	---	---	---	---	---	---	---	---	---
81D, 81F McDuff	7	---	---	---	---	---	---	---	---	---	---	---
81G McDuff	4	---	---	---	---	---	---	---	---	---	---	---
82C Meda	7.5	15	---	---	---	---	---	---	---	---	---	---
83B Minniece	10	12	---	---	---	---	---	---	---	---	---	---
84D Mulkey	3	---	---	---	---	---	---	---	---	---	---	---
85, 86 Natroy	8	12	---	---	---	---	---	---	---	---	---	---
88 Nehalem	9	18	---	---	---	270	---	---	---	---	---	220
89C, 89D Nekia	6	14	---	7	---	235	65	---	0.6	---	---	235
89E Nekia	6	---	---	---	---	---	60	---	0.6	---	---	---
89F Nekia	4	---	---	---	---	---	---	---	---	---	---	---
90 Nekoma	8	18	---	---	---	270	---	---	---	---	---	220
91D Neskowin	6	---	---	---	---	---	---	---	---	---	---	---
91E Neskowin	4	---	---	---	---	---	---	---	---	---	---	---
93 Nestucca	8	16	---	---	---	270	---	---	---	---	---	---
95, 96 Newberg	7	18	---	9	---	330	75	---	0.8	---	---	280
98 Noti	6	14	---	---	---	---	---	---	---	---	---	---
100 Oxley	7	15	---	6	---	330	55	---	---	---	---	---
102C Panther	5	---	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Pasture		Sweet corn		Snap beans		Winter wheat		Filberts		Strawberries	
	N	I	N	I	N	I	N	I	N	I	N	I
	AUM*	AUM*	Ton	Ton	Bu	Bu	Bu	Bu	Ton	Ton	Crate	Crate
104E, 104G----------------- Peavine	7	14	---	---	---	---	---	---	0.6	---	---	---
105A----------------------- Pengra	9	16	---	7	---	270	65	---	---	---	---	170
107C, 108C, 108F----------- Philomath	4	8	---	---	---	---	---	---	---	---	---	---
111D----------------------- Preacher	10	16	---	---	---	---	---	---	---	---	---	---
111F----------------------- Preacher	8	---	---	---	---	---	---	---	---	---	---	---
112G----------------------- Preacher-Bohannon-Slickrock	6	---	---	---	---	---	---	---	---	---	---	---
113C----------------------- Ritner	6	14	---	---	---	---	---	---	---	---	---	---
113E----------------------- Ritner	5	---	---	---	---	---	---	---	---	---	---	---
113G----------------------- Ritner	4	---	---	---	---	---	---	---	---	---	---	---
117E----------------------- Salander	2	---	---	---	---	---	---	---	---	---	---	---
118------------------------ Salem	9	18	---	9	---	400	75	---	0.6	---	---	280
120B, 121B----------------- Salkum	7	16	---	8	---	330	80	---	0.8	---	---	280
121C----------------------- Salkum	7	16	---	7	---	330	75	---	0.6	---	---	280
122------------------------ Saturn	9	15	---	6	---	270	---	---	0.6	---	---	---
123------------------------ Sifton	5	12	---	7	---	330	50	---	0.6	---	---	220
124D, 124F----------------- Slickrock	9	16	---	---	---	---	---	---	---	---	---	---
125C----------------------- Steiwer	6	15	---	6	---	200	50	---	0.6	---	---	170
125D----------------------- Steiwer	5	12	---	---	---	---	50	---	0.6	---	---	170
125F----------------------- Steiwer	4	---	---	---	---	---	---	---	---	---	---	---
126F----------------------- Tahkenitch	6	---	---	---	---	---	---	---	---	---	---	---
126G----------------------- Tahkenitch	4	---	---	---	---	---	---	---	---	---	---	---
128B----------------------- Veneta	10	17	---	7	---	330	85	---	0.8	---	---	280

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Pasture		Sweet corn		Snap beans		Winter wheat		Filberts		Strawberries	
	N	I	N	I	N	I	N	I	N	I	N	I
	AUM*	AUM*	Ton	Ton	Bu	Bu	Bu	Bu	Ton	Ton	Crate	Crate
129B: Veneta Variant	10	17	---	6	---	330	50	---	0.8	---	---	280
130: Waldo	8	15	---	6	---	200	50	---	---	---	---	---
131C: Waldport	3	6	---	---	---	---	---	---	---	---	---	---
131E, 131G: Waldport	3	6	---	---	---	---	---	---	---	---	---	---
134: Wapato	8	15	---	6	---	270	50	---	---	---	---	---
135C, 135D: Willakenzie	7	16	---	7	---	270	80	---	0.6	---	---	270
135E: Willakenzie	7	---	---	---	---	---	60	---	---	---	---	---
135F: Willakenzie	4	---	---	---	---	---	---	---	---	---	---	---
136: Willanch	6	8	---	---	---	---	---	---	---	---	---	---
137F: Winberry	1	---	---	---	---	---	---	---	---	---	---	---
138E: Witzel	4	---	---	---	---	---	---	---	---	---	---	---
138G: Witzel	2	---	---	---	---	---	---	---	---	---	---	---
139: Woodburn	10	18	---	9	---	400	100	---	0.8	---	---	280
140: Yaquina	4	8	---	---	---	---	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Management concerns				Potential productivity		Trees to plant
	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
1A, 1B------------------- Abiqua	Moderate	Slight	Slight	Severe	Douglas-fir---------	152	Douglas-fir.
2E----------------------- Astoria	Slight	Slight	Slight	Severe	Douglas-fir--------- Western hemlock-----	170 ---	Douglas-fir, western hemlock, western redcedar.
3E----------------------- Astoria Variant	Moderate	Slight	Slight	Severe	Douglas-fir--------- Western hemlock-----	170 ---	Douglas-fir, western hemlock, western redcedar.
3G----------------------- Astoria Variant	Severe	Slight	Slight	Severe	Douglas-fir--------- Western hemlock-----	170 ---	Douglas-fir, western hemlock, western redcedar.
4G*:							
Atring-------------------	Severe	Moderate	Moderate	Moderate	Douglas-fir--------- Oregon white oak----	120 ---	Douglas-fir, ponderosa pine.
Rock outcrop.							
7B----------------------- Bandon	Moderate	Moderate	Moderate	Moderate	Douglas-fir--------- Sitka spruce-------- Western hemlock-----	138 --- ---	Douglas-fir, Sitka spruce, western hemlock, shore pine.
7C----------------------- Bandon	Moderate	Moderate	Moderate	Moderate	Douglas-fir--------- Sitka spruce-------- Western hemlock-----	138 --- ---	Douglas-fir, Sitka spruce, western hemlock, shore pine.
7F----------------------- Bandon	Severe	Moderate	Moderate	Moderate	Douglas-fir--------- Sitka spruce-------- Western hemlock-----	138 --- ---	Douglas-fir, Sitka spruce, western hemlock, shore pine.
11C---------------------- Bellpine	Moderate	Slight	Slight	Slight	Douglas-fir--------- Oregon white oak----	155 ---	Douglas-fir.
11D, 11E----------------- Bellpine	Moderate	Slight	Slight	Slight	Douglas-fir--------- Oregon white oak----	155 ---	Douglas-fir.
11F---------------------- Bellpine	Moderate	Slight	Slight	Slight	Douglas-fir--------- Oregon white oak----	155 ---	Douglas-fir.
12E---------------------- Bellpine	Moderate	Slight	Slight	Slight	Douglas-fir---------	155	Douglas-fir.
13F---------------------- Blachly	Moderate	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	148 ---	Douglas-fir.
13G---------------------- Blachly	Severe	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	148 ---	Douglas-fir.
14E---------------------- Blachly	Moderate	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	165 ---	Douglas-fir.
14F---------------------- Blachly	Moderate	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	165 ---	Douglas-fir.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity		Trees to plant
	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
15E*:							
Blachly	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	148 ---	Douglas-fir.
McCully	Moderate	Slight	Slight	Severe	Douglas-fir Western hemlock	147 ---	Douglas-fir, western hemlock.
16D Bohannon	Moderate	Slight	Moderate	Moderate	Douglas-fir Western hemlock	155 ---	Douglas-fir, western hemlock.
16F Bohannon	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	155 ---	Douglas-fir, western hemlock.
16H Bohannon	Severe	Slight	Slight	Moderate	Douglas-fir Western hemlock	155 ---	Douglas-fir, western hemlock.
20B Briedwell	Slight	Moderate	Moderate	Severe	Douglas-fir Oregon white oak	135 ---	Douglas-fir.
21B*, 21C*, 21E*:							
Bullards	Slight	Moderate	Moderate	Moderate	Douglas-fir Sitka spruce Western hemlock	144 --- ---	Douglas-fir, Sitka spruce, western hemlock.
Ferrelo	Slight	Slight	Moderate	Moderate	Douglas-fir Sitka spruce Western hemlock	144 --- ---	Douglas-fir, western hemlock, Sitka spruce.
21G*:							
Bullards	Moderate	Moderate	Moderate	Moderate	Douglas-fir Sitka spruce Western hemlock	144 --- ---	Douglas-fir, Sitka spruce, western hemlock.
Ferrelo	Slight	Slight	Moderate	Moderate	Douglas-fir Sitka spruce Western hemlock	144 --- ---	Douglas-fir, Sitka spruce, Western hemlock.
35D Cruiser**	Moderate	Slight	Slight	Slight	Douglas-fir Noble fir Western hemlock	135 --- ---	Douglas-fir, western hemlock, Pacific silver fir, noble fir.
35F Cruiser**	Moderate	Slight	Slight	Slight	Douglas-fir Noble fir Western hemlock	135 --- ---	Douglas-fir, western hemlock, Pacific silver fir, noble fir.
35G Cruiser**	Severe	Slight	Slight	Slight	Douglas-fir Noble fir Western hemlock	135 --- ---	Douglas-fir, western hemlock, Pacific silver fir, noble fir.
36D Cumley	Severe	Slight	Severe	Severe	Douglas-fir Western hemlock	154 ---	Douglas-fir.
37C Cupola	Slight	Moderate	Moderate	Moderate	Douglas-fir Western hemlock	124 ---	Douglas-fir, western hemlock.
37E Cupola	Moderate	Moderate	Moderate	Moderate	Douglas-fir Western hemlock	124 ---	Douglas-fir, western hemlock.
39E Digger	Moderate	Moderate	Moderate	Moderate	Douglas-fir Western hemlock Red alder Bigleaf maple	145 --- --- ---	Douglas-fir.
39F Digger	Moderate	Moderate	Moderate	Moderate	Douglas-fir Western hemlock Red alder Bigleaf maple	145 --- --- ---	Douglas-fir.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity		Trees to plant
	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
40H*:							
Digger	Severe	Severe	Moderate	Moderate	Douglas-fir Western hemlock Red alder Bigleaf maple	145 --- --- ---	Douglas-fir.
Rock outcrop.							
41C, 41E Dixonville	Moderate	Moderate	Slight	Severe	Douglas-fir Oregon white oak	120 ---	Douglas-fir, Ponderosa pine.
41F Dixonville	Severe	Moderate	Slight	Severe	Douglas-fir Oregon white oak	120 ---	Douglas-fir, Ponderosa pine.
46 Eilertsen	Moderate	Slight	Slight	Moderate	Douglas-fir Western redcedar Western hemlock Red alder	159 --- --- ---	Douglas-fir.
47E Fendall	Slight	Slight	Moderate	Moderate	Douglas-fir Western redcedar Red alder Western hemlock Sitka spruce	150 --- --- --- ---	Douglas-fir, western hemlock, Sitka spruce.
49E Formader	Moderate	Slight	Moderate	Moderate	Douglas-fir Western hemlock	162 ---	Douglas-fir, western hemlock.
49G Formader	Moderate	Moderate	Slight	Moderate	Douglas-fir Western hemlock	162 ---	Douglas-fir, western hemlock.
50G*:							
Formader	Severe	Moderate	Slight	Moderate	Douglas-fir Western hemlock	162 ---	Douglas-fir, western hemlock.
Hembre	Severe	Slight	Slight	Moderate	Douglas-fir Western hemlock	170 ---	Douglas-fir, western hemlock.
Klickitat	Severe	Moderate	Slight	Moderate	Douglas-fir Western hemlock	144 ---	Douglas-fir, western hemlock.
51B*:							
Haflinger	Slight	Moderate	Moderate	Slight	Douglas-fir Incense cedar	147 ---	Douglas-fir.
Jimbo	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	162 ---	Douglas-fir, western hemlock.
54D Hembre	Slight	Slight	Slight	Moderate	Douglas-fir Western hemlock	170 ---	Douglas-fir, western hemlock.
54G Hembre	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	170 ---	Douglas-fir, western hemlock.
55E*:							
Hembre	Slight	Slight	Slight	Moderate	Douglas-fir Western hemlock	170 ---	Douglas-fir, western hemlock.
Klickitat	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	144 ---	Douglas-fir, western hemlock.
55G*:							
Hembre	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	170 ---	Douglas-fir, western hemlock.
Klickitat	Moderate	Slight	Moderate	Moderate	Douglas-fir Western hemlock	144 ---	Douglas-fir, western hemlock.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity		Trees to plant
	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
57D----- Holderman**	Slight	Moderate	Slight	Slight	Douglas-fir Western hemlock Noble fir Pacific silver fir Western white pine	120 --- --- --- ---	Douglas-fir, western hemlock, noble fir, Pacific silver fir.
57F----- Holderman**	Moderate	Moderate	Slight	Slight	Douglas-fir Western hemlock Noble fir Pacific silver fir Western white pine	120 --- --- --- ---	Douglas-fir, western hemlock, noble fir, Pacific silver fir.
57G----- Holderman**	Severe	Moderate	Slight	Slight	Douglas-fir Western hemlock Noble fir Pacific silver fir Wetern white pine	120 --- --- --- ---	Douglas-fir, western hemlock, noble fir, Pacific silver fir.
58D----- Honeygrove	Slight	Slight	Slight	Moderate	Douglas-fir Western hemlock	165 ---	Douglas-fir, western hemlock.
58F----- Honeygrove	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	165 ---	Douglas-fir, western hemlock.
59E----- Hullt	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock Bigleaf maple	165 --- ---	Douglas-fir, western hemlock.
59G----- Hullt	Severe	Slight	Slight	Moderate	Douglas-fir Western hemlock Bigleaf maple	165 --- ---	Douglas-fir, western hemlock.
60D, 60F----- Hummington**	Moderate	Moderate	Moderate	Moderate	Douglas-fir Western hemlock Noble fir Pacific silver fir	145 --- --- ---	Douglas-fir, western hemlock, noble fir, Pacific silver fir.
60G----- Hummington**	Severe	Moderate	Moderate	Moderate	Douglas-fir Western hemlock Noble fir Pacific silver fir	145 --- --- ---	Douglas-fir, western hemlock, noble fir, Pacific silver fir.
61----- Jimbo	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	162 ---	Douglas-fir, western hemlock.
62B*:							
Jimbo-----	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	162 ---	Douglas-fir, western hemlock.
Haflinger-----	Slight	Moderate	Moderate	Slight	Douglas-fir Incense cedar	147 ---	Douglas-fir.
63C, 63D----- Jory	Slight	Slight	Slight	Moderate	Douglas-fir	155	Douglas-fir.
63E----- Jory	Slight	Slight	Slight	Moderate	Douglas-fir	155	Douglas-fir.
64D----- Keel**	Moderate	Slight	Slight	Slight	Douglas-fir Western hemlock Noble fir	139 --- ---	Douglas-fir, western hemlock, noble fir.
64F----- Keel**	Moderate	Slight	Slight	Slight	Douglas-fir Western hemlock Noble fir	139 --- ---	Douglas-fir, western hemlock, noble fir.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
64G------------------------- Keel**	Severe	Slight	Slight	Slight	Douglas-fir--------- Western hemlock----- Noble fir-----------	139 --- ---	Douglas-fir, western hemlock, noble fir.
65G------------------------- Kilchis	Moderate	Severe	Severe	Moderate	Douglas-fir--------- Western hemlock-----	110 ---	Douglas-fir.
65H------------------------- Kilchis	Severe	Severe	Severe	Moderate	Douglas-fir--------- Western hemlock-----	110 ---	Douglas-fir.
66D------------------------- Kinney	Moderate	Moderate	Slight	Moderate	Douglas-fir--------- Western hemlock-----	150 ---	Douglas-fir, western hemlock.
67F, 67G------------------- Kinney	Severe	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	162 ---	Douglas fir, western hemlock.
68F, 68G------------------- Kinney	Severe	Moderate	Slight	Moderate	Douglas-fir--------- Western hemlock-----	150 ---	Douglas-fir, western hemlock.
69E------------------------- Kinney	Moderate	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	168 ---	Douglas-fir, western hemlock.
70E------------------------- Klickitat	Moderate	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	144 ---	Douglas-fir, western hemlock.
71F------------------------- Klickitat	Moderate	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	156 ---	Douglas-fir, western hemlock.
71G------------------------- Klickitat	Severe	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	156 ---	Douglas-fir, western hemlock.
72F------------------------- Klickitat	Moderate	Moderate	Slight	Moderate	Douglas-fir--------- Western hemlock-----	140 ---	Douglas-fir, western hemlock.
72G------------------------- Klickitat	Severe	Moderate	Slight	Moderate	Douglas-fir--------- Western hemlock-----	140 ---	Douglas-fir, western hemlock.
74B, 74C, 74D------------- Lint	Moderate	Moderate	Moderate	Severe	Douglas-fir--------- Sitka spruce-------- Western hemlock-----	160 --- ---	Douglas-fir, Sitka spruce, western hemlock.
74E------------------------- Lint	Severe	Moderate	Moderate	Severe	Douglas-fir--------- Sitka spruce-------- Western hemlock-----	160 --- ---	Douglas-fir, Sitka spruce, western hemlock.
78-------------------------- McAlpin	Severe	Slight	Slight	Severe	Douglas-fir--------- Ponderosa pine------ Red alder----------- Oregon ash----------	159 --- --- ---	Douglas-fir, ponderosa pine.
80F------------------------- McCully	Moderate	Slight	Slight	Severe	Douglas-fir--------- Western hemlock-----	162 ---	Douglas-fir, western hemlock.
80G------------------------- McCully	Severe	Slight	Slight	Severe	Douglas-fir--------- Western hemlock-----	162 ---	Douglas-fir, western hemlock.
81D------------------------- McDuff	Slight	Slight	Slight	Moderate	Douglas-fir--------- Bigleaf maple------- Red alder----------- Western hemlock-----	142 --- --- ---	Douglas-fir.
81F------------------------- McDuff	Moderate	Slight	Slight	Moderate	Douglas-fir--------- Bigleaf maple------- Red alder----------- Western hemlock-----	142 --- --- ---	Douglas-fir.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity		Trees to plant
	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
81G----------------------- McDuff	Severe	Slight	Slight	Moderate	Douglas-fir--------- Bigleaf maple------- Red alder----------- Western hemlock-----	142 --- --- ---	Douglas-fir.
82C----------------------- Meda	Slight	Moderate	Slight	Severe	Douglas-fir--------- Western hemlock-----	161 ---	Douglas-fir, western hemlock.
83B----------------------- Minniece	Severe	Severe	Severe	Severe	Douglas-fir--------- Western redcedar---- Western hemlock-----	130 --- ---	Western hemlock, western redcedar.
84D----------------------- Mulkey**	Slight	Moderate	Moderate	Moderate	Noble fir----------- Western hemlock----- Douglas-fir---------	143 --- ---	Douglas-fir, noble fir.
88------------------------ Nehalem	Moderate	Slight	Slight	Severe	Douglas-fir--------- Western hemlock----- Sitka spruce--------	174 --- ---	Douglas-fir, western hemlock, Sitka spruce, western redcedar.
89C----------------------- Nekia	Slight	Moderate	Slight	Moderate	Douglas-fir---------	151	Douglas-fir.
89D----------------------- Nekia	Slight	Moderate	Slight	Moderate	Douglas-fir---------	151	Douglas-fir.
89E----------------------- Nekia	Slight	Moderate	Slight	Moderate	Douglas-fir---------	151	Douglas-fir.
89F----------------------- Nekia	Moderate	Moderate	Slight	Moderate	Douglas-fir---------	151	Douglas-fir.
90------------------------ Nekoma	Moderate	Slight	Slight	Severe	Douglas-fir--------- Western hemlock-----	180 ---	Douglas-fir.
91D----------------------- Neskowin	Moderate	Slight	Slight	Moderate	Sitka spruce-------- Westerm hemlock-----	133 ---	Sitka spruce, western hemlock.
91E----------------------- Neskowin	Moderate	Slight	Slight	Moderate	Sitka spruce-------- Western hemlock-----	133 ---	Sitka spruce, western hemlock.
92G*:							
Neskowin-----------------	Severe	Slight	Slight	Moderate	Sitka spruce-------- Western hemlock-----	133 ---	Sitka spruce, western hemlock.
Salander-----------------	Severe	Slight	Slight	Moderate	Sitka spruce-------- Western hemlock-----	133 ---	Sitka spruce, western hemlock.
94C, 94E------------------ Netarts	Slight	Moderate	Moderate	Moderate	Douglas-fir--------- Western hemlock----- Sitka spruce-------- Shore pine----------	80 --- --- ---	Western hemlock, Sitka spruce, shore pine.
104E---------------------- Peavine	Moderate	Slight	Moderate	Moderate	Douglas-fir--------- Red alder----------- Bigleaf maple------- Western hemlock-----	155 --- --- ---	Douglas-fir, western hemlock.
104G---------------------- Peavine	Severe	Moderate	Slight	Moderate	Douglas-fir--------- Red alder----------- Bigleaf maple------- Western hemlock-----	155 --- --- ---	Douglas-fir, western hemlock.
111D---------------------- Preacher	Moderate	Slight	Slight	Moderate	Douglas-fir--------- Western hemlock-----	181 ---	Douglas-fir, western hemlock.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity		Trees to plant
	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
111F Preacher	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock	181 ---	Douglas-fir, western hemlock.
112G*:							
Preacher	Severe	Slight	Slight	Moderate	Douglas-fir Western hemlock	181 ---	Douglas-fir, western hemlock.
Bohannon	Severe	Moderate	Slight	Moderate	Douglas-fir Western hemlock	155 ---	Douglas-fir, western hemlock.
Slickrock	Severe	Slight	Slight	Moderate	Douglas-fir Western hemlock	195 ---	Douglas-fir, western hemlock.
113C Ritner	Slight	Moderate	Slight	Moderate	Douglas-fir	131	Douglas-fir.
113E Ritner	Moderate	Moderate	Slight	Moderate	Douglas-fir	131	Douglas-fir.
113G Ritner	Severe	Moderate	Slight	Moderate	Douglas-fir	131	Douglas-fir.
117E Salander	Moderate	Slight	Slight	Moderate	Sitka spruce Western hemlock	133 ---	Western hemlock, Sitka spruce.
120B Salkum	Moderate	Slight	Slight	Severe	Douglas-fir Red alder Western hemlock	145 --- ---	Douglas-fir.
121B, 121C Salkum	Moderate	Slight	Slight	Severe	Douglas-fir Western hemlock	145 ---	Douglas-fir.
122 Saturn	Moderate	Moderate	Slight	Moderate	Douglas-fir Western hemlock	162 ---	Douglas-fir, western hemlock.
124D Slickrock	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock Western redcedar	194 --- ---	Douglas-fir, western hemlock.
124F Slickrock	Moderate	Slight	Slight	Moderate	Douglas-fir Western hemlock Western redcedar	194 --- ---	Douglas-fir, western hemlock.
126F Tahkenitch	Moderate	Slight	Moderate	Moderate	Douglas-fir Western hemlock	156 ---	Douglas-fir, western hemlock.
126G Tahkenitch	Severe	Slight	Moderate	Moderate	Douglas-fir Western hemlock	156 ---	Douglas-fir, western hemlock.
128B Veneta	Moderate	Moderate	Slight	Moderate	Douglas-fir Pacific madrone Ponderosa pine Oregon white oak	139 --- --- ---	Douglas-fir, ponderosa pine.
129B Veneta Variant	Moderate	Slight	Slight	Moderate	Douglas-fir Ponderosa pine Oregon white oak Pacific madrone	150 --- --- ---	Douglas-fir, ponderosa pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity		Trees to plant
	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
131C, 131E, 131G---------- Waldport	Moderate	Severe	Slight	Slight	Shore pine---------- Sitka spruce-------- Douglas-fir--------- Western hemlock-----	92 --- --- ---	Shore pine, Sitka spruce, western hemlock.
135C, 135D---------------- Willakenzie	Slight	Slight	Slight	Moderate	Douglas-fir---------	160	Douglas-fir.
135E---------------------- Willakenzie	Slight	Slight	Slight	Moderate	Douglas-fir---------	160	Douglas-fir.
135F---------------------- Willakenzie	Moderate	Slight	Slight	Moderate	Douglas-fir---------	160	Douglas-fir.
137F---------------------- Winberry**	Moderate	Severe	Severe	Slight	Douglas-fir--------- Western hemlock----- Noble fir----------- Pacific silver fir-- Western white pine--	70 --- --- --- ---	Douglas-fir, western hemlock, noble fir, Pacific silver fir.
138E, 138G---------------- Witzel	Moderate	Severe	Moderate	Slight	Douglas-fir--------- Oregon white oak---- Ponderosa pine------	90 --- ---	Ponderosa pine, Douglas-fir.
142G*:							
Yellowstone**------------	Moderate	Severe	Severe	Slight	Douglas-fir--------- Western hemlock----- Noble fir----------- Pacific silver fir-- Western white pine--	86 --- --- --- ---	Douglas-fir, western hemlock, noble fir.
Rock outcrop.							

* See description of the map unit for composition and behavior characteristics of the map unit.

** Based on the 100-year, high elevation site index curve developed by Curtis (8).

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1A Abiqua	Slight	Slight	Slight	Slight	Slight.
1B Abiqua	Slight	Slight	Moderate: slope.	Slight	Slight.
2E Astoria	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
3E Astoria Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
3G Astoria Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
4G*:					
Atring	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop.					
5 Awbrig	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
6*:					
Awbrig	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Urban land.					
7B Bandon	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Severe: thin layer.
7C Bandon	Severe: cemented pan.	Severe: cemented pan.	Severe: slope, cemented pan.	Slight	Severe: thin layer.
7F Bandon	Severe: slope, cemented pan.	Severe: slope, cemented pan.	Severe: slope, cemented pan.	Severe: slope.	Severe: slope, thin layer.
8 Bashaw	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, too clayey.
9*:					
Bashaw	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, too clayey.
Urban land.					
10*. Beaches					
11C Bellpine	Slight	Slight	Severe: slope.	Slight	Moderate: large stones, thin layer.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
11D------------------ Bellpine	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
11E, 11F------------- Bellpine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12E------------------ Bellpine	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
13F, 13G------------- Blachly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
14E------------------ Blachly	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
14F------------------ Blachly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
15E*:					
Blachly--------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
McCully--------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
16D------------------ Bohannon	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Moderate: small stones, large stones, slope.
16F, 16H------------- Bohannon	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
17------------------- Brallier	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
18------------------- Brallier Variant	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
19------------------- Brenner	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
20B------------------ Briedwell	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: large stones, small stones.	Moderate: large stones, dusty.	Severe: large stones, droughty.
21B*:					
Bullards-------------	Slight----------	Slight----------	Moderate: slope.	Slight------------	Moderate: droughty.
Ferrelo--------------	Slight----------	Slight----------	Moderate: slope.	Slight------------	Slight.
21C*:					
Bullards-------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight------------	Moderate: droughty, slope.
Ferrelo--------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight------------	Moderate: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
21E*:					
Bullards	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Ferrelo	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
21G*:					
Bullards	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ferrelo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
22 Camas	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight	Severe: droughty, small stones.
23*:					
Camas	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight	Severe: droughty, small stones.
Urban land.					
24 Chapman	Severe: flooding.	Slight	Slight	Slight	Slight.
25*:					
Chapman	Severe: flooding.	Slight	Slight	Slight	Slight.
Urban land.					
26 Chehalis	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
27*:					
Chehalis	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Urban land.					
28C Chehulpum	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.	Severe: thin layer.
28E Chehulpum	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, thin layer.
29 Cloquato	Severe: flooding.	Moderate: dusty.	Moderate: flooding, dusty.	Moderate: dusty.	Moderate: flooding.
30*:					
Cloquato	Severe: flooding.	Moderate: dusty.	Moderate: flooding, dusty.	Moderate: dusty.	Moderate: flooding.
Urban land.					
31 Coburg	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
32*:					
Coburg	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Urban land.					

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
33-------------------- Conser	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
34-------------------- Courtney	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: small stones, wetness, percs slowly.	Severe: wetness.	Severe: wetness.
35D------------------- Cruiser	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight------------	Moderate: small stones, slope.
35F, 35G-------------- Cruiser	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
36D------------------- Cumley	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Slight------------	Moderate: slope.
37C------------------- Cupola	Moderate: large stones, small stones, percs slowly.	Moderate: large stones, small stones, percs slowly.	Severe: large stones, slope, small stones.	Slight------------	Moderate: small stones, large stones.
37E------------------- Cupola	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.
38-------------------- Dayton	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, erodes easily.	Severe: ponding.
39E------------------- Digger	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
39F------------------- Digger	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
40H*:					
Digger----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop.					
41C------------------- Dixonville	Slight----------	Slight----------	Severe: slope.	Slight------------	Moderate: large stones, thin layer.
41E------------------- Dixonville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
41F------------------- Dixonville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
42E*:					
Dixonville-----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hazelair-------------	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Moderate: wetness, slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
42E*: Urban land.					
43C*: Dixonville	Slight	Slight	Severe: slope.	Slight	Moderate: large stones, thin layer.
Philomath	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, depth to rock.	Moderate: large stones, too clayey.	Severe: thin layer, too clayey.
Hazelair	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness, thin layer.
43E*: Dixonville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Philomath	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Moderate: large stones, too clayey.	Severe: slope, thin layer, too clayey.
Hazelair	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Moderate: wetness, slope.	Severe: slope.
44*. Dune land					
45C Dupee	Moderate: slope, wetness, dusty.	Moderate: slope, wetness, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
46 Eilertsen	Slight	Slight	Slight	Severe: erodes easily.	Slight.
47E Fendall	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
48. Fluvents					
49E Formader	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
49G Formader	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
50G*: Formader	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hembre	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Klickitat	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
51B*:					
Haflinger	Severe: flooding.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Moderate: large stones.	Moderate: small stones, large stones, droughty.
Jimbo	Slight	Slight	Moderate: small stones.	Slight	Slight.
52B Hazelair	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, thin layer.
52D Hazelair	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness, slope, thin layer.
53 Heceta	Severe: flooding, ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
54D Hembre	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
54G Hembre	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
55E*:					
Hembre	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Klickitat	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones, slope.	Severe: slope.
55G*:					
Hembre	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Klickitat	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
56 Holcomb	Severe: wetness.	Moderate: wetness, too clayey.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.
57D Holderman	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: small stones.	Severe: small stones, large stones, slope.
57F, 57G Holderman	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope, small stones.	Severe: small stones, large stones, slope.
58D Honeygrove	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
58F Honeygrove	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
59E Hullt	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.	Severe: slope.
59G Hullt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
60D Hummington	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope.
60F, 60G Hummington	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
61 Jimbo	Slight	Slight	Moderate: small stones.	Slight	Slight.
62B*:					
Jimbo	Slight	Slight	Moderate: small stones.	Slight	Slight.
Haflinger	Severe: flooding.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Moderate: large stones.	Moderate: small stones, large stones, droughty.
63C Jory	Slight	Slight	Severe: slope.	Slight	Slight.
63D Jory	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
63E Jory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
64D Keel	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Slight	Moderate: small stones, large stones, slope.
64F, 64G Keel	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
65G, 65H Kilchis	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.	Moderate: large stones.	Severe: droughty, thin layer.
66D Kinney	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight	Moderate: large stones, slope.
67F, 67G, 68F, 68G Kinney	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
69E Kinney	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
70E Klickitat	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones, slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
71F, 71G, 72F, 72G---- Klickitat	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
73------------------- Linslaw	Severe: flooding.	Moderate: wetness, dusty.	Moderate: wetness, dusty.	Moderate: wetness, dusty.	Moderate: wetness.
74B------------------ Lint	Slight----------	Slight----------	Moderate: slope.	Severe: erodes easily.	Slight.
74C------------------ Lint	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
74D------------------ Lint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
74E------------------ Lint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
75------------------- Malabon	Slight----------	Slight----------	Slight----------	Slight------------	Slight.
76*:					
Malabon--------------	Slight----------	Slight----------	Slight----------	Slight------------	Slight.
Urban land.					
77B------------------ Marcola	Moderate: large stones, small stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: large stones.
78------------------- McAlpin	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Slight------------	Slight.
79------------------- McBee	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
80F, 80G------------- McCully	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
81D------------------ McDuff	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight------------	Moderate: slope, thin layer.
81F, 81G------------- McDuff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
82C------------------ Meda	Slight----------	Slight----------	Severe: slope.	Slight------------	Moderate: droughty.
83B------------------ Minniece	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
84D------------------ Mulkey	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
85------------------- Natroy	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
86------------------- Natroy	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding, too clayey.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
87*:					
Natroy	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Urban land.					
88 Nehalem	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
89C Nekia	Slight	Slight	Severe: slope.	Slight	Moderate: large stones, thin layer.
89D Nekia	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
89E, 89F Nekia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
90 Nekoma	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
91D Neskowin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
91E Neskowin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
92G*:					
Neskowin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Salander	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
93 Nestucca	Severe: flooding, wetness.	Moderate: flooding, wetness, percs slowly.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
94C Netarts	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty.
94E Netarts	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: slope.
95 Newberg	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
96 Newberg	Severe: flooding.	Moderate: dusty.	Moderate: flooding.	Moderate: dusty.	Moderate: flooding.
97*:					
Newberg	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Urban land.					
98 Noti	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
99H*:					
Ochrepts.					

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
99H*: Umbrepts.					
100------------------- Oxley	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.	Severe: wetness.	Severe: wetness.
101*:					
Oxley----------------	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.	Severe: wetness.	Severe: wetness.
Urban land.					
102C------------------ Panther	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: slope, wetness, percs slowly.	Severe: wetness.	Severe: wetness.
103C*:					
Panther--------------	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: slope, wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Urban land.					
104E------------------ Peavine	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
104G------------------ Peavine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
105A------------------ Pengra	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
106A*:					
Pengra---------------	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
Urban land.					
107C------------------ Philomath	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.	Severe: thin layer, too clayey.
108C------------------ Philomath	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, depth to rock.	Moderate: large stones, too clayey.	Severe: thin layer, too clayey.
108F------------------ Philomath	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope.	Severe: slope, thin layer, too clayey.
109F*:					
Philomath------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope.	Severe: slope, thin layer, too clayey.
Urban land.					
110*. Pits					

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
111D------------------ Preacher	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight------------	Moderate: slope.
111F------------------ Preacher	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
112G*:					
Preacher-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bohannon-------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Slickrock------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
113C------------------ Ritner	Moderate: large stones, small stones.	Moderate: large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones.
113E------------------ Ritner	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope.
113G------------------ Ritner	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones. slope.
114*. Riverwash					
115H*: Rock outcrop.					
Kilchis--------------	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.	Moderate: large stones.	Severe: droughty, thin layer.
116G*: Rock outcrop.					
Witzel---------------	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope, small stones.	Severe: small stones, large stones, slope.
117E------------------ Salander	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
118------------------- Salem	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.	Moderate: small stones, droughty.
119*:					
Salem----------------	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: dusty.	Moderate: small stones, droughty.
Urban land.					
120B------------------ Salkum	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
121B------------------ Salkum	Slight----------	Slight----------	Moderate: slope.	Slight------------	Slight.
121C------------------ Salkum	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight------------	Moderate: slope.
122------------------- Saturn	Severe: flooding.	Slight----------	Moderate: slope, small stones.	Slight------------	Moderate: droughty.
123------------------- Sifton	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
124D------------------ Slickrock	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight------------	Moderate: small stones, slope.
124F------------------ Slickrock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
125C------------------ Steiwer	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Moderate: dusty.	Moderate: thin layer.
125D------------------ Steiwer	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty, slope.	Severe: slope.
125F------------------ Steiwer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
126F, 126G------------ Tahkenitch	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
127C*: Urban land.					
Hazelair-------------	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness, thin layer.
Dixonville-----------	Slight----------	Slight----------	Severe: slope.	Slight------------	Moderate: large stones, thin layer.
128B------------------ Veneta	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight------------	Slight.
129B------------------ Veneta Variant	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight------------	Slight.
130------------------- Waldo	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
131C------------------ Waldport	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty.
131E------------------ Waldport	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: slope.
131G------------------ Waldport	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
132E------------------ Waldport	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: slope.
133C*:					
Waldport-------------	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty.
133C*: Urban land.					
134------------------- Wapato	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
135C------------------ Willakenzie	Slight----------	Slight----------	Severe: slope.	Slight------------	Moderate: thin layer.
135D------------------ Willakenzie	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
135E, 135F----------- Willakenzie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
136------------------- Willanch	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
137F------------------ Winberry	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.	Severe: small stones, slope, thin layer.
138E------------------ Witzel	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: small stones.	Severe: small stones, large stones, slope.
138G------------------ Witzel	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope, small stones.	Severe: small stones, large stones, slope.
139------------------- Woodburn	Moderate: wetness, dusty.	Moderate: wetness, dusty.	Moderate: wetness, dusty.	Moderate: dusty.	Slight.
140------------------- Yaquina	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
141*:					
Yaquina--------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Urban land.					
142G*:					
Yellowstone----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1A, 1B------------ Abiqua	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
2E---------------- Astoria	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
3E, 3G------------ Astoria Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
4G*:						
Atring-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
5----------------- Awbrig	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
6*:						
Awbrig-----------	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
Urban land.						
7B---------------- Bandon	Severe: cemented pan, cutbanks cave.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Severe: thin layer.
7C---------------- Bandon	Severe: cemented pan, cutbanks cave.	Moderate: slope, cemented pan.	Severe: cemented pan.	Severe: slope.	Moderate: cemented pan, slope.	Severe: thin layer.
7F---------------- Bandon	Severe: cemented pan, cutbanks cave, slope.	Severe: slope.	Severe: cemented pan, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
8----------------- Bashaw	Severe: cutbanks cave, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, too clayey.
9*:						
Bashaw-----------	Severe: cutbanks cave, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, too clayey.
Urban land.						
10*. Beaches						
11C--------------- Bellpine	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones, thin layer.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
11D, 11E, 11F, 12E Bellpine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
13F, 13G, 14E, 14F Blachly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
15E*:						
Blachly	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
McCully	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
16D Bohannon	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Moderate: small stones, large stones, slope.
16F, 16H Bohannon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
17 Brallier	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding.	Severe: ponding, excess humus.
18 Brallier Variant	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding, excess humus.
19 Brenner	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
20B Briedwell	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Severe: large stones, droughty.
21B*:						
Bullards	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
Ferrelo	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
21C*:						
Bullards	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Ferrelo	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
21E*, 21G*:						
Bullards	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ferrelo	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
22----------------- Camas	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
23*:						
Camas------------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: droughty.
Urban land.						
24----------------- Chapman	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, low strength, shrink-swell.	Slight.
25*:						
Chapman----------	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, low strength, shrink-swell.	Slight.
Urban land.						
26----------------- Chehalis	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
27*:						
Chehalis---------	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Urban land.						
28C---------------- Chehulpum	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: thin layer.
28E---------------- Chehulpum	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
29----------------- Cloquato	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
30*:						
Cloquato---------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Urban land.						
31----------------- Coburg	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
32*:						
Coburg-----------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
Urban land.						
33----------------- Conser	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
34----------------- Courtney	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
35D---------------- Cruiser	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: small stones, slope.
35F, 35G---------- Cruiser	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
36D---------------- Cumley	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
37C---------------- Cupola	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: small stones, large stones.
37E---------------- Cupola	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
38----------------- Dayton	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding.
39E, 39F---------- Digger	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
40H*:						
Digger------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
41C---------------- Dixonville	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: large stones, thin layer.
41E, 41F---------- Dixonville	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
42E*:						
Dixonville--------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Hazelair----------	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Urban land.						
43C*:						
Dixonville--------	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: large stones, thin layer.
Philomath---------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: thin layer, too clayey.
Hazelair----------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness, thin layer.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
43E*:						
Dixonville	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Philomath	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, thin layer, too clayey.
Hazelair	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
44*. Dune land						
45C Dupee	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
46 Eilertsen	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
47E Fendall	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
48. Fluvents						
49E, 49G Formader	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
50G*:						
Formader	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hembre	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Klickitat	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
51B*:						
Haflinger	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones.	Moderate: small stones, large stones, droughty.
Jimbo	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
52B Hazelair	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness, thin layer.
52D Hazelair	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: wetness, slope, thin layer.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
53----------------- Heceta	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.
54D, 54G---------- Hembre	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
55E*, 55G*:						
Hembre-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Klickitat--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
56----------------- Holcomb	Severe: too clayey, wetness.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: low strength, wetness, shrink-swell.	Moderate: wetness.
57D, 57F, 57G----- Holderman	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
58D---------------- Honeygrove	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
58F---------------- Honeygrove	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
59E, 59G---------- Hullt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
60D, 60F, 60G----- Hummington	Severe: slope, cutbanks cave, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
61----------------- Jimbo	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
62B*:						
Jimbo------------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
Haflinger--------	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones.	Moderate: small stones, large stones, droughty.
63C---------------- Jory	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
63D, 63E---------- Jory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
64D---------------- Keel	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: small stones, large stones, slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
64F, 64G---------- Keel	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
65G, 65H---------- Kilchis	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: droughty, thin layer.
66D--------------- Kinney	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
67F, 67G, 68F, 68G, 69E--------- Kinney	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
70E, 71F, 71G, 72F, 72G--------- Klickitat	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
73---------------- Linslaw	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength.	Moderate: wetness.
74B--------------- Lint	Slight---------	Slight---------	Slight---------	Slight---------	Severe: low strength.	Slight.
74C--------------- Lint	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
74D, 74E---------- Lint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
75---------------- Malabon	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
76*:						
Malabon----------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Urban land.						
77B--------------- Marcola	Severe: large stones.	Severe: shrink-swell, large stones.	Severe: shrink-swell, large stones.	Severe: shrink-swell, large stones.	Severe: shrink-swell, large stones.	Severe: large stones.
78---------------- McAlpin	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.	Slight.
79---------------- McBee	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
80F, 80G---------- McCully	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
81D--------------- McDuff	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
81F, 81G---------- McDuff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
82C--------------- Meda	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty.
83B--------------- Minniece	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
84D--------------- Mulkey	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
85---------------- Natroy	Severe: cutbanks cave, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
86---------------- Natroy	Severe: cutbanks cave, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding, too clayey.
87*:						
Natroy-----------	Severe: cutbanks cave, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding.	Severe: ponding.
Urban land.						
88---------------- Nehalem	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
89C--------------- Nekia	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: large stones, thin layer.
89D, 89E, 89F----- Nekia	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
90---------------- Nekoma	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
91D, 91E---------- Neskowin	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
92G*:						
Neskowin----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Salander----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
93---------------- Nestucca	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: flooding.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
94C--------------- Netarts	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty.
94E--------------- Netarts	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
95, 96------------ Newberg	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
97*:						
Newberg----------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Urban land.						
98---------------- Noti	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
99H*: Ochrepts.						
Umbrepts.						
100--------------- Oxley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
101*:						
Oxley------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.						
102C-------------- Panther	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness.	Severe: wetness.
103C*:						
Panther----------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness.	Severe: wetness.
Urban land.						
104E, 104G-------- Peavine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
105A-------------- Pengra	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
106A*:						
Pengra-----------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
Urban land.						
107C, 108C-------- Philomath	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: thin layer, too clayey.
108F-------------- Philomath	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, thin layer, too clayey.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
109F*:						
Philomath--------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, thin layer, too clayey.
Urban land.						
110*. Pits						
111D-------------- Preacher	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
111F-------------- Preacher	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
112G*:						
Preacher---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Bohannon---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Slickrock--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
113C-------------- Ritner	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Moderate: depth to rock, shrink-swell.	Severe: large stones.
113E, 113G-------- Ritner	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
114*. Riverwash						
115H*:						
Rock outcrop.						
Kilchis----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: droughty, thin layer.
116G*:						
Rock outcrop.						
Witzel-----------	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: small stones, large stones, slope.
117E-------------- Salander	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
118--------------- Salem	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: small stones, droughty.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
119*:						
Salem	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: small stones, droughty.
Urban land.						
120B, 121B Salkum	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
121C Salkum	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
122 Saturn	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: droughty.
123 Sifton	Severe: small stones, cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: small stones, droughty.
124D Slickrock	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, slope.
124F Slickrock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
125C Steiwer	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
125D, 125F Steiwer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
126F, 126G Tahkenitch	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
127C*:						
Urban land.						
Hazelair	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness, thin layer.
Dixonville	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: large stones, thin layer.
128B Veneta	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Slight.
129B Veneta Variant	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
130 Waldo	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness.
131C Waldport	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
131E, 131G, 132E-- Waldport	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
133C*: Waldport---------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty.
Urban land.						
134--------------- Wapato	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
135C-------------- Willakenzie	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
135D, 135E, 135F-- Willakenzie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
136--------------- Willanch	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
137F-------------- Winberry	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: small stones, slope, thin layer.
138E, 138G-------- Witzel	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: small stones, large stones, slope.
139--------------- Woodburn	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
140--------------- Yaquina	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
141*: Yaquina----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Urban land.						
142G*: Yellowstone------	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, thin layer.
Rock outcrop.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1A------------------ Abiqua	Severe: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
1B------------------ Abiqua	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
2E------------------ Astoria	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
3E, 3G-------------- Astoria Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
4G*:					
Atring-------------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
5------------------- Awbrig	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
6*:					
Awbrig-------------	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
Urban land.					
7B------------------ Bandon	Severe: cemented pan, percs slowly.	Severe: seepage, cemented pan.	Severe: seepage.	Severe: cemented pan.	Poor: area reclaim.
7C------------------ Bandon	Severe: cemented pan, percs slowly.	Severe: seepage, cemented pan, slope.	Severe: seepage.	Severe: cemented pan.	Poor: area reclaim.
7F------------------ Bandon	Severe: cemented pan, percs slowly, slope.	Severe: seepage, cemented pan, slope.	Severe: seepage, slope.	Severe: cemented pan, slope.	Poor: area reclaim, slope.
8------------------- Bashaw	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
9*:					
Bashaw-------------	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
Urban land.					

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
10*. Beaches					
11C----------------- Bellpine	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
11D, 11E, 11F, 12E-- Bellpine	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
13F, 13G, 14E, 14F-- Blachly	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
15E*:					
Blachly------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
McCully------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
16D----------------- Bohannon	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
16F, 16H------------ Bohannon	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
17------------------ Brallier	Severe: ponding.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding.	Poor: ponding, excess humus.
18------------------ Brallier Variant	Severe: flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, ponding, excess humus.	Severe: flooding, ponding.	Poor: ponding, excess humus.
19------------------ Brenner	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
20B----------------- Briedwell	Moderate: large stones, poor filter.	Moderate: slope, large stones, seepage.	Severe: large stones, seepage.	Severe: seepage.	Poor: large stones.
21B*:					
Bullards-----------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: small stones, thin layer.
Ferrelo------------	Slight-----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
21C*:					
Bullards-----------	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: small stones, slope, thin layer.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21C*:					
Ferrelo------------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope, thin layer.
21E*, 21G*:					
Bullards-----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Ferrelo------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
22----------------- Camas	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
23*:					
Camas--------------	Severe: poor filter.	Severe: seepage, flooding.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Urban land.					
24----------------- Chapman	Moderate: flooding, percs slowly.	Severe: flooding, seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
25*:					
Chapman------------	Moderate: flooding, percs slowly.	Severe: flooding, seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
Urban land.					
26----------------- Chehalis	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
27*:					
Chehalis-----------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Urban land.					
28C---------------- Chehulpum	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
28E---------------- Chehulpum	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
29----------------- Cloquato	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: thin layer.
30*:					
Cloquato-----------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: thin layer.
Urban land.					
31----------------- Coburg	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
32*:					
Coburg	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey.
Urban land.					
33 Conser	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
34 Courtney	Severe: wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: small stones, wetness.
35D Cruiser	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey, large stones.	Moderate: slope.	Poor: small stones.
35F, 35G Cruiser	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
36D Cumley	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
37C Cupola	Severe: large stones, percs slowly.	Severe: slope, large stones.	Severe: large stones.	Slight	Poor: area reclaim, large stones.
37E Cupola	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: area reclaim, large stones, slope.
38 Dayton	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
39E, 39F Digger	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
40H*:					
Digger	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
41C Dixonville	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
41E, 41F Dixonville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
42E*:					
Dixonville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Hazelair	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, wetness, slope.	Poor: area reclaim, too clayey, hard to pack.
Urban land.					
43C*:					
Dixonville	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Philomath	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Hazelair	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, too clayey, hard to pack.
43E*:					
Dixonville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Philomath	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Hazelair	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, wetness, slope.	Poor: area reclaim, too clayey, hard to pack.
44*. Dune land					
45C Dupee	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness, slope.	Poor: too clayey.
46 Eilertsen	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
47E Fendall	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope. depth to rock.	Poor: too clayey, hard to pack, slope.
48. Fluvents					
49E, 49G Formader	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, hard to pack, slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
50G*:					
Formader	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, hard to pack, slope.
Hembre	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: hard to pack, slope.
Klickitat	Severe: slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: small stones, slope.
51B*:					
Haflinger	Severe: poor filter, large stones.	Severe: seepage, flooding, large stones.	Severe: seepage, too sandy, large stones.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Jimbo	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
52B Hazelair	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, too clayey, hard to pack.
52D Hazelair	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, too clayey, hard to pack.
53 Heceta	Severe: ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
54D, 54G Hembre	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: hard to pack, slope.
55E*, 55G*:					
Hembre	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: hard to pack, slope.
Klickitat	Severe: slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: small stones, slope.
56 Holcomb	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness.
57D, 57F, 57G Holderman	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
58D Honeygrove	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
58F: Honeygrove	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
59E, 59G: Hullt	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
60D: Hummington	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
60F, 60G: Hummington	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, thin layer, area reclaim.
61: Jimbo	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
62B*:					
Jimbo	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
Haflinger	Severe: poor filter, large stones.	Severe: seepage, flooding, large stones.	Severe: seepage, too sandy, large stones.	Severe: seepage.	Poor: seepage, too sandy, small stones.
63C: Jory	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey.
63D, 63E: Jory	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
64D: Keel	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, hard to pack.
64F, 64G: Keel	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, hard to pack, slope.
65G, 65H: Kilchis	Severe: depth to rock.	Severe: seepage, depth to rock, large stones.	Severe: depth to rock, seepage, large stones.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
66D: Kinney	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: hard to pack.
67F, 67G, 68F, 68G, 69E: Kinney	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: hard to pack, slope.
70E, 71F, 71G, 72F, 72G: Klickitat	Severe: slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: small stones, slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
73------------------- Linslaw	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
74B------------------ Lint	Moderate: percs slowly.	Severe: seepage.	Moderate: too clayey.	Severe: seepage.	Poor: hard to pack.
74C------------------ Lint	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope, too clayey.	Severe: seepage.	Poor: hard to pack.
74D, 74E------------ Lint	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: hard to pack, slope.
75------------------- Malabon	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
76*:					
Malabon------------	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
Urban land.					
77B------------------ Marcola	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, too clayey, large stones.	Moderate: wetness.	Poor: too clayey, hard to pack, small stones.
78------------------- McAlpin	Severe: percs slowly, wetness.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
79------------------- McBee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness, thin layer.
80F, 80G------------ McCully	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
81D------------------ McDuff	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
81F, 81G------------ McDuff	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
82C------------------ Meda	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
83B------------------ Minniece	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
84D------------------ Mulkey	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
85, 86: Natroy	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
87*:					
Natroy	Severe: ponding, percs slowly.	Severe: flooding, ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Urban land.					
88: Nehalem	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
89C: Nekia	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, small stones.
89D, 89E, 89F: Nekia	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.
90: Nekoma	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Fair: too sandy.
91D, 91E: Neskowin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
92G*:					
Neskowin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Salander	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.
93: Nestucca	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
94C: Netarts	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
94E: Netarts	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, seepage.
95, 96: Newberg	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: too sandy.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
97*:					
Newberg	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: too sandy.
Urban land.					
98 Noti	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, wetness.	Poor: wetness.
99H*:					
Ochrepts.					
Umbrepts.					
100 Oxley	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: seepage, small stones, wetness.
101*:					
Oxley	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: seepage, small stones, wetness.
Urban land.					
102C Panther	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: too clayey, hard to pack.
103C*:					
Panther	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: too clayey, hard to pack.
Urban land.					
104E, 104G Peavine	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
105A Pengra	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
106A*:					
Pengra	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Urban land.					
107C, 108C Philomath	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
108F Philomath	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
109F*:					
Philomath----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Urban land.					
110*. Pits					
111D---------------- Preacher	Moderate: depth to rock, percs slowly. slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: hard to pack.
111F---------------- Preacher	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: hard to pack, slope.
112G*:					
Preacher-----------	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: hard to pack, slope.
Bohannon-----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Slickrock----------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
113C---------------- Ritner	Severe: depth to rock, percs slowly.	Severe: depth to rock, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, small stones.
113E, 113G---------- Ritner	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, small stones.
114*. Riverwash					
115H*: Rock outcrop.					
Kilchis------------	Severe: depth to rock.	Severe: seepage, depth to rock, large stones.	Severe: depth to rock, seepage, large stones.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
116G*: Rock outcrop.					
Witzel-------------	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
117E---------------- Salander	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: hard to pack, slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
118----------------- Salem	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
119*:					
Salem--------------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Urban land.					
120B, 121B---------- Salkum	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey, hard to pack.
121C---------------- Salkum	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
122----------------- Saturn	Severe: wetness, poor filter.	Severe: seepage, flooding.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
123----------------- Sifton	Severe: poor filter.	Severe: seepage, small stones.	Severe: seepage, small stones, too sandy.	Severe: seepage.	Poor: small stones, too sandy.
124D---------------- Slickrock	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: area reclaim, too clayey, slope.
124F---------------- Slickrock	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
125C---------------- Steiwer	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
125D, 125F---------- Steiwer	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
126F, 126G---------- Tahkenitch	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
127C*:					
Urban land.					
Hazelair-----------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, too clayey, hard to pack.
Dixonville---------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
128B----------------- Veneta	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey.
129B----------------- Veneta Variant	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
130------------------ Waldo	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, seepage, wetness.	Poor: too clayey, hard to pack, wetness.
131C----------------- Waldport	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
131E, 131G, 132E---- Waldport	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope.
133C*:					
Waldport-----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Urban land.					
134------------------ Wapato	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
135C----------------- Willakenzie	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
135D, 135E, 135F---- Willakenzie	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
136------------------ Willanch	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
137F----------------- Winberry	Severe: depth to rock, slope, large stones.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, large stones, slope.
138E, 138G---------- Witzel	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
139------------------ Woodburn	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
140------------------ Yaquina	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
141*:					
Yaquina-------------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Urban land.					
142G*:					
Yellowstone---------	Severe: depth to rock, slope, large stones.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, large stones, slope.
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1A, 1B---------------- Abiqua	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones, area reclaim.
2E-------------------- Astoria	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
3E-------------------- Astoria Variant	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
3G-------------------- Astoria Variant	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
4G*:				
Atring---------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
5--------------------- Awbrig	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
6*:				
Awbrig---------------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Urban land.				
7B, 7C---------------- Bandon	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
7F-------------------- Bandon	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
8--------------------- Bashaw	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
9*:				
Bashaw---------------	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Urban land.				
10*. Beaches				
11C------------------- Bellpine	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, large stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11D------------------- Bellpine	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
11E, 11F-------------- Bellpine	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
12E------------------- Bellpine	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
13F, 13G-------------- Blachly	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
14E------------------- Blachly	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
14F------------------- Blachly	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
15E*:				
Blachly--------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
McCully--------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
16D------------------- Bohannon	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
16F, 16H-------------- Bohannon	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
17-------------------- Brallier	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
18-------------------- Brallier Variant	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
19-------------------- Brenner	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
20B------------------- Briedwell	Fair: large stones.	Improbable: excess fines.	Probable:------------	Poor: area reclaim, small stones.
21B*:				
Bullards-------------	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: small stones.
Ferrelo--------------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
21C*:				
Bullards-------------	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
21C*: Ferrelo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
21E*: Bullards	Fair: slope.	Probable	Improbable: too sandy.	Poor: small stones, slope.
Ferrelo	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
21G*: Bullards	Poor: slope.	Probable	Improbable: too sandy.	Poor: small stones, slope.
Ferrelo	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
22 Camas	Good	Probable	Probable	Poor: small stones, area reclaim.
23*: Camas	Good	Probable	Probable	Poor: small stones, area reclaim.
Urban land.				
24 Chapman	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
25*: Chapman	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Urban land.				
26 Chehalis	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
27*: Chehalis	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Urban land.				
28C Chehulpum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
28E Chehulpum	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
29 Cloquato	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
30*: Cloquato	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
30*: Urban land.				
31 Coburg	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
32*: Coburg	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Urban land.				
33 Conser	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
34 Courtney	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
35D Cruiser	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
35F, 35G Cruiser	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
36D Cumley	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
37C Cupola	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones.
37E Cupola	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
38 Dayton	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
39E Digger	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
39F Digger	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
40H*: Digger	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
41C Dixonville	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
41E------------------- Dixonville	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
41F------------------- Dixonville	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
42E*:				
Dixonville-----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Hazelair-------------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Urban land.				
43C*:				
Dixonville-----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
Philomath------------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones.
Hazelair-------------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
43E*:				
Dixonville-----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Philomath------------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones.
Hazelair-------------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
44*. Dune land				
45C------------------- Dupee	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
46-------------------- Eilertsen	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
47E------------------- Fendall	Poor: low strength, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
48. Fluvents				
49E------------------- Formader	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
49G------------------- Formader	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
50G*:				
Formader-------------	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Hembre---------------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Klickitat------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
51B*:				
Haflinger------------	Poor: large stones.	Improbable: large stones.	Probable-------------	Poor: small stones, area reclaim.
Jimbo----------------	Good-----------------	Probable-------------	Probable-------------	Poor: area reclaim.
52B, 52D------------- Hazelair	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
53------------------- Heceta	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
54D------------------ Hembre	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
54G------------------ Hembre	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
55E*:				
Hembre---------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Klickitat------------	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
55G*:				
Hembre---------------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Klickitat------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
56------------------- Holcomb	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
57D-------------------- Holderman	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
57F, 57G-------------- Holderman	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
58D-------------------- Honeygrove	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
58F-------------------- Honeygrove	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
59E-------------------- Hullt	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
59G-------------------- Hullt	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
60D-------------------- Hummington	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
60F, 60G-------------- Hummington	Poor: slope, thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
61--------------------- Jimbo	Good------------------	Probable--------------	Probable--------------	Poor: area reclaim.
62B*:				
Jimbo-----------------	Good------------------	Probable--------------	Probable--------------	Poor: area reclaim.
Haflinger-------------	Poor: large stones.	Improbable: large stones.	Probable--------------	Poor: small stones, area reclaim.
63C-------------------- Jory	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
63D-------------------- Jory	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
63E-------------------- Jory	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
64D-------------------- Keel	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
64F, 64G-------------- Keel	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
65G, 65H-------------- Kilchis	Poor: area reclaim.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
66D-------------------- Kinney	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
67F, 67G, 68F, 68G---- Kinney	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
69E------------------- Kinney	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
70E------------------- Klickitat	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
71F, 71G, 72F, 72G---- Klickitat	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
73-------------------- Linslaw	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
74B------------------- Lint	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
74C------------------- Lint	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
74D------------------- Lint	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
74E------------------- Lint	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
75-------------------- Malabon	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
76*: Malabon--------------	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Urban land.				
77B------------------- Marcola	Poor: large stones, shrink-swell.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, area reclaim.
78-------------------- McAlpin	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
79-------------------- McBee	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
80F, 80G-------------- McCully	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
81D------------------- McDuff	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
81F, 81G: McDuff	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
82C: Meda	Good	Probable	Probable	Poor: small stones, area reclaim.
83B: Minniece	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
84D: Mulkey	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
85: Natroy	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
86: Natroy	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
87*:				
Natroy	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Urban land.				
88: Nehalem	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
89C: Nekia	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
89D: Nekia	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
89E, 89F: Nekia	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
90: Nekoma	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
91D: Neskowin	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
91E: Neskowin	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
92G*:				
Neskowin	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
92G*:				
Salander	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
93 Nestucca	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
94C Netarts	Good	Probable	Improbable: too sandy.	Poor: too sandy.
94E Netarts	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy.
95, 96 Newberg	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, thin layer.
97*:				
Newberg	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, thin layer.
Urban land.				
98 Noti	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
99H*:				
Ochrepts.				
Umbrepts.				
100 Oxley	Poor: wetness.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, wetness.
101*:				
Oxley	Poor: wetness.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, wetness.
Urban land.				
102C Panther	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
103C*:				
Panther	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Urban land.				
104E Peavine	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
104G------------------ Peavine	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
105A------------------ Pengra	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
106A*:				
Pengra---------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Urban land.				
107C, 108C------------ Philomath	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones.
108F------------------ Philomath	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones.
109F*:				
Philomath------------	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones.
Urban land.				
110*. Pits				
111D------------------ Preacher	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
111F------------------ Preacher	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
112G*:				
Preacher-------------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Bohannon-------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Slickrock------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
113C------------------ Ritner	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
113E------------------ Ritner	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
113G------------------ Ritner	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
114*. Riverwash				
115H*: Rock outcrop.				
Kilchis--------------	Poor: area reclaim.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
116G*: Rock outcrop.				
Witzel---------------	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
117E------------------ Salander	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
118------------------- Salem	Good----------------	Probable------------	Probable------------	Poor: small stones, area reclaim.
119*: Salem----------------	Good----------------	Probable------------	Probable------------	Poor: small stones, area reclaim.
Urban land.				
120B, 121B, 121C------ Salkum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
122------------------- Saturn	Good----------------	Probable------------	Probable------------	Poor: small stones, area reclaim.
123------------------- Sifton	Good----------------	Probable------------	Probable------------	Poor: small stones.
124D------------------ Slickrock	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
124F------------------ Slickrock	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
125C------------------ Steiwer	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
125D------------------ Steiwer	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
125F------------------ Steiwer	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
126F, 126G------------ Tahkenitch	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
127C*: Urban land.				
Hazelair-------------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Dixonville-----------	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
128B----------------- Veneta	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
129B----------------- Veneta Variant	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
130------------------ Waldo	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
131C----------------- Waldport	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
131E----------------- Waldport	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
131G----------------- Waldport	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
132E----------------- Waldport	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
133C*:				
Waldport-------------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Urban land.				
134------------------ Wapato	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
135C----------------- Willakenzie	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
135D----------------- Willakenzie	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
135E, 135F----------- Willakenzie	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
136----------------- Willanch	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
137F---------------- Winberry	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
138E---------------- Witzel	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
138G---------------- Witzel	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
139----------------- Woodburn	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
140----------------- Yaquina	Poor: wetness.	Probable------------	Improbable: too sandy.	Poor: wetness.
141*:				
Yaquina-------------	Poor: wetness.	Probable------------	Improbable: too sandy.	Poor: wetness.
Urban land.				
142G*:				
Yellowstone---------	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, large stones, slope.
Rock outcrop.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
1A Abiqua	Moderate: seepage.	Severe: hard to pack.	Deep to water	Favorable	Favorable	Favorable.
1B Abiqua	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
2E Astoria	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
3E, 3G Astoria Variant	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope	Slope.
4G*:						
Atring	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
5 Awbrig	Slight	Severe: hard to pack, wetness.	Percs slowly	Wetness, droughty, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily, droughty.
6*:						
Awbrig	Slight	Severe: hard to pack, wetness.	Percs slowly	Wetness, droughty, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily, droughty.
Urban land.						
7B Bandon	Severe: cemented pan.	Severe: piping.	Deep to water	Soil blowing, percs slowly, cemented pan.	Cemented pan, soil blowing.	Cemented pan, percs slowly.
7C, 7F Bandon	Severe: cemented pan, slope.	Severe: piping.	Deep to water	Soil blowing, percs slowly, cemented pan.	Slope, cemented pan, soil blowing.	Slope, cemented pan, percs slowly.
8 Bashaw	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
9*:						
Bashaw	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Urban land.						
10*. Beaches						
11C Bellpine	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Depth to rock	Depth to rock.
11D, 11E, 11F Bellpine	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
12E Bellpine	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
13F, 13G, 14E, 14F Blachly	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
15E*: Blachly	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
McCully	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
16D, 16F, 16H Bohannon	Severe: seepage, slope.	Severe: piping.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
17 Brallier	Moderate: seepage.	Severe: excess humus, ponding.	Ponding, subsides.	Ponding	Ponding	Wetness.
18 Brallier Variant	Moderate: seepage.	Severe: excess humus, ponding.	Ponding, flooding, subsides.	Ponding, flooding.	Ponding	Wetness.
19 Brenner	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
20B Briedwell	Moderate: seepage, slope.	Severe: piping, large stones.	Deep to water	Large stones, slope, droughty.	Large stones	Large stones.
21B*: Bullards	Moderate: seepage, slope.	Severe: seepage.	Deep to water	Droughty, soil blowing, slope.	Soil blowing	Droughty.
Ferrelo	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
21C*, 21E*, 21G*: Bullards	Severe: slope.	Severe: seepage.	Deep to water	Droughty, soil blowing, slope.	Slope, soil blowing.	Slope, droughty.
Ferrelo	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
22 Camas	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, flooding.	Large stones, too sandy.	Large stones, droughty.
23*: Camas	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Large stones, too sandy.	Large stones, droughty.
Urban land.						
24 Chapman	Moderate: seepage.	Severe: piping.	Favorable	Favorable	Favorable	Favorable.
25*: Chapman	Moderate: seepage.	Severe: piping.	Favorable	Favorable	Favorable	Favorable.
Urban land.						
26 Chehalis	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
27*:						
Chehalis	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
Urban land.						
28C Chehulpum	Severe: depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
28E Chehulpum	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
29 Cloquato	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
30*:						
Cloquato	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
Urban land.						
31 Coburg	Moderate: seepage.	Severe: wetness.	Favorable	Wetness	Erodes easily, wetness.	Erodes easily.
32*:						
Coburg	Moderate: seepage.	Severe: wetness.	Favorable	Wetness	Erodes easily, wetness.	Erodes easily.
Urban land.						
33 Conser	Moderate: seepage.	Severe: wetness.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
34 Courtney	Moderate: seepage.	Severe: seepage, wetness.	Percs slowly	Wetness, percs slowly.	Wetness	Wetness, percs slowly.
35D, 35F, 35G Cruiser	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope, large stones.	Slope.
36D Cumley	Severe: slope.	Severe: hard to pack.	Slope	Wetness, slope.	Slope, wetness.	Slope.
37C Cupola	Moderate: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, slope, droughty.	Large stones	Large stones.
37E Cupola	Severe: slope.	Severe: seepage, large stones.	Deep to water	Large stones, slope, droughty.	Slope, large stones.	Large stones, slope.
38 Dayton	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly.	Ponding, droughty, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, droughty.
39E, 39F Digger	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
40H*:						
Digger	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
41C---------------- Dixonville	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Large stones, percs slowly, depth to rock.	Large stones, depth to rock.	Large stones, depth to rock.
41E, 41F----------- Dixonville	Severe: slope.	Severe: hard to pack.	Deep to water	Large stones, percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
42E*:						
Dixonville-------	Severe: slope.	Severe: hard to pack.	Deep to water	Large stones, percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Hazelair---------	Severe: slope.	Severe: hard to pack.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Slope, depth to rock, wetness.	Wetness, slope, depth to rock.
Urban land.						
43C*:						
Dixonville-------	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Large stones, percs slowly, depth to rock.	Large stones, depth to rock.	Large stones, depth to rock.
Philomath--------	Severe: depth to rock.	Severe: hard to pack.	Deep to water	Large stones, slow intake, percs slowly.	Large stones, depth to rock.	Large stones, depth to rock.
Hazelair---------	Moderate: depth to rock, slope.	Severe: hard to pack.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Depth to rock, wetness.	Wetness, depth to rock.
43E*:						
Dixonville-------	Severe: slope.	Severe: hard to pack.	Deep to water	Large stones, percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Philomath--------	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Large stones, slow intake, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Hazelair---------	Severe: slope.	Severe: hard to pack.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Slope, depth to rock, wetness.	Wetness, slope, depth to rock.
44*. Dune land						
45C---------------- Dupee	Severe: slope.	Severe: thin layer.	Slope----------	Wetness, slope, erodes easily.	Slope, erodes easily, wetness.	Slope, erodes easily.
46----------------- Eilertsen	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
47E---------------- Fendall	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
48. Fluvents						
49E, 49G----------- Formader	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
50G*:						
Formader---------	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
50G*:						
Hembre	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope	Slope.
Klickitat	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
51B*:						
Haflinger	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty.	Large stones, too sandy.	Large stones, droughty.
Jimbo	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
52B Hazelair	Moderate: depth to rock, slope.	Severe: hard to pack.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Depth to rock, wetness.	Wetness, depth to rock
52D Hazelair	Severe: slope.	Severe: hard to pack.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Slope, depth to rock, wetness.	Wetness, slope, depth to rock
53 Heceta	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
54D, 54G Hembre	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope	Slope.
55E*, 55G*:						
Hembre	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope	Slope.
Klickitat	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
56 Holcomb	Severe: seepage.	Severe: hard to pack.	Percs slowly	Wetness, slow intake, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily percs slowly.
57D, 57F, 57G Holderman	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock
58D, 58F Honeygrove	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
59E, 59G Hullt	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope	Slope	Slope.
60D, 60F, 60G Hummington	Severe: seepage, slope.	Severe: seepage.	Slope, depth to rock.	Slope, rooting depth, large stones.	Slope, large stones, depth to rock.	Slope, depth to rock large stones.
61 Jimbo	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
62B*:						
Jimbo	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
62B*: Haflinger	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty.	Large stones, too sandy.	Large stones, droughty.
63C Jory	Moderate: slope.	Slight	Deep to water	Slope	Favorable	Favorable.
63D, 63E Jory	Severe: slope.	Slight	Deep to water	Slope	Slope	Slope.
64D, 64F, 64G Keel	Severe: slope.	Severe: hard to pack.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
65G, 65H Kilchis	Severe: depth to rock.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
66D, 67F, 67G, 68F, 68G, 69E Kinney	Severe: slope.	Severe: hard to pack.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
70E, 71F, 71G, 72F, 72G Klickitat	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
73 Linslaw	Moderate: seepage.	Severe: wetness.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
74B Lint	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
74C, 74D, 74E Lint	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
75 Malabon	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
76*: Malabon	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Urban land.						
77B Marcola	Moderate: slope.	Severe: large stones.	Deep to water	Large stones, percs slowly, slope.	Large stones, percs slowly.	Large stones, percs slowly.
78 McAlpin	Moderate: seepage.	Moderate: wetness.	Wetness	Wetness	Wetness	Percs slowly.
79 McBee	Moderate: seepage.	Moderate: piping, wetness.	Flooding	Wetness, flooding.	Wetness	Favorable.
80F, 80G McCully	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
81D, 81F, 81G McDuff	Severe: slope.	Severe: hard to pack.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
82C Meda	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, slope.	Favorable	Droughty.
83B Minniece	Moderate: slope.	Severe: hard to pack, wetness.	Percs slowly, slope.	Wetness, percs slowly, slope.	Wetness, percs slowly.	Wetness, percs slowly.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
84D: Mulkey	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
85: Natroy	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
86: Natroy	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
87*:						
Natroy	Slight	Severe: hard to pack, ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Urban land.						
88: Nehalem	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Erodes easily	Erodes easily.
89C: Nekia	Moderate: depth to rock, slope.	Moderate: thin layer, large stones.	Deep to water	Large stones, depth to rock, slope.	Large stones, depth to rock.	Large stones, depth to rock.
89D, 89E, 89F: Nekia	Severe: slope.	Moderate: thin layer, large stones.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
90: Nekoma	Severe: seepage.	Severe: seepage, piping.	Deep to water	Flooding	Favorable	Favorable.
91D, 91E: Neskowin	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
92G*:						
Neskowin	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Salander	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
93: Nestucca	Slight	Moderate: wetness.	Flooding	Wetness, percs slowly, flooding.	Wetness	Wetness.
94C: Netarts	Severe: seepage.	Severe: piping, seepage.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
94E: Netarts	Severe: seepage, slope.	Severe: piping, seepage.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
95, 96: Newberg	Severe: seepage.	Severe: seepage, piping.	Deep to water	Flooding	Too sandy	Favorable.
97*:						
Newberg	Severe: seepage.	Severe: seepage, piping.	Deep to water	Flooding	Too sandy	Favorable.
Urban land.						
98: Noti	Slight	Severe: piping, wetness.	Flooding	Wetness, flooding, percs slowly.	Wetness, percs slowly.	Wetness.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
99H*: Ochrepts.						
Umbrepts.						
100 Oxley	Moderate: seepage.	Severe: seepage, wetness.	Favorable	Wetness	Wetness	Wetness.
101*: Oxley	Moderate: seepage.	Severe: seepage, wetness.	Favorable	Wetness	Wetness	Wetness.
Urban land.						
102C Panther	Moderate: depth to rock, slope.	Severe: hard to pack, wetness.	Percs slowly, slope.	Wetness, percs slowly, slope.	Wetness, percs slowly.	Wetness, percs slowly.
103C*: Panther	Moderate: depth to rock, slope.	Severe: hard to pack, wetness.	Percs slowly, slope.	Wetness, percs slowly, slope.	Wetness, percs slowly.	Wetness, percs slowly.
Urban land.						
104E, 104G Peavine	Severe: slope.	Severe: hard to pack.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
105A Pengra	Slight	Severe: hard to pack.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
106A*: Pengra	Slight	Severe: hard to pack.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
Urban land.						
107C Philomath	Severe: depth to rock.	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Depth to rock	Depth to rock.
108C Philomath	Severe: depth to rock.	Severe: hard to pack.	Deep to water	Large stones, slow intake, percs slowly.	Large stones, depth to rock.	Large stones, depth to rock.
108F Philomath	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Large stones, slow intake, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
109F*: Philomath	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Large stones, slow intake, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Urban land.						
110*. Pits						
111D, 111F Preacher	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
112G*: Preacher	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
Bohannon	Severe: seepage, slope.	Severe: piping.	Deep to water	Large stones, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
112G*:						
Slickrock	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, large stones.	Large stones, slope.
113C Ritner	Moderate: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty.
113E, 113G Ritner	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
114*. Riverwash						
115H*: Rock outcrop.						
Kilchis	Severe: depth to rock.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
116G*: Rock outcrop.						
Witzel	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
117E Salander	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily
118 Salem	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Too sandy	Droughty.
119*:						
Salem	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Too sandy	Droughty.
Urban land.						
120B, 121B Salkum	Moderate: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
121C Salkum	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
122 Saturn	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Large stones, too sandy.	Droughty.
123 Sifton	Severe: seepage.	Severe: seepage.	Cutbanks cave	Droughty, fast intake.	Too sandy, piping, droughty.	Droughty.
124D, 124F Slickrock	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, large stones.	Large stones, slope.
125C Steiwer	Moderate: depth to rock, slope.	Moderate: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
125D, 125F Steiwer	Severe: slope.	Moderate: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock
126F, 126G Tahkenitch	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
27C*: Urban land.						
Hazelair	Moderate: depth to rock, slope.	Severe: hard to pack.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Depth to rock, wetness.	Wetness, depth to rock.
Dixonville	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Large stones, percs slowly, depth to rock.	Large stones, depth to rock.	Large stones, depth to rock.
28B Veneta	Slight	Severe: piping.	Percs slowly, slope.	Erodes easily, slope, percs slowly.	Percs slowly	Percs slowly, erodes easily.
29B Veneta Variant	Moderate: seepage, slope.	Moderate: thin layer, wetness.	Deep to water	Slope	Erodes easily	Erodes easily.
30 Waldo	Slight	Severe: hard to pack, wetness.	Flooding, percs slowly.	Wetness, flooding, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
31C Waldport	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
31E, 131G, 132E Waldport	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
33C*: Waldport	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Urban land.						
34 Wapato	Slight	Severe: hard to pack, ponding.	Ponding, flooding.	Ponding, flooding.	Ponding	Wetness.
35C Willakenzie	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
35D, 135E, 135F Willakenzie	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
136 Willanch	Severe: seepage.	Severe: piping, wetness.	Flooding, cutbanks cave.	Wetness, flooding.	Wetness, too sandy.	Wetness.
137F Winberry	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
138E, 138G Witzel	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
139 Woodburn	Moderate: seepage.	Severe: piping.	Percs slowly	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
140 Yaquina	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
141*:						
Yaquina----------	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, droughty.
Urban land.						
142G*:						
Yellowstone------	Severe: depth to rock, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--ENGINEERING INDEX PROPERTIES

[The symbol > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1A, 1B----------- Abiqua	0-21	Silty clay loam	ML	A-6	0-5	100	95-100	95-100	85-95	35-40	10-15
	21-38	Silty clay, silty clay loam, clay.	MH, ML	A-7	0-10	100	90-100	90-100	85-100	45-60	15-30
	38-60	Silty clay loam, gravelly clay loam, clay.	ML	A-6, A-7	0-10	65-100	60-100	55-100	50-95	35-50	10-20
2E--------------- Astoria	0-13	Silt loam--------	ML	A-4	0	95-100	95-100	85-100	65-90	30-40	NP-5
	13-60	Silty clay, clay	MH	A-7	0	95-100	95-100	85-100	65-95	50-60	10-15
3E, 3G----------- Astoria Variant	0-27	Silt loam--------	ML	A-4	0	100	100	90-100	70-90	30-40	NP-5
	27-67	Silt loam, silty clay loam, clay loam.	ML	A-7	0	100	100	90-100	70-95	40-50	10-15
4G*:											
Atring----------	0-15	Gravelly loam----	GM, ML, SM	A-4	0-15	70-85	65-75	55-75	40-65	25-30	NP-5
	15-32	Very gravelly loam, very gravelly silt loam.	GM	A-2, A-4, A-1	15-30	40-60	35-55	30-55	20-50	25-30	NP-5
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
5---------------- Awbrig	0-7	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-95	35-45	15-25
	7-29	Clay, silty clay	CH, MH	A-7	0	100	90-100	90-100	80-95	55-75	25-45
	29-60	Silty clay loam, clay loam.	CH, MH	A-7	0	100	90-100	90-100	75-95	50-65	20-35
6*:											
Awbrig----------	0-7	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-95	35-45	15-25
	7-29	Clay, silty clay	CH, MH	A-7	0	100	90-100	90-100	80-95	55-75	25-45
	29-60	Silty clay loam, clay loam.	CH, MH	A-7	0	100	90-100	90-100	75-95	50-65	20-35
Urban land.											
7B, 7C, 7F------- Bandon	0-3	Sandy loam-------	SM	A-2, A-4	0	100	100	60-70	30-40	---	NP
	3-35	Sandy loam, loam, gravelly sandy loam.	SM, ML	A-4	0	70-100	60-100	55-90	35-60	---	NP
	35-43	Cemented---------	---	---	---	---	---	---	---	---	---
	43-60	Stratified loam to fine sand.	SM	A-2, A-4	0	100	100	80-95	30-50	---	NP
8---------------- Bashaw	0-41	Clay-------------	CH	A-7	0	100	95-100	95-100	85-95	70-90	40-60
	41-63	Clay, silty clay, sandy clay.	CH	A-7	0	100	90-100	90-100	55-95	60-90	35-60
9*:											
Bashaw----------	0-41	Clay-------------	CH	A-7	0	100	95-100	95-100	85-95	70-90	40-60
	41-63	Clay, silty clay, sandy clay.	CH	A-7	0	100	90-100	90-100	55-95	60-90	35-60
Urban land.											
10*. Beaches											
11C, 11D, 11E, 11F------------- Bellpine	0-13	Silty clay loam	CL	A-6, A-7	0-10	100	100	95-100	85-95	35-45	15-20
	13-34	Silty clay, clay	MH	A-7	0-15	100	90-100	80-100	70-95	50-60	20-25
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
12E--------------- Bellpine	0-11	Cobbly silty clay loam.	CL	A-6, A-7	15-25	90-100	85-100	85-95	80-90	35-45	15-20
	11-40	Silty clay, clay	MH	A-7	0-15	100	90-100	80-100	70-95	50-60	20-25
	40	Weathered bedrock	---	---	---	---	---	---	---	---	---
13F, 13G--------- Blachly	0-9	Clay loam--------	MH	A-5, A-7	0	100	100	95-100	85-95	50-65	5-15
	9-60	Silty clay, clay	MH	A-7	0	70-100	70-100	65-100	50-85	50-65	10-20
14E, 14F--------- Blachly	0-5	Silty clay loam	MH	A-5, A-7	0	100	100	95-100	85-95	50-65	5-15
	5-63	Silty clay, clay	MH	A-7	0	70-100	70-100	65-100	50-85	50-65	10-20
15E*:											
Blachly---------	0-9	Clay loam--------	MH	A-5, A-7	0	100	100	95-100	85-95	50-65	5-15
	9-60	Silty clay, clay	MH	A-7	0	70-100	70-100	65-100	50-85	50-65	10-20
McCully---------	0-11	Clay loam--------	MH	A-5, A-7	0-5	100	85-100	75-100	60-90	50-60	5-15
	11-55	Clay, silty clay	ML, MH	A-5, A-7	0-10	90-100	85-100	80-95	60-90	45-55	5-15
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
16D, 16F, 16H---- Bohannon	0-11	Gravelly loam----	SM	A-4	0-30	70-95	60-90	50-85	35-50	---	NP
	11-24	Gravelly loam, cobbly loam, cobbly clay loam.	SM	A-4	0-30	70-95	60-90	50-85	35-50	<35	NP-10
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---
17--------------- Brallier	0-60	Muck-------------	PT	A-8	0	---	---	---	---	---	NP
18--------------- Brallier Variant	0-38	Muck-------------	PT	A-8	0	---	---	---	---	---	NP
	38-60	Stratified silt loam to fine sandy loam.	ML, SM	A-4	0	95-100	95-100	75-95	45-75	20-35	NP-5
19--------------- Brenner	0-8	Silty clay loam	ML	A-4	0	100	100	95-100	85-95	35-40	5-10
	8-55	Silty clay-------	MH	A-7	0	100	100	95-100	90-95	50-60	15-20
20B-------------- Briedwell	0-20	Cobbly loam------	ML, SM	A-4	5-35	75-85	70-85	60-80	45-70	25-35	NP-10
	20-38	Very cobbly loam, very gravelly clay loam, very stony loam.	GM-GC, GC	A-2, A-4, A-6	10-40	50-60	45-60	40-60	25-45	25-40	5-15
	38-50	Very cobbly sandy loam, very gravelly loam, very gravelly sandy loam.	GM, SM, ML	A-1, A-2, A-4	10-60	45-85	40-80	25-75	20-60	25-40	NP-10
21B*, 21C*, 21E*, 21G*:											
Bullards-------	0-4	Loam-------------	SM, ML	A-2, A-4	0	100	95-100	60-70	30-55	15-25	NP-5
	4-58	Gravelly sandy loam, gravelly loam.	SM	A-2, A-4	0	100	50-75	30-60	15-40	15-25	NP-5
	58-61	Loamy fine sand, sand.	SP-SM, SM	A-2, A-3	0	100	100	50-75	5-25	---	NP
Ferrelo--------	0-10	Loam-------------	ML, SM	A-4	0	100	100	65-95	35-75	---	NP
	10-47	Loam, fine sandy loam, silt loam.	ML, SM	A-4	0	100	90-100	65-95	35-75	---	NP
	47-60	Loamy fine sand, fine sandy loam, fine sand.	SM	A-2, A-4	0	100	90-100	60-85	20-50	---	NP

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22---------------- Camas	0-14	Gravelly sandy loam.	GM, SM	A-1	0-25	60-70	50-70	25-50	15-25	---	NP
	14-60	Very gravelly sand, very gravelly loamy sand.	GP	A-1	5-25	25-50	15-40	10-20	0-5	---	NP
23*:											
Camas------------	0-14	Gravelly sandy loam.	GM, SM	A-1	0-25	60-70	50-70	25-50	15-25	---	NP
	14-60	Very gravelly sand, very gravelly loamy sand.	GP	A-1	5-25	25-50	15-40	10-20	0-5	---	NP
Urban land.											
24---------------- Chapman	0-8	Loam--------------	ML	A-4	0	95-100	95-100	80-95	60-75	30-40	5-10
	8-42	Loam, clay loam	ML	A-4, A-6	0	90-100	85-100	75-100	55-80	30-40	5-15
	42-50	Gravelly sandy loam, gravelly loam.	SM	A-1, A-2, A-4	0	70-80	60-70	35-55	20-40	---	NP
	50-60	Very gravelly sandy loam.	GM	A-1	0	40-60	35-50	20-35	10-20	---	NP
25*:											
Chapman----------	0-8	Loam--------------	ML	A-4	0	95-100	95-100	80-95	60-75	30-40	5-10
	8-42	Loam, clay loam	ML	A-4, A-6	0	90-100	85-100	75-100	55-80	30-40	5-15
	42-50	Gravelly sandy loam, gravelly loam.	SM	A-1, A-2, A-4	0	70-80	60-70	35-55	20-40	---	NP
	50-60	Very gravelly sandy loam.	GM	A-1	0	40-60	35-50	20-35	10-20	---	NP
Urban land.											
26---------------- Chehalis	0-13	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	13-55	Silt loam, silty clay loam.	ML	A-4, A-6	0	100	100	95-100	85-95	30-40	5-15
	55-70	Stratified fine sandy loam to silty clay loam.	ML	A-4, A-6	0	100	75-100	70-90	50-85	30-40	5-15
27*:											
Chehalis---------	0-13	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	13-55	Silt loam, silty clay loam.	ML	A-4, A-6	0	100	100	95-100	85-95	30-40	5-15
	55-70	Stratified fine sandy loam to silty clay loam.	ML	A-4, A-6	0	100	75-100	70-90	50-85	30-40	5-15
Urban land.											
28C, 28E---------- Chehulpum	0-7	Silt loam---------	ML	A-4	0	95-100	90-100	85-95	60-90	25-35	NP-10
	7-13	Silt loam, clay loam, gravelly silt loam.	ML	A-4	0-10	80-100	60-95	55-95	50-90	30-40	5-10
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
29---------------- Cloquato	0-14	Silt loam---------	ML	A-4	0	100	100	90-100	80-95	20-30	NP-5
	14-50	Silt loam---------	ML	A-4	0	100	100	90-100	75-90	20-30	NP-5
	50-60	Stratified sand to silt loam.	SM	A-2	0	100	95-100	50-70	15-30	20-30	NP-5

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
30*:											
Cloquato--------	0-14	Silt loam--------	ML	A-4	0	100	100	90-100	80-95	20-30	NP-5
	14-50	Silt loam--------	ML	A-4	0	100	100	90-100	75-90	20-30	NP-5
	50-60	Stratified sand to silt loam.	SM	A-2	0	100	95-100	50-70	15-30	20-30	NP-5
Urban land.											
31--------------- Coburg	0-18	Silty clay loam	CL	A-6	0	95-100	90-100	85-100	80-95	30-40	10-15
	18-53	Silty clay loam, silty clay.	CL	A-7	0	95-100	90-100	85-100	80-95	40-50	15-25
	53-65	Fine sandy loam, loam, clay loam.	SM, ML	A-4	0	90-100	85-100	70-90	40-65	25-35	NP-10
32*:											
Coburg----------	0-18	Silty clay loam	CL	A-6	0	95-100	90-100	85-100	80-95	30-40	10-15
	18-53	Silty clay loam, silty clay.	CL	A-7	0	95-100	90-100	85-100	80-95	40-50	15-25
	53-65	Fine sandy loam, loam, clay loam.	SM, ML	A-4	0	90-100	85-100	70-90	40-65	25-35	NP-10
Urban land.											
33--------------- Conser	0-9	Silty clay loam	CL	A-6	0	100	95-100	95-100	85-95	35-40	15-20
	9-41	Clay, silty clay.	CH, CL	A-7	0	100	95-100	95-100	90-95	45-55	20-30
	41-60	Loam, sandy loam, clay loam.	ML	A-4	0	95-100	95-100	75-95	50-75	30-40	NP-10
34--------------- Courtney	0-15	Gravelly silty clay loam.	ML, CL	A-6	0-10	65-80	60-75	55-70	50-60	35-40	10-15
	15-28	Gravelly clay, gravelly silty clay.	CH	A-7	0-5	60-80	55-75	50-70	50-65	60-80	35-50
	28-41	Very gravelly clay loam, extremely gravelly clay loam.	GM, GC	A-2	5-10	20-40	15-35	15-35	10-25	35-40	10-15
	41-60	Very gravelly sand, extremely gravelly sand.	GP, GW	A-1	5-15	20-40	15-35	10-30	0-5	---	NP
35D, 35F, 35G---- Cruiser	0-15	Gravelly clay loam.	SM	A-1, A-2	0-5	70-85	60-75	35-55	15-35	---	NP
	15-55	Gravelly clay loam, gravelly loam.	SM, GM	A-5	0-15	65-85	60-75	50-70	35-50	50-60	5-10
	55-65	Very cobbly clay loam, cobbly loam, gravelly loam.	SM, GM	A-5, A-2	15-45	60-85	50-70	35-65	30-45	50-60	5-10
36D-------------- Cumley	0-14	Silty clay loam	CL, ML	A-6	0-5	95-100	90-95	85-95	75-90	35-40	10-15
	14-60	Silty clay, clay	MH	A-7	0-5	95-100	85-100	75-90	65-85	50-60	15-25
37C, 37E--------- Cupola	0-6	Cobbly loam------	GM	A-4	15-25	65-70	55-70	45-60	35-50	---	NP
	6-32	Very cobbly loam, very cobbly sandy loam.	GM	A-2, A-4	30-65	40-75	35-70	20-60	10-50	---	NP
	32-60	Very cobbly loam, very cobbly sandy loam, extremely cobbly loam.	GM	A-2, A-4	40-55	60-80	55-75	35-60	20-50	---	NP

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
38----------------	0-7	Silt loam--------	ML	A-4	0	100	95-100	90-100	85-100	30-35	5-10
Dayton	7-16	Silt loam, silty clay loam.	ML	A-6, A-4	0	100	95-100	90-100	90-100	30-40	5-15
	16-45	Clay, silty clay	CH	A-7	0	100	95-100	90-100	90-100	55-70	35-45
	45-60	Clay-------------	CH	A-7	0	100	95-100	85-100	80-95	50-75	30-50
39E, 39F---------	0-4	Gravelly loam----	SM, GM, ML	A-4	0-15	60-85	60-70	50-65	40-60	30-40	NP-10
Digger	4-17	Gravelly loam----	SM, GM, ML	A-4	0-15	60-85	60-75	50-70	40-60	30-40	NP-10
	17-37	Very gravelly loam, very cobbly loam.	GM, SM	A-4, A-2	10-35	50-80	45-80	35-70	25-50	35-40	5-10
	37	Weathered bedrock	---	---	---	---	---	---	---	---	---
40H*:											
Digger----------	0-4	Gravelly loam----	SM, GM, ML	A-4	0-15	60-85	60-70	50-65	40-60	30-40	NP-10
	4-17	Gravelly loam----	SM, GM, ML	A-4	0-15	60-85	60-75	50-70	40-60	30-40	NP-10
	17-37	Very gravelly loam, very cobbly loam.	GM, SM	A-4, A-2	10-35	50-80	45-80	35-70	25-50	35-40	5-10
	37	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
41C, 41E, 41F----	0-14	Silty clay loam	CL	A-6	0-10	90-100	90-100	85-100	75-95	35-40	15-20
Dixonville	14-26	Clay, cobbly clay, silty clay.	CH	A-7	0-30	75-100	70-100	65-100	50-95	50-80	30-50
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
42E*:											
Dixonville------	0-14	Silty clay loam	CL	A-6	0-10	90-100	90-100	85-100	75-95	35-40	15-20
	14-26	Clay, cobbly clay, silty clay.	CH	A-7	0-30	75-100	70-100	65-100	50-95	50-80	30-50
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hazelair--------	0-11	Silty clay loam	CL	A-6	0	95-100	90-95	85-95	80-90	30-40	10-20
	11-15	Silty clay, silty clay loam.	CL	A-7	0	95-100	90-95	85-95	80-95	40-50	20-25
	15-36	Clay-------------	CH	A-7	0	95-100	85-95	75-90	70-90	60-80	40-50
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
Urban land.											
43C*, 43E*:											
Dixonville------	0-14	Silty clay loam	CL	A-6	0-10	90-100	90-100	85-100	75-95	35-40	15-20
	14-26	Clay, cobbly clay, silty clay.	CH	A-7	0-30	75-100	70-100	65-100	50-95	50-80	30-50
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
Philomath-------	0-6	Cobbly silty clay	CL, CH	A-7	15-30	85-100	75-90	70-85	60-80	40-60	35-45
	6-14	Clay, cobbly silty clay, cobbly clay.	CH	A-7	0-30	90-100	70-95	60-90	60-85	60-80	40-50
	14	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hazelair--------	0-11	Silty clay loam	CL	A-6	0	95-100	90-95	85-95	80-90	30-40	10-20
	11-15	Silty clay, silty clay loam.	CL	A-7	0	95-100	90-95	85-95	80-95	40-50	20-25
	15-36	Clay-------------	CH	A-7	0	95-100	85-95	75-90	70-90	60-80	40-50
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
44*. Dune land											

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticit inde
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
45C--------------- Dupee	0-12	Silt loam---------	ML	A-4	0	100	95-100	85-100	65-90	30-40	5-1
	12-55	Silty clay loam, silty clay, clay loam.	ML	A-7	0	100	90-100	85-95	75-90	40-50	10-2
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
46---------------- Eilertsen	0-11	Silt loam---------	CL-ML	A-4	0	100	100	90-100	65-85	25-30	5-1
	11-72	Silt loam, clay loam, silty clay loam.	CL	A-6	0	100	100	90-100	60-85	30-40	10-2
47E--------------- Fendall	0-12	Silt loam---------	ML	A-5	0	90-100	90-100	85-95	65-80	40-50	5-1
	12-16	Clay loam, gravelly clay loam.	ML	A-5	0	80-90	70-90	65-90	50-85	40-45	5-1
	16-26	Clay, gravelly clay.	MH	A-7	0	75-95	65-90	60-90	50-85	50-60	10-2
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---
48. Fluvents											
49E, 49G---------- Formader	0-18	Loam--------------	MH	A-5, A-7	0	95-100	85-100	75-100	55-90	50-65	5-1
	18-33	Silty clay loam, gravelly silty clay loam.	ML, MH, GM, SM	A-7	0-15	70-95	65-95	55-95	40-90	40-55	10-2
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
50G*: Formader---------	0-18	Loam--------------	MH	A-5, A-7	0	95-100	85-100	75-100	55-90	50-65	5-1
	18-33	Silty clay loam, gravelly silty clay loam.	ML, MH, GM, SM	A-7	0-15	70-95	65-95	55-95	40-90	40-55	10-2
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hembre-----------	0-12	Silt loam---------	ML	A-4	0-5	95-100	90-100	80-90	60-85	30-40	5-1
	12-44	Silty clay loam, gravelly silty clay loam, silt loam.	ML, MH	A-5, A-7	0-15	80-100	70-100	65-90	60-85	40-55	5-1
	44	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Klickitat--------	0-13	Stony loam--------	GM, ML	A-2, A-4	15-30	50-75	50-70	40-65	30-55	25-35	5-1
	13-39	Very gravelly clay loam, very cobbly clay loam, extremely cobbly clay loam.	GC, SC	A-2, A-6	20-40	45-70	35-65	30-65	25-50	30-40	10-1
	39-50	Very cobbly loam, extremely cobbly loam.	GM, SM	A-2, A-4	30-55	35-70	30-60	25-60	20-50	25-35	5-1
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
51B*: Haflinger--------	0-17	Cobbly loam-------	SM, GM	A-2, A-1, A-4	20-30	65-95	60-90	35-85	20-50	---	NP
	17-60	Very cobbly loamy sand, very cobbly sand, extremely cobbly sand.	GP-GM, GM, SP-SM, SM	A-1	45-65	30-70	25-65	10-50	5-20	---	NP

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
51B*:											
Jimbo	0-14	Fine sandy loam	MH, SM	A-5	0	95-100	80-95	75-85	40-75	50-60	NP-10
	14-43	Loam, fine sandy loam.	ML	A-5	0	100	95-100	80-100	45-65	40-45	NP-5
	43-60	Very cobbly sand	GP, SP	A-1	40-50	45-60	35-55	20-40	0-5	---	NP
52B, 52D Hazelair	0-11	Silty clay loam	CL	A-6	0	95-100	90-95	85-95	80-90	30-40	10-20
	11-15	Silty clay, silty clay loam.	CL	A-7	0	95-100	90-95	85-95	80-95	40-50	20-25
	15-36	Clay	CH	A-7	0	95-100	85-95	75-90	70-90	60-80	40-50
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
53 Heceta	0-5	Fine sand	SM	A-2	0	100	100	65-80	20-30	---	NP
	5-60	Sand, fine sand, loamy sand.	SP-SM, SM	A-3, A-2	0	100	100	50-80	5-30	---	NP
54D, 54G Hembre	0-12	Silt loam	ML	A-4	0-5	95-100	90-100	80-90	60-85	30-40	5-10
	12-44	Silty clay loam, gravelly silty clay loam, silt loam.	ML, MH	A-5, A-7	0-15	80-100	70-100	65-90	60-85	40-55	5-15
	44	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
55E*, 55G*:											
Hembre	0-12	Silt loam	ML	A-4	0-5	95-100	90-100	80-90	60-85	30-40	5-10
	12-44	Silty clay loam, gravelly silty clay loam, silt loam.	ML, MH	A-5, A-7	0-15	80-100	70-100	65-90	60-85	40-55	5-15
	44	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Klickitat	0-13	Stony loam	GM, ML	A-2, A-4	15-30	50-75	50-70	40-65	30-55	25-35	5-10
	13-39	Very gravelly clay loam, very cobbly clay loam, extremely cobbly clay loam.	GC, SC	A-2, A-6	20-40	45-70	35-65	30-65	25-50	30-40	10-15
	39-50	Very cobbly loam, extremely cobbly loam.	GM, SM	A-2, A-4	30-55	35-70	30-60	25-60	20-50	25-35	5-10
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
56 Holcomb	0-19	Silty clay loam	ML, CL	A-6	0	100	100	90-100	90-95	35-40	10-15
	19-55	Clay, silty clay	CH	A-7	0	80-100	75-100	70-100	65-100	60-80	40-50
57D, 57F, 57G Holderman	0-5	Extremely cobbly loam.	GM	A-2, A-1	10-35	30-45	25-40	20-40	15-30	20-30	NP-5
	5-21	Very gravelly loam, extremely cobbly loam.	GM	A-2, A-1	20-35	30-50	25-45	20-40	15-35	20-30	NP-5
	21-32	Extremely cobbly loam.	GM	A-2, A-1	30-60	30-55	25-50	20-50	15-35	---	NP
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
58D, 58F Honeygrove	0-9	Silty clay loam	ML	A-4	0	100	100	95-100	85-95	30-40	5-10
	9-60	Clay, silty clay	MH	A-7	0-15	85-100	75-100	70-100	50-95	55-70	10-20
59E, 59G Hullt	0-13	Loam	CL, CL-ML	A-6, A-4	0-5	95-100	95-100	85-100	65-80	25-35	5-15
	13-54	Silty clay loam, clay loam, loam.	CL	A-6	0-15	90-100	85-95	75-95	60-85	30-40	10-20
	54	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
60D, 60F, 60G---- Hummington	0-12	Gravelly loam----	SM, GM	A-4, A-2	5-15	60-85	55-75	30-65	30-50	---	NP
	12-29	Very cobbly loam, very gravelly loam, extremely cobbly loam.	GM, SM, GP-GM, SP-SM	A-4, A-1, A-2	20-60	40-75	30-70	20-60	10-45	---	NP
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
61---------------- Jimbo	0-14	Silt loam--------	MH, SM	A-5	0	95-100	80-95	75-85	40-75	50-60	NP-10
	14-43	Loam, fine sandy loam.	ML	A-5	0	100	95-100	80-100	45-65	40-45	NP-5
	43-60	Very cobbly sand	GP, SP	A-1	40-50	45-60	35-55	20-40	0-5	---	NP
62B*:											
Jimbo-----------	0-14	Fine sandy loam	MH, SM	A-5	0	95-100	80-95	75-85	40-75	50-60	NP-10
	14-43	Loam, fine sandy loam.	ML	A-5	0	100	95-100	80-100	45-65	40-45	NP-5
	43-60	Very cobbly sand	GP, SP	A-1	40-50	45-60	35-55	20-40	0-5	---	NP
Haflinger-------	0-17	Cobbly loam------	SM, GM	A-2, A-1, A-4	20-30	65-95	60-90	35-85	20-50	---	NP
	17-60	Very cobbly loamy sand, very cobbly sand, extremely cobbly sand.	GP-GM, GM, SP-SM, SM	A-1	45-65	30-70	25-65	10-50	5-20	---	NP
63C, 63D, 63E---- Jory	0-9	Silty clay loam	ML	A-7	0	100	95-100	80-95	65-90	40-50	10-15
	9-60	Clay, silty clay	CL	A-7	0	100	95-100	85-100	75-90	40-50	15-25
64D, 64F, 64G---- Keel	0-6	Cobbly clay loam	MH	A-5	10-20	70-95	65-90	60-90	50-70	80-100	NP-10
	6-19	Clay loam--------	MH	A-5	0-5	90-100	85-95	80-90	70-80	70-90	NP-10
	19-35	Gravelly loam, cobbly loam, clay loam.	ML, MH, SM	A-5, A-7	10-30	75-95	70-95	60-90	45-80	40-55	NP-15
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
65G, 65H--------- Kilchis	0-4	Stony loam-------	SM, ML	A-4	15-30	75-95	70-95	60-90	40-65	20-30	NP-5
	4-19	Very cobbly loam, very stony loam.	GM	A-1, A-2, A-4	25-55	30-65	25-60	20-55	15-45	20-30	NP-5
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
66D-------------- Kinney	0-12	Cobbly loam------	MH	A-7	10-25	85-95	80-90	70-85	55-80	60-70	10-20
	12-42	Cobbly clay loam, cobbly loam.	MH	A-7	20-30	90-95	85-90	75-85	55-75	55-65	10-20
	42-50	Cobbly loam, very cobbly loam.	MH	A-7	15-40	85-95	80-90	65-80	50-75	50-65	10-20
	50	Weathered bedrock	---	---	---	---	---	---	---	---	---
67F, 67G--------- Kinney	0-16	Cobbly loam------	MH	A-7	10-25	85-95	80-90	70-85	55-80	60-70	10-20
	16-50	Cobbly clay loam, cobbly loam.	MH	A-7	20-30	90-95	85-90	75-85	55-75	55-65	10-20
	50-58	Cobbly loam, very cobbly loam.	MH	A-7	15-40	85-95	80-90	65-80	50-75	50-65	10-20
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---
68F, 68G--------- Kinney	0-12	Cobbly loam------	MH	A-7	10-25	85-95	80-90	70-85	55-80	60-70	10-20
	12-42	Cobbly clay loam, cobbly loam.	MH	A-7	20-30	90-95	85-90	75-85	55-75	55-65	10-20
	42-50	Cobbly loam, very cobbly loam.	MH	A-7	15-40	85-95	80-90	65-80	50-75	50-65	10-20
	50	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
69E-------------- Kinney	0-16	Cobbly loam------	MH	A-7	10-25	85-95	80-90	70-85	55-80	60-70	10-20
	16-50	Cobbly clay loam, cobbly loam.	MH	A-7	20-30	90-95	85-90	75-85	55-75	55-65	10-20
	50-59	Cobbly loam, very cobbly loam.	MH	A-7	15-40	85-95	80-90	65-80	50-75	50-65	10-20
	59	Weathered bedrock	---	---	---	---	---	---	---	---	---
70E, 71F, 71G, 72F, 72G-------- Klickitat	0-13	Stony loam-------	GM, ML	A-2, A-4	15-30	50-75	50-70	40-65	30-55	25-35	5-10
	13-39	Very gravelly clay loam, very cobbly clay loam, extremely cobbly clay loam.	GC, SC	A-2, A-6	20-40	45-70	35-65	30-65	25-50	30-40	10-15
	39-50	Very cobbly loam, extremely cobbly loam.	GM, SM	A-2, A-4	30-55	35-70	30-60	25-60	20-50	25-35	5-10
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
73--------------- Linslaw	0-16	Loam-------------	ML	A-4	0	100	95-100	80-95	60-75	30-40	5-10
	16-42	Clay loam, clay	CL	A-7	0	100	95-100	90-100	65-90	40-50	20-25
	42-56	Clay-------------	CL, CH	A-7	0	100	95-100	85-100	70-90	45-55	20-30
	56-60	Sandy loam, sandy clay loam.	SM, ML	A-4	0	100	95-100	60-90	30-55	20-40	NP-10
74B, 74C, 74D, 74E------------- Lint	0-16	Silt loam--------	MH	A-5	0	100	95-100	90-100	70-85	50-65	NP-10
	16-69	Silt loam, silty clay loam.	MH	A-7	0	100	95-100	85-95	65-75	50-60	10-15
75--------------- Malabon	0-12	Silty clay loam	ML	A-6	0	95-100	90-100	80-100	75-95	35-40	10-15
	12-42	Silty clay, silty clay loam.	CL	A-7	0	95-100	90-100	85-100	80-95	45-50	20-25
	42-60	Clay loam, loam	ML	A-6, A-4	0	95-100	85-100	70-100	60-80	30-40	5-15
76*:											
Malabon---------	0-12	Silty clay loam	ML	A-6	0	95-100	90-100	80-100	75-95	35-40	10-15
	12-42	Silty clay, silty clay loam.	CL	A-7	0	95-100	90-100	85-100	80-95	45-50	20-25
	42-60	Clay loam, loam	ML	A-6, A-4	0	95-100	85-100	70-100	60-80	30-40	5-15
Urban land.											
77B-------------- Marcola	0-15	Cobbly silty clay loam.	CL, GC	A-7, A-6	15-40	60-85	50-80	50-80	40-75	35-45	15-20
	15-60	Very cobbly clay, very gravelly clay, extremely cobbly clay.	GC, CH	A-2, A-7	30-60	30-75	20-70	20-70	15-65	50-60	25-35
78--------------- McAlpin	0-14	Silty clay loam	ML, CL	A-6	0	100	95-100	90-95	80-95	35-40	10-15
	14-60	Silty clay, clay	CL	A-7	0	100	95-100	90-100	85-95	40-50	15-25
79--------------- McBee	0-24	Silty clay loam	ML	A-6	0	100	100	95-100	85-95	35-40	10-15
	24-41	Silty clay loam, clay loam, silt loam.	ML	A-6	0	100	100	95-100	80-95	35-40	10-15
	41-62	Silty clay, gravelly loam, silt loam.	CL, GC	A-6	0	55-100	50-100	50-100	45-95	30-40	10-15

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
80F, 80G--------- McCully	0-11	Clay loam--------	MH, ML	A-5, A-7	0-5	100	85-100	75-100	60-90	50-60	15-25
	11-55	Clay, silty clay	MH, CH	A-5, A-7	0-10	90-100	85-100	80-95	60-90	45-55	25-30
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
81D, 81F, 81G---- McDuff	0-14	Clay loam--------	ML	A-6	0-5	90-100	90-100	85-100	75-95	35-40	10-15
	14-37	Silty clay, clay	MH	A-7	0	100	90-100	85-100	80-95	50-60	20-25
	37	Weathered bedrock	---	---	---	---	---	---	---	---	---
82C-------------- Meda	0-8	Loam-------------	ML	A-4	0	80-100	75-95	60-80	55-70	25-40	NP-10
	8-40	Gravelly clay loam.	ML, GM, SM	A-2, A-4	0-10	55-80	50-75	35-75	35-60	30-40	NP-10
	40-60	Very gravelly sandy loam, gravelly loam, gravelly sandy loam.	GP-GM, GM, SM, SP-SM	A-1, A-2	5-10	25-65	20-60	10-45	5-35	15-20	NP-5
83B-------------- Minniece	0-10	Silty clay loam	ML	A-6	0-5	100	95-100	95-100	85-95	35-40	10-15
	10-39	Clay, silty clay	MH	A-7	0-5	100	90-100	85-95	75-85	50-60	15-25
	39-60	Clay, silty clay loam, clay loam.	MH	A-7	0-5	100	90-100	85-95	65-90	50-60	10-15
84D-------------- Mulkey	0-15	Loam-------------	ML	A-4	0-5	95-100	90-100	75-95	55-75	30-40	5-10
	15-23	Gravelly loam----	ML, SM, GM	A-4	0-15	70-80	65-75	55-70	40-55	30-40	5-10
	23-27	Cobbly loam, cobbly sandy loam.	ML	A-4	20-40	85-95	80-90	70-85	50-70	30-40	NP-5
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
85--------------- Natroy	0-5	Silty clay loam	CL	A-7	0	100	95-100	90-100	90-95	40-50	20-25
	5-57	Clay-------------	CH	A-7	0	100	90-100	90-100	75-95	60-75	30-45
	57-60	Gravelly clay, clay, sandy clay.	CL, CH	A-7	0	55-100	50-100	40-90	35-85	45-55	20-30
86--------------- Natroy	0-5	Silty clay-------	CH	A-7	0	100	95-100	90-100	75-95	50-60	25-35
	5-57	Clay-------------	CH	A-7	0	100	90-100	90-100	75-95	60-75	30-45
	57-60	Gravelly clay, clay, sandy clay.	CL, CH	A-7	0	55-100	50-100	40-90	35-85	45-55	20-3
87*:											
Natroy-----------	0-5	Silty clay loam	CL	A-7	0	100	95-100	90-100	90-95	40-50	20-2
	5-57	Clay-------------	CH	A-7	0	100	90-100	90-100	75-95	60-75	30-4
	57-60	Gravelly clay, clay, sandy clay.	CL, CH	A-7	0	55-100	50-100	40-90	35-85	45-55	20-3
Urban land.											
88--------------- Nehalem	0-15	Silt loam--------	ML, CL-ML	A-4	0	100	100	90-100	70-90	25-35	5-1
	15-48	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	75-95	30-45	10-2
	48-60	Silty clay loam, silt loam, loam.	CL, CL-ML	A-6, A-4	0-5	85-100	80-100	75-95	55-90	25-40	5-1
89C, 89D, 89E, 89F-------------- Nekia	0-10	Silty clay loam	ML	A-6	0-15	100	85-100	85-95	70-80	35-40	10-1
	10-35	Clay, gravelly clay, silty clay.	CL, GC	A-7	0-30	70-100	50-100	50-95	40-85	40-50	15-2
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
90--------------- Nekoma	0-11	Silt loam--------	ML	A-4	0	100	100	85-100	65-90	25-35	NP-5
	11-20	Fine sandy loam	SM, ML	A-4	0	100	100	70-90	40-70	---	NP
	20-60	Stratified very fine sandy loam to loamy fine sand.	SM	A-2	0	95-100	90-100	50-80	15-35	---	NP
91D, 91E--------- Neskowin	0-12	Silt loam--------	ML	A-5	0-5	95-100	85-100	80-100	70-95	40-50	5-10
	12-30	Silty clay loam, silt loam, clay loam.	ML	A-5	0-5	95-100	85-100	75-95	65-85	40-50	5-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
92G*: Neskowin--------	0-12	Silt loam--------	ML	A-5	0-5	95-100	85-100	80-100	70-95	40-50	5-10
	12-30	Silty clay loam, silt loam, clay loam.	ML	A-5	0-5	95-100	85-100	75-95	65-85	40-50	5-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Salander--------	0-18	Silt loam--------	ML, MH	A-5	0	100	85-100	70-90	60-80	45-55	NP-10
	18-70	Silty clay loam, silt loam.	ML, MH	A-7	0	100	95-100	85-95	60-80	45-55	10-15
93--------------- Nestucca	0-17	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	75-95	25-35	5-10
	17-43	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-20
	43-60	Silty clay, clay loam, loam.	CL	A-7, A-6	0	100	95-100	85-100	65-95	30-50	10-25
94C, 94E--------- Netarts	0-6	Fine sand--------	SM, SP, SP-SM	A-2, A-3	0	100	100	65-80	0-25	---	NP
	6-47	Loamy fine sand, fine sand.	SM, SP, SP-SM	A-2, A-3	0	100	100	65-80	0-25	---	NP
	47-60	Fine sand--------	SM, SP, SP-SM	A-2, A-3	0	100	100	65-80	0-15	---	NP
95--------------- Newberg	0-14	Fine sandy loam	SM	A-4, A-2	0	100	100	60-85	30-50	20-25	NP-5
	14-65	Sandy loam, fine sandy loam, coarse sandy loam.	SM	A-2, A-4	0	75-100	75-100	40-85	25-50	20-25	NP-5
96--------------- Newberg	0-14	Loam-------------	ML	A-4	0	100	100	90-100	65-85	30-35	NP-5
	14-65	Sandy loam, fine sandy loam, coarse sandy loam.	SM	A-2, A-4	0	75-100	75-100	40-85	25-50	20-25	NP-5
97*: Newberg---------	0-14	Fine sandy loam	SM	A-4, A-2	0	100	100	60-85	30-50	20-25	NP-5
	14-65	Sandy loam, fine sandy loam, coarse sandy loam.	SM	A-2, A-4	0	75-100	75-100	40-85	25-50	20-25	NP-5
Urban land.											

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
98---------------- Noti	0-9	Loam-------------	ML	A-4	0	100	90-100	80-95	60-75	30-35	5-10
	9-34	Loam, fine sandy loam.	ML, SM	A-4	0	100	90-100	65-95	40-65	25-35	NP-5
	34-44	Loamy sand-------	SM	A-2, A-1	0	100	85-100	40-70	15-25	---	NP
	44-60	Very gravelly loamy sand, very gravelly sandy loam.	GM	A-2, A-1	0-10	30-55	25-50	15-35	5-20	---	NP
99H*: Ochrepts.											
Umbrepts.											
100--------------- Oxley	0-17	Gravelly silt loam.	ML	A-4	0	75-80	70-75	60-75	50-70	25-35	NP-5
	17-23	Gravelly clay loam.	GC, CL	A-6	0	65-75	60-70	55-70	40-55	35-40	15-20
	23-41	Very gravelly clay loam, very gravelly loam.	GC, GM	A-1, A-2	0-5	25-55	20-50	20-50	15-35	25-40	NP-15
	41-60	Extremely gravelly sandy loam, extremely gravelly loam, very gravelly loam.	GM, GP-GM	A-1	15-25	25-50	20-40	15-35	5-25	---	NP
101*: Oxley-----------	0-17	Gravelly silt loam.	ML	A-4	0	75-80	70-75	60-75	50-70	25-35	NP-5
	17-23	Gravelly clay loam.	GC, CL	A-6	0	65-75	60-70	55-70	40-55	35-40	15-20
	23-41	Very gravelly clay loam, very gravelly loam.	GC, GM	A-1, A-2	0-5	25-55	20-50	20-50	15-35	25-40	NP-15
	41-60	Extremely gravelly sandy loam, extremely gravelly loam, very gravelly loam.	GM, GP-GM	A-1	15-25	25-50	20-40	15-35	5-25	---	NP
Urban land.											
102C-------------- Panther	0-10	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	10-42	Clay-------------	CH	A-7	0	100	100	90-100	80-100	60-85	35-50
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---
103C*: Panther---------	0-10	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	10-42	Clay-------------	CH	A-7	0	100	100	90-100	80-100	60-85	35-50
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---
Urban land.											
104E, 104G-------- Peavine	0-8	Silty clay loam	ML, MH	A-7	0	100	100	90-100	80-90	45-55	10-20
	8-38	Silty clay, clay	MH	A-7	0	100	100	90-100	80-95	60-85	25-4
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---
105A-------------- Pengra	0-6	Silt loam--------	ML	A-4	0	100	100	95-100	80-90	30-40	NP-1
	6-21	Silty clay loam	ML	A-6	0	100	100	95-100	85-95	35-40	10-1
	21-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	60-80	40-5

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
106A*:											
Pengra----------	0-6	Silt loam--------	ML	A-4	0	100	100	95-100	80-90	30-40	NP-10
	6-21	Silty clay loam	ML	A-6	0	100	100	95-100	85-95	35-40	10-15
	21-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	60-80	40-50
Urban land.											
107C------------- Philomath	0-6	Silty clay-------	CH, CL	A-7	0	100	90-100	75-100	70-95	40-60	35-45
	6-14	Clay, cobbly silty clay, cobbly clay.	CH	A-7	0-30	90-100	70-95	60-90	60-85	60-80	40-50
	14	Weathered bedrock	---	---	---	---	---	---	---	---	---
108C, 108F------- Philomath	0-6	Cobbly silty clay	CL, CH	A-7	15-30	85-100	75-90	70-85	60-80	40-60	35-45
	6-14	Clay, cobbly silty clay, cobbly clay.	CH	A-7	0-30	90-100	70-95	60-90	60-85	60-80	40-50
	14	Weathered bedrock	---	---	---	---	---	---	---	---	---
109F*:											
Philomath-------	0-6	Cobbly silty clay	CL, CH	A-7	15-30	85-100	75-90	70-85	60-80	40-60	35-45
	6-14	Clay, cobbly silty clay, cobbly clay.	CH	A-7	0-30	90-100	70-95	60-90	60-85	60-80	40-50
	14	Weathered bedrock	---	---	---	---	---	---	---	---	---
Urban land.											
110*. Pits											
111D, 111F------- Preacher	0-18	Loam-------------	ML	A-4, A-6	0-5	95-100	90-100	80-100	60-80	30-40	5-15
	18-52	Loam, clay loam	MH, ML	A-7	0-5	90-100	80-100	70-100	55-80	45-60	10-20
	52-58	Sandy loam, loam, clay loam.	SM, ML	A-4, A-2	0-15	85-100	75-100	45-85	30-65	---	NP
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---
112G*:											
Preacher--------	0-18	Loam-------------	ML	A-4, A-6	0-5	95-100	90-100	80-100	60-80	30-40	5-15
	18-52	Loam, clay loam	MH, ML	A-7	0-5	90-100	80-100	70-100	55-80	45-60	10-20
	52-58	Sandy loam, loam, clay loam.	SM, ML	A-4, A-2	0-15	85-100	75-100	45-85	30-65	---	NP
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---
Bohannon--------	0-11	Gravelly loam----	SM	A-4	0-30	70-95	60-90	50-85	35-50	---	NP
	11-24	Gravelly loam, cobbly loam, cobbly clay loam.	SM	A-4	0-30	70-95	60-90	50-85	35-50	<35	NP-10
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---
Slickrock-------	0-13	Gravelly loam----	ML, SM	A-4, A-5	0-10	80-90	70-85	55-80	40-60	30-45	NP-10
	13-40	Gravelly loam, gravelly clay loam, cobbly clay loam.	SM, ML	A-4, A-5	5-20	75-90	70-85	60-75	40-55	30-45	NP-10
	40-55	Very cobbly clay loam, very cobbly loam.	GM, SM	A-4	50-70	65-80	60-70	40-55	35-50	30-40	NP-10
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
113C, 113E, 113G- Ritner	0-7	Cobbly silty clay loam.	ML, GM, CL, GC	A-6	0-35	60-90	50-85	45-85	40-80	35-40	10-15
	7-32	Very gravelly silty clay, very cobbly silty clay loam.	CL, GC	A-7, A-6	20-45	60-80	50-60	45-60	40-55	35-50	15-25
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
114*. Riverwash											
115H*: Rock outcrop.											
Kilchis---------	0-4	Stony loam-------	SM, ML	A-4	15-30	75-95	70-95	60-90	40-65	20-30	NP-5
	4-19	Very cobbly loam, very stony loam.	GM	A-1, A-2, A-4	25-55	30-65	25-60	20-55	15-45	20-30	NP-5
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
116G*: Rock outcrop.											
Witzel----------	0-4	Very cobbly loam	GM	A-4, A-2	30-45	50-75	30-70	30-70	25-50	25-30	NP-5
	4-17	Very stony silty clay loam, very cobbly clay loam.	GC	A-6, A-2	50-60	45-75	30-65	30-60	25-50	35-40	15-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
117E------------ Salander	0-18	Silt loam--------	ML, MH	A-5	0	100	85-100	70-90	60-80	45-55	NP-10
	18-70	Silty clay loam, silt loam.	ML, MH	A-7	0	100	95-100	85-95	60-80	45-55	10-15
118-------------- Salem	0-7	Gravelly silt loam.	ML, GM	A-4	0-5	55-80	50-75	45-75	40-70	25-35	5-10
	7-26	Gravelly clay loam, gravelly silty clay loam, gravelly sandy clay loam.	GM, SM, ML, CL	A-2, A-6, A-7	0-5	55-80	50-75	40-70	20-65	25-35	5-10
	26-60	Very gravelly sand, very gravelly loamy sand.	GP, SP	A-1	10-15	20-55	30-50	10-35	0-5	---	NP
119*:											
Salem-----------	0-7	Gravelly silt loam.	ML, GM	A-4	0-5	55-80	50-75	45-75	40-70	25-35	5-10
	7-26	Gravelly clay loam, gravelly silty clay loam, gravelly sandy clay loam.	GM, SM, ML, CL	A-2, A-6, A-7	0-5	55-80	50-75	40-70	20-65	25-35	5-10
	26-60	Very gravelly sand, very gravelly loamy sand.	GP, SP	A-1	10-15	20-55	30-50	10-35	0-5	---	NP
Urban land.											

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
120B-------------- Salkum	0-11	Silt loam--------	CL	A-6	0	95-100	95-100	85-100	65-90	30-40	10-15
	11-45	Silty clay, clay	ML, MH	A-7	0	100	85-100	80-95	65-90	45-60	15-25
	45-60	Silty clay, silty clay loam, clay.	ML, MH	A-7	0	100	90-100	80-95	65-90	45-60	15-25
121B, 121C------- Salkum	0-13	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-20
	13-49	Silty clay, clay	ML, MH	A-7	0	100	85-100	80-95	65-90	45-60	15-25
	49-60	Silty clay, silty clay loam, clay.	ML, MH	A-7	0	100	90-100	80-95	65-90	45-60	15-25
122--------------- Saturn	0-10	Clay loam--------	ML	A-6	0-5	85-95	85-90	75-85	55-75	35-40	10-15
	10-32	Clay loam, gravelly clay loam, gravelly loam.	CL, GC, SC	A-6	0-10	60-85	55-85	45-80	35-65	30-40	10-15
	32-60	Very gravelly sand, very gravelly loamy sand, extremely gravelly loamy sand.	GP, GP-GM	A-1	20-35	30-50	25-45	10-30	0-10	---	NP
123--------------- Sifton	0-15	Gravelly loam----	SM, GM	A-2, A-5	0-5	60-80	55-75	45-60	30-45	40-55	NP-10
	15-60	Very gravelly loamy coarse sand, very gravelly coarse sand, very gravelly sand.	GP, SP	A-1	0-10	40-55	15-30	5-15	0-5	---	NP
124D, 124F------- Slickrock	0-13	Gravelly loam----	ML, SM	A-4, A-5	0-10	80-90	7U-85	55-80	40-60	30-45	NP-10
	13-40	Gravelly loam, gravelly clay loam, cobbly clay loam.	SM, ML	A-4, A-5	5-20	75-90	70-85	60-75	40-55	30-45	NP-10
	40-55	Very cobbly clay loam, very cobbly loam.	GM, SM	A-4	50-70	65-80	60-70	40-55	35-50	30-40	NP-10
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
125C, 125D, 125F- Steiwer	0-16	Loam-------------	ML	A-4	0	100	95-100	85-95	65-90	30-40	5-10
	16-29	Clay loam, silty clay loam.	ML	A-7	0-5	95-100	85-100	80-100	60-95	40-50	10-15
	29	Weathered bedrock	---	---	---	---	---	---	---	---	---
126F, 126G------- Tahkenitch	0-12	Loam-------------	ML	A-4	0	90-100	90-100	80-95	55-75	---	NP
	12-42	Loam, sandy loam, gravelly sandy loam.	SM, ML, GM	A-4, A-2	0	70-100	70-95	50-90	30-65	---	NP
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---
127C*: Urban land.											
Hazelair--------	0-11	Silty clay loam	CL	A-6	0	95-100	90-95	85-95	80-90	30-40	10-20
	11-15	Silty clay, silty clay loam.	CL	A-7	0	95-100	90-95	85-95	80-95	40-50	20-25
	15-36	Clay-------------	CH	A-7	0	95-100	85-95	75-90	70-90	60-80	40-50
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
Dixonville------	0-14	Silty clay loam	CL	A-6	0-10	90-100	90-100	85-100	75-95	35-40	15-20
	14-26	Clay, cobbly clay, silty clay.	CH	A-7	0-30	75-100	70-100	65-100	50-95	50-80	30-50
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
128B------------- Veneta	0-14	Loam------------	ML	A-4	0	100	95-100	80-95	60-85	25-35	NP-10
	14-39	Clay loam, silty clay, clay.	CL-ML, CL	A-4, A-6	0	100	95-100	85-100	70-85	25-40	5-15
	39-60	Clay------------	CH, MH	A-7	0	100	90-100	85-100	75-95	75-85	40-50
129B------------- Veneta Variant	0-12	Silt loam--------	ML	A-4	0	100	100	90-100	70-90	25-35	5-10
	12-52	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-20
	52-60	Silt loam, fine sandy loam.	ML	A-4	0	100	100	75-95	50-80	25-35	NP-5
130-------------- Waldo	0-11	Silty clay loam	ML, CL	A-6	0	100	95-100	90-100	85-95	35-40	10-15
	11-60	Silty clay, clay	MH, CH	A-7	0	100	95-100	90-100	85-95	50-60	20-30
131C, 131E, 131G- Waldport	0-5	Fine sand--------	SM	A-2	0	100	100	70-80	20-30	---	NP
	5-60	Fine sand--------	SM	A-2	0	100	100	70-80	20-30	---	NP
132E------------- Waldport	0-2	Fine sand--------	SM	A-2	0	100	100	70-80	20-30	---	NP
	2-60	Fine sand--------	SM	A-2	0	100	100	70-80	20-30	---	NP
133C*:											
Waldport--------	0-5	Fine sand--------	SM	A-2	0	100	100	70-80	20-30	---	NP
	5-60	Fine sand--------	SM	A-2	0	100	100	70-80	20-30	---	NP
Urban land.											
134-------------- Wapato	0-17	Silty clay loam	ML	A-6	0	100	100	95-100	85-95	35-40	10-15
	17-33	Silty clay loam, silt loam.	ML	A-6	0	100	100	95-100	80-95	30-40	5-15
	33-60	Silty clay-------	MH	A-7	0	100	100	95-100	90-95	50-60	10-20
135C, 135D, 135E, 135F------------ Willakenzie	0-11	Clay loam--------	ML	A-4, A-5	0	100	100	90-100	75-95	35-45	5-10
	11-36	Silty clay loam, clay loam.	ML	A-6, A-7	0	100	100	95-100	80-95	35-45	10-15
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
136-------------- Willanch	0-11	Fine sandy loam	SM	A-4	0	100	100	65-85	35-50	---	NP
	11-34	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	90-100	85-100	55-85	30-50	---	NP
	34-60	Loamy fine sand, loamy sand.	SM	A-2	0	90-100	85-100	55-80	25-35	---	NP
137F------------- Winberry	0-4	Very gravelly loam.	GM	A-1	10-25	30-50	25-35	20-30	15-25	20-30	NP-5
	4-18	Very cobbly loam	GM	A-2, A-4	45-60	50-65	40-55	35-50	25-40	20-30	NP-5
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
138E, 138G------- Witzel	0-4	Very cobbly loam	GM	A-4, A-2	30-45	50-75	30-70	30-70	25-50	25-30	NP-5
	4-17	Very stony silty clay loam, very cobbly clay loam.	GC	A-6, A-2	50-60	45-75	30-65	30-60	25-50	35-40	15-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
139-------------- Woodburn	0-9	Silt loam--------	ML	A-4	0	100	95-100	85-95	70-85	25-30	NP-5
	9-26	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	26-60	Silt loam, fine sandy loam.	ML, SM	A-4	0	100	100	85-100	60-80	25-35	NP-5

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
140-------------- Yaquina	0-8	Loamy fine sand	SM, SP, SP-SM	A-2, A-3	0	100	100	75-80	0-25	---	NP
	8-29	Fine sand--------	SM, SP, SP-SM	A-2, A-3	0	100	100	75-80	0-15	---	NP
	29-60	Fine sand--------	SM, SP, SP-SM	A-2, A-3	0	100	100	75-80	0-15	---	NP
141*:											
Yaquina---------	0-8	Loamy fine sand	SM, SP, SP-SM	A-2, A-3	0	100	100	75-80	0-25	---	NP
	8-29	Fine sand--------	SM, SP, SP-SM	A-2, A-3	0	100	100	75-80	0-15	---	NP
	29-60	Fine sand--------	SM, SP, SP-SM	A-2, A-3	0	100	100	75-80	0-15	---	NP
Urban land.											
142G*:											
Yellowstone-----	0-4	Stony loam-------	GM, SM	A-4	15-30	65-85	60-80	50-70	35-50	20-30	NP-5
	4-12	Extremely stony sandy loam, very stony sandy loam, extremely cobbly loam.	GM, SM	A-1, A-2, A-4	45-75	40-80	35-75	25-55	15-40	15-25	NP-5
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
1A, 1B----------- Abiqua	0-21	27-40	1.20-1.30	0.6-2.0	0.19-0.21	5.1-6.5	Moderate-----	0.24	5	3-6
	21-38	35-50	1.20-1.30	0.2-0.6	0.12-0.16	5.1-6.0	High---------	0.28		
	38-60	30-45	1.20-1.40	0.6-2.0	0.19-0.21	5.1-6.0	Moderate-----	0.37		
2E--------------- Astoria	0-13	---	0.85-0.95	0.6-2.0	0.30-0.50	4.5-5.0	Low----------	0.24	5	5-10
	13-60	---	0.90-1.20	0.6-2.0	0.13-0.15	4.5-5.0	Moderate-----	0.28		
3E, 3G----------- Astoria Variant	0-27	---	0.85-0.95	0.6-2.0	0.30-0.35	4.5-5.5	Low----------	0.32	5	5-10
	27-67	---	0.90-1.10	0.6-2.0	0.21-0.25	4.5-5.5	Low----------	0.32		
4G*:										
Atring----------	0-15	15-25	1.30-1.40	2.0-6.0	0.12-0.16	6.1-6.5	Low----------	0.15	3	3-4
	15-32	15-25	1.30-1.40	2.0-6.0	0.08-0.13	5.1-6.5	Low----------	0.20		
	32	---	---	---	---	---	-------------	----		
Rock outcrop.										
5---------------- Awbrig	0-7	27-30	1.30-1.40	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.32	5	2-5
	7-29	50-60	1.30-1.40	<0.06	0.03-0.05	6.1-6.5	High---------	0.37		
	29-60	27-40	1.30-1.40	0.2-0.6	0.17-0.20	6.6-7.3	Moderate-----	0.32		
6*:										
Awbrig----------	0-7	27-30	1.30-1.40	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.32	5	2-5
	7-29	50-60	1.30-1.40	<0.06	0.03-0.05	6.1-6.5	High---------	0.37		
	29-60	27-40	1.30-1.40	0.2-0.6	0.17-0.20	6.6-7.3	Moderate-----	0.32		
Urban land.										
7B, 7C, 7F------- Bandon	0-3	5-12	1.20-1.50	0.6-2.0	0.11-0.13	3.6-5.5	Low----------	0.28	3	1-3
	3-35	5-15	1.20-1.50	0.6-2.0	0.12-0.17	5.1-6.0	Low----------	0.17		
	35-43	---	---	0.06-0.2	---	---	Low----------	0.20		
	43-60	5-18	1.30-1.50	2.0-6.0	0.06-0.12	5.1-6.0	Low----------	0.20		
8---------------- Bashaw	0-41	55-70	1.10-1.30	<0.06	0.14-0.16	5.6-7.3	High---------	0.17	5	4-8
	41-63	55-70	1.10-1.30	<0.06	0.14-0.16	6.1-7.3	High---------	0.20		
9*:										
Bashaw----------	0-41	55-70	1.10-1.30	<0.06	0.14-0.16	5.6-7.3	High---------	0.17	5	4-8
	41-63	55-70	1.10-1.30	<0.06	0.14-0.16	6.1-7.3	High---------	0.20		
Urban land.										
10*. Beaches										
11C, 11D, 11E, 11F------------- Bellpine	0-13	27-35	1.20-1.40	0.6-2.0	0.18-0.21	5.1-6.0	Low----------	0.28	3	3-6
	13-34	40-55	1.10-1.40	0.06-0.2	0.13-0.16	5.1-6.0	Moderate-----	0.32		
	34	---	---	---	---	---	-------------	----		
12E-------------- Bellpine	0-11	27-35	1.20-1.50	0.6-2.0	0.14-0.18	5.1-6.0	Low----------	0.24	3	3-6
	11-40	40-55	1.10-1.40	0.06-0.2	0.13-0.16	5.1-6.0	Moderate-----	0.32		
	40	---	---	---	---	---	-------------	----		
13F, 13G--------- Blachly	0-9	27-40	1.10-1.20	0.6-2.0	0.17-0.21	4.5-6.0	Low----------	0.17	5	3-6
	9-60	40-50	1.10-1.30	0.2-0.6	0.11-0.13	4.5-5.0	Moderate-----	0.24		
14E, 14F--------- Blachly	0-5	27-40	1.10-1.20	0.6-2.0	0.17-0.21	4.5-6.0	Low----------	0.17	5	3-6
	5-63	40-50	1.10-1.30	0.2-0.6	0.11-0.13	4.5-5.0	Moderate-----	0.24		
15E*:										
Blachly---------	0-9	27-40	1.10-1.20	0.6-2.0	0.17-0.21	4.5-6.0	Low----------	0.17	5	3-6
	9-60	40-50	1.10-1.30	0.2-0.6	0.11-0.13	4.5-5.0	Moderate-----	0.24		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
15E*:										
McCully---------	0-11	30-40	1.20-1.30	0.6-2.0	0.17-0.21	5.1-5.5	Low----------	0.17	4	7-12
	11-55	45-55	1.20-1.30	0.2-0.6	0.14-0.16	4.5-5.0	Moderate-----	0.20		
	55	---	---	---	---	---	-------------	----		
16D, 16F, 16H---- Bohannon	0-11	15-25	0.90-1.20	2.0-6.0	0.12-0.15	4.5-6.0	Low----------	0.10	3	4-6
	11-24	18-30	1.00-1.30	2.0-6.0	0.09-0.15	4.5-6.0	Low----------	0.17		
	24	---	---	---	---	---	-------------	----		
17--------------- Brallier	0-60	---	0.10-0.20	0.6-2.0	0.30-0.40	3.6-5.0	Low----------	0.00	5	50-70
18--------------- Brallier Variant	0-38	---	0.10-0.20	0.6-2.0	0.30-0.40	5.1-7.3	Low----------	0.00	5	50-90
	38-60	5-20	0.80-1.20	0.6-2.0	0.16-0.20	6.6-7.3	Low----------	0.28		
19--------------- Brenner	0-8	27-35	0.90-1.20	0.6-2.0	0.19-0.21	4.5-5.5	Low----------	0.28	5	4-8
	8-55	40-50	1.10-1.30	0.06-0.2	0.15-0.17	4.5-6.5	Moderate-----	0.24		
20B-------------- Briedwell	0-20	18-25	1.10-1.40	0.6-2.0	0.12-0.19	5.1-6.5	Low----------	0.17	4	3-6
	20-38	18-35	1.20-1.40	0.6-2.0	0.12-0.18	5.6-6.5	Moderate-----	0.24		
	38-60	10-20	1.20-1.40	6.0-20	0.04-0.06	5.6-6.5	Low----------	0.20		
21B*, 21C*, 21E*, 21G*:										
Bullards-------	0-4	8-18	1.20-1.40	0.6-2.0	0.11-0.13	4.5-5.5	Low----------	0.20	5	4-7
	4-58	8-18	1.20-1.40	0.6-2.0	0.06-0.10	4.5-6.0	Low----------	0.17		
	58-61	2-5	1.60-1.80	2.0-6.0	0.05-0.07	5.6-6.0	Low----------	0.24		
Ferrelo--------	0-10	10-18	1.10-1.30	0.6-2.0	0.11-0.18	5.1-6.0	Low----------	0.24	5	5-8
	10-47	10-18	1.20-1.40	2.0-6.0	0.12-0.17	5.6-6.0	Low----------	0.20		
	47-60	2-10	1.40-1.60	2.0-6.0	0.08-0.13	5.6-6.0	Low----------	0.20		
22--------------- Camas	0-14	5-10	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.10	2	1-3
	14-60	0-5	1.40-1.60	>20	0.03-0.05	5.6-6.5	Low----------	0.10		
23*:										
Camas-----------	0-14	5-10	1.30-1.50	2.0-6.0	0.07-0.09	5.6-7.3	Low----------	0.10	2	1-3
	14-60	0-5	1.40-1.60	>20	0.03-0.05	5.6-6.5	Low----------	0.10		
Urban land.										
24--------------- Chapman	0-8	18-27	1.20-1.40	0.6-2.0	0.19-0.21	5.6-6.5	Low----------	0.28	4	3-5
	8-42	20-35	1.20-1.40	0.6-2.0	0.13-0.16	5.6-6.5	Moderate-----	0.32		
	42-50	5-20	1.30-1.50	2.0-6.0	0.07-0.10	6.1-7.3	Low----------	0.20		
	50-60	0-15	1.40-1.50	6.0-20	0.05-0.08	6.6-7.3	Low----------	0.10		
25*:										
Chapman---------	0-8	18-27	1.20-1.40	0.6-2.0	0.19-0.21	5.6-6.5	Low----------	0.28	4	3-5
	8-42	20-35	1.20-1.40	0.6-2.0	0.13-0.16	5.6-6.5	Moderate-----	0.32		
	42-50	5-20	1.30-1.50	2.0-6.0	0.07-0.10	6.1-7.3	Low----------	0.20		
	50-60	0-15	1.40-1.50	6.0-20	0.05-0.08	6.6-7.3	Low----------	0.10		
Urban land.										
26--------------- Chehalis	0-13	30-40	1.20-1.40	0.6-2.0	0.19-0.21	5.6-6.5	Moderate-----	0.32	5	2-6
	13-55	25-35	1.20-1.40	0.6-2.0	0.17-0.21	5.6-7.3	Moderate-----	0.32		
	55-70	15-35	1.30-1.50	0.6-2.0	0.17-0.21	5.6-7.3	Moderate-----	0.32		
	60-70	15-25	1.40-1.50	0.6-2.0	0.19-0.21	6.6-7.3	Low----------	0.32		
27*:										
Chehalis--------	0-13	30-40	1.20-1.40	0.6-2.0	0.19-0.21	5.6-6.5	Moderate-----	0.32	5	2-6
	13-55	25-35	1.20-1.40	0.6-2.0	0.17-0.21	5.6-7.3	Moderate-----	0.32		
	55-70	15-35	1.20-1.50	0.6-2.0	0.17-0.21	5.6-7.3	Moderate-----	0.32		
	60-70	15-25	1.20-1.50	0.6-2.0	0.19-0.21	6.6-7.3	Low----------	0.32		
Urban land.										

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
28C, 28E--------- Chehulpum	0-7 7-13 13	18-27 20-30 ---	1.30-1.40 1.30-1.40 ---	0.6-2.0 0.6-2.0 ---	0.19-0.21 0.18-0.22 ---	5.6-6.5 5.6-6.5 ---	Low---------- Low---------- -------------	0.28 0.28 ----	2	3-5
29--------------- Cloquato	0-14 14-50 50-60	5-15 5-15 2-10	1.30-1.40 1.30-1.40 1.30-.140	0.6-2.0 0.6-2.0 0.6-2.0	0.20-0.22 0.19-0.21 0.08-0.10	5.6-6.5 6.1-7.3 6.1-7.3	Low---------- Low---------- Low----------	0.32 0.32 0.24	5	5-10
30*: Cloquato---------	0-14 14-50 50-60	5-15 5-15 2-10	1.30-1.40 1.30-1.40 1.30-1.40	0.6-2.0 0.6-2.0 0.6-2.0	0.20-0.22 0.19-0.21 0.08-0.10	5.6-6.5 6.1-7.3 6.1-7.3	Low---------- Low---------- Low----------	0.32 0.32 0.24	5	5-10
Urban land.										
31--------------- Coburg	0-18 18-53 53-65	27-35 35-45 15-30	1.20-1.40 1.20-1.40 1.20-1.40	0.6-2.0 0.2-0.6 2.0-6.0	0.18-0.20 0.18-0.20 0.13-0.15	5.6-6.5 6.1-7.3 6.6-7.3	Moderate----- Moderate----- Low----------	0.32 0.37 0.24	5	4-6
32*: Coburg----------	0-18 18-53 53-65	27-35 35-45 15-30	1.20-1.40 1.20-1.40 1.20-1.40	0.6-2.0 0.2-0.6 2.0-6.0	0.18-0.20 0.18-0.20 0.13-0.15	5.6-6.5 6.1-7.3 6.6-7.3	Moderate----- Moderate----- Low----------	0.32 0.37 0.24	5	4-6
Urban land.										
33--------------- Conser	0-9 9-41 41-60	27-35 35-50 15-30	1.20-1.40 1.20-1.40 1.20-1.40	0.6-2.0 0.06-0.2 0.6-2.0	0.19-0.21 0.14-0.16 0.16-0.18	5.6-6.5 6.1-6.5 6.1-7.3	Moderate----- High--------- Low----------	0.37 0.37 0.43	5	4-8
34--------------- Courtney	0-15 15-28 28-41 41-60	27-35 50-60 27-35 0-5	1.30-1.40 1.30-1.40 1.30-1.40 1.30-1.40	0.2-0.6 <0.06 0.2-0.6 6.0-20	0.16-0.19 0.11-0.14 0.07-0.13 0.03-0.05	5.1-6.0 6.1-6.5 6.1-6.5 6.1-7.3	Moderate----- High--------- Moderate----- Low----------	0.20 0.20 0.17 0.10	2	3-5
35D, 35F, 35G---- Cruiser	0-15 15-55 55-65	--- --- ---	0.85-0.95 0.90-1.00 1.10-1.30	0.6-2.0 0.6-2.0 0.6-2.0	0.20-0.25 0.17-0.20 0.10-0.16	4.5-6.0 4.5-6.0 4.5-6.0	Low---------- Low---------- Low----------	0.17 0.24 0.24	5	4-6
36D-------------- Cumley	0-14 14-60	27-35 40-55	1.20-1.40 1.30-1.40	0.6-2.0 0.2-0.6	0.18-0.20 0.14-0.16	5.1-6.5 5.1-6.0	Moderate----- High---------	0.24 0.24	5	4-6
37C, 37E--------- Cupola	0-6 6-32 32-60	--- --- ---	0.85-0.95 1.20-1.40 1.40-1.60	0.6-2.0 0.6-2.0 0.2-0.6	0.17-0.20 0.10-0.13 0.05-0.08	5.1-6.0 5.6-6.5 5.6-6.5	Low---------- Low---------- Low----------	0.15 0.10 0.02	3	4-8
38--------------- Dayton	0-7 7-16 16-45 45-60	15-20 15-30 40-50 40-60	1.30-1.40 1.25-1.40 1.25-1.40 1.30-1.40	0.6-2.0 0.6-2.0 <0.06 0.06-0.2	0.18-0.25 0.18-0.22 0.03-0.05 0.05-0.10	5.1-6.0 5.1-6.0 5.1-6.5 6.1-7.3	Low---------- Low---------- High--------- High---------	0.43 0.49 0.32 0.37	5	1-4
39E, 39F--------- Digger	0-4 4-17 17-37 37	15-25 15-25 15-25 ---	0.90-1.10 0.95-1.10 1.00-1.40 ---	2.0-6.0 2.0-6.0 2.0-6.0 ---	0.10-0.14 0.10-0.12 0.10-0.12 ---	5.1-6.5 5.1-6.0 4.5-6.0 ---	Low---------- Low---------- Low---------- -------------	0.10 0.20 0.24 ----	3	3-5
40H*: Digger----------	0-4 4-17 17-37 37	15-25 15-25 15-25 ---	0.90-1.10 0.95-1.10 1.00-1.40 ---	2.0-6.0 2.0-6.0 2.0-6.0 ---	0.10-0.14 0.10-0.12 0.10-0.12 ---	5.1-6.5 5.1-6.0 4.5-6.0 ---	Low---------- Low---------- Low---------- -------------	0.10 0.20 0.24 ----	3	3-5
Rock outcrop.										
41C, 41E, 41F---- Dixonville	0-14 14-26 26	27-40 40-60 ---	1.30-1.50 1.30-1.60 ---	0.6-2.0 0.06-0.2 ---	0.18-0.21 0.12-0.17 ---	5.6-6.5 5.6-6.5 ---	Moderate----- High--------- -------------	0.32 0.24 ----	3	3-6

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
42E*:										
Dixonville------	0-14	27-40	1.30-1.50	0.6-2.0	0.18-0.21	5.6-6.5	Moderate-----	0.32	3	3-6
	14-26	40-60	1.30-1.60	0.06-0.2	0.12-0.17	5.6-6.5	High---------	0.24		
	26	---	---	---	---	---	-------------	----		
Hazelair---------	0-11	27-40	1.20-1.40	0.6-2.0	0.16-0.18	5.6-6.5	Moderate-----	0.32	2	2-4
	11-15	35-50	1.05-1.20	0.2-0.6	0.13-0.19	5.1-6.5	High---------	0.28		
	15-36	60-70	1.00-1.20	<0.06	0.09-0.12	5.1-6.5	High---------	0.24		
	36	---	---	---	---	---	-------------	----		
Urban land.										
43C*, 43E*:										
Dixonville------	0-14	27-40	1.30-1.50	0.6-2.0	0.18-0.21	5.6-6.5	Moderate-----	0.32	3	3-6
	14-26	40-60	1.30-1.60	0.06-0.2	0.12-0.17	5.6-6.5	High---------	0.24		
	26	---	---	---	---	---	-------------	----		
Philomath-------	0-6	40-55	1.30-1.40	0.6-2.0	0.14-0.17	5.6-6.5	High---------	0.28	1	2-4
	6-14	40-60	1.30-1.40	0.06-0.2	0.14-0.16	5.6-7.3	High---------	0.24		
	14	---	---	---	---	---	-------------	----		
Hazelair---------	0-11	27-40	1.20-1.40	0.6-2.0	0.16-0.18	5.6-6.5	Moderate-----	0.32	2	2-4
	11-15	35-50	1.05-1.20	0.2-0.6	0.13-0.19	5.1-6.5	High---------	0.28		
	15-36	60-70	1.00-1.20	<0.06	0.09-0.12	5.1-6.5	High---------	0.24		
	36	---	---	---	---	---	-------------	----		
44*. Dune land										
45C-------------- Dupee	0-12	15-27	1.35-1.50	0.6-2.0	0.19-0.23	5.1-6.0	Low----------	0.43	4	2-3
	12-55	35-45	1.30-1.45	0.2-0.6	0.16-0.23	4.5-5.5	Moderate-----	0.37		
	55	---	---	---	---	---	-------------	----		
46--------------- Eilertsen	0-11	12-20	1.10-1.30	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.37	5	1-2
	11-72	18-35	1.20-1.30	0.6-2.0	0.19-0.21	4.5-5.5	Moderate-----	0.32		
47E-------------- Fendall	0-12	20-27	0.90-1.10	0.6-2.0	0.18-0.20	4.5-5.0	Low----------	0.28	3	10-15
	12-16	30-40	1.10-1.20	0.6-2.0	0.16-0.21	4.5-5.0	Low----------	0.24		
	16-26	40-50	1.10-1.30	0.2-0.6	0.11-0.16	4.5-5.0	Moderate-----	0.24		
	26	---	---	---	---	---	-------------	----		
48. Fluvents										
49E, 49G--------- Formader	0-18	---	0.85-0.95	0.6-2.0	0.25-0.45	4.5-5.5	Low----------	0.28	3	5-10
	18-33	---	0.90-1.20	0.6-2.0	0.18-0.25	4.5-5.5	Low----------	0.37		
	33	---	---	---	---	---	-------------	----		
50G*:										
Formader--------	0-18	---	0.85-0.95	0.6-2.0	0.25-0.45	4.5-5.5	Low----------	0.28	3	5-10
	18-33	---	0.90-1.20	0.6-2.0	0.18-0.25	4.5-5.5	Low----------	0.37		
	33	---	---	---	---	---	-------------	----		
Hembre----------	0-12	18-27	0.90-1.00	0.6-2.0	0.19-0.21	4.5-5.5	Low----------	0.32	3	4-8
	12-44	25-32	1.00-1.15	0.6-2.0	0.16-0.20	4.5-5.5	Low----------	0.28		
	44	---	---	---	---	---	-------------	----		
Klickitat-------	0-13	20-27	1.20-1.40	0.6-2.0	0.08-0.10	4.5-6.0	Low----------	0.10	3	3-6
	13-39	27-33	1.20-1.40	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.15		
	39-50	20-27	1.20-1.40	0.6-2.0	0.05-0.08	4.5-5.5	Low----------	0.10		
	50	---	---	---	---	---	-------------	----		
51B*:										
Haflinger-------	0-17	5-15	1.20-1.50	2.0-6.0	0.08-0.11	5.6-6.0	Low----------	0.15	5	2-5
	17-60	0-10	1.30-1.50	6.0-20	0.03-0.04	5.6-6.0	Low----------	0.10		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
51B*:										
Jimbo-----------	0-14	10-18	0.85-0.95	2.0-6.0	0.20-0.25	5.6-6.0	Low-----------	0.28	4	3-8
	14-43	10-18	0.90-1.20	2.0-6.0	0.20-0.25	5.1-5.5	Low-----------	0.32		
	43-60	0-5	1.20-1.40	>20.0	0.03-0.05	5.1-5.5	Low-----------	0.10		
52B, 52D--------- Hazelair	0-11	27-40	1.20-1.40	0.6-2.0	0.16-0.18	5.6-6.5	Moderate-----	0.32	2	2-4
	11-15	35-50	1.05-1.20	0.2-0.6	0.13-0.19	5.1-6.5	High---------	0.28		
	15-36	60-70	1.00-1.20	<0.06	0.09-0.12	5.1-6.5	High---------	0.24		
	36	---	---	---	---	---	-------------	----		
53---------------- Heceta	0-5	3-10	1.20-1.40	6.0-20	0.05-0.07	5.6-6.5	Low-----------	0.10	5	2-4
	5-60	3-15	1.30-1.60	6.0-20	0.05-0.07	5.6-6.5	Low-----------	0.10		
54D, 54G--------- Hembre	0-12	18-27	0.90-1.00	0.6-2.0	0.19-0.21	4.5-5.5	Low-----------	0.32	3	4-8
	12-44	25-32	1.00-1.15	0.6-2.0	0.16-0.20	4.5-5.5	Low-----------	0.28		
	44	---	---	---	---	---	-------------	----		
55E*, 55G*:										
Hembre-----------	0-12	18-27	0.90-1.00	0.6-2.0	0.19-0.21	4.5-5.5	Low-----------	0.32	3	4-8
	12-44	25-32	1.00-1.15	0.6-2.0	0.16-0.20	4.5-5.5	Low-----------	0.28		
	44	---	---	---	---	---	-------------	----		
Klickitat-------	0-13	20-27	1.20-1.40	0.6-2.0	0.08-0.10	4.5-6.0	Low-----------	0.10	3	3-6
	13-39	27-33	1.20-1.40	0.6-2.0	0.06-0.10	4.5-5.5	Low-----------	0.15		
	39-50	20-27	1.20-1.40	0.6-2.0	0.05-0.08	4.5-5.5	Low-----------	0.10		
	50	---	---	---	---	---	-------------	----		
56---------------- Holcomb	0-19	27-30	1.30-1.40	0.6-2.0	0.18-0.22	5.6-6.5	Moderate-----	0.28	5	3-5
	19-55	40-50	1.30-1.40	<0.06	0.03-0.05	6.1-7.3	High---------	0.32		
57D, 57F, 57G---- Holderman	0-5	---	0.65-0.95	2.0-6.0	0.20-0.30	5.1-5.5	Low-----------	0.17	2	5-10
	5-21	---	0.75-0.95	2.0-6.0	0.20-0.30	5.1-6.0	Low-----------	0.24		
	21-32	---	1.20-1.50	2.0-6.0	0.15-0.25	5.1-5.5	Low-----------	0.20		
	32	---	---	---	---	---	-------------	----		
58D, 58F--------- Honeygrove	0-9	30-40	1.20-1.40	0.2-0.6	0.14-0.16	4.5-6.5	Low-----------	0.17	5	5-8
	9-60	50-60	1.20-1.40	0.2-0.6	0.14-0.16	4.5-5.5	Moderate-----	0.24		
59E, 59G--------- Hullt	0-13	20-27	1.10-1.30	0.6-2.0	0.19-0.21	5.1-6.0	Low-----------	0.24	4	3-6
	13-54	25-35	1.10-1.30	0.6-2.0	0.18-0.21	4.5-5.5	Moderate-----	0.28		
	54	---	---	---	---	---	-------------	----		
60D, 60F, 60G---- Hummington	0-12	7-18	0.50-0.85	2.0-6.0	0.25-0.35	5.1-5.5	Low-----------	0.10	2	5-10
	12-29	7-18	0.50-0.85	2.0-6.0	0.20-0.30	5.1-5.5	Low-----------	0.10		
	29	---	---	---	---	---	-------------	----		
61---------------- Jimbo	0-14	10-18	0.85-0.95	2.0-6.0	0.20-0.25	5.6-6.0	Low-----------	0.28	4	3-8
	14-43	10-18	0.90-1.20	2.0-6.0	0.20-0.25	5.1-5.5	Low-----------	0.32		
	43-60	0-5	1.20-1.40	>20.0	0.03-0.05	5.1-5.5	Low-----------	0.10		
62B*:										
Jimbo-----------	0-14	10-18	0.85-0.95	2.0-6.0	0.20-0.25	5.6-6.0	Low-----------	0.28	4	3-8
	14-43	10-18	0.90-1.20	2.0-6.0	0.20-0.25	5.1-5.5	Low-----------	0.32		
	43-60	0-5	1.20-1.40	>20.0	0.03-0.05	5.1-5.5	Low-----------	0.10		
Haflinger-------	0-17	5-15	1.20-1.50	2.0-6.0	0.08-0.11	5.6-6.0	Low-----------	0.15	5	2-5
	17-60	0-10	1.30-1.50	6.0-20	0.03-0.04	5.6-6.0	Low-----------	0.10		
63C, 63D, 63E---- Jory	0-9	27-40	1.20-1.30	0.6-2.0	0.18-0.21	4.5-6.0	Low-----------	0.17	5	3-6
	9-60	50-60	1.30-1.50	0.2-0.6	0.15-0.17	4.5-5.5	Moderate-----	0.24		
64D, 64F, 64G---- Keel	0-6	---	0.40-0.85	0.6-2.0	0.30-0.50	4.5-6.0	Low-----------	0.20	3	3-10
	6-19	---	0.40-0.85	0.6-2.0	0.30-0.50	4.5-6.0	Low-----------	0.32		
	19-35	18-32	0.75-0.90	0.6-2.0	0.15-0.20	4.5-6.0	Low-----------	0.28		
	35	---	---	---	---	---	-------------	----		
65G, 65H--------- Kilchis	0-4	18-27	1.10-1.30	2.0-6.0	0.06-0.08	4.5-5.5	Low-----------	0.15	1	4-8
	4-19	18-27	1.20-1.40	2.0-6.0	0.04-0.06	4.5-5.5	Low-----------	0.10		
	19	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
66D--------------- Kinney	0-12	18-27	0.85-0.95	0.6-2.0	0.16-0.22	5.1-6.5	Low-----------	0.10	4	4-8
	12-42	22-30	0.90-1.20	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.17		
	42-50	15-27	0.90-1.20	0.6-2.0	0.13-0.20	3.6-5.5	Low-----------	0.32		
	50	---	---	---	---	---	-------------	----		
67F, 67G---------- Kinney	0-16	18-27	0.85-0.95	0.6-2.0	0.16-0.22	5.1-6.5	Low-----------	0.10	4	4-8
	16-50	22-30	0.90-1.20	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.17		
	50-58	15-27	0.90-1.20	0.6-2.0	0.13-0.20	3.6-5.5	Low-----------	0.32		
	58	---	---	---	---	---	-------------	----		
68F, 68G---------- Kinney	0-12	18-27	0.85-0.95	0.6-2.0	0.16-0.22	5.1-6.5	Low-----------	0.10	4	4-8
	12-42	22-30	0.90-1.20	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.17		
	42-50	15-27	0.90-1.20	0.6-2.0	0.13-0.20	3.6-5.5	Low-----------	0.32		
	50	---	---	---	---	---	-------------	----		
69E--------------- Kinney	0-16	18-27	0.85-0.95	0.6-2.0	0.16-0.22	5.1-6.5	Low-----------	0.10	4	4-8
	16-50	22-30	0.90-1.20	0.6-2.0	0.15-0.20	4.5-5.5	Low-----------	0.17		
	50-59	15-27	0.90-1.20	0.6-2.0	0.13-0.20	3.6-5.5	Low-----------	0.32		
	59	---	---	---	---	---	-------------	----		
70E, 71F, 71G, 72F, 72G--------- Klickitat	0-13	20-27	1.20-1.40	0.6-2.0	0.08-0.10	4.5-6.0	Low-----------	0.10	3	3-6
	13-39	27-33	1.20-1.40	0.6-2.0	0.06-0.10	4.5-5.5	Low-----------	0.15		
	39-50	20-27	1.20-1.40	0.6-2.0	0.05-0.08	4.5-5.5	Low-----------	0.10		
	50	---	---	---	---	---	-------------	----		
73---------------- Linslaw	0-16	15-25	1.20-1.40	0.6-2.0	0.16-0.18	5.1-6.0	Low-----------	0.28	5	2-4
	16-42	35-45	1.20-1.40	0.06-0.2	0.16-0.20	4.5-5.5	Moderate------	0.32		
	42-56	50-55	1.20-1.40	0.06-0.2	0.10-0.18	4.5-6.0	Moderate------	0.32		
	56-60	10-25	1.20-1.40	0.6-2.0	0.10-0.16	5.6-6.0	Low-----------	0.28		
74B, 74C, 74D, 74E-------------- Lint	0-16	---	0.50-0.85	2.0-6.0	0.23-0.50	5.1-5.5	Low-----------	0.37	5	10-15
	16-69	---	0.50-0.85	0.6-2.0	0.22-0.48	5.1-5.5	Low-----------	0.49		
75---------------- Malabon	0-12	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-6.0	Moderate------	0.15	5	4-6
	12-42	35-45	1.20-1.40	0.2-0.6	0.18-0.20	6.1-7.3	Moderate------	0.28		
	42-60	20-35	1.20-1.40	0.6-2.0	0.18-0.20	6.1-7.3	Moderate------	0.32		
76*:										
Malabon----------	0-12	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-6.0	Moderate------	0.15	5	4-6
	12-42	35-45	1.20-1.40	0.2-0.6	0.18-0.20	6.1-7.3	Moderate------	0.28		
	42-60	20-35	1.20-1.40	0.6-2.0	0.18-0.20	6.1-7.3	Moderate------	0.32		
Urban land.										
77B--------------- Marcola	0-15	27-35	1.30-1.40	0.6-2.0	0.14-0.18	5.6-6.5	Moderate------	0.20	5	4-6
	15-60	40-50	1.30-1.50	0.06-0.2	0.12-0.16	6.1-7.3	High----------	0.20		
78---------------- McAlpin	0-14	30-40	1.20-1.40	0.6-2.0	0.19-0.21	5.1-6.0	Moderate------	0.24	5	3-6
	14-60	40-50	1.20-1.40	0.2-0.6	0.15-0.17	5.1-6.0	High----------	0.28		
79---------------- McBee	0-24	27-35	1.20-1.40	0.6-2.0	0.19-0.21	5.6-6.5	Moderate------	0.28	5	4-6
	24-41	25-35	1.20-1.40	0.6-2.0	0.19-0.21	5.6-7.3	Moderate------	0.28		
	41-62	25-45	1.20-1.40	0.6-2.0	0.13-0.21	6.1-7.3	Moderate------	0.28		
80F, 80G---------- McCully	0-11	30-40	1.20-1.30	0.6-2.0	0.17-0.21	5.1-5.5	Low-----------	0.17	4	7-12
	11-55	45-55	1.20-1.30	0.2-0.6	0.14-0.16	4.5-5.0	Moderate------	0.20		
	55	---	---	---	---	---	-------------	----		
81D, 81F, 81G----- McDuff	0-14	27-35	0.95-1.10	0.6-2.0	0.19-0.21	4.5-5.5	Moderate------	0.24	3	4-6
	14-37	40-60	0.95-1.10	0.2-0.6	0.11-0.13	3.6-5.0	Moderate------	0.28		
	37	---	---	---	---	---	-------------	----		
82C--------------- Meda	0-8	20-25	1.30-1.35	0.6-2.0	0.14-0.17	5.6-6.0	Low-----------	0.32	5	1-3
	8-40	27-35	1.30-1.35	0.6-2.0	0.08-0.14	5.6-6.0	Low-----------	0.24		
	40-60	3-15	1.25-1.30	6.0-20.0	0.07-0.10	5.6-6.0	Low-----------	0.20		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
83B: Minniece	0-10	27-35	1.10-1.30	0.2-0.6	0.19-0.21	5.6-6.5	Moderate	0.32	5	6-10
	10-39	40-55	1.10-1.30	<0.06	0.06-0.08	5.6-6.5	High	0.32		
	39-60	35-55	1.10-1.30	0.06-0.2	0.06-0.10	5.6-6.5	High	0.32		
84D: Mulkey	0-15	10-20	0.50-0.85	2.0-6.0	0.16-0.18	3.6-5.0	Low	0.17	2	3-10
	15-23	10-20	0.50-0.85	2.0-6.0	0.14-0.16	4.5-5.0	Low	0.15		
	23-27	10-20	0.50-0.85	2.0-6.0	0.12-0.15	4.5-5.5	Low	0.15		
	27	---	---	---	---	---	---	---		
85: Natroy	0-5	30-40	1.10-1.30	0.2-0.6	0.17-0.19	5.1-6.0	High	0.24	5	3-6
	5-57	60-65	1.10-1.30	<0.06	0.13-0.17	6.1-7.3	High	0.20		
	57-60	40-55	1.10-1.30	<0.06	0.12-0.16	6.1-7.3	High	0.20		
86: Natroy	0-5	40-60	1.10-1.30	0.06-0.2	0.15-0.17	5.1-6.0	High	0.20	5	3-6
	5-57	60-65	1.10-1.30	<0.06	0.13-0.17	6.1-7.3	High	0.20		
	57-60	40-55	1.10-1.30	<0.06	0.12-0.16	6.1-7.3	High	0.20		
87*:										
Natroy	0-5	30-40	1.10-1.30	0.2-0.6	0.17-0.19	5.1-6.0	High	0.24	5	3-6
	5-57	60-65	1.10-1.30	<0.06	0.13-0.17	6.1-7.3	High	0.20		
	57-60	40-55	1.10-1.30	<0.06	0.12-0.16	6.1-7.3	High	0.20		
Urban land.										
88: Nehalem	0-15	15-25	1.10-1.20	0.6-2.0	0.19-0.21	4.5-6.0	Low	0.32	5	5-10
	15-48	20-35	1.20-1.30	0.6-2.0	0.19-0.21	4.5-5.5	Moderate	0.37		
	48-60	20-35	1.25-1.35	0.2-0.6	0.19-0.21	4.5-5.0	Low	0.37		
89C, 89D, 89E, 89F: Nekia	0-10	30-40	1.10-1.30	0.6-2.0	0.17-0.21	5.1-6.0	Low	0.24	3	3-8
	10-35	40-50	1.10-1.30	0.2-0.6	0.09-0.16	4.5-5.5	Moderate	0.20		
	35	---	---	---	---	---	---	---		
90: Nekoma	0-11	5-20	1.00-1.20	0.6-2.0	0.20-0.23	5.1-6.0	Low	0.24	5	4-8
	11-20	5-15	1.10-1.30	2.0-6.0	0.12-0.15	5.1-6.0	Low	0.15		
	20-60	5-15	1.30-1.40	6.0-20.0	0.10-0.13	4.5-6.0	Low	0.10		
91D, 91E: Neskowin	0-12	---	0.75-0.85	0.6-2.0	0.30-0.40	4.5-5.5	Moderate	0.24	2	5-15
	12-30	---	0.75-0.85	0.6-2.0	0.30-0.40	4.5-5.5	Moderate	0.24		
	30	---	---	---	---	---	---	---		
92G*:										
Neskowin	0-12	---	0.75-0.85	0.6-2.0	0.30-0.40	4.5-5.5	Moderate	0.24	2	5-15
	12-30	---	0.75-0.85	0.6-2.0	0.30-0.40	4.5-5.5	Moderate	0.24		
	30	---	---	---	---	---	---	---		
Salander	0-18	---	0.55-0.65	0.6-2.0	0.26-0.34	4.5-5.5	Low	0.28	5	7-15
	18-70	---	0.65-1.05	0.6-2.0	0.25-0.37	4.5-5.5	Low	0.43		
93: Nestucca	0-17	27-35	1.10-1.25	0.6-2.0	0.19-0.21	4.5-5.5	Low	0.32	5	4-8
	17-43	27-35	1.25-1.40	0.2-0.6	0.19-0.21	4.5-5.0	Moderate	0.32		
	43-60	20-45	1.35-1.45	0.06-0.6	0.15-0.17	4.5-5.0	Moderate	0.28		
94C, 94E: Netarts	0-6	1-5	1.30-1.60	6.0-20	0.05-0.10	3.6-5.5	Low	0.17	5	3-6
	6-47	1-5	1.30-1.60	2.0-6.0	0.05-0.10	4.5-6.0	Low	0.17		
	47-60	1-5	1.30-1.60	6.0-20	0.05-0.10	5.1-6.0	Low	0.17		
95: Newberg	0-14	7-15	1.20-1.40	2.0-6.0	0.12-0.15	5.6-6.5	Low	0.28	5	2-4
	14-65	5-15	1.20-1.40	2.0-6.0	0.12-0.15	5.6-6.5	Low	0.24		
96: Newberg	0-14	7-15	1.20-1.40	2.0-6.0	0.20-0.23	5.6-6.5	Low	0.32	5	2-4
	14-65	5-15	1.20-1.40	2.0-6.0	0.12-0.15	5.6-6.5	Low	0.24		
97*:										
Newberg	0-14	7-15	1.20-1.40	2.0-6.0	0.12-0.15	5.6-6.5	Low	0.28	5	2-4
	14-65	5-15	1.20-1.40	2.0-6.0	0.12-0.15	5.6-6.5	Low	0.24		
Urban land.										

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
98---------------- Noti	0-9	10-18	1.00-1.30	0.6-2.0	0.16-0.20	4.5-5.5	Low-----------	0.28	3	4-6
	9-34	10-18	1.10-1.30	0.6-2.0	0.14-0.18	4.5-5.5	Low-----------	0.32		
	34-44	5-10	1.10-1.40	2.0-6.0	0.08-0.10	4.5-5.5	Low-----------	0.20		
	44-60	5-10	1.40-1.60	0.06-0.2	0.04-0.06	4.5-5.5	Low-----------	0.02		
99H*: Ochrepts.										
Umbrepts.										
100--------------- Oxley	0-17	15-27	1.20-1.40	0.6-2.0	0.13-0.18	5.1-6.0	Low-----------	0.20	5	3-5
	17-23	27-35	1.25-1.40	0.2-0.6	0.14-0.17	5.6-6.0	Moderate-----	0.24		
	23-41	10-35	1.25-1.35	0.2-0.6	0.06-0.14	5.6-6.0	Low-----------	0.20		
	41-60	5-15	1.30-1.50	2.0-6.0	0.05-0.07	6.6-7.3	Low-----------	0.20		
101*: Oxley-----------	0-17	15-27	1.20-1.40	0.6-2.0	0.13-0.18	5.1-6.0	Low-----------	0.20	5	3-5
	17-23	27-35	1.25-1.40	0.2-0.6	0.14-0.17	5.6-6.0	Moderate-----	0.24		
	23-41	10-35	1.25-1.35	0.2-0.6	0.06-0.14	5.6-6.0	Low-----------	0.20		
	41-60	5-15	1.30-1.50	2.0-6.0	0.05-0.07	6.6-7.3	Low-----------	0.20		
Urban land.										
102C-------------- Panther	0-10	25-35	1.20-1.30	0.2-0.6	0.19-0.21	5.6-6.5	Moderate-----	0.24	3	3-5
	10-42	60-70	1.30-1.50	<0.06	0.13-0.16	3.6-6.5	High----------	0.24		
	42	---	---	---	---	---	--------------	----		
103C*: Panther----------	0-10	25-35	1.20-1.30	0.2-0.6	0.19-0.21	5.6-6.5	Moderate-----	0.24	3	3-5
	10-42	60-70	1.30-1.50	<0.06	0.13-0.16	3.6-6.5	High----------	0.24		
	42	---	---	---	---	---	--------------	----		
Urban land.										
104E, 104G-------- Peavine	0-8	30-40	1.10-1.30	0.2-0.6	0.18-0.20	5.1-6.0	Moderate-----	0.28	3	4-8
	8-38	45-60	1.10-1.30	0.2-0.6	0.13-0.16	4.5-5.5	Moderate-----	0.28		
	38	---	---	---	---	---	--------------	----		
105A-------------- Pengra	0-6	20-27	1.30-1.40	0.2-0.6	0.19-0.21	5.6-6.0	Low-----------	0.28	5	4-6
	6-21	27-35	1.30-1.40	0.2-0.6	0.19-0.21	5.6-6.0	Moderate-----	0.28		
	21-60	60-70	1.40-1.60	<0.06	0.10-0.12	6.1-7.3	High----------	0.24		
106A*: Pengra-----------	0-6	20-27	1.30-1.40	0.2-0.6	0.19-0.21	5.6-6.0	Low-----------	0.28	5	4-6
	6-21	27-35	1.30-1.40	0.2-0.6	0.19-0.21	5.6-6.0	Moderate-----	0.28		
	21-60	60-70	1.40-1.60	<0.06	0.10-0.12	6.1-7.3	High----------	0.24		
Urban land.										
107C-------------- Philomath	0-6	40-55	1.30-1.40	0.6-2.0	0.18-0.21	5.6-6.5	High----------	0.32	1	2-4
	6-14	40-60	1.30-1.40	0.06-0.2	0.14-0.16	5.6-7.3	High----------	0.24		
	14	---	---	---	---	---	--------------	----		
108C, 108F-------- Philomath	0-6	40-55	1.30-1.40	0.6-2.0	0.14-0.17	5.6-6.5	High----------	0.28	1	2-4
	6-14	40-60	1.30-1.40	0.06-0.2	0.14-0.16	5.6-7.3	High----------	0.24		
	14	---	---	---	---	---	--------------	----		
109F*: Philomath--------	0-6	40-55	1.30-1.40	0.6-2.0	0.14-0.17	5.6-6.5	High----------	0.28	1	2-4
	6-14	40-60	1.30-1.40	0.06-0.2	0.14-0.16	5.6-7.3	High----------	0.24		
	14	---	---	---	---	---	--------------	----		
Urban land.										
110*. Pits										

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
111D, 111F------- Preacher	0-18	20-27	0.90-1.20	2.0-6.0	0.18-0.21	4.5-5.5	Low----------	0.17	4	5-8
	18-52	25-35	1.10-1.30	0.6-2.0	0.16-0.21	4.5-5.5	Moderate-----	0.24		
	52-58	7-30	1.20-1.30	2.0-6.0	0.10-0.17	4.5-5.0	Low----------	0.32		
	58	---	---	---	---	---	-------------	----		
112G*:										
Preacher--------	0-18	20-27	0.90-1.20	2.0-6.0	0.18-0.21	4.5-5.5	Low----------	0.17	4	5-8
	18-52	25-35	1.10-1.30	0.6-2.0	0.16-0.21	4.5-5.5	Moderate-----	0.24		
	52-58	7-30	1.20-1.30	2.0-6.0	0.10-0.17	4.5-5.0	Low----------	0.32		
	58	---	---	---	---	---	-------------	----		
Bohannon--------	0-11	15-25	0.90-1.20	2.0-6.0	0.12-0.15	4.5-6.0	Low----------	0.10	3	4-6
	11-24	18-30	1.00-1.30	2.0-6.0	0.09-0.15	4.5-6.0	Low----------	0.17		
	24	---	---	---	---	---	-------------	----		
Slickrock-------	0-13	18-27	0.90-1.20	0.6-2.0	0.14-0.19	4.5-5.5	Low----------	0.15	4	8-12
	13-40	20-35	1.00-1.30	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.32		
	40-55	15-30	1.20-1.40	0.6-2.0	0.10-0.12	4.5-5.5	Low----------	0.28		
	55	---	---	---	---	---	-------------	----		
113C, 113E, 113G- Ritner	0-7	30-40	1.20-1.40	0.6-2.0	0.12-0.19	5.6-6.0	Low----------	0.24	3	2-4
	7-32	35-50	1.30-1.50	0.2-0.6	0.10-0.15	5.1-6.0	Moderate-----	0.20		
	32	---	---	---	---	---	-------------	----		
114*. Riverwash										
115H*: Rock outcrop.										
Kilchis---------	0-4	18-27	1.10-1.30	2.0-6.0	0.06-0.08	4.5-5.5	Low----------	0.15	1	4-8
	4-19	18-27	1.20-1.40	2.0-6.0	0.04-0.06	4.5-5.5	Low----------	0.10		
	19	---	---	---	---	---	-------------	----		
116G*: Rock outcrop.										
Witzel----------	0-4	18-25	1.35-1.50	0.6-2.0	0.07-0.10	5.6-6.5	Low----------	0.20	1	1-4
	4-17	27-35	1.30-1.40	0.2-0.6	0.10-0.15	5.6-6.5	Low----------	0.20		
	17	---	---	---	---	---	-------------	----		
117E------------ Salander	0-18	---	0.55-0.65	0.6-2.0	0.26-0.34	4.5-5.5	Low----------	0.28	5	7-15
	18-70	---	0.65-1.05	0.6-2.0	0.25-0.37	4.5-5.5	Low----------	0.43		
118------------- Salem	0-7	15-20	1.20-1.50	0.6-2.0	0.11-0.17	5.6-6.5	Low----------	0.28	3	4-6
	7-26	25-35	1.20-1.50	0.6-2.0	0.09-0.17	6.1-7.3	Moderate-----	0.24		
	26-60	0-15	1.30-1.60	>20	0.03-0.05	6.1-6.5	Low----------	0.10		
119*:										
Salem-----------	0-7	15-20	1.20-1.50	0.6-2.0	0.11-0.17	5.6-6.5	Low----------	0.28	3	4-6
	7-26	25-35	1.20-1.50	0.6-2.0	0.09-0.17	6.1-7.3	Moderate-----	0.24		
	26-60	0-15	1.30-1.60	>20	0.03-0.05	6.1-6.5	Low----------	0.10		
Urban land.										
120B------------ Salkum	0-11	20-27	---	0.6-2.0	0.19-0.21	5.6-6.5	Low----------	0.32	5	2-6
	11-45	40-55	1.10-1.30	0.06-0.2	0.15-0.17	4.5-6.0	Moderate-----	0.24		
	45-60	35-50	---	0.2-0.6	0.15-0.17	4.5-6.0	Moderate-----	0.24		
121B, 121C------- Salkum	0-13	27-35	1.00-1.40	0.6-2.0	0.19-0.21	5.6-6.5	Low----------	0.24	5	2-6
	13-49	40-55	1.10-1.30	0.06-0.2	0.15-0.17	4.5-6.0	Moderate-----	0.24		
	49-60	35-50	---	0.2-0.6	0.15-0.17	4.5-6.0	Moderate-----	0.24		
122------------- Saturn	0-10	27-35	1.00-1.20	0.6-2.0	0.15-0.20	5.1-6.0	Low----------	0.17	3	6-8
	10-32	25-35	1.10-1.30	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.32		
	32-60	0-5	1.20-1.40	>20	0.03-0.05	4.5-5.5	Low----------	0.10		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
123-------------- Sifton	0-15	15-20	0.55-0.65	2.0-6.0	0.12-0.16	4.5-6.0	Low----------	0.24	2	5-10
	15-60	0-5	1.20-1.40	>20	0.03-0.05	4.5-6.5	Low----------	0.05		
124D, 124F------- Slickrock	0-13	18-27	0.90-1.20	0.6-2.0	0.14-0.19	4.5-5.5	Low----------	0.15	4	8-12
	13-40	20-35	1.00-1.30	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.32		
	40-55	15-30	1.20-1.40	0.6-2.0	0.10-0.12	4.5-5.5	Low----------	0.28		
	55	---	---	---	---	---	-------------	----		
125C, 125D, 125F- Steiwer	0-16	20-27	1.30-1.40	0.6-2.0	0.17-0.21	5.1-6.5	Low----------	0.32	3	2-5
	16-29	27-35	1.30-1.40	0.2-0.6	0.17-0.20	5.1-6.0	Moderate-----	0.32		
	29	---	---	---	---	---	-------------	----		
126F, 126G------- Tahkenitch	0-12	10-18	1.00-1.20	0.6-2.0	0.20-0.28	4.5-5.5	Low----------	0.20	4	3-8
	12-42	7-18	1.00-1.20	2.0-6.0	0.15-0.19	4.5-5.5	Low----------	0.28		
	42	---	---	---	---	---	-------------	----		
127C*: Urban land.										
Hazelair--------	0-11	27-40	1.20-1.40	0.6-2.0	0.16-0.18	5.6-6.5	Moderate-----	0.32	2	2-4
	11-15	35-50	1.05-1.20	0.2-0.6	0.13-0.19	5.1-6.5	High---------	0.28		
	15-36	60-70	1.00-1.20	<0.06	0.09-0.12	5.1-6.5	High---------	0.24		
	36	---	---	---	---	---	-------------	----		
Dixonville------	0-14	27-40	1.30-1.50	0.6-2.0	0.18-0.21	5.6-6.5	Moderate-----	0.32	3	3-6
	14-26	40-60	1.30-1.60	0.06-0.2	0.12-0.17	5.6-6.5	High---------	0.24		
	26	---	---	---	---	---	-------------	----		
128B------------- Veneta	0-14	20-25	1.20-1.40	0.6-2.0	0.16-0.18	5.1-6.0	Low----------	0.37	5	2-4
	14-39	35-45	1.20-1.40	0.06-0.2	0.18-0.20	5.1-5.5	Moderate-----	0.32		
	39-60	55-65	1.20-1.40	0.06-0.2	0.14-0.16	5.1-5.5	High---------	0.24		
129B------------- Veneta Variant	0-12	15-25	1.10-1.30	0.6-2.0	0.19-0.21	5.6-6.0	Low----------	0.32	5	2-4
	12-52	27-35	1.20-1.30	0.2-0.6	0.19-0.21	4.5-5.5	Moderate-----	0.37		
	52-60	10-25	1.20-1.40	0.6-2.0	0.13-0.21	4.5-5.5	Low----------	0.24		
130-------------- Waldo	0-11	27-40	1.10-1.30	0.6-2.0	0.18-0.21	5.1-6.5	Moderate-----	0.24	5	4-8
	11-60	40-55	1.10-1.30	0.06-0.2	0.14-0.17	5.1-6.0	High---------	0.28		
131C, 131E, 131G- Waldport	0-5	1-5	1.30-1.60	6.0-20	0.05-0.07	4.5-6.0	Low----------	0.17	5	3-8
	5-60	1-5	1.30-1.60	>20	0.05-0.07	5.1-6.5	Low----------	0.17		
132E------------- Waldport	0-2	1-5	1.40-1.60	>20	0.05-0.07	4.5-6.0	Low----------	0.17	5	1-5
	2-60	1-5	1.40-1.60	>20	0.05-0.07	4.5-6.0	Low----------	0.17		
133C*: Waldport--------	0-5	1-5	1.30-1.60	6.0-20	0.05-0.07	4.5-6.0	Low----------	0.17	5	3-8
	5-60	1-5	1.30-1.60	>20	0.05-0.07	5.1-6.5	Low----------	0.17		
Urban land.										
134-------------- Wapato	0-17	27-35	1.20-1.40	0.2-2.0	0.19-0.21	5.1-7.3	Moderate-----	0.32	5	4-8
	17-33	20-35	1.20-1.40	0.2-0.6	0.15-0.17	5.1-6.5	Moderate-----	0.32		
	33-60	40-50	1.20-1.40	0.2-0.6	0.15-0.17	5.6-6.5	Moderate-----	0.28		
135C, 135D, 135E, 135F------------ Willakenzie	0-11	27-30	1.15-1.25	0.2-0.6	0.19-0.21	5.6-6.5	Low----------	0.24	2	3-6
	11-36	32-35	1.15-1.30	0.2-0.6	0.15-0.18	4.5-6.0	Moderate-----	0.32		
	36	---	---	---	---	---	-------------	----		
136-------------- Willanch	0-11	5-10	1.30-1.40	2.0-6.0	0.13-0.15	5.6-6.5	Low----------	0.15	5	2-5
	11-34	5-10	1.30-1.40	2.0-6.0	0.12-0.14	5.6-6.0	Low----------	0.15		
	34-60	0-5	1.40-1.45	2.0-6.0	0.09-0.12	5.6-6.0	Low----------	0.20		
137F------------- Winberry	0-4	10-18	1.00-1.20	2.0-6.0	0.07-0.13	5.6-6.0	Low----------	0.17	1	4-8
	4-18	10-18	1.00-1.20	2.0-6.0	0.07-0.13	5.6-6.0	Low----------	0.24		
	18	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
138E, 138G------- Witzel	0-4 4-17 17	18-25 27-35 ---	1.35-1.50 1.30-1.40 ---	0.6-2.0 0.2-0.6 ---	0.07-0.10 0.10-0.15 ---	5.6-6.5 5.6-6.5 ---	Low----------- Low----------- -------------	0.20 0.20 ----	1	1-4
139--------------- Woodburn	0-9 9-26 26-60	10-20 20-35 15-27	1.20-1.40 1.20-1.40 1.30-1.50	0.6-2.0 0.6-2.0 0.06-0.2	0.19-0.21 0.19-0.21 0.19-0.21	5.6-6.5 5.6-6.5 5.6-6.5	Low----------- Moderate----- Low-----------	0.32 0.43 0.55	5	3-5
140--------------- Yaquina	0-8 8-29 29-60	1-5 1-2 1-2	1.30-1.60 1.30-1.60 1.30-1.60	2.0-6.0 2.0-6.0 6.0-20	0.05-0.10 0.05-0.07 0.05-0.07	4.5-5.5 5.1-6.0 5.1-6.0	Low----------- Low----------- Low-----------	0.17 0.17 0.17	5	.5-2
141*:										
Yaquina---------	0-8 8-29 29-60	1-5 1-2 1-2	1.30-1.60 1.30-1.60 1.30-1.60	2.0-6.0 2.0-6.0 6.0-20	0.05-0.10 0.05-0.07 0.05-0.07	4.5-5.5 5.1-6.0 5.1-6.0	Low----------- Low----------- Low-----------	0.17 0.17 0.17	5	.5-2
Urban land.										
142G*:										
Yellowstone-----	0-4 4-12 12	10-20 5-15 ---	1.10-1.40 1.30-1.50 ---	2.0-6.0 6.0-20 ---	0.09-0.11 0.04-0.06 ---	4.5-5.5 4.5-5.5 ---	Low----------- Low----------- -------------	0.10 0.10 ----	1	4-8
Rock outcrop.										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
1A, 1B------------ Abiqua	C	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate.
2E---------------- Astoria	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
3E, 3G------------ Astoria Variant	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
4G*:												
Atring-----------	B	None--------	---	---	>6.0	---	---	20-40	Soft	---	Moderate	Low.
Rock outcrop.												
5----------------- Awbrig	D	Rare--------	---	---	0-1.0	Perched	Nov-May	>60	---	---	High-----	Moderate.
6*:												
Awbrig-----------	D	Rare--------	---	---	0-1.0	Perched	Nov-May	>60	---	---	High-----	Moderate.
Urban land.												
7B, 7C, 7F-------- Bandon	C	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
8----------------- Bashaw	D	Occasional	Long------	Dec-Apr	+1-0.5	Perched	Nov-May	>60	---	---	High-----	Moderate.
9*:												
Bashaw-----------	D	Occasional	Long------	Dec-Apr	+1-0.5	Perched	Nov-May	>60	---	---	High-----	Moderate.
Urban land.												
10*. Beaches												
11C, 11D, 11E, 11F, 12E--------- Bellpine	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Moderate.
13F, 13G, 14E, 14F-------------- Blachly	C	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
15E*:												
Blachly----------	C	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
McCully----------	C	None--------	---	---	>6.0	---	---	40-60	Soft	Low------	High-----	High.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
16D, 16F, 16H----- Bohannon	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	Low------	High.
17---------------- Brallier	D	Frequent----	Brief-----	Nov-Mar	+1-2.0	Apparent	Jan-Dec	>60	---	---	High-----	High.
18---------------- Brallier Variant	D	Frequent----	Brief-----	Jan-Dec	+1-2.0	Apparent	Jan-Dec	>60	---	---	High-----	High.
19---------------- Brenner	C/D	Frequent----	Brief-----	Dec-Apr	0-1.0	Perched	Dec-Apr	>60	---	---	High-----	High.
20B--------------- Briedwell	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
21B*, 21C*, 21E*, 21G*:												
Bullards--------	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
Ferrelo---------	B	None--------	---	---	>6.0	---	---	>60	---	---	Low------	Moderate.
22---------------- Camas	A	Occasional	Brief-----	Nov-May	>6.0	---	---	>60	---	---	Moderate	Moderate.
23*:												
Camas------------	A	Rare--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
Urban land.												
24---------------- Chapman	B	Rare--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
25*:												
Chapman----------	B	Rare--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
Urban land.												
26---------------- Chehalis	B	Occasional	Brief-----	Nov-Mar	>6.0	---	---	>60	---	Low------	Moderate	Moderate.
27*:												
Chehalis---------	B	Occasional	Brief-----	Nov-Mar	>6.0	---	---	>60	---	Low------	Moderate	Moderate.
Urban land.												
28C, 28E---------- Chehulpum	C	None--------	---	---	>6.0	---	---	10-20	Soft	---	High-----	Moderate.
29---------------- Cloquato	B	Occasional	Very brief	Nov-Mar	>6.0	---	---	>60	---	Low------	Moderate	Moderate.
30*:												
Cloquato---------	B	Occasional	Very brief	Nov-Mar	>6.0	---	---	>60	---	Low------	Moderate	Moderate.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
30*: Urban land.												
31---------------- Coburg	C	None---------	---	---	1.5-2.5	Apparent	Nov-May	>60	---	---	High-----	Low.
32*: Coburg-----------	C	None---------	---	---	1.5-2.5	Apparent	Nov-May	>60	---	---	High-----	Low.
Urban land.												
33---------------- Conser	D	Rare---------	---	---	0-1.5	Apparent	Nov-May	>60	---	---	High-----	Moderate.
34---------------- Courtney	D	Rare---------	---	---	0-1.5	Perched	Dec-May	>60	---	---	High-----	Moderate.
35D, 35F, 35G----- Cruiser	B	None---------	---	---	>6.0	---	---	>60	---	High-----	High-----	High.
36D--------------- Cumley	C	None---------	---	---	2.0-3.0	Apparent	Nov-Apr	>60	---	---	High-----	Moderate.
37C, 37E---------- Cupola	B	None---------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
38---------------- Dayton	D	None---------	---	---	+1-1.5	Perched	Nov-May	>60	---	---	High-----	Moderate.
39E, 39F---------- Digger	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	Low------	Moderate.
40H*: Digger-----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	Low------	Moderate.
Rock outcrop.												
41C, 41E, 41F----- Dixonville	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Low.
42E*: Dixonville-------	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Low.
Hazelair---------	D	None---------	---	---	1.0-2.0	Perched	Dec-Apr	20-40	Soft	---	High-----	Moderate.
Urban land.												
43C*, 43E*: Dixonville-------	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Low.
Philomath--------	D	None---------	---	---	>6.0	---	---	12-20	Soft	---	High-----	Moderate.
Hazelair---------	D	None---------	---	---	1.0-2.0	Perched	Dec-Apr	20-40	Soft	---	High-----	Moderate.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
44*. Dune land												
45C---------------- Dupee	C	None---------	---	---	2.0-3.0	Perched	Dec-Mar	40-60	Soft	---	Moderate	High.
46----------------- Eilertsen	B	None---------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate.
47E---------------- Fendall	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	High-----	High.
48. Fluvents												
49E, 49G----------- Formader	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	High-----	High.
50G*:												
Formader----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	High-----	High.
Hembre------------	B	None---------	---	---	>6.0	---	---	40-60	Hard	---	High-----	High.
Klickitat---------	B	None---------	---	---	>6.0	---	---	40-60	Hard	---	High-----	High.
51B*:												
Haflinger---------	A	Rare---------	---	---	>6.0	---	---	>60	---	---	Low------	Moderate.
Jimbo-------------	B	None---------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
52B, 52D----------- Hazelair	D	None---------	---	---	1.0-2.0	Perched	Dec-Apr	20-40	Soft	---	High-----	Moderate.
53----------------- Heceta	B/D	Rare---------	---	---	+1-0.5	Apparent	Oct-May	>60	---	---	High-----	Moderate.
54D, 54G----------- Hembre	B	None---------	---	---	>6.0	---	---	40-60	Hard	---	High-----	High.
55E*, 55G*:												
Hembre------------	B	None---------	---	---	>6.0	---	---	40-60	Hard	---	High-----	High.
Klickitat---------	B	None---------	---	---	>6.0	---	---	40-60	Hard	---	High-----	High.
56----------------- Holcomb	D	None---------	---	---	1.0-1.5	Perched	Nov-May	>60	---	---	High-----	Moderate.
57D, 57F, 57G------ Holderman	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	Moderate.
58D, 58F----------- Honeygrove	C	None---------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
59E, 59G---------- Hullt	B	None---------	---	---	>6.0	---	---	40-60	Soft	---	Moderate	Moderate.
60D, 60F, 60G----- Hummington	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
61---------------- Jimbo	B	None---------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
62B*:												
Jimbo------------	B	None---------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
Haflinger--------	A	Rare---------	---	---	>6.0	---	---	>60	---	---	Low------	Moderate.
63C, 63D, 63E----- Jory	C	None---------	---	---	>6.0	---	---	>60	---	---	High-----	High.
64D, 64F, 64G----- Keel	C	None---------	---	---	>6.0	---	---	20-40	Soft	High-----	High-----	High.
65G, 65H---------- Kilchis	C	None---------	---	---	>6.0	---	---	12-20	Hard	---	High-----	High.
66D, 67F, 67G, 68F, 68G, 69E---- Kinney	B	None---------	---	---	>6.0	---	---	40-60	Soft	Moderate	High-----	High.
70E, 71F, 71G, 72F, 72G--------- Klickitat	B	None---------	---	---	>6.0	---	---	40-60	Hard	---	High-----	High.
73---------------- Linslaw	D	Rare---------	---	---	1.5-2.5	Apparent	Nov-May	>60	---	---	High-----	High.
74B, 74C, 74D, 74E-------------- Lint	B	None---------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
75---------------- Malabon	C	None---------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate.
76*:												
Malabon----------	C	None---------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate.
Urban land.												
77B--------------- Marcola	C	None---------	---	---	3.5-4.5	Apparent	Nov-May	>60	---	---	High-----	Moderate.
78---------------- McAlpin	C	Rare---------	---	---	2.0-3.0	Apparent	Nov-Mar	>60	---	---	High-----	Moderate.
79---------------- McBee	B	Frequent----	Brief-----	Nov-May	2.0-3.0	Apparent	Nov-Apr	>60	---	---	Moderate	Moderate.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
80F, 80G---------- McCully	C	None--------	---	---	>6.0	---	---	40-60	Soft	Low------	High-----	High.
81D, 81F, 81G----- McDuff	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	High-----	High.
82C--------------- Meda	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Moderate.
83B--------------- Minniece	D	Rare--------	---	---	0-2.0	Perched	Nov-May	>60	---	---	High-----	High.
84D--------------- Mulkey	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	High-----	High.
85, 86------------ Natroy	D	Frequent----	Long------	Nov-May	+1-1.0	Perched	Nov-May	>60	---	---	High-----	Moderate.
87*: Natroy-----------	D	Rare--------	---	---	+1-1.0	Perched	Nov-May	>60	---	---	High-----	Moderate.
Urban land.												
88---------------- Nehalem	B	Occasional	Brief-----	Dec-Apr	3.0-6.0	Apparent	Dec-Apr	>60	---	---	High-----	High.
89C, 89D, 89E, 89F--------------- Nekia	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	High-----	High.
90---------------- Nekoma	B	Frequent----	Brief-----	Nov-Apr	4.0->6	Apparent	Nov-Apr	>60	---	---	Low------	High.
91D, 91E---------- Neskowin	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	High-----	High.
92G*: Neskowin---------	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	High-----	High.
Salander---------	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
93---------------- Nestucca	C	Frequent----	Brief-----	Dec-Apr	1.0-2.0	Apparent	Dec-Apr	>60	---	---	High-----	High.
94C, 94E---------- Netarts	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate	High.
95, 96------------ Newberg	B	Occasional	Brief-----	Dec-Mar	>6.0	---	---	>60	---	---	Moderate	Moderate.
97*: Newberg----------	B	Occasional	Brief-----	Dec-Mar	>6.0	---	---	>60	---	---	Moderate	Moderate.
Urban land.												

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
98----------------- Noti	D	Frequent----	Brief-----	Oct-May	0-1.0	Perched	Oct-May	>60	---	---	High-----	High.
99H*: Ochrepts.												
Umbrepts.												
100---------------- Oxley	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	---	---	High-----	Moderate.
101*: Oxley------------	C	None--------	---	---	0.5-1.5	Perched	Nov-May	>60	---	---	High-----	Moderate.
Urban land.												
102C--------------- Panther	D	None--------	---	---	0-1.0	Perched	Dec-Apr	40-60	Soft	---	High-----	High.
103C*: Panther----------	D	None--------	---	---	0-1.0	Perched	Dec-Apr	40-60	Soft	---	High-----	High.
Urban land.												
104E, 104G-------- Peavine	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	High-----	High.
105A--------------- Pengra	D	None--------	---	---	1.5-2.5	Perched	Nov-May	>60	---	---	High-----	Moderate.
106A*: Pengra-----------	D	None--------	---	---	1.5-2.5	Perched	Nov-May	>60	---	---	High-----	Moderate.
Urban land.												
107C, 108C, 108F-- Philomath	D	None--------	---	---	>6.0	---	---	12-20	Soft	---	High-----	Moderate.
109F*: Philomath--------	D	None--------	---	---	>6.0	---	---	12-20	Soft	---	High-----	Moderate.
Urban land.												
110*. Pits												
111D, 111F-------- Preacher	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	High-----	High.
112G*: Preacher---------	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	High-----	High.
Bohannon---------	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	Low------	High.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
112G*:												
Slickrock--------	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	High-----	High.
113C, 113E, 113G-- Ritner	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	High-----	Moderate.
114*. Riverwash												
115H*: Rock outcrop.												
Kilchis----------	C	None--------	---	---	>6.0	---	---	12-20	Hard	---	High-----	High.
116G*: Rock outcrop.												
Witzel-----------	D	None--------	---	---	>6.0	---	---	12-20	Hard	---	Moderate	Moderate.
117E-------------- Salander	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	High.
118--------------- Salem	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
119*:												
Salem------------	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
Urban land.												
120B, 121B, 121C-- Salkum	C	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	High.
122--------------- Saturn	B	Rare--------	---	---	3.5-5.0	Apparent	Dec-Mar	>60	---	---	High-----	High.
123--------------- Sifton	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
124D, 124F-------- Slickrock	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	High-----	High.
125C, 125D, 125F-- Steiwer	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Moderate.
126F, 126G-------- Tahkenitch	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	High-----	High.
127C*: Urban land.												
Hazelair---------	D	None--------	---	---	1.0-2.0	Perched	Dec-Apr	20-40	Soft	---	High-----	Moderate.
Dixonville-------	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	High-----	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
128B--------------- Veneta	D	None---------	---	---	3.0-6.0	Perched	Nov-May	>60	---	---	High------	High.
129B--------------- Veneta Variant	B	None---------	---	---	3.5-6.0	Apparent	Nov-May	>60	---	---	High------	Moderate.
130---------------- Waldo	D	Occasional	Brief------	Jan-Apr	0-0.5	Perched	Nov-May	>60	---	---	Moderate	Moderate.
131C, 131E, 131G, 132E------------- Waldport	A	None---------	---	---	>6.0	---	---	>60	---	---	High------	High.
133C*:												
Waldport---------	A	None---------	---	---	>6.0	---	---	>60	---	---	High------	High.
Urban land.												
134---------------- Wapato	D	Frequent----	Brief------	Dec-Apr	+1-1.0	Apparent	Dec-May	>60	---	---	Moderate	Moderate.
135C, 135D, 135E, 135F------------- Willakenzie	C	None---------	---	---	>6.0	---	---	20-40	Soft	---	High------	High.
136---------------- Willanch	C	Frequent----	Brief------	Nov-Mar	0-2.0	Apparent	Nov-Mar	>60	---	---	High------	Moderate.
137F--------------- Winberry	C	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low-------	Moderate.
138E, 138G--------- Witzel	D	None---------	---	---	>6.0	---	---	12-20	Hard	---	Moderate	Moderate.
139---------------- Woodburn	C	None---------	---	---	2.0-3.0	Perched	Dec-Apr	>60	---	---	Moderate	Moderate.
140---------------- Yaquina	B/D	None---------	---	---	+2-2.0	Apparent	Nov-Apr	>60	---	Low-------	High------	High.
141*:												
Yaquina-----------	B/D	None---------	---	---	+2-2.0	Apparent	Nov-Apr	>60	---	Low-------	High------	High.
Urban land.												
142G*:												
Yellowstone------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	High------	High.
Rock outcrop.												

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Abiqua	Fine, mixed, mesic Cumulic Ultic Haploxerolls
Astoria	Medial, mesic Andic Haplumbrepts
Astoria Variant	Medial, mesic Andic Haplumbrepts
Atring	Loamy-skeletal, mixed, mesic Dystric Xerochrepts
Awbrig	Fine, montmorillonitic, mesic Vertic Albaqualfs
Bandon**	Coarse-loamy, mixed, mesic, ortstein Typic Haplorthods
Bashaw	Very-fine, montmorillonitic, mesic Typic Pelloxererts
Bellpine	Clayey, mixed, mesic Xeric Haplohumults
Blachly	Fine, mixed, mesic Umbric Dystrochrepts
Bohannon	Fine-loamy, mixed, mesic Typic Haplumbrepts
Brallier	Dysic, isomesic Typic Tropohemists
Brallier Variant	Euic Isomesic Terric Tropohemist
*Brenner	Fine, mixed, acid, isomesic Aeric Tropaquepts
Briedwell	Loamy-skeletal, mixed, mesic Ultic Haploxerolls
Bullards**	Coarse-loamy, mixed, mesic Typic Haplorthods
Camas	Sandy-skeletal, mixed, mesic Fluventic Haploxerolls
Chapman	Fine-loamy, mixed, mesic Cumulic Ultic Haploxerolls
Chehalis	Fine-silty, mixed, mesic Cumulic Ultic Haploxerolls
Chehulpum	Loamy, mixed, mesic, shallow Ultic Haploxerolls
Cloquato	Coarse-silty, mixed, mesic Cumulic Ultic Haploxerolls
Coburg	Fine, mixed, mesic Pachic Ultic Argixerolls
Conser	Fine, mixed, mesic Typic Argiaquolls
Courtney	Fine, montmorillonitic, mesic Abruptic Argiaquolls
Cruiser	Medial Andic Cryochrepts
Cumley	Clayey, mixed, mesic Typic Haplohumults
Cupola	Medial-skeletal, mesic Entic Dystrandepts
Dayton	Fine, montmorillonitic, mesic Typic Albaqualfs
Digger	Loamy-skeletal, mixed, mesic Dystric Eutrochrepts
Dixonville	Fine, mixed, mesic Pachic Ultic Argixerolls
Dupee	Fine, mixed, mesic Aquultic Haploxeralfs
Eilertsen	Fine-silty, mixed, mesic Ultic Hapludalfs
Fendall	Fine, mixed, isomesic Typic Humitropepts
Ferrelo	Coarse-loamy, mixed, isomesic Typic Dystropepts
Formader	Medial, mesic Andic Haplumbrepts
Haflinger	Sandy-skeletal, mixed, mesic Entic Haplumbrepts
Hazelair	Very-fine, mixed, mesic Aquultic Haploxerolls
Heceta	Mixed, mesic Typic Psammaquents
Hembre	Fine-loamy, mixed, mesic Typic Haplumbrepts
Holcomb	Fine, montmorillonitic, mesic Mollic Albaqualfs
Holderman	Medial-skeletal Andic Cryochrepts
Honeygrove	Clayey, mixed, mesic Typic Haplohumults
Hullt	Fine-loamy, mixed, mesic Typic Xerumbrepts
Hummington	Medial-skeletal Dystric Cryandepts
Jimbo	Medial, mesic Andic Haplumbrepts
Jory	Clayey, mixed, mesic Xeric Haplohumults
Keel	Medial Dystric Cryandepts
Kilchis	Loamy-skeletal, mixed, mesic Lithic Haplumbrepts
Kinney	Medial, mesic Andic Haplumbrepts
Klickitat	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Linslaw	Fine, mixed, mesic Aquultic Haploxeralfs
Lint	Medial, isomesic Typic Dystrandepts
Malabon	Fine, mixed, mesic Pachic Ultic Argixerolls
Marcola	Clayey-skeletal, mixed, mesic Pachic Ultic Argixerolls
McAlpin	Fine, mixed, mesic Cumulic Ultic Haploxerolls
McBee	Fine-silty, mixed, mesic Cumulic Ultic Haploxerolls
McCully	Fine, mixed, mesic Typic Haplumbrepts
McDuff	Clayey, mixed, mesic Typic Haplohumults
Meda	Fine-loamy, mixed, mesic Typic Haplumbrepts
Minniece	Fine, mixed, mesic Typic Umbraqualfs
Mulkey	Medial Dystric Cryandepts
Natroy	Very-fine, montmorillonitic, mesic Aquic Chromoxererts
*Nehalem	Fine-silty, mixed, isomesic Fluventic Humitropepts
Nekia	Clayey, mixed, mesic Xeric Haplohumults
Nekoma	Coarse-loamy, mixed, mesic Fluventic Haplumbrepts
Neskowin	Medial, isomesic Typic Dystrandepts
*Nestucca	Fine-silty, mixed, acid, isomesic Aeric Tropaquepts
Netarts**	Sandy, mixed, mesic Entic Haplorthods
Newberg	Coarse-loamy, mixed, mesic Fluventic Haploxerolls

TABLE 15.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Noti	Coarse-loamy over sandy or sandy-skeletal, mixed, acid, mesic Typic Humaquepts
Oxley	Loamy-skeletal, mixed, mesic Typic Argiaquolls
Panther	Very-fine, montmorillonitic, mesic Typic Haplaquolls
Peavine	Clayey, mixed, mesic Typic Haplohumults
Pengra	Fine-silty over clayey, mixed, mesic Typic Haplaquolls
Philomath	Clayey, montmorillonitic, mesic, shallow Vertic Haploxerolls
Preacher	Fine-loamy, mixed, mesic Typic Haplumbrepts
Ritner	Clayey-skeletal, mixed, mesic Dystric Xerochrepts
Salander	Medial, isomesic Typic Dystrandepts
Salem	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Pachic Ultic Argixerolls
Salkum	Clayey, kaolinitic, mesic Xeric Haplohumults
Saturn	Fine-loamy over fragmental, mixed, mesic Fluventic Haplumbrepts
Sifton	Medial over sandy or sandy-skeletal, mixed, mesic Andic Xerumbrepts
Slickrock	Fine-loamy, mixed, mesic Pachic Haplumbrepts
Steiwer	Fine-loamy, mixed, mesic Ultic Haploxerolls
Tahkenitch	Coarse-loamy, mixed, mesic Typic Haplumbrepts
Veneta	Fine, mixed, mesic Ultic Haploxeralfs
Veneta Variant	Fine silty, mixed, mesic Ultic Haploxeralfs
Waldo	Fine, mixed, mesic Fluvaquentic Haplaquolls
Waldport	Mixed, isomesic Typic Tropopsamments
Wapato	Fine-silty, mixed, mesic Fluvaquentic Haplaquolls
Willakenzie	Fine-silty, mixed, mesic Ultic Haploxeralfs
Willanch	Coarse-loamy, mixed, nonacid, isomesic Aeric Tropaquepts
Winberry	Loamy-skeletal, mixed Lithic Cryochrepts
Witzel	Loamy-skeletal, mixed, mesic Lithic Ultic Haploxerolls
*Woodburn	Fine-silty, mixed, mesic Aquultic Argixerolls
Yaquina**	Sandy, mixed, mesic Aquic Haplorthods
Yellowstone	Loamy-skeletal, mixed Lithic Cryumbrepts

** These series have isomesic soil temperature regimes. The proposed amendments to Soil Taxonomy will change the series classification.

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CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

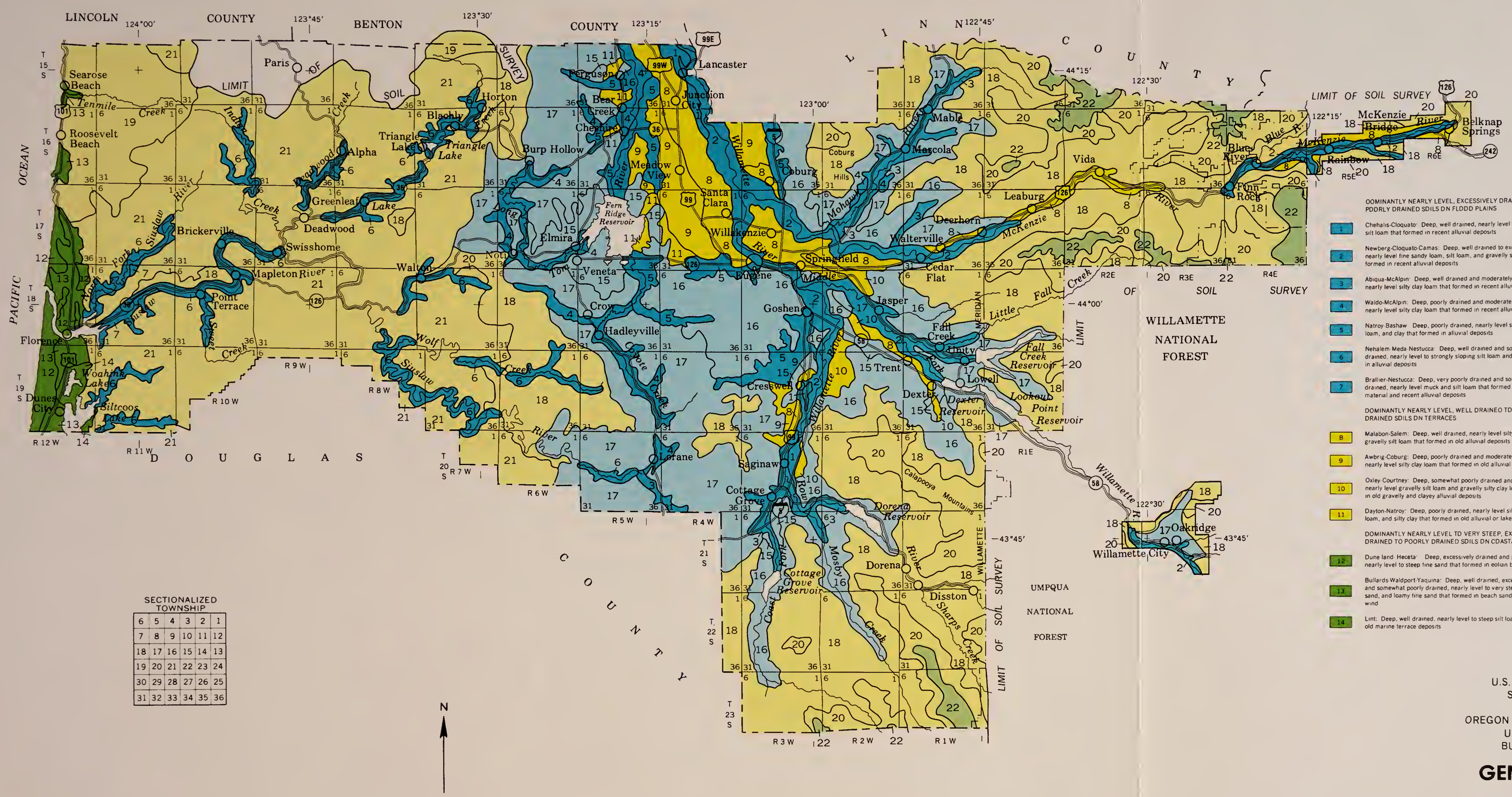
GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot



Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LEGEND

DOMINANTLY NEARLY LEVEL, EXCESSIVELY DRAINED TO VERY POORLY DRAINED SOILS ON FLOOD PLAINS

1 — Chehalis-Cloquato: Deep, well drained, nearly level silty clay loam and silt loam that formed in recent alluvial deposits

2 — Newberg-Cloquato-Camas: Deep, well drained to excessively drained, nearly level fine sandy loam, silt loam, and gravelly sandy loam that formed in recent alluvial deposits

3 — Abiqua-McAlpin: Deep, well drained and moderately well drained, nearly level silty clay loam that formed in recent alluvial deposits

4 — Waldo-McAlpin: Deep, poorly drained and moderately well drained, nearly level silty clay loam that formed in recent alluvial deposits

5 — Natroy-Bashaw: Deep, poorly drained, nearly level silty clay, silty clay loam, and clay that formed in alluvial deposits

6 — Nehalem-Meda-Nestucca: Deep, well drained and somewhat poorly drained, nearly level to strongly sloping silt loam and loam that formed in alluvial deposits

7 — Brallier-Nestucca: Deep, very poorly drained and somewhat poorly drained, nearly level muck and silt loam that formed in organic material and recent alluvial deposits

DOMINANTLY NEARLY LEVEL, WELL DRAINED TO POORLY DRAINED SOILS ON TERRACES

8 — Malabon-Salem: Deep, well drained, nearly level silty clay loam and gravelly silt loam that formed in old alluvial deposits

9 — Awbrig-Coburg: Deep, poorly drained and moderately well drained, nearly level silty clay loam that formed in old alluvial deposits

10 — Oxley-Courtney: Deep, somewhat poorly drained and poorly drained, nearly level gravelly silt loam and gravelly silty clay loam that formed in old gravelly and clayey alluvial deposits

11 — Dayton-Natroy: Deep, poorly drained, nearly level silt loam, silty clay loam, and silty clay that formed in old alluvial or lake deposits

DOMINANTLY NEARLY LEVEL TO VERY STEEP, EXCESSIVELY DRAINED TO POORLY DRAINED SOILS ON COASTAL TERRACES

12 — Dune land-Heceta: Deep, excessively drained and poorly drained, nearly level to steep fine sand that formed in eolian beach sand

13 — Bullards-Waldport-Yaquina: Deep, well drained, excessively drained, and somewhat poorly drained, nearly level to very steep loam, fine sand, and loamy fine sand that formed in beach sand deposited by wind

14 — Lint: Deep, well drained, nearly level to steep silt loam that formed in old marine terrace deposits

DOMINANTLY NEARLY LEVEL TO STEEP, DEEP TO SHALLOW WELL DRAINED AND MODERATELY WELL DRAINED SOILS ON FOOTHILLS

15 — Veneta-Salkum: Deep, moderately well drained and well drained, nearly level to strongly sloping loam, silty clay loam, and silt loam that formed in old alluvium

16 — Bellpine-Hazelair-Philomath: Moderately deep and shallow, well drained and moderately well drained, gently sloping to steep silty clay loam, cobbly silty clay loam, and cobbly silty clay that formed in material weathered from sandstone or in mixed material weathered from igneous and sedimentary rock

17 — Bellpine-Nekia-Ritner: Moderately deep, well drained, gently sloping to steep silty clay loam and cobbly silty clay loam that formed in material weathered from sandstone or basic igneous rock

DOMINANTLY GENTLY SLOPING TO VERY STEEP, MODERATELY DEEP TO DEEP, WELL DRAINED SOILS IN THE CASCADE AND COAST RANGES

18 — Peavine-Blachly-Honeygrove: Moderately deep and deep, well drained, gently sloping to very steep silty clay loam and clay loam that formed in material weathered from sandstone or mixed sedimentary and igneous rock

19 — Formader-Klickitat-Hembre: Moderately deep and deep, well drained, gently sloping to very steep loam, stony loam, and silt loam that formed in material weathered from basic igneous rock

20 — Klickitat-Kinney-Bohannon: Moderately deep and deep, well drained, gently sloping to very steep stony loam, cobbly loam, and gravelly loam that formed in material weathered from basic igneous rock or interbedded sedimentary, basic igneous, and pyroclastic rock

21 — Bohannon-Preacher-Digger: Moderately deep and deep, well drained, nearly level to very steep gravelly loam and loam that formed in material weathered from interbedded sandstone and siltstone

DOMINANTLY GENTLY SLOPING TO VERY STEEP, MODERATELY DEEP, WELL DRAINED SOILS ON HIGH RIDGES IN THE WESTERN PART OF THE CASCADE RANGE

22 — Keel-Hummington: Moderately deep, well drained, gently sloping to very steep cobbly clay loam and gravelly loam that formed in material weathered from mixed igneous rock and volcanic ash

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SOIL CONSERVATION SERVICE
AND FOREST SERVICE
OREGON AGRICULTURAL EXPERIMENT STATION
U.S. DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

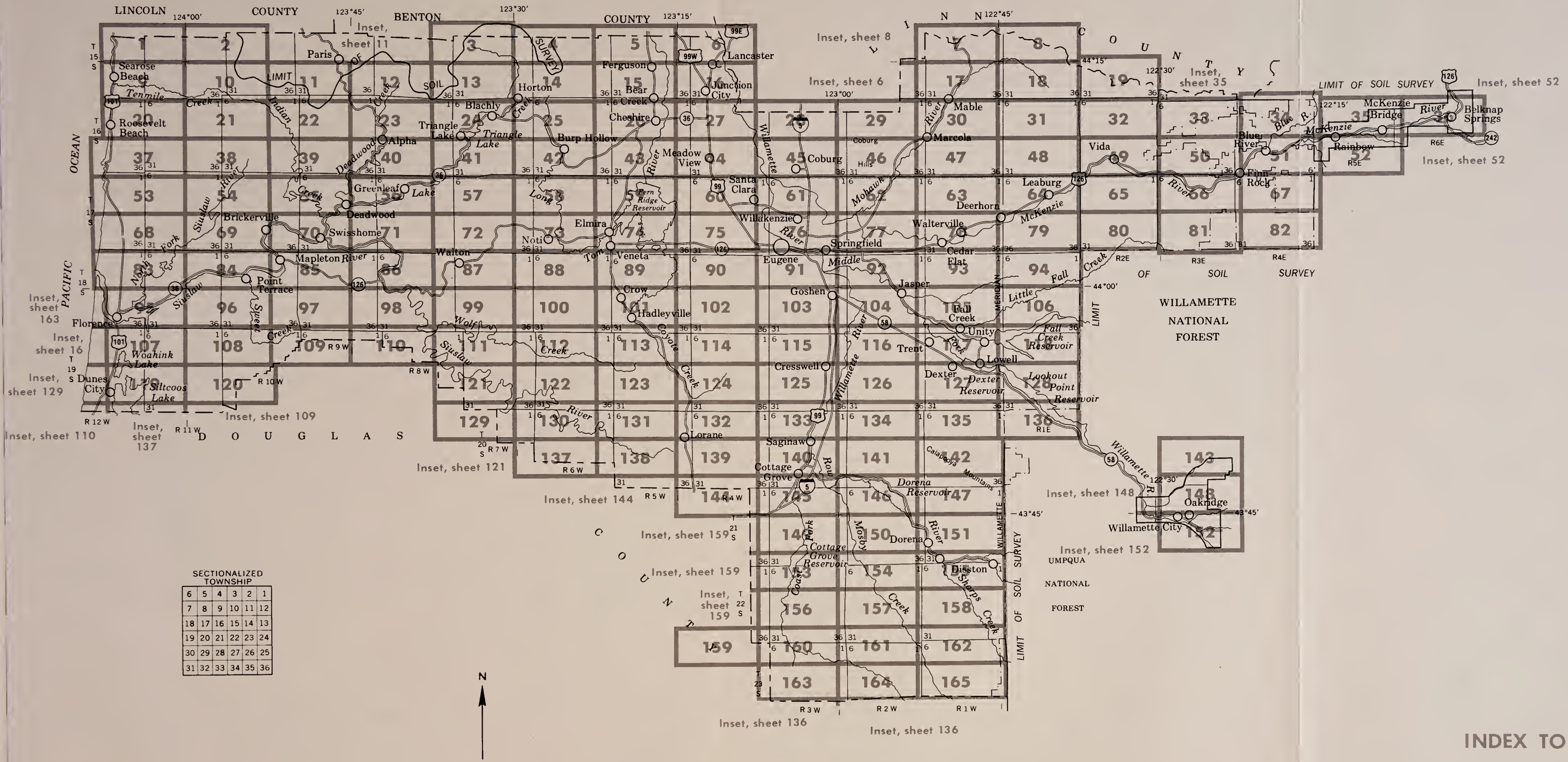
GENERAL SOIL MAP

LANE COUNTY AREA, OREGON

Scale 1: 443,520

1 0 1 2 3 4 5 6 7 Miles

10 5 10 Km



INDEX TO MAP SHEETS

LANE COUNTY AREA, OREGON

Scale 1: 443,520

1 0 1 2 3 4 5 6 7 Miles

10 5 10 Km

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE AND FOREST SERVICE

LANE COUNTY AREA, OREGON

OREGON AGRICULTURAL EXPERIMENT STATION
UNITED STATES DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT

SOIL LEGEND

SYMBOL	NAME
1A	Abiqua silty clay loam, 0 to 3 percent slopes
1B	Abiqua silty clay loam, 3 to 5 percent slopes
2E	Astoria silt loam, 5 to 30 percent slopes
3E	Astoria Variant silt loam, 3 to 30 percent slopes
3G	Astoria Variant silt loam, 30 to 60 percent slopes
4G	Atring-Rock outcrop complex, 30 to 60 percent slopes
5	Awbrig silty clay loam
6	Awbrig-Urban land complex
7B	Bandon sandy loam, 0 to 7 percent slopes
7C	Bandon sandy loam, 7 to 12 percent slopes
7F	Bandon sandy loam, 12 to 50 percent slopes
8	Bashaw clay
9	Bashaw-Urban land complex
10	Beaches
11C	Bellpine silty clay loam, 3 to 12 percent slopes
11D	Bellpine silty clay loam, 12 to 20 percent slopes
11E	Bellpine silty clay loam, 20 to 30 percent slopes
11F	Bellpine silty clay loam, 30 to 50 percent slopes
12E	Bellpine cobbly silty clay loam, 2 to 30 percent slopes
13F	Blachly clay loam, 30 to 50 percent slopes
13G	Blachly clay loam, 50 to 70 percent slopes
14E	Blachly silty clay loam, 3 to 30 percent slopes
14F	Blachly silty clay loam, 30 to 50 percent slopes
15E	Blachly-McCully clay loams, 3 to 30 percent slopes
16D	Bohannon gravelly loam, 3 to 25 percent slopes
16F	Bohannon gravelly loam, 25 to 50 percent slopes
16H	Bohannon gravelly loam, 50 to 90 percent slopes
17	Brallier muck, drained
18	Brallier Variant muck
19	Brenner silty clay loam
20B	Briedwell cobbly loam, 0 to 7 percent slopes
21B	Bullards-Ferrelo loams, 0 to 7 percent slopes
21C	Bullards-Ferrelo loams, 7 to 12 percent slopes
21E	Bullards-Ferrelo loams, 12 to 30 percent slopes
21G	Bullards-Ferrelo loams, 30 to 60 percent slopes
22	Camas gravelly sandy loam, occasionally flooded
23	Camas-Urban land complex
24	Chapman loam
25	Chapman-Urban land complex
26	Chehalis silty clay loam, occasionally flooded
27	Chehalis-Urban land complex
28C	Chehulpum silt loam, 3 to 12 percent slopes
28E	Chehulpum silt loam, 12 to 40 percent slopes
29	Cloquato silt loam
30	Cloquato-Urban land complex
31	Coburg silty clay loam
32	Coburg-Urban land complex
33	Conser silty clay loam
34	Courtney gravelly silty clay loam
35D	Cruiser gravelly clay loam, 3 to 25 percent slopes
35F	Cruiser gravelly clay loam, 25 to 50 percent slopes
35G	Cruiser gravelly clay loam, 50 to 70 percent slopes
36D	Cumley silty clay loam, 2 to 20 percent slopes
37C	Cupola cobbly loam, 3 to 12 percent slopes
37E	Cupola cobbly loam, 12 to 30 percent slopes
38	Dayton silt loam, clay substratum
39E	Digger gravelly loam, 10 to 30 percent slopes
39F	Digger gravelly loam, 30 to 50 percent slopes
40H	Digger-Rock outcrop complex, 50 to 85 percent slopes
41C	Dixonville silty clay loam, 3 to 12 percent slopes
41E	Dixonville silty clay loam, 12 to 30 percent slopes
41F	Dixonville silty clay loam, 30 to 50 percent slopes
42E	Dixonville-Hazelair-Urban land complex, 12 to 35 percent slopes
43C	Dixonville-Philomath-Hazelair complex, 3 to 12 percent slopes
43E	Dixonville-Philomath-Hazelair complex, 12 to 35 percent slopes
44	Dune land
45C	Dupee silt loam, 3 to 20 percent slopes
46	Eilertsen silt loam
47E	Fendall silt loam, 3 to 30 percent slopes
48	Fluvents, nearly level
49E	Formader loam, 3 to 30 percent slopes
49G	Formader loam, 30 to 60 percent slopes
50G	Formader-Hembre-Klickitat complex, 50 to 80 percent slopes
51B	Haflinger-Jimbo complex, 0 to 5 percent slopes
52B	Hazelair silty clay loam, 2 to 7 percent slopes
52D	Hazelair silty clay loam, 7 to 20 percent slopes
53	Heceta fine sand
54D	Hembre silt loam, 5 to 25 percent slopes
54G	Hembre silt loam, 25 to 60 percent slopes
55E	Hembre-Klickitat complex, 3 to 30 percent slopes
55G	Hembre-Klickitat complex, 30 to 60 percent slopes
56	Holcomb silty clay loam
57D	Holderman extremely cobbly loam, 5 to 25 percent slopes
57F	Holderman extremely cobbly loam, 25 to 50 percent slopes
57G	Holderman extremely cobbly loam, 50 to 75 percent slopes
58D	Honeygrove silty clay loam, 3 to 25 percent slopes
58F	Honeygrove silty clay loam, 25 to 50 percent slopes
59E	Hullt loam, 2 to 30 percent slopes
59G	Hullt loam, 30 to 60 percent slopes
60D	Hummington gravelly loam, 5 to 25 percent slopes
60F	Hummington gravelly loam, 25 to 50 percent slopes
60G	Hummington gravelly loam, 50 to 75 percent slopes
61	Jimbo silt loam
62B	Jimbo-Haflinger complex, 0 to 5 percent slopes
63C	Jory silty clay loam, 2 to 12 percent slopes
63D	Jory silty clay loam, 12 to 20 percent slopes
63E	Jory silty clay loam, 20 to 30 percent slopes
64D	Keel cobbly clay loam, 3 to 25 percent slopes
64F	Keel cobbly clay loam, 25 to 45 percent slopes
64G	Keel cobbly clay loam, 45 to 75 percent slopes
65G	Kilchis stony loam, 30 to 60 percent slopes
65H	Kilchis stony loam, 60 to 90 percent slopes
66D	Kinney cobbly loam, 3 to 20 percent slopes
67F	Kinney cobbly loam, 20 to 50 percent north slopes
67G	Kinney cobbly loam, 50 to 70 percent north slopes
68F	Kinney cobbly loam, 20 to 50 percent south slopes
68G	Kinney cobbly loam, 50 to 70 percent south slopes
69E	Kinney cobbly loam, slump, 3 to 30 percent slopes
70E	Klickitat stony loam, 3 to 30 percent slopes
71F	Klickitat stony loam, 30 to 50 percent north slopes
71G	Klickitat stony loam, 50 to 75 percent north slopes
72F	Klickitat stony loam, 30 to 50 percent south slopes
72G	Klickitat stony loam, 50 to 75 percent south slopes
73	Linslaw loam
74B	Lint silt loam, 0 to 7 percent slopes
74C	Lint silt loam, 7 to 12 percent slopes
74D	Lint silt loam, 12 to 20 percent slopes
74E	Lint silt loam, 20 to 40 percent slopes
75	Malabon silty clay loam
76	Malabon-Urban land complex
77B	Marcola cobbly silty clay loam, 2 to 7 percent slopes
78	McAlpin silty clay loam
79	McBee silty clay loam
80F	McCully clay loam, 30 to 50 percent slopes
80G	McCully clay loam, 50 to 70 percent slopes
81D	McDuff clay loam, 3 to 25 percent slopes
81F	McDuff clay loam, 25 to 50 percent slopes
81G	McDuff clay loam, 50 to 70 percent slopes
82C	Meda loam, 2 to 12 percent slopes
83B	Minniece silty clay loam, 0 to 8 percent slopes
84D	Mulkey loam, 5 to 25 percent slopes
85	Natroy silty clay loam
86	Natroy silty clay
87	Natroy-Urban land complex
88	Nehalem silt loam
89C	Nekia silty clay loam, 2 to 12 percent slopes
89D	Nekia silty clay loam, 12 to 20 percent slopes
89E	Nekia silty clay loam, 20 to 30 percent slopes
89F	Nekia silty clay loam, 30 to 50 percent slopes
90	Nekoma silt loam
91D	Neskowin silt loam, 12 to 20 percent slopes
91E	Neskowin silt loam, 20 to 40 percent slopes
92G	Neskowin-Salander silt loams, 40 to 60 percent slopes
93	Nestucca silt loam
94C	Netarts fine sand, 3 to 12 percent slopes
94E	Netarts fine sand, 12 to 30 percent slopes
95	Newberg fine sandy loam
96	Newberg loam
97	Newberg-Urban land complex
98	Noti loam
99H	Ochrepts and Umbrepts, very steep
100	Oxley gravelly silt loam
101	Oxley-Urban land complex
102C	Panther silty clay loam, 2 to 12 percent slopes
103C	Panther-Urban land complex, 2 to 12 percent slopes
104E	Peavine silty clay loam, 3 to 30 percent slopes
104G	Peavine silty clay loam, 30 to 60 percent slopes
105A	Pengra silt loam, 1 to 4 percent slopes
106A	Pengra-Urban land complex, 1 to 4 percent slopes
107C	Philomath silty clay, 3 to 12 percent slopes
108C	Philomath cobbly silty clay, 3 to 12 percent slopes
108F	Philomath cobbly silty clay, 12 to 45 percent slopes
109F	Philomath-Urban land complex, 12 to 45 percent slopes
110	Pits
111D	Preacher loam, 0 to 25 percent slopes
111F	Preacher loam, 25 to 50 percent slopes
112G	Preacher-Bohannon-Slickrock complex, 50 to 75 percent slopes
113C	Ritner cobbly silty clay loam, 2 to 12 percent slopes
113E	Ritner cobbly silty clay loam. 12 to 30 percent slopes
113G	Ritner cobbly silty clay loam, 30 to 60 percent slopes
114	Riverwash
115H	Rock outcrop-Kilchis complex, 30 to 90 percent slopes
116G	Rock outcrop-Witzel complex, 10 to 70 percent slopes
117E	Salander silt loam, 12 to 30 percent slopes
118	Salem gravelly silt loam
119	Salem-Urban land complex
120B	Salkum silt loam, 2 to 6 percent slopes
121B	Salkum silty clay loam, 2 to 8 percent slopes
121C	Salkum silty clay loam, 8 to 16 percent slopes
122	Saturn clay loam
123	Sifton gravelly loam
124D	Slickrock gravelly loam, 3 to 25 percent slopes
124F	Slickrock gravelly loam, 25 to 50 percent slopes
125C	Steiwer loam, 3 to 12 percent slopes
125D	Steiwer loam, 12 to 20 percent slopes
125F	Steiwer loam, 20 to 50 percent slopes
126F	Tahkenitch loam, 20 to 45 percent slopes
126G	Tahkenitch loam, 45 to 75 percent slopes
127C	Urban land-Hazelair-Dixonville complex, 3 to 12 percent slopes
128B	Veneta loam, 0 to 7 percent slopes
129B	Veneta Variant silt loam, 0 to 7 percent slopes
130	Waldo silty clay loam
131C	Waldport fine sand, 0 to 12 percent slopes
131E	Waldport fine sand, 12 to 30 percent slopes
131G	Waldport fine sand, 30 to 70 percent slopes
132E	Waldport fine sand, thin surface, 0 to 30 percent slopes
133C	Waldport-Urban land complex, 0 to 12 percent slopes
134	Wapato silty clay loam
135C	Willakenzie clay loam, 2 to 12 percent slopes
135D	Willakenzie clay loam, 12 to 20 percent slopes
135E	Willakenzie clay loam, 20 to 30 percent slopes
135F	Willakenzie clay loam, 30 to 50 percent slopes
136	Willanch fine sandy loam
137F	Winberry very gravelly loam, 10 to 45 percent slopes
138E	Witzel very cobbly loam, 3 to 30 percent slopes
138G	Witzel very cobbly loam, 30 to 75 percent slopes
139	Woodburn silt loam
140	Yaquina loamy fine sand
141	Yaquina-Urban land complex
142G	Yellowstone-Rock outcrop complex, 10 to 60 percent slopes
	Water

1

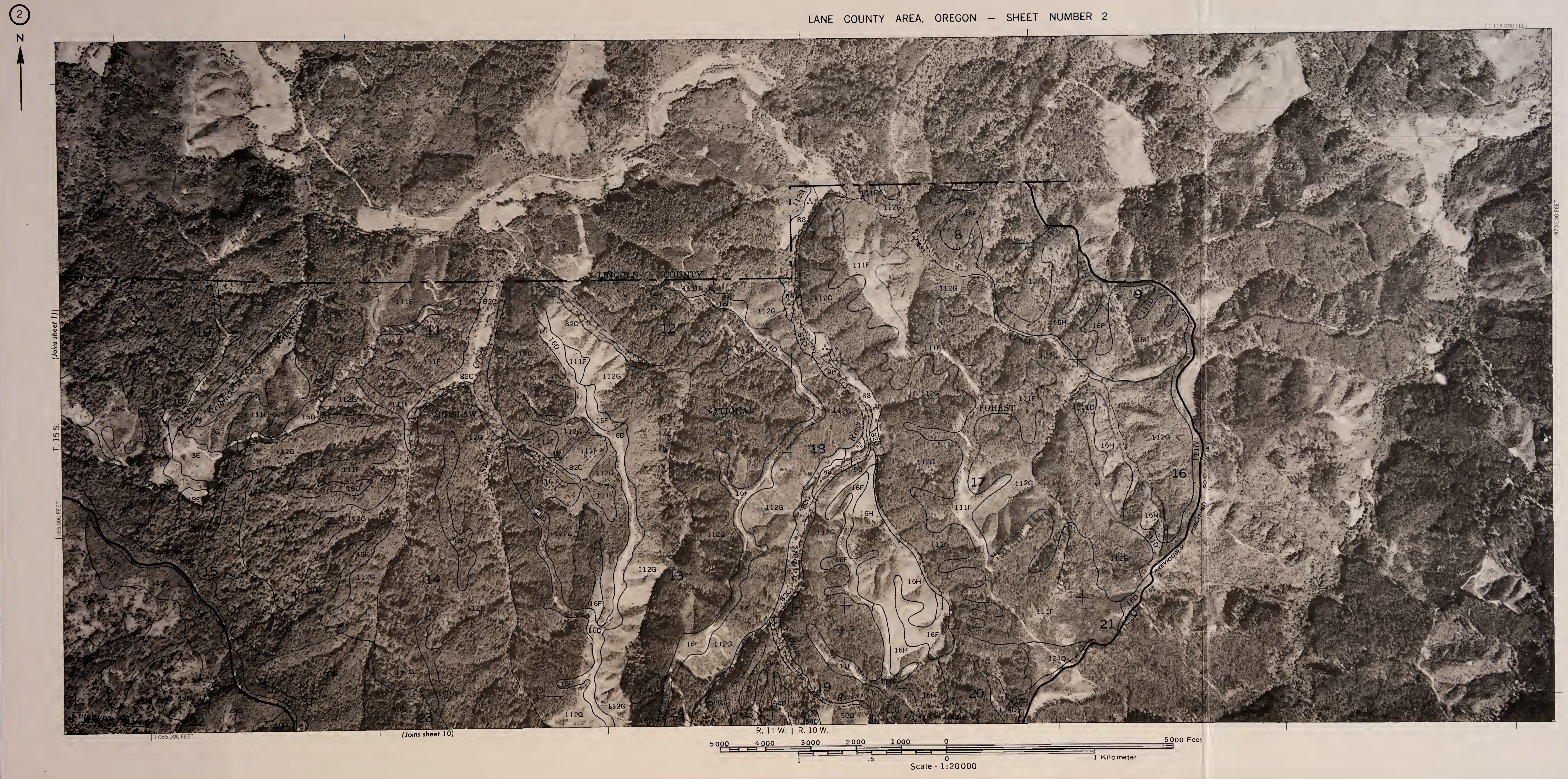
LANE COUNTY AREA, OREGON — SHEET NUMBER 1

N

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000


2
N
LINCOLN COUNTY
SIUSLAW
NATIONAL
FOREST
T. 15 S.
(Joins sheet 1)
(Joins sheet 10)
R. 11 W. | R. 10 W.
1 085 000 FEET
1 115 000 FEET
970 000 FEET
965 000 FEET
5 000 Feet
1 Kilometer
Scale - 1:20000

N

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

N

LANE COUNTY AREA, OREGON — SHEET NUMBER 4

1 245 000 FEET

(Joins sheet 3)

960 000 FEET

T. 15 S.

(Joins sheet 5)

1 215 000 FEET (Joins sheet 14) R. 7 W. | R. 6 W.

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 5

1 Mile — ¾ — ½ — ¼ — 0

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 6

7

N

R. 2 W. | R. 1 W.

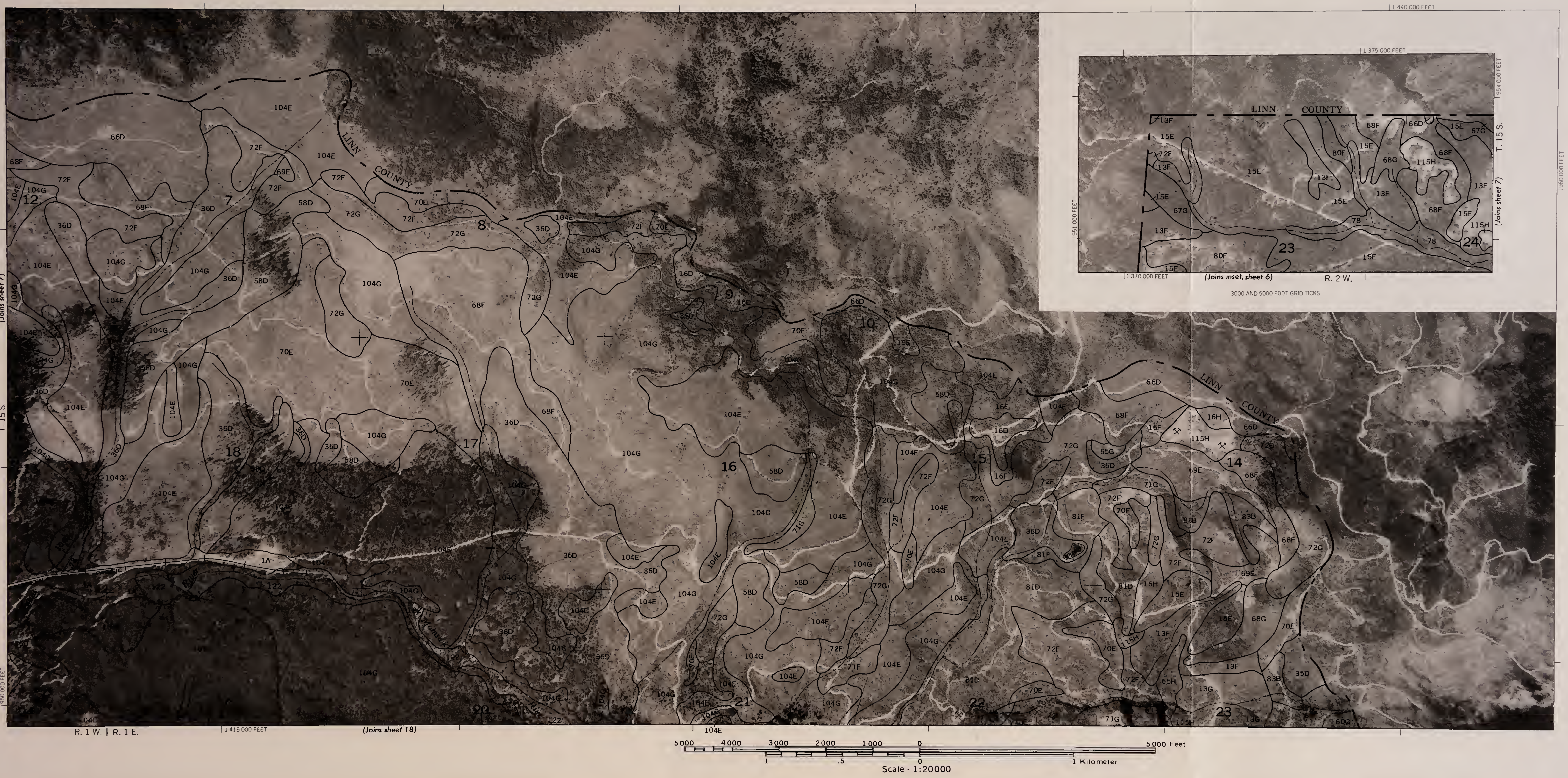
1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

N

LANE COUNTY AREA, OREGON — SHEET NUMBER 8



N

1 ¾ ½ ¼ 0 1 Mile

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

Scale 1:20000

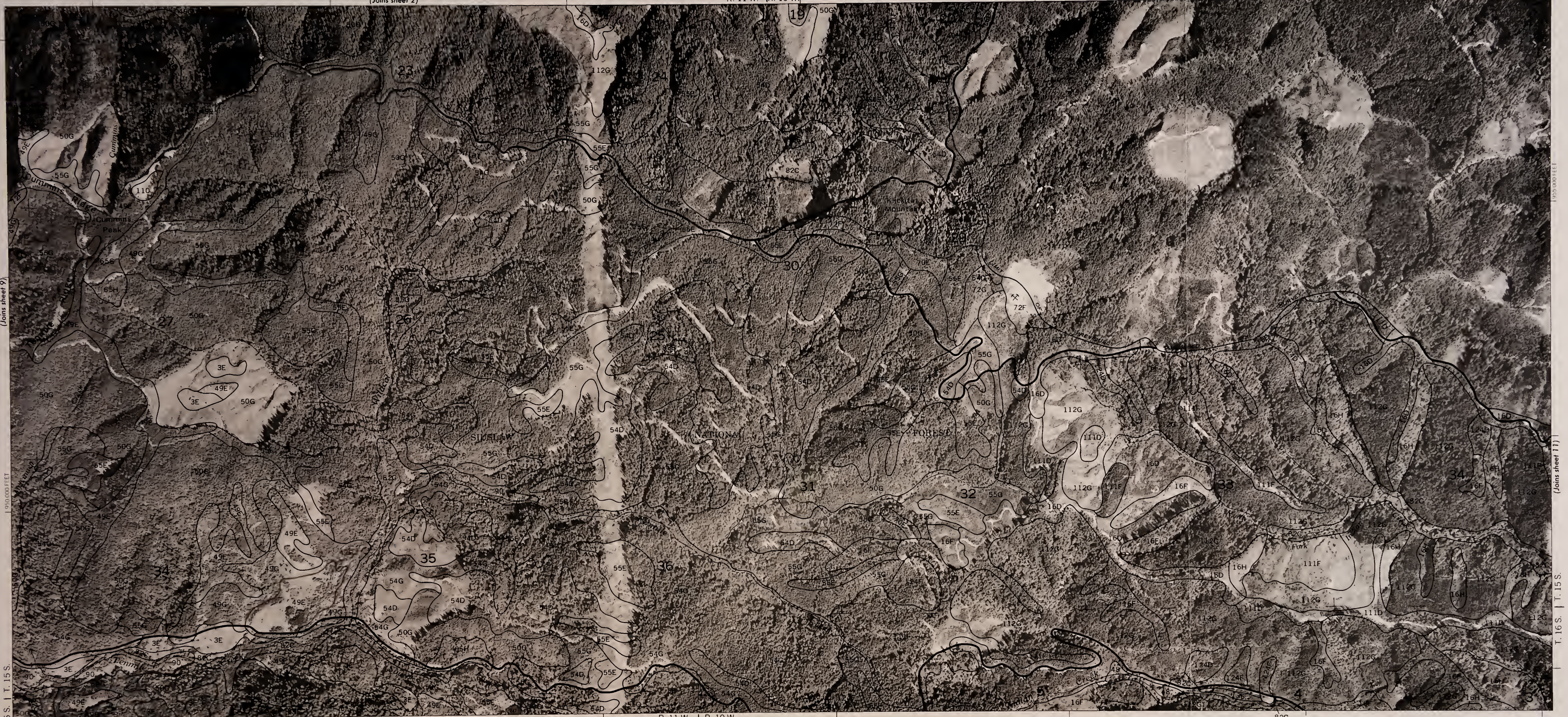
10

N

LANE COUNTY AREA, OREGON — SHEET NUMBER 10

(Joins sheet 2)

R. 11 W. | R. 10 W.



(Joins sheet 9)

(Joins sheet 11)

T. 16 S. | T. 15 S.

(Joins sheet 21)

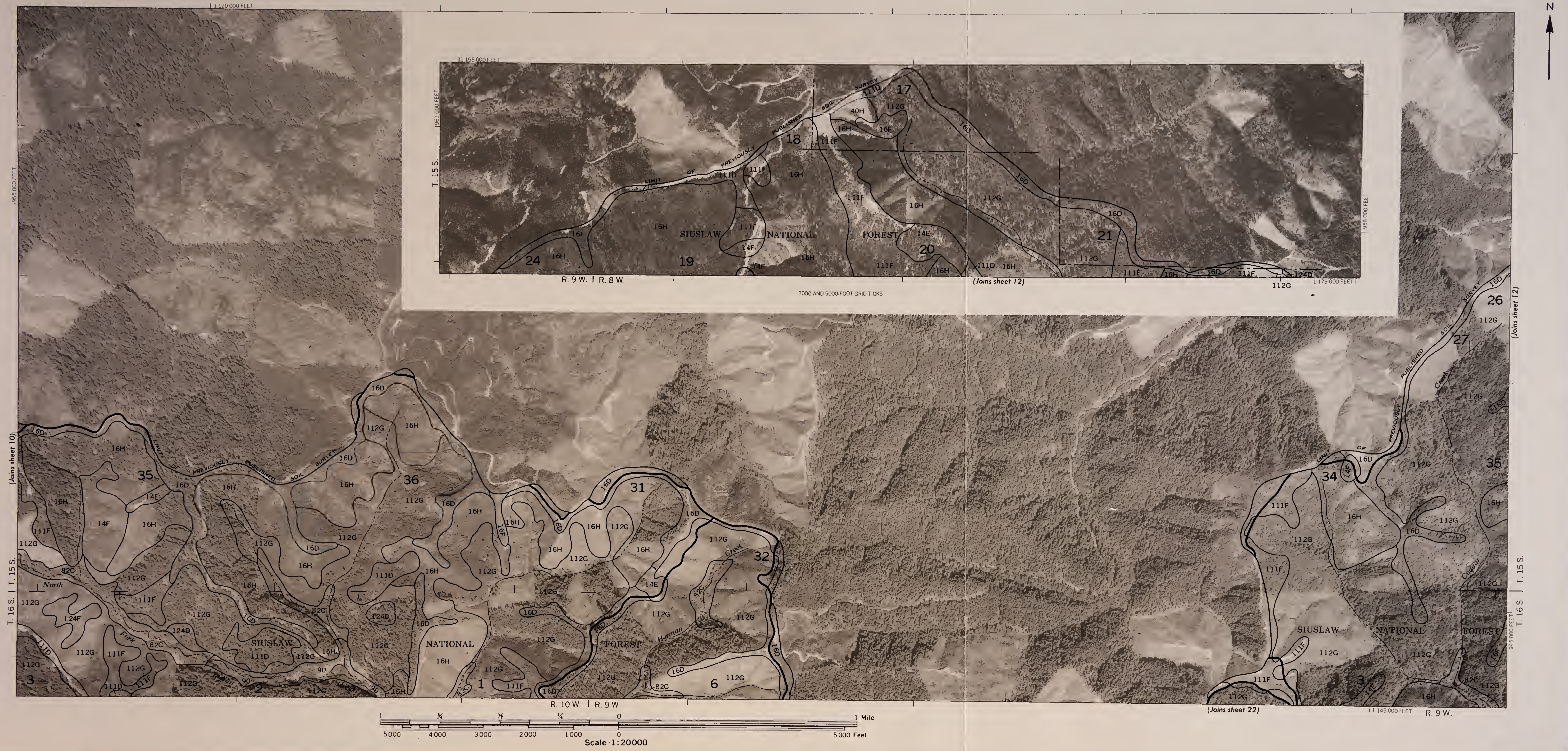
R. 11 W. | R. 10 W.

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 11



LANE COUNTY AREA, OREGON — SHEET NUMBER 12

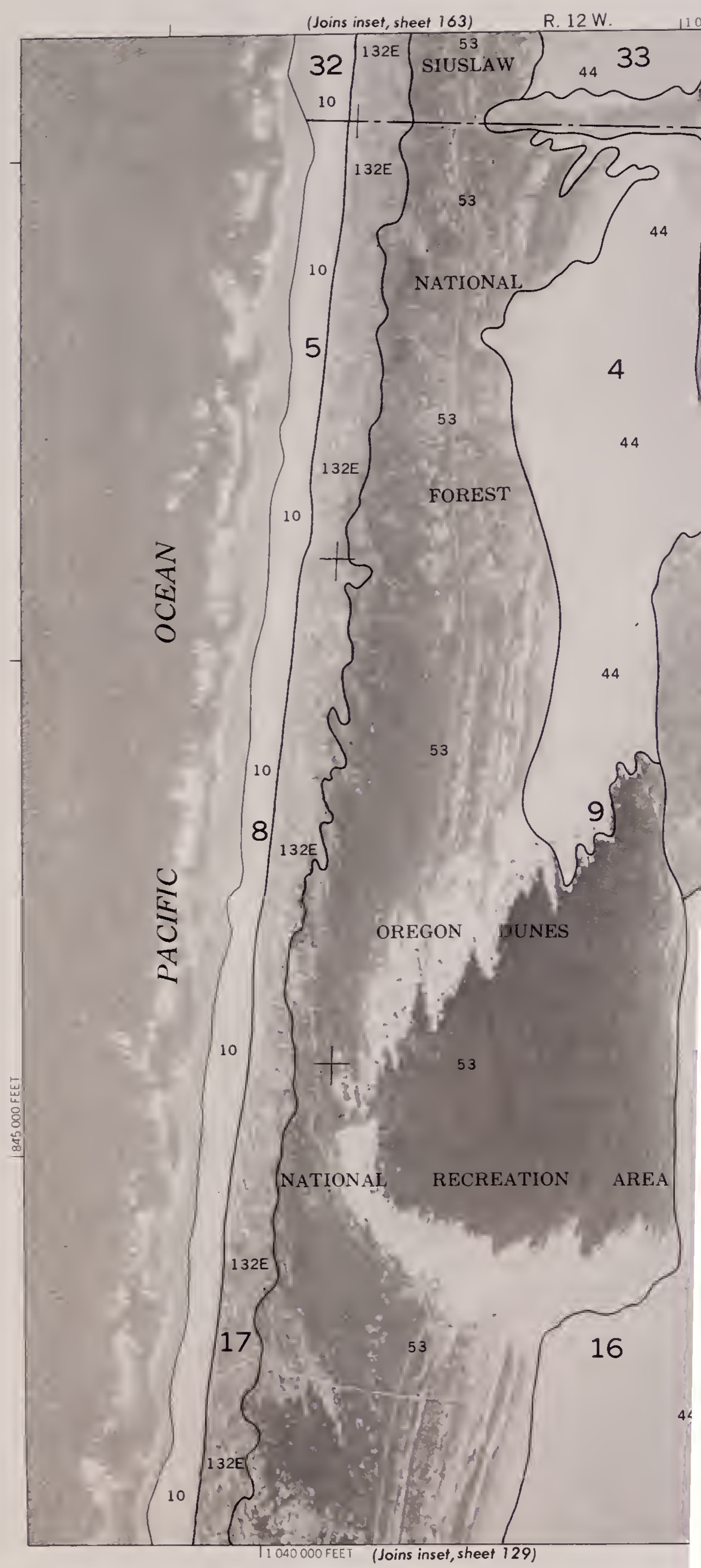
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 13

LANE COUNTY AREA, OREGON — SHEET NUMBER 14

LANE COUNTY AREA, OREGON — SHEET NUMBER 15

LANE COUNTY AREA, OREGON — SHEET NUMBER 16



5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

R. 2 W. | R. 1 W.

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000


N
R. 1 W. | R. 1 E.
(Joins sheet 8)
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 31)
LINN CO.
T. 16 S. | T. 15 S.
Mohawk River
North Fork Mohawk River
South Fork Mohawk River
Oshkosh Creek
Oshkosh Mountain
1 440 000 FEET
1 410 000 FEET
945 000 FEET
935 000 FEET
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 19

1 Mile
1 ¾ ½ ¼ 0
5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

20

N

LANE COUNTY AREA, OREGON — SHEET NUMBER 20

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 21

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

N

LANE COUNTY AREA, OREGON — SHEET NUMBER 22

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 23

Scale 1:20000

1 Mile — ¾ — ½ — ¼ — 0 — 1 Mile

5000 — 4000 — 3000 — 2000 — 1000 — 0 — 5000 Feet

24

N

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 25

1 ¾ ½ ¼ 0 1 Mile
5000 4000 3000 2000 1000 0 5000 Feet
Scale 1:20000

N

R. 6 W. | R. 5 W. (Joins sheet 15)

(Joins sheet 25)

(Joins sheet 27)

T. 16 S.

(Joins sheet 43)

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 27

1 Mile
5000 Feet
5000 4000 3000 2000 1000 0
Scale 1:20000


N
1 340 000 FEET
935 000 FEET
LINN COUNTY
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 45)
T. 16 S.
925 000 FEET
1 315 000 FEET
R. 4 W.
R. 3 W.
Coleman Creek
Dry Muddy Creek
Muddy Creek
Rock Hill
Centennial Butte
SOUTHERN PACIFIC
5
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 29

30

N

R. 2 W. R. 1 W.

LANE COUNTY AREA, OREGON — SHEET NUMBER 30

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 31

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

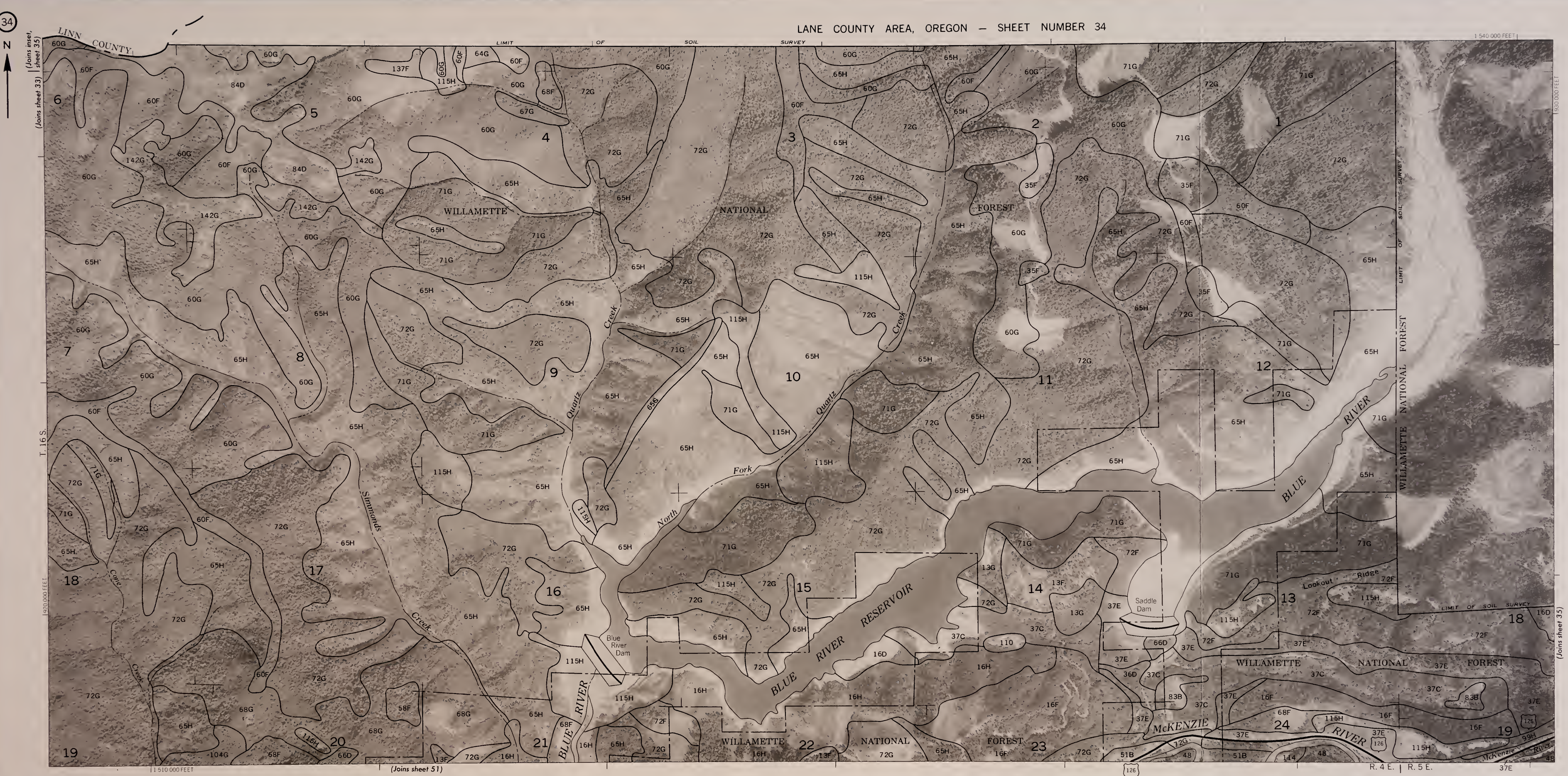
N

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

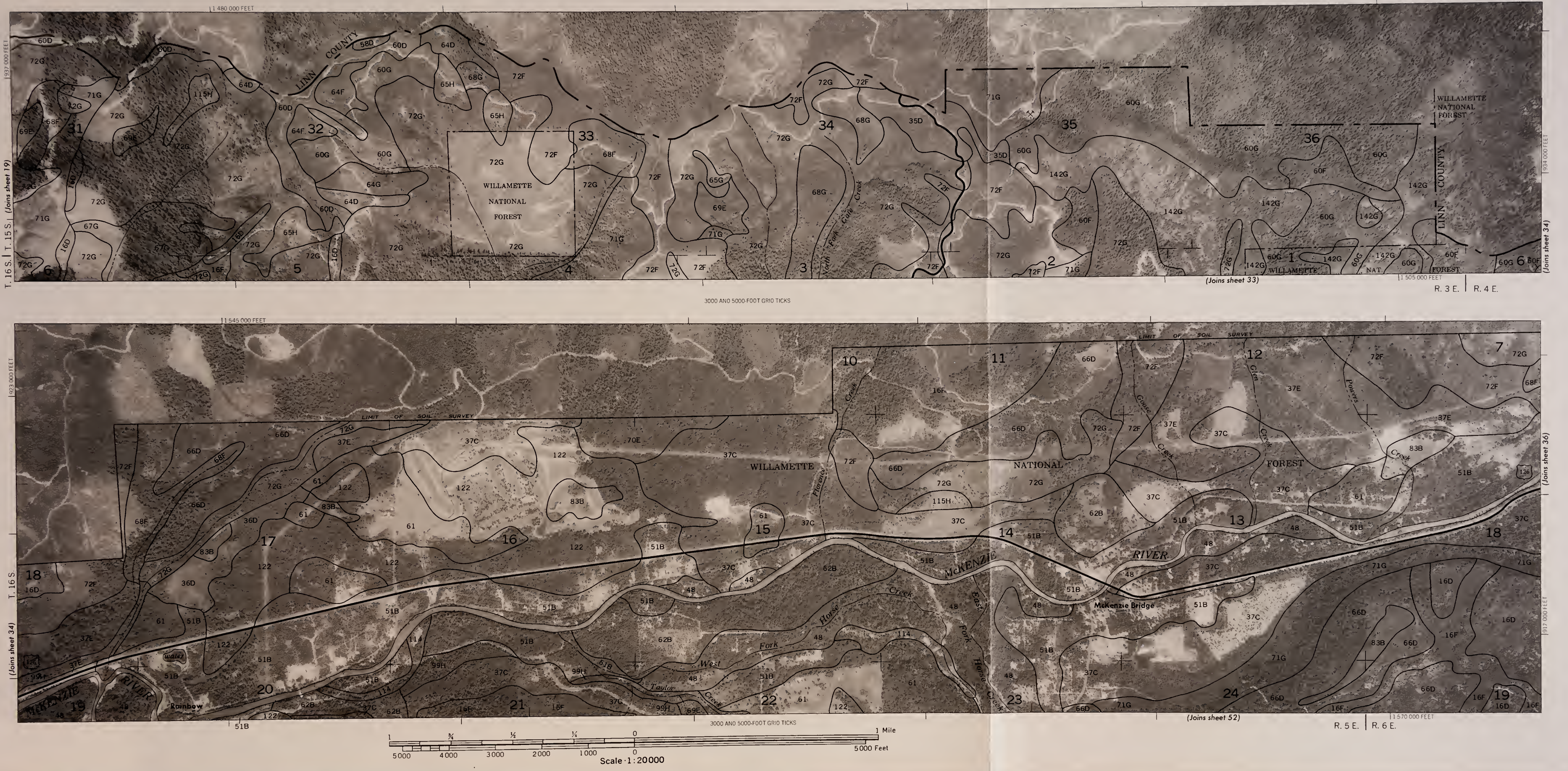
1 .5 0 1 Kilometer

Scale - 1:20000

1 ¾ ½ ¼ 0 1 Mile
5000 4000 3000 2000 1000 0 5000 Feet
Scale 1:20000


34
N
(Joins inset, sheet 35)
(Joins sheet 33)
LINN COUNTY
LIMIT OF SOIL SURVEY
WILLAMETTE NATIONAL FOREST
Quartz Creek
North Fork Quartz Creek
Simmonds Creek
Cone Creek
Blue River Dam
BLUE RIVER RESERVOIR
BLUE RIVER
Saddle Dam
Lookout Ridge
McKENZIE RIVER
T. 16 S.
R. 4 E. | R. 5 E.
1 510 000 FEET
1 540 000 FEET
920 000 FEET
930 000 FEET
(Joins sheet 51)
(Joins sheet 35)

LANE COUNTY AREA, OREGON — SHEET NUMBER 35



N

LANE COUNTY AREA, OREGON — SHEET NUMBER 36

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 38

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 39

R. 10 W. | R. 9 W.

1 Mile ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

40

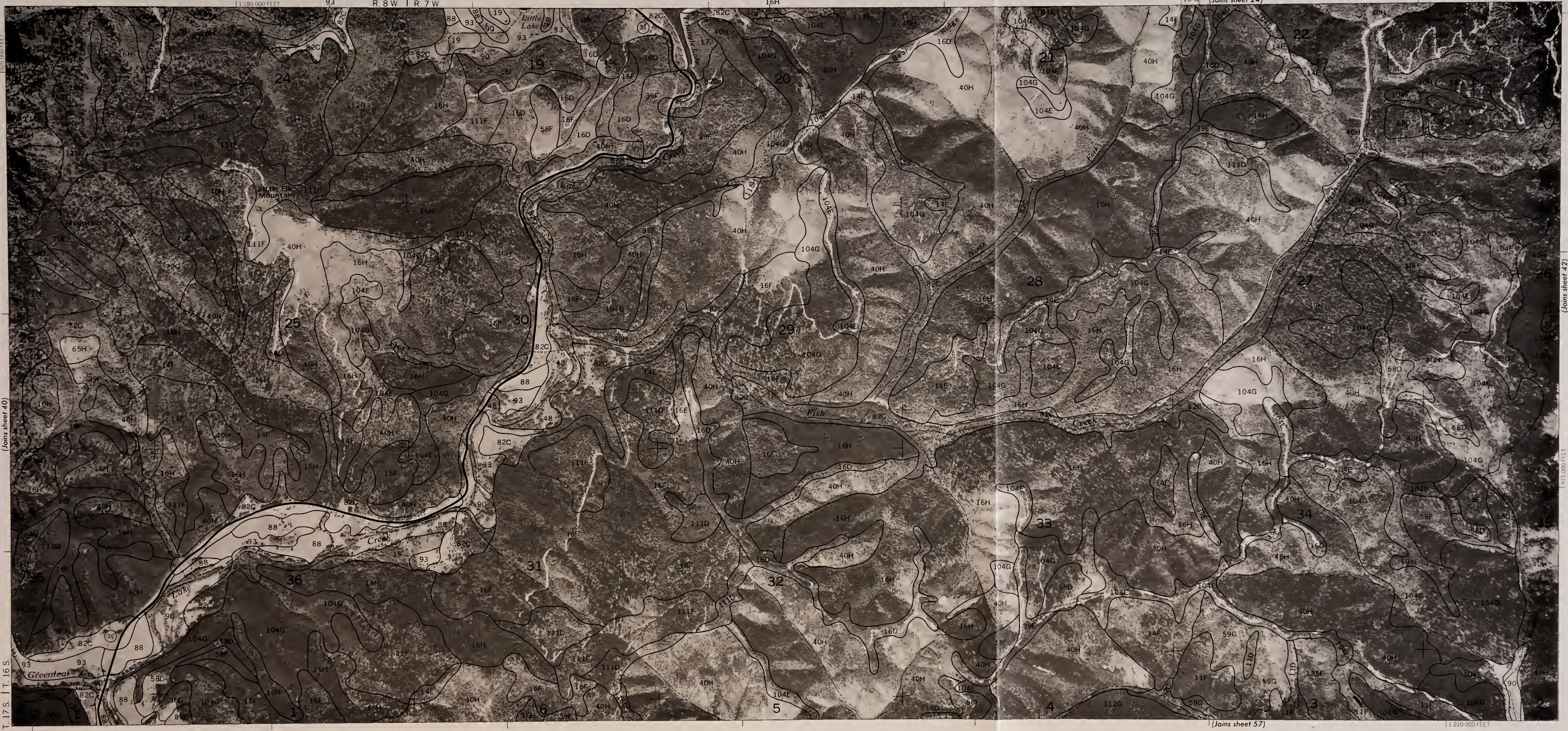
N

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

N



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

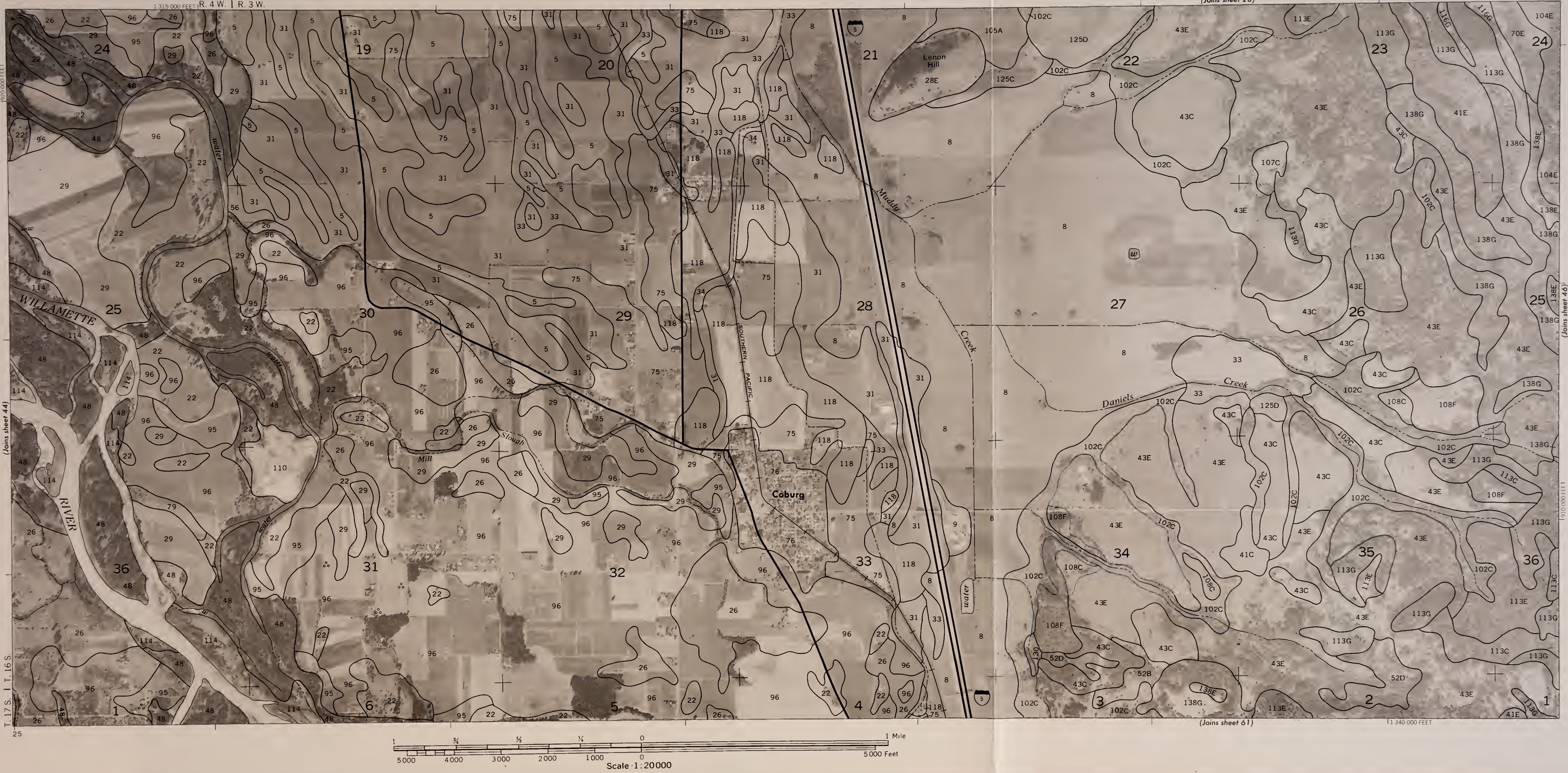
LANE COUNTY AREA, OREGON — SHEET NUMBER 42

5000 4000 3000 2000 1000 0 5000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000


R. 6 W. | R. 5 W.
(Joins sheet 26)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 59)
T. 17 S. | T. 16 S.
N
Franklin
Richardson Butte
Alvadore
Bear Creek
Swamp Creek
Squaw Creek
Coyote Creek
LONG TOM RIVER
intermittent
Scale 1:20000
1 Mile
5000 Feet


N
R. 5 W. | R. 4 W.
(Joins sheet 27)
(Joins sheet 43)
(Joins sheet 45)
(Joins sheet 60)
1 310 000 FEET
920 000 FEET
910 000 FEET
1 280 000 FEET
SOUTHERN PACIFIC
Amazon Creek
Blue Star Pond
WILLAMETTE RIVER
Spring Creek
MAHLON SWEET AIRPORT
T. 17 S. | T. 16 S.
5000 4000 3000 2000 1000 0 5000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 45

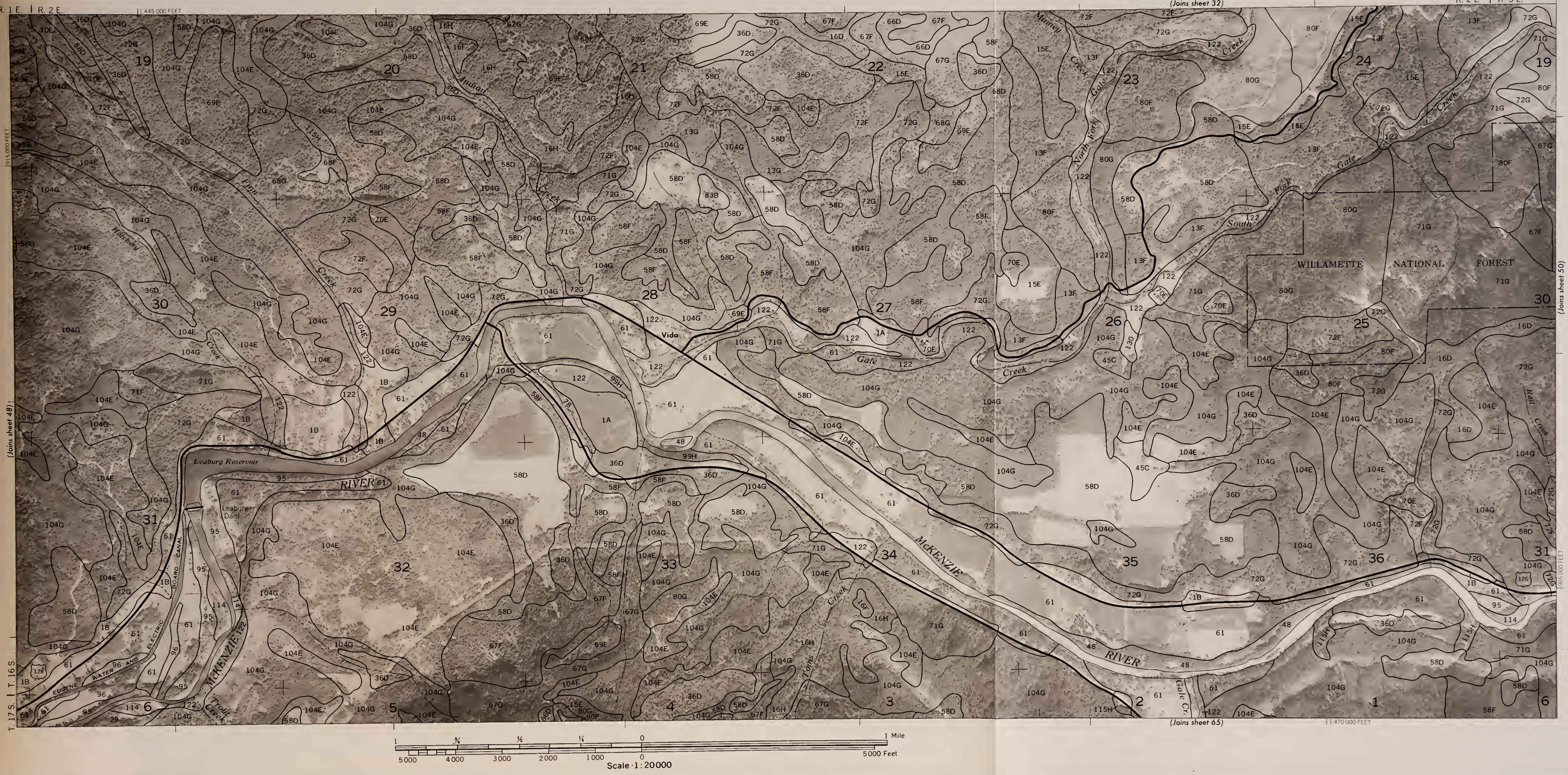



N
R. 3 W. | R. 2 W.
(Joins sheet 29)
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 62)
1 375 000 FEET
920 000 FEET
910 000 FEET
1 345 000 FEET
T. 17 S. | T. 16 S.
McGowan Creek
Allison Creek
Spores Creek
Mohawk
MOHAWK RIVER
SOUTHERN PACIFIC
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000


N
R. 2 W. | R. 1 W.
1 380 000 FEET
920 000 FEET
(Joins sheet 30)
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 63)
T. 17 S. | T. 16 S.
1 405 000 FEET
Mohawk
River
Drury Butte
Hells Hill
Cartwright
Creek
Solomon
Creek
Camp
Creek
1 Mile
5000 Feet
5000
4000
3000
2000
1000
0
Scale 1:20000

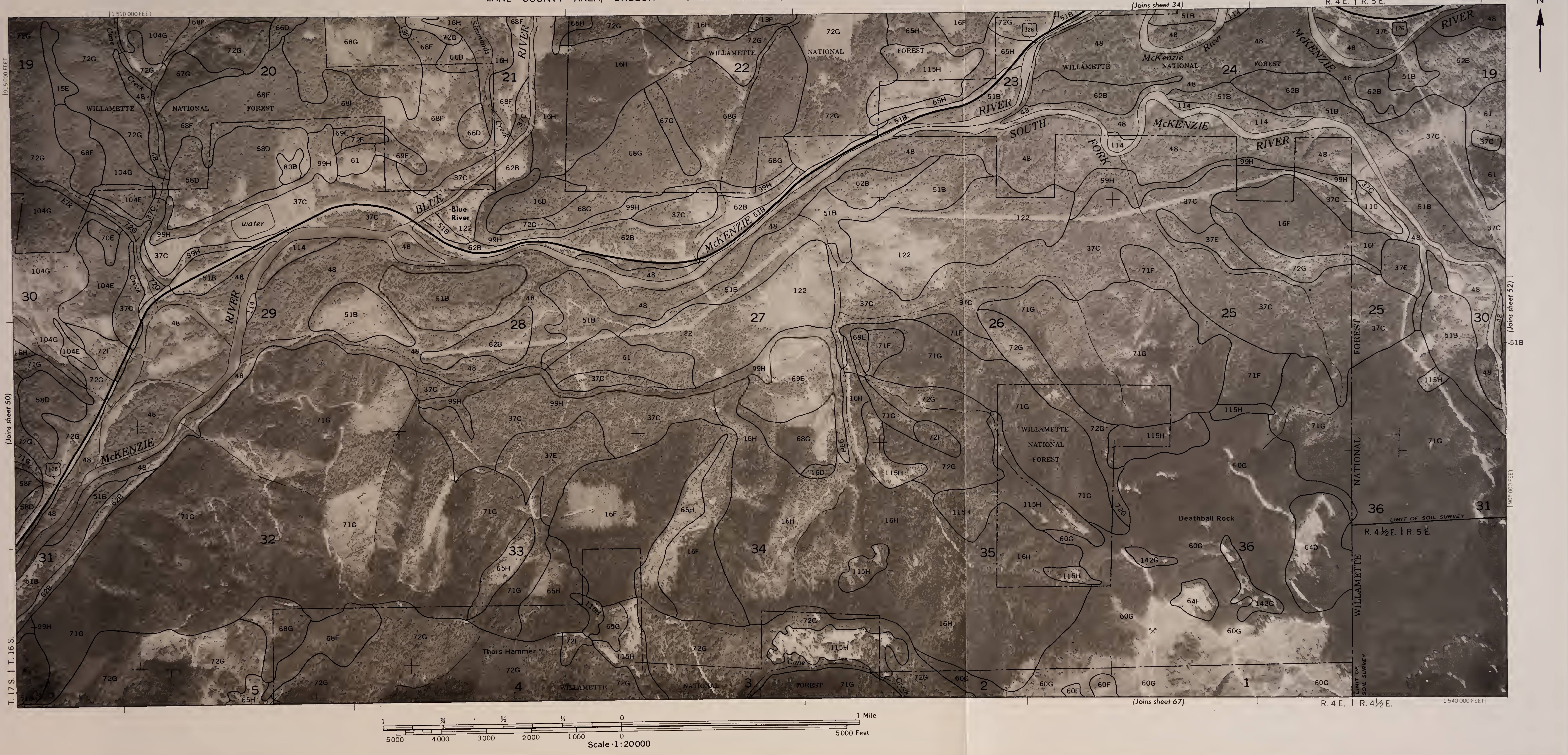

N
R.1 W. | R.1 E.
(Joins sheet 31)
(Joins sheet 47)
(Joins sheet 49)
(Joins sheet 64)
1 440 000 FEET
1 410 000 FEET
915 000 FEET
895 000 FEET
T. 17 S. | T. 16 S.
Mount Nebo
Deer Creek
Camp Creek
Johnson Creek
Coggswell Creek
Hatchery Creek
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20 000

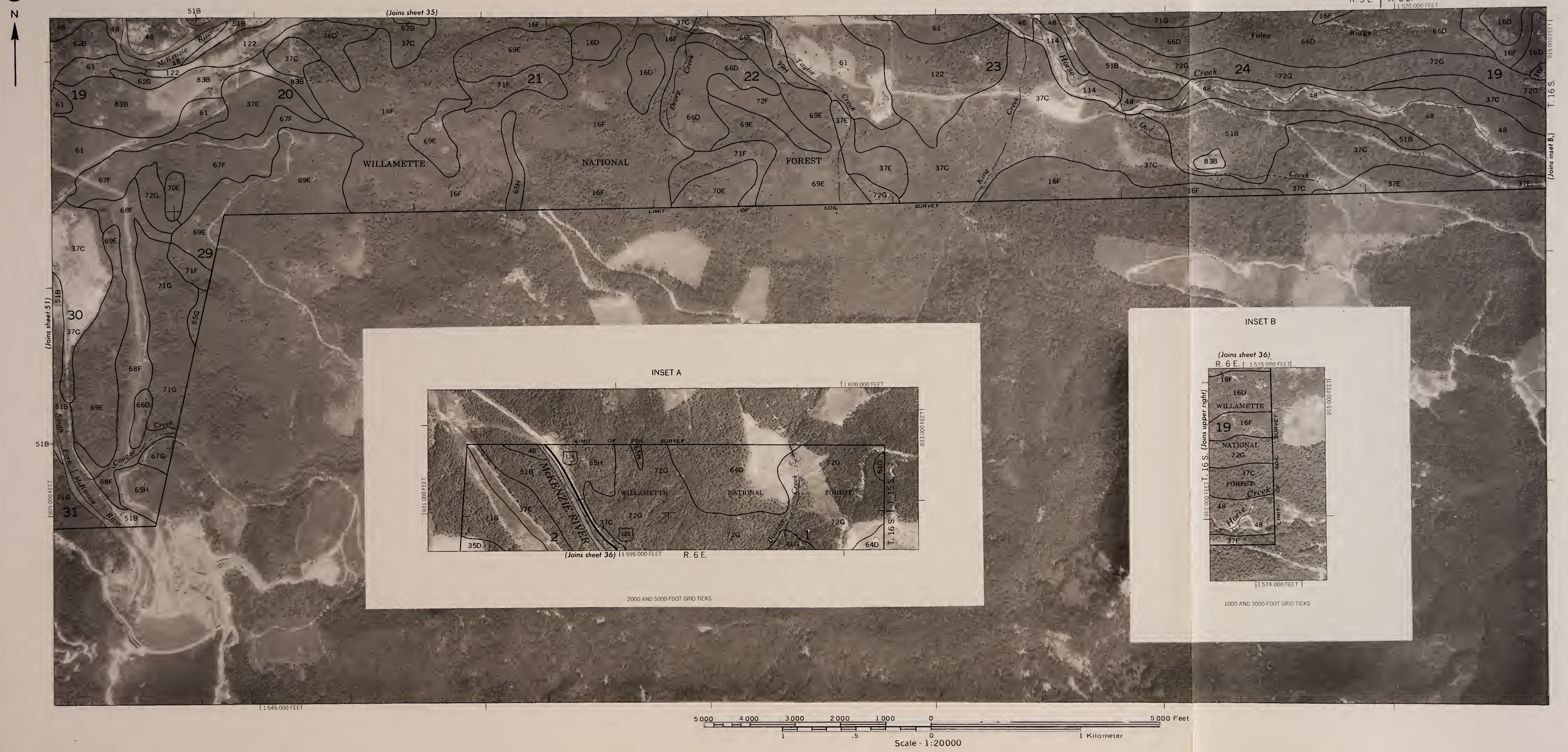
LANE COUNTY AREA, OREGON — SHEET NUMBER 49



LANE COUNTY AREA, OREGON — SHEET NUMBER 50

LANE COUNTY AREA, OREGON — SHEET NUMBER 51




52
N
(Joins sheet 35)
(Joins sheet 51)
(Joins inset B)
R. 5 E. | R. 6 E.
T. 16 S.
1 570 000 FEET
915 000 FEET
905 000 FEET
1 545 000 FEET
WILLAMETTE
NATIONAL
FOREST
LIMIT OF SOIL SURVEY
McKenzie River
South Fork McKenzie River
Cougar Creek
Drury Creek
Taylor Creek
King Creek
Horse Creek
Owl Creek
Foley Ridge
19
20
21
22
23
24
29
30
31
INSET A
(Joins sheet 36)
1 595 000 FEET
1 600 000 FEET
931 000 FEET
933 000 FEET
R. 6 E.
T. 15 S.
T. 16 S.
McKENZIE RIVER
WILLAMETTE
NATIONAL
FOREST
Boulder Creek
2000 AND 5000-FOOT GRID TICKS
INSET B
(Joins sheet 36)
R. 6 E.
1 575 000 FEET
T. 16 S. (Joins upper right)
912 000 FEET
915 000 FEET
WILLAMETTE
NATIONAL
FOREST
Horse Creek
LIMIT OF SOIL SURVEY
1 574 000 FEET
1000 AND 3000-FOOT GRID TICKS
5 000
4 000
3 000
2 000
1 000
0
5 000 Feet
1
.5
0
1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 53

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

N

R. 11 W. | R. 10 W.

(Joins sheet 38)

1 110 000 FEET

(Joins sheet 53)

(Joins sheet 55)

910 000 FEET

T. 17 S.

900 000 FEET

1 085 000 FEET

(Joins sheet 69)

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

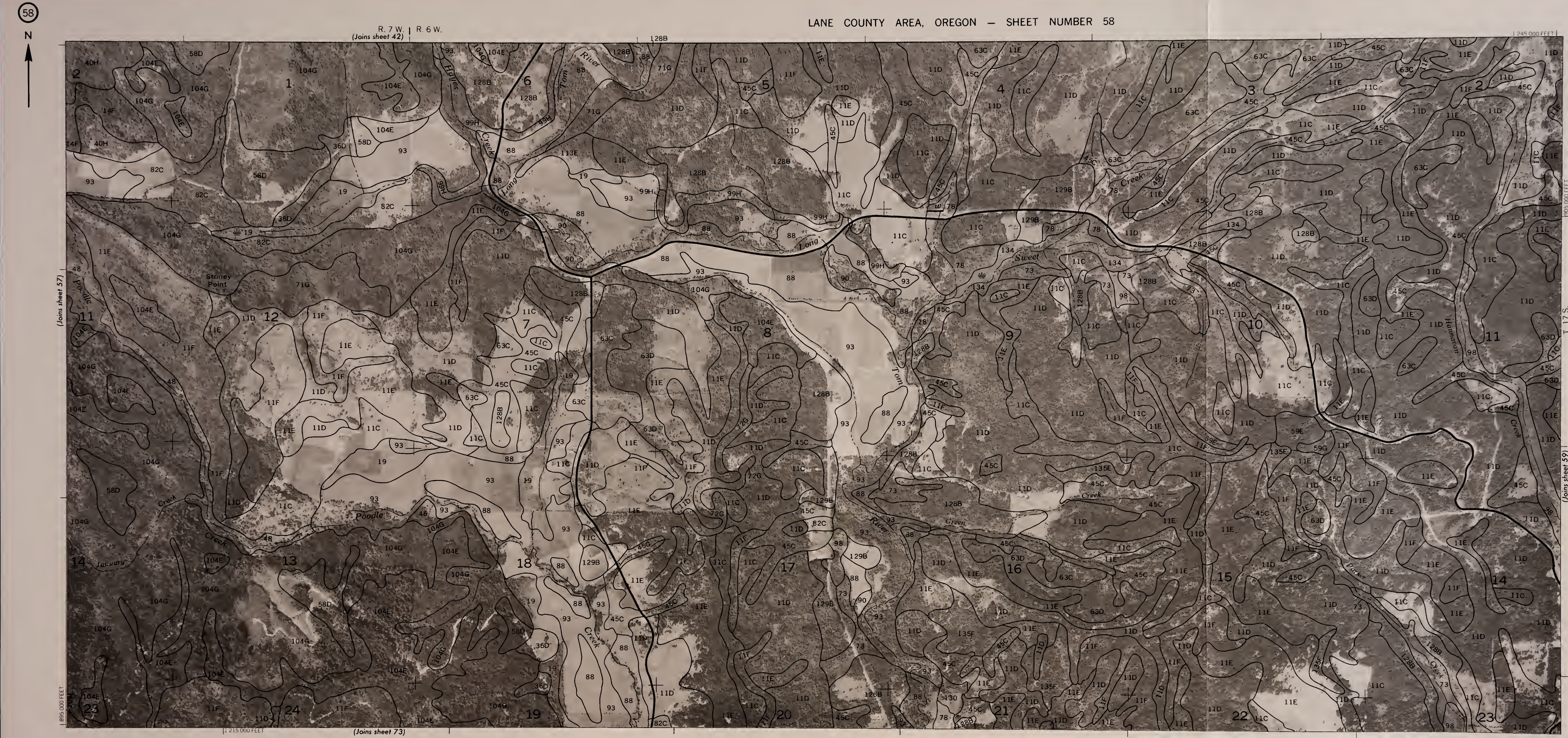
Scale - 1:20000

1 ¾ ½ ¼ 0 1 Mile

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 58

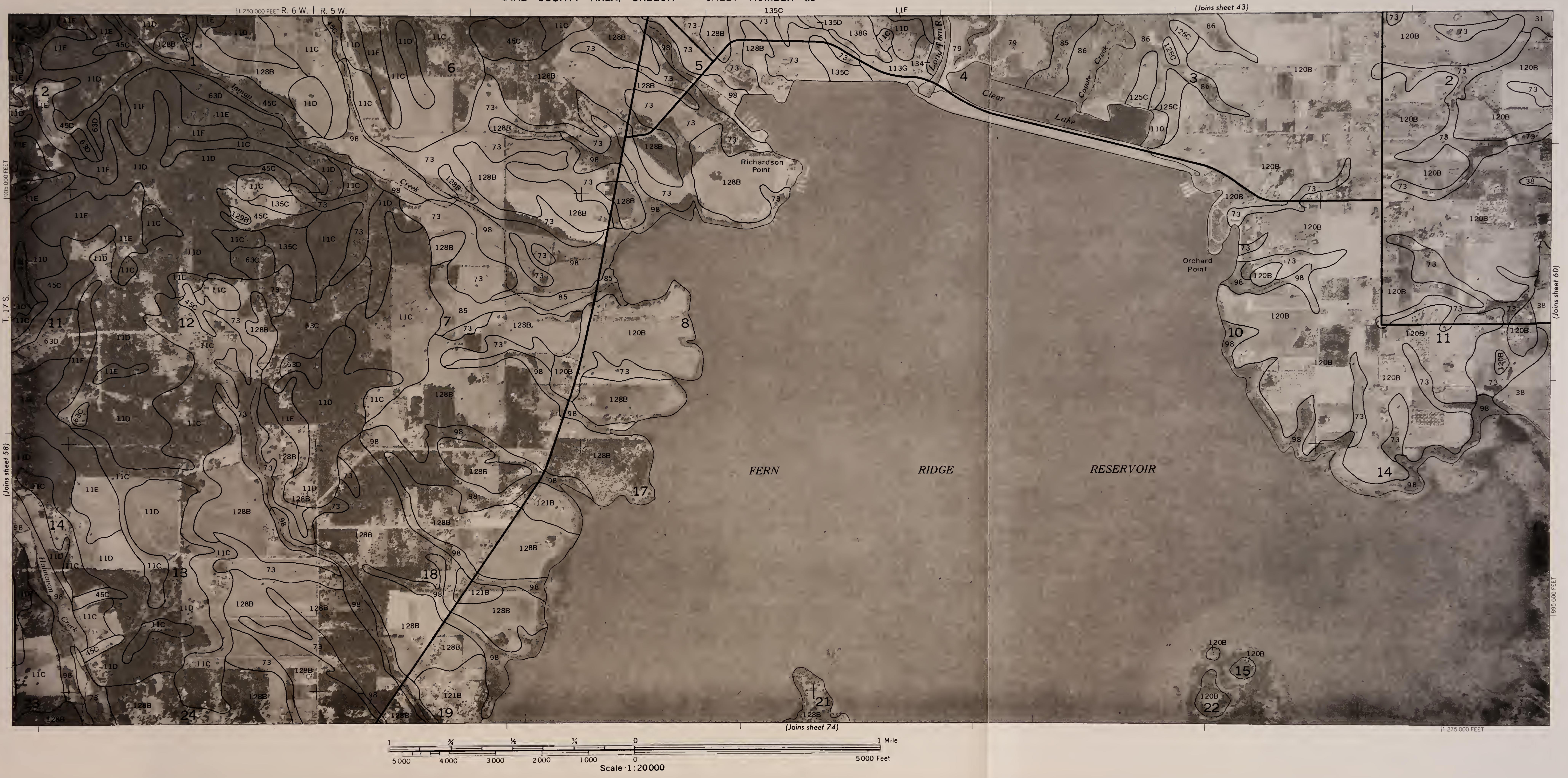


5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 59



60

N

118 (Joins sheet 44) R. 5 W. | R. 4 W.

1 310 000 FEET

1 280 000 FEET (Joins sheet 75)

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000


N
R. 4 W. | R. 3 W.
1 315 000 FEET
(Joins sheet 45)
(Joins sheet 60)
(Joins sheet 62)
(Joins sheet 76)
T. 17 S.
905 000 FEET
EUGENE
(COUNTY SEAT)
WILLAMETTE
RIVER
McKENZIE
RIVER
water
Goodpasture Island
Dodson Slough
SOUTHERN PACIFIC
Spores Point
Coburg Ridge
1 Mile
5000 Feet
Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 62

N

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 63

1 Mile
5 000 Feet
Scale 1:20000


64
N
R.1W. R.1E.
(Joins sheet 48)
(Joins sheet 63)
(Joins sheet 65)
(Joins sheet 79)
T. 17 S.
McKENZIE
RIVER
Leaburg
EUGENE WATER AND ELECTRIC BOARD CANAL
Johnson Creek
Holden Creek
Lane Creek
Cogswell Creek
Ritchie Creek
1 440 000 FEET
1 410 000 FEET
890 000 FEET
900 000 FEET
5000 4000 3000 2000 1000 0 5000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 65

LANE COUNTY AREA, OREGON — SHEET NUMBER 66

N


R. 4 E.
(Joins sheet 51)
1 510 000 FEET
T. 17 S.
(Joins sheet 66)
(Joins sheet 82)
1 535 000 FEET
WILLAMETTE NATIONAL FOREST
WILLAMETTE
NATIONAL
FOREST
Quartz Creek
Cane Creek
Coffee Creek
Rush Creek
Wycoff Creek
Deathball Mountain
Katsuk Butte
Harvey Mountain
LIMIT OF SOIL SURVEY
W. N. F.
1
¾
½
¼
0
1 Mile
5000
4000
3000
2000
1000
0
5000 Feet
Scale 1:20000


N
(Joins sheet 53)
R. 12 W. | R. 11 W.
1 080 000 FEET
900 000 FEET
890 000 FEET
1 045 000 FEET
(Joins sheet 83)
(Joins sheet 69)
T. 17 S.
PACIFIC OCEAN
SUTTON CREEK
Sutton Creek
Alder Lake
Buck Lake
Dune L.
Sutton Lake
Mercer Creek
Rath Creek
Dahlin Creek
Levage Creek
Bailey Creek
Morris Creek
Billie Creek
Uncle Creek
Condon Creek
Lindsley Creek
MERCER LAKE
Dowells Pen
DARLINGTONIA STATE PARK
SIUSLAW NATIONAL FOREST
S. N. F.
North Fork Siuslaw River
Condon
101
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

N

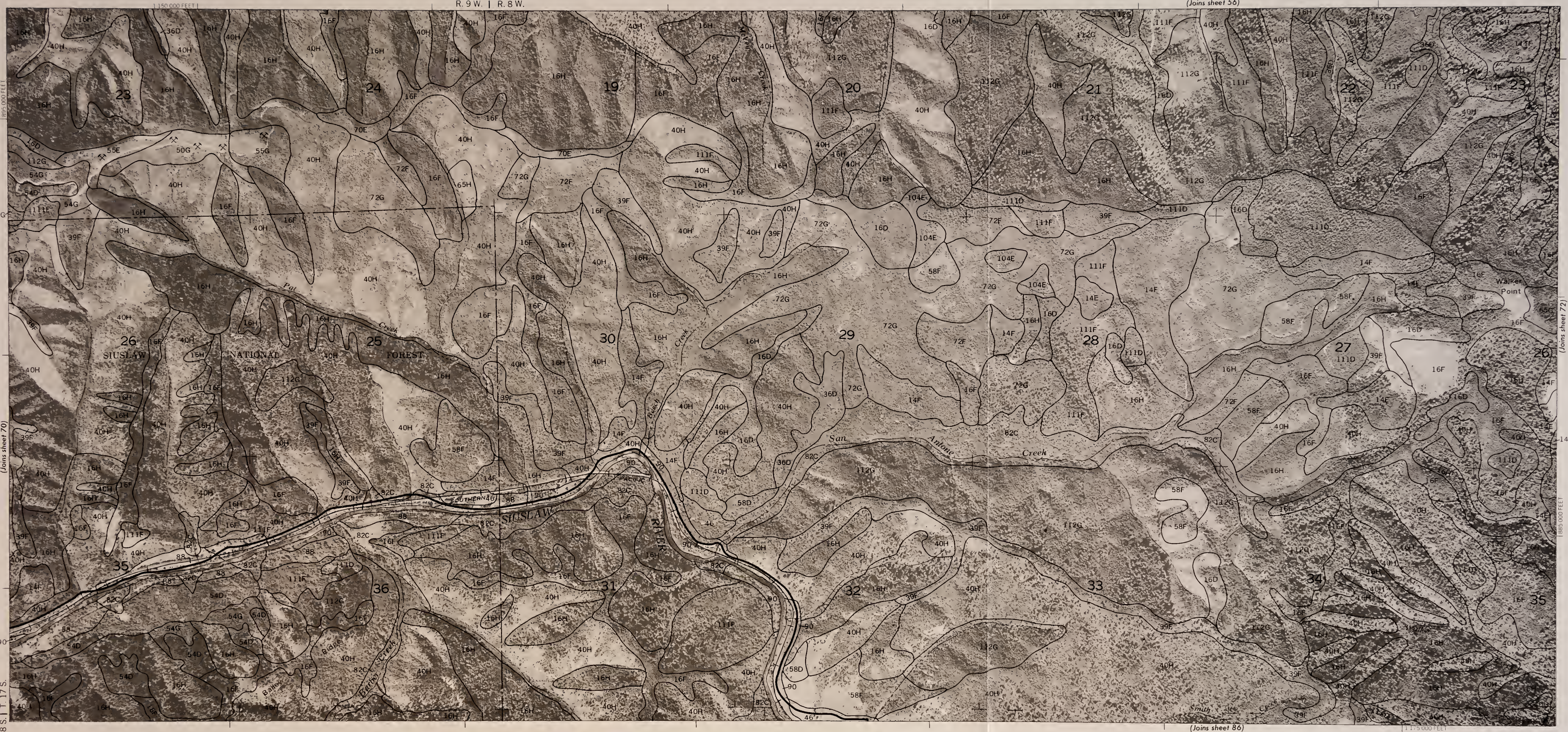
Scale 1:20000

1 Mile — ¾ — ½ — ¼ — 0

5000 — 4000 — 3000 — 2000 — 1000 — 0 — 5000 Feet

LANE COUNTY AREA, OREGON — SHEET NUMBER 70

LANE COUNTY AREA, OREGON — SHEET NUMBER 71



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

72

N

16F (Joins sheet 57) R. 8 W. | R. 7 W. 82C 90 58F 1 210 000 FEET

T. 17 S. | T. 18 S.

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 73

R. 7 W. | R. 6 W.

1 215 000 FEET

(Joins sheet 58)

N

(Joins sheet 88)

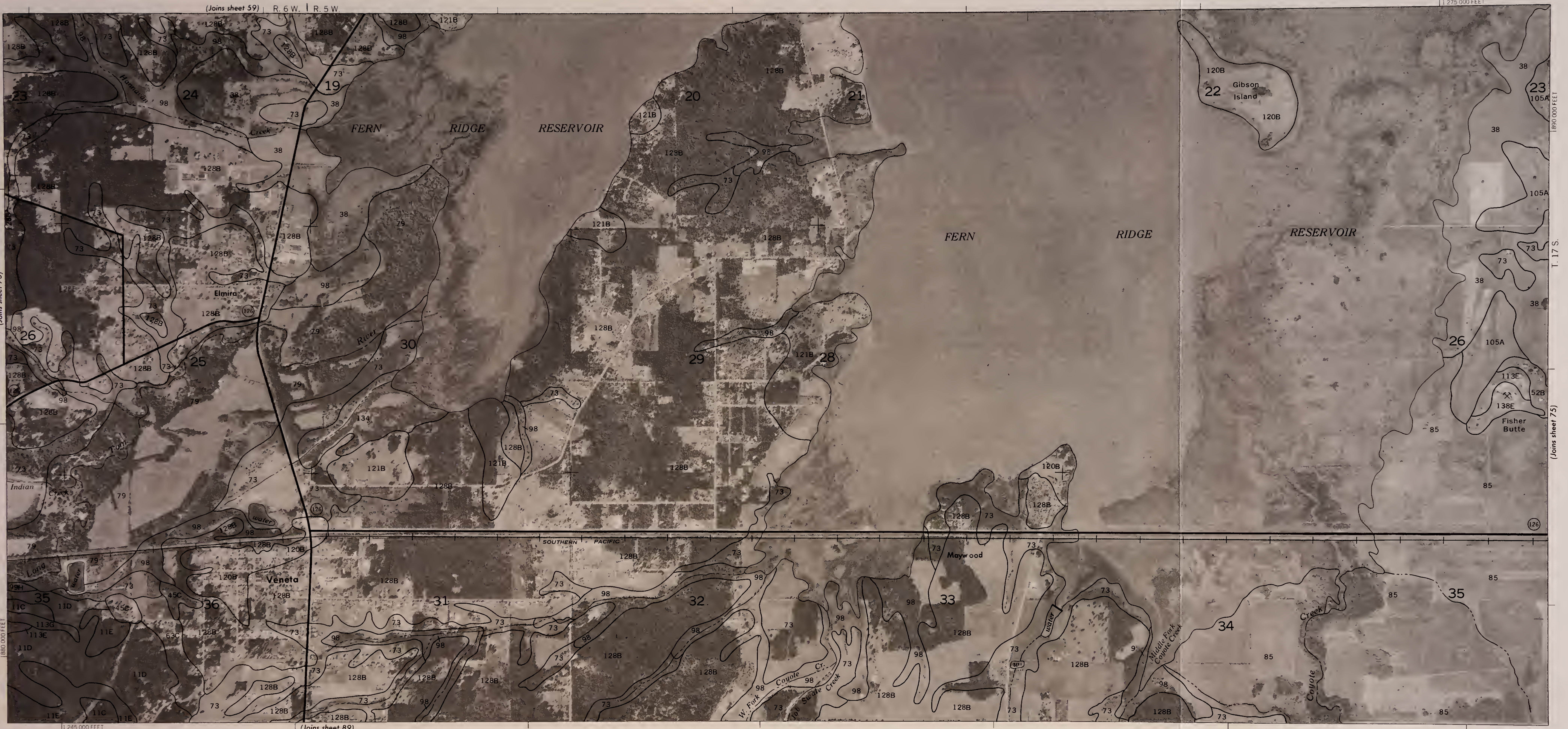
1 240 000 FEET

T. 18 S. | T. 17 S.

1 ¾ ½ ¼ 0 1 Mile

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

Scale 1:20000

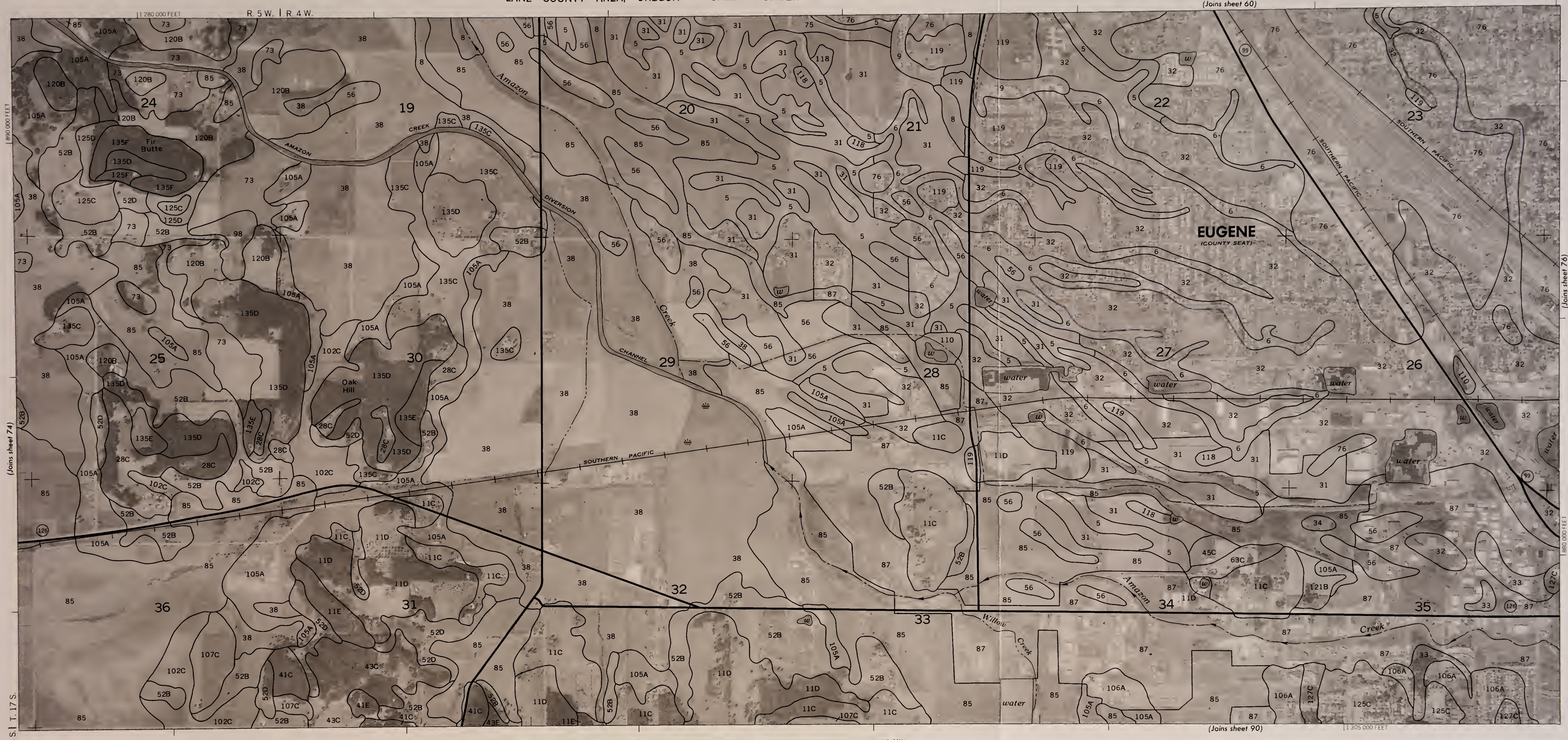


5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

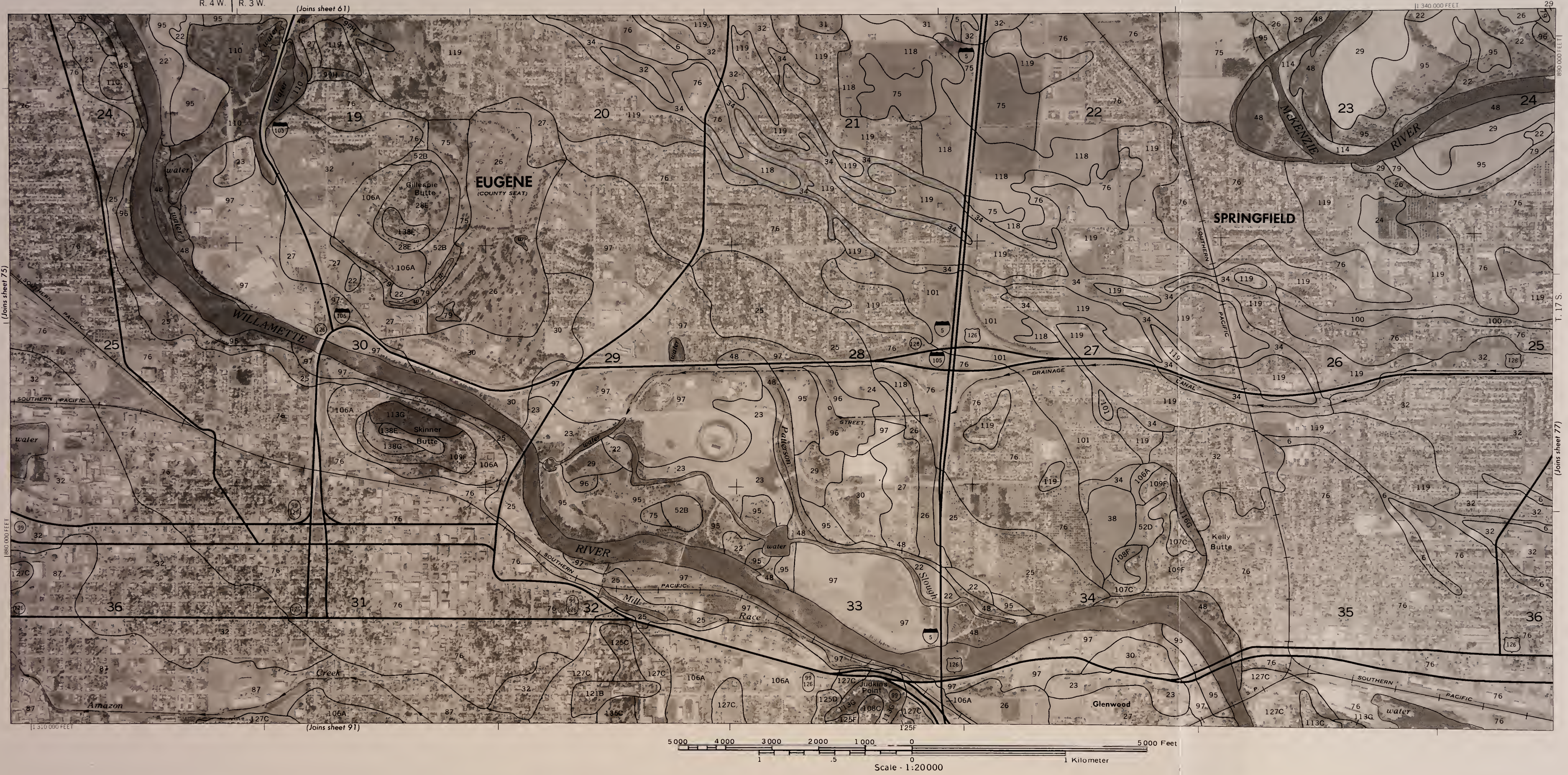
LANE COUNTY AREA, OREGON — SHEET NUMBER 75



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000


N
R. 4 W. | R. 3 W.
(Joins sheet 61)
(Joins sheet 75)
(Joins sheet 77)
(Joins sheet 91)
T. 17 S.
EUGENE
(COUNTY SEAT)
SPRINGFIELD
Gillespie Butte
Skinner Butte
Kelly Butte
Judkins Point
Glenwood
WILLAMETTE
RIVER
McKENZIE RIVER
SOUTHERN PACIFIC
DRAINAGE CANAL
Patterson
STREET
Slough
Mill Race
Amazon Creek
water
1 310 000 FEET
1 340 000 FEET
880 000 FEET
890 000 FEET
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 77

1 ¾ ½ ¼ 0 1 Mile

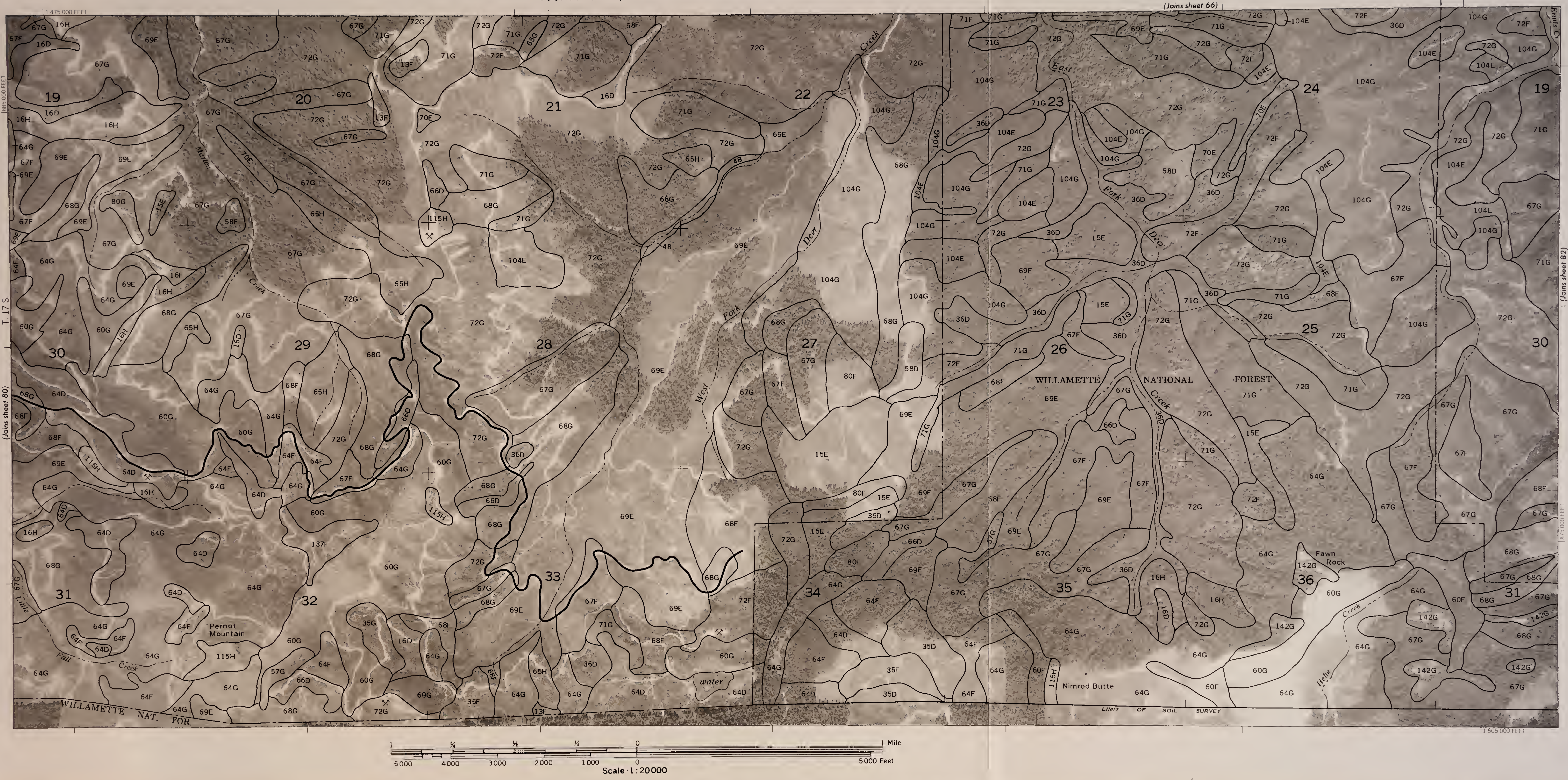
5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000


N
R. 2 W. | R. 1 W.
(Joins sheet 63)
(Joins sheet 77)
(Joins sheet 79)
(Joins sheet 93)
T. 18 S. | T. 17 S.
1 405 000 FEET
885 000 FEET
875 000 FEET
1 380 000 FEET
Walterville Reservoir
Walterville
WALTERVILLE CANAL
McKENZIE RIVER
Cedar Flat
Cedar Creek
Camp Creek
Potter Creek
Johnson Creek
Osborn Creek
Creek
5000 4000 3000 2000 1000 0 5000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000


R. 1 W. | R. 1 E.
(Joins sheet 64)
(Joins sheet 80)
(Joins sheet 94)
(Joins sheet 78)
N
Deerhorn
McKENZIE
RIVER
Lane Cr.
Taylor
Creek
Miles Peak
T. 18 S. | T. 17 S.
1 Mile
5 000 Feet
Scale 1:20000


N
R. 1 E. | R. 2 E.
(Joins sheet 65)
R. 2 E. | R. 3 E.
(Joins sheet 79)
(Joins sheet 81)
(Joins sheet 94)
T. 17 S.
T. 17 S. | T. 18 S.
1 470 000 FEET
1 445 000 FEET
885 000 FEET
875 000 FEET
Goat Point
Walker Point
Ritchey Creek
Little Fall Creek
WILLAMETTE NATIONAL FOREST
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000


(Joins sheet 66)
R. 3 E. | R. 4 E.
N
T. 17 S.
(Joins sheet 80)
(Joins sheet 82)
1 475 000 FEET
885 000 FEET
1 505 000 FEET
WILLAMETTE NATIONAL FOREST
WILLAMETTE NAT. FOR.
LIMIT OF SOIL SURVEY
Pernot Mountain
Nimrod Butte
Fawn Rock
water
Marten Creek
West Fork Deer Creek
East Fork Deer Creek
Deer Creek
Little Fall Creek
Hehe Creek
48
19
20
21
22
23
24
19
30
29
28
27
26
25
30
31
32
33
34
35
36
31
1 Mile
5 000 Feet
Scale 1:20000

N

LANE COUNTY AREA, OREGON — SHEET NUMBER 82

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

83

N

T. 18 S. | T. 17 S.

(Joins inset, sheet 163) | (Joins sheet 95)

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 84

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 85

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

86


N
(Joins sheet 71)
R. 9 W. | R. 8 W.
1 175 000 FEET
880 000 FEET
SIUSLAW NATIONAL FOREST
Bailey Ridge
SIUSLAW RIVER
Smith Creek
Meadow Creek
Rock Creek
Turner Creek
Wildcat Creek
Wolfe Creek
Austa
Linslow
T. 18 S.
(Joins sheet 85)
(Joins sheet 87)
870 000 FEET
1 145 000 FEET
(Joins sheet 98)
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 88

89

LANE COUNTY AREA, OREGON — SHEET NUMBER 89

1 ¾ ½ ¼ 0 1 Mile

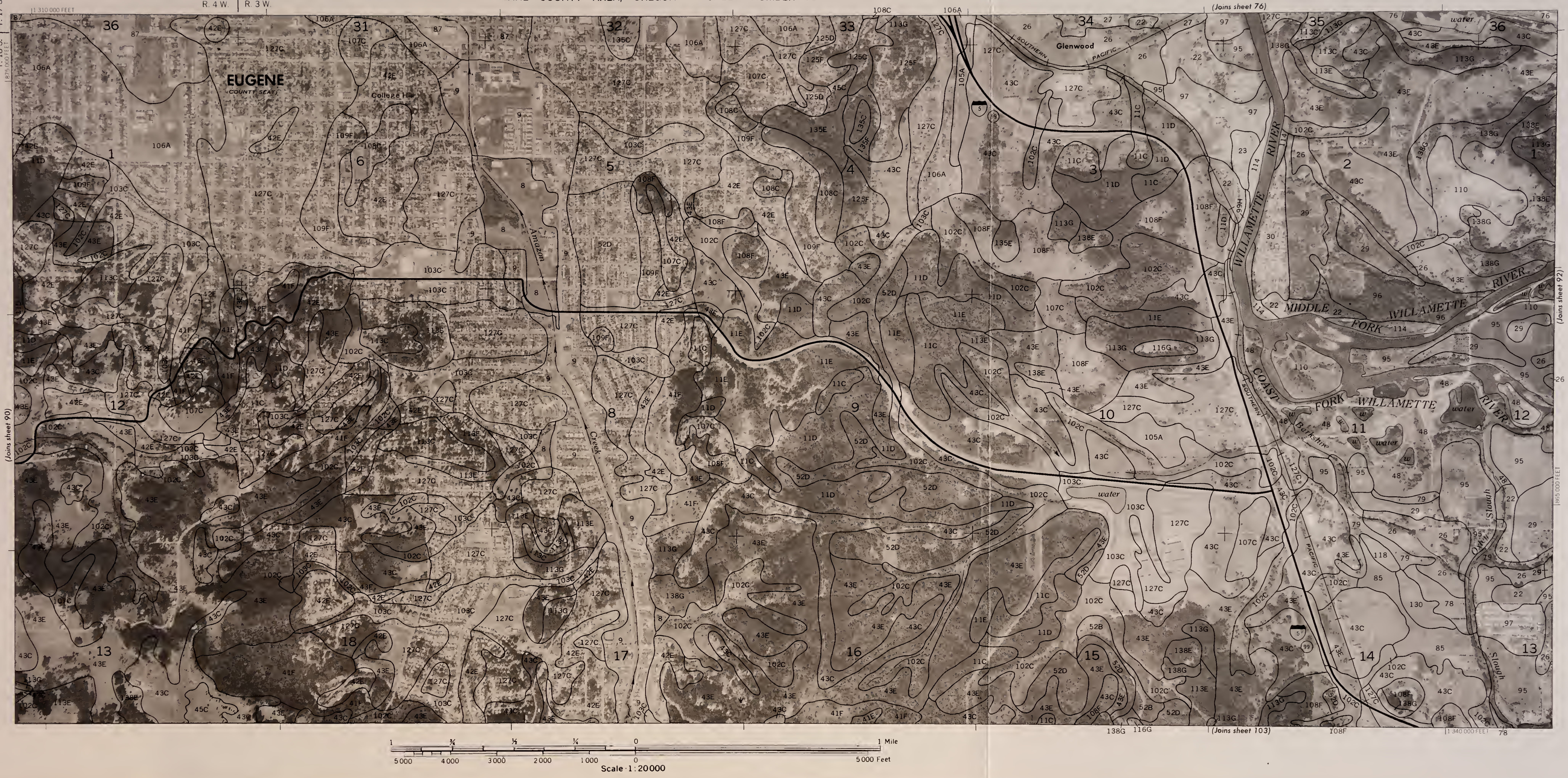
5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

90

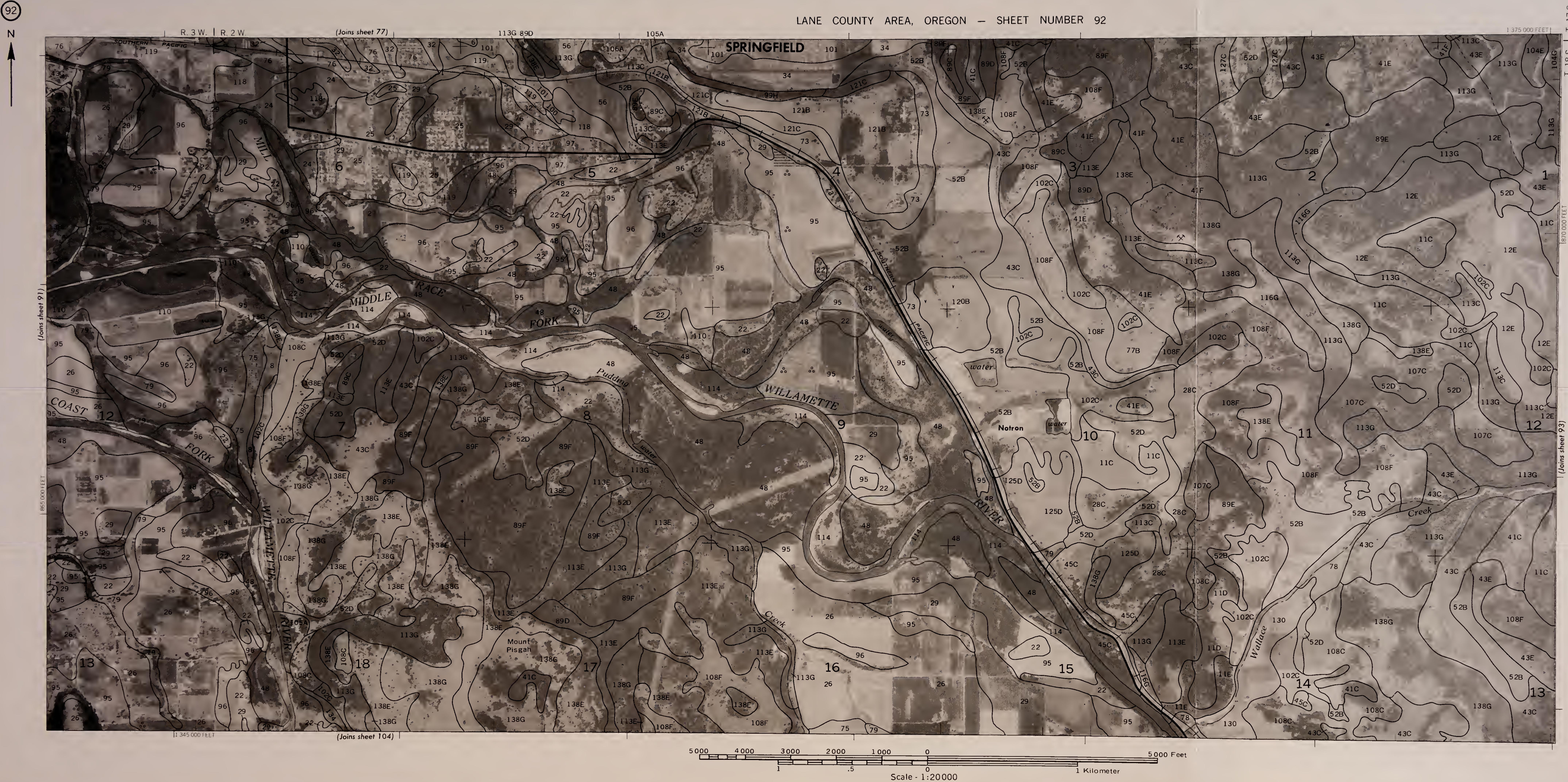
N

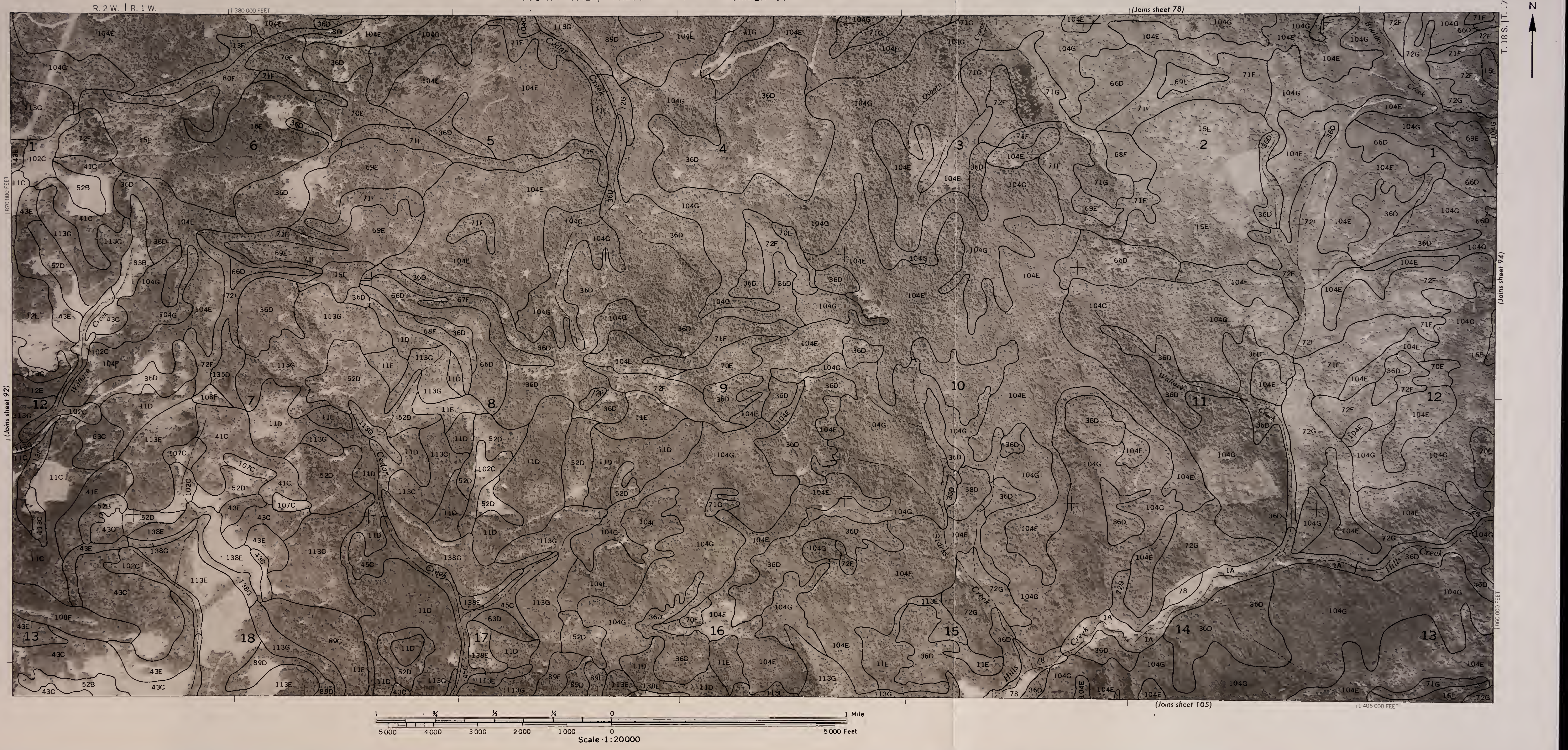

R. 5 W. | R. 4 W. (Joins sheet 75)
EUGENE
(COUNTY SEAT)
1 305 000 FEET
T. 17 S.
T. 18 S.
875 000 FEET
(Joins sheet 89)
(Joins sheet 91)
865 000 FEET
1 280 000 FEET
(Joins sheet 102)
Willow
Creek
water
Murray
Hill
Bailey
Hill
Coyote
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000


R. 4 W. | R. 3 W.
T. 17 S. | T. 18 S.
(Joins sheet 76)
(Joins sheet 90)
(Joins sheet 92)
(Joins sheet 103)
EUGENE
(COUNTY SEAT)
College Hill
Glenwood
SOUTHERN PACIFIC
Amazon Creek
WILLAMETTE RIVER
MIDDLE FORK WILLAMETTE RIVER
COAST FORK WILLAMETTE RIVER
Owens Slough
water
1 310 000 FEET
1 340 000 FEET
1 Mile
5000 Feet
Scale 1:20000

N

LANE COUNTY AREA, OREGON — SHEET NUMBER 92




R. 2 W. | R. 1 W.
1 380 000 FEET
(Joins sheet 78)
T. 18 S. | T. 17 S.
N
(Joins sheet 94)
(Joins sheet 92)
(Joins sheet 105)
1 405 000 FEET
870 000 FEET
860 000 FEET
Cedar Creek
Osborn Creek
Wallace Creek
Starks Creek
Hills Creek
1 ¾ ½ ¼ 0 1 Mile
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
Scale 1:20000


94
N
R. 1 W. | R. 1 E.
T. 18 S. | T. 17 S.
(Joins sheet 79)
(Joins sheet 80)
(Joins sheet 93)
(Joins sheet 106)
1 440 000 FEET
1 410 000 FEET
870 000 FEET
860 000 FEET
WILLAMETTE NATIONAL FOREST
Hills Creek
Norton Creek
Sturdy Creek
Little Fall Creek
Fall Creek
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 95

N

LANE COUNTY AREA, OREGON — SHEET NUMBER 96

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 97

LANE COUNTY AREA, OREGON — SHEET NUMBER 98

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

N

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

N

(Joins sheet 88) R. 7 W. | R. 6 W.

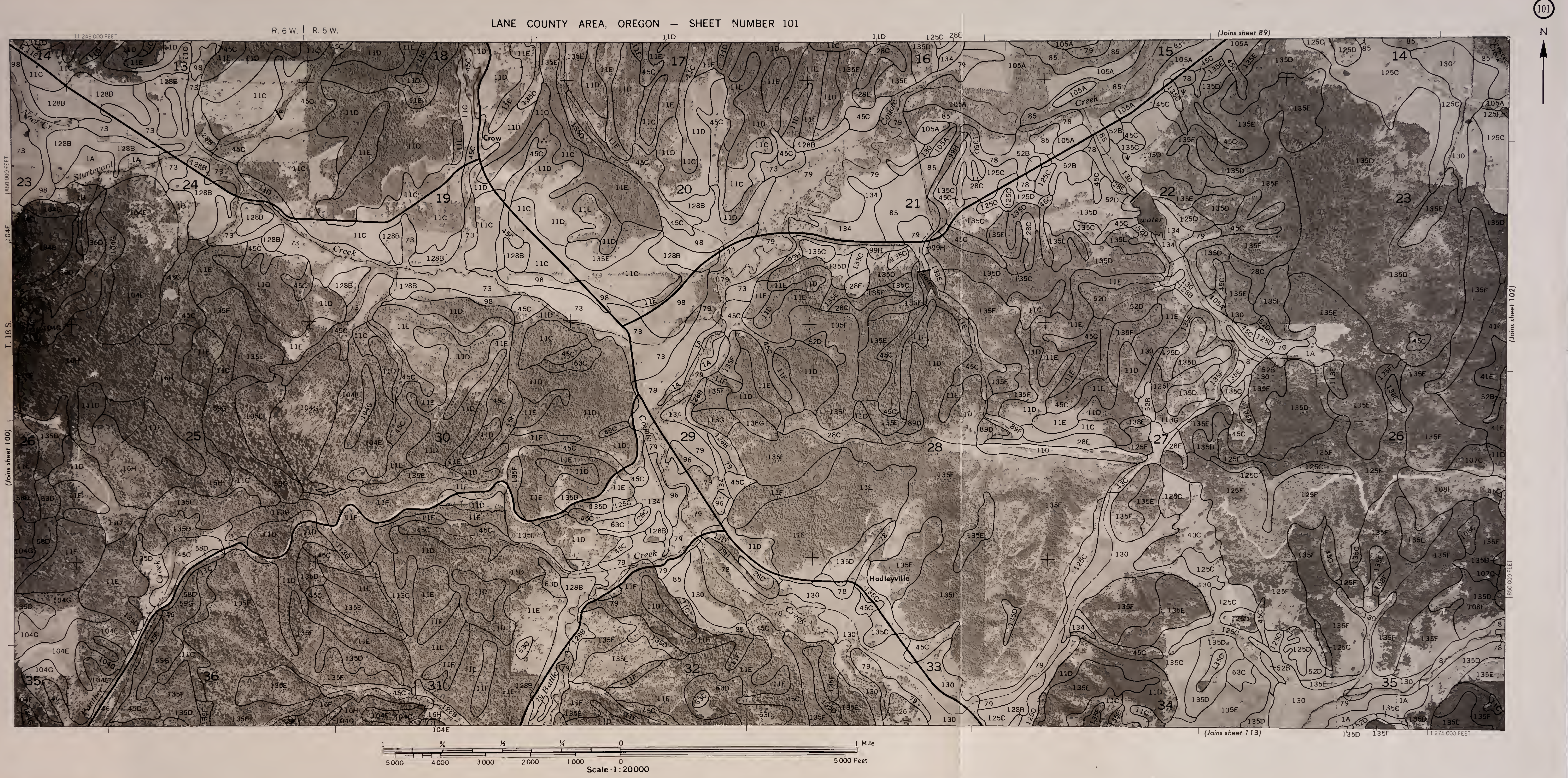
1 240 000 FEET

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

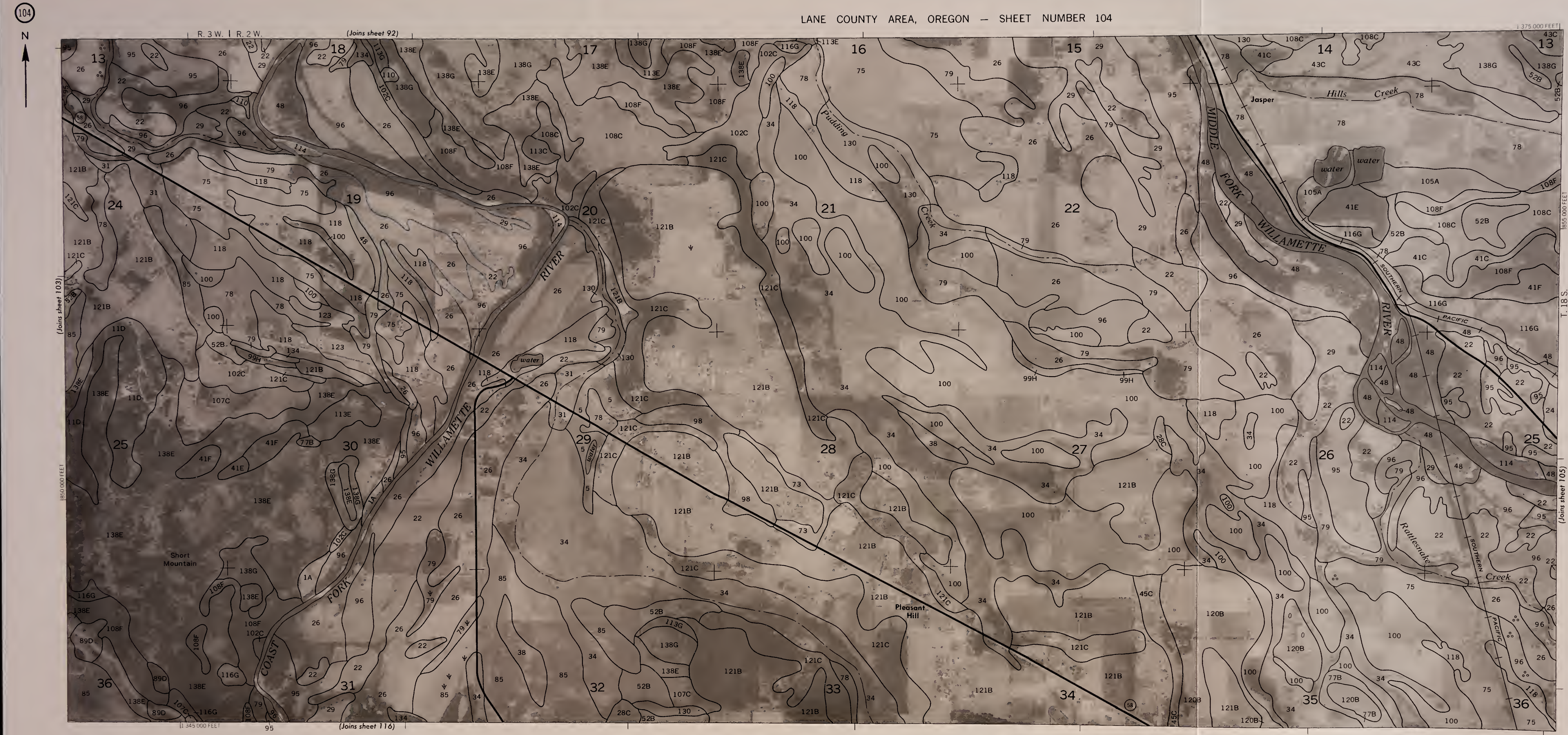
LANE COUNTY AREA, OREGON — SHEET NUMBER 101



LANE COUNTY AREA, OREGON — SHEET NUMBER 102


R. 4 W. | R. 3 W.
1 310 000 FEET
(Joins sheet 91)
(Joins sheet 102)
(Joins sheet 104)
(Joins sheet 115)
T. 18 S.
850 000 FEET
1 340 000 FEET
N
Spencer Butte
116G
Goshen
SOUTHERN
1 Mile
5000 Feet
Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 104



5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 105

1 — ¾ — ½ — ¼ — 0 — 1 Mile

5000 — 4000 — 3000 — 2000 — 1000 — 0 — 5000 Feet

Scale 1:20000

(106)

LANE COUNTY AREA, OREGON — SHEET NUMBER 106

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 107

1 Mile | 5000 Feet

Scale 1:20000

N

5000 4000 3000 2000 1000 0 5000 Feet

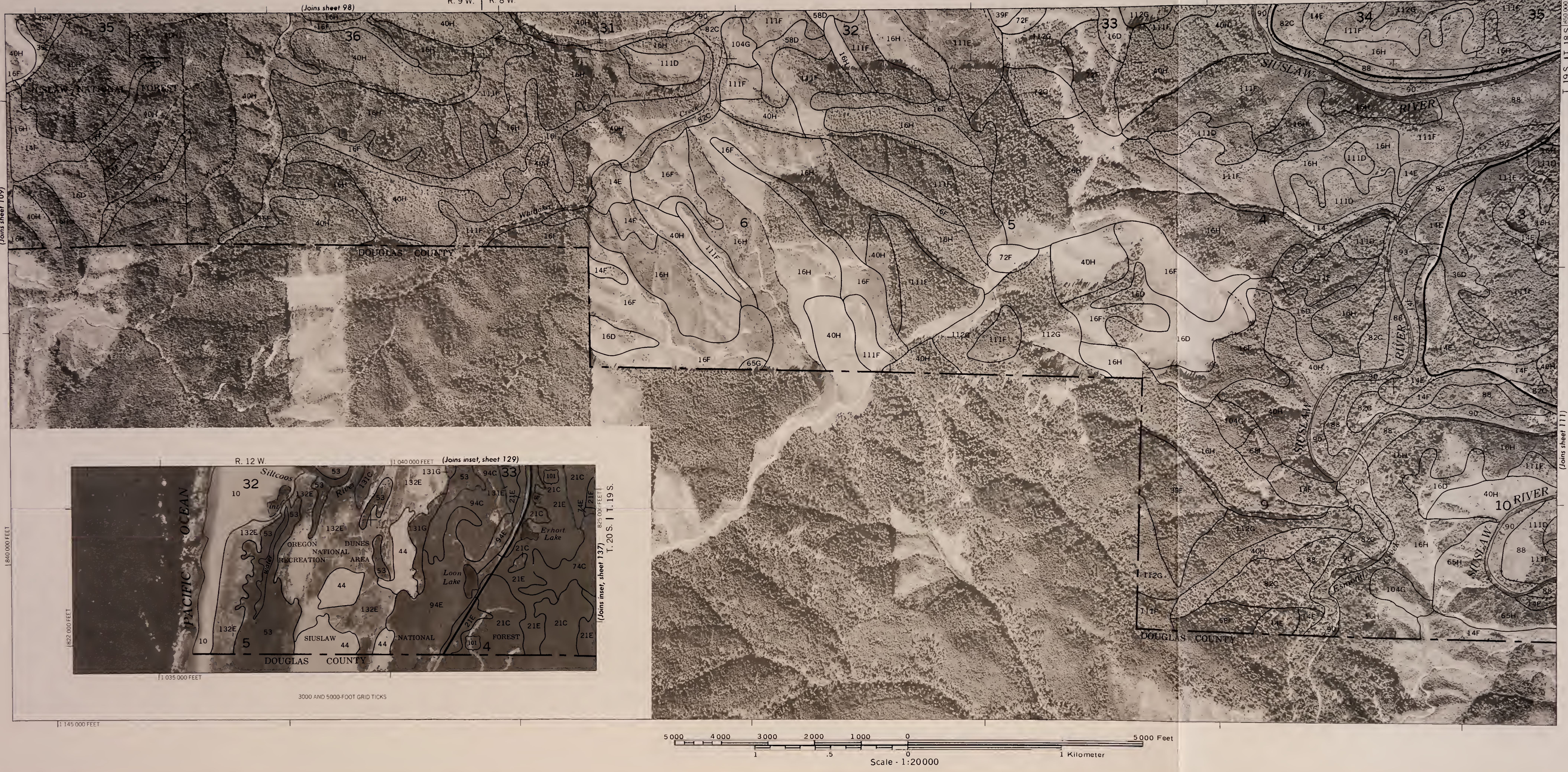
1 .5 0 1 Kilometer

Scale - 1:20000

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000


N
R. 9 W. | R. 8 W.
(Joins sheet 98)
(Joins sheet 109)
(Joins sheet 111)
T. 19 S. | T. 18 S.
SIUSLAW NATIONAL FOREST
DOUGLAS COUNTY
SIUSLAW RIVER
1 175 000 FEET
1 145 000 FEET
R. 12 W.
1 040 000 FEET
(Joins inset, sheet 129)
(Joins inset, sheet 137)
T. 20 S. | T. 19 S.
PACIFIC OCEAN
Siltcoos River
OREGON DUNES NATIONAL RECREATION AREA
Loon Lake
Erhart Lake
SIUSLAW NATIONAL FOREST
DOUGLAS COUNTY
840 000 FEET
822 000 FEET
825 000 FEET
1 035 000 FEET
3000 AND 5000-FOOT GRID TICKS
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 111

LANE COUNTY AREA, OREGON — SHEET NUMBER 112

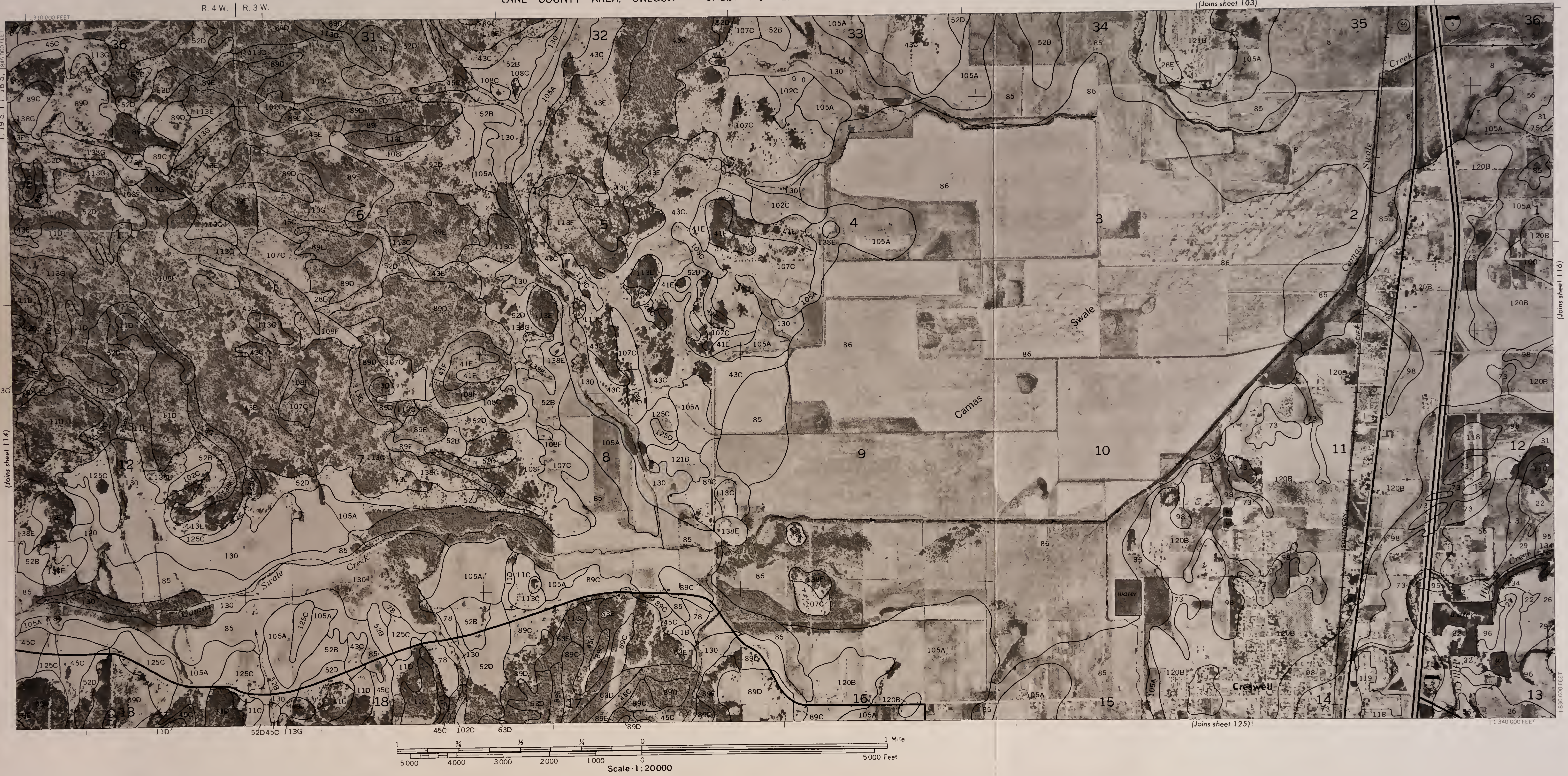
LANE COUNTY AREA, OREGON — SHEET NUMBER 113

1 Mile | 3/4 | 1/2 | 1/4 | 0

5000 | 4000 | 3000 | 2000 | 1000 | 0 | 5000 Feet

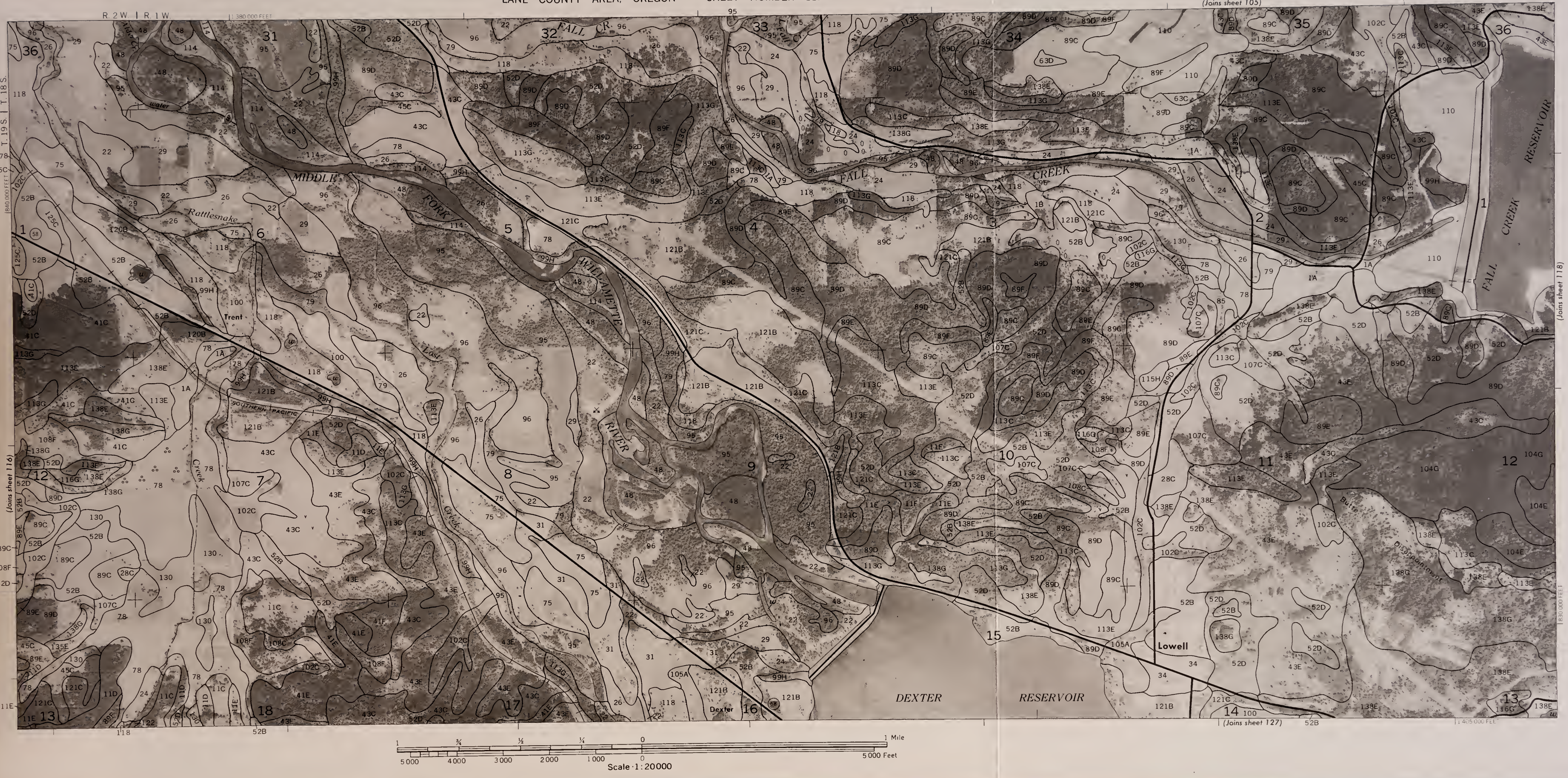
Scale 1:20000


114
N
R. 5 W. | R. 4 W.
(Joins sheet 102)
(Joins sheet 113)
(Joins sheet 115)
(Joins sheet 124)
T. 19 S. | T. 18 S.
Fox Hollow
Camas Swale Creek
1 305 000 FEET
1 280 000 FEET
835 000 FEET
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000


R. 4 W. | R. 3 W.
(Joins sheet 103)
(Joins sheet 114)
(Joins sheet 116)
(Joins sheet 125)
T. 19 S. | T. 18 S.
N
Camas
Swale
Creek
Creswell
water
Scale 1:20000
1 Mile
5000 Feet


N
R. 3 W. | R. 2 W.
(Joins sheet 104)
(Joins sheet 115)
(Joins sheet 117)
(Joins sheet 126)
T. 19 S. | T. 18 S.
WILLAMETTE
RIVER
COAST
FORK
Bear
Creek
Sellsrs
Butte
Rattlesnake
Butte
Cloverdale
SOUTHERN
PACIFIC
1 375 000 FEET
840 000 FEET
830 000 FEET
1 345 000 FEET
5 000
4 000
3 000
2 000
1 000
0
5 000 Feet
1
.5
0
1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 117



5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 119

LANE COUNTY AREA, OREGON — SHEET NUMBER 120

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

N

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000


N
R. 5 W. | R. 4 W.
(Joins sheet 114)
(Joins sheet 123)
(Joins sheet 125)
(Joins sheet 132)
T. 19 S.
1 305 000 FEET
830 000 FEET
1 280 000 FEET
820 000 FEET
Doak Creek
Coyote Creek
Camas Swale Creek
Skunk Creek
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 125

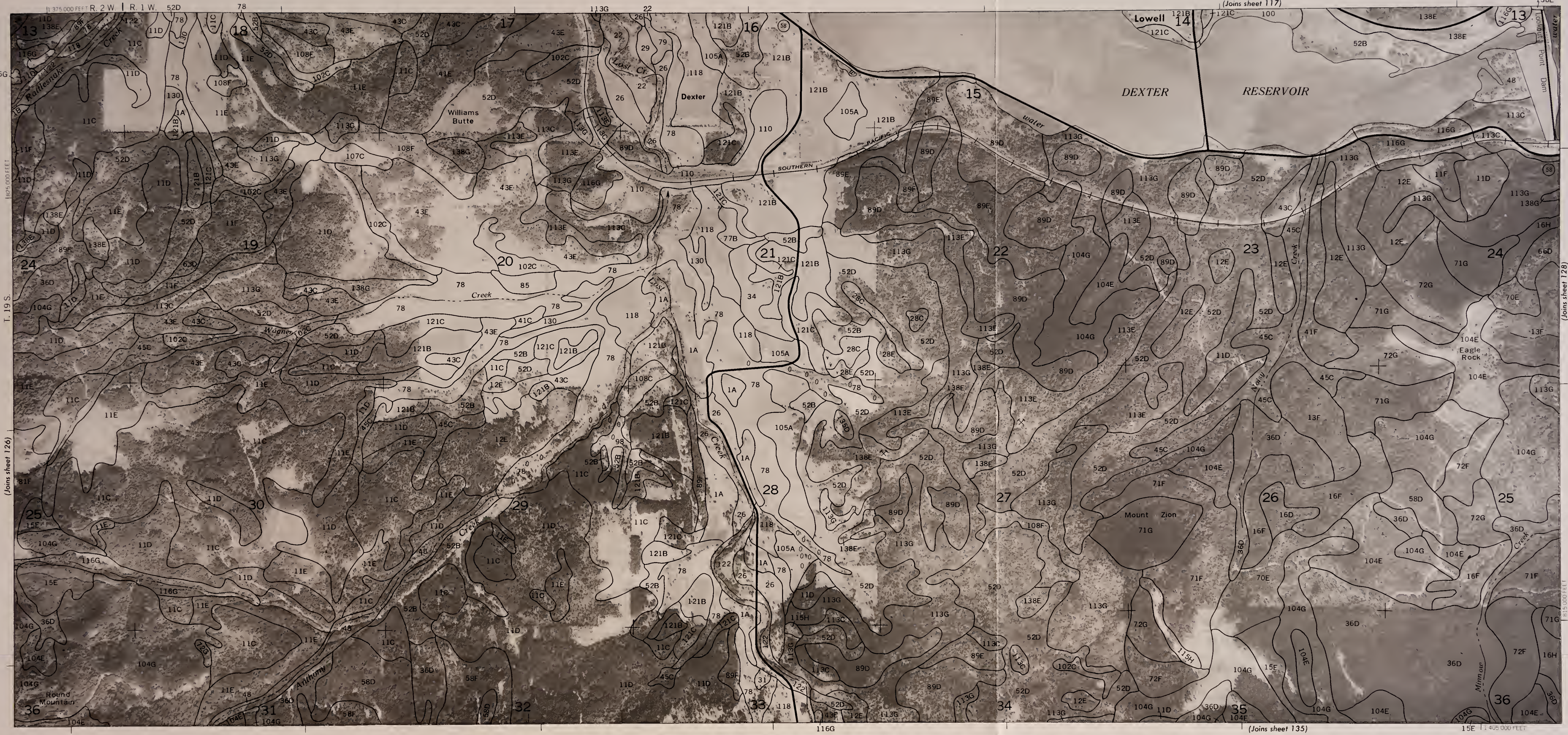
1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 126

LANE COUNTY AREA, OREGON — SHEET NUMBER 127

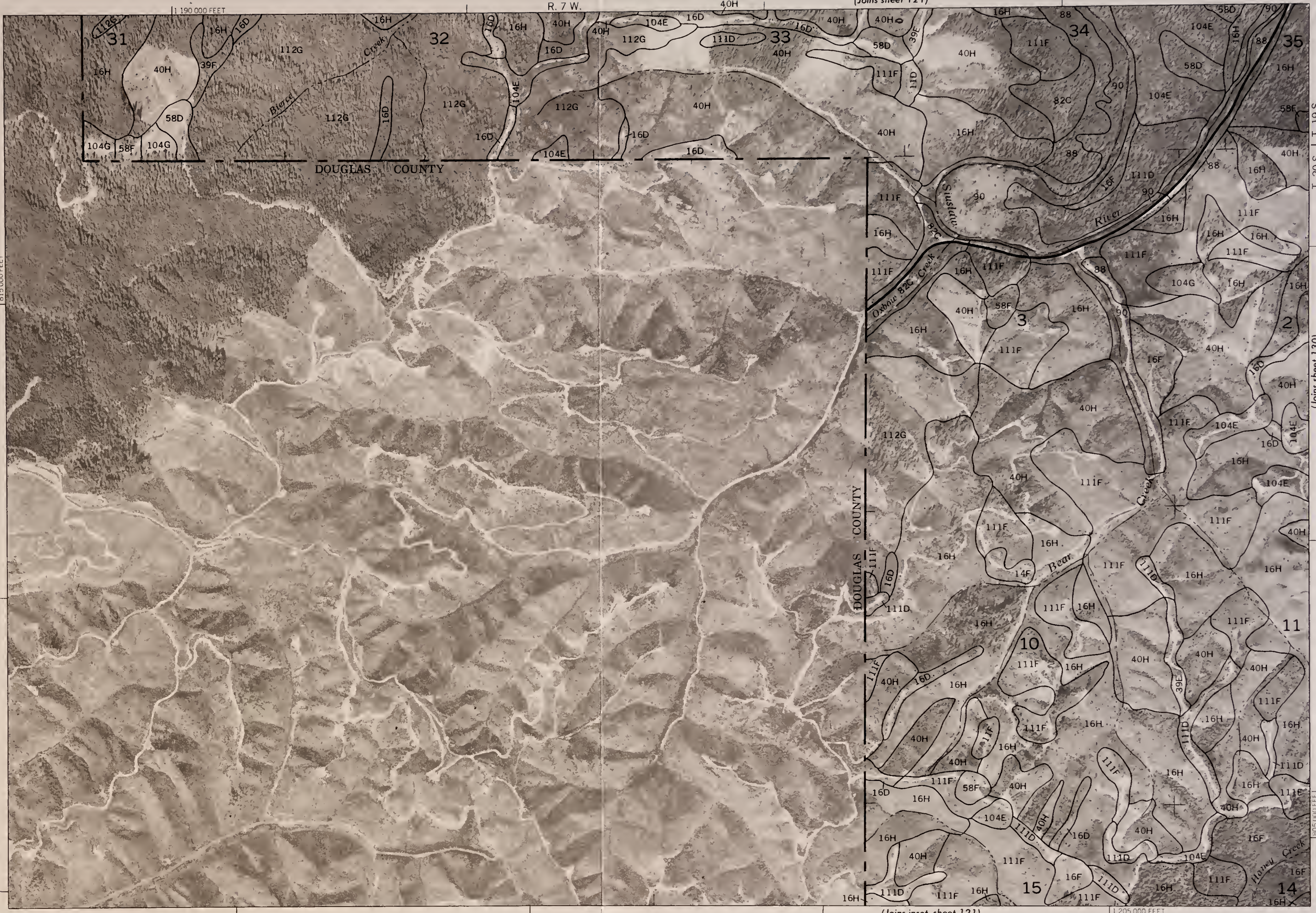


1 Mile ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000


N
R.1 W. | R.1 E.
(Joins sheet 118)
(Joins sheet 127)
(Joins sheet 136)
T.19 S.
LOOKOUT POINT RESERVOIR
Winberry Creek
Alder
Green Butte
Minnow
Minnow Creek
SOUTHERN PACIFIC
WILLAMETTE NATIONAL FOREST
1 410 000 FEET
1 440 000 FEET
5000 Feet
1 Kilometer
Scale - 1:20000



1 ¾ ½ ¼ 0 1 Mile
5000 4000 3000 2000 1000 0 5000 Feet
Scale 1:20000

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 131

1 Mile ¾ ½ ¼ 0 1 Mile
5000 4000 3000 2000 1000 0 5000 Feet
Scale 1:20000

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

N

(Joins sheet 125)
(Joins sheet 132)
(Joins sheet 134)
(Joins sheet 140)
R. 4 W. | R. 3 W.
T. 20 S. | T. 19 S.
1 310 000 FEET
815 000 FEET
1 340 000 FEET
800 000 FEET
Hill Creek
Lynx Hollow
Calico Creek
Bennett Creek
Hill Creek
COAST FORK WILLAMETTE RIVER
Gettings Creek
North Fork Gettings Creek
Gettings Cr.
SOUTHERN PACIFIC
1 Mile
5000 4000 3000 2000 1000 0 5000 Feet
Scale 1:20000

N

R. 3 W. | R. 2 W.

(Joins sheet 126)

T. 20 S. | T. 19 S.

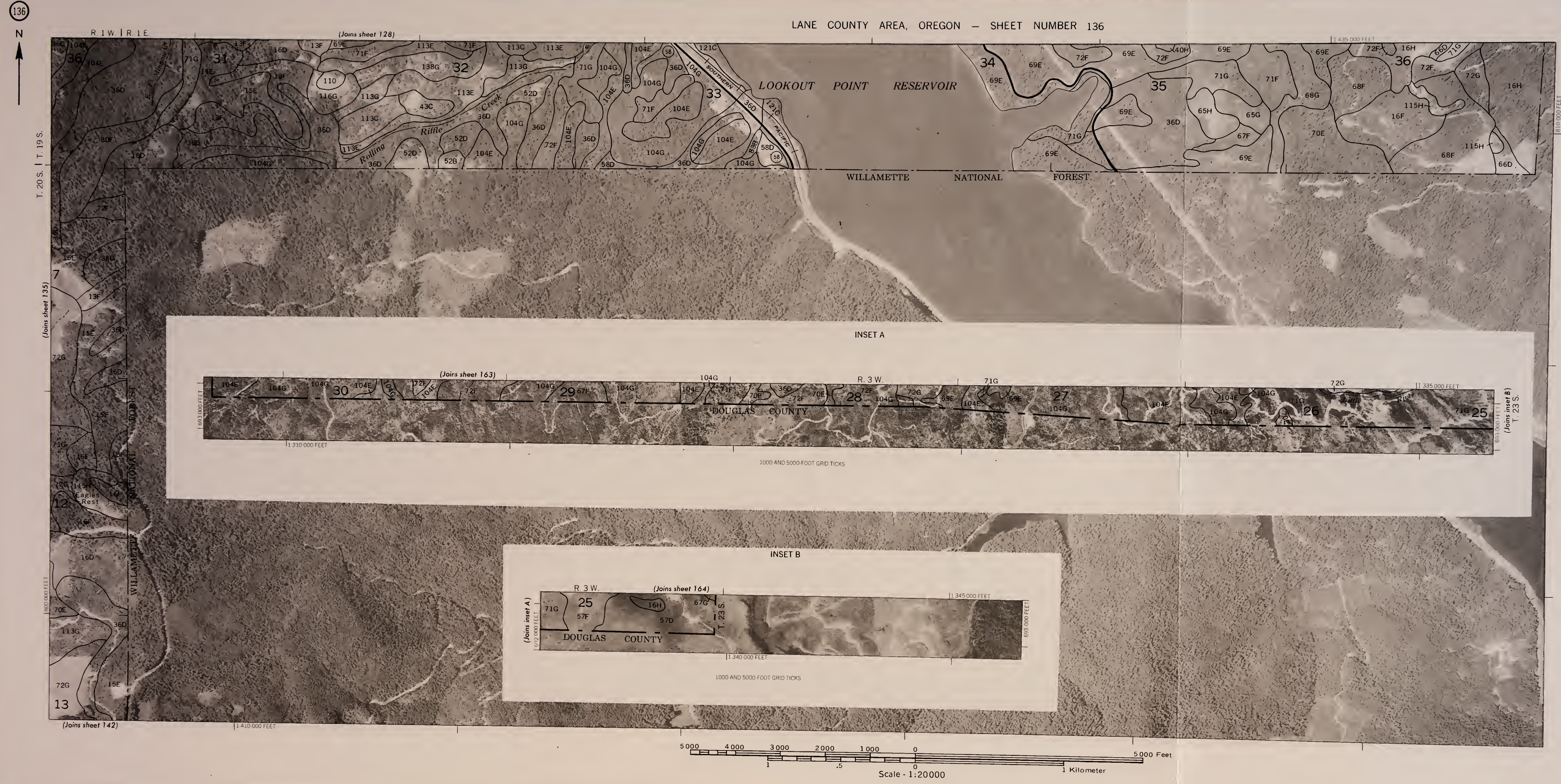
5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000


N
R. 2 W. | R. 1 W.
T. 20 S. | T. 19 S.
(Joins sheet 127)
(Joins sheet 134)
(Joins sheet 136)
(Joins sheet 142)
Kloster Mountain
Lost Creek
Anthony Creek
Middle Creek
Gosage Creek
Guiley Creek
Scale 1:20000
1 Mile
5000 Feet

LANE COUNTY AREA, OREGON — SHEET NUMBER 136



LANE COUNTY AREA, OREGON — SHEET NUMBER 137


N
(Joins sheet 131)
R. 6 W.
R. 5 W.
1 270 000 FEET
800 000 FEET
(Joins sheet 137)
(Joins sheet 139)
T. 20 S.
DOUGLAS COUNTY
790 000 FEET
1 245 000 FEET
(Joins inset, sheet 144)
Siuslaw River
Douglas Creek
Lorane Creek
Leitz Creek
N. Fork Siuslaw River
5 000 Feet
4 000
3 000
2 000
1 000
0
1
.5
0
1 Kilometer
Scale - 1:20000

1 Mile ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

N

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 141

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

N

R. 2 W. | R. 1 W.

LANE COUNTY AREA, OREGON — SHEET NUMBER 142

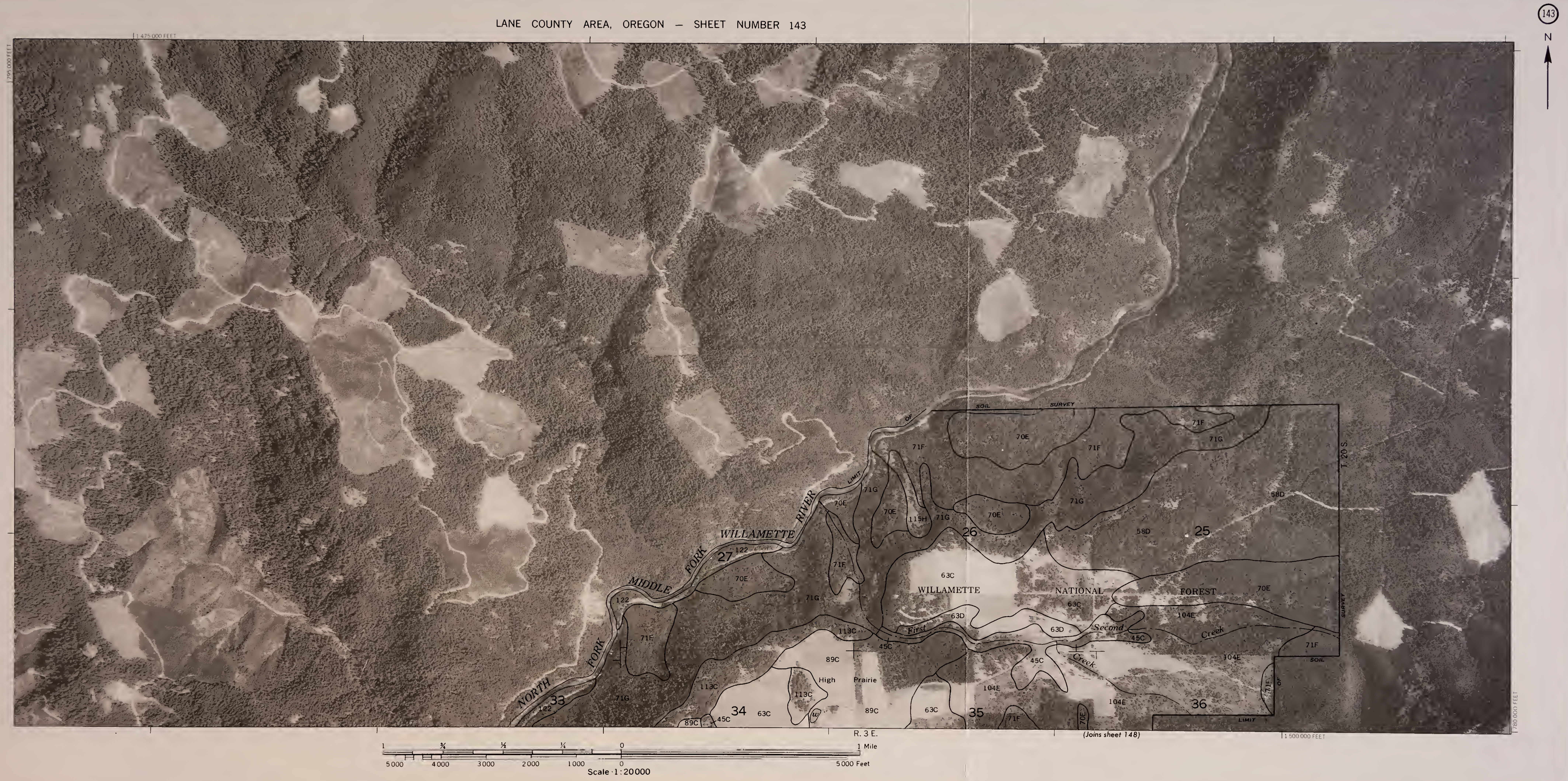
(Joins sheet 135) | (Joins sheet 136)

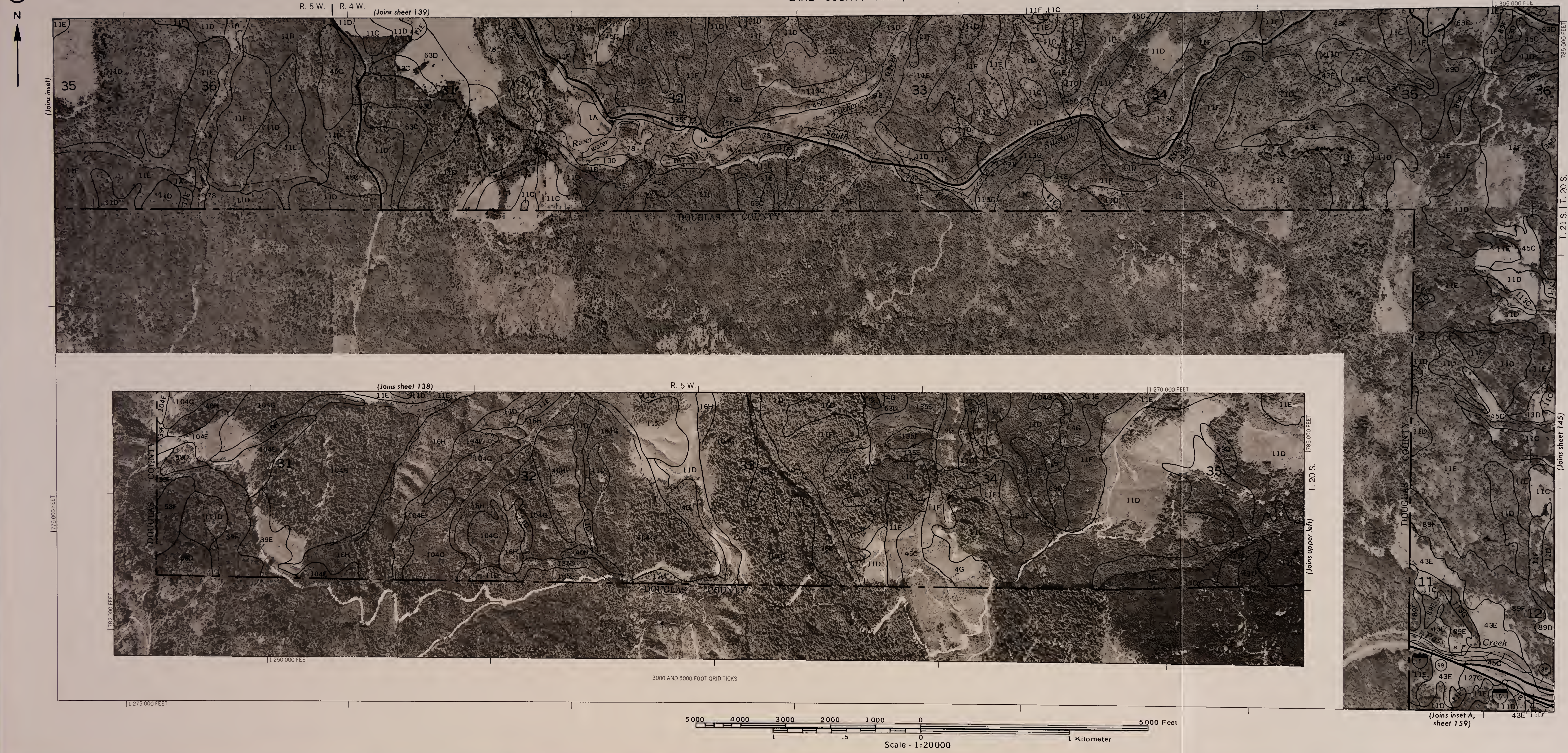
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

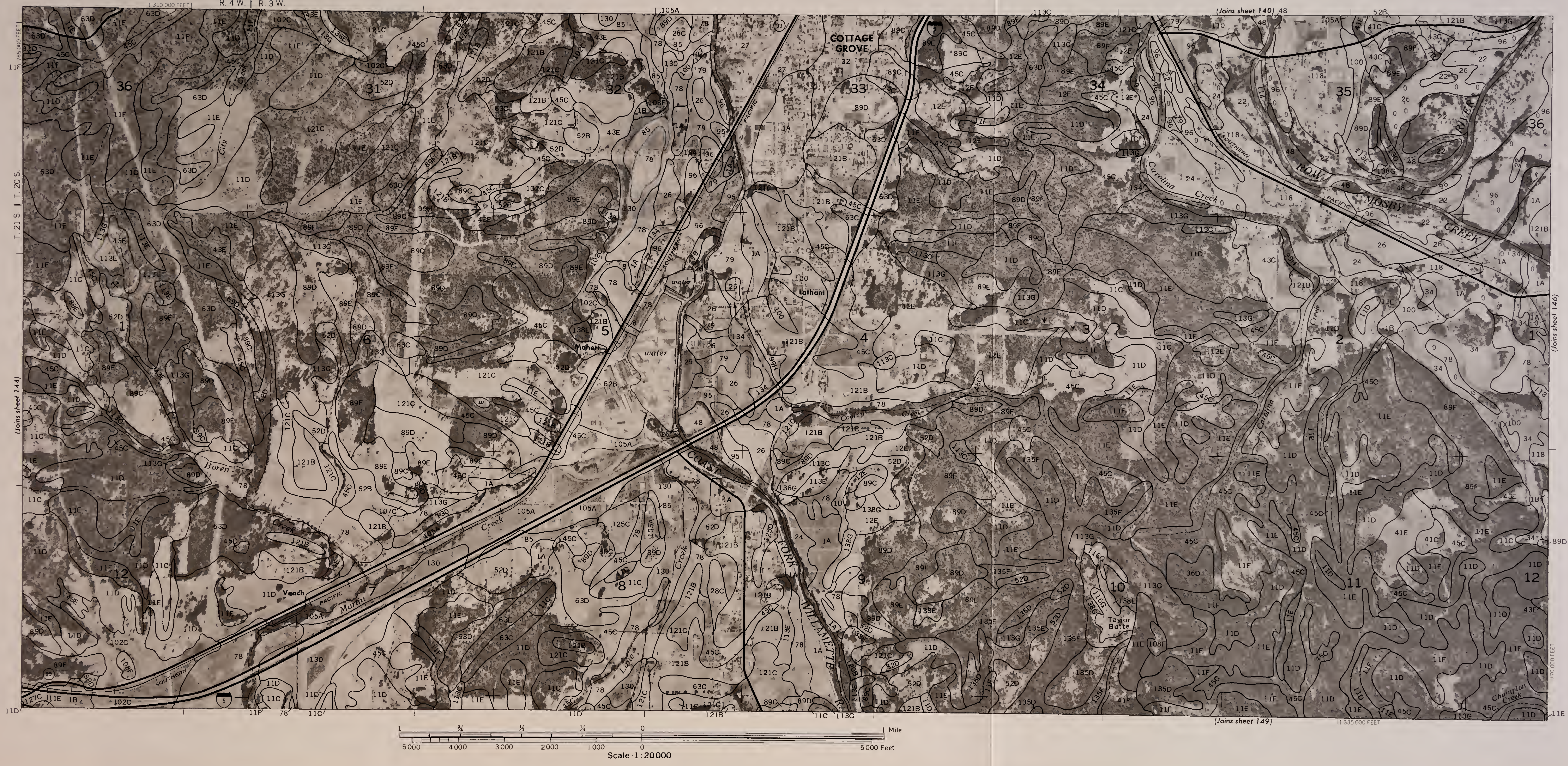
LANE COUNTY AREA, OREGON — SHEET NUMBER 143




N
R. 5 W.
R. 4 W.
(Joins sheet 139)
(Joins inset)
1 305 000 FEET
785 000 FEET
T. 20 S.
T. 21 S.
(Joins sheet 145)
River
South
Siuslaw
DOUGLAS COUNTY
(Joins sheet 138)
R. 5 W.
1 270 000 FEET
(Joins upper left)
1 275 000 FEET
782 000 FEET
1 250 000 FEET
3000 AND 5000-FOOT GRID TICKS
1 275 000 FEET
Creek
(Joins inset A, sheet 159)
5 000
4 000
3 000
2 000
1 000
0
5 000 Feet
1
.5
0
1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 145

145



Scale 1:20000

146

N

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

Scale 1:20000

1 ¾ ½ ¼ 0 1 Mile

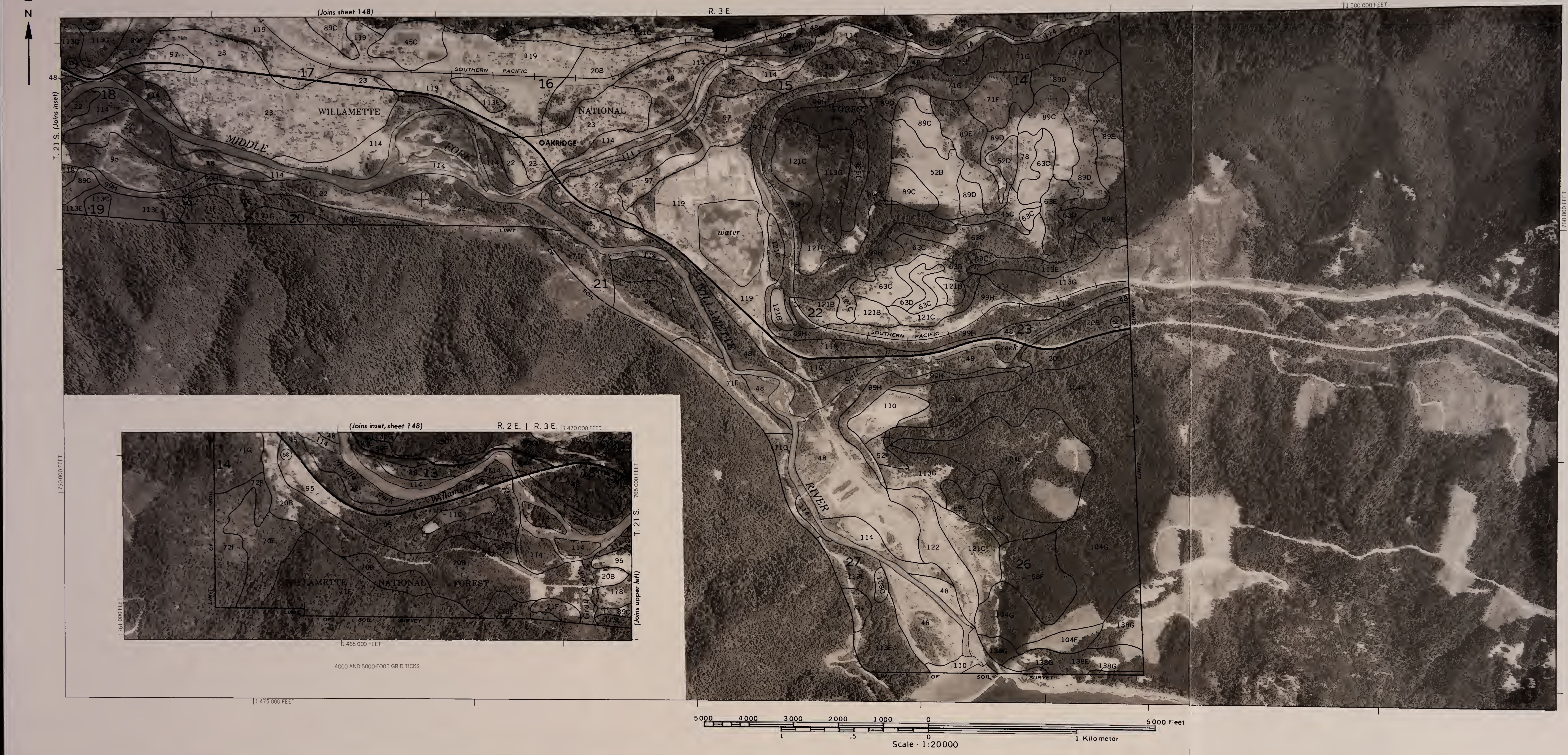
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet


N
(Joins sheet 143)
R. 3 E.
T. 21 S. | T. 20 S.
MIDDLE FORK WILLAMETTE RIVER
NORTH FORK
WILLAMETTE NATIONAL FOREST
High Prairie
Flat Creek
LIMIT OF SOIL SURVEY
SOUTHERN PACIFIC
Westfir
OAKRIDGE
(Joins inset)
(Joins sheet 152)
Salmon Cr.
1 475 000 FEET
1 500 000 FEET
780 000 FEET
770 000 FEET
33
34
35
36
3
4
5
7
8
9
10
14
15
16
17
18
1 470 000 FEET
771 000 FEET
766 000 FEET
1 465 000 FEET
M. FORK WILLAMETTE RIVER
N. Fork M. Fork Willamette River
TUNNEL
WILLAMETTE NATIONAL FOREST
Westfir
T. 21 S.
(Joins lower left)
(Joins inset, sheet 152)
R. 2 E. | R. 3 E.
11
12
13
14
18
5 000
4 000
3 000
2 000
1 000
0
5 000 Feet
1
.5
0
1 Kilometer
Scale - 1:20000


R. 4 W. | R. 3 W.
1 310 000 FEET
770 000 FEET
755 000 FEET
1 335 000 FEET
T. 21 S.
(Joins sheet 145)
(Joins sheet 150)
(Joins sheet 153)
(Joins inset A, sheet 159)
N
Martin Creek
Snyder Creek
Langdon Creek
Williams Creek
Coast Fork Willamette River
Gap
Piper Creek
Rattlesnake Prairie
Champion Creek
Shortridge Butte
Youngs Butte
Powell Creek
COTTAGE GROVE RESERVOIR
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
Scale 1:20000
1 Mile
5000 Feet

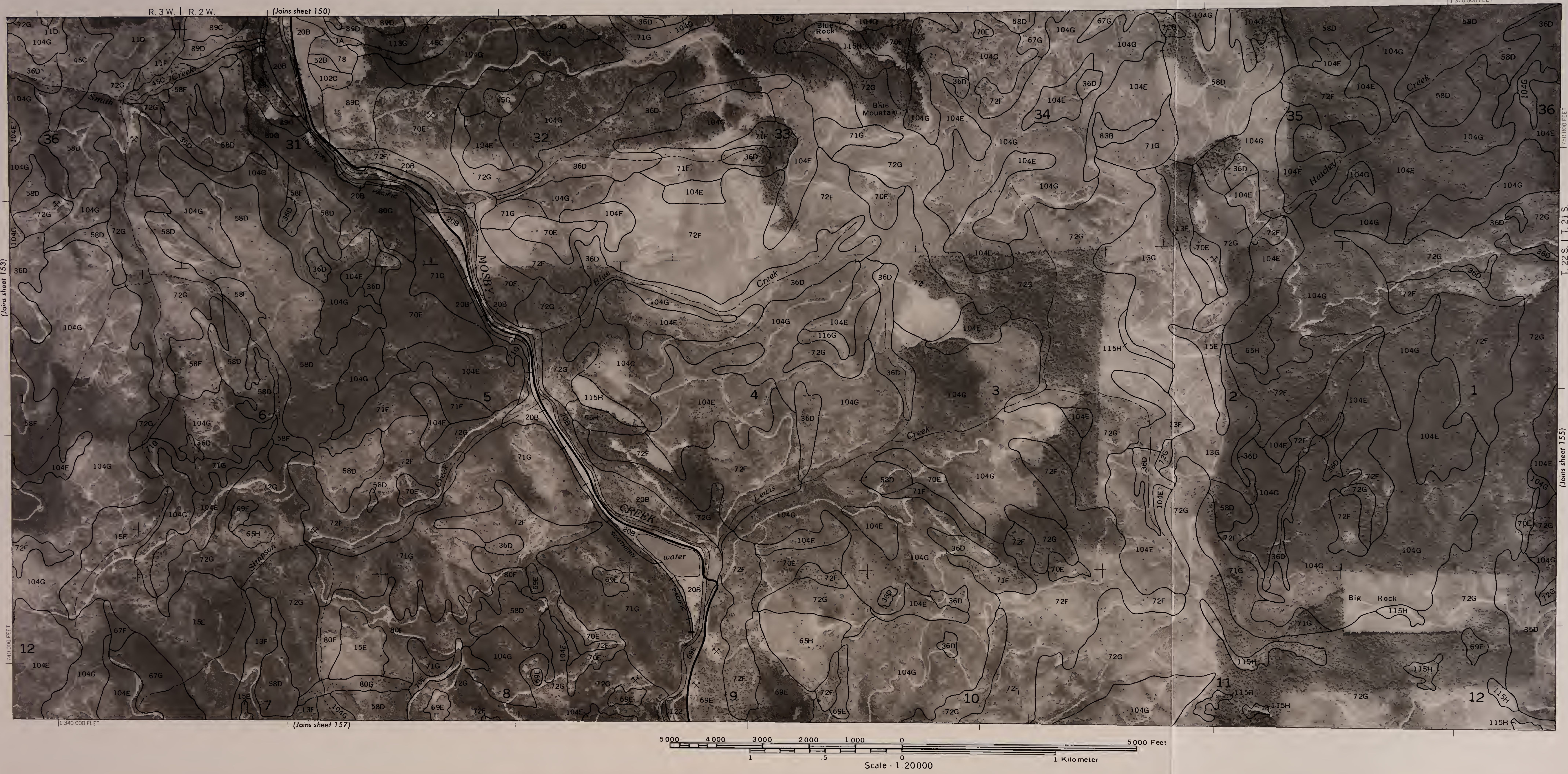

150
N
R. 3 W. | R. 2 W.
(Joins sheet 146)
(Joins sheet 149)
(Joins sheet 151)
(Joins sheet 154)
T. 21 S.
1 370 000 FEET
765 000 FEET
755 000 FEET
1 340 000 FEET
Kizer Creek
MOSBY CREEK
Perkins Creek
Vaughn Creek
Anderson Creek
King Creek
Pitcher Creek
ROW RIVER
SOUTHERN PACIFIC
Round Mountain
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
34
35
36
5000 4000 3000 2000 1000 0 5000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

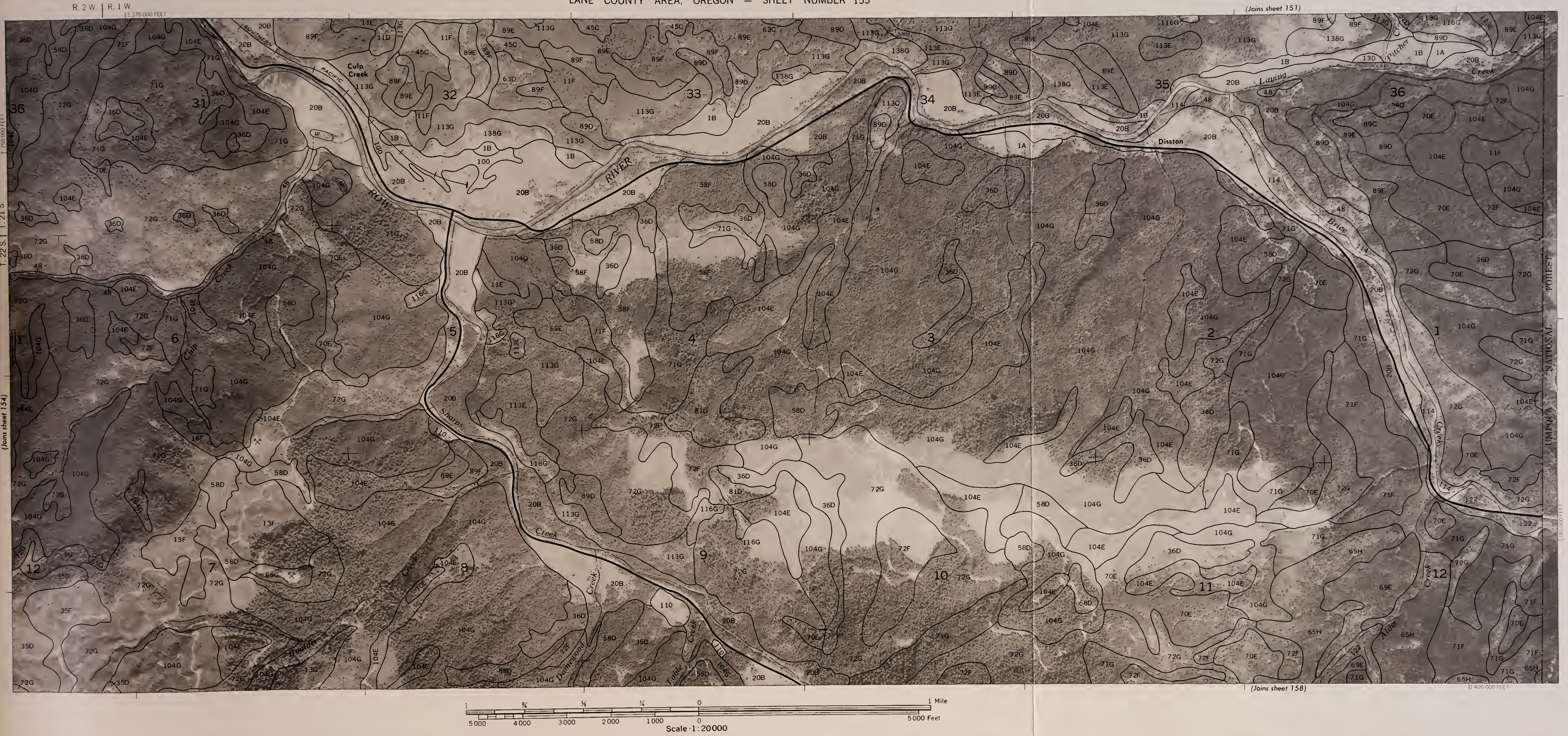

R. 2 W.
R. 1 W.
T. 21 S.
(Joins sheet 147)
(Joins sheet 150)
(Joins sheet 155)
N
Teeter Creek
Cedar Creek
Green Mountain
Dorena
ROW
SOUTHERN PACIFIC
RIVER
Hawley Butte
Hawley Creek
West Fork Prather Creek
Pitcher Creek
UMPQUA NATIONAL FOREST
water
1 Mile
5000 Feet
Scale 1:20000


N
(Joins sheet 148)
R. 3 E.
T. 21 S. (Joins inset)
WILLAMETTE
NATIONAL
FOREST
OAKRIDGE
MIDDLE
FORK
WILLAMETTE
RIVER
SOUTHERN PACIFIC
Salmon
Creek
water
LIMIT OF SOIL SURVEY
1 500 000 FEET
760 000 FEET
1 475 000 FEET
(Joins inset, sheet 148)
R. 2 E. | R. 3 E.
1 470 000 FEET
765 000 FEET
T. 21 S.
(Joins upper left)
750 000 FEET
761 000 FEET
1 465 000 FEET
Middle Fork Willamette
WILLAMETTE NATIONAL FOREST
4000 AND 5000-FOOT GRID TICKS
5000 4000 3000 2000 1000 0 5000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000


R. 4 W.
R. 3 W.
T. 21 S.
T. 22 S.
(Joins sheet 149)
(Joins sheet 154)
(Joins sheet 156)
(Joins inset 8, sheet 159)
N
COTTAGE
GROVE
RESERVOIR
Williams Creek
North Cedar Creek
Cedar Creek
Wilson Creek
Sweeney Creek
Prairie Buttes
Hoodoo Mountain
Brush Mountain
Coast Fork Willamette River
1 Mile
5000 Feet
Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 154




R. 2 W.
R. 1 W.
1 375 000 FEET
(Joins sheet 151)
N
T. 22 S.
T. 21 S.
750 000 FEET
(Joins sheet 154)
(Joins sheet 158)
1 405 000 FEET
UMPQUA NATIONAL FOREST
SOUTHERN PACIFIC
RIVER
ROW
Culp Creek
Disston
Laying
Brice
Pitcher
Creek
Sharps
Dinner
Boulder
Table
Alder
31
32
33
34
35
36
1
2
3
4
5
6
7
8
9
10
11
12
1 Mile
5000 Feet
Scale 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 156


1 340 000 FEET
R. 3 W.
R. 2 W.
(Joins sheet 154)
(Joins sheet 156)
(Joins sheet 158)
(Joins sheet 161)
T. 22 S.
1 370 000 FEET
N
North Fork Rock Creek
South Fork Rock Creek
Palmer Creek
Clearing Creek
Mosby Creek
MOSBY CREEK
Cedar Creek
Allen Creek
Shanty Creek
Table Rock Creek
Bark Creek
Stell Creek
North Fork Stell Creek
1 Mile
5000 Feet
Scale 1:20000

158

N

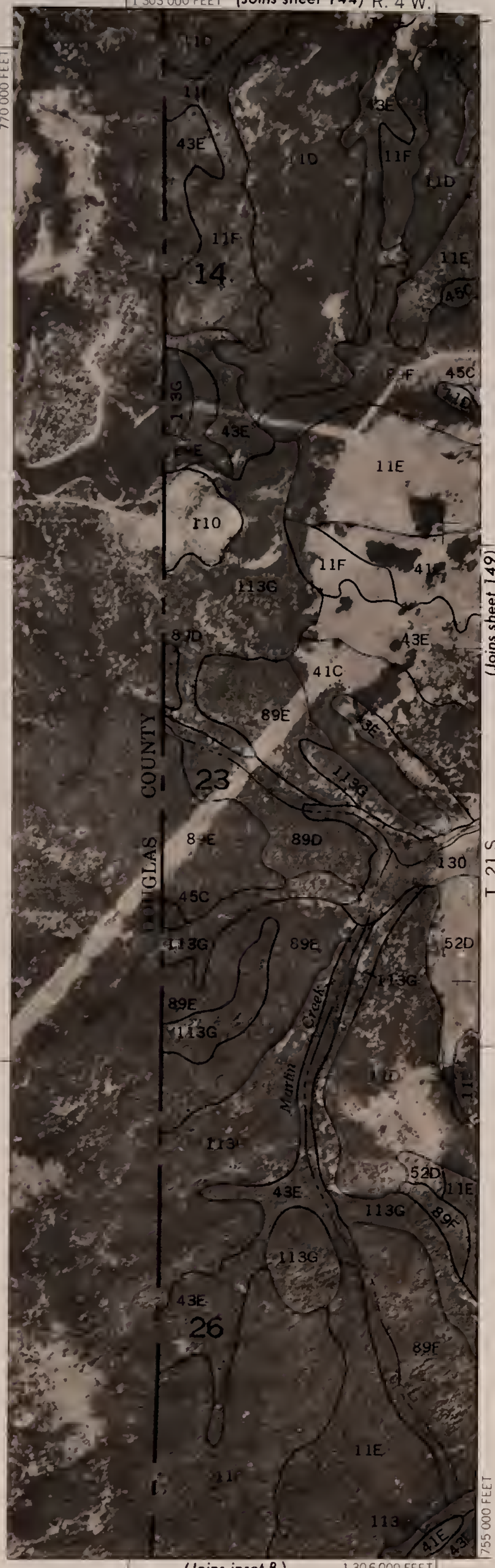
5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

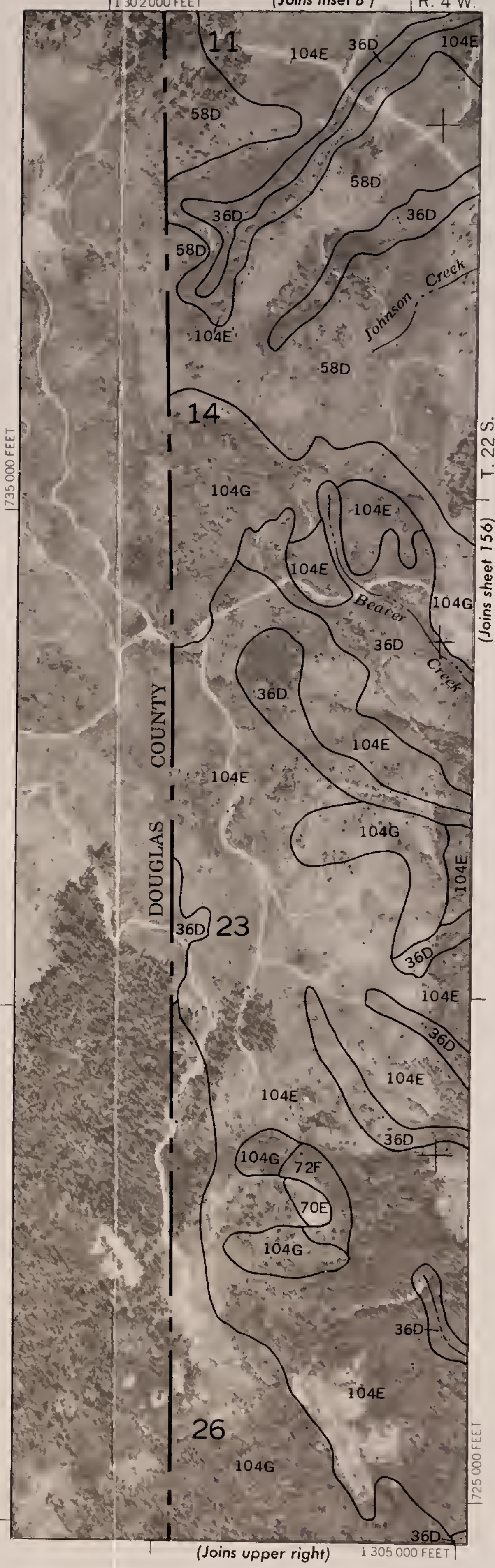
Scale - 1:20000

N

INSET A



INSET C



1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

160

N

R. 4 W. | R. 3 W.

(Joins sheet 156)

(Joins sheet 159)

(Joins sheet 161)

T. 23 S. | T. 22 S.

(Joins sheet 163)

5000 4000 3000 2000 1000 0 5000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

161

N

1 Mile ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

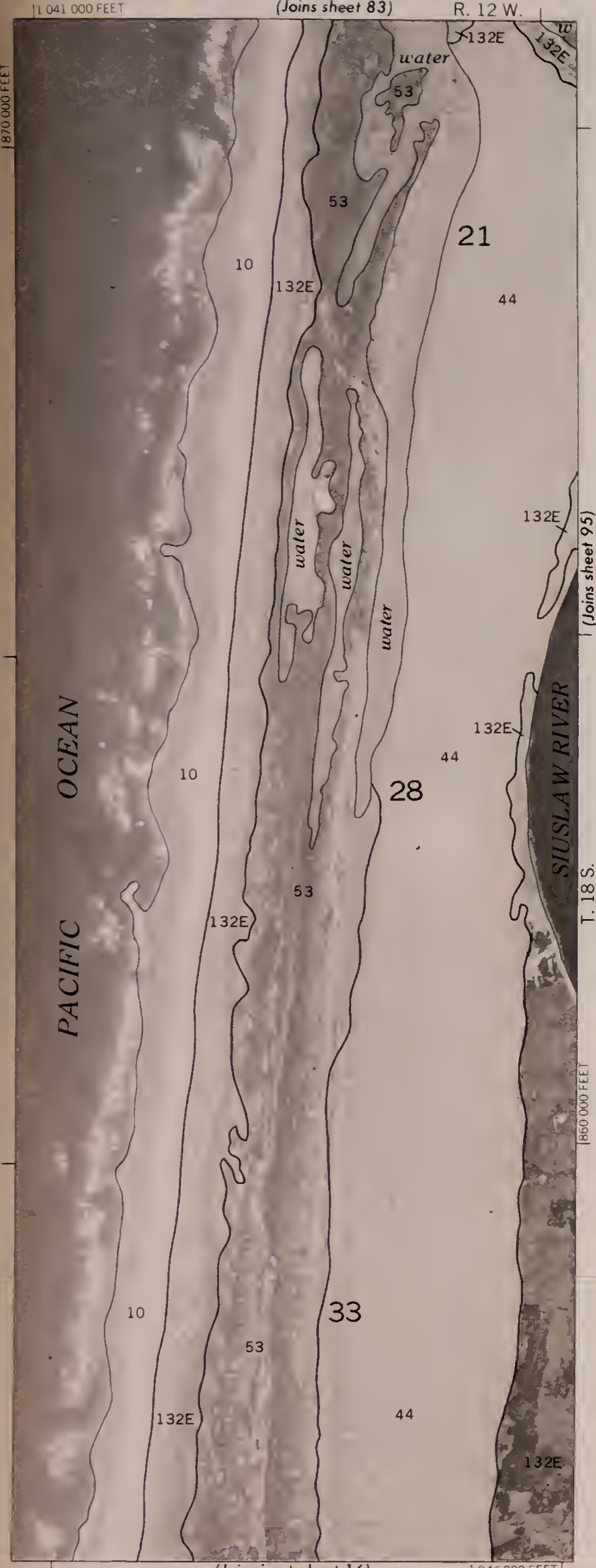
Scale 1:20000

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet

1 .5 0 1 Kilometer

Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 163



1 Mile ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet
1 .5 0 1 Kilometer
Scale - 1:20000

LANE COUNTY AREA, OREGON — SHEET NUMBER 165

165

1 ¾ ½ ¼ 0 1 Mile

5000 4000 3000 2000 1000 0 5000 Feet

Scale 1:20000